UC Davis General Catalog
2018-2019

Apr 30, 2018

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2018-2019 General Catalog

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The official version of the 2018-2019 UC Davis General Catalog is this web version prepared by the Office of the University Registrar.

Changes for the 2018-2019 General Catalog, and on:

- The catalog now encompasses one academic year.
- Printed catalogs are *no longer produced*; to download a printable catalog, see General Catalog Downloads.
- The General Catalog Course Supplement and Policies & Requirements Addendum is *no longer produced*. Courses are updated and published with effective terms as they are approved. Programs (majors & minors) are updated for fall term only; once a year.
- To understand course desciptions better, see the expanded About Courses.
- For best viewing, use the latest Firefox or Chrome browsers.

Printing the Catalog

To print the entire 2018-2019 General Catalog, see General Catalog Downloads.

To print a single section, like Animal Science or Introduction, use *Export PDF* in the upper right corner of your browser.

The provisions of this general catalog reflect information as of the date of publication. Content is subject to change without notice.

It is the responsibility of the individual student to become familiar with the announcements and regulations of the university contained in this general catalog.

Office of the University Registrar, 3100 Dutton Hall, One Shields Avenue, Davis, CA 95616-8692

Editorial and production coordination: Randall Larson-Maynard, Senior Editor; Office of the University Registrar.

The University of California, Davis, will provide assistance to the visually impaired regarding the information contained in this catalog. Questions should be directed to the office or department concerned.

DISCLAIMER NOTICE: *This General Catalog is not a contract nor an offer to enter into a contract. While every effort is made to ensure the accuracy of the information provided in this General Catalog, it must be understood that all courses, course descriptions, designations of instructors, curricular and degree requirements and other academic information described herein are subject to change or elimination at any time without notice or published amendment to this catalog. In addition, The University of California reserves the right to make changes at any time, without prior notice, to other programs, policies, procedures and information, which are described in this General Catalog only as a convenience to its readers. Fees and all other charges are subject to change at any time without notice. Students should consult the appropriate academic or administrative department, school, college, graduate division or other service provider for currently accurate information on any matters described in this General Catalog; contact information is available at http://ucdavis.edu.*

Welcome to UC Davis

From the Chancellor

Welcome to UC Davis. We're entering an exciting new era of excellence and opportunity, and I'm delighted that you've chosen to be part of our thriving community. All of us – faculty, staff and alumni – are committed to helping you reach your academic goals and make the most of your college experience.

Your journey at UC Davis will set a foundation for success that can be carried throughout your life. You have an opportunity to learn from world-class faculty and earn a degree that commands respect in graduate schools and the workplace.

The diversity of our campus community is a tremendous asset as our students seek success in a global workforce that demands a range of backgrounds and skill sets. You are surrounded by some of the best and brightest students from around the globe, and my hope is that your own world opens up like never before at this dynamic university.

For over a century, our alumni have made significant, lasting contributions to society and provided leadership in government, technology, business, the arts and much more. Our students have an incredible opportunity to learn from acclaimed faculty, some of whom have won MacArthur "genius" grants or been inducted into the National Academies.

Our research and innovations improve the world as we address such critical issues as climate change, food and water shortages, and poverty. We are driven by curiosity and thrive on self-expression and artistry that values all voices.

The Manetti Shrem Museum of Art, the renovation of the Memorial Union and the expansion of our Activities and Recreation Center (ARC) are a few of the new developments that reflect our commitment to providing the best educational experience possible as we plan for future growth.

The intellectual curiosity, social engagement and passion for learning you bring to our campus elevates the university as a whole. Together, we build a thriving community dedicated to academic excellence, public service and upward social mobility for students of all backgrounds.

Thank you for the personal touch that you bring to UC Davis. I wish you much success in your studies and the best of times in your college life.

Gary S. May, Chancellor

Academic Calendars

All UC Davis Academic Calendars are now maintained by the Office of the University Registrar; see Academic Calendars.

Introduction

UC Davis

For the full UC Davis story, see About UC Davis.

Visiting the Campus

UC Davis Welcome Center; 530-752-8111
Monday-Friday 8:00 a.m.-5:00 p.m. (PT) | Saturdays 9:00 a.m.-3:00 p.m. (PT) | Closed Sundays except for Apr 1-Apr 30.
Campus tours. Monday-Friday 9:00 a.m. & 1 p.m. (PT) | Saturdays 11:00 a.m. & Sundays April 1-Apr 30 11:00 a.m. (PT). Register at http://visit.ucdavis.edu or 530-752-8111.

Accreditation

The University of California, Davis is accredited by WASC Senior College and University Commission (WSCUC).

UC Davis is also accredited by the Accreditation Board for Engineering and Technology, Accreditation Council for Graduate Medical Education, Accreditation Review Commission on Education for the Physician Assistant (ARC-PA), American Association for Accreditation of Laboratory Animal Care, American Bar Association, American Chemical Society, American Dietetic Association, American Psychological Association, American Society of Crime Lab Directors Laboratory Accreditation Board (ASCLD/LAB); American Society of Landscape Architects, Association of American Law Schools, Association of American Medical Colleges, Association to Advance Collegiate Schools of Business; Commission on Collegiate Nursing Education; Commission on Teacher Credentialing, Computer Science Accreditation Commission, Council on Education and Public Health, the Council on Education of the American Veterinary Medical Association, Intersocietal Commission for the Accreditation of Vascular Laboratories (ICAVL), and the Liaison Committee on Medical Education.

UC Davis Principles of Community

The University of California, Davis, is first and foremost an institution of learning and teaching, committed to serving the needs of society. Our campus community reflects and is a part of a society comprising all races, creeds, and social circumstances. The successful conduct of the University's affairs requires that every member of the University community acknowledge and practice the following basic principles:

We affirm the dignity inherent in all of us, and we strive to maintain a climate of justice marked by respect for each other. We acknowledge that our society carries within it historical and deep-rooted misunderstandings and biases, and therefore we will endeavor to foster mutual understanding among the many parts of our whole.

We affirm the right of freedom of expression within our community and also affirm our commitment to the highest standards of civility and decency towards all. We recognize the right of every individual to think and speak as dictated by personal belief, to express any idea, and to disagree with or counter another's point of view, limited only by University regulations governing time, place, and manner. We promote open expression of our individuality and our diversity within the bounds of courtesy, sensitivity, and respect.

We confront and reject all manifestations of discrimination, including those based on race, ethnicity, gender, age, disability, sexual orientation, religious or political beliefs, status within or outside the University, or any of the other differences among people which have been excuses for misunderstanding, dissension, or hatred. We recognize and cherish the richness contributed to our lives by our diversity. We take pride in our various achievements, and we celebrate our differences.

We recognize that each of us has an obligation to the community of which we have chosen to be a part. We will strive to build a true community of spirit and purpose based on mutual respect and caring.

The "Principles of Community" were prepared and adopted after extensive discussion within the campus community about the need for a statement that reflects UC Davis' commitment to a learning environment characterized by diversity, understanding and the acceptance of all people. This statement of common principles was published on April 20, 1990, carrying the endorsement of Chancellor Theodore L. Hullar and the leadership of the Davis Division of the Academic Senate, the Academic Staff Organization, the UCD Staff Assembly, the UCDMC Staff Assembly, the Associated Students of UC Davis (ASUCD), and the Graduate Student Association.

Educational Objectives for Students

The Educational Objectives for Students were adopted by the Academic Senate in April 2002. They articulate our aspirations for student learning; help to establish campus priorities and guide decision making related to student development; and guide academic programs in the review of how their classes and course requirements interact with the goals to demonstrate educational effectiveness.

Develop effective communication skills:

- Written, oral, interpersonal, group

Develop higher cognitive skills:

- Critical thinking, creativity, analytical ability

Cultivate the virtues:

- Ethics, responsibility, honor, tolerance, respect for others, empathy

Develop focus and depth in one or more disciplines.

Develop leadership skills:

- Ability to stimulate and direct collaborative learning and collaborative action

Develop a global perspective:

- Broad intellectual and cultural experience through active engagement, an understanding of the interactions among the individual, society, and the natural world

Prepare for lifelong learning:

- Independent thinking and learning, learning to find information, asking the right questions

Mission Statement | Philosophy of Purpose

UC Davis is dedicated to academic excellence and serving the public good. As a major research institution, UC Davis takes a holistic approach in addressing the most critical issues faced by the region, state and the world. The university embraces the principles of diversity, inclusion and equity to sustain a culture of mutual respect.

Colleges & Schools

College of:

- Agricultural & Environmental Sciences
- Biological Sciences
- Engineering
- Letters & Science

Schools:

- Graduate Study

- Betty Irene Moore School of Nursing
- Graduate School of Management
- School of Education
- School of Law
- School of Medicine
- School of Veterinary Medicine

Academic Resources

University Library; 530-752-8792

Information & Educational Technology; 530-754-HELP (4357)

UC Davis Arboretum & Public Garden; 530-752-4880

Research Programs & Resources

Organized Research Units

Air Quality Research Center (AQRC)

Bodega Marine Laboratory & Reserve

California National Primate Research Center

Center for Health & the Environment

Crocker Nuclear Laboratory

Institute for Data Analysis & Visualization

Institute of Governmental Affairs

Institute of Transportation Studies

John Muir Institute of the Environment

Nanomaterials in the Environment, Agriculture & Technology (NEAT)

Program in International & Community Nutrition

Additional Research Centers & Resources

Adult Fitness Program

Advanced Highway Maintenance & Construction Technology (AHMCT) Research Center

Advanced Materials Characterization and Testing Laboratory (AMCaT)

Advanced Transportation Infrastructure Research Center Facility (ATIRC)

Agricultural Sustainability Institute

California Agricultural Experiment Station

Center for Advanced Laboratory Fusion Science & Engineering (CALFUSE)

Center for Biophotonics (C4B)

Center for Child & Family Studies

Center for Geotechnical Modeling

Center for Information Technology in the Interest of Society (CITRIS)

Center for Mind & Brain

Center for Molecular Genomic Imaging (CMGI)

Center for Nano & Micromanufacturing

Center for Neuroscience

Center for Population Biology

Center for Science & Innovation Studies

Coastal & Marine Sciences Institute

Computer Security Laboratory

Genome Center

Health Sciences Research Laboratory—Animal Surgery; 530-752-7756

Human Performance Laboratory

Humanities Institute

Mann Laboratory; 530-754-8313

Natural Reserve System

Nuclear Magnetic Resonance Facility

Social Science Data Service

Sustainable Transportation Energy Pathways (STEPS)

Tahoe Environmental Research Center (TERC)

UC Agricultural Issues Center

UC Davis Center for Plant Diversity

UC Davis Energy Institute

UC Davis J. Amorocho Hydraulics Laboratory (JAHL)

UC Pavement Research Center

X-Ray Crystallographic Laboratory

Administrative Officers of UC Davis

Chancellor

Provost & Executive Vice Chancellor

Vice Chancellors

Vice Provosts

Associate & Associate Vice Chancellors

Chief Campus Counsel

Chief Executive Officer—Medical Center

Ombuds

University Librarian

Registrar

Directors

- Cal Aggie Alumni Association
- Financial Aid
- Intercollegiate Athletics
- Internal Audit Services
- Mondavi Center for the Performing Arts
- News & Media Relation

- Enterprise Student Applications
- Student Health & Wellness Center
- Student Housing
- World Food Center

Agricultural & Environmental Sciences, College of

Betty Irene Moore School of Nursing

Biological Sciences, College of

Education, School of

Engineering, College of

Graduate Studies

Letters & Science, College of

Management, Graduate School of

Medical Center, School of Medicine

Medicine, School of

Nursing, Betty Irene Moore School of

Veterinary Medicine, School of

UC Davis Extension

Governance of the University of California

Board of Regents **|** Administrative Officers

Degrees Offered by UC Davis

Undergraduate majors are administered by the colleges of Agricultural & Environmental Sciences (A&ES), Biological Sciences (CBS), Letters & Science (L&S), and Engineering. All graduate programs are administered by Graduate Studies. Professional studies are administered by the schools indicated. The list below indicates the major or discipline, the degree(s) offered and the college or school offering the major. **Minor Programs are listed, below the majors**. The **legend** is at the bottom of this page.

Aerospace Science and Engineering, B.S., Engineering

African American and African Studies, A.B., L&S

Agricultural and Environmental Chemistry, M.S., Ph.D., A&ES

Agricultural and Resource Economics, M.S., M.S./M.B.A., Ph.D., A&ES

Agricultural and Environmental Education, B.S., A&ES

American Studies, A.B., L&S

Animal Behavior, M.S.*, Ph.D., CBS

Animal Biology, B.S., M.S., Ph.D., A&ES

Animal Science, B.S., A&ES

Animal Science and Management, B.S., A&ES

Anthropology, A.B. or B.S., M.A., Ph.D., L&S

Applied Mathematics, B.S., M.S., Ph.D., L&S

Applied Physics, B.S., L&S

Art History, A.B., M.A., L&S

Art Studio, A.B., M.F.A., L&S

Asian American Studies, A.B., L&S

Atmospheric Science, B.S., M.S., Ph.D., A&ES

Avian Sciences, M.S., A&ES

Biochemical Engineering, B.S., Engineering

Biochemistry, Molecular, Cellular, and Developmental Biology, M.S.*, Ph.D., CBS

Biochemistry and Molecular Biology, B.S., CBS

Biological Sciences, A.B. or B.S., CBS

Biological Systems Engineering, B.S., Integrated B.S./M.S, D.Engr., M.Engr., Ph.D., Engineering

Biomedical Engineering, B.S., M.S., Ph.D., Engineering

Biophysics, Ph.D., CBS

Biostatistics, M.S., Ph.D., L & S

Biotechnology, B.S., A&ES

Cell Biology, B.S., CBS

Chemical Engineering, B.S., M.S., Ph.D., Engineering

Chemical Physics, B.S., L&S

Chemistry, A.B., B.S., M.S.*, Ph.D., L&S

Chicana/Chicano Studies, A.B., L&S

Child Development, M.S., A&ES
Chinese, A.B., L&S
Cinema and Digital Media, A.B, L&S
Civil and Environmental Engineering, M.S., Ph.D., Certificate, Engineering
Civil Engineering, B.S., Engineering
Classical Civilization, A.B., L&S
Clinical Nutrition, B.S., A&ES
Clinical Research, M.A.S., School of Medicine
Cognitive Science, A.B., B.S., L&S
Communication, A.B., M.A., Ph.D., L&S
Community and Regional Development, B.S., A&ES
Community Development, M.S., A&ES
Comparative Literature, A.B., M.A., Ph.D., L&S
Computer Engineering, B.S., Engineering
Computer Science, B.S., L&S
Computer Science, M.S., Ph.D., Engineering
Computer Science and Engineering, B.S., Engineering
Conservation Management, Certificate, Graduate Studies
Creative Writing, M.F.A., L&S
Cultural Studies, M.A.*, Ph.D., L&S
Design, A.B., M.F.A., L&S
Dramatic Art, M.F.A., L&S
East Asian Studies, A.B., L&S
Ecological Management and Restoration, B.S., A&ES
Ecology, M.S., Ph.D., A&ES
Ecology (Joint Doctorate with San Diego State University), Ph.D., A&ES
Economics, A.B., M.A.*, Ph.D., L&S
Education, M.A., Ph.D., Ed.D., Credential, School of Education
Electrical and Computer Engineering, B.S./M.S., M.S., Ph.D., Engineering
Electrical Engineering, B.S., Engineering
Energy Systems, M.S, Ph.D., GSM
English, A.B., M.A.*, Ph.D., L&S
Entomology, B.S., M.S., Ph.D., A&ES
Environmental Engineering, B.S., Engineering
Environmental Horticulture and Urban Forestry, B.S., A&ES
Environmental Policy Analysis and Planning, B.S., A&ES
Environmental Policy & Management, M.S., Graduate Studies
Environmental Science and Management, B.S., A&ES

Environmental Toxicology, B.S., A&ES
Epidemiology, M.S., Ph.D., School of Veterinary Medicine
Evolution, Ecology, and Biodiversity, A.B., B.S., CBS
Fiber and Polymer Science, B.S.**, A&ES
Food Science, B.S., M.S., Ph.D., A&ES
Forensic Science, M.S., Graduate Studies
French, A.B., M.A., Ph.D., L&S
Gender, Sexuality & Women's Studies, A.B., L&S
Genetics and Genomics, B.S., CBS
Geography, M.A., Ph.D., A&ES
Geology, A.B. or B.S., M.S., Ph.D., L&S
German, A.B., M.A., Ph.D., L&S
Global Disease Biology, B.S., A&ES
Health Informatics, M.S., School of Medicine
Health Services, M.H.S., Betty Irene Moore School of Nursing
History, A.B., M.A.*, Ph.D., L&S
Horticulture and Agronomy, M.S., Ph.D, A&ES
Human Development, B.S., Ph.D., A&ES
Hydrologic Sciences, M.S., Ph.D., A&ES
Hydrology, B.S., A&ES
Immunology, M.S., Ph.D., School of Veterinary Medicine
Individual Major, A.B., B.S., CBS or L&S
Integrative Genetics and Genomics, M.S., Ph.D., CBS
Integrative Pathobiology, M.S., Ph.D., School of Veterinary Medicine
International Agricultural Development, B.S., M.S., A&ES
International Relations, A.B., L&S
Italian, A.B., L&S
Japanese, A.B., L&S
Landscape Architecture, B.S., A&ES
Law, J.D., LL.M., School of Law
Linguistics, A.B., M.A., Ph.D., L&S
Managerial Economics, B.S., A&ES
Marine and Coastal Science, B.S., A&ES, CBS, L&S
Master of Professional Accountancy, M.P.Ac., Graduate School of Management
Master of Business Administration, M.B.A., Graduate School of Management
Master of Business Analytics, M.B.A, Graduate School of Management
Master of Public Health, M.P.H., School of Medicine
Materials Science and Engineering, B.S., M.S., M.Engr., Ph.D., Engineering

Maternal and Child Nutrition, M.A.S., A&ES

Mathematical Analytics and Operations Research, B.S., L&S

Mathematical and Scientific Computation, B.S., L&S

Mathematics, A.B., B.S., M.A., Ph.D., L&S

Mechanical and Aerospace Engineering, M.S., Ph.D., Engineering

Mechanical Engineering, B.S., Engineering

Medicine, M.D., School of Medicine

Medieval and Early Modern Studies, A.B., L&S

Microbiology, M.S.*, Ph.D., School of Medicine

Microbiology and Molecular Genetics, A.B. or B.S., CBS

Middle East/South Asia Studies, A.B., L&S

Molecular, Cellular, and Integrative Physiology, M.S., Ph.D., CBS

Music, A.B., M.A., Ph.D., L&S

Native American Studies, A.B., M.A., Ph.D., L&S

Natural Sciences***, B.S., L&S

Neurobiology, Physiology, and Behavior, B.S., CBS

Neuroscience, M.S.*, Ph.D., CBS

Nursing Science and Health-Care Leadership, M.S., M.S.N., Ph.D., Betty Irene Moore School of Nursing

Nutrition Science, B.S., A&ES

Nutritional Biology, M.S., Ph.D., A&ES

Performance Studies, M.A.*, Ph.D., L&S

Pharmaceutical Chemistry, B.S., M.S., L&S

Pharmacology and Toxicology, M.S., Ph.D., A&ES, School of Veterinary Medicine

Philosophy, A.B., M.A.*, Ph.D., L&S

Physician Assistant Studies, M.H.S., Betty Irene Moore School of Nursing

Physics, A.B. or B.S., M.S., Ph.D., L&S

Plant Biology, A.B. or B.S., M.S., Ph.D., CBS

Plant Pathology, M.S., Ph.D., A&ES

Plant Sciences, B.S., A&ES

Political Science, A.B., M.A.*, Ph.D., L&S

Political Science—Public Service, A.B., L&S

Population Biology, M.S.*, Ph.D., CBS

Preventive Veterinary Medicine, M.P.V.M., School of Veterinary Medicine

Psychology, A.B., B.S., M.A.*, Ph.D., L&S

Public Health, M.P.H., Ph.D., School of Medicine

Religious Studies, A.B., L&S

Russian, A.B., L&S

Science and Technology Studies, A.B, L&S

Second Language Acquisition, Certificate, Graduate Studies

Sociology, A.B., M.A.*, Ph.D., L&S

Sociology—Organizational Studies, A.B., L&S

Soils and Biogeochemistry, M.S., Ph.D., A&ES

Spanish, A.B., M.A., Ph.D., L&S

Statistics, A.B., B.S., B.S./M.S., M.S., Ph.D., L&S

Study of Religion, Ph.D., Graduate Studies

Sustainable Agriculture and Food Systems, B.S., A&ES

Sustainable Environmental Design, B.S, A&ES

Technocultural Studies, A.B., L&S

Textiles, M.S., A&ES

Textiles and Clothing, B.S.**, A&ES

Theatre and Dance, A.B., L&S

Transportation Technology and Policy, M.S., Ph.D., Engineering

Veterinary Medicine, D.V.M., School of Veterinary Medicine

Viticulture and Enology, B.S., M.S., A&ES

Wildlife, Fish, and Conservation Biology, B.S., A&ES

Minor Programs Offered by UC Davis

Minor programs are offered by the Colleges of Agricultural & Environmental Sciences (A&ES), Biological Sciences (CBS), Engineering (ENGR), and Letters & Science (L&S), the School of Education (SOE), School of Medicine (SOM), and the Graduate School of Management (GSM). The list below indicates the minor program, the offering department (if the department name is different than the name of the minor) and the college offering the minor.

Accounting, GSM

African American and African Studies, L&S

Aging and Adult Development (Human & Community Development), A&ES

Agricultural Pest Management, A&ES

Agricultural Systems and Environment (Plant Sciences), A&ES

American Studies, L&S

Animal Science—Animal Biology, A&ES

Animal Science—Animal Genetics, A&ES

Animal Science—Aquaculture, A&ES

Animal Science—Dairy/Livestock, A&ES

Animal Science—Equine, A&ES

Anthropology, L&S

Applied Computing & Information Systems (Plant Sciences), A&ES

Arab Studies, L&S

Arabic, L&S
Art History, L&S
Art Studio, L&S
Asian American Studies, L&S
Atmospheric Science (Land, Air, and Water Resources), A&ES
Avian Sciences (Animal Science), A&ES
Biological Sciences, CBS
Biomedical Engineering, ENGR
Chemistry, L&S
Chicana/Chicano Studies, L&S
Chinese (East Asian Languages and Cultures), L&S
Classical Civilization (Classics), L&S
Climate Science and Policy, A&ES
Coaching Principles and Methods, L&S
Communication, L&S
Community Development (Human & Community Development), A&ES
Community Nutrition (Nutrition), A&ES
Comparative Literature, L&S
Computational Biology (Computer Science), ENGR
Computer Science, L&S
Construction Engineering and Management (Civil and Environmental Engineering), ENGR
Contemporary Leadership, A&ES
East Asian Studies, L&S
Economics, L&S
Education, SOE
Electrical Engineering (Electrical and Computer Engineering), ENGR
Energy Efficiency (Biological and Agricultural Engineering), ENGR
Energy Science & Technology (Biological and Agricultural Engineering), ENGR
Energy Policy (Biological and Agricultural Engineering), ENGR
English, L&S
Environmental Geology (Geology), L&S
Environmental Horticulture (Plant Sciences), A&ES
Environmental Policy Analysis & Planning (Environmental Science and Policy), A&ES
Environmental Toxicology, A&ES
Evolution, Ecology and Biodiversity, CBS
Exercise Biology (Neurobiology, Physiology, and Behavior), CBS
Fiber and Polymer Science (Textiles and Clothing), A&ES
Film Studies, L&S

Food Service Management (Nutrition), A&ES
Forensic Entomology (Entomology), A&ES
French, L&S
Fungal Biology and Ecology (Plant Pathology), A&ES
Gender, Sexuality and Women's Studies, L&S
Geographic Information Systems (Biological & Agricultural Engineering), A&ES
Geographic Studies (Environmental Design), A&ES
Geology, L&S
Geophysics (Geology), L&S
German, L&S
Global and International Studies (Humanities), L&S
Global Disease Biology, A&ES
Greek (Classics), L&S
History, L&S
History and Philosophy of Science (Science & Technology Studies), L&S
Human Development (Human & Community Development), A&ES
Human Physiology (Neurobiology, Physiology, and Behavior), CBS
Human Rights (Human Rights Studies), L&S
Hydrology (Land, Air, and Water Resources), A&ES
India and South Asia Studies, L&S
Insect Biology (Entomology), A&ES
Insect Ecology and Evolution (Entomology), A&ES
International Agricultural Development (Human & Community Development), A&ES
International Science Studies (Land, Air, and Water Resources), A&ES
Iran and Persian Studies, L&S
Italian, L&S
Japanese (East Asian Languages and Cultures), L&S
Jewish Studies (Humanities), L&S
Landscape Restoration (Plant Sciences), A&ES
Latin (Classics), L&S
Latin American and Hemispheric Studies, L&S
Linguistics, L&S
Linguistics for Language Teachers, L&S
Luso–Brazilian Studies (Spanish and Portuguese), L&S
Managerial Economics (Agricultural and Resource Economics), A&ES
Materials Science (Materials Science and Engineering), ENGR
Mathematics, L&S
Medical—Veterinary Entomology (Entomology), A&ES

Medieval and Early Modern Studies, L&S

Middle East/South Asia Studies, L&S

Music, L&S

Native American Studies, L&S

Nematology, A&ES

Neuroscience (Neurobiology, Physiology, and Behavior), CBS

Nutrition and Food (Nutrition), A&ES

Nutrition Science (Nutrition), A&ES

Oceanography (Geology), L&S

Philosophy, L&S

Physics, L&S

Plant Biology, CBS

Political Science, L&S

Precision Agriculture (Biological and Agricultural Engineering), A&ES

Professional Writing (University Writing Program), L&S

Psychology, L&S

Public Health Sciences, SOM

Quantitative Biology and Bioinformatics (Biological Sciences), CBS

Religious Studies, L&S

Russian, L&S

Science and Society, A&ES

Sexuality Studies, L&S

Social and Ethnic Relations (African American and African Studies, Asian American Studies, Native American Studies, Women and Gender Studies), L&S

Sociology, L&S

Soil Science (Land, Air, and Water Resources), A&ES

Spanish, L&S

Statistics, L&S

Sustainability in the Built Environment (Civil and Environmental Engineering), ENGR

Technology Management, GSM

Textiles and Clothing, A&ES

Theatre and Dance, L&S

War—Peace Studies (International Relations), L&S

Watershed Science (Land, Air, and Water Resources), A&ES

Wildlife, Fish and Conservation Biology, A&ES

Legend

A.B.—Bachelor of Arts

B.S.—Bachelor of Science Certificate Credential

D.Engr.—Doctor of Engineering

D.V.M.—Doctor of Veterinary Medicine Ed.D.–Doctorate in Education J.D.–Doctor of Jurisprudence

LL.M.—Master of Laws

M.A.—Master of Arts

M.A.S.—Master of Advanced Studies M.B.A.–Master of Business Administration

M.D.—Doctor of Medicine

M.Engr.—Master of Engineering

M.F.A.—Master of Fine Arts

M.P.H.–Master of Public Health M.P.V.M.–Master of Preventive Veterinary Medicine

M.S.—Master of Science

M.S.N.—Master of Science in Nursing Ph.D.–Doctor of Philosophy

* Master's degree offered only en route to Ph.D.

** Fall 2018-19 admissions suspended.

*** Major discontinued; closed to admissions beginning fall 2018.

Undergraduate Admissions

Undergraduate Admissions; One Shields Avenue, Davis, CA 95616-8507

Welcome Center Advising

Campus Tours

Applying to UC Davis

Freshman Admission

- Admission Requirements
- Special Situations

Transfer Admission

- Admission Requirements
- Special Situations
- UC Intercampus Transfer. Undergraduate students who are currently or were previously registered at another UC campus and have not since registered at a non-UC institution may apply for transfer to UC Davis. Filing dates, application, fees/waivers and requirements are the same as for new undergraduate transfer applicants.

International Admission Requirements

Examination Credit; *Effective 4/30/2018 – 4/28/2019*

- Advanced Placement (AP) Examinations
- International Baccalaureate (IB) Examinations
- AP & IB Charts Archive

Application Fees | Fee Waivers

Application Filing Periods

Apply for Admission

After You Apply for Admission

Next Steps

UC Transfer Academic Update (TAU)

Reporting Changes after Admission

Deferred Enrollment

AP & IB Charts Archive

- 2017-2018: AP | IB
- 2016-2017: AP | IB
- 2014-2016: AP | IB
- 2012-2014: AP | IB
- 2010-2012: AP | IB
- 2008-2010: AP | IB
- 2006-2008: AP | IB
- 2004-2006: AP
- 2002-2004: AP
- 2000-2002: AP
- 1999-2000: AP
- 1998-1999: AP

Fees, Expenses, & Financial Aid

Give careful consideration to the total financing of your university education. If you need funds beyond those that you and your family can provide, you should apply for financial aid well in advance of enrollment. There are deadlines for applying for financial aid; grants, loans, Work Study and scholarships.

For current student fee information, see Tuition and Fees. Every student must pay the quarterly fees, and any amounts charged to the student account, in full by the fee payment deadlines in the Fees and Billing calendar. A Deferred Payment Plan (DPP) is available, allowing students to pay quarterly student and housing fees in three monthly installments, or semester fees in four monthly installments.

Course Materials & Service Fees

Students may be charged fees in some courses for the use, rental or consumption of materials, tools or equipment, or for the costs of materials or services necessary to provide a special supplemental educational experience. For example, course materials fees may cover the purchase of chemicals and glassware for a science laboratory or art supplies for an art studio class. They might also cover film rentals, field trips, or the purchase or rental of specific equipment. Courses that may be subject to the course materials fee are listed in the Class Schedule. See the current course materials fees list.

Part-Time Students Fees

Students approved for enrollment on a part-time basis pay the same fees as full-time students, but pay only one-half of Tuition. Nonresident part-time students pay one-half the Nonresident Supplemental Tuition. For full information, see Part Time.

UC Employee-Student Fees

Reduced fees are available to UC career employees and certain UC retirees who are qualified for admission to the university. For full information, see Career Staff Reduced Fee.

Vehicle Parking Permit & Bicycle Licensing Fees

Parking permit information and rates or 530-752-8277.

A California State bicycle license sticker is required on all bicycles operated on campus; full information or 530-752-2453.

Costs for a Year at UC Davis

For the most recent Cost of Attendance figures, see undergraduate; graduate; professional.

International Student Expenses

International students are responsible for all of their expenses while studying at UC Davis. The expenses include nonresident supplemental tuition, systemwide tuition and fees, campus-based fees, room and board, books and a modest amount for personal expenses. For the latest costs, see Cost of Attendance. It is extremely important that students arrive on campus with sufficient funds for the entire academic year to cover all fees, tuition and expenses such as room and board, health insurance, books, supplies, transportation and other miscellaneous expenses. Careful budgeting is essential for international students.

During the admission process, most international undergraduate students are required to complete the "Confidential Financial Statement" form certifying that support funds are available for nine months. Students need to have adequate, reliable and continuing financial support for the whole time they are here. After students arrive in the United States, it is extremely difficult to obtain

additional funding. The university does not offer grants or financial aid to international undergraduate students.

Fee Refunds

Schedule of Refunds

Cancel registration and withdrawal from the university.

Planned Educational Leave Program (PELP) | University of California Student Health Plan (SHIP)

Residence for Tuition Information

For complete information for determination of residence for tuition, see Tuition & Residence.

Financial Aid

The Financial Aid and Scholarships Office provides financial assistance in the form of grants, scholarships, loans, and work-study employment. To apply, undergraduates and graduate students are required to annually file the Free Application for Federal Student Aid (FAFSA), or the California Dream Act Application.

UC Education Finance Policy for Undergraduates | Graduate Student Funding

Satisfactory Academic Progress

Federal regulations require that undergraduate and graduate student financial aid recipients meet the published Standards for Satisfactory Academic Progress (SAP) for Financial Aid concerning units and maximum quarters of attendance allowed to obtain a degree; see Satisfactory Academic Progress (SAP).

Financial Aid Types

Grants. A grant is an award that does not have to be repaid as long as the student remains eligible. Whenever criteria and funding levels permit, a student's financial aid award includes grants; see Available Grant Awards.

Loans. Financial aid almost always includes a long-term loan; see Undergraduate Student Loans.

Work-Study

Undergraduate Work-Study allows students to earn part of their financial aid through part-time employment; see Work-Study for Undergraduate Students.

Community Service Work-Study. A wide variety of community service jobs are available for students who apply for Work-Study funding; see Work-Study for Undergraduate Students.

Work-Study for Graduate. Work-Study funds for graduate students are allocated directly to the chairpersons of the graduate programs; see Work-Study for Graduate Student Researchers.

Undergraduate Scholarships and Awards

Undergraduates with outstanding academic records are encouraged to apply for scholarships. For information about scholarship application process, see Undergraduate and Prestigious Scholarships.

Student Life

As a UC Davis student, you're part of a creative, innovative community. Located in a classic college town where bicycles predominate and students make up half the population, UC Davis offers resources to create your unique path whether you have established academic and career goals or want to explore. Living-learning communities and vibrant student centers are spaces for exploring and affirming diverse identities. The campus's multiple advising, tutoring, leadership and career resources will help you excel and achieve your aspirations, and the array of UC Davis professional schools—business, law, veterinary medicine and medicine—offer unique opportunities for undergraduates. With over 750 student organizations, you will find welcoming, supportive groups that share your interests and passions, and when it's time to recreate, options at UC Davis encompass everything from arts and crafts to indoor rock climbing.

Living at Davis

On-Campus Housing

Student Housing and Dining Services

Living on campus adds a measure of convenience to your life and helps familiarize students with the campus. All incoming fall quarter freshmen and transfer students are guaranteed housing in Student Housing, provided they meet eligibility requirements and all Student Housing and university deadlines. Freshmen and Transfer students are guaranteed one year of housing. For more information about the housing guarantee; see Prospective Residents. All other students should contact Student Housing to inquire about their housing options.

For more information on the following housing, see Housing Areas.

- Residence Halls
- Apartments
- Student Housing Apartments (SHA)—Transfer Student Communities
- Apartments (UC Davis)
- Public-Private Partnerships
- Capital Projects

Off-Campus Housing

The majority of UC Davis students live off campus. The City of Davis has ample apartments for rent, from one-person studio apartments to five- or six-person suites. Townhouses, duplexes and houses throughout the city are also available for student rental. ASUCD maintains a list of available community housing and, early every year, hosts "Housing Day," an event that brings dozens of local housing managers to campus to introduce their communities to UC Davis students.

Transportation and Parking

Transportation Services

Transportation Services (TAPS)

The restricted central campus is closed to unauthorized motor vehicles. Walking and bicycling are the most common ways to traverse the campus. For complete information, see Transportation Services (TAPS).

- Bicycles | Parking | Motorist Assistance
- Alternative Transportation
    - goClub
    - UC Davis/UC Davis Medical Center Shuttle
    - Davis/Berkeley Shuttle

Buses

Unitrans provides year round public transit service on 18 lines on the UC Davis campus and the City of Davis. Unlimited access is provided to undergraduate students with a valid UC Davis registration card; others may ride by paying the single-ride cash fare or by purchasing discounted multi-ride passes from TAPS or at the Unitrans business office.

Student Employment

Student Employment is a resource for UC Davis students seeking employment opportunities to fund their educational expenses. For resources, eligibility, and available jobs, see the Internship and Career Center.

WorkLife and Wellness

Heitman Staff Learning Center; worklife@ucdavis.edu

WorkLife and Wellness is the principal resource on campus for referrals, outreach, education and programming that enable students, faculty and staff to meet commitments and pursue interests both in and outside of the university. For services addressing child care, elder care, breastfeeding support, health and wellness, community involvement, and workplace flexibility, see WorkLife and Wellness. See also, the UC Davis Student Parent Child Care Funding Program and Community Child Care Programs.

Health and Counseling Services

Student Health and Counseling Services (SHCS)

Student Health and Wellness Center; Appointments: 530-752-2349; General information: 530-752-2300

Student Health and Counseling Services (SHCS) provides wellness resources and cost-sensitive medical care tailored to the unique and diverse needs of UC Davis students. All registered students are assigned a primary care provider (PCP) who coordinates their wellness care and treatment needs. SHCS staff include physicians, nurse practitioners, registered nurses, physical therapists, dietitians and health educators. Pharmacy, lab, and x-ray services are available. Medical care is provided at the Student Health and Wellness Center. Services are available to all registered students regardless of insurance coverage. After hours, students can speak with an advice nurse at 530-752-2349. To read about services and fees, make an appointment, get urgent care information, or contact an advice nurse after hours, see Medical Services.

Student Health Insurance

The University of California (UC) requires that all students have health insurance. To ensure this requirement is met, all UC students are automatically enrolled in UC Student Health Insurance Plan (UC SHIP) and fees for coverage are charged to your student account each term. UC SHIP includes medical, dental and vision benefits. Students with comparable health insurance can apply for a UC SHIP waiver. Students may apply for a student health insurance waiver. For complete information, see Insurance Services.

Immunizations

The University of California (UC) is committed to protecting the health and well-being of our students. Therefore, all of the UC campuses are implementing procedures to ensure that students are educated about and receive vaccinations to prevent potentially serious and contagious diseases.

To meet the UC Davis entrance requirements, you must complete BOTH the Immunization and TB Screening Questionnaire Forms.

- Health History Form
- Immunizations
- TB Risk Screening

Students who have not completed this requirement may have a hold on their registration. Students submit their information through HEM or MyAdmissions

Counseling Services

Student Health and Counseling Services (SHCS); 219 North Hall; Appointments: 530-752-0871; General information: 530-752-2300

SHCS Counseling Services offers short term counseling services to all registered students with liaison to off-campus community resources. To make a counseling appointment or for consultations, call 530-752-0871, any time. Those concerned about a student or who desire consultation or assistance in making a referral are encouraged to call 530-752-2349.

Mind Spa

Mind Spa; 132 North Hall and Student Health and Wellness Center

Health Education and Promotion

Health Education and Promotion (HEP) helps students stay healthy, thrive and enhance their academic and personal success through the creation of health-promoting campus and community environments and student-centered health education. HEP focuses on promotion of healthy eating, physical activity, hydration, sexual health and communication, mental well-being, bike helmet use, sleep, and risk reduction related to alcohol, tobacco, other drug use.

Extracurricular Activities

By participating in extracurricular activities at UC Davis, students benefit from numerous opportunities for educational, personal, cultural and social enrichment. In general, registered and enrolled UC Davis students may participate in extracurricular activities sponsored by the campus. Some activities have additional eligibility criteria, so you are encouraged to inquire about the particular requirements of the groups and programs that interest you.

Campus Recreation And Unions

Department of Campus Recreation; Activities and Recreation Center (ARC) | Memorial Union

The UC Davis Department of Campus Recreation and Memorial Union manage the following programs and facilities, creating opportunities to build community, cultivate friendships and enhance learning; complementing the academic mission of the university and enhancing the quality of life for the campus:

- Activities and Recreation Center (ARC)
- Cal Aggie Marching Band
- Craft Center
- Equestrian Center
- Games Area
- Hickey Pool
- Intramural Sports
- Memorial Union
- Outdoor Adventures Center
- Pavilion
- Putah Creek Lodge
- Recreation Fields
- Recreation Pool

- Sport Clubs
- The Buzz
- UCDHS Student Fitness Center

UC Davis Stores

The UC Davis Stores are full-service stores owned and operated by the university.

Silo Union

The Silo Union houses food services, meeting/conference facilities, lounges and the campus pub.

Intercollegiate Athletics

The Intercollegiate Athletics (ICA) program is an integral part of the total educational process and a vital part of the human development of young men and women.

Arts

Robert and Margrit Mondavi Center for the Performing Arts | UC Davis

The Mondavi Center is the premier performance venue in Northern California and the regional destination for the best in music, dance, distinguished speakers, jazz, theater, and world music.

Music

Department of Music

Theatre and Dance

Department of Theatre and Dance

Art Galleries

Manetti Shrem Museum

UC Davis Design Museum

Richard L. Nelson Gallery; 530-752-8500

Fine Arts Collection; 530-752-8500

Basement Gallery

C.N. Gorman Museum

Student Government

Associated Students (ASUCD)

Student Government Administrative Office

ASUCD Student Services Office

UC Davis Administrative Advisory Committees

Office of the Chancellor

Graduate Student Association (GSA)

Graduate Student Association (GSA)

Center for Student Involvement (CSI)

Center for Student Involvement (CSI)

- http://aggielife.ucdavis.edu; Over 750 student organizations are registered and supported at UC Davis through Center for Student Involvement.
- Involvement Fair
- Sorority and Fraternity Life

Cal Aggie Student Alumni Association (SAA)

Cal Aggie Student Alumni Association (SAA)

University Policies on Nondiscrimination, Sexual Harassment, Student Records and Privacy

Nondiscrimination

Sexual Harassment/Sexual Assault

Accommodations for Students with Disabilities

Disclosures from Student Records; see also UC Davis Policy and Procedure Manual Section 320-21

Social Security Numbers

Release of Registration Material and Grades

Campus Security, Crime Awareness, and Alcohol and Drug Abuse Prevention

In accordance with federal laws, Crime Awareness and Campus Security Act of 1990, and the Drug Free Schools and Communities Act of 1989, UC Davis annually makes information available to students and employees regarding campus security, crime statistics, and alcohol and drug abuse prevention. Also see, victim support services.

Academic Advising & Student Services

To help you get the most from your education, UC Davis offers many different types of academic advising. College advisors assist you in meeting degree requirements and taking maximum advantage of available university resources. A conference at least once a quarter with your faculty or staff advisor is especially desirable during your first year and during your final quarters preceding graduation. A meeting with a faculty or staff advisor is required each year for students in the College of:

- Engineering
- Letters and Science

College of Biological Sciences matriculating students in their first-year at UC Davis are required to meet with a BASC advisor in the Biology Academic Success Center (BASC).

For complete information on academic advising, see the College of:

- Agricultural and Environmental Sciences
- Biological Sciences
- Engineering
- Letters and Science

Academic Advising Services

Educational Opportunity Program (EOP), 530-752-9366, offers an array of services to support students both academically and socially. EOP provides a caring and supportive environment for students to meet with peer and staff advisors for help with course selection, registration procedures, campus processes and resources, choosing a major, social challenges and other general advising questions.

Student Disability Center, 530-752-3184, is committed to ensuring equal educational access and opportunities for students with disabilities. An integral part of that commitment is the coordination of specialized academic accommodations and support services. Additionally, the center advises students on their rights and responsibilities, as well as strategies and tools for managing their disabilities. Current and prospective students, faculty, and staff are encouraged to contact the center for information regarding available services, resources, and the accommodation process.

Student Housing

The First-Year Experience Program, 530-752-5566, is one component of the New Student Academic Services unit in Student Housing & Dining Services, which includes the new student Orientation program and the academic year First-Year Experience Peer Advising program. The Residence Hall Advising Team (RHAT) is a collaboration between NSAS, the four colleges and Study Skills Assistance to provide drop-in academic peer advising and tutoring within the residence halls.

New Student Orientation, 530-752-4443, assists new students and their families with the transition to UC Davis. Orientation includes assistance with academic advising, course registration, information for campus resources and social integration.

Student Conduct and Grievances

Office of Student Support and Judicial Affairs, 530-752-1128

The Office of Student Support and Judicial Affairs (OSSJA) upholds campus standards of academic honesty and student conduct by resolving alleged violations of university policies or campus regulations. OSSJA Case Managers serve students in distress by coordinating campus resources for assistance and care. OSSJA also provides conflict resolution services and general problem solving for students.

Code of Academic Conduct

A long tradition at UC Davis, students are expected to uphold high standards of honesty and fairness in their academic work. The Code and additional information may be found at the Office of Student Support & Judicial Affairs.

Student Responsibilities

Students are responsible for complying with the announcements and regulations in this catalog and with all policies, rules and regulations of the university and this campus. Students will not be able to register or receive transcripts of record or diplomas until they have met all university obligations.

Discrimination & Sexual Harassment/Sexual Violence

Discrimination | Sexual Harassment/Sexual Violence

If students believe that they have been subjected to prohibited discrimination, harassment, sexual harassment, and/or sexual violence, they may contact the Harassment and Discrimination Assistance and Prevention Program (HDAPP) at 530-747-3864. HDAPP also offers an Anonymous Call Line at 530-747-3865. Concerns related to sexual harassment and/or sexual violence can also be filed at http://sexualviolence.ucdavis.edu/report/report-form.cfm. Concerns related to Hate and Bias incidents on campus can be reported at http://reporthateandbias.ucdavis.edu/. For more information about resources available on campus, including confidential resources, for students experiencing prohibited discrimination, harassment, sexual harassment, and/or sexual violence, please see https://hdapp.ucdavis.edu/resources/index.html.

Resolving Academic Problems

Grade Changes

Students who believe they received an incorrect grade due to a clerical or procedural error should ask their instructor to file a Request for Grade Change form with the Office of the University Registrar; for complete information, see Grade Changes and the guidelines for the Committee on Grade Changes.

Associated Students, University of California at Davis (ASUCD)

The Associated Students, University of California, Davis (ASUCD), 530-752-1990, is constituted to represent its membership in the University of California and in the greater community and to increase the role and impact of its members on those decisions affecting their lives.

ASUCD is run by a three-branch, federal model government with some city council-style modifications. It consists of an executive branch, a legislative branch, and a judicial branch, as well as administrative support units. ASUCD is one of the largest student employers on campus and offers a variety of services that provide resources for UC Davis students and create a great environment for academics as well as for entertainment.

The Association aims to create and provide services and activities which its membership shall consider important to fulfilling the experience of being a student attending the University of California, Davis.

Student Academic Success Center

The Student Academic Success Center, 530-752-3000, is a large, multi-program Student Affairs department providing essential services, programs, and information for UC Davis students. Programs include: academic support services in math, science, and writing,Educational Opportunity Program (EOP), Guardian Scholars Program (GSP), Mathematics Diagnostic Testing Project, Reentry and Transfer Student Services, Veterans Success Center, TRiO Scholars Program, MURALS, Study Skills and Success Coaching, and Pre-Professional and Pre-Graduate Advising. For complete information, see Student Academic Success Center.

Academic Assistance and Tutoring (AAT)

Academic Assistance and Tutoring (AAT), 530-752-2013, provides academic support to undergraduate students enrolled in Biology, Chemistry, Economics, Mathematics, Physics, Statistics, and Writing Across the Disciplines. Our instructional professional staff offers classes, workshops, and office hours. To support our professional staff and our services, AAT undergraduate tutors provide drop-in tutoring for students enrolled in math and science courses and in writing across the disciplines. For complete information, Academic Assistance and Tutoring.

Educational Opportunity Program (EOP) Services

Educational Opportunity Program (EOP), 530-752-9366, offers an array of services to help students adapt both academically and socially to the University setting and successfully achieve their educational goals. EOP provides a caring and supportive environment for students to meet with peer and staff advisors and network with other students. For complete information, see Educational Opportunity Program (EOP).

Guardian Scholars Program (GSP)

The mission of the Guardian Scholars Program (GSP), 530-752-1211, is to empower foster youth at UC Davis to reach their potential by providing a community network that supports their academic progress and personal growth. For complete information, see Guardian Scholars Program (GSP).

Mentorships for Undergraduate Research in Agriculture, Letters and Science (MURALS)

Mentorships for Undergraduate Research in Agriculture, Letters and Science (MURALS), 530-752-9931, is designed to enrich the research experience of students situationally disadvantaged in their access to graduate school. For complete information, see MURALS.

Transfer and Reentry Center

If you transferred to UC Davis, are a reentry student, the Transfer and Reentry Center, 530-752-2200, is here to serve you. Reentry refers to undergraduate students who are 25 years-old or older, graduate students who are 30 years-old or older, married students or student parents. If you or your parent(s) served in the U.S. military and you are unsure of what benefits you may be eligible for, the Transfer and Reentry Center can help. For complete information, see Transfer and Reentry Center.

Pre-Graduate/Pre-Professional Services

Pre-Professional/Pre-Graduate School Advising, 530-752-4475, offers individualized advice and information to students interested in admission to professional and graduate schools (law, Masters and Ph.D. programs, etc.) including prerequisite course planning, exam preparation, evaluation of competitiveness and assistance with all aspects of the application process such as writing the personal statement, getting good letters of recommendation, selecting schools/programs and strategies for becoming the most competitive applicant possible. In addition, the program offers small group advising and informative workshops, and hosts visits from admissions officers from

various professional schools. For complete information, see Pre-Professional/Pre-Graduate School Advising.

Special Transitional Enrichment Program (STEP)

Freshman EOP students are invited to participate in the Special Transitional Enrichment Program (STEP), 530-752-2013. The program begins in summer and continues through the first two academic years. STEP offers preparatory course work, academic assistance and advising to help students adjust academically and socially to the campus by strengthening their learning skills and study habits, and by providing an extensive orientation to campus life. For complete information, see Special Transitional Enrichment Program (STEP).

Study Skills Assistance

Advising and workshops are offered to help students strengthen skills that have significant impact on college achievement and academic success. Students may attend a scheduled workshop or meet with an advisor to get help with time management, test preparation, success strategies, note taking and other study skills. For complete information, see Study Skills Assistance, 530-752-4475.

Success Coaching

The Success Coaching Program is designed to help undergraduate students at UC Davis take control of their academic, personal, and professional success. Coaches use a strengths-based approach to support the student's exploration of the habits, priorities, values, and challenges that may be imp acting their college experience. Coaching incorporates elements of self-assessment, reflection, skill-building, goal-setting, and accountability. Through one-on-one meetings with a coach, students will gain an increased sense of self-awareness in order to develop practical strategies for solving problems and eliminating barriers to maximum performance. For complete information, see Success Coaching Program.

Veterans Success Center

The Veterans Success Center provides students a welcoming space, professional and peer advising, guidance with educational benefits and engagement opportunities that span the university and the larger Davis community. For complete information, see Veterans Success Center.

Internship and Career Services

Internship Programs

Gain practical skills that will transfer to the workplace. Apply your coursework. Launch your career. Take advantage of hundreds of internships organized through the Internship and Career Center (ICC) or initiate your own. There is literally something for everyone. An internship may be full time or part time, credit or non-credit, voluntary or paid, depending on your skills, needs and interests and the availability of openings. Internship experiences must emphasize learning and be supervised by a professional. Academic credit is awarded for experiences planned and approved in advance by a sponsoring faculty member.

The Internship and Career Center (ICC)

The Internship and Career Center (ICC) works with undergraduate, masters, and Ph.D students, postdoctoral scholars and recent alumni. The ICC can help you identify your abilities and interests and relate them to career options; gain access to practical experience to increase your competitiveness in the job market; and find out how and where to look for employment. Attend ICC workshops on finding an internship or part time job, beginning a job search, developing a resume, networking and preparing for an interview.

Masters, Ph.D.s, and Postdoc Services

The Internship and Career Center, located in South Hall, provides comprehensive career services for UC Davis Master's and Ph.D. students, and Postdoctoral scholars (MPP). Career advisors can assist you with all aspects of your career search either within or beyond academia, or both. Our career services include confidential one-to-one advising with individualized review of curriculum vitae (CV), resumes, and cover letters; workshops and panel discussions; recruiting and networking events; and employer information sessions, all specifically designed for advanced degree holders.

Community Service Resource Center

If you are interested in providing community service, visit the Community Service Resource Center (CSRC) coordinated through the ICC. Volunteering can be a rewarding and satisfying experience that may also improve your qualifications for the job market. The CSRC has a database with information about non-profit agencies and volunteer opportunities locally, nationally and world-wide.

Academic Resources

UC Davis Study Abroad

UC Davis Study Abroad, 530-752-5763, is one of the richest educational experiences a student can have. When students return from study abroad in places like Italy or Hong Kong, they describe their time abroad as an experience that changed their lives and prepared them to learn, work, and engage in a globally interconnected world. UC Davis Study Abroad is home to UC Davis Quarter Abroad, UC Davis Summer Abroad, UC Davis Internships Abroad, UC Davis Seminars Abroad, UC Davis Exchanges, and the University of California Education Abroad Program (UCEAP). For complete information, see UC Davis Study Abroad.

First-Year Seminar Program

The UC Davis First-Year Seminar Program gives first-year students the opportunity to study with faculty members in small groups, meeting in settings more informal than the ordinary classroom. For complete information, see UC Davis First-Year Seminar Program.

CalTeach/Mathematics and Science Teaching Program (MAST)

The UC Davis CalTeach/Mathematics and Science Teaching Program (MAST), 530-754-1056, provides students with opportunities to explore careers in mathematics and science education. For complete information, see Mathematics and Science Teaching Program (CalTeach/MAST).

Undergraduate Research Center

The Undergraduate Research Center, 530-752-3390, serves as central hub to inspire and facilitate UC Davis undergraduates to engage in faculty-sponsored undergraduate research, scholarship, design and creative activities. For complete information, see Undergraduate Research Center.

UC Washington Program

The University of California hosts a system-wide academic internship and residential program for undergraduate students attending from each of the UC campuses. The programs provide undergraduates an opportunity to enrich their education while in residence for one quarter in the nation's capital. Students also have unparalleled access to a wide range of internship opportunities. For complete information, see UC Washington Program, 530-752-6652.

Student Resource and Information Centers

Center for Advocacy, Resources & Education (CARE)

The UC Davis Center of Advocacy, Resources & Education (CARE) is committed to reducing the incidence and the impact of sexual harassment and all forms of sexual violence, including sexual assault, dating and domestic violence, and stalking, within the UC Davis and UC Davis Health communities. CARE staff work to broaden public awareness about the nature of sexual violence and its impact on people of all genders, to reinforce the necessity of healthy communication, including healthy sexual communication and consent, and to mitigate the trauma of the survivor. For complete information, see Center for Advocacy, Resources & Education (CARE), 530-752-3299 or 916-734-3799.

Center for Leadership Learning

The Center for Leadership Learning (CLL), 530-752-6908, offers a unique space for undergraduates to engage in the study of leadership through a variety of interactive, experiential learning environments, including quarterly workshops, certificate programs, a speaker series, and annual conference. CLL programs are open to the undergraduate community and welcome students from all majors, class levels, and degrees of leadership experience. For complete information, see Center for Leadership Learning.

Cross-Cultural Center

Born out of student activism and political struggle, the Cross Cultural Center (CCC) provides a culturally relevant community space where student voices can be expressed and respected. The CCC cultivates critical consciousness and cultural competency by providing learning opportunities at the crossroads of the many aspects of our identities and experiences. By embracing our cultural and intellectual heritage, the CCC supports student leadership in advancing our collective vision for community empowerment and social justice. For complete information, see Cross Cultural Center or call 530-752-4287.

Lesbian Gay Bisexual Transgender Queer Intersex Asexual Resource Center

The Lesbian, Gay, Bisexual, Transgender, Queer, Intersex, Asexual Resource Center (LGBTQIARC), 530-752-2452, provides an open and inclusive space and community that is committed to challenging sexism, cis-sexism, genderism, homophobia, biphobia, transphobia and heterosexism. For complete information, see Lesbian, Gay, Bisexual, Transgender, Queer, Intersex, Asexual Resource Center.

Services for International Students and Scholars (SISS)

Services for International Students and Scholars (SISS), 530-752-0864, assists international students, faculty and researchers in gaining and maintaining an appropriate immigration status while at UC Davis. SISS provides orientation and other information and assistance as part of its mission to build a campus community that is fully inclusive of international students and scholars. For complete information, see Services for International Students and Scholars.

Women's Resources and Research Center (WRRC)

The Women's Resources and Research Center (WRRC), 530-752-3372, promotes gender equity and aspires for a campus where students, faculty, and staff of all genders can thrive. All are welcome to visit the WRRC and learn about gender equity, connect with community, and find resources and support. For complete information, see Women's Resources and Research Center.

Academic Information

Registration

Office of the University Registrar; 530-752-3639

Registration includes the process of enrolling in classes, the financial obligation to pay tuition, fees and all other charges, filing current address (mailing, permanent, and emergency) information with the Office of the University Registrar, and completing and submitting any forms pertaining to your registration status. To be a continuing student at the university, you must enroll in classes each academic term. To be considered a registered student, you must also pay all tuition, fees and any outstanding balance due.

If you are a *new* student, your acceptance letter will direct you to all of the required next steps to obtain student status at the university. Graduate students who have previously attended UC Davis as undergraduates are considered to be *new* students. If you do not enroll in classes for a future academic term or did not take an approved leave of absence, you must apply for Readmission to return to the university and resume student status.

For complete information, see Registration.

Important Registration-Related Subjects

Change of Name | Change of Address

Preparing to Register | Undergraduate Registration Priority | Late Registration

Adding and Dropping Courses | Late Adding and Dropping Courses | Retroactive Drop & Add

Course Load

Expected and Minimum Progress | Full-Time Status | Part-Time Status

The Major

Complete list Degrees Offered By UC Davis.

Declaring a Major

College of:

- Agricultural & Environmental Sciences
- Biological Sciences
- Engineering
- Letters & Science

Change of Major Within a College

College of:

- Agricultural & Environmental Sciences
- Biological Sciences
- Engineering
- Letters & Science

Change of Major Accompanied by Change of College

College of:

- Agricultural & Environmental Sciences
- Biological Sciences
- Engineering
- Letters & Science

Multiple Majors

College of:

- Agricultural & Environmental Sciences
- Biological Sciences
- Engineering
- Letters & Science

Cross-College Majors

College of:

- Agricultural & Environmental Sciences
- Biological Sciences
- Letters & Science

Individual Major

College of:

- Agricultural & Environmental Sciences
- Biological Sciences
- Engineering
- Letters & Science

The Minor

Complete list Minor Programs Offered by UC Davis.

Additional Requirements for Colleges

College of:

- Agricultural & Environmental Sciences
- Biological Sciences
- Letters & Science

Requirements for Schools

College of School of Education; Declare

School of Management; Accounting | Technology Management

Academic Credit

Units of Credit | Credit by Examination | Concurrent Credit from Another Institution

Intercampus Visitor Program | Summer Sessions | UC/CSU/Community College Cross Enrollment

Open Campus (Concurrent) Program | UC Davis Extension

Examinations

Final Examination Information & Schedule | Academic Senate Regulations— Examinations | Midterms

Grades & Grading

For complete information on grades & grading, see Grading. Each college has different rules regarding P/NP grading; see College of:

- Agricultural & Environmental Sciences
- Biological Sciences
- Engineering

- Letters & Science

Probation & Dismissal

For complete information on Probation and Dismissal, see Academic Standing.

Honors & Prizes

Deans' Honors Lists

According to UC Davis Academic Senate Regulation 551 (ASR 551.A), the quarterly Dean's Honors List includes names of students who have completed, for a letter grade, a minimum of 12 units in a specific quarter with a grade point average equal to or higher than the minimum grade point average attained by the upper 16 percent of those registered in the same class level and college during that quarter. Honors lists will be posted quarterly on deans' office websites or made available by other means and a notation of these honors will be placed on each student's permanent record by the Office of the University Registrar.

College of:

- Agricultural & Environmental Sciences
- Biological Sciences
- Engineering
- Letters & Science

Graduation Honors

Honors at graduation are awarded to students who have a grade point average in the top percent of their college as shown in the table below. The College of Letters & Science requires that additional criteria be met for high and highest honors.

Total Quarter Units at UC	Highest Honors	High Honors	Honors	Total
45-89	2%	next 2%	next 4%	8%
90-134	3%	next 3%	next 6%	12%
135+	4%	next 4%	next 8%	16%

Grade point averages from the winter quarter prior to graduation are used to determine the averages that will earn an honors designation. Following are the averages for winter quarter 2018. These averages will be used through winter quarter 2019.

Grade Point Average by College

Percent Determining Cut-Off Point	Agricultural & Environmental Sciences	Biological Sciences	Engineering	Letters & Science
2%	3.932	3.964	3.936	3.946
3%	3.900	3.940	3.916	3.922
4%	3.867	3.904	3.896	3.898
6%	3.819	3.856	3.841	3.848
8%	3.771	3.817	3.795	3.804
12%	3.675	3.738	3.714	3.714
16%	3.594	3.679	3.634	3.648

An honors notation is made on students' diplomas and on their permanent records in the Office of the University Registrar.

University Honors Program

The University Honors Program (UHP), 530-752-9797, is a four-year, interdisciplinary, campus-wide program for highly achieving, high potential and socially conscious undergraduate students

interested in enhancing their educational experience through special courses, close faculty contact, dynamic peer interaction and positive social change.

Prizes & Awards

The University Medal is the highest campus honor awarded to a graduating senior in recognition of superior scholarship and achievement. A College or School Medal is also given to the outstanding graduating student in each of the colleges and professional schools.

Departmental citations, special awards and prizes are also awarded to students for superior achievement and scholarship.

Prizes & awards for, College of:

- Agricultural & Environmental Sciences
- Biological Sciences
- Engineering
- Letters & Science

Chancellor's Award for Excellence in Mentoring Undergraduate Research

These prestigious awards recognize a graduating senior who has distinguished him/herself through their excellence in undergraduate research; and faculty, postdocs or graduate students who have exceled in mentoring undergraduate researchers. For complete information, see Chancellor's Award for Excellence in Undergraduate Research.

Leaving UC Davis

To graduate, undergraduate students must file an Application for Graduation with the Office of the University Registrar by the stated deadline. To participate in the Commencement Ceremony, a student **must** register with their college by the stated deadline. **These are separate actions.**

Graduation | Commencement Ceremony

Leave of Absence: Planned Educational Leave Program (PELP)

The Planned Educational Leave Program (PELP) allows any continuing undergraduate or graduate level student to temporarily suspend academic work at UC Davis.

Withdrawal

Withdrawal | Retroactive Withdrawal

Returning to UC Davis

Undergraduate Readmission

For any term a student does not register and is not an approved leave of absence, the student is considered non-continuing and must apply for readmission to return to registered status.

Undergraduate Education

UC Davis offers the Bachelor of Arts (A.B.) and Bachelor of Science (B.S.) degrees in over 100 major programs, as well as over 110 minors in a variety of disciplines; see Degrees Offered by UC Davis. For complete program information; see Colleges of:

- Agricultural and Environmental Sciences
- Biological Sciences
- Engineering
- Letters and Science

University Requirements

To earn a Bachelor's Degree, all students must fulfill the following University of California requirements; see Bachelor's Degree Requirements.

- Entry Level Writing Requirement (ELWR)
- American History and Institutions Requirement
- Unit Requirement
- Residence Requirements
- Scholarship Requirement
- General Education Requirement
- College Requirements
- Major Requirements

General Education (GE) Requirement

For complete information, see General Education Requirements. For a list of courses that contain GE attributes and GE search tools, see General Education (GE) Requirements.

Advanced Academic Studies

Graduate Studies; 530-752-0650

School of Education; 530-752-0757

School of Law; 530-752-6477

Graduate School of Management; 530-752-7658

School of Medicine; 916-734-7055

Betty Irene Moore School of Nursing; 916-734-2145

School of Veterinary Medicine; 530-752-1360

Departments, Programs, & Degrees

Accounting Minor; Graduate School of Management

Accounting Minor; Graduate School of Management | Accounting Minor

(Graduate School of Management)

School Office. Gallagher Hall; 530-752-7658; http://gsm.ucdavis.edu/

The UC Davis Graduate School of Management's Undergraduate Accounting Minor gives you the opportunity to enhance your coursework with a carefully crafted series of five upper-division courses. These courses are designed to prepare you for accounting-related careers or advanced study in accounting. All five courses, 20 units total, must be completed to receive the minor certification.

The accounting minor courses are open to all undergraduate and graduate majors at UC Davis.

All minor courses must be taken at UC Davis.

Prerequisites for minor courses are required and you should plan accordingly.

Accounting **Units:** 20

MGT 101	Sources and Uses of Accounting Information	4
MGT 103	Intermediate Financial Accounting I	4
MGT 105	Intermediate Financial Accounting II	4
MGT 107	Intermediate Financial Accounting III	4
MGT 170	Managing Costs and Quality	4

To complete the minor, students must complete the 20 units of coursework in the minor with a GPA of 2.000 or better. Students may petition to have the minor noted on your transcript by following the process designated by your college, which allows the Graduate School of Management to approve the minor electronically. Contact your college's academic advisor for more information.

Most prerequisites could be used to partially satisfy the University's General Education requirements. No grade lower than a C- will be accepted in any prerequisite course.

Total: 20

Aerospace Science & Engineering; Engineering

Aerospace Science & Engineering; Engineering | EAE B.S.

(College of Engineering)

Stephen K. Robinson, Ph.D., Chairperson of the Department

Benjamin D. Shaw, Ph.D., Vice Chairperson of Undergraduate Studies

Department Office. 2132 Bainer Hall; 530-752-0580; Fax 530-752-4158; http://mae.ucdavis.edu

Faculty. http://mae.ucdavis.edu/people/faculty/

The Mechanical and Aerospace Engineering Undergraduate Programs

The Department of Mechanical and Aerospace Engineering administers two undergraduate programs in the College of Engineering: *(1)* Mechanical Engineering, *(2)* Aerospace Science and Engineering.

For more information about our programs, please see http://mae.ucdavis.edu/undergraduate/undergraduate-majors.

Mission. The Department of Mechanical and Aerospace Engineering is committed to educating future engineers so that they may contribute to the economic growth and well-being of the state, the nation, and the world, and to the advancement of knowledge in the mechanical and aerospace sciences.

Objectives. The objectives of the programs offered in Mechanical and Aerospace Engineering include the following: to prepare its graduates to practice mechanical and/or aerospace engineering in a broad range of industries, to enable interested graduates to pursue graduate education, to prepare its graduates to participate in research and development, and in other creative and innovative efforts in science, engineering, and technology and to allow interested graduates to pursue entrepreneurial endeavors.

Division of Aerospace Science and Engineering

The Division of Aerospace Science and Engineering administers the Aerospace Science and Engineering Program within the Department of Mechanical and Aerospace Engineering.

The Aerospace Science & Engineering Undergraduate Program

The Aerospace Science and Engineering program is accredited by the Engineering Accreditation Commission of ABET; http://www.abet.org.

Aerospace Science and Engineering majors learn to apply the principles of the physical sciences and engineering to the design of aerospace vehicles. Specific objectives include the design, development and manufacture of aerospace vehicles and other transportation systems through the integration of disciplines associated with aerodynamics, propulsion, structures and guidance/control.

Our Bachelor of Science degree in Aerospace Science and Engineering provides a broad background and fundamental education in mathematics, the physical sciences, and the engineering sciences. These fundamentals, when complemented by the required technical courses, prepare students for employment in government or industry, while simultaneously establishing an excellent foundation for graduate studies.

Students are encouraged to adhere carefully to all prerequisite requirements. The instructor is authorized to drop students from a course for which stated prerequisites have not been completed.

Exclusive of General Education units, the minimum number of units required for the Aerospace Science and Engineering major is 160.

Lower Division Required Courses **Units:** 74

MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3
MAT 022B	Differential Equations	3
PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
OR		
CHE 002AH	Honors General Chemistry	5

CHE 002BH	Honors General Chemistry	5
ENG 004	Engineering Graphics in Design	3
ENG 006	Engineering Problem Solving	4
OR		
EME 005	Computer Programming for Engineering Applications	4
ENG 017	Circuits I	4
ENG 035	Statics	4
ENG 045	Properties of Materials	4
OR		
ENG 045Y	Properties of Materials	4

Choose one; a grade of C- or better is required:

ENL 003	Introduction to Literature	4
UWP 001	Expository Writing	4
UWP 001Y	Expository Writing	4
UWP 001V	Expository Writing	4
COM 001	Major Books of Western Culture: The Ancient World	4
COM 002	Major Books of Western Culture: From the Middle Ages to the Enlightenment	4
COM 003	Major Books of Western Culture: The Modern Crisis	4
COM 004	Major Books of the Contemporary World	4
NAS 005	Introduction to Native American Literature	4

Choose one:

CMN 001	Introduction to Public Speaking	4
CMN 003	Interpersonal Communication Competence	4
ENG 003	Introduction to Engineering Design	4

Upper Division Required Courses **Units:** 86-90

ENG 100	Electronic Circuits and Systems	3
ENG 102	Dynamics	4
ENG 103	Fluid Mechanics	4
ENG 104	Mechanics of Materials	4
ENG 105	Thermodynamics	4
ENG 190	Professional Responsibilities of Engineers	3
EME 106	Thermo-Fluid Dynamics	4
EME 108	Measurement Systems	4
EME 109	Experimental Methods for Thermal Fluids	4
EME 165	Heat Transfer	4
EME 172	Automatic Control of Engineering Systems	4
EAE 127	Applied Aircraft Aerodynamics	4
EAE 129	Stability and Control of Aerospace Vehicles	4
EAE 130A	Aircraft Performance and Design	4
EAE 130B	Aircraft Performance and Design	4
EAE 133	Finite Element Methods in Structures	4
EAE 135	Aerospace Structures	4
EAE 138	Aircraft Propulsion	4

Choose one:

ENG 180	Engineering Analysis	4
EME 115	Introduction to Numerical Analysis and Methods	4

MAT 128C	Numerical Analysis in Differential Equations	4

Technical Electives

Choose one; must be chosen from the following astronautics electives:

EAE 140	Rocket Propulsion	4
EAE 141	Space Systems Design	4
EAE 142	Orbital Mechanics	4

Remaining units must be from:

EME 139	Stability of Flexible Dynamic Systems	4
OR		
EAE 126	Theoretical and Computational Aerodynamics	4
OR		

From the above Astronautics Electives list if not used in satisfaction of other degree requirements.

Up to four units may be selected from any upper-division engineering course including any engineering 192 or 199 not used in satisfaction of other degree requirements. Courses that cannot be used are BIM 110L, ENG 160, ECS 188 or any 197T course.

Upper Division Composition Requirement

Choose one; grade of C- or better is required:

UWP 101	Advanced Composition	4
UWP 102E	Writing in the Disciplines: Engineering	4
UWP 104A	Writing in the Professions: Business Writing	4
UWP 104E	Writing in the Professions: Science	4
UWP 104T	Writing in the Professions: Technical Writing	4

Passing the Upper-Division Composition Exam.

Total: 160

Aerospace Science & Engineering; Engineering | EAE Courses

Courses in EAE:

EAE 001—Introduction to Aerospace Science Engineering (1)
Lecture—1 hour. Description of the field of aerospace engineering with examples from industry, government, and research. Aerospace engineering principles, ethics, and responsibilities. (P/NP grading only.) Effective: 2002 Fall Quarter.

EAE 010—From the Wright Brothers to Drones and Quadcopters (2)
Lecture—2 hours. History of aircraft and its influence on society. Topics covered will include Unmanned Aerial Vehicles, safety considerations, economics and privacy issues. Aerodynamics, stability and control will also be introduced. GE credit: SE, SS. Effective: 2015 Summer Session 1.

EAE 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

EAE 126—Theoretical and Computational Aerodynamics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ENG 180 C- or better or EAD 115 C- or better or MAT 128C C- or better or EME 115 C- or better); EAE 127 C- or better Development of general equations of fluid motion. Study of flow field kinematics and dynamics. Flow about a body. Thin airfoil theory. Viscous effects. Applications of numerical methods to wing analysis and design. GE credit: SE. Effective: 2013 Fall Quarter.

EAE 127—Applied Aircraft Aerodynamics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EME 106 C- or better Principles, governing equations, and predictive theories for aircraft aerodynamics. Lift and drag of 2D airfoils, 3D wings, and high-lift devices. GE credit: SE, WE. Effective: 2017 Fall Quarter.

EAE 129—Stability and Control of Aerospace Vehicles (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 102 C- or better Restricted to upper division standing. Aircraft and spacecraft stability and control. Derivation of fundamental equations of motion for aircraft/spacecraft. Fundamentals of feedback. Aircraft flight control systems. Spacecraft attitude control systems. GE credit: SE. Effective: 2017 Fall Quarter.

EAE 130A—Aircraft Performance and Design (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): EAE 127 C- or better; EAE 129 C- or better (can be concurrent) Major aircraft design experience with multiple realistic constraints including aerodynamics, performance analysis, weight estimation, stability and control, and appropriate engineering standards. GE credit: SE. Effective: 2017 Fall Quarter.

EAE 130B—Aircraft Performance and Design (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): EAE 130A C- or better Restricted to upper division standing. Major aircraft design experience including detailed design, cost analysis, analysis of aircraft structure, propulsion system, aerodynamics, aircraft handling qualities, manufacturing, or meeting relevant engineering standards. GE credit: OL, SE. Effective: 2017 Fall Quarter.

EAE 133—Finite Element Methods in Structures (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 104 C- or better Open to College of Engineering Students. Introduction to the aerospace structural design process. History of aircraft and spacecraft materials. Effects of loading beyond elastic limit. Deflections and stresses due to combined loading. Virtual work principles, and finite element methods. Applications to aerospace structures. GE credit: SE. Effective: 2011 Fall Quarter.

EAE 135—Aerospace Structures (4)
Lecture—4 hours. Prerequisite(s): ENG 104 C- or better; EAE 126 or EAE 127 recommended. Analysis and design methods used in aerospace structures. Shear flow in open, closed and multicell beam cross-sections, buckling of flat and curved sheets, tension field beams, local buckling. GE credit: SE. Effective: 2017 Fall Quarter.

EAE 137—Structural Composites (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 104 C- or better Overview of materials and technology for creating structures from fiber reinforced resin matrix composite material systems. Elementary design analysis and case studies emphasizing aeronautical applications. GE credit: SE. Effective: 2010 Fall Quarter.

EAE 138—Aircraft Propulsion (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EME 106 C- or better Analysis/design of modern aircraft gas turbine engines. Development/application of cycle performance prediction techniques. Introduction to design of inlets, compressors, burners, turbines, and nozzles. Cycle design for specific applications. GE credit: SE. Effective: 2017 Fall Quarter.

EAE 140—Rocket Propulsion (4)
Lecture—4 hours. Prerequisite(s): EME 106 C- or better Restricted to upper division standing. Fluid and thermodynamics of rocket engines, liquid and solid rocket propulsion. Space propulsion concepts and space mission requirements. Not open for credit to students who have taken identical EAE 189A prior to Fall Quarter 2013. GE credit: SE. Effective: 2016 Winter Quarter.

EAE 141—Space Systems Design (4)
Discussion—2 hours; Lecture—2 hours. Prerequisite(s): ENG 102 C- or better; EME 106 C- or better Introduction to space systems design including space project organization, requirements definition and specification, concepts formulation, system tradeoffs, subsystem design. Prototype space mission concepts are presented and a multidisciplinary mission design is developed that considers all relevant architecture elements. GE credit: SE. Effective: 2013 Fall Quarter.

EAE 142—Orbital Mechanics (4)
Lecture—4 hours. Prerequisite(s): ENG 102 C- or better Restricted to upper division standing. Satellite orbits, multistage rockets, current global boosters, and new technologies. Design application problems include satellites, trajectory optimizations, and interplanetary trajectories. Not open for credit to students who have completed EAE 189B prior to Fall Quarter 2013. GE credit: SE. Effective: 2013 Fall Quarter.

EAE 189C—Flight Simulation and Testing in Design of Aircraft and Spacecraft (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 102; and Consent of Instructor. Teaches flight test techniques together with data analysis methods to prepare students for any type of flight testing including fixed wing, rotary wing and launch vehicles. GE credit: SE. Effective: 2013 Fall Quarter.

EAE 198—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

EAE 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

African American & African Studies

African American & African Studies | AAS Information

(College of Letters and Science)

Department Office. 2201 Hart Hall; 530-752-1548; http://aas.ucdavis.edu

Faculty. http://aas.ucdavis.edu/people/faculty

African American & African Studies | AAS A.B.

(College of Letters and Science)

Department Office. 2201 Hart Hall; 530-752-1548; http://aas.ucdavis.edu

Faculty. http://aas.ucdavis.edu/people/faculty

The Major Program

African American and African Studies is an interdisciplinary field of study in the humanities, arts, and social sciences. This major introduces students to the social cultural, historical and artistic dimensions of global African Diaspora and Black communities in the United States, Africa, Europe, Asia, Caribbean, Latin America and Pacific regions of the world. The instructors are creative, accessible and highly qualified, with specializations across a range of disciplines. Students are exposed to and trained to think critically about the conditions and demands of global societies. Students may choose to enrich their education studying for a summer, a quarter, or a year in Africa, or by studying for a quarter in the Caribbean. Majors and Minors are also encouraged to take advantage of relevant internship opportunities.

The Program. The purpose of this program is to give students a sense of the individual characteristics and common concerns of Black communities in Africa, the United States, and in the wider Diaspora. The African American emphasis includes courses on history, culture, and the impact of developments in politics and the economy on the social organization of Black people in the United States. The African Diaspora emphasis enables students to study the way Black communities outside Africa and the United States have dealt with questions of race and ethnicity. It also considers how they have defined their identity in the political arena as well as by using religion, theater and dance, literature and film. The African emphasis allows students to focus on Africa's recent history, social issues, and contemporary culture.

Career Alternatives. Students majoring in African American and African Studies gain knowledge and strong critical thinking and analytical skills, problem-solving skills and communication skills, all

suited for advanced studies in the social sciences, law, education and professional schools. Graduates in the major have pursued careers in education, the private and public sectors, the non-profit sector, international development agencies and in human service. The interdisciplinary nature of African American and African Studies is excellent preparation for professions in community organizations such as the Urban League, NAACP and the Office of Economic Opportunity.

Major Advisor. Dionica Bell; dbbell@ucdavis.edu

American History and Institutions. This University requirement can be satisfied by completion of AAS 010, AAS 100; listed in University Requirements.

Note: Although a course may be listed more than once, such a course may satisfy only one requirement.

Preparatory Subject Matter **Units:** 28

Choose one:

AAS 010	African-American Culture and Society	4
AAS 012	Introduction to African Studies	4

Choose one:

AAS 015	Introduction to African American Humanities	4
AAS 017	Women in African Societies	4
AAS 018	Introduction to Caribbean Studies	4
AAS 050	Black Popular Culture	4
AAS 051	History of Afro American Dance	4
AAS 052	African Traditional Religion	4
AAS 080	Introduction to Black Politics	4

Choose one:

ANT 002	Cultural Anthropology	5
ECN 001A	Principles of Microeconomics	4
ECN 001B	Principles of Macroeconomics	4
SOC 001	Introduction to Sociology	5
POL 001	American National Government	4
POL 002	Introduction to Comparative Politics	4
PSC 001	General Psychology	4

Choose one:

CHI 010	Introduction to Chicana/o Studies	4
NAS 001	Introduction to Native American Studies	4
NAS 010	Native American Experience	4
WMS 050	Introduction to Critical Gender Studies	4
AMS 010	Introduction to American Studies	4
ASA 001	Historical Experience of Asian Americans	4
ASA 002	Contemporary Issues of Asian Americans	4

Choose two:

HIS 015A	Africa to 1900	4
HIS 015B	Africa Today	4
HIS 017A	History of the United States	4
HIS 017B	History of the United States	4

Choose four units:

AAS 016	Verbal and Performance Arts in Africa	4
AAS 051	History of Afro American Dance	4
AAS 155A	African-American Dance and Culture in the United States, Brazil and the Caribbean	4

DRA 041A	Beginning Jazz Dance	2
DRA 041B	Intermediate Jazz Dance	2
DRA 044A	Beginning Hip Hop Dance	2
DRA 044B	Intermediate Hip Hop Dance	2
MUS 028	Introduction to African American Music	4
MUS 105	History and Analysis of Jazz	4
MUS 106	History of Rock Music	4

Depth Subject Matter **Units:** 36

Choose one:

AAS 100	Survey of Ethnicity in the US	4
AAS 101	Introduction to Research in the Afro-American Community	4
AAS 107A	African Descent Communities and Culture in the Caribbean and Latin America	4
AAS 107B	African Descent Communities and Culture in North America	4
AAS 107C	African Descent Communities and Culture in Asia	4
AAS 110	West African Social Organization	4
AAS 145B	Black Intellectuals	4
AAS 172	Diaspora and New Black Identities	4
AAS 180	Race and Ethnicity in Latin America	4

Choose one:

AAS 150A	Afro-American Visual Arts Tradition: A Historical and Cultural Study	4
AAS 150B	Afro-American Visual Arts Tradition: A Historical and Cultural Study	4
AAS 151	Afro-American Vernacular Music and Verbal Arts	4
AAS 152	Major Voices in Black World Literature	4
AAS 153	African Literature	4
AAS 155A	African-American Dance and Culture in the United States, Brazil and the Caribbean	4
AAS 156	Language and Identity in Africa and the African Diaspora	4
AAS 157	Literature and Society in South Africa	4
AAS 160	African-American Folklore	4
AAS 169	History of African American Television	4
AAS 170	African-American Film and Video	4
AAS 171	Black African and Black European Film and Video	4
AAS 175A	Black Documentary: History and Theory	4
AAS 175B	Black Documentary Practicum	4
AAS 181	Hip Hop in Urban America	4
AAS 182	Hip Hop Culture & Globalization	4
AAS 185	Topics in African American Film	4

Choose one:

AAS 111	Cultural Politics in Contemporary Africa	4
AAS 123	Black Female Experience in Contemporary Society	4
AAS 130	Education in the African-American Community	4
AAS 133	The Black Family In America	4
AAS 141	Psychology of the African American Experience	3
AAS 145A	Black Social and Political Thought	4
AAS 145B	Black Intellectuals	4
AAS 156	Language and Identity in Africa and the African Diaspora	4
AAS 162	Islam in Africa and the Americas	4

AAS 163	African Religions in the Americas	4
AAS 165	Afro-Christianity and the Black Church	4
AAS 172	Diaspora and New Black Identities	4
AAS 176	The Politics of Resources	4
AAS 177	Politics of Life in Africa	4

A coordinated program of upper division courses, selected and approved in consultation with the major advisor and chosen to reflect the student's major emphasis.

Possible areas of emphasis include the following:

Creative arts in the black community worldwide, social and political trends in the global black community, African American society and culture, Africa, African Diasporas. These areas of emphasis are offered as guidelines for students in the major. They are not the only areas of emphasis that students may choose for the major.

Related Upper Division Courses **Units:** 0

The following courses are offered by faculty members in other disciplines and focus on African American studies, African diaspora studies, or African studies:

AMS 156	Race, Culture and Society in the United States	4
ANT 104N	Cultural Politics of the Environment	4
ANT 139AN	Race, Class, Gender Systems	4
ANT 140A	Cultures and Societies of West and Central Africa	4
ANT 140B	Cultures and Societies of East and South Africa	4
AHI 150	Arts of Subsaharan Africa	4
CRD 151	Community Field Research: Theory and Analysis	4
CRD 152	Community Development	4
CRD 172	Social Inequality: Issues and Innovations	4
COM 154	African Literature	4
COM 165	Caribbean Literatures	4
ENL 167	Twentieth-Century African American Poetry	4
ENL 178	Topics in Nations, Regions, and Other Cultural Geographies	4
ENL 179	Multi-Ethnic Literature of the United States	4
ENL 181A	African American Literature to 1900	4
ENL 181B	African American Literature 1900-Present	4
HIS 102O	Undergraduate Proseminar in History; Africa	5
HIS 115A	History of West Africa	4
HIS 115B	History of East Africa and the Indian Ocean	4
HIS 115C	History of Southern Africa from Exploration to the Rainbow Nation	4
HIS 115D	Postcolonial Africa	4
HIS 116	African History: Special Themes	4
HIS 177A	History of Black People and American Race Relations, 1450-1860	4
HIS 177B	History of Black People and American Race Relations, 1860-Present	4
HIS 178B	Race In America, 1865-Present (Discontinued)	4
POL 134	Africa and U.S. Foreign Policy	4
POL 176	Racial Politics	4
SOC 128	Interracial Interpersonal Dynamics	4
SOC 129	Sociology of Black Experience in America	4
SOC 130	Race Relations	4
SOC 134	Sociology of Racial Ethnic Families	4

SOC 137	African American Society and Culture 1790 to 1990	4
SOC 143A	Urban Society	4
SOC 145A	Sociology of Third World Development	4
SOC 145B	Gender and Rural Development in the Third World	4
DRA 155A	African American Dance and Culture in the United States, Brazil and the Caribbean	4
WMS 160	Women, 'Race' and Sexuality in Postcolonial Cinema	4
WMS 178C	Women Writers and the Transnational Imaginary; The Caribbean	4
WMS 180	Women of Color Writing in the United States	4
WMS 182	Globalization, Gender and Culture	4

Total: 64

African American & African Studies | AAS Minor

(College of Letters and Science)

Department Office. 2201 Hart Hall; 530-752-1548; http://aas.ucdavis.edu

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Career Alternatives. Students majoring in African American and African Studies gain knowledge and strong critical thinking and analytical skills, problem-solving skills and communication skills, all suited for advanced studies in the social sciences, law, education and professional schools. Graduates in the major have pursued careers in education, the private and public sectors, the non-profit sector, international development agencies and in human service. The interdisciplinary nature of African American and African Studies is excellent preparation for professions in community organizations such as the Urban League, NAACP and the Office of Economic Opportunity.

Minor Advisor. Dionica Bell; dbbell@ucdavis.edu

American History and Institutions. This University requirement can be satisfied by completion of African American Studies 10, 100; listed in University Requirements.

Note: Although a course may be listed more than once, such a course may satisfy only one requirement.

African American and African Studies **Units:** 24

Choose one:

AAS 010	African-American Culture and Society	4
AAS 012	Introduction to African Studies	4
AAS 015	Introduction to African American Humanities	4
AAS 017	Women in African Societies	4
AAS 018	Introduction to Caribbean Studies	4
AAS 080	Introduction to Black Politics	4

Select any five upper division courses offered in African American and African Studies, but not including AAS 154.

Total: 24

African American & African Studies | AAS Courses

Courses in AAS:

AAS 010—African-American Culture and Society (4)
Discussion—1 hour; Lecture—3 hours. Critical examination of the historical, political, social, and economic factors that have affected the development and status of African-American people in contemporary society. GE credit: ACGH, DD, SS, WE. Effective: 2012 Winter Quarter.

AAS 012—Introduction to African Studies (4)
Discussion—1 hour; Lecture—3 hours. Introduction to African Studies which will focus on the various disciplinary perspectives through which African society and culture are generally studied. A survey of methods, resources and conceptual tools for the study of Africa. GE credit: AH, SS, WC, WE. Effective: 2017 Fall Quarter.

AAS 015—Introduction to African American Humanities (4)
Discussion—1 hour; Lecture—3 hours. Class size limited to 165 students. Introduction to the humanist tradition developed by writers, philosophers, and artists of African descent in the West. Attention also given to African sources, as well as European, Caribbean, Latin-American, and North American variations on this tradition. GE credit: ACGH, AH, DD. Effective: 2012 Winter Quarter.

AAS 016—Verbal and Performance Arts in Africa (4)
Lecture/Discussion—4 hours. African verbal arts; oral texts from different African cultures. Types of critical response to oral texts, role of oral artists, context and esthetics of oral performance in Africa. GE credit: AH, VL, WC. Effective: 2012 Winter Quarter.

AAS 017—Women in African Societies (4)
Lecture/Discussion—4 hours. Gender relations in traditional and contemporary African society. Involvement of African women in politics, religion, the economy, the arts. African responses to feminist theory. Images of women in African literature. GE credit: SS, WC, WE. Effective: 2012 Winter Quarter.

AAS 018—Introduction to Caribbean Studies (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the contemporary culture, peoples, politics, and societies of the Caribbean. Topics include movements of people, goods and ideas across the Atlantic world and creative productions within the Caribbean. GE credit: AH, SS, WC. Effective: 2011 Fall Quarter.

AAS 050—Black Popular Culture (4)
Discussion—1 hour; Lecture—3 hours; Term Paper. Survey of the African American images in popular culture (film, television, comedy, sports and music). GE credit: ACGH, AH, DD, VL, WE. Effective: 2012 Winter Quarter.

AAS 051—History of Afro American Dance (4)
Lecture—4 hours. Evolution of African-American dance, tracing its history and development from West and Central Africa to the United States. Investigates the social and cultural relevance of African American dance and its artistic merits through contributions from its choreographers and performers. GE credit: AH, DD, VL. Effective: 2012 Spring Quarter.

AAS 052—African Traditional Religion (4)
Discussion—2 hours; Lecture—2 hours. Introduction to traditional religions of the sub-Saharan African peoples: emphasis on myths, rituals and symbols in West, East, Central and South African indigenous religions. Examines themes: sacred kingship, divination system, women, prophecy, conversion and adaptation to Islam and Christianity. GE credit: AH, WC. Effective: 2012 Winter Quarter.

AAS 080—Introduction to Black Politics (4)
Lecture—4 hours. Introduction to the analysis of Afro-American politics, using conceptual frameworks from political science and other social sciences. Effective: 1997 Winter Quarter.

AAS 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

AAS 100—Survey of Ethnicity in the US (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Upper division standing or consent of instructor. Limited enrollment. Sociological and historical analysis of the experience, culture, and relations of and between groups considered racial and/or ethnic minorities in the United States. GE credit: ACGH, AH, DD. Effective: 2012 Winter Quarter.

AAS 101—Introduction to Research in the Afro-American Community (4)
Lecture—4 hours. Prerequisite(s): AAS 010; or Consent of Instructor. Introductory survey of Afro-American Studies methods and techniques; problems and methodology in Afro-American Studies. Effective: 1997 Winter Quarter.

AAS 107A—African Descent Communities and Culture in the Caribbean and Latin America (4)
Lecture/Discussion—4 hours. Prerequisite(s): Upper division standing. Origin and development of African descent communities and cultures in the Caribbean, and Latin America. The similarities and differences among African descent communities and cultures in terms of religious practices, music, and national identity. GE credit: WC. Effective: 2011 Fall Quarter.

AAS 107B—African Descent Communities and Culture in North America (4)
Lecture/Discussion—4 hours. Prerequisite(s): Upper division standing. Study of the origin and development of African descent communities and cultures in the U.S.A., Canada, and Mexico. GE credit: AH, DD, SS. Effective: 2017 Winter Quarter.

AAS 107C—African Descent Communities and Culture in Asia (4)
Lecture/Discussion—4 hours. Study of the origin and development of African Descent communities and cultures in Asia. GE credit: AH, SS, WC. Effective: 2015 Winter Quarter.

AAS 107D—African Descent Communities and Cultures in Europe (4)
Lecture/Discussion—4 hours. Study of the origin and development of African Descent communities and cultures in Europe. GE credit: AH, SS, WC. Effective: 2015 Spring Quarter.

AAS 110—West African Social Organization (4)
Lecture—4 hours. Ecology, population, social and political organization, and culture of West Africa in the precolonial, colonial, and post-colonial periods. GE credit: SS, WC. Effective: 2012 Winter Quarter.

AAS 111—Cultural Politics in Contemporary Africa (4)
Lecture/Discussion—4 hours. Prerequisite(s): AAS 012; Or upper division standing. Themes and style of new cultural forms in Africa as displayed in art, music, film and writing, especially in regard to blending of indigenous and foreign influences. Social and political forces shaping contemporary cultural expression. GE credit: AH, SS, WC. Effective: 2012 Winter Quarter.

AAS 123—Black Female Experience in Contemporary Society (4)
Lecture—4 hours. Prerequisite(s): Upper division standing or consent of instructor. Black female social, intellectual, and psychological development. Black women's contributions in history, literature, and social science; life experiences of Black women and philosophical underpinnings of the feminist movement. GE credit: ACGH, DD, SS. Effective: 2012 Winter Quarter.

AAS 130—Education in the African-American Community (4)
Discussion—1 hour; Fieldwork—3 hours; Lecture—2 hours. Examination of the history of the education of African Americans in the
United States. Examination and critique of contemporary theories concerning the schooling of African Americans. (Former course AAS 140.). GE credit: DD, SS. Effective: 2011 Fall Quarter.

AAS 133—The Black Family In America (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Upper division standing or consent of instructor. Analysis of social science research to examine relationship between black (African-descent) family structures, patterns of functioning, and political, economic, and social conditions in the U.S. GE credit: ACGH, DD, SS. Effective: 2012 Winter Quarter.

AAS 141—Psychology of the African American Experience (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): AAS 010; or Consent of Instructor. Introduction to the psychological issues faced by African Americans. Analysis of issues from European/Western and Afrocentric frame of reference. Emphasis on Optimal Theory, a psychological theory based on an Afrocentric world view. Effective: 1997 Winter Quarter.

AAS 145A—Black Social and Political Thought (4)
Lecture—4 hours. Prerequisite(s): AAS 010 or AAS 080; or Consent of Instructor. Exploration and analysis of Black social and political thought in the Americas. GE credit: SS. Effective: 2012 Winter Quarter.

AAS 145B—Black Intellectuals (4)
Lecture—4 hours. Prerequisite(s): (AAS 010, AAS 080, AAS 145A); or Consent of Instructor. Exposition and critical analysis of selected theoretical writings of Black intellectuals, and especially political and social thinkers, in the Americas. GE credit: DD, SS, WE. Effective: 2012 Winter Quarter.

AAS 150A—Afro-American Visual Arts Tradition: A Historical and Cultural Study (4)
Lecture—4 hours. Prerequisite(s): Upper division standing. Afro-American visual arts tradition, folk and formal, in historical and cultural context, from 1600 through Reconstruction. Effective: 1997 Winter Quarter.

AAS 150B—Afro-American Visual Arts Tradition: A Historical and Cultural Study (4)
Lecture—4 hours. Prerequisite(s): Upper division standing. Afro-American visual arts tradition, folk and formal, in historical and cultural context, from Reconstruction to the present. Effective: 1997 Winter Quarter.

AAS 151—Afro-American Vernacular Music and Verbal Arts (4)
Discussion—2 hours; Lecture—2 hours. Socio-political dimensions of Afro-American musical forms like spiritual, work song, minstrelsy blues, rhythm and blues, jazz, gospel, soul and contemporary pop, and related verbal arts like preaching, toasting, rapping. Effective: 1997 Winter Quarter.

AAS 152—Major Voices in Black World Literature (4)
Discussion—1 hour; Lecture—2 hours; Term Paper. Prerequisite(s): AAS 010 or AAS 012 or AAS 018; Upper division standing. Recurrence of cultural tropes in the works of major black world authors and formation of an African-oriented canon. Principal activities include critical reading and discovery of literature as a cultural resource. GE credit: AH, DD, WC, WE. Effective: 2012 Winter Quarter.

AAS 153—African Literature (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Completion of Entry Level Writing Requirement (ELWR). Colonial and post-colonial sub-Saharan African literature and the African oral traditions from which it emerged. Genres and themes of African literature from the nineteenth century to the present. (COM 154.) GE credit: AH, WC, WE. Effective: 2012 Spring Quarter.

AAS 155A—African-American Dance and Culture in the United States, Brazil and the Caribbean (4)
Lecture/Discussion—4 hours. Comparative study of the African American dance forms in the U.S.A., Brazil, Haiti, Cuba, Jamaica, Barbados, and Trinidad. Examination of ritual, folk, and popular dance forms and the socio/historical factors that have influenced these forms. (DRA 155A.) GE credit: AH, VL, WC. Effective: 2012 Fall Quarter.

AAS 156—Language and Identity in Africa and the African Diaspora (4)
Lecture/Discussion—4 hours. Prerequisite(s): AAS 012; Or upper division standing. Relationship between language and identity in literature from Africa and the African Diaspora. Use of pidgins, Creoles, translation from African languages and impact of language policies. GE credit: AH, DD, WC. Effective: 2012 Winter Quarter.

AAS 157—Literature and Society in South Africa (4)
Lecture/Discussion—4 hours. Prerequisite(s): Upper division standing. Political and social developments in 20th-century South Africa as illustrated by a range of South African writing. Response of different writers to race relations, impact of government policy on types and context of writing. GE credit: AH, WC, WE. Effective: 2012 Winter Quarter.

AAS 160—African-American Folklore (4)
Discussion—1 hour; Fieldwork—3 hours; Lecture—2 hours. Prerequisite(s): AAS 010 Theory and history of African American folklore and folklife, including
music, material culture, oral narrative, proverbs, and humor. African and Caribbean cultural influences on New World folk genres will be probed. Effective: 1997 Winter Quarter.

AAS 162—Islam in Africa and the Americas (4)
Lecture/Discussion—4 hours. Prerequisite(s): RST 060 or AAS 012 or AAS 110 Comparative and historical survey of Islam in the regional and cultural settings of Sub-Saharan Africa and the Americas. GE credit: AH, WC, WE. Effective: 2012 Winter Quarter.

AAS 163—African Religions in the Americas (4)
Lecture/Discussion—4 hours. Prerequisite(s): AAS 010; AAS 015; or Consent of Instructor. Comparative study of African religious heritage in the Americas: Jamaica, Trinidad, Cuba, U.S.A., Haiti, and Brazil. Emphasis on the origins and development of Candomble, Santeria, Shango, Vodun, and
Rastafarianism in the New World. GE credit: AH, WC, WE. Effective: 2012 Winter Quarter.

AAS 165—Afro-Christianity and the Black Church (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): AAS 010; AAS 015; or Consent of Instructor. Upper division standing. Examination of the historical role of Christian belief and practice as well as the institution of the Black Church in the experience of African Americans, from slavery to the present. GE credit: ACGH, DD, SS. Effective: 2012 Winter Quarter.

AAS 168—Black Documentary: History and Practice (4)
Laboratory—5 hours; Lecture—3 hours. Prerequisite(s): FMS 001; AAS 170; and Consent of Instructor. AAS 050 recommended. Study of Black documentary history and understanding of the use of the documentary form for political purposes. A discussion of documentary theory. Each student, singly or in a team, will create and carefully edit a documentary project. GE credit: AH, DD, VL, WC. Effective: 2011 Summer Session 1.

AAS 169—History of African American Television (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): AAS 050 recommended. History of the representation of African Americans in television; how the representations reflect social and political forces in American society. Role of African Americans in actively shaping their representation. GE credit: AH, DD, VL, WE. Effective: 2012 Winter Quarter.

AAS 170—African-American Film and Video (4)
Film Viewing—3 hours; Lecture—3 hours. Prerequisite(s): FMS 001; AAS 050 recommended. Comparative approach in the study of fictional film and video dealing with the African American experience drawing on film and cultural studies to examine and discuss selected works. GE credit: AH, DD, VL, WE. Effective: 2011 Fall Quarter.

AAS 171—Black African and Black European Film and Video (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): AAS 015 or AAS 050 or ENL 160 or ENL 162; or Consent of Instructor. Comparative approach in the study of dramatic films and videos that treat black life in Africa and Europe. Critical attention will focus on the imaginative construction of ethnicity, race, nationality, gender, and sexuality in each particular work. GE credit: AH, VL, WC. Effective: 2012 Spring Quarter.

AAS 172—Diaspora and New Black Identities (4)
Lecture/Discussion—3 hours; Term Paper. Critical analysis about what it means to be Black/African American in the United States today. Topics include old and new diasporas, immigration, national origin, language, religion, class, education, politics, identity and cultural heritage. GE credit: ACGH, DD, SS, WE. Effective: 2011 Fall Quarter.

AAS 175A—Black Documentary: History and Theory (4)
Film Viewing—3 hours; Lecture—3 hours. Prerequisite(s): FMS 001; AAS 170; AAS 050 recommended. Black documentary history and documentary theory. Use of black documentary for political purposes. GE credit: AH, DD, VL, WE. Effective: 2011 Fall Quarter.

AAS 175B—Black Documentary Practicum (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): AAS 175A; and Consent of Instructor. Creation of documentary projects, with students working in production crews. GE credit: AH, DD. Effective: 2012 Winter Quarter.

AAS 176—The Politics of Resources (4)
Lecture/Discussion—4 hours. Prerequisite(s): AAS 012 or AAS 110 Limited enrollment. Examination of the ways in which the processes of the extraction, purification and use of natural resources and the complex regimes of valuation and commodification they (re)produce lead to cooperation and conflict in contemporary Africa and beyond. GE credit: SS, WC. Effective: 2012 Winter Quarter.

AAS 177—Politics of Life in Africa (4)
Lecture/Discussion—4 hours. Existing (in)capacities in the structures of state and society in Africa for people to live well. Topics include institutions and practices that define state and civil society encounters in Africa; democracy, ethnicity, economic crisis, religion, citizenship, etc. GE credit: AH, SS, WC. Effective: 2012 Winter Quarter.

AAS 178—African Modernity and Globalization (4)
Lecture—4 hours. Prerequisite(s): AAS 012; or Consent of Instructor. Class size limited to 80 students. Exploration of modernity and globalization and their dimensions and impacts in/on Africa. Examination of modern necessities and constrains in Africa in relation to (neo)colonialism, transnational encounters, technology, gender, risk, ritual, identity, culture, etc. GE credit: AH, SS, WC. Effective: 2015 Winter Quarter.

AAS 180—Race and Ethnicity in Latin America (4)
Lecture/Discussion—4 hours. The social and political effects of racial and ethnic categorization in Latin America, including issues of economic production, citizenship, national belonging, and access to resources. Emphasis is on peoples of African, Indigenous, and Asian descent. GE credit: SS, WC, WE. Effective: 2012 Winter Quarter.

AAS 181—Hip Hop in Urban America (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Upper division standing or consent of instructor. Must have Junior or Senior level standing. History, aesthetics, urban context, and economics of hip-hop in the US, and its globalization. Hip-hop's four artistic elements-rap, deejaying, breakdance, and aerosol art-allow the examination of issues of race, ethnicity, and gender in youth culture and American society. GE credit: AH, DD, VL. Effective: 2012 Spring Quarter.

AAS 182—Hip Hop Culture & Globalization (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): AAS 181 preferable, not required. Investigation of hip-hop youth cultures outside the United States using globalization and Cultural Studies theories. Analysis of international hip-hop sites in Africa, Asia, Europe, South America, and the Middle East through reading, discussion, and visiting virtual sites. GE credit: AH, WC. Effective: 2014 Spring Quarter.

AAS 185—Topics in African American Film (4)
Film Viewing—3 hours; Lecture—3 hours. Prerequisite(s): AAS 170; AAS 050 recommended. Intensive study of special topics in African American film. May be repeated up to 1 time(s). GE credit: AH, DD, VL, WE. Effective: 2011 Fall Quarter.

AAS 190—Topics in African and African-Diaspora Studies (4)
Lecture/Discussion—3 hours; Term Paper—1 hour. Prerequisite(s): Upper division standing in African American and African Studies courses or consent of instructor. Intensive treatment of a special topic or problem in African or African Diaspora Studies. May be repeated once for credit when topic differs. May be repeated up to 1 time(s) topic differs. Effective: 1997 Winter Quarter.

AAS 192—Internship in African-American and African Studies (1-8)
Internship—3-24 hours. Prerequisite(s): Consent of Instructor. Completion of 12 units of upper division study in African American and African Studies courses; upper division standing. Restricted to African American and African Studies majors and minors. Supervised internship in community, government, or private institutions, in all subject areas offered by the African American and African Studies Program. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

AAS 197T—Tutoring in Afro-American Studies (1-5)
Tutorial—1-5 hours. Prerequisite(s): Consent of major committee; upper division standing with major in African American and African Studies. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. May be repeated up to 6 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

AAS 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

AAS 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

AAS 201—Critical Foundations in African American Studies (4)
Seminar—3 hours. Prerequisite(s): Graduate standing. Introduction to history of African American Studies. Topics include: research agendas, policy implications, debates, crises, and institutional frameworks. Effective: 2007 Fall Quarter.

AAS 202—Critical Foundations in African Studies (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Introduction to the history and current organization of African Studies as area of intellectual investigation. Offers students an opportunity to review research agenda and policy implications, debates, crises, and institutional frameworks surrounding the production of knowledge about Africa. Effective: 2006 Spring Quarter.

AAS 203—Critical Foundations in African Diaspora Studies (4)
Seminar—3 hours; Term Paper. Integrative conceptual framework includes History, Geography, Political Economy, Culture, Aesthetics as tools to investigate the African Diaspora. Students engage African Diaspora theories within their research projects understanding issues developing from the movement of Africans to the rest of the world. Effective: 2007 Fall Quarter.

AAS 204—Methodologies in African American and African Studies (4)
Seminar—3 hours; Term Paper. Relationship between theory and methodology, with emphasis on identifying relevant methodological approaches and constructing theoretically informed research projects for studying the experience of people of African descent whether on the African continent or in the rest of the world. Effective: 2006 Fall Quarter.

AAS 298A—Directed Group Study in African American and African Diaspora Studies (1-5)
Variable—3-15 hours. Prerequisite(s): Graduate standing. May be repeated up to 3 time(s) with consent of instructor. (S/U grading only.) Effective: 2007 Winter Quarter.

AAS 298B—Directed Group Study in African Studies (1-5)
Variable—3-15 hours. May be repeated up to 3 time(s) with consent of instructor. (S/U grading only.) Effective: 2007 Winter Quarter.

AAS 299—Directed research (1-12)
Variable—3-36 hours. (S/U grading only.) Effective: 2007 Fall Quarter.

Aging & Adult Development Minor; Human Ecology

Aging & Adult Development Minor; Human Ecology | Aging & Adult Development Minor

(College of Agricultural and Environmental Sciences)

Advising Office. 1303 Hart Hall; 530-752-2244, 530-752-1805; https://humanecology.ucdavis.edu

Faculty. https://humanecology.ucdavis.edu/people

The Department of Human and Community Development offers two minors: Aging and Adult Development & Human Development.

Minor Advisors. L. Miller, B. Ober

Aging and Adult Development **Units:** 18-20

Choose three:

HDE 100C	Adulthood and Aging	4
HDE 117	Longevity	4
HDE 143	Field Studies of the Elderly	4-6
HDE 160	Social Aspects of Aging	4
HDE 161	Applied Cognition and Aging	4
HDE 163	Cognitive Neuropsychology in Adulthood and Aging	4

Choose two:

HDE 110	Contemporary American Family	4
EXB 117	Exercise and Aging in Health and Disease	3
PSC 121	Physiological Psychology	4
PSC 123	Hormones and Behavior	3
PSC 126	Health Psychology	4
PSC 130	Human Learning and Memory	4

Total: 18-20

Agricultural & Environmental Chemistry (Graduate Group)

Agricultural & Environmental Chemistry (Graduate Group) | AGC Information

Cort Anastasio, Ph.D., Chairperson of the Group

Group Office. 4139 Meyer Hall; 530-752-4516; http://agchem.ucdavis.edu/

Faculty. The more than 50 faculty in the graduate group represent at least 13 academic departments within the College of Agricultural and Environmental Sciences, the College of Letters and Science, the College of Engineering, the School of Medicine, and the School of Veterinary Medicine.

Agricultural & Environmental Chemistry (Graduate Group) | AGC M.S.

Cort Anastasio, Ph.D., Chairperson of the Group

Group Office. 4139 Meyer Hall; 530-752-4516; http://agchem.ucdavis.edu/

Faculty. The more than 50 faculty in the graduate group represent at least 13 academic departments within the College of Agricultural and Environmental Sciences, the College of Letters and Science, the College of Engineering, the School of Medicine, and the School of Veterinary Medicine.

Graduate Study. The Graduate Group in Agricultural and Environmental Chemistry offers programs of study and research leading to the M.S. and Ph.D. degrees in four areas: (1) Environmental & Analytical Chemistry, (2) Biological & Toxicological Chemistry, (3) Food & Wine Chemistry, and (4) Fiber & Polymer Chemistry. Detailed information regarding graduate study may be obtained at http://agchem.ucdavis.edu/.

Graduate Advisors. C. Anastasio (Land, Air and Water Resources), P. G. Green (Civil and Environmental Engineering), M. Hengel (Environmental Toxicology), H. Heymann (Viticulture and Enology), Y.-L. Hsieh (Textiles and Clothing), A.E. Mitchell (Food Science and Technology), S. Parikh (Land, Air and Water Resources)

Agricultural & Environmental Chemistry (Graduate Group) | AGC Ph.D.

Cort Anastasio, Ph.D., Chairperson of the Group

Group Office. 4139 Meyer Hall; 530-752-4516; http://agchem.ucdavis.edu/

Faculty. The more than 50 faculty in the graduate group represent at least 13 academic departments within the College of Agricultural and Environmental Sciences, the College of Letters and Science, the College of Engineering, the School of Medicine, and the School of Veterinary Medicine.

Graduate Study. The Graduate Group in Agricultural and Environmental Chemistry offers programs of study and research leading to the M.S. and Ph.D. degrees in four areas: (1) Environmental & Analytical Chemistry, (2) Biological & Toxicological Chemistry, (3) Food & Wine Chemistry, and (4) Fiber & Polymer Chemistry. Detailed information regarding graduate study may be obtained at http://agchem.ucdavis.edu/.

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Agricultural & Environmental Chemistry (Graduate Group) | AGC Courses

Courses in AGC:

AGC 290—Seminar (1)
Seminar—1 hour. Selected topics in agricultural and environmental chemistry, presented by students. (S/U grading only.) Effective: 1997 Winter Quarter.

AGC 298—Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. The chemistry and biochemistry of foods, nutritional chemicals, pesticides, and other special topics as they apply to agricultural and environmental chemistry. Effective: 1997 Fall Quarter.

AGC 299—Research (1-12)
Variable. Arrangements should be made well in advance with a faculty member of the Group in Agricultural and Environmental Chemistry. (S/U grading only.) Effective: 1997 Winter Quarter.

Agricultural & Environmental Education

Agricultural & Environmental Education | AEE B.S.

(College of Agricultural and Environmental Sciences and School of Education)

Undergraduate Advising Center (including peer advising) is located in the Animal Science Advising Center in 1202 Meyer Hall; 530-754-7915; http://asac.ucdavis.edu/.

The Major Program

The major serves those interested in teaching agricultural and environmental sciences in K through 12 classrooms or in non-formal settings such as food production and distribution systems, nature preserves, environmental camps, or other venues. This major prepares graduates to direct programs in the agricultural and environmental sciences as well as provides them with a skill set necessary to work within social science careers related to these fields. This program of study meets state and federal requirements for entry into teacher preparation in agriculture and science, as well as requirements in Career Technical Education (CTE).

The Program

The program is designed to provide students with a broad background in various agricultural and environmental science disciplines, e.g., animal science, environmental science, plant and soil science, agricultural engineering, business management, agro ecology, and horticulture. The program also focuses on the social sciences related to human resource development. The program provides students with practical experiences through fieldwork, school, and non-formal learning sites placements, or placement in sites related to a student's focus of study. Through this major students will have the opportunity to explore and then incorporate agricultural and environmental issues into educational and development settings.

Career Alternatives. The need for scientists, technicians and educators to assist in domestic and international agricultural development and environmental programs has created a continuing demand for qualified instructors and supervisory personnel. This major also provides general preparation for positions in banking, sales and service, rural recreation and related agricultural and environmental sectors. Students interested in obtaining breadth in both agricultural and environmental sciences will appreciate the scope and flexibility the major provides.

Master Advisor. Deanne Meyer, Cooperative Extension Specialist/Lecturer

Major Advisors. Lynn Martindale, Lecturer/Supervisor School of Education; Cary J. Trexler, Associate Professor; Deanne Meyer, Cooperative Extension Specialist/Lecturer

Government/U.S. Constitution **Units:** 4

Choose one:

HIS 017A	History of the United States	4
POL 001	American National Government	4

Preparatory Subject Matter **Units:** 50

Choose a minimum of eight (8) units is required in each area of Animal Science, Applied Biological Systems Technology, Agricultural Business and Economics, Environmental Horticulture, Environmental Science and Natural Resources; and Plant and Soil Science:

ANS 001	Domestic Animals and People	4
ANS 002	Introductory Animal Science	4
ANS 021	Livestock and Dairy Cattle Judging	2
ANS 041	Domestic Animal Production	2
ABT 016	Metal Properties and Fabrication	2
ABT 052	Field Equipment Welding	2
ABT 049	Field Equipment Operation	2
ABT 101	Engine Technology	3
ARE 015	Population, Environment and World Agriculture	4
ECN 001A	Principles of Microeconomics	4
OR		
ECN 001B	Principles of Macroeconomics	4
ENH 001	Introduction to Environmental Horticulture/Urban Forestry	3
ENH 006	Introduction to Environmental Plants	4
PLS 005	Plants for Garden, Orchard and Landscape	2
ESP 010	Current Issues in the Environment	3
ETX 010	Introduction to Environmental Toxicology	3
HYD 010	Water, Power, Society	3
HYD 047	Watershed Processes and Water Quality in the Tahoe Basin (Discontinued)	2
PLS 001	Agriculture, Nature and Society	3
PLS 002	Botany and Physiology of Cultivated Plants	4
PLS 015	Introduction to Sustainable Agriculture	4
PLS 049	Organic Crop Production Practices	3
VEN 002	Introduction to Viticulture	2
VEN 003	Introduction to Winemaking	3

Science/Math Preparatory **Units:** 43-45

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
GEL 001	The Earth	4
GEL 020	Geology of California	2
SSC 010	Soils in Our Environment	3
MAT 016A	Short Calculus	3
MAT 016B	Short Calculus	3
OR		
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
OR		

MAT 021A	Calculus	4
MAT 021B	Calculus	4
PHY 007A	General Physics	4
PHY 007B	General Physics	4

Depth Subject Matter **Units:** 20

AED 100	Concepts in Agricultural and Environmental Education	3
AED 160	Vocational Education	3
EDU 110	Educational Psychology: General	4
EDU 115	Educating Children with Disabilities	2
EDU 142	Introduction to Environmental Education	4
ESP 110	Principles of Environmental Science	4

Focused Depth Subject Matter **Units:** 16

The specialized focus will consist of a minimum of 16 units in one of the six areas listed below:

Agricultural Business and Economics:

ARE 100A	Intermediate Microeconomics: Theory of Production and Consumption	4
ARE 100B	Intermediate Microeconomics: Imperfect Competition, Markets and Welfare Economics	4
ARE 120	Agricultural Policy	4
ARE 130	Agricultural Markets	4
ARE 135	Agribusiness Marketing Plan Development	2
ARE 138	International Commodity and Resource Markets	4
ARE 140	Farm Management	4
ARE 150	Agricultural Labor	4
ARE 175	Natural Resource Economics	4
ARE 176	Environmental Economics	4

Animal Science:

Choose upper division units from any Animal Genetics, Animal Science, or Avian Sciences courses

OR

ABI 102	Animal Biochemistry and Metabolism	5
FST 109	Principles of Quality Assurance in Food Processing	3
NPB 101	Systemic Physiology	5
NPB 121	Physiology of Reproduction	4
NUT 115	Animal Nutrition	4
NUT 122	Ruminant Nutrition and Digestive Physiology	4
NUT 123	Comparative Animal Nutrition	3

Applied Biological Systems Technology:

ABT 121	Animal Housing and Environment Management	2
ABT 142	Equipment and Technology for Small Farms	2
ABT 161	Water Quality Management for Aquaculture	3
ABT 165	Irrigation Practices for an Urban Environment	2
ABT 182	Environmental Analysis using GIS	4

Environmental Horticulture:

ENH 102	Physiological Principles in Environmental Horticulture	4
ENH 105	Taxonomy and Ecology of Environmental Plant Families	4
ENH 120	Management of Container Media	3
ENH 125	Greenhouse and Nursery Crop Production	5
ENH 133	Woody Plants in the Landscape: Growth, Ecology and Management	4
ENH 160	Restoration Ecology	3
PLS 150	Sustainability and Agroecosystem Management	4

Environmental Science and Natural Resources:

ESP 100	General Ecology	4
ESP 101	Ecology, Nature, and Society	4
ESP 110	Principles of Environmental Science	4
ESP 123	Introduction to Field and Laboratory Methods in Ecology	4
ESP 151	Limnology	4
ESP 161	Environmental Law	4
ESP 170	Conservation Biology Policy	4
EVE 101	Introduction to Ecology	4
EVE 115	Marine Ecology	4
PLS 101	Agriculture and the Environment	3
PLS 105	Concepts in Pest Management	3
WFC 110	Biology and Conservation of Wild Mammals	3
WFC 111	Biology and Conservation of Wild Birds	3
WFC 120	Biology and Conservation of Fishes	3
WFC 154	Conservation Biology	4

Plant and Soil Science:

PLB 102	California Floristics	5
PLB 105	Developmental Plant Anatomy	5
PLB 116	Plant Morphology and Evolution	5
PLB 117	Plant Ecology	4
PLS 150	Sustainability and Agroecosystem Management	4
SSC 100	Principles of Soil Science	5
SSC 102	Environmental Soil Chemistry	3
SSC 118	Soils in Land Use and the Environment	4
VEN 101A	Viticultural Practices	3
VEN 101C	Viticultural Practices	3

Restricted Electives **Units:** 16

Choose at least four additional upper division courses (minimum 16 units; duplicate from Depth specialization courses not counted) selected with approval of an advisor to supplement or expand depth subject matter courses chosen from Animal Biology, Animal Genetics, Animal Science, Agricultural and Resource Economics, Avian Sciences, Environmental Horticulture, Environmental and Resource Sciences, Environmental Science and Policy, Food Science and Technology, International Agricultural Development, Nature and Culture, Neurobiology, Physiology, and Behavior, Nutrition, Plant Sciences, Plant Biology, or Viticulture and Enology.

Total: 149-151

Agricultural & Environmental Education | AED Courses

Questions pertaining to the following courses should be directed to the instructor or Lynn Martindale; 530-754-6655.

Courses in AED:

AED 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Supervised internship off and on campus in areas of agricultural education. (P/NP grading only.) Effective: 1997 Winter Quarter.

AED 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

AED 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

AED 100—Concepts in Agricultural and Environmental Education (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Upper division standing. Philosophy and nature of formal and non-formal agricultural and environmental education programs. Emphasis on understanding the role of the teacher and observing a variety of programs. Effective: 1997 Winter Quarter.

AED 160—Vocational Education (3)
Lecture—3 hours. Philosophy and organization of vocational education, with particular reference to educational principles for agriculture commerce, home economics, and industry. Effective: 1997 Winter Quarter.

AED 171—Audiovisual Communications (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): Upper division standing. Theory and principles of audiovisual communications. Comparison of audiovisual materials such as transparencies, slides, computer- generated graphics, and videos. Operation and use of audiovisual equipment is stressed. Effective: 1997 Winter Quarter.

AED 172—Multimedia Productions (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): AED 171 recommended. Design and production of educational, technical, and professional multimedia presentations. Instructional or professional presentations using a variety of media, including slides, video, transparencies, and computer-generated graphics. Effective: 1997 Winter Quarter.

AED 190—Seminar in Agricultural Education (2)
Seminar—2 hours. Discussion of selected critical issues in agricultural education. May be repeated for credit with consent of instructor. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

AED 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Supervised internship off and on campus in areas of agricultural education. (P/NP grading only.) Effective: 1997 Winter Quarter.

AED 198—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

AED 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

AED 300—Directed Field Experience in Teaching (2)
Discussion—1 hour; Fieldwork—3 hours. Prerequisite(s): AED 100 Experience as teaching assistant in agriculture or home economics programs in public schools. May be repeated once for credit. May be repeated up to 1 time(s). (S/U grading only.) Effective: 1997 Winter Quarter.

AED 301—Planning for Instructional Programs (3)
Lecture—3 hours. Prerequisite(s): AED 100; AED 300 (can be concurrent) Major paradigms in program planning and development. Emphasis on key steps in curriculum development, including selection and organization of educational objectives, learning experiences and teaching materials and
resources. Effective: 1997 Winter Quarter.

AED 302—Teaching Methods in Agricultural Education (3)
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): AED 100; AED 300 (can be concurrent) Development of teaching strategies with special emphasis on the designing of learning experiences, instructional execution, and use of teaching aids in agricultural education. Effective: 1998 Fall Quarter.

AED 306A—Field Experience with Future Farmers of America and Supervised Experience Programs (4)
Fieldwork—6 hours; Lecture/Discussion—2 hours. Prerequisite(s): AED 306B (can be concurrent); Acceptance into a teacher education program. Develop an understanding of the Future Farmers of America and supervised occupational experience programs through planning, conducting, and evaluating actual programs. Effective: 1997 Winter Quarter.

AED 306B—Field Experience in Teaching Agriculture (5-18)
Variable. Prerequisite(s): AED 306A (can be concurrent); AED 100; AED 300; AED 301; AED 302; and Consent of Instructor. Acceptance into a teacher education program. Directed teaching including supervision of occupational experience programs and youth activities in secondary schools or community colleges. May be repeated for credit for maximum of 18 units. May be repeated up to 18 unit(s). Effective: 1997 Winter Quarter.

AED 323—Resource Development: Agricultural Education (3)
Lecture—3 hours. Prerequisite(s): AED 306A; AED 306B Selection and implementation of community resources in teaching. Effective: 1997 Winter Quarter.

AED 390—Seminar: Issues in Agricultural Education (2)
Discussion/Laboratory—4 hours. Prerequisite(s): AED 306A; AED 306B; Acceptance into a teacher education program. Discussion and evaluation of current issues, theories and research in agricultural education. (S/U grading only.) Effective: 1997 Winter Quarter.

Agricultural & Resource Economics

Agricultural & Resource Economics | ARE Information

(College of Agricultural and Environmental Sciences)

Rachael E. Goodhue, Ph.D., Chair of the Department

Department Office. 1176 Social Sciences and Humanities Building; 530-752-1515; https://are.ucdavis.edu/graduate/

Faculty. https://are.ucdavis.edu/people/faculty/

Agricultural & Resource Economics | ARE M.S.

(College of Agricultural and Environmental Sciences)

Rachael E. Goodhue, Ph.D., Chair of the Department

Department Office. 1176 Social Sciences and Humanities Building; 530-752-1515; https://are.ucdavis.edu/graduate/

Faculty. https://are.ucdavis.edu/people/faculty/

Graduate Student Information. 1171 Social Sciences and Humanities Building; 530-752-6185; https://are.ucdavis.edu/graduate/

The program is both an end in itself and a preparation for a Ph.D. degree in Applied Economics. The program includes courses emphasizing applications of economic theory and quantitative methods, along with elective field courses and a thesis option. The M.S. program prepares students for jobs in academic industry and government.

Undergraduate Student Information for the Managerial Economics major, 1176 Social Sciences and Humanities Building; 530-754-9536; https://managerialeconomics.ucdavis.edu/.

Major Program. See Managerial Economics undergraduate program.

Major Advisor. Contact the Department office.

Related Courses. See courses in Economics and Environmental Science and Policy.

Agricultural & Resource Economics | ARE M.S./M.B.A.

(College of Agricultural and Environmental Sciences)

Rachael E. Goodhue, Ph.D., Chair of the Department

Department Office. 1176 Social Sciences and Humanities Building; 530-752-1515; https://are.ucdavis.edu/graduate/

Faculty. https://are.ucdavis.edu/people/faculty/

Graduate Student Information. 1171 Social Sciences and Humanities Building; 530-752-6185; https://are.ucdavis.edu/graduate/

The program combines a course of study similar to the regular M.S. program with a complementary regime of M.B.A. courses similar to the regular M.B.A. program but with some savings in requirements and some synergy. This dual- degree program prepares students for a range of employment opportunities in business-oriented industries.

Undergraduate Student Information for the Managerial Economics major, 1176 Social Sciences and Humanities Building; 530-754-9536; https://managerialeconomics.ucdavis.edu/

Major Program. See Managerial Economics undergraduate program.

Major Advisor. Contact the Department office.

Agricultural & Resource Economics | ARE Ph.D.

(College of Agricultural and Environmental Sciences)

Rachael E. Goodhue, Ph.D., Chair of the Department

Department Office. 1176 Social Sciences and Humanities Building; 530-752-1515; https://are.ucdavis.edu/graduate/

Faculty. https://are.ucdavis.edu/people/faculty/

Graduate Student Information. 1171 Social Sciences and Humanities Building; 530-752-6185; https://are.ucdavis.edu/graduate/

The Ph.D. program provides intensive training in modern economic theory, econometrics, and mathematical programming, with elective fields such as natural resource and environmental economics, development economics, agricultural economics, and econometrics. Complementary fields in other areas of economics and management are also available. It is typically a four or five year course of study that prepares graduates for jobs in academia, government, near-government organizations, and the private sector.

Undergraduate Student Information for the Managerial Economics major, 1176 Social Sciences and Humanities Building; 530-754-9536; https://managerialeconomics.ucdavis.edu/.

Major Program. See Managerial Economics undergraduate program.

Major Advisor. Contact the Department office.

Related Courses. See courses in Economics and Environmental Science and Policy.

Agricultural & Resource Economics | ARE Courses

Courses in ARE:

ARE 001—Economic Basis of the Agricultural Industry (4)
Lecture—4 hours. Agriculture and man; the agricultural industry in U.S. and world economies; production and supply, marketing and demand; agricultural land, capital and labor markets; economic and social problems of agriculture in an urban and industrialized economy emphasizing California. GE credit: SS. Effective: 1997 Winter Quarter.

ARE 001S—Economic Basis of the Agricultural Industry (4)
Lecture—4 hours. Agriculture and man; the agricultural industry in Australia and world economies; production and supply, marketing and demand; agricultural land, capital and labor markets; economic and social problems of agriculture in an urban and industrialized economy emphasizing Australia. Taught in Australia under the supervision of a UC Davis faculty member. Not open for credit to students who have taken ARE 001. GE credit: SS, WC. Effective: 2004 Fall Quarter.

ARE 015—Population, Environment and World Agriculture (4)
Discussion—1 hour; Lecture—3 hours. Economic analysis of interactions among population, environment, natural resources and development of world agriculture. Introduces students to economic thinking about population growth, its causes and consequences for world food demand, and environmental and technological limits to increasing food supplies. GE credit: SS, WC, WE. Effective: 1997 Winter Quarter.

ARE 018—Business Law (4)
Lecture—4 hours. Prerequisite(s): Sophomore standing. General principles of business law in the areas of contracts, business organization, real property, uniform commercial code, sales, commercial paper, employment relations, and creditor-debtor against a background of the history and functioning of our present legal system. GE credit: SS. Effective: 1997 Winter Quarter.

ARE 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Restricted to lower division students. (P/NP grading only.) GE credit: SS. Effective: 1997 Winter Quarter.

ARE 099—Special Study for Undergraduates (1-5)
Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SS. Effective: 1997 Winter Quarter.

ARE 100A—Intermediate Microeconomics: Theory of Production and Consumption (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ((ECN 001A C- or better or ECN 001AV C- or better); ECN 001B C- or better); ((MAT 016A C- or better, MAT 016B C- or better, MAT 016C C- or better) or (MAT 017A C- or better, MAT 017B C- or better) or (MAT 021A C- or better, MAT 021B C- or better)) Pass One open to Managerial Economics (AMGE), Animal Science and Management (AANM), and Textiles and Clothing (ATXC) Majors and Agricultural and Resource Economics (GARE), International Agricultural Development (GIAD), Viticulture and Enology (GVEN) and Transportation Technology and Policy (GTTP) Graduate Majors. Theory of individual consumer and market demand; theory of production and supply of agricultural products, with particular reference to the individual firm; price determination, and employment of resources under pure competition. Not open for credit to students who have completed ECN 100. GE credit: QL, SS. Effective: 2018 Winter Quarter.

ARE 100B—Intermediate Microeconomics: Imperfect Competition, Markets and Welfare Economics (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A C- or better Pass One open to Managerial Economics Majors (AMGE) and Agricultural and Resource Economics (GARE) Graduate Majors. Price determination, and employment of resources under conditions of monopoly, oligopoly, and monopolistic competition. GE credit: QL, SS. Effective: 2017 Spring Quarter.

ARE 100B—Intermediate Microeconomics: Imperfect Competition, Markets and Welfare Economics (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A C- or better; ((ECN 001A C- or better or ECN 001AV C- or better); ECN 001B C- or better); ((MAT 016A C- or better, MAT 016B C- or better, MAT 016C C- or better) or (MAT 017A C- or better, MAT 017B C- or better) or (MAT 021A C- or better, MAT 021B C- or better)) Pass One open to Managerial Economics Majors (AMGE) and Agricultural and Resource Economics (GARE) Graduate Majors. Price determination, and employment of resources under conditions of monopoly, oligopoly, and monopolistic competition. GE credit: QL, SS. Effective: 2018 Summer Session 1.

ARE 106—Econometric Theory and Applications (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A C- or better; STA 103 C- or better Pass One open to Managerial Economics Majors (AMGE) and Agricultural and Resource Economics (GARE) Graduate Majors. Statistical methods for analyzing data to solve problems in managerial economics. Topics include the linear regression model, methods to resolve data problems, and the economic interpretation of results. Not open for credit to students who have enrolled in or completed Economics 140. GE credit: QL, SS. Effective: 2017 Spring Quarter.

ARE 106—Econometric Theory and Applications (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A C- or better; (STA 013 C- or better or STA 013Y C- or better); STA 103 C- or better Pass One open to Managerial Economics Majors (AMGE) and Agricultural and Resource Economics (GARE) Graduate Majors. Statistical methods for analyzing data to solve problems in managerial economics. Topics include the linear regression model, methods to resolve data problems, and the economic interpretation of results. Not open for credit to students who have enrolled in or completed ECN 140. GE credit: QL, SS. Effective: 2018 Summer Session 1.

ARE 107—Econometrics for Business Decisions (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 106 Pass One open to Managerial Economics majors; Pass Two open to majors in the College of Agricultural and Environmental Sciences. Covers state-of-the art econometric and statistical methods for causal and predictive modeling with applications to finance and marketing. GE credit: SS. Effective: 2015 Fall Quarter.

ARE 107—Econometrics for Business Decisions (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 106; ARE 100A C- or better; (STA 013 C- or better or STA 013Y C- or better); STA 103 C- or better Pass One open to Managerial Economics majors; Pass Two open to majors in the College of Agricultural and Environmental Sciences. Covers state-of-the art econometric and statistical methods for causal and predictive modeling with applications to finance and marketing. GE credit: SS. Effective: 2018 Fall Quarter.

ARE 112—Fundamentals of Organization Management (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): Upper-division standing. Pass One restricted to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Role of organizational design and behavior in business and public agencies. Principles of planning, decision making, individual behavior, management, leadership, informal groups, conflict and change in the organization. GE credit: SS. Effective: 2017 Fall Quarter.

ARE 112—Fundamentals of Organization Management (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): Upper-division standing recommended. Pass One restricted to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Role of organizational design and behavior in business and public agencies. Principles of planning, decision making, individual behavior, management, leadership, informal groups, conflict and change in the organization. GE credit: SS. Effective: 2018 Summer Session 1.

ARE 113—Fundamentals of Marketing Management (4)
Lecture—4 hours. Prerequisite(s): ECN 001A or ECN 001AV; For non-majors only. Nature of product marketing by the business firm. Customer-product relationships, pricing and demand; new product development and marketing strategy; promotion and advertising; product life cycles; the distribution system; manufacturing, wholesaling, retailing. Government regulation and restraints. Not open for credit to students who have completed ARE 136. GE credit: SS. Effective: 2018 Winter Quarter.

ARE 115A—Economic Development (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ECN 001B Major issues encountered in emerging from international poverty, problems of growth and structural change, human welfare, population
growth and health, labor markets and internal migration. Important issues of policy concerning international trade and industrialization. (ECN 115A.) GE credit: SS, WC. Effective: 2018 Winter Quarter.

ARE 115B—Economic Development (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ECN 001B Macroeconomic issues of developing countries. Issues include problems in generating capital, conduct of monetary and fiscal policies, foreign aid and investment. Important issues of policy concerning international borrowing and external debt of developing countries. (ECN 115B.) GE credit: SS, WC. Effective: 2018 Spring Quarter.

ARE 118—Tax Accounting (4)
Lecture—4 hours. Prerequisite(s): MGT 011A; MGT 011B; ARE 018 recommended. Development and application of a framework to understand the tax effects of typical management decisions on both entities and their owners. Impacts that different methods of taxation have on business entities with emphasis on tax planning, using income and deduction strategies, retirement plans, and choice of business entity for tax minimization. Effective: 2000 Spring Quarter.

ARE 119—Intermediate Managerial Accounting (4)
Extensive Problem Solving—8 hours; Lecture—4 hours. Prerequisite(s): MGT 011A; MGT 011B Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Use of accounting information by mangers in decision making, planning, directing and controlling operations. Focuses on managerial/cost accounting theory and practice. Covers costing systems, budgeting, and financial statement analysis. GE credit: SS. Effective: 2016 Fall Quarter.

ARE 120—Agricultural Policy (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A C- or better Pass One open to Managerial Economics (AMGE), Animal Science and Management (AANM) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Analytical treatment of historical and current economic problems and governmental policies influencing American agriculture. Uses of economic theory to develop historical and conceptual understanding of the economics of agriculture; how public policy influences the nature and performance of American agriculture. GE credit: SS. Effective: 2018 Spring Quarter.

ARE 120S—Agricultural Policy (4)
Lecture—4 hours. Prerequisite(s): ARE 100A; or Consent of Instructor. Analytical treatment of historical and current economic problems and governmental policies influencing agriculture. Uses of economic theory to develop historical and conceptual understanding of the economics of agriculture; how public policy influences the nature and performance of agriculture. Taught in Australia under the supervision of a UC Davis faculty member. Not open for credit to students who have taken ARE 120. GE credit: SS, WC. Effective: 2004 Fall Quarter.

ARE 121—Economics of Agricultural Sustainability (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); MAT 012; Or equivalent of MAT 012. Pass One open to Majors in the College of Agricultural and Environmental Sciences and Graduate Majors. Application of economic concepts to agro-environmental issues relevant to agricultural sustainability. Topics include market efficiency, production externalities, government policies, agricultural trade, product differentiation, all linked to sustainability issues. Case studies include biofuels, genetically modified foods and geographically differentiated products. GE credit: SS. Effective: 2018 Winter Quarter.

ARE 121—Economics of Agricultural Sustainability (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 001A C- or better or ECN 001AV C- or better Pass One open to Majors in the College of Agricultural and Environmental Sciences and Graduate Majors. Application of economic concepts to agro-environmental issues relevant to agricultural sustainability. Topics include market efficiency, production externalities, government policies, agricultural trade, product differentiation, all linked to sustainability issues. Case studies include biofuels, genetically modified foods and geographically differentiated products. GE credit: SS. Effective: 2018 Fall Quarter.

ARE 130—Agricultural Markets (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 106 Pass One open to Managerial Economics (AMGE), Animal Science and Management (AANM) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Nature, function, organizational structure, and operation of agricultural markets; prices, costs, and margins; market information, regulation, and controls; cooperative marketing. GE credit: SS. Effective: 2016 Fall Quarter.

ARE 130—Agricultural Markets (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 106; ARE 100A C- or better; (STA 013 C- or better or STA 013Y C- or better); STA 103 C- or better Pass One open to Managerial Economics (AMGE), Animal Science and Management (AANM) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Nature, function, organizational structure, and operation of agricultural markets; prices, costs, and margins; market information, regulation, and controls; cooperative marketing. GE credit: SS. Effective: 2018 Fall Quarter.

ARE 132—Cooperative Business Enterprises (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): ECN 001A Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Study of cooperative business enterprise in the United States and elsewhere; economic theories of behavior, principles of operation, finance, decision-making, and taxation. GE credit: SS. Effective: 2016 Fall Quarter.

ARE 132—Cooperative Business Enterprises (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): (ECN 001A C- or better or ECN 001AV C- or better); (UWP 104A or UWP 101) Pass One open to Managerial Economics (AMGE) and Animal Science and Management Majors (AANM) and Agricultural and Resource Economics (GARE) Graduate Majors. Study of cooperative business enterprise in the United States and elsewhere; economic theories of behavior, principles of operation, finance, decision-making, and taxation. GE credit: SS. Effective: 2018 Fall Quarter.

ARE 135—Agribusiness Marketing Plan Development (2)
Lecture/Discussion—2 hours. Prerequisite(s): Upper division standing. Fundamental components required to develop a marketing plan. Appreciation of the concept of marketing plans, appropriate research
required, including the use of library, Internet, survey and interview instruments, government documents, market analysis, business proposition, action planning, financial evaluation and monitoring. (P/NP grading only.) GE credit: SS. Effective: 1999 Fall Quarter.

ARE 136—Managerial Marketing (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100B; ARE 106 Pass One open to Managerial Economics (AMGE), Animal Science and Management (AANM) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Application of economic theory and econometrics to the study of marketing and consumer research. Emphasis on industry structure, history, regulatory aspects, integrated brand promotion, market segmentation, optimal product mix, message placement. GE credit: SS. Effective: 2017 Fall Quarter.

ARE 136—Managerial Marketing (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100B; ARE 106; ARE 100A C- or better; (STA 013 C- or better or STA 013Y C- or better); STA 103 C- or better Pass One open to Managerial Economics (AMGE), Animal Science and Management (AANM) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Application of economic theory and econometrics to the study of marketing and consumer research. Emphasis on industry structure, history, regulatory aspects, integrated brand promotion, market segmentation, optimal product mix, message placement. GE credit: SS. Effective: 2018 Summer Session 1.

ARE 138—International Commodity and Resource Markets (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100B Pass One open to Managerial Economics (AMGE), Animal Science and Management (AANM) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Basic nature and scope of international trade in agricultural commodities, agricultural inputs, and natural resources. Market dimensions and policy institutions. Case studies to illustrate import and export problems associated with different regions and commodities. GE credit: SS. Effective: 2016 Fall Quarter.

ARE 138—International Commodity and Resource Markets (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100B; ARE 100A C- or better Pass One open to Managerial Economics (AMGE), Animal Science and Management (AANM) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Basic nature and scope of international trade in agricultural commodities, agricultural inputs, and natural resources. Market dimensions and policy institutions. Case studies to illustrate import and export problems associated with different regions and commodities. GE credit: SS. Effective: 2018 Fall Quarter.

ARE 139—Futures and Options Markets (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A C- or better; STA 103 C- or better Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. History, mechanics, and economic functions of futures and options markets; hedging; theory of inter-temporal price formation and behavior of futures and options prices; price forecasting; futures and options as policy tools. GE credit: SS. Effective: 2018 Winter Quarter.

ARE 139—Futures and Options Markets (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A C- or better; (STA 013 C- or better or STA 013Y C- or better); STA 103 C- or better Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. History, mechanics, and economic functions of futures and options markets; hedging; theory of inter-temporal price formation and behavior of futures and options prices; price forecasting; futures and options as policy tools. GE credit: SS. Effective: 2018 Fall Quarter.

ARE 140—Farm Management (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): ECN 001A or ECN 001AV Pass One open to Managerial Economics majors. Farm organization and resources; economic and technological principles in decision making; analytical techniques and management control; problems in organizing and managing the farm business. GE credit: SS. Effective: 2018 Winter Quarter.

ARE 140—Farm Management (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): ECN 001A C- or better or ECN 001AV C- or better Pass One open to Managerial Economics majors. Farm organization and resources; economic and technological principles in decision making; analytical techniques and management control; problems in organizing and managing the farm business. GE credit: SS. Effective: 2018 Fall Quarter.

ARE 142—Personal Finance (3)
Lecture—3 hours. Prerequisite(s): ECN 001B Management of income and expenditures by the household. Use of consumer credit, savings, and insurance by households. Principles of tax, retirement, and estate planning. GE credit: SS. Effective: 1997 Winter Quarter.

ARE 143—Investments (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Survey of investment institutions, sources of investment information, and portfolio theory. Analysis of the stock, bond and real estate markets from the perspective of the investor. GE credit: SS. Effective: 2017 Winter Quarter.

ARE 143—Investments (4) ***Review all entries***
Lecture—4 hours. Pass One open to upper-division Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Survey of investment institutions, sources of investment information, and portfolio theory. Analysis of the stock, bond and real estate markets from the perspective of the investor. Not open for credit to students who completed ARE 171 or ARE 171A. GE credit: SS. Effective: 2018 Summer Session 1.

ARE 144—Real Estate Economics (4)
Lecture—4 hours. Prerequisite(s): ARE 100A C- or better Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Economic theory, analysis, and institutions of real estate markets and related financial markets. Techniques for appraising property values. Cases drawn from the raw land, single family, multifamily, industrial and office real estate markets. GE credit: SS. Effective: 2018 Spring Quarter.

ARE 145—Farm and Rural Resources Appraisal (4)
Lecture/Discussion—4 hours. Pass One open to Managerial Economics (AMGE), Animal Science and Management (AANM) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Principles and procedures of the valuation process with emphasis placed on rural real estate. Course includes identification of the major physical and economic determinants of value, the three primary appraisal approaches to valuation, discussion of appraisal activity and practice. GE credit: SS. Effective: 2016 Fall Quarter.

ARE 146—Business, Government Regulation, and Society (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100B Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Variety, nature and impact of government regulation: anti-trust laws and economic and social regulation. Nature of the legislative process, promulgation of regulations, and their impact, especially as analyzed by economists. GE credit: ACGH, SS. Effective: 2016 Fall Quarter.

ARE 146—Business, Government Regulation, and Society (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100B; ARE 100A C- or better Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Variety, nature and impact of government regulation: anti-trust laws and economic and social regulation. Nature of the legislative process, promulgation of regulations, and their impact, especially as analyzed by economists. GE credit: ACGH, SS. Effective: 2018 Fall Quarter.

ARE 147—Resource and Environment Policy Analysis (3)
Lecture—3 hours. Prerequisite(s): ECN 001A or ECN 001AV Open to non-majors only. Natural resource use problems with emphasis on past and current policies and institutions affecting resource use; determinants, principles, and patterns of natural resource use; property rights; conservation; private and public resource use problems; and public issues. Students who have had or are taking ARE 100A, ECN 100, or the equivalent, may receive only 2 units of credit, so must enroll in ARE 147M instead. GE credit: SS. Effective: 2018 Spring Quarter.

ARE 147M—Resource and Environmental Policy Analysis (2)
Lecture—3 hours. Prerequisite(s): ECN 001A or ECN 001AV Open to non-majors only. Natural resource use problems with emphasis on past and current policies and institutions affecting resource use; determinants, principles, and patterns of natural resource use; property rights; conservation; private and public resource use problems; and public issues. Students who have had or are taking ARE 100A, ECN 100, or the equivalent, must enroll in this course for 2 units rather than ARE 147. GE credit: SS. Effective: 2018 Spring Quarter.

ARE 150—Agricultural Labor (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A C- or better Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Analysis of labor markets with focus on U.S. and world agriculture. Labor supply, demand, market equilibrium; why farm labor markets are different; global trends in farm labor; U.S. farm labor history; unions and collective bargaining; immigration policy. GE credit: SS. Effective: 2018 Spring Quarter.

ARE 155—Operations Research and Management Science (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A C- or better; STA 103 C- or better Pass One open to Managerial Economics (AMGE) and Animal Science and Management (AANM) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Introduction to quantitative methods used to analyze business and economic processes: decision analysis for management, mathematical programming, competitive analysis, and other methods. GE credit: QL, SS. Effective: 2017 Spring Quarter.

ARE 155—Operations Research and Management Science (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A C- or better; (STA 013 C- or better or STA 013Y C- or better); STA 103 C- or better Pass One open to Managerial Economics (AMGE) and Animal Science and Management (AANM) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Introduction to quantitative methods used to analyze business and economic processes: decision analysis for management, mathematical programming, competitive analysis, and other methods. GE credit: QL, SS. Effective: 2018 Summer Session 1.

ARE 156—Introduction to Mathematical Economics (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): ARE 100B; ARE 155 Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Linear algebra for economists; necessary and sufficient conditions in static optimization problems; implicit function theorem; economic methodology and mathematics; comparative statics; envelope theorem; Le Chatelier principle; applications to production and consumer models. GE credit: QL, SS. Effective: 2016 Fall Quarter.

ARE 156—Introduction to Mathematical Economics (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): ARE 100B; ARE 155; ARE 100A C- or better; (STA 013 C- or better or STA 013Y C- or better); STA 103 C- or better Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Linear algebra for economists; necessary and sufficient conditions in static optimization problems; implicit function theorem; economic methodology and mathematics; comparative statics; envelope theorem; Le Chatelier principle; applications to production and consumer models. GE credit: QL, SS. Effective: 2018 Fall Quarter.

ARE 157—Analysis for Operations and Production Management (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): ARE 155 Pass One open to Managerial Economics (AMGE), Animal Science and Management (AANM) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Application of economic theory and quantitative methods to analyze operations and production management problems including process strategy, quality management, location and plant layout, and inventory management. GE credit: SS. Effective: 2016 Fall Quarter.

ARE 157—Analysis for Operations and Production Management (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): ARE 155; ARE 100A C- or better; (STA 013 C- or better or STA 013Y C- or better); STA 103 C- or better Pass One open to Managerial Economics (AMGE), Animal Science and Management (AANM) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Application of economic theory and quantitative methods to analyze operations and production management problems including process strategy, quality management, location and plant layout, and inventory management. GE credit: SS. Effective: 2018 Fall Quarter.

ARE 165—Emerging Economies and Globalization (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A C- or better; ARE 115A; ARE 115B; Completion of ARE 106 and ECN 162 strongly recommended. Pass One open to Managerial Economics and graduate majors. Economic drivers and policy challenges in the major emerging markets, with an emphasis on the effects of rising incomes, population growth, urbanization, and relative wages on world markets and natural resources. GE credit: SS. Effective: 2018 Spring Quarter.

ARE 166—The Economics of Global Poverty Reduction: What Works and Why (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100B or ECN 100; ARE 106 or ECN 140; ARE 115A or ECN 115A Pass One open to Managerial Economics (AMGE) and Economics (LECN) majors only. Application of microeconomic theory and econometrics to understand causes of poverty and critically evaluate poverty alleviation policies in low income countries. Effective: 2017 Spring Quarter.

ARE 166—The Economics of Global Poverty Reduction: What Works and Why (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ARE 100B or ECN 100 or ECN 100B); (ARE 106 or ECN 140); (ARE 115A or ECN 115A) Pass One open to Managerial Economics (AMGE) and Economics (LECN) majors only. Application of microeconomic theory and econometrics to understand causes of poverty and critically evaluate poverty alleviation policies in low income countries. Effective: 2018 Fall Quarter.

ARE 171—Principles of Finance (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A C- or better; ARE 106; MGT 011A; MGT 011B Pass One open to Managerial Economics Majors and Agricultural and Resource Economics Graduate Majors. Principles of corporate financial management. Time value of money, interest rates, principles of valuation, NPV, risk and return, and cost of capital. Not open for credit to students who have completed ECN 134. Effective: 2018 Summer Session 1.

ARE 171A—Financial Management of the Firm (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 106; MGT 011A; MGT 011B Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Financial analysis at the firm level: methods of depreciation; influence of the tax structure; inventory, cash, and accounts receivable management; sources of short-term and long-term financing, and financial problem solving using a computer spreadsheet program. Not open for credit to students who have completed Economics 134. GE credit: QL, SS. Effective: 2017 Winter Quarter.

ARE 171A—Financial Management of the Firm (4) ***Review all entries Discontinued***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 106; MGT 011A; MGT 011B Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Financial analysis at the firm level: methods of depreciation; influence of the tax structure; inventory, cash, and accounts receivable management; sources of short-term and long-term financing, and financial problem solving using a computer spreadsheet program. Not open for credit to students who have completed Economics 134. GE credit: QL, SS. Effective: 2018 Summer Session 1.

ARE 171B—Financial Management of the Firm (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 171A Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Financial analysis at the firm level: methods of capital budgeting; calculating the cost of capital; dividend policies; mergers and acquisitions; and special current topics in finance. GE credit: QL, SS. Effective: 2017 Winter Quarter.

ARE 171B—Financial Management of the Firm (4) ***Review all entries Discontinued***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 171A Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Financial analysis at the firm level: methods of capital budgeting; calculating the cost of capital; dividend policies; mergers and acquisitions; and special current topics in finance. GE credit: QL, SS. Effective: 2018 Summer Session 1.

ARE 172—Financial Management of the Firm (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ARE 171A or ARE 171); ARE 106; ARE 100A C- or better; MGT 011A; MGT 011B Pass One open to Managerial Economics Majors and Agricultural and Resource Economics Graduate Majors. Financial analysis at the firm level: optimizing capital structure; minimizing the cost of capital; dividend policies; mergers and acquisitions; real options; and risk management. Effective: 2018 Summer Session 1.

ARE 173—Capital Markets (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 171 or ARE 171A Pass One Open to Managerial Economics majors and Agricultural and Resource Economics graduate majors. Introduction to asset pricing. Valuation and risk characteristics of financial assets, including stocks, bonds, futures, and options. Investors' attitudes toward risk, capital allocation, portfolio selection, the capital asset pricing model, and the efficient market hypothesis. Effective: 2018 Spring Quarter.

ARE 173—Capital Markets (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ARE 171A or ARE 171); ARE 106; ARE 100A C- or better; MGT 011A; MGT 011B Pass One Open to Managerial Economics majors and Agricultural and Resource Economics graduate majors. Introduction to asset pricing. Valuation and risk characteristics of financial assets, including stocks, bonds, futures, and options. Investors' attitudes toward risk, capital allocation, portfolio selection, the capital asset pricing model, and the efficient market hypothesis. Effective: 2018 Fall Quarter.

ARE 175—Natural Resource Economics (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100B or ECN 100; Or the equivalent. Pass One open to Managerial Economics (AMGE) and Environmental Policy Analysis and Planning (AEPP) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Economic concepts and policy issues associated with natural resources, renewable resources (ground water, forests, fisheries, and wildlife populations) and non-renewable resources (minerals and energy resources, soil). (Environmental Science and Policy 175) GE credit: SS. Effective: 2017 Winter Quarter.

ARE 175—Natural Resource Economics (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A C- or better or ECN 100A C- or better or ECN 100 C- or better Pass One open to Managerial Economics (AMGE) and Environmental Policy Analysis and Planning (AEPP) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Economic concepts and policy issues associated with natural resources, renewable resources (ground water, forests, fisheries, and wildlife populations) and non-renewable resources (minerals and energy resources, soil). (ESP 175.) GE credit: SS. Effective: 2018 Fall Quarter.

ARE 176—Environmental Economics (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100B or ECN 100 Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Role of the environment in economic activity and methods for protecting
and enhancing environmental quality; implications of market failures for public policy; design of environmental policy; theory of welfare measurement; measuring the benefits of environmental improvement. GE credit: SS. Effective: 2017 Winter Quarter.

ARE 176—Environmental Economics (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A C- or better or ECN 100A C- or better or ECN 100 C- or better Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Role of the environment in economic activity and methods for protecting
and enhancing environmental quality; implications of market failures for public policy; design of environmental policy; theory of welfare measurement; measuring the benefits of environmental improvement. GE credit: SS. Effective: 2018 Fall Quarter.

ARE 190—Topics in Managerial Economics (3)
Lecture—3 hours. Prerequisite(s): ARE 100A; STA 103; and Consent of Instructor. Selected topics in managerial economics, focusing on current research. May be repeated up to 4 time(s) when the topic differs. GE credit: SS. Effective: 2012 Fall Quarter.

ARE 192—Internship (1-6)
Internship—3-18 hours. Internship experience off and on campus in all subject areas offered in the Department of Agricultural and Resource Economics. Internships are supervised by a member of the staff. (P/NP grading only.) GE credit: SS. Effective: 1997 Winter Quarter.

ARE 194HA—Special Study for Honors Students (4)
Independent Study—3 hours; Seminar—1 hour. Prerequisite(s): ARE 100B; ARE 106; ARE 155 (can be concurrent); and Consent of Instructor. Minimum GPA of 3.500; major in Agricultural and Managerial Economics or Managerial Economics; senior standing. A program of research culminating in the writing of a senior honors thesis under the direction of a faculty adviser. GE credit: QL, SS, WE. Effective: 2000 Winter Quarter.

ARE 194HB—Special Study for Honors Students (4)
Independent Study—3 hours; Seminar—1 hour. Prerequisite(s): ARE 100B; ARE 106; ARE 155 (can be concurrent); Minimum GPA of 3.500; major in Agricultural and Managerial Economics or Managerial Economics; senior standing. A program of research culminating in the writing of a senior honors thesis under the direction of a faculty adviser. GE credit: QL, SS, WE. Effective: 2000 Winter Quarter.

ARE 197T—Tutoring in Managerial Economics (1-3)
Variable. Prerequisite(s): Senior standing in Managerial Economics and consent of Department Chairperson. Undergraduates assist the instructor by tutoring students in one of the department's regularly scheduled courses. (P/NP grading only.) GE credit: SS. Effective: 2012 Fall Quarter.

ARE 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SS. Effective: 1997 Winter Quarter.

ARE 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SS. Effective: 1997 Winter Quarter.

ARE 200A—Microeconomic Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Graduate standing. Linear and non-linear optimization theory applied to develop the theory of the profit-maximizing firm and the utility-maximizing consumer. (ECN 200A.) Effective: 2018 Winter Quarter.

ARE 200B—Microeconomic Theory (5) ***Review all entries***
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): ARE 200A Characteristics of market equilibrium under perfect competition, simple monopoly and monopsony. Emphasis on general equilibrium and welfare economics; the sources of market success and market failures. (Economics 200B) Effective: 1997 Winter Quarter.

ARE 200B—Microeconomic Theory (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 200A Characteristics of market equilibrium under perfect competition, simple monopoly and monopsony. Emphasis on general equilibrium and welfare economics; the sources of market success and market failure. (ECN 200B.) Effective: 2018 Fall Quarter.

ARE 200C—Microeconomic Theory (5) ***Review all entries***
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): ARE 200B Uncertainty and information economics. Individual decision making under uncertainty. Introduction to game theory, with emphasis on applications
to markets with firms that are imperfect competitors or consumers that are imperfectly informed. (Economics 200C) Effective: 1997 Winter Quarter.

ARE 200C—Microeconomic Theory (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 200B Uncertainty and information economics. Individual decision making under uncertainty. Introduction to game theory, with emphasis on applications to markets with firms that are imperfect competitors or consumers that are imperfectly informed. (ECN 200C.) Effective: 2018 Fall Quarter.

ARE 202A—Introduction to Applied Research Methods (3) ***Review all entries***
Lecture/Discussion—3 hours. Prerequisite(s): ARE 204A; ARE 256; ARE 200A (can be concurrent); Or the equivalent of ARE 204A and ARE 256. Study of philosophy and methodology of applied research in agricultural economics. Methods of conceptualization of researchable topics. Method of communication and constructive criticism. Effective: 1997 Winter Quarter.

ARE 202A—Introduction to Applied Research Methods (3) ***Review all entries***
Lecture/Discussion—3 hours. Prerequisite(s): ARE 204A; ARE 200A (can be concurrent); ARE 256A Study of philosophy and methodology of applied research in agricultural economics. Methods of conceptualization of researchable topics. Method of communication and constructive criticism. Effective: 2018 Fall Quarter.

ARE 202B—Applied Microeconomics I: Consumer and Producer Behavior (3)
Lecture/Discussion—3 hours. Prerequisite(s): ARE 200A; ARE 202A; ARE 200B (can be concurrent) Application of consumer and producer theory in models of individual behavior and market-level phenomena. Implications of consumer and producer theory for specification of empirical models of supply and
demand for inputs and outputs and market equilibrium displacement models. Effective: 1997 Winter Quarter.

ARE 202C—Research Design for Applied Microeconomics (3)
Lecture/Discussion—3 hours. Prerequisite(s): ARE 240A; ARE 202B Third of three courses in the Ph.D. level applied microeconomics sequence. Examines the design of empirical research and the application of econometric theory. Effective: 2014 Fall Quarter.

ARE 204A—Microeconomic Analysis I (4)
Lecture—4 hours. Prerequisite(s): ARE 100B or ECN 100; Advanced undergraduates with consent of instructor. Behavior of consumers and producers and their interactions; tools and methods needed to analyze economic behavior in the marketplace. Application of those methods to real-world problems. Effective: 2006 Fall Quarter.

ARE 204B—Microeconomic Analysis II (4)
Lecture—4 hours. Prerequisite(s): ARE 204A; or Consent of Instructor. Behavior in imperfectly competitive markets--monopoly and price discrimination; oligopoly. Introduction to noncooperative game theory. Analysis of decisions made under risk and uncertainty and imperfect information. The economics of externalities and public goods. Effective: 2006 Fall Quarter.

ARE 214—Development Economics (4)
Lecture—4 hours. Prerequisite(s): ARE 100A; ARE 100B; ECN 101; ARE 204A and ECN 160A, ECN 160B recommended. Review of the principal theoretical and empirical issues whose analysis has formed development economics. Analysis of economic development theories and development strategies and their application to specific policy issues in developing country contexts. (ECN 214.) Effective: 1997 Winter Quarter.

ARE 215A—Microdevelopment Theory and Methods I (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 200A or ARE 204A; ARE 240A recommended. Agricultural development theory, with a focus on microeconomics. Agricultural household behavior with and without imperfections and uncertainty. Analysis of rural land, labor, credit and insurance
markets, institutions, and contracts. (ECN 215A.) Effective: 1999 Fall Quarter.

ARE 215B—Open Macroeconomics of Development (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ARE 200A or ARE 204A); (ARE 214 or ARE 215A); (ARE 200D or ARE 205) Models and policy approaches regarding trade,monetary and fiscal issues, capital flows and debt are discussed in the macroeconomic framework of an open developing country. The basic analytical focus is real exchange rate and its impact on sectoral allocation of resources. (ECN 215B.) Effective: 1997 Winter Quarter.

ARE 215C—Microdevelopment Theory and Methods II (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 215A Extension of development theory and microeconomic methods. Agricultural growth and technological change; poverty and income inequality;
multisectoral, including village and regional models. Computable general equilibrium methods and applications. (ECN 215C.) Effective: 1999 Fall Quarter.

ARE 215D—Environmental and Economic Development (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 200A; (ARE 204A or ARE 275) Interdisciplinary course drawing on theoretical and empirical research on interactions between environmental resource use and economic development processes. Analysis of issues emerging at the interface of environmental and development economics. (ECN 215D.) Effective: 1998 Spring Quarter.

ARE 222—International Agricultural Trade and Policy (4)
Lecture—4 hours. Prerequisite(s): (ARE 100B or ARE 204A); ECN 160A; Or the equivalent of ECN 160A. Analysis of country interdependence through world agricultural markets. Partial equilibrium analysis is used to study the impacts of national intervention on world markets, national policy choice in an open economy
and multinational policy issues. Effective: 2014 Fall Quarter.

ARE 223—Economics of Agriculture (4)
Lecture—4 hours. Prerequisite(s): ARE 204A (can be concurrent); ARE 256A (can be concurrent); Or equivalent course(s) completed or concurrent required. Open to MS students in Agricultural and Resource Economics, Ph.D. students in Agricultural and Resource Economics and qualified students from other UC Davis graduate groups/programs. Analytic treatment of the historical development and contemporary role of agriculture in the global, U.S. and California economies. Uses economic reasoning and evidence to develop historical and conceptual understanding of the economics of agriculture, agricultural issues, and related government policies. Effective: 2015 Fall Quarter.

ARE 231—Supply and Demand for Agricultural Products (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 200A; ARE 202A; ARE 240A; or Consent of Instructor. Analysis of supply and demand for agricultural commodities emphasizing the effective use of microeconomic theory with econometric methods,
and other empirical procedures, in conducting applied analysis of supply and demand at the firm and industry level. Effective: 1999 Fall Quarter.

ARE 232—Agricultural Commodity Markets (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 200A; ARE 202A; ARE 240A; or Consent of Instructor. Economic analysis of industries that produce, market, transport, store, and process basic commodities. Analysis of market equilibrium under perfect and imperfect competition, with and without government involvement. Effective: 1999 Fall Quarter.

ARE 233—Agricultural Policy (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 200A; ARE 202A; ARE 240A; or Consent of Instructor. Nature, formation, evolution, and institutions of economic policy applied to food, agricultural, and rural issues. Examples for detailed
consideration include food security, commodity issues, and trade policy. Analytical approaches include static and dynamic welfare analysis, policy design, and political-economic analysis. Effective: 1999 Fall Quarter.

ARE 239—Econometric Foundations (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Course will prepare students for econometric theory and empirical work by examining the statistical foundation of econometrics. Special attention is paid to problems specific to non-experimental data common to social sciences. Topics from matrix algebra are also covered. (ECN 239.) Effective: 2016 Fall Quarter.

ARE 240A—Econometric Methods (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 239; or Consent of Instructor. Least squares, instrumental variables, and maximum likelihood estimation and inference for single equation linear regression model; linear restrictions; heteroskedasticity; autocorrelation; lagged dependent variables. (ECN 240A.) Effective: 2017 Fall Quarter.

ARE 240B—Econometric Methods (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 240A Topics include asymptotic theory and instrumental variables, pooled time-series cross-section estimation, seemingly unrelated regression, classical hypothesis tests, identification and estimation of simultaneous equation models, cointegration, errorcorrection models, and qualitative and limited dependent variable models. (ECN 240B.) Effective: 2000 Spring Quarter.

ARE 240C—Time Series Econometrics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 240B; or Consent of Instructor. Probability theory; estimation, inference and forecasting of time series models; trends and non-standard asymptotic theory; vector time series methods and cointegration; time series models for higher order moments and transition data; state-space modeling; the Kalman filter. (ECN 240C.) Effective: 2016 Fall Quarter.

ARE 240D—Cross Section Econometrics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 240B; or Consent of Instructor. Estimation and inference for nonlinear regression models for cross-section data; models for discrete data and for limited dependent variables; models for panel data; additional topics such as bootstrap and semiparametric regression. (Same course as Economics 240D) (ECN 240D.) Effective: 2016 Fall Quarter.

ARE 240E—Topics in Time Series Econometrics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 240C; or Consent of Instructor. Modern econometric techniques for time series data. Expand on topics covered in Economics 240A, 240B and 240C. Contents may vary from year to year. (ECN 240E.) Effective: 2016 Fall Quarter.

ARE 240F—Topics in Cross Section Econometrics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 240D; or Consent of Instructor. Modern econometrics techniques for cross-section data. Expand on topics covered in Economics 240A, 240B and 240D. Contents may vary from year to year. (ECN 240F.) Effective: 2016 Fall Quarter.

ARE 252—Optimization with Economic Applications (4)
Discussion—1 hour; Lecture—3 hours. Microeconomic topics in the framework of mathematical programming. Effective: 2013 Winter Quarter.

ARE 254—Dynamic Optimization Techniques with Economic Applications (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): ARE 253; And elementary knowledge of ordinary differential equations. Necessary and sufficient conditions in the calculus of variations and optimal control, economic interpretations, the dynamic envelope theorem and transversality conditions, infinite horizon problems and phase diagrams, local stability and comparative statics of the steady state, comparative dynamics. Effective: 1997 Winter Quarter.

ARE 254—Dynamic Optimization Techniques with Economic Applications (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): Elementary knowledge of ordinary differential equations. Necessary and sufficient conditions in the calculus of variations and optimal control, economic interpretations, the dynamic envelope theorem and transversality conditions, infinite horizon problems and phase diagrams, local stability and comparative statics of the steady state, comparative dynamics. Effective: 2018 Fall Quarter.

ARE 255—Applied Dynamic Structural Econometric Modeling (4)
Lecture—4 hours. Prerequisite(s): ARE 254 Course covers structural econometric models of static games of incomplete information, single-agent dynamic optimization problems and multi-agent dynamic games, with a focus on applications to issues relevant to the environment, energy, natural resources, agriculture, and development. Effective: 2014 Fall Quarter.

ARE 256A—Applied Econometrics I (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 106 or ECN 140; or Consent of Instructor. First of two courses in the Masters-level econometrics sequence. The linear regression model and generalizations are applied to topics in agricultural and resource economics. Tools for empirical research for problems requiring more sophisticated tools than standard regression models are emphasized. Effective: 2015 Spring Quarter.

ARE 256B—Applied Econometrics II (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 256A; or Consent of Instructor. Second of two courses in the Masters-level econometrics sequence. The linear regression model and generalizations are applied to topics in agricultural and resource economics. Tools for empirical research for problems requiring more sophisticated tools than standard regression models are emphasized. Effective: 2015 Spring Quarter.

ARE 258—Demand and Market Analysis (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): ARE 204B; ARE 256; or Consent of Instructor. Application of theoretical material covered in 204A/B, with particular focus on production theory/factor demand and imperfect competition/market power. Use of theoretical models as a foundation for empirical economic analysis, and empirical exercises. Independent research on chosen topics, with empirical application. Effective: 2011 Fall Quarter.

ARE 258—Demand and Market Analysis (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): ARE 204B; ARE 256B; or Consent of Instructor. Application of theoretical material covered in 204A/B, with particular focus on production theory/factor demand and imperfect competition/market power. Use of theoretical models as a foundation for empirical economic analysis, and empirical exercises. Independent research on chosen topics, with empirical application. Effective: 2018 Fall Quarter.

ARE 275—Economic Analysis of Resource and Environmental Policies (4)
Lecture/Discussion—4 hours. Prerequisite(s): ARE 204A Development of externality theory, market failure concepts, welfare economics, theory of renewable and non-renewable resource use, and political economic models. Applications to policy issues regarding the agricultural/environment interface and managing resources in the public domain. (ESP 275.) Effective: 1999 Spring Quarter.

ARE 276A—Environmental Economics: Externalities (4)
Lecture—4 hours. Prerequisite(s): Students should have completed the first year graduate level sequence in microeconomics and econometrics. Course introduces fundamental and recent research in environmental economics, focusing on the design, implementation and evaluation of environmental policy instruments to correct market failures. It will expose students to economic theories and empirical techniques frequently used in this field. Effective: 2014 Fall Quarter.

ARE 276B—Environmental Economics: Non-Market Valuation (4)
Lecture—4 hours. Prerequisite(s): Students should have completed the first year graduate level sequence in microeconomics and econometrics. Second PhD field course in environmental economics, covering theory and econometrics of methods for valuing nonmarket goods and environmental quality changes. Topics include revealed preference (travel cost, hedonics, sorting equilibrium) and stated preference (contingent valuation, choice experiments, conjoint analysis) techniques. Effective: 2014 Fall Quarter.

ARE 277—Natural Resource Economics (4)
Lecture—4 hours. Prerequisite(s): ARE 254; or Consent of Instructor. Application of capital theory and dynamic methods to issues of optimal use of renewable and nonrenewable resources. Examination of policy issues associated with forests, fisheries, groundwater, energy resources, watersheds, soil, global climate, and wildlife. Effective: 1999 Spring Quarter.

ARE 290—Topics in Agricultural and Resource Economics (3)
Lecture—3 hours. Selected topics in agricultural and resource economics, focusing on current research. May be repeated up to 4 time(s) for credit. Effective: 2002 Fall Quarter.

ARE 293—Analysis of California Agriculture and Resources (3)
Fieldwork—45 hours; Lecture—1.5 hours. Review and analysis of production, marketing, and resource issues facing agricultural firms in California. Application of economic theory and measurement to individual firm and industry decisions in an applied setting. Fieldwork-45 hours total, including one 5-day summer field trip. (S/U grading only.) Effective: 1997 Winter Quarter.

ARE 298—Directed Group Study (1-5)
Variable. Advanced study through special seminars, informal group studies, or group research on problems for analysis and experimentation. Sections:(1) Managerial Economics; (2) Agricultural Policy; (3) Community and Regional Development; (4) Natural Resources; (5) Human Resources; (6) Research Methods and Quantitative Analysis. Effective: 1997 Winter Quarter.

ARE 299—Individual Study (1-12)
Variable. Sections: (1) Managerial Economics; (2) Agricultural Policy; (3) Community and Regional Development; (4) Natural Resources; (5) Human Resources; (6) Research Methods and Quantitative Analysis; and (7) Dissertation Research Prospectus. (S/U grading only.) Effective: 1997 Winter Quarter.

ARE 299D—Special Study for Doctoral Dissertation (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

ARE 396—Teaching Assistant Training Practicum (1-4)
Variable—3-36 hours. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Agricultural Pest Management Minor; Entomology & Nematology

Agricultural Pest Management Minor; Entomology & Nematology | Agricultural Pest Management Minor

Formerly the departments of Entomology and Nematology

(College of Agricultural and Environmental Sciences)

Steve Nadler, Ph.D., Chairperson of the Department

Joanna Chiu, Ph.D., Vice Chairperson of the Department

Department Office. 367 Briggs Hall; 530-752-0492; http://entomology.ucdavis.edu

Faculty. http://entomology.ucdavis.edu/Faculty/

Minor Requirements:

The Department of Entomology has five minor programs open to students in other disciplines who are interested in rounding out their academic study with a concentration in the area of entomology.

Minor Adviser. S. Lawler, S. Nadler

Agricultural Pest Management **Units:** 22-23

ENT 100	General Entomology	4
ENT 100L	General Entomology Laboratory	2
PLS 105	Concepts in Pest Management	3

Choose at least three:

NEM 100	General Plant Nematology	4
PLS 176	Introduction to Weed Science	4
PLP 120	Introduction to Plant Pathology	4
ENT 123	Plant-Virus-Vector Interaction	3
OR		
PLB 123	Plant-Virus-Vector Interaction	3
OR		
PLP 123	Plant-Virus-Vector Interaction	3

Total: 22-23

Agricultural Systems & Environment Minor; Plant Sciences

Agricultural Systems & Environment Minor; Plant Sciences | Agricultural Systems & Environment Minor

(College of Agricultural and Environmental Science)

Advising Center is located in 1220 Plant and Environmental Sciences; 530-752-1715; http://www.plantsciences.ucdavis.edu/plantsciences/undergrad_students/minors.htm

Minor Advisor. T. Gradziel (Plant Sciences)

Preparatory Material: **Units:** 8-9

Choose one in statistics:

STA 013	Elementary Statistics	4
STA 032	Gateway to Statistical Data Science	4
STA 100	Applied Statistics for Biological Sciences	4
PLS 120	Applied Statistics in Agricultural Sciences	4
SOC 046B	Introduction to Social Research	5

Choose one in plant science:

PLS 002	Botany and Physiology of Cultivated Plants	4

Completion of Biological Sciences 2A, 2B, 2C fulfills this requirement.

Agricultural Systems and Environment **Units:** 18-20

Choose one of the two following tracks:

Sustainable Agriculture Track

PLS 150	Sustainability and Agroecosystem Management	4

SSC 100	Principles of Soil Science	5
PLS 176	Introduction to Weed Science	4
OR		
PLS 105	Concepts in Pest Management	3
OR		
ENT 110	Arthropod Pest Management	5

Choose a minimum of six units:

PLS 112	Forage Crop Production	3
PLS 113	Biological Applications in Fruit Tree Management	2
PLS 114	Biological Applications in Fruit Production	2
PLS 170A	Fruit and Nut Cropping Systems	2
PLS 170B	Fruit and Nut Cropping Systems	2

Range and Natural Resources Track

PLS 130	Rangelands: Ecology, Conservation and Restoration	3

Choose a minimum of 15 units from:

PLS 112	Forage Crop Production	3
PLS 131	Identification and Ecology of Grasses	2
PLS 135	Ecology and Community Structure of Grassland and Savannah Herbivores	3
PLS 150	Sustainability and Agroecosystem Management	4
PLS 163	Ecosystem and Landscape Ecology	4
ESP 123	Introduction to Field and Laboratory Methods in Ecology	4
ESP 172	Public Lands Management	4
WFC 110	Biology and Conservation of Wild Mammals	3
WFC 151	Wildlife Ecology	4

Total: 18-20

American Studies

American Studies | AMS Information

(College of Letters and Science)

Department Office. 1200 Hart Hall; 530-752-6429; http://ams.ucdavis.edu

Faculty. http://ams.ucdavis.edu/faculty

American Studies | AMS A.B.

(College of Letters and Science)

Department Office. 1200 Hart Hall; 530-752-6429; http://ams.ucdavis.edu

Faculty. http://ams.ucdavis.edu/faculty

The Department

American Studies explores the cultures of the United States, as well as their transnational exchanges and impact. The discipline's practitioners seek to understand the historical origins of particular cultures and practices held by individuals and groups within the United States and how those values and beliefs shape social and political realities within and beyond U.S. borders. The approach that American Studies takes is interdisciplinary, meaning that in American Studies we answer these questions using tools developed by numerous disciplines including history, sociology, anthropology, literary criticism, folklore, media and science and technology studies.

American Studies takes as its subject American cultures and provides an excellent, broad education in the liberal arts. Our aim is to make each student a culture critic, a person capable of bringing a thoughtful and humane approach to bear upon our understanding of the varieties of American experiences. Making connections is the way we like to characterize our work in American Studies. American Studies majors are good critical thinkers, develop excellent writing skills, and most importantly "learn how to learn," that is, you learn to figure out what intellectual tools and specialized knowledge you will need to perform a task or solve a problem. These intellectual and communication skills will prepare majors for a broad array of careers.

The Major. American Studies majors create an emphasis devoted to the close study of major issues crucial to the practice of American Studies. Advanced work in at least two other departments or programs allows each student to study areas tailored to his or her own individual education goals. Sample emphases include: Culture and Consumption, Youth Education, Social Identities, Nature, Culture and Environment, Marketing, Advertising and Business, and Food and Health, for example. Students have the option of writing a senior thesis within this emphasis.

Career Alternatives. As an interdisciplinary department, American Studies provides a good liberal arts and sciences undergraduate education. American Studies maximizes a student's contact with a variety of subject matter and approaches. Graduates have moved into a broad range of career settings, including journalism, law, teaching, marketing, non-profit and community organizations, government, social work, environmental planning, library science, museum curatorship, and business. Students discover new career possibilities through their internships in American institutions.

Faculty Advisor. R. Cartwright

Preparatory Subject Matter **Units:** 24

AMS 010	Introduction to American Studies	4

One additional lower division American Studies course

Choose one:

AAS 010	African-American Culture and Society	4
ASA 001	Historical Experience of Asian Americans	4
CHI 010	Introduction to Chicana/o Studies	4
NAS 001	Introduction to Native American Studies	4

OR

An equivalent course in racial and ethnic diversity.

Choose one:

ANT 002	Cultural Anthropology	5
SOC 002	Self and Society	4
WMS 050	Introduction to Critical Gender Studies	4

OR

An equivalent course in social science approaches to culture.

Choose one:

HIS 017A	History of the United States	4
HIS 017B	History of the United States	4
HIS 072A	Women and Gender in America, to 1865	4
HIS 072B	Women and Gender in America, 1865-Present	4

Choose one:

ENL 003	Introduction to Literature	4
ENL 010A	Literatures in English I: To 1700	4
ENL 010B	Literatures in English II: 1700-1900	4
ENL 010C	Literatures in English III: 1900 to Present	4

FMS 001	Introduction to Film Studies	4

OR

An equivalent course introducing critical approaches to literary and visual texts in the humanities.

Depth Subject Matter **Units:** 40

AMS 100	Methods in American Studies	4
AMS 160	Undergraduate Seminar in American Studies	4

American Studies Electives:

Three additional upper-division American Studies courses

Emphasis:

In consultation with the American Studies Undergraduate Advisor, the student designs a program of 20 units (typically five courses) of upper division course work around a unifying theme, period, or subject matter in American cultures. The courses should come from two or more departments or programs and can include up to 8 units of American Studies courses. Only 4 units of course 192 (internship) can be included in the emphasis. The student may choose the senior thesis option (190A-190B) for 8 units of the emphasis and take the remaining 12 units outside the program.

Recommended

Completion of the college requirement in English composition before enrollment in American Studies 190A.

Total: 64

American Studies | AMS Minor

(College of Letters and Science)

Department Office. 1200 Hart Hall; 530-752-6429; http://ams.ucdavis.edu

Faculty. http://ams.ucdavis.edu/faculty

Faculty Advisor. R. Cartwright

American Studies **Units:** 20

American Studies, upper division courses.

No more than 8 units of course 192 may be counted toward this total.

Total: 20

American Studies | AMS Courses

Courses in AMS:

AMS 001A—Science and American Culture (4)

Discussion—1 hour; Lecture—3 hours. American science as a cultural system. Mutual influence and interaction of that system with other cultural systems including religion, social thought, art, architecture, literature, music, and common sense. GE credit: ACGH, DD, WE. Effective: 2002 Spring Quarter.

AMS 001B—Religion in American Lives (4)
Discussion—1 hour; Lecture—3 hours. Religions and spiritual practices in the Unisted States, and their interrelationships with other aspects of U.S. history, society and culture; indigenous and imported faiths, and the impact of immigration, colonization and culture contact on religious systems. GE credit: ACGH, AH, DD, SS, WE. Effective: 1997 Winter Quarter.

AMS 001C—American Lives Through Autobiography (4)
Discussion—1 hour; Lecture—3 hours. American culture as understood through the individual life stories told by Americans, with attention to the roles of gender, race, ethnicity, social class, and sexual orientation in the individual's life course. GE credit: ACGH, AH, DD, SS, WE. Effective: 2003 Winter Quarter.

AMS 001E—Nature and Culture in America (4)
Discussion—1 hour; Lecture—3 hours. Uses and abuses of nature in America; patterns of inhabitation, exploitation, appreciation, and neglect; attention to California; emphasis on metaphor as a key to understanding ourselves and the natural world; attention to models of healing: stewardship, ecology, the "rights" movement. GE credit: ACGH, AH, DD, SS, WE. Effective: 2012 Spring Quarter.

AMS 004—Freshman Seminar (2)
Seminar—2 hours. Prerequisite(s): Open only to students who have completed fewer than 40 quarter units. Class size limited to 25 students. Investigation of a special topic in American Studies through shared readings, discussions, written assignments, and special activities (such as fieldwork, site visits). Emphasis on student participation in learning. Effective: 1997 Winter Quarter.

AMS 005—Technology in American Lives (4)
Discussion—2 hours; Lecture—2 hours. Technology as both a material cultural force and a symbol in American
culture; the lives of engineers at work and play; images of the engineer and technology in popular culture; social political and ethical issues raised by technology. GE credit: AH, SS, WE. Effective: 2016 Fall Quarter.

AMS 010—Introduction to American Studies (4)
Discussion—1 hour; Lecture—3 hours. United States history, culture and society. Examination of cultural objects and social practices. Topics include popular culture (film, TV, Internet), cultural diversity, social activism, play, and communication. GE credit: ACGH, AH, DD, SS, WE. Effective: 2003 Spring Quarter.

AMS 021—Objects and Everyday Life (4)
Discussion—1 hour; Lecture—3 hours; Term Paper. Material culture (objects and artifacts ranging from everyday objects like toys and furnishings to buildings and constructed landscapes) as evidence for understanding the everyday (vernacular) lives (gender, social class, ethnicity, region, age, and other factors; collecting and displaying material. GE credit: ACGH, AH, DD, WE. Effective: 2016 Fall Quarter.

AMS 025—United States as a Business Culture (4)
Discussion—1 hour; Lecture—3 hours. Business as a cultural system and its relation to religion, politics, arts, science, technology, and material culture; business themes of success, creativity, invention, and competition in American autobiographies, fiction, advice literature, film, and television; cultures of the workplace; multinational business. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

AMS 030—Images of America and Americans in Popular Culture (4)
Discussion—1 hour; Lecture—3 hours. Investigation of verbal and visual discourses about American identity in various popular culture products, including film, television, radio, music, fiction, art, advertising, and commercial experiences; discourses about the United States in the popular culture of other societies. GE credit: ACGH, AH, DD, SS, WE. Effective: 1997 Winter Quarter.

AMS 055—Food in American Culture (4)
Discussion—1 hour; Lecture—3 hours. Relationship between food and culture; relationship between food and the social order; influences on eating habits and the tensions between them including identity, convenience, and responsibility; multiple disciplines and genres. (FST 055.) GE credit: ACGH, AH, DD, SS, WE. Effective: 2018 Winter Quarter.

AMS 059—Music and American Culture (4)
Discussion—1 hour; Lecture—3 hours. Examination of music and American culture. Studies will explore music in its cultural contexts, which may include examinations of recording and broadcasting, of race, class, and gender, the role of technolgy, and relationships between musical production, consumption and listening. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

AMS 095—Careers and Identity in American Culture (2)
Discussion—1 hour; Lecture—1 hour. Defining one's identity through the career. The life course, preparation, and choices. Personality and career. Ethics. Gender, ethnicity, sexuality, and social class in the workplace. The transnational workplace. Conflicts between the career and other social roles. Effective: 2007 Summer Quarter.

AMS 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

AMS 099—Individual Study for Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

AMS 100—Methods in American Studies (4)
Lecture/Discussion—3 hours; Term Paper. Design and implementation of interdisciplinary research, analysis and writing for American Studies and other cultural studies fields. Library and Internet research skills, project/problem definition, methods for study of texts, individuals, communities. Hand-on, skill-building, focused reading, discussion. Effective: 2008 Fall Quarter.

AMS 101A—Special Topics: Popular Culture Studies (4)
Seminar—3 hours. Intensive reading, writing, and special projects. Interdisciplinary group study of special topics in American Culture Studies, designed for non-majors as well as majors. May be repeated for credit. Effective: 1997 Winter Quarter.

AMS 101B—Special Topics: Women's Studies (4)
Seminar—3 hours. Intensive reading, writing, and special projects. Interdisciplinary group study of special topics in American Culture Studies, designed for non-majors as well as majors. May be repeated for credit. Effective: 1997 Winter Quarter.

AMS 101C—Special Topics: Material Aspects of American Culture (4)
Seminar—3 hours. Intensive reading, writing, and special projects. Interdisciplinary group study of special topics in American Culture Studies, designed for non-majors as well as majors. May be repeated for credit. Effective: 1997 Winter Quarter.

AMS 101E—Special Topics: American Lives Through Autobiography (4)
Seminar—3 hours. Intensive reading, writing, and special projects. Interdisciplinary group study of special topics in American Culture Studies, designed for non-majors as well as majors. May be repeated for credit. Effective: 1997 Winter Quarter.

AMS 101F—Special Topics: Interrelationship Between Arts and Ideas (4)
Seminar—3 hours. Intensive reading, writing, and special projects. Interdisciplinary group study of special topics in American Culture Studies, designed for non-majors as well as majors. May be repeated for credit. Effective: 1997 Winter Quarter.

AMS 101G—Special Topics: New Directions in American Culture Studies (4)
Seminar—3 hours. Intensive reading, writing, and special projects. Interdisciplinary group study of special topics in American Culture Studies, designed for non-majors as well as majors. May be repeated for credit. Effective: 1997 Winter Quarter.

AMS 101H—Special Topics: Problems in Cross-Cultural American Studies (4)
Seminar—3 hours. Intensive reading, writing, and special projects. Interdisciplinary group study of special topics in American Culture Studies, designed for non-majors as well as majors. May be repeated for credit. Effective: 1997 Winter Quarter.

AMS 110—A Decade in American Civilization (4)
Discussion—2 hours; Lecture—2 hours. Close examination of a single decade in American civilization; the connections between the history, literature, arts, customs, and ideas of Americans living in the decade. Issues and representations of race,class,gender,age,and sexuality in the decade. May be repeated for credit if decades studied are different. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Spring Quarter.

AMS 125—Corporate Cultures (4)
Discussion—1 hour; Fieldwork—1 hour; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Exploration of the small group cultures of American corporate workplaces, including the role of environment, stories, jokes, rituals, ceremonies, personal style, and play. The effects of cultural diversity upon corporate cultures, both from within and in contact with foreign corporations. Effective: 2016 Spring Quarter.

AMS 130—American Popular Culture (4)
Fieldwork—1 hour; Lecture/Discussion—3 hours. American popular expression and experience as a cultural system, and the relationship between this system and elite and folk cultures. Exploration of theories and methods for discovering and interpreting patterns of meaning in American popular culture. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Spring Quarter.

AMS 139—Feminist Cultural Studies (4)
Lecture/Discussion—4 hours. Histories, theories, and practices of feminist traditions within cultural studies. (WMS 139.) GE credit: ACGH, AH, DD, SS, VL, WE. Effective: 2016 Fall Quarter.

AMS 151—American Landscapes and Places (4)
Discussion—1 hour; Fieldwork—3 hours; Lecture—2 hours. Comparative study of several American cultural populations inhabiting a region, including their relationship to a shared biological, physical, and social environment, their intercultural relations, and their relationships to the dominant American popular and elite culture and folk traditions. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Spring Quarter.

AMS 152—The Lives of Children in America (4)
Discussion—2 hours; Lecture—2 hours. Experience of childhood and adolescence in American culture, as understood through historical, literary, artistic, and social scientific approaches. GE credit: ACGH, AH, DD, SS, WE. Effective: 1997 Winter Quarter.

AMS 153—The Individual and Community in America (4)
Discussion—2 hours; Lecture—2 hours. Interdisciplinary examination of past and present tensions between the individual and the community in American experience, as those tensions are expressed in such cultural systems as folklore, public ritual, popular entertainment, literature, fine arts, architecture, and social thought. GE credit: ACGH, AH, DD, SS, WE. Effective: 1997 Winter Quarter.

AMS 154—The Lives of Men in America (4)
Discussion—2 hours; Lecture—2 hours. Interdisciplinary examination of the lives of boys and men in America, toward understanding cultural definitions of masculinity, the ways individuals have accepted or resisted these definitions, and the broader consequences of the struggle over the social construction of gender. GE credit: ACGH, AH, DD, SS, WE. Effective: 1997 Winter Quarter.

AMS 155—Eating in America (4)
Fieldwork; Lecture—3 hours. Interdisciplinary examination of the culture of food in America. Exploration of eating as a richly symbolic event integral to how Americans express and negotiate values, politics and identity. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

AMS 156—Race, Culture and Society in the United States (4)
Discussion—2 hours; Lecture—2 hours. Interdisciplinary examination of the significance of race in the making of America; how race shapes culture, identities and social processes in the United States; the interweaving of race with gender, class and nationhood in self and community. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Spring Quarter.

AMS 157—Animals in American Culture (4)
Discussion—1 hour; Lecture—3 hours. Animals as symbols in American thought, as found in folklore, popular culture, literature, and art; customs and stories around human-animal interactions, including hunting, religion, foodways, pets, zoos, circuses, rodeos, theme parks, and scientific research on animals. GE credit: ACGH, AH, DD, SS, WE. Effective: 2000 Fall Quarter.

AMS 158—Technology and the Modern American Body (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): TCS 001; (AMS 001A or AMS 005) The history and analysis of the relationships between human bodies and technologies in modern society. Dominant and eccentric examples of how human bodies and technologies influence one another and reveal underlying cultural assumptions. (TCS 158.) GE credit: ACGH, AH, WE. Effective: 2003 Fall Quarter.

AMS 160—Undergraduate Seminar in American Studies (4)
Seminar—3 hours; Term Paper. Pass One restricted to American Studies majors; limited enrollment. Intensive reading, discussion, research, and writing by small groups in selected topics of American Studies scholarship; emphasis on theory and its application to American material. May be repeated up to 1 time(s) when content differs. Effective: 2017 Winter Quarter.

AMS 190A—Senior Thesis Research Seminar (4)
Extensive Writing; Seminar—2 hours. Research and prospectus writing for senior thesis. Effective: 2016 Spring Quarter.

AMS 190B—Senior Thesis (4)
Independent Study—12 hours. Prerequisite(s): AMS 190A; Consent of Instructor. In consultation with advisor, student writes an extended research paper on a topic proposed in course 190A. Effective: 2016 Fall Quarter.

AMS 192—Internship in American Institutions (1-12)
Internship—1-12 hours. Prerequisite(s): Consent of Instructor. Enrollment dependent on availability of intern positions, with priority to American Studies majors. Supervised internship and study within and about key organizations in American civilization at archives, museums, schools, historical societies, governmental and social agencies, etc., with attention to the techniques of participant obersvation and the collection of ethnographical data. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

AMS 197T—Tutoring in American Studies (1-5)
Tutorial—1-5 hours. Prerequisite(s): Consent of Chairperson of American Studies Program. Tutoring in lower division American Studies courses, usually in small discussion groups. Periodic meetings with the instructor in charge; reports and readings. May be repeated for credit when the tutoring is for a different course. (P/NP grading only.) Effective: 1997 Winter Quarter.

AMS 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

AMS 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of instructor and chairperson of American Studies Program. (P/NP grading only.) Effective: 1997 Winter Quarter.

AMS 220—American Folklore and Folklife (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Theory and methods for the study of the folklore and the folk customary behavior of Americans; contributions of folklore studies to scholarship in humanities and social science disciplines. Effective: 1997 Winter Quarter.

AMS 250—Cultural Study of Masculinities (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Interdisciplinary approaches to understanding the social and cultural construction of masculinities; attention to the effects of biology, gender, race, class, sexual and national identities; criticism of oral, printed, visual, and mass mediated texts, and of sicial relations and structure. (WMS 250.) Effective: 1997 Winter Quarter.

AMS 255—Food in American Culture (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Graduate standing or advanced undergraduate with consent of instructor. Interdisciplinary theories and methods for the study of food in American culture; food studies in relation to issues of identity (age, gender, ethnicity, religion, region, etc.), social relations, systems of production, and cultures of consumption. Effective: 2007 Fall Quarter.

AMS 298—Group Study (1-5)
Variable—1-5 hours. (P/NP grading only.) Effective: 1997 Winter Quarter.

AMS 299—Individual Study (1-12)
Variable—1-12 hours. (P/NP grading only.) Effective: 1997 Winter Quarter.

AMS 396—Teaching Assistant Training Practicum (1-4)
Variable—1-4 hours. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Animal Behavior (Graduate Group)

Gail L. Patricelli, Ph.D., Chairperson of the Group

Group Office. 227D Life Sciences 530-752-2981; Fax 530-752-8822; animalbehavior@biosci.ucdavis.edu; http://anb.ucdavis.edu/

Faculty. The Group includes faculty from 12 departments in five schools and college.

Animal Behavior (Graduate Group) | ANB Information

Gail L. Patricelli, Ph.D., Chairperson of the Group

Group Office. 227D Life Sciences 530-752-2981; Fax 530-752-8822; animalbehavior@biosci.ucdavis.edu; http://anb.ucdavis.edu/

Faculty. The Group includes faculty from 12 departments in five schools and college.

Animal Behavior (Graduate Group) | ANB M.S.

Gail L. Patricelli, Ph.D., Chairperson of the Group

Group Office. 227D Life Sciences 530-752-2981; Fax 530-752-8822; animalbehavior@biosci.ucdavis.edu; http://anb.ucdavis.edu/

Faculty. The Group includes faculty from 12 departments in five schools and college.

Graduate Study. The Ph.D. program in Animal Behavior is an interdepartmental program focusing on the mechanisms underlying and evolution of behavior, and applications of animal behavior to current problems in conservation biology and animal welfare. The program trains students for teaching and research in a variety of areas, including anthropology, animal science, ecology, entomology, neurobiology, psychology, physiology, veterinary science, wildlife biology, and zoology. Resources available to students, in addition to various departmental facilities, include those of the California National Primate Research Center, Bodega Marine Laboratory, and the UC Natural Reserve System.

The Master of Science degree is offered only en route to the Ph.D.

There is an application deadline of Dec 1 for fall quarter.

Preparation **Units:** 0

Appropriate preparation is a bachelor's or master's degree in a discipline relevant to the biology of behavior. In addition, at least one course from each of the following areas must be taken before admission into the program or before the end of the first year in the program.

Ecology, e.g.:

EVE 101	Introduction to Ecology	4
ESP 100	General Ecology	4

Genetics, e.g.:

BIS 101	Genes and Gene Expression	4

Statistics, e.g.:

STA 102	Introduction to Probability Modeling and Statistical Inference (Discontinued)	4
ANT 119	World Writing Systems (Discontinued)	4

Evolution, e.g.:

EVE 100	Introduction to Evolution	4

Animal Behavior, e.g.:

NPB 102	Animal Behavior	3

Physiology, e.g.:

NPB 101	Systemic Physiology	5

Core Requirements **Units:** 24-27

Students take two "breadth" courses, at least one course in statistics, a methodology and grant writing course, and a graduate seminar.

Required courses:

Fundamentals of Animal Behavior

ANB 218A	Fundamentals of Animal Behavior	5
ANB 218B	Fundamentals of Animal Behavior	5

Methodology and Grant Writing

ANB 201	Scientific Approaches to Animal Behavior Research	3

Advanced Statistics

PSC 204A	Statistical Analysis of Psychological Experiments	5
PSC 204B	Causal Modeling of Correlational Data	5
PSC 204C	Applied Psychometrics and Measurement Theory (Discontinued)	4
PSC 204D	Advanced Statistical Inference from Psychological Experiments	5
STA 106	Applied Statistical Methods: Analysis of Variance	4
STA 108	Applied Statistical Methods: Regression Analysis	4
STA 138	Analysis of Categorical Data	4
STA 205	Statistical Methods for Research with SAS	4
AGR 204 (Nonexistent)		
AGR 206	Multivariate Systems and Modeling (Discontinued)	4

Graduate Seminars

ANB 290	Seminar in Animal Behavior	1-3

Strongly recommended:

A course on teaching science:

BIS 310	Effective Teaching of College Biology (Discontinued)	2
PSC 390A	The Teaching of Psychology	6
PSC 390B	The Teaching of Psychology	4

Electives:

Students also take two additional courses (of at least 3 units each) in the student's area of specialization, chosen in consultation with and approved by the Course Guidance Committee.

Strongly recommended:

At least one additional course in statistics or modeling. In addition to the above listed courses, modeling courses include:

PBG 231	Mathematical Methods in Population Biology	3
PSC 120	Agent-Based Modeling	4

Animal Behavior (Graduate Group) | ANB Ph.D.

Gail L. Patricelli, Ph.D., Chairperson of the Group

Group Office. 227D Life Sciences 530-752-2981; Fax 530-752-8822; animalbehavior@biosci.ucdavis.edu; http://anb.ucdavis.edu/

Faculty. The Group includes faculty from 12 departments in five schools and college.

Graduate Study. The Ph.D. program in Animal Behavior is an interdepartmental program focusing on the mechanisms underlying and evolution of behavior, and applications of animal behavior to current problems in conservation biology and animal welfare. The program trains students for teaching and research in a variety of areas, including anthropology, animal science, ecology, entomology, neurobiology, psychology, physiology, veterinary science, wildlife biology, and zoology. Resources available to students, in addition to various departmental facilities, include those of the California National Primate Research Center, Bodega Marine Laboratory, and the UC Natural Reserve System.

The Master of Science degree is offered only en route to the Ph.D.

There is an application deadline of Dec 1 for fall quarter.

Preparation **Units:** 0

Appropriate preparation is a bachelor's or master's degree in a discipline relevant to the biology of behavior. In addition, at least one course from each of the following areas must be taken before admission into the program or before the end of the first year in the program.

Ecology, e.g.:

EVE 101	Introduction to Ecology	4
ESP 100	General Ecology	4

Genetics, e.g.:

BIS 101	Genes and Gene Expression	4

Statistics, e.g.:

STA 102	Introduction to Probability Modeling and Statistical Inference (Discontinued)	4

PSC 103	Advanced Research Design and Data Analysis (Discontinued)	5

Evolution, e.g.:

EVE 100	Introduction to Evolution	4

Animal Behavior, e.g.:

NPB 102	Animal Behavior	3

Physiology, e.g.:

NPB 101	Systemic Physiology	5

Core Requirements **Units:** 24-27

Students take two "breadth" courses, at least one course in statistics, a methodology and grant writing course, and a graduate seminar.

Required courses:

Fundamentals of Animal Behavior

ANB 218A	Fundamentals of Animal Behavior	5
ANB 218B	Fundamentals of Animal Behavior	5

Methodology and Grant Writing

ANB 201	Scientific Approaches to Animal Behavior Research	3

Advanced Statistics

PSC 204A	Statistical Analysis of Psychological Experiments	5
PSC 204B	Causal Modeling of Correlational Data	5
PSC 204C	Applied Psychometrics and Measurement Theory (Discontinued)	4
PSC 204D	Advanced Statistical Inference from Psychological Experiments	5
STA 106	Applied Statistical Methods: Analysis of Variance	4
STA 108	Applied Statistical Methods: Regression Analysis	4
STA 138	Analysis of Categorical Data	4
STA 205	Statistical Methods for Research with SAS	4
AGR 204 (Nonexistent)		
AGR 206	Multivariate Systems and Modeling (Discontinued)	4

Graduate Seminars

ANB 290	Seminar in Animal Behavior	1-3

Strongly recommended:

A course on teaching science:

BIS 015	Biology of Aging (Discontinued)	3
PSC 390A	The Teaching of Psychology	6
PSC 390B	The Teaching of Psychology	4

Electives:

Students also take two additional courses (of at least 3 units each) in the student's area of specialization, chosen in consultation with and approved by the Course Guidance Committee.

Strongly recommended:

At least one additional course in statistics or modeling. In addition to the above listed courses, modeling courses include:

PBG 231	Mathematical Methods in Population Biology	3
PSC 120	Agent-Based Modeling	4

Animal Behavior (Graduate Group) | ANB Courses

Courses in ANB:

ANB 201—Scientific Approaches to Animal Behavior Research (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Philosophical issues, goals, strategies and tools in field and laboratory research. May be repeated for credit. Effective: 1997 Winter Quarter.

ANB 210—History of Animal Behavior (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Classic, seminal papers in animal behavior. Discussion of readings and broader historical context in which papers were written. (S/U grading only.) Effective: 2002 Fall Quarter.

ANB 218A—Fundamentals of Animal Behavior (5)
Discussion—1 hour; Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Upper-division undergraduate introduction to the biology of behavior, such as PSC 101, PSC 122, PSC 123, NPB 102, NPB 150, NPB 152, WFC 141, ENT 104, or ANS 105. Survey of the phenomena and theory of animal behavior from the
perspectives of multiple biological disciplines, including evolution, ecology, psychology, genetics, neurobiology, endocrinology, and animal science. (PSC 218A.) Effective: 2007 Fall Quarter.

ANB 218B—Fundamentals of Animal Behavior (5)
Discussion—1 hour; Lecture/Discussion—4 hours. Prerequisite(s): ANB 218A or PSC 218A; or ECL 218A; consent of instructor. Survey of the phenomena and theory of animal behavior from the perspectives of multiple biological disciplines, including evolution, ecology, psychology, genetics, neurobiology, endocrinology, and animal science. (ECL 2018A and PSC 218B.) Effective: 2007 Fall Quarter.

ANB 221—Animal Behavior, Ecology and Evolution (3)
Lecture—3 hours. Prerequisite(s): NPB 102; EVE 100; EVE 101; and Consent of Instructor. Or the equivalent, graduate standing. Interface between animal behavior, ecology and evolution. New developments in behavioral ecology development and testing of hypotheses in this discipline. (PBG 221.) Effective: 2002 Winter Quarter.

ANB 230A—Interdisciplinary Approaches to Animal Behavior (3)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Analysis of literature in behavior and an allied discipline or disciplines that offer the potential, in combination, to advance the understanding of a topic in animal behavior conceptually and empirically. Topics will vary from year to year. Effective: 1997 Winter Quarter.

ANB 230B—Interdisciplinary Approaches to Animal Behavior (5)
Discussion—3 hours; Term Paper—1 hour; Workshop—4 hours. Prerequisite(s): ANB 230A; Taken the previous quarter. Development of an empirical or theoretical interdisciplinary approach to research on a current topic in animal behavior. Effective: 1997 Winter Quarter.

ANB 270—Research Conference in Behavioral Ecology (1)
Conference—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Critical presentation and evaluation of current literature and ongoing
research in behavioral ecology. Limited enrollment. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Fall Quarter.

ANB 287—Advanced Animal Behavior (2)
Seminar—2 hours. Prerequisite(s): NPB 102; (EVE 100 or EVE 101); and Consent of Instructor. Or the equivalents; graduate standing. Reading, reports and discussion on current topics in animal behavior, with a focus on topics that lie at the interface between animal behavior, ecology and evolution. May be repeated up to 2 time(s). (PBG 287.) Effective: 2002 Spring Quarter.

ANB 290—Seminar in Animal Behavior (1-3)
Seminar—1-3 hours. Prerequisite(s): Consent of Instructor. Selected topics in animal behavior. (S/U grading only.) Effective: 1997 Winter Quarter.

ANB 294—Seminar in Behavioral Ecology of Predators and Prey (3)
Seminar—2 hours. Prerequisite(s): Graduate standing. Presentation and analysis of research papers on social and foraging behavior of predatory animals, antipredator strategies of prey species, co-evolution of predators and prey, and ecology of predator prey interactions. May be repeated up to 2 time(s). (WFC 294.) Effective: 2003 Winter Quarter.

ANB 298—Group Study (1-5)
Discussion—1-5 hours; Laboratory—5-15 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Lectures and/or discussion of current issues, problems, or techniques in animal behavior. Effective: 1997 Winter Quarter.

ANB 299—Research (1-12)
Laboratory—3-36 hours. Advanced research in one of the specialty areas in animal behavior (S/U grading only.) Effective: 1997 Winter Quarter.

ANB 396—Teaching Assistant Training Practicum (1-4)
Variable. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Animal Biology

Animal Biology | ABI B.S

(College of Agricultural and Environmental Sciences)

Department. Entomology and Nematology

The Major. https://abi.ucdavis.edu/

Faculty. http://entomology.ucdavis.edu/Faculty/

The Major Program

The Animal Biology major offers students training in the biological and natural sciences as they apply to animals. The major covers the basic biological sciences that explain animal evolution, systematics, ecology, physiology and molecular biology. Students in the Animal Biology major are encouraged to think beyond particular groups of animals in which they are interested and to consider science as a process and a way of advancing society. Emphasis is on biological principles that can be used in research or in solving societal problems associated with animals in agriculture, urban areas, or natural environments.

The Program. The Animal Biology major consists of core courses in the biological sciences that build an understanding of animal biology from the molecular to the ecological and evolutionary levels of organization. After completing these core courses, students have the option of specializing in various interdisciplinary aspects of animal biology, and plan their chosen emphasis of study as part of a required discussion course and in consultation with their advisor. The Animal Biology major emphasizes courses on biological principles as opposed to courses on animal care and husbandry. This program includes a senior thesis, which each student designs to bridge the disciplines of the major.

Internships and Career Alternatives. The program and interests of each student in solving societal problems guides him or her to logical internship and career choices. On- and off-campus internship opportunities are available in research laboratories, in field situations, with governmental agencies, with private industry, and in international programs. A degree in Animal Biology prepares students for careers in research, teaching, governmental regulation, health, or agriculture as each relates to the integrative biology or ecology of animals. Careers in veterinary medicine, animal husbandry and animal management are open to Animal Biology majors, however, other

preparation may be required. Students in the major gain research experience and may choose to continue their training at the graduate or professional level in a variety of biological disciplines.

Master Advisor. R. Kimsey

Major Advisor. E. Galvan Hack

Advising Center for the major, including peer advising, is located in 150 and 152 Hutchison Hall 530-754-7277; abi-advising@ucdavis.edu.

Preparatory Subject Matter **Units:** 69-74

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
BIS 002C	Introduction to Biology: Biodiversity and the Tree of Life	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 002C	General Chemistry	5
CHE 008A	Organic Chemistry: Brief Course	2
CHE 008B	Organic Chemistry: Brief Course	4
CHE 118A	Organic Chemistry for Health and Life Sciences	4
CHE 118B	Organic Chemistry for Health and Life Sciences	4
MAT 016A	Short Calculus	3
MAT 016B	Short Calculus	3
MAT 016C	Short Calculus	3
OR		
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
MAT 017C	Calculus for Biology and Medicine	4
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
PHY 007A	General Physics	4
PHY 007B	General Physics	4
PHY 007C	General Physics	4

Choose one:

STA 013	Elementary Statistics	4
STA 100	Applied Statistics for Biological Sciences	4

ABI 050A	Animal Biology Laboratory	2
ABI 050B	Animal Biology	3
ABI 050C	Animal Biology	3

Depth Subject Matter **Units:** 29-36

BIS 101	Genes and Gene Expression	4
ABI 102	Animal Biochemistry and Metabolism	5

ABI 103	Animal Biochemistry and Metabolism	5
OR		
BIS 102	Structure and Function of Biomolecules	3
BIS 103	Bioenergetics and Metabolism	3

Choose one:

NPB 101	Systemic Physiology	5
NPB 117	Avian Physiology	3
ENT 102	Insect Physiology	4
WFC 121	Physiology of Fishes	4

Choose one:

APC 100	Comparative Vertebrate Organology	4
ENT 101	Functional Insect Morphology	3
NPB 123	Comparative Vertebrate Organology	4

EVE 100	Introduction to Evolution	4

Choose one:

ESP 100	General Ecology	4
ESP 121	Population Ecology	4
EVE 101	Introduction to Ecology	4
EVE 102	Population and Quantitative Genetics	4

ABI 187	Animal Biology Seminar	2
ABI 189	Senior Practicum	2
ABI 189D	Senior Practicum Discussion	1

Restricted Electives **Units:** 25

Focused specialty upper division courses as outlined in the student's major proposal (from course 187) with approval of an advisor.

Total: 123-135

Animal Biology | ABI Courses

Courses in ABI:

ABI 050A—Animal Biology Laboratory (2)
Lecture/Lab—4 hours. Scientific methods for answering questions in animal biology by doing exercises to demonstrate hypothesis testing and reporting, short laboratory, population and field experiments. Maintain notebooks, analyze data, interpret results and write reports. Effective: 2018 Winter Quarter.

ABI 050B—Animal Biology (3)
Lecture—3 hours. Prerequisite(s): BIS 001A; BIS 001B (can be concurrent) Basic biological disciplines important to an understanding of practical animal biology issues including the evolution of animal groups, genetic
mechanisms, animal physiology as it relates to maintenance and production, and aspects of comparative anatomy, behavior and ecology. Effective: 2018 Winter Quarter.

ABI 050C—Animal Biology (3)
Lecture—3 hours. Prerequisite(s): BIS 001B; BIS 001C; ABI 050A; ABI 050B Animal management and conservation. Societal concerns arising from
management and conservation issues, including economics, aesthetics, regulations, safety, public perspectives and advocacy Effective: 2018 Winter Quarter.

ABI 092—Intership in Animal Biology (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Office, laboratory or fieldwork off or on campus in research, governmental regulation, policy making, and private enterprise dealing with animal related issues of production, welfare, pest management, biodiversity and the environment. All requirements of Internship Approval Request form must be met. (P/NP grading only.) Effective: 2018 Winter Quarter.

ABI 098—Directed Group Study (1-5)
Variable—1-5 hours. - (P/NP grading only.) Effective: 2018 Winter Quarter.

ABI 099—Special Study for Unergraduate (1-5)
Variable—1-5 hours. (P/NP grading only.) Effective: 2018 Winter Quarter.

ABI 102—Animal Biochemistry and Metabolism (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): (CHE 002A, CHE 002B, CHE 008A, CHE 008B) or (CHE 118A, CHE 118B) Water and biological buffers; thermodynamics of metabolism; structure and function of biomolecules; enzyme kinetics and function; membrane biology; digestion and absorption; carbohydrate metabolism. Not open for credit to students who have completed BIS 102. Effective: 2018 Winter Quarter.

ABI 103—Animal Biochemistry and Metabolism (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): ABI 102 or BIS 102 Physiological function and metabolism of lipids and amino acids; integrative metabolism; biochemical basis for nutrient requirements; structure and function of vitamins; mineral metabolism and requirements. Not open for credit to students who have completed BIS 103. Effective: 2018 Winter Quarter.

ABI 187—Animal Biology Seminar (2)
Discussion—1 hour; Seminar—1 hour. Junior standing. Seminar leading to development of the Major Proposal for the Animal Biology major. Effective: 2018 Fall Quarter.

ABI 189—Senior Practicum (2)
Independent Study—6 hours. Prerequisite(s): ABI 050A; ABI 050B; ABI 050C; ABI 187; Junior standing. The practicum may be an experimental research project, a library research project or some other creative activity that will serve as a capstone experience for the Animal Biology major. May be repeated once for credit. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 2018 Winter Quarter.

ABI 189D—Senior Practicum Discussion (1)
Discussion—1 hour. Prerequisite(s): ABI 050A; ABI 050B; ABI 050C; ABI 187; ABI 189 (can be concurrent); Junior standing. Course helps prevent or solve problems during the students' senior practicum activity. (P/NP grading only.) Effective: 2018 Winter Quarter.

ABI 192—Internship in Animal Biology (1-12)
Variable. Prerequisite(s): Consent of Instructor. Completion of 84 units. Office, laboratory or fieldwork off or on campus in research, governmental regulations, policy making, and private enterprise dealing with animal related issues of production, welfare, pest management, biodiversity and the environment. All requirements of Intership Approval Request form must be met. (P/NP grading only.) Effective: 2018 Winter Quarter.

ABI 198—Directed Group Study (1-5)
Variable—1-5 hours. (P/NP grading only.) Effective: 2018 Winter Quarter.

ABI 199—Special Study for Advanced Unergratuate (1-5)
Variable—1-5 hours. (P/NP grading only.) Effective: 2018 Winter Quarter.

Animal Biology (Graduate Group)

Animal Biology (Graduate Group) | ABG M.S.

(College of Agricultural and Environmental Sciences)

James W. Oltjen, Ph.D., Chairperson of the Group

Group Office. 1249 Meyer Hall; 530-752-2382; Fax 530-752-0175; http://animalbiology.ucdavis.edu

Faculty. http://animalbiology.ucdavis.edu/people/

Graduate Study. The Graduate Group in Animal Biology offers programs of study and research leading to the M.S. and the Ph.D. degrees. The Animal Biology Graduate Group focuses on integrated animal biology. Each student individually tailors his/her program of study to meet individual needs. The Animal Biology Graduate Group is unique in encouraging a multidisciplinary or interdisciplinary approach involving physiology, nutrition, genetics, ecology and/or behavior within the context of organismal animal biology.

Preparation. Applicants should have undergraduate preparation in a field appropriate to the course of study selected, including upper division coursework in most of the following subjects: biochemistry, genetics, nutrition, physiology, and integrative animal biology such as animal management.

Graduate Advisors. R.C. Hovey, E.A. Maga, C.B. Tucker, J.D. Murray, E.Kebreab, P.J. Ross, S. Meyers, A. Todgham, R. Bellone

Animal Biology (Graduate Group) | ABG Ph.D.

(College of Agricultural and Environmental Sciences)

James W. Oltjen, Ph.D., Chairperson of the Group

Group Office. 1249 Meyer Hall; 530-752-2382; Fax 530-752-0175; http://animalbiology.ucdavis.edu

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Graduate Study. The Graduate Group in Animal Biology offers programs of study and research leading to the M.S. and the Ph.D. degrees. The Animal Biology Graduate Group focuses on integrated animal biology. Each student individually tailors his/her program of study to meet individual needs. The Animal Biology Graduate Group is unique in encouraging a multidisciplinary or interdisciplinary approach involving physiology, nutrition, genetics, ecology and/or behavior within the context of organismal animal biology.

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Graduate Advisors. R.C. Hovey, E.A. Maga, C.B. Tucker, J.D. Murray, E.Kebreab, P.J. Ross, S. Meyers, A. Todgham, R. Bellone

Animal Biology (Graduate Group) | ABG Courses

Courses in ABG:

ABG 200A—Integrated Animal Biology I (3)
Lecture/Discussion—3 hours. Prerequisite(s): BIS 101; or Consent of Instructor. Or equivalent of course; graduate standing. Class size limited to 20 students; Pass One restricted to Animal Biology Graduate Group students. Natural history, management, historical and current uses, and specialized disciplinary features of model and novel animal systems used in research. Development of conceptual approaches in organismal biology to improve experimental design and interpretation of interdisciplinary research studies. Effective: 2005 Fall Quarter.

ABG 200B—Integrated Animal Biology II (3)
Lecture/Discussion—3 hours. Prerequisite(s): ABG 200A Limited enrollment; Pass One restricted to Animal Biology Graduate Group students. Natural history, management, historical and current uses, and specialized disciplinary features of model and novel animal systems used in research. Development of conceptual approaches in organismal biology to improve experimental design and interpretation of interdisciplinary research studies. Effective: 2006 Winter Quarter.

ABG 202—Grant Procurement and Administration (2)
Discussion/Laboratory—1 hour; Lecture—1 hour. Prerequisite(s): ABG 200B Class size limited to 12 graduate students; Pass One restricted to Animal Biology Graduate Group students. Topics include: structure of grants, attention to specifications, concise persuasive writing, and grant budgeting. Identify grant opportunities, write a persuasive research grant proposal, and administer grants. Effective: 2009 Fall Quarter.

ABG 203—Advanced Animal Welfare (3)
Lecture—3 hours. Advanced animal welfare. Key concepts used when evaluating and understanding the welfare of animals kept by humans. Topics include animal pain, stress, cognition, motivation and emotions. Critical discussion of primary literature. May be repeated up to 1 time(s) It is offered every other year and the topics are adjusted (as well as updated) so it would be a different course. Effective: 2016 Spring Quarter.

ABG 205—Advanced Nutritional Energetics (3)
Discussion/Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): (ABI 102, ABI 103, NPB 101); or the equivalent courses. Class size limited to 30 students. History of nutritional energetics. Evaluation of energy transformations associated with food utilization. Energy expenditures at cellular, tissue, and animal levels as affected by diet and physiological state. Current and future feeding systems. Effective: 2017 Spring Quarter.

ABG 211—Advances in Animal Biotechnology and Genetics (3)
Lecture/Discussion—3 hours. Prerequisite(s): NPB 121; BIS 101; or Consent of Instructor. Pass One restricted to graduate students. Introduction to advanced techniques used for assisted reproductive technologies in mammals and birds, genetic engineering, gene editing, stem cell biology. Offered in alternate years. Effective: 2017 Spring Quarter.

ABG 250—Mathematical Modeling in Biological Systems (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 016A; MAT 016B; STA 100; Or equivalents required; graduate standing; MAT 016C or equivalent recommended; more than one course in statistics recommended; ABI 102 or BIS 102 recommended or equivalent course in biochemistry. Limited enrollment. Model development and evaluation including sensitivity analyses using R. Four principle modeling methodologies included: algebraic functions of biological processes, physiological-based compartmental models, linear programming and meta-analysis. Fundamental background and understanding of mathematical modeling principles in biological systems. Effective: 2012 Winter Quarter.

ABG 255—Physiology of the Stress Response (2)
Lecture/Discussion—2 hours. Prerequisite(s): Graduate standing. Definition of Stress; Physiological mechanisms of adaptation to stress; Hormonal control of the systemic stress response; Mechanisms of the cellular stress response; Discussion of current trends in stress physiology and current methods for studying the stress response. (MCP 255.) Effective: 2006 Summer Session 2.

ABG 290—Seminar in Animal Biology (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Seminar on advanced topics in animal biology. Presentations by members of the Animal Biology Graduate Group and guest speakers. May be repeated for credit for credit. (S/U grading only.) Effective: 2005 Spring Quarter.

ABG 290C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Student presentations of research in Animal Biology and discussions among participating students and Animal Biology faculty. May be repeated for credit for credit. (S/U grading only.) Effective: 2005 Spring Quarter.

ABG 298—Group Study in Animal Biology (1-5)
Lecture. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated up to 2 time(s). Effective: 2006 Fall Quarter.

ABG 299—Research (1-11)
Discussion/Laboratory—3-33 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Research with a faculty member in Animal Biology Graduate Group. May be repeated for credit for credit. (S/U grading only.) Effective: 2005 Winter Quarter.

ABG 300—Methods in Teaching Animal Biology (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Practical experience in the methods and problems of teaching animal biology. Includes analysis of laboratory exercises, discussion of teaching techniques, grading scientific essays, preparing for and conducting discussion or laboratory sections, formulating quiz and exam questions under instructor supervision. May be repeated up to 3 time(s). (S/U grading only.) Effective: 2005 Spring Quarter.

ABG 396—Teaching Assistant Training Practicum (1-4)
Variable—3-12 hours. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit. (S/U grading only.) Effective: 2005 Spring Quarter.

ABG 401—Ethics and Professionalism in Animal Biology (2)
Discussion—2 hours. Restricted to graduate standing; Pass One restricted to Animal Biology graduate group students. Case studies and discussion of ethical and professional issues for animal biologists, including the use of animals in research and teaching, patenting and intellectual property, consulting and conflict of interest, scientific integrity, dealing with the media, and mentoring relationships. Effective: 2005 Spring Quarter.

Animal Genetics

Animal Genetics | ANG Information

(College of Agricultural and Environmental Sciences)

Faculty. http://animalscience.ucdavis.edu/faculty/

Minor Program. See the minor in Animal Science**.**

Related Courses **Units:** 0

BIS 101	Genes and Gene Expression	4
BIS 101D	Genes and Gene Expression Discussion	1
EVE 102	Population and Quantitative Genetics	4
EVE 175	Computational Genetics	3

Genetics Graduate Group courses:

MIC 150	Genomes of Pathogenic Bacteria	3
MIC 170	Yeast Molecular Genetics	3
MIC 215	Recombinant DNA	3
MIC 274	Seminar in Genetic Recombination	1
MIC 292	Seminar in Bacterial Physiology and Genetics	1
MCB 121	Advanced Molecular Biology	3
MCB 160L	Principles of Genetics Laboratory	5
MCB 162	Human Genetics and Genomics	3
MCB 163	Developmental Genetics	3
MCB 164	Advanced Eukaryotic Genetics	3
MCB 178	Undergraduate Seminar in Molecular Genetics	1
MCB 182	Principles of Genomics	3
PLP 217	Molecular Genetics of Fungi	3
PLS 220	Genomics and Biotechnology of Plant Improvement	3
PLS 221	Genomics and Breeding of Vegetable Crops	3

Animal Genetics | ANG Courses

Questions pertaining to the following courses should be directed to the instructor or to the Animal Science Advising Center in 1202 Meyer Hall; 530-754-7915.

Courses in ANG:

ANG 101—Animal Cytogenetics (3)
Discussion/Laboratory—1 hour; Laboratory—6 hours. Prerequisite(s): BIS 101; BIS 102; Or equivalent of BIS 102. Principles and techniques of cytogenetics applied to animal systems; chromosome harvest techniques, analysis of mitosis and meiosis, karyotyping, chromosome banding, cytogenetic mapping, chromosome structure and function, comparative cytogenetics. GE credit: SE. Effective: 2003 Spring Quarter.

ANG 105—Horse Genetics (2)
Lecture—2 hours. Prerequisite(s): ANS 015; BIS 101 Coat color, parentage testing, medical genetics, pedigrees, breeds, the gene map and genus Equus. Emphasis on understanding horse genetics based on the unity of mammalian genetics and making breeding decisions based on fundamental genetic concepts. GE credit: SE, SL. Effective: 2017 Winter Quarter.

ANG 107—Genetics and Animal Breeding (5)
Laboratory—3 hours; Lecture—4 hours. Prerequisite(s): BIS 101 Principles of quantitative genetics applied to improvement of livestock and poultry. Effects of mating systems and selection methods are emphasized with illustration from current breeding practices. GE credit: SE. Effective: 1997 Winter Quarter.

ANG 111—Molecular Biology Laboratory Techniques (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): BIS 002C; BIS 101; (BIS 102 or ABI 102); (BIS 103 or ABI 103) Introduction to the concepts and techniques used in molecular biology; the role of this technology in both basic and applied animal research, and participation in laboratories using some of the most common techniques in molecular biology. GE credit: SE, SL, VL, WE. Effective: 2017 Winter Quarter.

ANG 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Selected topics relating to animal genetics. (P/NP grading only.) Effective: 1997 Winter Quarter.

ANG 199—Special Study for Advanced Undergraduates (1-5)
Independent Study. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

ANG 204—Theory of Quantitative Genetics (3)
Lecture—3 hours. Prerequisite(s): ANG 107; Or the equivalent. Theoretical basis of quantitative genetics and the consequences of Mendelian inheritance. Concepts used to estimate quantitative genetic differences and basis for partitioning the phenotypic variance. Effective: 1997 Winter Quarter.

ANG 206—Advanced Domestic Animal Breeding (3)
Lecture—3 hours. Prerequisite(s): ANG 107; ANS 205; ANG 204 recommended. Procedures for the genetic evaluation of individuals to include selection indices and mixed model evaluation for single and multiple traits. Methods of estimating genetic trends. Effective: 1997 Winter Quarter.

ANG 208—Estimation of Genetic Parameters (3)
Lecture—3 hours. Prerequisite(s): ANG 107; ANS 205; ANG 204 and ANG 108 recommended. General methods for the estimation of components of variance and covariance and their application to the estimation of heritability, repeatability and genetic correlations are considered. Specific emphasis is given to procedures applicable to livestock populations under selection. Effective: 1997 Winter Quarter.

ANG 211—Genetic Engineering of Animals (2)
Lecture—1 hour; Lecture/Discussion—1 hour. Review of techniques for the genetic engineering of animals and their limitations and applications. Student-led discussions of recent papers in the field and possible future applications of genetically engineered animals in basic research and applied agricultural and medical research. (S/U grading only.) Effective: 1997 Winter Quarter.

ANG 212—Sequence Analysis in Molecular Genetics (2)
Lecture/Lab—2 hours. Prerequisite(s): BIS 101; Or the equivalent; graduate standing or consent of instructor. Use of computer algorithms and on-line databases to analyze nucleic acid and protein sequences in molecular genetics research. Effective: 2005 Winter Quarter.

ANG 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lectures and discussions of advanced topics in animal genetics. (S/U grading only.) Effective: 1997 Winter Quarter.

ANG 299—Research in Animal Genetics (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

Animal Science

Animal Science | ANS Information

(College of Agricultural and Environmental Sciences)

Anita M. Oberbauer Ph.D., Chairperson of the Department

Department Office. 2223 Meyer Hall; 530-752-1250; http://animalscience.ucdavis.edu/

Master Advisor. E.J. DePeters

Undergraduate Advising. 1202 Meyer Hall; 530-754-7915; http://asac.ucdavis.edu

Advising Center for the major, minors and course offerings (including peer advising) is located in the Animal Science Advising Center in 1202 Meyer Hall; 530-754-7915. Each student will be assigned a faculty advisor through this office upon entering the major.

Graduate Advising. 1249 Meyer Hall; 530-752-2382

Faculty. http://animalscience.ucdavis.edu/faculty/

Animal Science | ANS B.S.

(College of Agricultural and Environmental Sciences)

Anita M. Oberbauer Ph.D., Chairperson of the Department

Department Office. 2223 Meyer Hall; 530-752-1250; http://animalscience.ucdavis.edu/

Master Advisor. E.J. DePeters

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Graduate Advising. 1249 Meyer Hall; 530-752-2382

Faculty. http://animalscience.ucdavis.edu/faculty/

The Major Program

The Animal Science major is devoted to the sciences central to understanding biological function of domestic and captive animals, their care, management, and utilization by people for food, fiber, companionship and recreation. Advances in science and technology, and an ever-growing human population, have increased the complexity of issues surrounding the care and management of animals. Specializations within the major allow students to develop a scientific appreciation of animals and their relationship to their environment. Graduates in Animal Science are able to advance the science and technology of animal care and management in an objective and effective manner for the betterment of animals and society.

The Program. The curriculum provides depth in the biological and physiological sciences and allows students to specialize within the broad field of applied animal science. Study begins with

introductory courses in animal science, biology, chemistry, mathematics, and statistics. Students undertake advanced courses in animal behavior, biochemistry, genetics, nutrition, and physiology and the integration of these sciences to animal function, growth, reproduction, and lactation. Students complete the curriculum by choosing a specialization in either an animal science discipline (behavior, biochemistry, genetics, nutrition, or physiology) or in the sciences particular to a class of animals (aquatic, avian, companion and captive, equine, laboratory, livestock and dairy, or poultry).

Career Alternatives. A wide range of career opportunities are available to graduates. The primary goal of the major is to prepare students for graduate study leading to the M.S. and Ph.D. degrees; for continued study in a professional school such as veterinary medicine, human medicine or dentistry; for careers in research, agricultural production, farm and ranch management, or positions in business, sales, financial services, health care, agricultural extension, consulting services, teaching, journalism, or laboratory technology.

Graduate Study. The Animal Biology Graduate Group offers a program of study and research leading to the M.S. or Ph.D., degree in Animal Biology. See Animal Biology (Graduate Group); see also Graduate Studies.

Preparatory Subject Matter **Units:** 53-57

ANS 001	Domestic Animals and People	4
ANS 002	Introductory Animal Science	4
ANS 041	Domestic Animal Production	2
ANS 041L	Domestic Animal Production Laboratory	2
BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
BIS 002C	Introduction to Biology: Biodiversity and the Tree of Life	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
AND		
CHE 008A	Organic Chemistry: Brief Course	2
CHE 008B	Organic Chemistry: Brief Course	4
OR		
CHE 118A	Organic Chemistry for Health and Life Sciences	4
CHE 118B	Organic Chemistry for Health and Life Sciences	4
MAT 016A	Short Calculus	3
MAT 016B	Short Calculus	3
OR		
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
PLS 120	Applied Statistics in Agricultural Sciences	4
OR		
STA 100	Applied Statistics for Biological Sciences	4

Note: Some professional and graduate schools may require additional preparatory subject matter. Please consult the advising center.

Depth Subject Matter **Units:** 39-43

Biology:

BIS 101	Genes and Gene Expression	4
ANG 107	Genetics and Animal Breeding	5
ABI 102	Animal Biochemistry and Metabolism	5
ABI 103	Animal Biochemistry and Metabolism	5
NPB 101	Systemic Physiology	5
OR		
ANS 100	Animal Physiology	5

Integrative Animal Biology:

ANS 123	Animal Growth and Development	4
ANS 124	Lactation	4
NPB 121	Physiology of Reproduction	4
NPB 121L	Physiology of Reproduction Laboratory	1

Laboratory; choose one:

ANG 111	Molecular Biology Laboratory Techniques	4
ANS 106	Domestic Animal Behavior Laboratory	2
ANS 136	Techniques and Practices of Fish Culture	3
ANS 137	Techniques and Practices of Avian Culture	3
ANS 139	Experimental Animal Physiology	3
MCB 120L	Molecular Biology and Biochemistry Laboratory	3
MCB 160L	Principles of Genetics Laboratory	5
NPB 101L	Systemic Physiology Laboratory	3
NPB 104L	Cellular Physiology/Neurobiology Laboratory	4
PMI 126L	Immunology Laboratory	2

Area of Specialization **Units:** 20-23

Choose one area of specialization below; the program of study must be approved in advance by your faculty advisor. Courses must be taken for a letter grade.

Animal Science with a Disciplinary Focus

Select 20 upper division units, with approval from your faculty advisor, to form a coherent series of courses in one of the following disciplines: animal behavior, biochemistry, genetics, nutrition, or physiology

Aquatic Animals

ANS 018	Introductory Aquaculture	4
ANS 131	Reproduction and Early Development in Aquatic Animals	4
NUT 124	Nutrition and Feeding of Finfishes	3
ANS 118	Fish Production	4
OR		
ANS 119	Invertebrate Aquaculture	4

Select additional upper division units from any Animal Genetics or Animal Science course, or other courses approved by your faculty advisor.

Students in this specialization must take Animal Science 136 to meet their Laboratory Depth Subject Matter requirement.

Students in this specialization may elect to substitute any of Biological Sciences 104, Evolution and Ecology 112, or Wildlife, Fish, and Conservation Biology 120 and 121 for the 12-unit requirement under Integrative Animal Biology, with approval of your faculty advisor.

Avian Sciences

AVS 013	Birds, Humans and the Environment	3
AVS 100	Avian Biology	3
AVS 150	Nutrition of Birds	1
NUT 123	Comparative Animal Nutrition	3
NUT 123L	Comparative Animal Nutrition Laboratory	1

Select additional upper division units from any Animal Genetics, Animal Science, or Avian Sciences courses or other courses approved by your advisor. Students in this specialization must substitute Avian Sciences 103, 121, and Neurobiology, Physiology, and Behavior 117 for the Animal Science 124 and Neurobiology, Physiology, and Behavior 121 and 121L requirement under Integrative Animal Biology.

Companion and Captive Animals

ANS 042	Introductory Companion Animal Biology	4
ANS 142	Companion Animal Care and Management	4
NUT 115	Animal Nutrition	4
NUT 122	Ruminant Nutrition and Digestive Physiology	4
OR		
NUT 123	Comparative Animal Nutrition	3
NUT 123L	Comparative Animal Nutrition Laboratory	1
ANS 170	Ethics of Animal Use	4

Select additional upper division units from any Animal Genetics, Animal Science or Avian Sciences course, or from Nutrition 115, 122, 123, 123L or other courses.

Equine Science

ANS 015	Introductory Horse Husbandry	3
ANS 115	Advanced Horse Production	4
ANS 141	Equine Enterprise Management	4
One from:		
ANS 125	Equine Exercise Physiology	3
ANS 126	Equine Nutrition	3
ANS 127	Advanced Equine Reproduction	3

Select additional upper division units from any Animal Genetics or Animal Science course, or from Nutrition 115, 122, 123, 123L or other courses approved by your faculty advisor.

Laboratory Animals

ANS 042	Introductory Companion Animal Biology	4
ANS 103	Animal Welfare	4
ANS 140	Management of Laboratory Animals	4

ANS 104	Principles and Applications of Domestic Animal Behavior	4
OR		
NPB 102	Animal Behavior	3
APC 100	Comparative Vertebrate Organology	4
OR		
NPB 123	Comparative Vertebrate Organology	4

Livestock and Dairy

Select two from:

ANS 143	Pig and Poultry Care and Management	4
ANS 144	Beef Cattle and Sheep Production	4
ANS 146	Dairy Cattle Production	5
ANS 145	Meat Processing and Marketing	4
OR		
ANS 147	Dairy Processing and Marketing	3
NUT 115	Animal Nutrition	4

Select additional upper division units from any Animal Genetics, Animal Science or Avian Sciences course, or from Nutrition 122, 123, 123L or other courses approved by your faculty advisor.

Poultry

AVS 011	Introduction to Poultry Science	3
AVS 100	Avian Biology	3
AVS 150	Nutrition of Birds	1
ANS 143	Pig and Poultry Care and Management	4
AVS 149	Egg Production Management	2
NUT 123	Comparative Animal Nutrition	3
NUT 123L	Comparative Animal Nutrition Laboratory	1

Select additional upper division units from any Animal Genetics, Animal Science, Avian Sciences, or other courses approved by your faculty advisor.

Students in this specialization must substitute Avian Sciences 103, 121, and Neurobiology, Physiology, and Behavior 117 for the Animal Science 124 and Neurobiology, Physiology, and Behavior 121 and 121L requirement under Integrative Animal Biology.

Total: 112-125

Animal Science | ANS Minor

(College of Agricultural and Environmental Sciences)

James Murray Ph.D., Chairperson of the Department

Department Office. 2223 Meyer Hall; 530-752-1250; http://animalscience.ucdavis.edu/

The Department of Animal Science offers five minor programs open to students majoring in other disciplines who wish to complement their study programs with a minor in Animal Science. Some courses have required prerequisites not included as part of the minor, and students should plan accordingly.

Minor Advisor. E.J. DePeters

Undergraduate Advising. 1202 Meyer Hall; 530-754-7915; http://asac.ucdavis.edu

Advising Center for the major, minors, and course offerings (including peer advising) is located in the Animal Science Advising Center in 1202 Meyer Hall; 530-754-7915. Each student will be assigned a faculty advisor through this office upon entering the major.

Animal Science—Animal Biology **Units:** 20

ANS 015	Introductory Horse Husbandry	3
OR		
ANS 042	Introductory Companion Animal Biology	4
OR		
ANS 041	Domestic Animal Production	2
AND		
ANS 041L	Domestic Animal Production Laboratory	2
OR		
ANS 041	Domestic Animal Production	2
AND		
ANS 021	Livestock and Dairy Cattle Judging	2
ANS 103	Animal Welfare	4
OR		
ANS 104	Principles and Applications of Domestic Animal Behavior	4
ANS 123	Animal Growth and Development	4
ANS 124	Lactation	4
OR		
NPB 121	Physiology of Reproduction	4
NPB 121L	Physiology of Reproduction Laboratory	1

Choose additional units to complete the 20-unit total:

Upper division Animal Science courses.

Animal Genetics courses.

NPB 121	Physiology of Reproduction	4
NPB 121L	Physiology of Reproduction Laboratory	1
NUT 115	Animal Nutrition	4
NUT 122	Ruminant Nutrition and Digestive Physiology	4
NUT 123	Comparative Animal Nutrition	3
NUT 123L	Comparative Animal Nutrition Laboratory	1

Variable unit courses (92, 99, 192, 197T, 198, 199) are not allowed for the completion of this requirement.

Animal Science—Animal Genetics **Units:** 20

ANS 015	Introductory Horse Husbandry	3
AND		
ANS 042	Introductory Companion Animal Biology	4
OR		
ANS 041	Domestic Animal Production	2
AND		
ANS 041L	Domestic Animal Production Laboratory	2
OR		
ANS 041	Domestic Animal Production	2
AND		
ANS 021	Livestock and Dairy Cattle Judging	2
ANG 107	Genetics and Animal Breeding	5

ANG 111 Molecular Biology Laboratory Techniques 4
Additional upper division courses.

Choose additional units to complete the 20-unit total:
Upper division Animal Science courses.
Animal Genetics courses.

AVS 103	Avian Development and Genomics	3
NPB 121	Physiology of Reproduction	4
NPB 121L	Physiology of Reproduction Laboratory	1
NUT 115	Animal Nutrition	4
NUT 122	Ruminant Nutrition and Digestive Physiology	4
NUT 123	Comparative Animal Nutrition	3
NUT 123L	Comparative Animal Nutrition Laboratory	1

Variable unit courses (92, 99, 192, 197T, 198, 199) are not allowed for the completion of this requirement.

Animal Science—Aquaculture **Units:** 20

ANS 018 Introductory Aquaculture 4
ANS 118 Fish Production 4
ANS 119 Invertebrate Aquaculture 4
Additional upper division courses.

Choose additional units to complete the 20-unit total:
Upper division Animal Science courses.
Animal Genetics courses.

ABT 161	Water Quality Management for Aquaculture	3
NUT 124	Nutrition and Feeding of Finfishes	3
WFC 121	Physiology of Fishes	4

Variable unit courses (92, 99, 192, 197T, 198, 199) are not allowed for the completion of this requirement.

Animal Science—Dairy/Livestock **Units:** 20

ANS 041L Domestic Animal Production Laboratory 2
AND
ANS 041L Domestic Animal Production Laboratory 2
OR
ANS 021 Livestock and Dairy Cattle Judging 2

ANS 104 Principles and Applications of Domestic Animal Behavior 4
Additional upper division courses.

Choose four or eight units:

ANS 143	Pig and Poultry Care and Management	4
ANS 144	Beef Cattle and Sheep Production	4
ANS 146	Dairy Cattle Production	5

Choose additional units to complete the 20 unit total:
Upper division Animal Science courses.
Animal Genetics courses.

NPB 121	Physiology of Reproduction	4
NPB 121L	Physiology of Reproduction Laboratory	1
NUT 115	Animal Nutrition	4
NUT 122	Ruminant Nutrition and Digestive Physiology	4
NUT 123	Comparative Animal Nutrition	3

NUT 123L	Comparative Animal Nutrition Laboratory	1

Variable unit courses (92, 99, 192, 197T, 198, 199) are not allowed for the completion of this requirement.

Animal Science—Equine **Units:** 21

ANS 015	Introductory Horse Husbandry	3
ANS 103	Animal Welfare	4
OR		
ANS 104	Principles and Applications of Domestic Animal Behavior	4
ANS 115	Advanced Horse Production	4
ANS 141	Equine Enterprise Management	4
ANS 125	Equine Exercise Physiology	3
OR		
ANS 126	Equine Nutrition	3

One additional upper division course.

Choose from:

Upper division Animal Science courses.
Animal Genetics courses.

NPB 121	Physiology of Reproduction	4
NPB 121L	Physiology of Reproduction Laboratory	1
NUT 115	Animal Nutrition	4
NUT 122	Ruminant Nutrition and Digestive Physiology	4
NUT 123	Comparative Animal Nutrition	3
NUT 123	Comparative Animal Nutrition	3
NUT 123L	Comparative Animal Nutrition Laboratory	1

Variable unit courses (92, 99, 192, 197T, 198, 199) are not allowed for the completion of this requirement.

Total: 20-21

Animal Science | ANS Courses

Courses in ANS:

ANS 001—Domestic Animals and People (4)
Laboratory—3 hours; Lecture—3 hours. Animal domestication and factors affecting their characteristics and distribution. Animal use for food, fiber, work, drugs, research and recreation; present and future roles in society. Laboratory exercises with beef and dairy cattle, poultry, sheep, swine, laboratory animals, fish, horses, meat and dairy products. GE credit: SE, WE. Effective: 1997 Winter Quarter.

ANS 002—Introductory Animal Science (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ANS 001 and BIS 002A recommended. Open to students in Animal Science, Animal Science and Management, Agricultural and Environmental Education, and Sustainable Agriculture and Food Systems majors. Growth, reproduction, lactation, inheritance, nutrition, and disease control in domesticated animals and species used in aquaculture; the application of sciences to animal production. GE credit: SE, SL, VL, WE. Effective: 2016 Fall Quarter.

ANS 012—Animal Science: Basic Principles and Application (3)
Lecture—3 hours. Overview of domestic and global animal industries. Exploration of production systems, animal biology, genetics, anatomy, physiology, reproduction, health, behavior, research, biotechnology and welfare. GE credit: SE. Effective: 2014 Fall Quarter.

ANS 015—Introductory Horse Husbandry (3)
Lecture—3 hours. Introduction to care and use of light horses emphasizing the basic principles for selection of horses, responsibilities of ownership, recreational use and raising of foals. GE credit: QL, SE, VL. Effective: 2016 Fall Quarter.

ANS 017—Canine Behavior: Learning and Cognition (3)
Lecture—3 hours. Domestic dog behavior from basic principles of learning to complex cognitive behaviors; interaction between learning and cognition including how these processes contribute to interactions with humans; basic genetic correlates of learning and cognition. Effective: 2012 Summer Session 1.

ANS 018—Introductory Aquaculture (4)
Discussion—1 hour; Lecture—3 hours. Historical and contemporary aquacultural practices. Interaction between the aqueous culture environment and the biology of aquatic animals. Impact of economics and governmental policies on the development of
aquaculture. Interaction of aquacultural practices with larger societal goals. GE credit: OL, QL, SE, SL, VL, WE. Effective: 1997 Winter Quarter.

ANS 021—Livestock and Dairy Cattle Judging (2)
Laboratory—6 hours. Prerequisite(s): ANS 001 or ANS 002 recommended. Evaluation of type as presently applied to light horses, meat animals and dairy cattle. Relationship between form and function, form and carcass quality, and form and milk production. GE credit: OL, SE. Effective: 1997 Winter Quarter.

ANS 022A—Animal Evaluation (2)
Fieldwork—30 hours; Laboratory—3 hours. Prerequisite(s): ANS 021; Or equivalent. Attendance at 3 one-day weekend field trips required. Domestic livestock species with emphasis on visual appraisal, carcass evaluation, and application of performance information. Emphasis on accurate written and oral descriptions of evaluations. Prerequisite to intercollegiate judging competition. (P/NP grading only.) GE credit: OL, SE. Effective: 1999 Fall Quarter.

ANS 022B—Animal Evaluation (2)
Fieldwork—30 hours; Laboratory—3 hours. Prerequisite(s): ANS 022A; Or equivalent. Attendance at 3 one-day weekend field trips required. Continuation of course 22A with emphasis on specific species: swine, beef cattle and sheep. Application of animal science principles to selection and management problem-solving scenarios. Prerequisite to intercollegiate judging competition. (P/NP grading only.) GE credit: OL, SE. Effective: 2000 Winter Quarter.

ANS 041—Domestic Animal Production (2)
Lecture—2 hours. Principles of farm animal management, including dairy and beef cattle, sheep, and swine. Industry trends, care and management, nutrition, and reproduction. GE credit: SE. Effective: 1997 Winter Quarter.

ANS 041L—Domestic Animal Production Laboratory (2)
Discussion—1 hour; Laboratory—3 hours. Prerequisite(s): ANS 041 (can be concurrent) Animal production principles and practices, including five field trips to dairy cattle, beef cattle, sheep, and swine operations and campus labs. (P/NP grading only.) GE credit: QL, SE, SL, VL, WE. Effective: 2016 Fall Quarter.

ANS 042—Introductory Companion Animal Biology (4)
Discussion—1 hour; Lecture—3 hours. Companion animal domestication. Historical, contemporary perspectives.
Legislation concerning companion animals. Selected topics in anatomy, physiology, genetics, nutrition, behavior and management. Scientific
methods in studying the human-animal bond. Discussions: application of biological concepts to problems related to companion animals. GE credit: QL, SE, SL, WE. Effective: 1997 Winter Quarter.

ANS 049A—Animal Management Practices: Aquaculture (2)
Discussion—1 hour; Laboratory—3 hours. Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken. (P/NP grading only.) Effective: 1998 Fall Quarter.

ANS 049B—Animal Management Practices: Beef (2)
Discussion—1 hour; Laboratory—3 hours. Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken. (P/NP grading only.) Effective: 1998 Fall Quarter.

ANS 049C—Animal Management Practices: Dairy (2)
Discussion—1 hour; Laboratory—3 hours. Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken. (P/NP grading only.) Effective: 1998 Fall Quarter.

ANS 049D—Animal Management Practices: Goats (2)
Discussion—1 hour; Laboratory—3 hours. Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken. (P/NP grading only.) Effective: 1998 Fall Quarter.

ANS 049E—Animal Management Practices: Horses (2)
Discussion—1 hour; Laboratory—3 hours. Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken. (P/NP grading only.) Effective: 1998 Fall Quarter.

ANS 049F—Animal Management Practices: Laboratory Animals (2)
Discussion—1 hour; Laboratory—3 hours. Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken. (P/NP grading only.) Effective: 1998 Fall Quarter.

ANS 049G—Animal Management Practices: Meats (2)
Discussion—1 hour; Laboratory—3 hours. Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken. (P/NP grading only.) Effective: 1998 Fall Quarter.

ANS 049H—Animal Management Practices: Poultry (2)
Discussion—1 hour; Laboratory—3 hours. Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken. (P/NP grading only.) Effective: 1998 Fall Quarter.

ANS 049I—Animal Management Practices: Sheep (2)
Discussion—1 hour; Laboratory—3 hours. Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken. (P/NP grading only.) Effective: 1998 Fall Quarter.

ANS 049J—Animal Management Practices: Swine (2)
Discussion—1 hour; Laboratory—3 hours. Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken. (P/NP grading only.) Effective: 1998 Fall Quarter.

ANS 049K—Animal Management Practices: Captive and Companion Avian (2)
Discussion—1 hour; Laboratory—3 hours. Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken. (P/NP grading only.) Effective: 2013 Winter Quarter.

ANS 090C—Research Group Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Restricted to lower division standing. Weekly conference on research problems, progress and techniques in the animal sciences. May be repeated for credit. (P/NP grading only.) Effective: 2016 Fall Quarter.

ANS 092—Internship in Animal Science (1-12)
Internship—3-18 hours. Prerequisite(s): Consent of Instructor. Restricted to lower division standing. Internship off and on campus in dairy, livestock, and aquaculture production, research and management; or in a business, industry, or agency associated with these or other animal enterprises. All requirements of Internship Approval form must be met. (P/NP grading only.) Effective: 2016 Fall Quarter.

ANS 098—Directed Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Restricted to lower division standing. (P/NP grading only.) Effective: 2016 Fall Quarter.

ANS 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Restricted to lower division standing. (P/NP grading only.) Effective: 2016 Fall Quarter.

ANS 100—Animal Physiology (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): BIS 002A; CHE 002B Pass One restricted to students in the Animal Science and Animal Science and Management majors. Basic principles of animal physiology in domesticated and captive animals with a comparative approach. Molecular, biochemical, chemical and physical aspects and their influences on function of physiological systems in animals. Not open for credit to students who have taken NPB 101. GE credit: SE. Effective: 2016 Spring Quarter.

ANS 103—Animal Welfare (4)
Discussion—2 hours; Lecture—2 hours. Prerequisite(s): ANS 104 or NPB 102 or WFC 141; or Consent of Instructor. Restricted to upper division standing. Application of principles of animal behavior and physiology to assessment and improvement of the welfare of wild, captive, and domestic animals. Topics include animal pain, stress, cognition, motivation, emotions, and preferences, as well as environmental enrichment methods. GE credit: SE, SL. Effective: 2016 Fall Quarter.

ANS 104—Principles and Applications of Domestic Animal Behavior (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANS 002 or BIS 002B Basic principles of animal behavior as applied to domesticated species. Emphasis placed on application of the principles of animal behavior. GE credit: SE. Effective: 2014 Fall Quarter.

ANS 106—Domestic Animal Behavior Laboratory (2)
Laboratory—6 hours. Prerequisite(s): ANS 104 or NPB 102; or Consent of Instructor. Research experience with the behavior of large domestic animals. Experimental design, methods of data collection and analysis, and reporting of experimental results. GE credit: QL, SE, SL, VL, WE. Effective: 2016 Fall Quarter.

ANS 112—Sustainable Animal Agriculture (3)
Lecture/Discussion—3 hours. Prerequisite(s): BIS 002B or ANS 001; STA 100 or PLS 120 recommended. Current applications of sustainable animal agriculture including the challenges of animal production, animal needs, animal well-being, and protection of the environment and resources for future food supply systems. Various scenarios for meeting sustainability objectives are evaluated using computing modeling. GE credit: OL, QL, SE, SS. Effective: 2016 Fall Quarter.

ANS 115—Advanced Horse Production (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ANS 015; BIS 101; NUT 115; (ANS 100 or NPB 101); or Consent of Instructor. Feeding, breeding, and management of horses; application of the basic principles of animal science to problems of production of all types of horses. Designed for students who wish to become professionally involved in the horse industry. GE credit: QL, SE, SL, WE. Effective: 2016 Fall Quarter.

ANS 118—Fish Production (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): WFC 120 Current practices in fish production; relationship between the biological aspects of a species and the production systems, husbandry, management, and marketing practices utilized. Emphasis on species currently reared in California. GE credit: SE. Effective: 2016 Fall Quarter.

ANS 119—Invertebrate Aquaculture (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 002B Management, breeding and feeding of aquatic invertebrates; application of basic principles of physiology, reproduction, and nutrition to production of mollusks and crustaceans for human food; emphasis on interaction of species biology and managerial techniques on production efficiencies. GE credit: SE. Effective: 2016 Fall Quarter.

ANS 120—Principles of Meat Science (3)
Lecture—3 hours. Prerequisite(s): ANS 002 Restricted to upper division standing. Anatomical, physiological, developmental, and biochemical aspects of muscle underlying the conversion of muscle to meat. Includes meat processing, preservation, microbiology, and public health issues associated with meat products. GE credit: SE. Effective: 2016 Fall Quarter.

ANS 120L—Meat Science Laboratory (2)
Discussion—1 hour; Laboratory—3 hours. Prerequisite(s): ANS 002; ANS 120 (can be concurrent) Restricted to upper division standing. Laboratory exercises and student participation in transformation of live animal to carcass and meat, structural and biochemical changes related to meat quality, chemical and sensory evaluation of meat, and field trips to packing plant and processing plant. GE credit: SE. Effective: 2016 Fall Quarter.

ANS 123—Animal Growth and Development (4)
Lecture—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): (ABI 103 or BIS 103); (ANS 100 or NPB 101) Growth and development of animals from conception to maturity, viewed from practical and biological perspectives; includes genetic, metabolic, nutritional control of cell and organism function. GE credit: OL, QL, SE, VL, WE. Effective: 2016 Fall Quarter.

ANS 124—Lactation (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (NPB 101 or ANS 100); (ABI 103 (can be concurrent) or BIS 103 (can be concurrent)) Consideration of the biochemical, genetic, physiological, nutritional, and structural factors relating to mammary gland development, the initiation of lactation, the composition of milk and lactational performance. GE credit: SE, SL. Effective: 2016 Fall Quarter.

ANS 125—Equine Exercise Physiology (3)
Lecture—3 hours. Prerequisite(s): (NPB 101 or ANS 100); ANS 015 Basic and applied physiology of the exercising horse. Includes physiological systems, gait analysis, lameness, pharmacology, sports medicine; sport horse performance evaluation and conditioning. GE credit: SE. Effective: 2016 Fall Quarter.

ANS 126—Equine Nutrition (3)
Lecture—3 hours. Prerequisite(s): ANS 015; NUT 115 Equine digestion, digestive physiology, diet development and evaluation, and the relationship of the topics to recommended feeding practices and nutritional portfolios. GE credit: SE. Effective: 2014 Fall Quarter.

ANS 127—Advanced Equine Reproduction (3)
Lecture—3 hours. Prerequisite(s): ANS 115; (ANS 100 or NPB 101) Reproductive physiology, anatomy and endocrinology of the mare and stallion. Emphasis on structure/function relationships as they are applied to improving equine reproductive management and efficiency. GE credit: SE, WE. Effective: 2016 Fall Quarter.

ANS 128—Agricultural Applications of Linear Programming (4)
Discussion—1 hour; Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): PLS 021 or ECS 015; or Consent of Instructor. Restricted to upper division standing. Applications of linear programming in agriculture, emphasizing resource allocation problems and decision making. Problems include crop production, ration formulation, and farm management. Hands-on experience in developing linear programs and interpreting the results. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

ANS 129—Environmental Stewardship in Animal Production Systems (3)
Lecture—3 hours. Prerequisite(s): (BIS 010 or (BIS 002A, BIS 002B)), CHE 002A, CHE 002B, (CHE 008A, CHE 008B) or (CHE 118A, CHE 118B); and Consent of Instructor. Management principles of environmental stewardship for grazing lands, animal feeding, operations and aquaculture operations; existing regulations, sample analyses, interpretation and utilization of data, evaluation of alternative practices, and policy development. GE credit: SE, SL. Effective: 2017 Winter Quarter.

ANS 131—Reproduction and Early Development in Aquatic Animals (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): MCB 150; WFC 120; or Consent of Instructor. Physiological and developmental functions related to reproduction, breeding efficiency and fertility of animals commonly used in aquaculture. GE credit: SE, WE. Effective: 2017 Winter Quarter.

ANS 135—Production Animal Laboratory (3)
Fieldwork; Laboratory—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): ABI 102; ABI 103; (NPB 101 or ANS 100) Pass One restricted to Animal Science and Animal Science and Management students. Biochemical methods for developing and conducting research with production animals, and interpreting and presenting data. Laboratory focus course which uses sheep as model. There may be one or two mandatory all day Saturday field trips. GE credit: SE. Effective: 2017 Winter Quarter.

ANS 136—Techniques and Practices of Fish Culture (3)
Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): ANS 002; BIS 002A; BIS 002B; BIS 002C; ((CHE 008A, CHE 008B) or (CHE 118A, CHE 118B)) Restricted to upper division standing. Daily care and maintenance of fish in residential aquariums, research and commercial facilities. Biological and environmental factors important to sound management of fish. Laboratories focus on fish culture including growth trials and biochemical assays. Not open for credit to students who have previously completed ANS 136A or ANS 137. GE credit: QL, SE, SL, VL, WE. Effective: 2017 Winter Quarter.

ANS 137—Techniques and Practices of Avian Culture (3)
Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): ANS 002; BIS 002A; BIS 002B; BIS 002C; ((CHE 008A, CHE 008B) or (CHE 118A, CHE 118B)) Restricted to upper division standing. Daily care and maintenance of birds for research, commercial production and companion or hobby uses. Biological and environmental factors important to sound management of birds. Laboratories focus on bird husbandry, management and care and include growth trials and biochemical assays. Not open for credit to students who have previously completed ANS 136B or ANS 137. GE credit: QL, SE, SL, VL, WE. Effective: 2017 Winter Quarter.

ANS 139—Experimental Animal Physiology (3)
Fieldwork—3 hours; Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): ABI 102; BIS 101; or Consent of Instructor. Restricted to seniors in the Animal Science and Animal Science and Management majors. Combination of theory and hands-on experiences in animal physiology using various experimental techniques. Practical laboratory skill development from cellular level to whole animal, in areas such as genetics, endocrinology, histology and physiological function. GE credit: SE, WE. Effective: 2016 Spring Quarter.

ANS 140—Management of Laboratory Animals (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): NPB 101 or ANS 100 Laboratory animal management procedures in view of animal physiology, health and welfare, government regulations, and experimental needs. Clinical techniques using rodents and rabbits as models. GE credit: SE. Effective: 2017 Winter Quarter.

ANS 141—Equine Enterprise Management (4)
Lecture/Discussion—4 hours. Prerequisite(s): ANS 115; ECN 001A and ECN 001B recommended. Examination of the concepts and principles involved in the operation of an equine enterprise. Essential aspects of equine enterprise management, including equine law, marketing, cash flow analysis, and impact of state and federal regulations. GE credit: SS. Effective: 1997 Winter Quarter.

ANS 142—Companion Animal Care and Management (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANS 042; BIS 101; (NPB 101 or ANS 100); ABI 102 or BIS 102 and ABI 103 or BIS 103 recommended. Management and production of companion animals. Integration of the disciplinary principles of behavior, genetics, nutrition, and physiology as related to the care of companion animals. GE credit: OL, QL, SE, SL, VL, WE. Effective: 2017 Winter Quarter.

ANS 143—Pig and Poultry Care and Management (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): NUT 115; (NPB 101 or ANS 100); ANS 041; or Consent of Instructor. Care and management of swine, broilers and turkeys as related to environmental physiology, nutrition and metabolism, disease management and reproduction. Saturday field trips. GE credit: SE, SL. Effective: 2017 Winter Quarter.

ANS 144—Beef Cattle and Sheep Production (4)
Fieldwork—2 hours; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ANS 041; NUT 115; or Consent of Instructor. Animal Genetics 107 recommended. Genetics, physiology, nutrition, economics and business in beef cattle and sheep production. Resources used, species differences, range and feedlot operations. Emphasis on integration and information needed in methods for management of livestock enterprises. One or two Saturday field trips. GE credit: OL, QL, SE, SL, VL, WE. Effective: 2017 Winter Quarter.

ANS 145—Meat Processing and Marketing (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ANS 002; Consent of Instructor. Distribution, processing and marketing of meat and meat products. Meat and meat animal grading and pricing. Government regulations and social/consumer concerns. Future trends and impact on production management practices. Includes poultry. GE credit: SE. Effective: 2017 Winter Quarter.

ANS 146—Dairy Cattle Production (5)
Discussion—1 hour; Fieldwork—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): NUT 115; or Consent of Instructor. ANG 107 recommended. Scientific principles from genetics, nutrition, physiology, and related fields applied to conversion of animal feed to human food through dairy animals. Management and economic decisions are related to animal biology considering the environment and animal well-being. Mandatory Saturday field-trip. GE credit: OL, QL, SE, SL, VL, WE. Effective: 2017 Winter Quarter.

ANS 147—Dairy Processing and Marketing (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): ANS 002; or Consent of Instructor. Restricted to upper division standing. Examination of distribution systems, processing practices, product quality, impact of government policy (domestic and foreign), marketing alternatives, and product development. GE credit: SE. Effective: 2017 Winter Quarter.

ANS 148—Enterprise Analysis in Animal Industries (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Restricted to students with upper division standing. Examination and application of decision making and problem solving in the production enterprise. The areas of production analysis, problem solving, risk analysis and cost-benefit analysis will be examined in terms of the total enterprise. GE credit: OL, QL, SS, WE. Effective: 2016 Fall Quarter.

ANS 149—Farrier Science (3)
Lecture—3 hours. Prerequisite(s): ANS 115 In-depth examination of the structure-function relationship of the equine hoof and how it relates to conformation, injury and performance. GE credit: SE. Effective: 2015 Winter Quarter.

ANS 149L—Farrier Science Laboratory (1)
Laboratory—3 hours. Prerequisite(s): ANS 149 (can be concurrent); or Consent of Instructor. Art and science of horseshoeing in equine related fields. Proper use of the tools, materials and techniques in the fabrication of shoes and safe preparation of the hoof for application of shoes. (P/NP grading only.) Effective: 1999 Spring Quarter.

ANS 170—Ethics of Animal Use (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Any basic course in composition or speech, or completion of college English requirement. Ethical issues relating to animal use in contemporary society. Integration of philosophical theories with scientific evidence relating to animal behavior, mentality, and welfare. Uses of animals in agriculture, research, and as companions. Ethical responsibilities regarding wildlife and the environment. GE credit: SL, SS, WE. Effective: 2016 Fall Quarter.

ANS 190C—Research Group Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Advanced standing. Weekly conference on research problems, progress and techniques in the
animal sciences. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

ANS 192—Internship in Animal Science (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Internship off and on campus in dairy, livestock and aquaculture production, research and management; or in a business, industry, or agency associated with these or other animal enterprises. All requirements of Internship Approval Form must be met. (P/NP grading only.) Effective: 1997 Winter Quarter.

ANS 194—Research in Animal Science (3)
Discussion—1 hour; Laboratory—6 hours. Prerequisite(s): ANS 106 or ANS 135 or ANS 136 or ANS 137 or ANS 139 or ANG 111; or ANS 133; and Consent of Instructor. Research with a faculty mentor. Weekly discussion and laboratory on specific research topic. May include a seminar to research group. Choose from sections: (1) Animal Behavior; (2) Animal Genetics; (3) Animal Nutrition; (4) Animal Physiology. May be repeated up to 4 time(s). Effective: 2016 Fall Quarter.

ANS 194HA—Undergraduate Honors Thesis in Animal Science (4)
Laboratory—9 hours; Lecture—1 hour. Prerequisite(s): (NPB 101 or ANS 100); (ABI 103 or BIS 103); and Consent of Instructor. Minimum cumulative GPA of 3.200 and selection by the Honors Selection Committee. Students will carry out a research project (chosen from faculty-suggested or approved proposals) during the academic year under the guidance of a faculty member. Upon completion, student will write a thesis and present a public seminar describing his/her research. GE credit: OL, SE. Effective: 2016 Fall Quarter.

ANS 194HB—Undergraduate Honors Thesis in Animal Science (4)
Laboratory—9 hours; Lecture—1 hour. Prerequisite(s): (NPB 101 or ANS 100); (ABI 103 or BIS 103); and Consent of Instructor. Minimum cumulative GPA of 3.200 and selection by the Honors Selection Committee. Students will carry out a research project (chosen from faculty-suggested or approved proposals) during the academic year under the guidance of a faculty member. Upon completion, student will write a thesis and present a public seminar describing his/her research. GE credit: SE, VL. Effective: 2016 Fall Quarter.

ANS 194HC—Undergraduate Honors Thesis in Animal Science (4)
Laboratory—9 hours; Lecture—1 hour. Prerequisite(s): (NPB 101 or ANS 100); (ABI 103 or BIS 103); and Consent of Instructor. Minimum cumulative GPA of 3.200 and selection by the Honors Selection Committee. Students will carry out a research project (chosen from faculty-suggested or approved proposals) during the academic year under the guidance of a faculty member. Upon completion, student will write a thesis and present a public seminar describing his/her research. GE credit: SE, WE. Effective: 2016 Fall Quarter.

ANS 197T—Tutoring in Animal Science (1-2)
Tutorial—1-2 hours. Prerequisite(s): Consent of Instructor. Animal Science or related major; upper division standing. Tutoring of students in lower division animal science courses; weekly conference with instructors in charge of courses; written critiques of teaching procedures. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 2016 Fall Quarter.

ANS 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Selected topics relating to the animal sciences. (P/NP grading only.) Effective: 1997 Winter Quarter.

ANS 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Restricted to students with upper division standing. (P/NP grading only.) Effective: 2016 Fall Quarter.

ANS 200—Strategies in Animal Production (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Examines the forces and issues in animal agriculture through the strategic management process. Effective: 1997 Winter Quarter.

ANS 206—Models in Agriculture and Nutrition (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): MAT 016B; STA 108 Basic model building principles and techniques for statistical and systems simulation models. Optimization techniques for non-linear experimental designs and management models are presented. Quantitative analysis and evaluation of linear and non-linear equations used in agriculture and nutrition. Effective: 1997 Winter Quarter.

ANS 259—Literature in Animal Science (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Critical presentation and analysis of recent journal articles in animal science. May be repeated up to 9 time(s). (S/U grading only.) Effective: 2004 Fall Quarter.

ANS 290—Seminar (1)
Seminar—1 hour. Reports and discussions of topics of interest in genetics, nutrition, and physiology as they apply to animal science. (S/U grading only.) Effective: 1997 Winter Quarter.

ANS 290C—Research Group Conference (1)
Discussion—1 hour. Prerequisite(s): Graduate standing. Weekly conference on research problems, progress and techniques in the animal sciences. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

ANS 291—Current Research in Animal Science (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Current research in animal science explored at weekly seminars presented by guest lecturers. Discussion of research presented. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

ANS 297—Supervised Teaching in Animal Science (2)
Variable—6 hours. Practical experience in teaching Animal Science at University level; curriculum design and evaluation; preparation and presentation of material. Assistance in laboratories, discussion sections, and evaluation of student work. Evaluation letter sent to the graduate advisor with copy to the student. (S/U grading only.) Effective: 1997 Winter Quarter.

ANS 298—Group Study (1-5)
Discussion—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Lectures and discussions of advanced topics in the animal sciences.

(Sect. 1, 2, 3-letter grading; from Sect. 4 on-S/U grading only.) Effective: 1997 Winter Quarter.

ANS 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

Animal Science & Management

Animal Science & Management | Animal Science & Management B.S.

(College of Agricultural and Environmental Sciences)

http://asac.ucdavis.edu

Master Advisor. J.G. Fadel

Advising Center for the major (including peer advising) is located in 1202 Meyer Hall; 530-754-7915. Each student will be assigned a faculty advisor through this office upon entering the major.

The Major Program

The Animal Science and Management major combines a thorough education in the basic biology of domestic animal species with a strong background in agricultural economics. Graduates of this interdisciplinary major will be well positioned to adjust to our rapidly changing world and job market.

The Program. The interdisciplinary program in Animal Science and Management combines a fundamental background in the natural sciences (chemistry, biology, physiology, nutrition, genetics, mathematics, and behavior), with an understanding of economics and humanities. After

completing preparatory courses, students focus on both the animal species that interest them (horses, cattle, sheep, companion animals, goats, fish, crustaceans or mollusks, among others) and principles of managerial economics (marketing, finance, business organization or systems analysis). Students preparing for medical or veterinary school can meet professional entrance requirements with those of this major if they plan ahead.

Career Alternatives. Job opportunities for successful graduates are plentiful and include positions with banking and financial institutions, agribusiness, Peace Corps, and farms of all scales. Most Animal Science and Management graduates are well prepared for professional study (medical, law, veterinary, and graduate business schools) as well as graduate research programs leading to the M.S. or Ph.D. degrees. Advanced degrees open doors to work as extension specialists, farm advisors, and teachers, and prepare students for international service.

Written and Oral Expression **Units:** 8

Choose two; if not chosen for English college requirement:

CMN 130	Group Communication	4
CMN 136	Organizational Communication	4
CMN 140	Introduction to Mass Communication	4
UWP 101	Advanced Composition	4
UWP 102A	Writing in the Disciplines: Special Topics	4
UWP 102B	Writing in the Disciplines: Biology	4
UWP 102C	Writing in the Disciplines: History	4
UWP 102D	Writing in the Disciplines: International Relations	4
UWP 102E	Writing in the Disciplines: Engineering	4
UWP 102F	Writing in the Disciplines: Food Science and Technology	4
UWP 102G	Writing in the Disciplines: Environmental Writing	4
UWP 104A	Writing in the Professions: Business Writing	4
UWP 104B	Writing in the Professions: Law	4
UWP 104C	Writing in the Professions: Journalism	4
UWP 104D	Writing in the Professions: Elementary and Secondary Education	4
UWP 104E	Writing in the Professions: Science	4
UWP 104F	Writing in the Professions: Health	4

Preparatory Subject Matter **Units:** 69-75

ANS 001	Domestic Animals and People	4
ANS 002	Introductory Animal Science	4
BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
BIS 002C	Introduction to Biology: Biodiversity and the Tree of Life	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 008A	Organic Chemistry: Brief Course	2
CHE 008B	Organic Chemistry: Brief Course	4
PLS 021	Application of Computers in Technology	3
OR		
ECS 015	Introduction to Computers	4
ECN 001A	Principles of Microeconomics	4
ECN 001B	Principles of Macroeconomics	4
MGT 011A	Elementary Accounting	4
MGT 011B	Elementary Accounting	4
MAT 016A	Short Calculus	3

MAT 016B	Short Calculus	3
MAT 016C	Short Calculus	3
OR		
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
MAT 017C	Calculus for Biology and Medicine	4
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4

Choose one:

PLS 120	Applied Statistics in Agricultural Sciences	4
STA 100	Applied Statistics for Biological Sciences	4
STA 103	Applied Statistics for Business and Economics	4

OR

Other courses in quantitative skills with prior approval of the Master Advisor.

Depth Subject Matter **Units:** 27-30

BIS 101	Genes and Gene Expression	4
NUT 115	Animal Nutrition	4
NPB 101	Systemic Physiology	5
OR		
ANS 100	Animal Physiology	5

Business Management:

ARE 100A	Intermediate Microeconomics: Theory of Production and Consumption	4

Choose one:

ARE 113	Fundamentals of Marketing Management	4
ARE 130	Agricultural Markets	4
ARE 136	Managerial Marketing	4
ARE 138	International Commodity and Resource Markets	4

Choose one:

ARE 120	Agricultural Policy	4
ARE 132	Cooperative Business Enterprises	4
ARE 140	Farm Management	4
ARE 145	Farm and Rural Resources Appraisal	4
ARE 157	Analysis for Operations and Production Management	4

Choose one:

ANS 128	Agricultural Applications of Linear Programming	4
ARE 155	Operations Research and Management Science	4

Area of Specializations **Units:** 14-16

Choose one area of specialization below:

Aquatic Animals

ANS 018	Introductory Aquaculture	4

ANS 118	Fish Production	4
OR		
ANS 119	Invertebrate Aquaculture	4
ANS 131	Reproduction and Early Development in Aquatic Animals	4
ANS 148	Enterprise Analysis in Animal Industries	4

Companion Animals

ANS 042	Introductory Companion Animal Biology	4
ANS 140	Management of Laboratory Animals	4
ANS 142	Companion Animal Care and Management	4
ANS 148	Enterprise Analysis in Animal Industries	4

Dairy

ANS 041	Domestic Animal Production	2
ANS 041L	Domestic Animal Production Laboratory	2
ANS 146	Dairy Cattle Production	5
ANS 147	Dairy Processing and Marketing	3
ANS 148	Enterprise Analysis in Animal Industries	4

Equine

ANS 015	Introductory Horse Husbandry	3
ANS 115	Advanced Horse Production	4
ANS 141	Equine Enterprise Management	4
ANS 148	Enterprise Analysis in Animal Industries	4

Livestock

ANS 041	Domestic Animal Production	2
ANS 041L	Domestic Animal Production Laboratory	2
ANS 143	Pig and Poultry Care and Management	4
OR		
ANS 144	Beef Cattle and Sheep Production	4
ANS 145	Meat Processing and Marketing	4
ANS 148	Enterprise Analysis in Animal Industries	4

Poultry

AVS 011	Introduction to Poultry Science	3
ANS 143	Pig and Poultry Care and Management	4
ANS 145	Meat Processing and Marketing	4
ANS 148	Enterprise Analysis in Animal Industries	4

Individualized

Students may, with prior approval of their advisor and the Master Advisor, design their own individualized specialization within the major. The specialization will consist of 4 to 6 courses with one of the courses being ANS148. The other courses will include an introduction, care and management, and processing and/or marketing aspects of the animal of interest.

Restricted Electives **Units:** 8-10

Choose at least two additional courses with approval of advisor; minimum eight units; duplicate from Depth Subject Matter courses not counted:

ARE 018	Business Law	4

ARE 112	Fundamentals of Organization Management	4
ARE 113	Fundamentals of Marketing Management	4
ARE 118	Tax Accounting	4
ARE 120	Agricultural Policy	4
ARE 130	Agricultural Markets	4
ARE 132	Cooperative Business Enterprises	4
ARE 136	Managerial Marketing	4
ARE 138	International Commodity and Resource Markets	4
ARE 140	Farm Management	4
ARE 142	Personal Finance	3
ARE 143	Investments	4
ARE 144	Real Estate Economics	4
ARE 145	Farm and Rural Resources Appraisal	4
ARE 150	Agricultural Labor	4
ARE 155	Operations Research and Management Science	4
ARE 157	Analysis for Operations and Production Management	4
ARE 171A	Financial Management of the Firm (Discontinued)	4
ARE 171B	Financial Management of the Firm (Discontinued)	4
ARE 176	Environmental Economics	4
ANS 103	Animal Welfare	4
ANS 104	Principles and Applications of Domestic Animal Behavior	4
ANS 106	Domestic Animal Behavior Laboratory	2
ANS 115	Advanced Horse Production	4
ANS 118	Fish Production	4
ANS 119	Invertebrate Aquaculture	4
ANS 120	Principles of Meat Science	3
ANS 120L	Meat Science Laboratory	2
ANS 123	Animal Growth and Development	4
ANS 124	Lactation	4
ANS 125	Equine Exercise Physiology	3
ANS 126	Equine Nutrition	3
ANS 127	Advanced Equine Reproduction	3
ANS 128	Agricultural Applications of Linear Programming	4
ANS 129	Environmental Stewardship in Animal Production Systems	3
ANS 131	Reproduction and Early Development in Aquatic Animals	4
ANS 136	Techniques and Practices of Fish Culture	3
ANS 137	Techniques and Practices of Avian Culture	3
ANS 140	Management of Laboratory Animals	4
ANS 141	Equine Enterprise Management	4
ANS 142	Companion Animal Care and Management	4
ANS 143	Pig and Poultry Care and Management	4
ANS 144	Beef Cattle and Sheep Production	4
ANS 145	Meat Processing and Marketing	4
ANS 146	Dairy Cattle Production	5
ANS 147	Dairy Processing and Marketing	3
ANS 149	Farrier Science	3
ANS 170	Ethics of Animal Use	4
ANS 192	Internship in Animal Science	1-12
ANS 194	Research in Animal Science	3
ANS 194H	(Nonexistent)	
AVS 100	Avian Biology	3
AVS 103	Avian Development and Genomics	3
AVS 115	Raptor Biology	3
AVS 121	Avian Reproduction	2
AVS 123	Management of Birds	3

AVS 149	Egg Production Management	2
AVS 150	Nutrition of Birds	1
ANG 101	Animal Cytogenetics	3
ANG 105	Horse Genetics	2
ANG 107	Genetics and Animal Breeding	5
ANG 111	Molecular Biology Laboratory Techniques	4
NUT 122	Ruminant Nutrition and Digestive Physiology	4
NUT 123	Comparative Animal Nutrition	3
NUT 123L	Comparative Animal Nutrition Laboratory	1
NUT 124	Nutrition and Feeding of Finfishes	3
ABI 102	Animal Biochemistry and Metabolism	5
ABI 102 strongly recommended.		
ABI 103	Animal Biochemistry and Metabolism	5
ECS 124	Theory and Practice of Bioinformatics	4
MGT 100	Introduction to Financial Accounting	3
NPB 117	Avian Physiology	3
NPB 121	Physiology of Reproduction	4
NPB 121L	Physiology of Reproduction Laboratory	1
NPB 130	Physiology of the Endocrine Glands	4
WFC 120	Biology and Conservation of Fishes	3
WFC 120L	Laboratory in Biology and Conservation of Fishes	2
WFC 130	Physiological Ecology of Wildlife	4

Total: 126-139

Anthropology

Anthropology | ANT Information

(College of Letters and Science)

Lynne A. Isbell, Ph.D., Chairperson of the Department

Department Office. 328 Young Hall; 530-752-0745; http://anthropology.ucdavis.edu

Faculty. http://anthropology.ucdavis.edu/directory-of-people

Anthropology | ANT A.B.

(College of Letters and Science)

Lynne A. Isbell, Ph.D., Chairperson of the Department

Department Office. 328 Young Hall; 530-752-0745; http://anthropology.ucdavis.edu

Faculty. http://anthropology.ucdavis.edu/directory-of-people

The A.B. Major

Anthropology is the systematic study of humans. The student of anthropology learns about human biology, ecology, and social life—past and present—and gains a broad understanding of humans and societies. It is a diverse field, and the courses, faculty, and degree programs at UC Davis are subdivided into two wings—*Evolutionary* and *Sociocultural*.

Evolutionary A.B. *Evolutionary anthropologists* are united by their common application of science and evolutionary theory to understand the behavior, ecology, history, and evolution of humans and non-human primates, as individuals and as societies. These topics may be approached through archaeology, human behavioral ecology, paleoanthropology, primatology, genetics, biogeography, and conservation biology. *Archaeology* is the study of history or prehistory by analysis of a people's artifacts, or their material culture, with the goal of reconstructing culture history and human behavior. *Human behavioral ecology* is the study of how variation in ecology and social

organization can help us understand variation in human behavior. *Paleoanthropology* is the study of human evolution through the fossil and archaeological records, drawing on relevant studies in biological anthropology, Paleolithic archaeology, genetics, and geology. *Primatology* is the study of behavior, ecology, and morphology of primates to address questions about the evolution and function of behavioral and morphological patterns in nonhuman primates and to test models of the origins of human morphology and behavior. *Genetic anthropology* uses DNA to address anthropological questions about population histories, migrations, mixing, and adaptations to local contexts. *Biogeography* investigates the biology behind the geographic distribution of species and human cultures. *Conservation biology* explores the causes of loss of biological diversity—in this department, it focuses on threatened non-human primates and the conservation of natural resources by a rapidly growing population. A Bachelor of Arts degree provides broad training that includes all subfields of Anthropology.

Sociocultural. *Sociocultural anthropologists* study the varied ways in which people around the world organize their lives and interpret the circumstances in which they operate. Their main method is extended field research, which combines attention to global issues with the close study of human relations and culture. Among the themes addressed in the department's undergraduate courses are globalization and transnationalism; human ecology and environmental change; cultures of healing, health and medicine, the anthropology of law and global legal processes, the study of resistance, rebellion, and social control, the global spread of media and technology; migration, multiculturalism and urban life; colonialism and neocolonialism development and post-development; race, class and gender; politics and the political; cultures of everyday life; language use and discourse; and self, identity and family. The track in sociocultural anthropology thus offers a rich set of resources for understanding and engaging pressing issues in a globalizing world characterized by new forms of international culture and community as well as by increasing material inequality and political volatility.

The Program. The Bachelor of Arts program is divided into two tracks, *Sociocultural* and *Evolutionary*, which parallel the two wings described above. Students interested in the study of recent and contemporary human languages and societies should follow the Sociocultural Track. To obtain a A.B. degree in sociocultural anthropology, each student is required to complete courses that provide *(1)* foundational skills, *(2)* language and cultural skills, *(3)* comprehensive skills, and *(4)* specialized skills. Students interested in the study of archaeology; primate studies; or human biology, ecology or origins should follow the Evolutionary Track. The A.B. degree offered by the Evolutionary Track provides general training in anthropology from an evolutionary perspective. The Evolutionary Track also offers a B.S. degree that requires lower division coursework in math and science and upper division coursework in biological anthropology and closely related disciplines. Students planning on pursuing jobs in medical fields after graduation may be especially interested in the B.S. degree.

Students in both tracks are encouraged to gain practical experience through courses taken while studying abroad (under the administration of the UC Davis Study Abroad) and through undergraduate research or internships performed for credit (under ANT 192, 198, or 199 units provided by the advising office). Students showing exceptional ability are welcome to seek permission from instructors to participate in graduate seminars offered by the department.

Career Opportunities. A Bachelor of Arts degree in Anthropology is suited for students seeking a solid liberal arts education. With its broad goal to facilitate understanding across lines of cultural difference, sociocultural anthropology prepares students for lives that are influenced by increasingly pervasive cultural exchange, as well as cultural conflict, around the world. The program serves as excellent preparation for careers in which inter-cultural skills are increasingly needed, including social and environmental activism, business, diplomacy and social administration, journalism, law, education and international relations. Students that focus on evolutionary processes will be well prepared to enter fields such as medical or health anthropology, museum studies, cultural resource management and wildlife conservation. A degree in anthropology with appropriate courses in education is good preparation for high school teaching in social, biological, and physical sciences. It also provides the foundation for advanced study leading to careers in college-level teaching and research.

Major Advisor. Consult Department advising office in 1282 Social Sciences and Humanities Building.

Honors Program. Candidates for high or highest honors in Anthropology must write a senior thesis under the direction of a faculty member. The thesis project will have a minimum duration of two quarters. Honors candidates must take at least six units of Anthropology 194H. Only students who, at the end of their junior year (135 units), have attained a cumulative grade point average of 3.500 in Anthropology courses will be eligible for the honors program. The quality of the thesis work will be the primary determinant for designating high or highest honors at graduation.

Teaching Credential Subject Representative. See the Teaching Credential/M.A. Program.

Graduate Study

The Department offers a program of study leading to the M.A. and Ph.D. degrees in Anthropology. Further information regarding graduate study may be obtained at the Department office and at Graduate Studies.

A.B. Anthropology - Evolutionary Emphasis **Units:** 63-71

Preparatory Subject Matter **Units:** 21-23

ANT 001	Human Evolutionary Biology	4
ANT 002	Cultural Anthropology	5
ANT 003	Introduction to Archaeology	4

Choose one:

ANT 015	From Birth to Death: The Evolution of the Human Life Cycle	5
ANT 023	Introduction to World Prehistory	4
ANT 024	Ancient Crops and People	4
ANT 050	Evolution and Human Nature	4
ANT 054	Introduction to Primatology	4

Choose one:

ANT 013	Scientific Method in Physical Anthropology	4
SOC 046B	Introduction to Social Research	5
STA 013	Elementary Statistics	4
STA 032	Gateway to Statistical Data Science	4
STA 100	Applied Statistics for Biological Sciences	4

Depth Subject Matter **Units:** 42-48

Choose two:

ANT 101	Ecology, Nature, and Society	4
ANT 103	Indigenous Peoples and Natural Resource Conservation	4
ANT 105	Evolution of Societies and Cultures	4
ANT 122A	Economic Anthropology	4
ANT 128A	Kinship and Social Organization	4
ANT 141B	Ethnography of California and the Great Basin	4
ANT 141C	People of the Arctic: Contemporary and Historic Cultures of the Circumpolar Region	4
ANT 154A	The Evolution of Primate Behavior	5
ANT 154B	Primate Evolutionary Ecology	5
ANT 154C	Primate Behavior: Methods & Experimental Design Must be taken concurrently with ANT 154CL.	2
ANT 154CL	Laboratory in Primate Behavior	4

Must be taken concurrently with ANT 154C.

ANT 158	The Evolution of Females and Males: Biological Perspective	4
ANT 178	Hunter-Gatherers	4

Choose one:

ANT 153	Human Biological Variation	5
ANT 157	Anthropological Genetics	3
ANT 159	Molecular Anthropology of Native America	4

Choose one:

ANT 151	Primate Evolution	4
ANT 152	Human Evolution	5

Choose one:

ANT 170	Archeological Theory and Method	4
ANT 172	New World Prehistory: The First Arrivals	4
ANT 173	New World Prehistory: Archaic Adaptations	4
ANT 174	European Prehistory	4
ANT 175	Andean Prehistory: Archaeology of the Incas and their Ancestors	4
ANT 176	Prehistory of California and the Great Basin	4
ANT 177	African Prehistory	4
ANT 179	Asian Prehistory	4
ANT 180	Zooarchaeology	4
ANT 182	Archaeometry	4
ANT 183	Laboratory in Archeological Analysis	4
ANT 184	Prehistoric Technology: The Material Aspects of Prehistoric Adaptation	4
ANT 185	Lithic Analysis	4

Choose one:

ANT 100	Theory in Social-Cultural Anthropology	4
ANT 104N	Cultural Politics of the Environment	4
ANT 109	Visualization in Science: A Critical Introduction	4
ANT 110	Language and Sociocultural Anthropology	4
ANT 117	Language and Society	4
ANT 120	Language and Culture	4
ANT 121	Special Topics in Medical Anthropology	4
ANT 122B	Anthropology and Political Economy	4
ANT 123AN	Resistance, Rebellion, and Popular Movements	4
ANT 124	Religion in Society and Culture	4
ANT 125A	Structuralism and Symbolism	4
ANT 125B	Postmodernism(s) and Culture	4
ANT 126A	Anthropology of Development	4
ANT 126B	Women and Development	4
ANT 127	Urban Anthropology	4
ANT 128B	Self, Identity, and Family	4
ANT 129	Health and Medicine in a Global Context	4
ANT 130A	Cultural Dimensions of Globalization	4
ANT 131	Ecology and Politics	4
ANT 132	Psychological Anthropology	4
ANT 133	Anthropology of Ocean Worlds	4
ANT 134	Buddhism in Global Culture	4
ANT 135	Media Anthropology	4
ANT 136	Ethnographic Film	4

ANT 137	Meditation and Culture	4
ANT 138	Ethnographic Research Methods in Anthropology	4
ANT 139AN	Race, Class, Gender Systems	4
ANT 139BN	Gender and Sexuality	4
ANT 140A	Cultures and Societies of West and Central Africa	4
ANT 140B	Cultures and Societies of East and South Africa	4
ANT 141B	Ethnography of California and the Great Basin	4
ANT 141C	People of the Arctic: Contemporary and Historic Cultures of the Circumpolar Region	4
ANT 142	Peoples of the Middle East	4
ANT 143A	Ethnology of Southeast Asia	4
ANT 144	Contemporary Societies and Cultures of Latin America	4
ANT 145	Performance, Embodiment, and Space in South Asia	4
ANT 146N	Topics in the Anthropology of Europe	4
ANT 147	Modern South Asia Cinema	4
ANT 148A	Culture and Political Economy in Contemporary China	4
ANT 149A	Traditional Japanese Society	4
ANT 149B	Contemporary Japanese Society	4
ANT 186A	Museum Studies: Analysis of Native American Basketry	4

Choose 20 additional units from any upper division evolutionary track Anthropology courses (see list below):

ANT 101	Ecology, Nature, and Society	4
ANT 103	Indigenous Peoples and Natural Resource Conservation	4
ANT 105	Evolution of Societies and Cultures	4
ANT 122A	Economic Anthropology	4
ANT 128A	Kinship and Social Organization	4
ANT 141B	Ethnography of California and the Great Basin	4
ANT 141C	People of the Arctic: Contemporary and Historic Cultures of the Circumpolar Region	4
ANT 151	Primate Evolution	4
ANT 152	Human Evolution	5
ANT 153	Human Biological Variation	5
ANT 154A	The Evolution of Primate Behavior	5
ANT 154B	Primate Evolutionary Ecology	5
ANT 154C	Primate Behavior: Methods & Experimental Design	2
ANT 154CL	Laboratory in Primate Behavior	4
ANT 156A	Human Osteology	4
ANT 156B	Advanced Human Osteology	4
ANT 157	Anthropological Genetics	3
ANT 157L	Laboratory in Anthropological Genetics	2
ANT 158	The Evolution of Females and Males: Biological Perspective	4
ANT 159	Molecular Anthropology of Native America	4
ANT 160	Neandertals and Modern Human Origins	4
ANT 170	Archeological Theory and Method	4
ANT 172	New World Prehistory: The First Arrivals	4
ANT 173	New World Prehistory: Archaic Adaptations	4
ANT 174	European Prehistory	4
ANT 175	Andean Prehistory: Archaeology of the Incas and their Ancestors	4
ANT 176	Prehistory of California and the Great Basin	4
ANT 177	African Prehistory	4
ANT 178	Hunter-Gatherers	4
ANT 179	Asian Prehistory	4
ANT 180	Zooarchaeology	4

ANT 181	Archaeological Field Methods	4
ANT 181L	Field Course in Archeological Methods	4
ANT 182	Archaeometry	4
ANT 183	Laboratory in Archeological Analysis	4
ANT 184	Prehistoric Technology: The Material Aspects of Prehistoric Adaptation	4
ANT 185	Lithic Analysis	4
ANT 186A	Museum Studies: Analysis of Native American Basketry	4

A.B. Anthropology - Sociocultural Emphasis **Units:** 63-67

Preparatory Subject Matter **Units:** 21-23

ANT 002 Cultural Anthropology 5

Choose two:

ANT 001	Human Evolutionary Biology	4
ANT 003	Introduction to Archaeology	4
ANT 004	Introduction to Anthropological Linguistics	4

Choose one of the following two options:

(1) Two additional quarters of the foreign language used to meet the L&S language requirement.

(2) Two lower division sociocultural courses from the following:

ANT 020	Comparative Cultures	4
ANT 030	Sexualities	4
ANT 032	Drugs, Science and Culture	4
ANT 034	Cultures of Consumerism	4

Depth Subject Matter **Units:** 42-44

ANT 100 Theory in Social-Cultural Anthropology 4

Choose two upper division area-focus sociocultural track courses:

ANT 140A	Cultures and Societies of West and Central Africa	4
ANT 140B	Cultures and Societies of East and South Africa	4
ANT 141C	People of the Arctic: Contemporary and Historic Cultures of the Circumpolar Region	4
ANT 142	Peoples of the Middle East	4
ANT 143A	Ethnology of Southeast Asia	4
ANT 144	Contemporary Societies and Cultures of Latin America	4
ANT 145	Performance, Embodiment, and Space in South Asia	4
ANT 146N	Topics in the Anthropology of Europe	4
ANT 147	Modern South Asia Cinema	4
ANT 148A	Culture and Political Economy in Contemporary China	4
ANT 149A	Traditional Japanese Society	4
ANT 149B	Contemporary Japanese Society	4

Choose one of the following two options in (see list below identifying upper division sociocultural courses; see list above identifying evolutionary track courses):

(1) Eight additional upper division anthropology courses (two courses may be in the evolutionary track; and up to six units can be Anthropology 192, 194H, 198, or 199 units)

(2) Eight additional upper division courses that may combine six sociocultural track courses and either eight units of Study Abroad credit or two related courses in a single academic discipline (including but not limited to: African American and African Studies, American Studies, Art Studio, Art History, Asian American Studies, Chicana/o Studies, Communication, Community and Regional Development, Design, Economics, East Asian Studies, History, Linguistics, Middle East and South Asian Studies, Music, Native American Studies, Nature and Culture, Philosophy, Political Science, Psychology, Religious Studies, Science and Technology Studies, Sociology, Textiles and Clothing, Theatre and Dance, Women and Gender Studies)

Sociocultural track upper division courses:

Note: Sociocultural track courses at the upper division level are those with numbers from 100 to 149B, with the exception of 101, 103, 105, 128A, and 141B. Area-focus sociocultural track courses are those that refer in their titles to one or more peoples or regions of the world.

ANT 100	Theory in Social-Cultural Anthropology	4
ANT 104N	Cultural Politics of the Environment	4
ANT 109	Visualization in Science: A Critical Introduction	4
ANT 110	Language and Sociocultural Anthropology	4
ANT 117	Language and Society	4
ANT 120	Language and Culture	4
ANT 121	Special Topics in Medical Anthropology	4
ANT 122A	Economic Anthropology	4
ANT 122B	Anthropology and Political Economy	4
ANT 123AN	Resistance, Rebellion, and Popular Movements	4
ANT 124	Religion in Society and Culture	4
ANT 125A	Structuralism and Symbolism	4
ANT 125B	Postmodernism(s) and Culture	4
ANT 126A	Anthropology of Development	4
ANT 126B	Women and Development	4
ANT 127	Urban Anthropology	4
ANT 128B	Self, Identity, and Family	4
ANT 129	Health and Medicine in a Global Context	4
ANT 130A	Cultural Dimensions of Globalization	4
ANT 130BN	Migration and the Politics of Place and Identity	4
ANT 131	Ecology and Politics	4
ANT 132	Psychological Anthropology	4
ANT 133	Anthropology of Ocean Worlds	4
ANT 134	Buddhism in Global Culture	4
ANT 135	Media Anthropology	4
ANT 136	Ethnographic Film	4
ANT 137	Meditation and Culture	4
ANT 138	Ethnographic Research Methods in Anthropology	4
ANT 139AN	Race, Class, Gender Systems	4
ANT 139BN	Gender and Sexuality	4
ANT 140A	Cultures and Societies of West and Central Africa	4
ANT 140B	Cultures and Societies of East and South Africa	4
ANT 141C	People of the Arctic: Contemporary and Historic Cultures of the Circumpolar Region	4
ANT 142	Peoples of the Middle East	4
ANT 143A	Ethnology of Southeast Asia	4
ANT 144	Contemporary Societies and Cultures of Latin America	4
ANT 145	Performance, Embodiment, and Space in South Asia	4
ANT 146N	Topics in the Anthropology of Europe	4

ANT 147	Modern South Asia Cinema	4
ANT 148A	Culture and Political Economy in Contemporary China	4
ANT 149A	Traditional Japanese Society	4
ANT 149B	Contemporary Japanese Society	4

Total: 63-67

Anthropology | ANT B.S.

(College of Letters and Science)

Lynne A. Isbell, Ph.D., Chairperson of the Department

Department Office. 328 Young Hall; 530-752-0745; http://anthropology.ucdavis.edu

Faculty. http://anthropology.ucdavis.edu/directory-of-people

The B.S. Major

Anthropology is the systematic study of humans. The student of anthropology learns about human biology, ecology, and social life—past and present—and gains a broad understanding of humans and societies. The *Bachelor of Science degree in Anthropology* is interdisciplinary in nature since it requires lower division coursework in math and science and upper division coursework in biological anthropology and closely related disciplines.

The Program. Evolutionary anthropologists are united by their common application of science and evolutionary theory to understand the behavior, ecology, history, and evolution of humans and non-human primates, as individuals and as societies. These topics may be approached through archaeology, human behavioral ecology, paleoanthropology, primatology, genetics, biogeography, and conservation biology. Archaeology is the study of history or prehistory by analysis of a people's artifacts, or their material culture, with the goal of reconstructing culture history and human behavior. Human behavioral ecology is the study of how variation in ecology and social organization can help us understand variation in human behavior. Paleoanthropology is the study of human evolution through the fossil and archaeological records, drawing on relevant studies in biological anthropology, Paleolithic archaeology, genetics, and geology. Primatology is the study of behavior, ecology, and morphology of primates to address questions about the evolution and function of behavioral and morphological patterns in nonhuman primates and to test models of the origins of human morphology and behavior. Genetic anthropology uses DNA to address anthropological questions about population histories, migrations, mixing, and adaptations to local contexts. Biogeography investigates the biology behind the geographic distribution of species and human cultures. Conservation biology explores the causes of loss of biological diversity—in this department, it focuses on threatened non-human primates and the conservation of natural resources by a rapidly growing population. A Bachelor of Science degree, in addition to core evolutionary anthropology courses, includes the introductory sequences of biology, chemistry, organic chemistry, and calculus, as well as genetics and ecology.

Students are encouraged to gain practical experience through undergraduate research or internships performed for credit (under ANT 192, 198, or 199 units provided by the advising office). Students showing exceptional ability are welcome to seek permission from instructors to participate in graduate seminars offered by the department.

Career Opportunities. A Bachelor of Science degree in Anthropology combines a solid liberal arts education with training in the life and physical sciences. Through its interdisciplinary nature, a Bachelor of Science degree in Anthropology provides the educational background for careers in the biological sciences and a variety of health professions including pre-medical, pre-dental, and pre-veterinary, fields which increasingly need professionals with training in the social and behavioral sciences. In addition, students will be well prepared to enter fields such as medical or health anthropology, forensic sciences, museum studies, cultural resource management, and wildlife conservation. A Bachelor of Science degree in Anthropology with appropriate courses in education is good preparation for high school teaching in social, biological, and physical sciences. It also

provides the foundation for advanced study leading to careers in college-level teaching and research.

Major Advisor. Consult Department advising office in 1282 Social Sciences and Humanities Building.

Honors Program. Candidates for high or highest honors in Anthropology must write a senior thesis under the direction of a faculty member. The thesis project will have a minimum duration of two quarters. Honors candidates must take at least six units of Anthropology 194H. Only students who, at the end of their junior year (135 units), have attained a cumulative grade point average of 3.500 in Anthropology courses will be eligible for the honors program. The quality of the thesis work will be the primary determinant for designating high or highest honors at graduation.

Teaching Credential Subject Representative. See the Teaching Credential/M.A. Program.

Graduate Study

The Department offers a program of study leading to the M.A. and Ph.D. degrees in Anthropology. Further information regarding graduate study may be obtained at the Department office and at Graduate Studies.

Preparatory Subject Matter **Units:** 53-58

ANT 001	Human Evolutionary Biology	4
ANT 002	Cultural Anthropology	5
ANT 003	Introduction to Archaeology	4
BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
BIS 002C	Introduction to Biology: Biodiversity and the Tree of Life	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
AND		
CHE 008A	Organic Chemistry: Brief Course	2
CHE 008B	Organic Chemistry: Brief Course	4
OR		
CHE 118A	Organic Chemistry for Health and Life Sciences	4
CHE 118B	Organic Chemistry for Health and Life Sciences	4
MAT 016A	Short Calculus	3
MAT 016B	Short Calculus	3
MAT 016C	Short Calculus	3
OR		
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
MAT 017C	Calculus for Biology and Medicine	4
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4

Choose one:

ANT 013	Scientific Method in Physical Anthropology	4
SOC 046B	Introduction to Social Research	5
STA 013	Elementary Statistics	4
STA 032	Gateway to Statistical Data Science	4
STA 100	Applied Statistics for Biological Sciences	4

Depth Subject Matter **Units:** 45

Choose one:

ANT 151	Primate Evolution	4
ANT 152	Human Evolution	5

Choose one:

ANT 153	Human Biological Variation	5
ANT 157	Anthropological Genetics	3
ANT 159	Molecular Anthropology of Native America	4

Choose one:

ANT 154A	The Evolution of Primate Behavior	5
ANT 154B	Primate Evolutionary Ecology	5

Three additional upper division courses in anthropology.

BIS 101	Genes and Gene Expression	4
EVE 100	Introduction to Evolution	4

Additional units from the list below to achieve a minimum of 45 upper division units:

ANT 101	Ecology, Nature, and Society	4
ANT 103	Indigenous Peoples and Natural Resource Conservation	4
ANT 105	Evolution of Societies and Cultures	4
ANT 122A	Economic Anthropology	4
ANT 128A	Kinship and Social Organization	4
ANT 151	Primate Evolution	4
ANT 152	Human Evolution	5
ANT 153	Human Biological Variation	5
ANT 154A	The Evolution of Primate Behavior	5
ANT 154B	Primate Evolutionary Ecology	5
ANT 154C	Primate Behavior: Methods & Experimental Design	2
ANT 154CL	Laboratory in Primate Behavior	4
ANT 156A	Human Osteology	4
ANT 156B	Advanced Human Osteology	4
ANT 157	Anthropological Genetics	3
ANT 157L	Laboratory in Anthropological Genetics	2
ANT 158	The Evolution of Females and Males: Biological Perspective	4
ANT 159	Molecular Anthropology of Native America	4
ANT 180	Zooarchaeology	4
ANT 182	Archaeometry	4
ANT 185	Lithic Analysis	4
APC 100	Comparative Vertebrate Organology	4
BIS 102	Structure and Function of Biomolecules	3
BIS 103	Bioenergetics and Metabolism	3
CHA 101	Human Gross Anatomy	4
CHA 101L	Human Gross Anatomy Laboratory	3
ESP 100	General Ecology	4
EVE 101	Introduction to Ecology	4
EVE 102	Population and Quantitative Genetics	4
EVE 103	Phylogeny, Speciation and Macroevolution	4
EVE 104	Community Ecology	4
EVE 105	Phylogenetic Analysis of Vertebrate Structure	4
EVE 138	Ecology of Tropical Latitudes	5
EVE 141	Principles of Systematics	3

EVE 147	Biogeography	4
EVE 149	Evolution of Ecological Systems	4
EVE 175	Computational Genetics	3
GEL 107	Earth History: Paleobiology	3
GEL 107L	Earth History: Paleobiology Laboratory	2
GEL 108	Earth History: Paleoclimates	3
GEL 144	Historical Ecology	3
GEL 146	Radiogenic Isotope Geochemistry and Cosmochemistry	3
MCB 120L	Molecular Biology and Biochemistry Laboratory	3
MCB 121	Advanced Molecular Biology	3
MCB 150	Developmental Biology	4
MCB 160L	Principles of Genetics Laboratory	5
MCB 162	Human Genetics and Genomics	3
MCB 163	Developmental Genetics	3
MCB 164	Advanced Eukaryotic Genetics	3
NPB 101	Systemic Physiology	5
NPB 101L	Systemic Physiology Laboratory	3
NPB 102	Animal Behavior	3
NPB 123	Comparative Vertebrate Organology	4
NPB 124	Comparative Neuroanatomy	3
NPB 150	Advanced Animal Behavior	4
NPB 152	Hormones and Behavior	3
PSC 101	Introduction to Biological Psychology	4
PSC 113	Developmental Psychobiology	4
PSC 121	Physiological Psychology	4
PSC 122	Advanced Animal Behavior	4
PSC 123	Hormones and Behavior	3
PSC 124	Comparative Neuroanatomy	3
STA 104	Applied Statistical Methods: Nonparametric Statistics	4
STA 106	Applied Statistical Methods: Analysis of Variance	4
STA 108	Applied Statistical Methods: Regression Analysis	4
STA 130A	Mathematical Statistics: Brief Course	4
STA 130B	Mathematical Statistics: Brief Course	4
STS 131	Darwin	4
WFC 141	Behavioral Ecology	4
WFC 154	Conservation Biology	4

Total: 98-103

Anthropology | ANT M.A.

(College of Letters and Science)

Lynne A. Isbell, Ph.D., Chairperson of the Department

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Faculty. http://anthropology.ucdavis.edu/directory-of-people

Graduate Study. The Department offers a program of study leading to the M.A. and Ph.D. degrees in Anthropology. Further information regarding graduate study may be obtained at the Department office and at Graduate Studies.

Anthropology | ANT Ph.D.

(College of Letters and Science)

Lynne A. Isbell, Ph.D., Chairperson of the Department

Department Office. 328 Young Hall; 530-752-0745; http://anthropology.ucdavis.edu

Faculty. http://anthropology.ucdavis.edu/directory-of-people

Graduate Study. The Department offers a program of study leading to the M.A. and Ph.D. degrees in Anthropology. Further information regarding graduate study may be obtained at the Department office and at Graduate Studies.

Anthropology | ANT Minor

(College of Letters and Science)

Lynne A. Isbell, Ph.D., Chairperson of the Department

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Faculty. http://anthropology.ucdavis.edu/directory-of-people

Minor Advisor. Consult Department office in 1282 Social Sciences & Humanities.

General Emphasis **Units:** 19-21

Choose one:

ANT 101	Ecology, Nature, and Society	4
ANT 103	Indigenous Peoples and Natural Resource Conservation	4
ANT 105	Evolution of Societies and Cultures	4
ANT 122A	Economic Anthropology	4
ANT 128A	Kinship and Social Organization	4
ANT 151	Primate Evolution	4
ANT 152	Human Evolution	5
ANT 153	Human Biological Variation	5
ANT 154A	The Evolution of Primate Behavior	5
ANT 157	Anthropological Genetics	3
ANT 158	The Evolution of Females and Males: Biological Perspective	4
ANT 159	Molecular Anthropology of Native America	4

Choose one:

ANT 170	Archeological Theory and Method	4
ANT 172	New World Prehistory: The First Arrivals	4
ANT 173	New World Prehistory: Archaic Adaptations	4
ANT 174	European Prehistory	4
ANT 176	Prehistory of California and the Great Basin	4
ANT 177	African Prehistory	4
ANT 179	Asian Prehistory	4
ANT 180	Zooarchaeology	4
ANT 182	Archaeometry	4
ANT 183	Laboratory in Archeological Analysis	4
ANT 184	Prehistoric Technology: The Material Aspects of Prehistoric Adaptation	4
ANT 185	Lithic Analysis	4

Choose one from below or any other sociocultural track course that refers in its title to one or more peoples or regions of the world:

ANT 140A	Cultures and Societies of West and Central Africa	4
ANT 140B	Cultures and Societies of East and South Africa	4
ANT 141B	Ethnography of California and the Great Basin	4
ANT 141C	People of the Arctic: Contemporary and Historic Cultures of the Circumpolar Region	4
ANT 142	Peoples of the Middle East	4
ANT 143A	Ethnology of Southeast Asia	4

ANT 144	Contemporary Societies and Cultures of Latin America	4
ANT 145	Performance, Embodiment, and Space in South Asia	4
ANT 146N	Topics in the Anthropology of Europe	4
ANT 147	Modern South Asia Cinema	4
ANT 148A	Culture and Political Economy in Contemporary China	4
ANT 149A	Traditional Japanese Society	4
ANT 149B	Contemporary Japanese Society	4
ANT 178	Hunter-Gatherers	4

Choose two:

ANT 100	Theory in Social-Cultural Anthropology	4
ANT 104N	Cultural Politics of the Environment	4
ANT 109	Visualization in Science: A Critical Introduction	4
ANT 110	Language and Sociocultural Anthropology	4
ANT 117	Language and Society	4
ANT 120	Language and Culture	4
ANT 121	Special Topics in Medical Anthropology	4
ANT 122A	Economic Anthropology	4
ANT 122B	Anthropology and Political Economy	4
ANT 123AN	Resistance, Rebellion, and Popular Movements	4
ANT 124	Religion in Society and Culture	4
ANT 125A	Structuralism and Symbolism	4
ANT 125B	Postmodernism(s) and Culture	4
ANT 126A	Anthropology of Development	4
ANT 126B	Women and Development	4
ANT 127	Urban Anthropology	4
ANT 128B	Self, Identity, and Family	4
ANT 129	Health and Medicine in a Global Context	4
ANT 130A	Cultural Dimensions of Globalization	4
ANT 130BN	Migration and the Politics of Place and Identity	4
ANT 131	Ecology and Politics	4
ANT 132	Psychological Anthropology	4
ANT 133	Anthropology of Ocean Worlds	4
ANT 134	Buddhism in Global Culture	4
ANT 135	Media Anthropology	4
ANT 136	Ethnographic Film	4
ANT 137	Meditation and Culture	4
ANT 138	Ethnographic Research Methods in Anthropology	4
ANT 139AN	Race, Class, Gender Systems	4
ANT 139BN	Gender and Sexuality	4

Archaeology Emphasis **Units:** 20

ANT 170	Archeological Theory and Method	4

Choose two:

ANT 172	New World Prehistory: The First Arrivals	4
ANT 173	New World Prehistory: Archaic Adaptations	4
ANT 174	European Prehistory	4
ANT 175	Andean Prehistory: Archaeology of the Incas and their Ancestors	4
ANT 176	Prehistory of California and the Great Basin	4
ANT 177	African Prehistory	4
ANT 178	Hunter-Gatherers	4
ANT 179	Asian Prehistory	4

Choose two:

ANT 156A	Human Osteology	4
ANT 156B	Advanced Human Osteology	4
ANT 180	Zooarchaeology	4
ANT 181	Archaeological Field Methods	4
ANT 181L	Field Course in Archeological Methods	4
ANT 182	Archaeometry	4
ANT 183	Laboratory in Archeological Analysis	4
ANT 184	Prehistoric Technology: The Material Aspects of Prehistoric Adaptation	4
ANT 185	Lithic Analysis	4

Evolutionary Emphasis **Units:** 18-25

Any five upper division Evolutionary Anthropology courses. Note: Evolutionary track courses at the upper division level are those with numbers 101, 103, 105, 122A, 128A, 141B, 141C, and 151-185.

Sociocultural Emphasis **Units:** 20

ANT 100	Theory in Social-Cultural Anthropology	4

One upper division area-focus sociocultural track course; area-focus sociocultural track courses are those that are numbered between 140A-149.

One additional upper division Sociocultural Anthropology course. Sociocultural track courses at the upper division level are those with numbers from 100 to 149B, with the exception of 101, 103, 105, 128A, and 141B.

Choose two:

ANT 104N	Cultural Politics of the Environment	4
ANT 109	Visualization in Science: A Critical Introduction	4
ANT 110	Language and Sociocultural Anthropology	4
ANT 117	Language and Society	4
ANT 120	Language and Culture	4
ANT 121	Special Topics in Medical Anthropology	4
ANT 122A	Economic Anthropology	4
ANT 122B	Anthropology and Political Economy	4
ANT 123AN	Resistance, Rebellion, and Popular Movements	4
ANT 124	Religion in Society and Culture	4
ANT 125A	Structuralism and Symbolism	4
ANT 125B	Postmodernism(s) and Culture	4
ANT 126A	Anthropology of Development	4
ANT 126B	Women and Development	4
ANT 127	Urban Anthropology	4
ANT 128B	Self, Identity, and Family	4
ANT 129	Health and Medicine in a Global Context	4
ANT 130A	Cultural Dimensions of Globalization	4
ANT 130BN	Migration and the Politics of Place and Identity	4
ANT 131	Ecology and Politics	4
ANT 132	Psychological Anthropology	4
ANT 133	Anthropology of Ocean Worlds	4
ANT 134	Buddhism in Global Culture	4
ANT 135	Media Anthropology	4
ANT 136	Ethnographic Film	4
ANT 137	Meditation and Culture	4

ANT 138	Ethnographic Research Methods in Anthropology	4
ANT 139AN	Race, Class, Gender Systems	4
ANT 139BN	Gender and Sexuality	4

Total: 18-25

Anthropology | ANT Courses

Courses in ANT:

ANT 001—Human Evolutionary Biology (4)
Discussion—1 hour; Lecture—3 hours. Processes and course of human evolution; primatology; biological and social diversity within Homo sapiens; human paleontology. GE credit: SE, SL, WE. Effective: 1999 Fall Quarter.

ANT 001Y—Human Evolutionary Biology (Hybrid Version) (4)
Discussion/Laboratory—1 hour; Lecture/Discussion—1.5 hours; Web Virtual Lecture—1.5 hours. Evolutionary theory and mechanisms of evolution; basic population and quantitative genetics; primatology; biological and cultural diversity within Homo sapiens; paleoanthropology. Students may not take both ANT 1 and ANT 1Y for credit. GE credit: SE, SL, WE. Effective: 2017 Winter Quarter.

ANT 002—Cultural Anthropology (5)
Discussion—1 hour; Lecture—3 hours; Term Paper. Introduction to cultural diversity in its many forms and methods used by anthropologists to account for it. Relational dynamic of culture, history, and power in constituting "social facts" and "realities." Critical thinking of contemporary concerns. GE credit: ACGH, DD, SS, WC, WE. Effective: 2017 Winter Quarter.

ANT 003—Introduction to Archaeology (4)
Discussion—1 hour; Lecture—3 hours. Development of archaeology as an anthropological study; objectives
and methods of modern archaeology. GE credit: SE, SL, SS. Effective: 2015 Spring Quarter.

ANT 004—Introduction to Anthropological Linguistics (4)
Discussion—1 hour; Lecture—3 hours. Exploration of the role of language in social interaction and world view, minority languages and dialects, bilingualism, literacy, the social motivation of language change. Introduction of analytical techniques of linguistics and demonstration of their relevance to language in sociocultural issues. GE credit: SS, WC, WE. Effective: 1997 Winter Quarter.

ANT 005—Proseminar in Biological Anthropology (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. ANT 1 or ANT 1Y recommended. Course primarily for majors. Integration of related disciplines in the study of biological anthropology through discussion and research projects. Principal emphasis in human adaptation to the environment. GE credit: OL, SE, WE. Effective: 2016 Fall Quarter.

ANT 013—Scientific Method in Physical Anthropology (4)
Discussion/Laboratory—1 hour; Fieldwork—1 hour; Lecture—2 hours. Skills for scientific thinking; designing, implementing, analyzing, interpreting, presenting, and criticizing research. Collection and analysis of original data. Basic statistical methods. GE credit: OL, SE, VL, WE. Effective: 2004 Fall Quarter.

ANT 015—From Birth to Death: The Evolution of the Human Life Cycle (5)
Discussion—1 hour; Lecture—3 hours; Term Paper. Introduction to the biology of birth, childhood, marriage, the family, old age, and death. Examines comparative characteristics of nonhuman primates and other animals as well as cross-cultural variation in humans by study of selected cases. GE credit: SE, SL, WC, WE. Effective: 2018 Winter Quarter.

ANT 020—Comparative Cultures (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the anthropological study of cultural diversity. Case
studies of eight societies will be presented to illustrate and compare the distinctive features of major cultural regions of the world. Concludes with a discussion of modernization. GE credit: ACGH, AH, DD, SS, WC, WE. Effective: 1997 Winter Quarter.

ANT 023—Introduction to World Prehistory (4)
Discussion—1 hour; Lecture—3 hours. Broadly surveys patterns and changes in the human species' physical and cultural evolution from earliest evidence for "humanness" to recent development of large-scale complex societies or "civilizations." Lectures emphasize use of archaeology in reconstructing the past. GE credit: SS, WC, WE. Effective: 1997 Winter Quarter.

ANT 024—Ancient Crops and People (4)
Discussion—1 hour; Lecture—3 hours. The archaeological evidence for domestication of plants and the origins of agricultural societies. Anthropological context of agriculture and the effects on sexual division of labor, social inequality, wealth accumulation, warfare, human health, and sedentism. GE credit: SS, WC, WE. Effective: 2005 Spring Quarter.

ANT 025—Ancient Animals and People (2)
Lecture—2 hours. History of human and animal relationships and how animals have influenced social and economic structures of past societies. Why, when and how humans used animals in the context of hunting, domestication, secondary products, ritual, companionship, and conservation. GE credit: SS. Effective: 2015 Winter Quarter.

ANT 026—Mummies of the Ancient World (2)
Lecture—2 hours. Archaeological approaches for studying mummies and the process of mummification in the ancient world. Analytical techniques used, environmental factors promoting mummification, and archaeological conservation of mummified bodies. GE credit: SS, WC. Effective: 2014 Fall Quarter.

ANT 028—Prehistoric Origins of Art (2)
Lecture/Discussion—2 hours. Interdisciplinary look at the earliest evidence for art and symbolic behavior. Method and techniques to investigate Prehistoric art. Interpretative framework and relevance for understanding the role of symbolic activities in traditional societies. GE credit: SS. Effective: 2015 Winter Quarter.

ANT 029—Vikings (2)
Lecture—2 hours. History of the Vikings through the Slavic and Mediterranean regions in the East and across the vast North Atlantic region to the west. Emphasis on archaeology and sagas to understand Viking culture from the 8th to 11th centuries. GE credit: SS, WC. Effective: 2016 Spring Quarter.

ANT 030—Sexualities (4)
Lecture/Discussion—4 hours. Introduction to the study of sexuality, particularly to the meanings and social organization of same-sex sexual behavior across cultures and through time. Biological and cultural approaches will be compared, and current North American issues placed in a wider comparative context. GE credit: ACGH, AH, DD, SS, WC. Effective: 2005 Fall Quarter.

ANT 032—Drugs, Science and Culture (4)
Discussion—1 hour; Lecture—3 hours. Drugs, politics, science, society in a cultural perspective: emphasis on roles of science, government and the media in shifting attitudes toward alcohol, marijuana, Prozac and other pharmaceuticals; drug laws, war on drugs and global trade in sugar, opium, cocaine. (STS 032.) GE credit: SS, VL, WE. Effective: 2008 Fall Quarter.

ANT 034—Cultures of Consumerism (4)
Lecture/Discussion—4 hours; Term Paper. Aspects of modern consumer cultures in capitalist and socialist countries. Transformations of material cultures over the past century. Case studies on the intersections of gender, class, and culture in everyday consumption practices. GE credit: SS, WC. Effective: 2007 Fall Quarter.

ANT 050—Evolution and Human Nature (4)
Discussion—1 hour; Lecture—3 hours. Evolutionary analyses of human nature, beginning with Lamarck, Darwin, Spencer and contemporaries, and extending through social Darwinism controversies to contemporary evolutionary anthropology research on human diversity in economic, mating, life-history, and social behavior. GE credit: SE, SL, WE. Effective: 2004 Fall Quarter.

ANT 054—Introduction to Primatology (4)
Lecture/Discussion—3 hours; Term Paper. Basic survey of the primates as a separate order of mammals; natural history and evolution of primates; consideration of hypotheses for their origin. GE credit: SE, SL, WE. Effective: 2007 Fall Quarter.

ANT 098—Directed Group Study (1-5)
Variable. Primarily intended for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

ANT 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

ANT 100—Theory in Social-Cultural Anthropology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Discussion of the theoretical and philosophical developments in cultural anthropology from the 19th century to the present. No credit if taken ANT 137. GE credit: SS, WE. Effective: 2016 Fall Quarter.

ANT 101—Ecology, Nature, and Society (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 001 or ANT 002 or ESP 030 or EVE 100 or BIS 101 recommended. Interdisciplinary study of diversity and change in human societies, using frameworks from anthropology, evolutionary ecology, history, archaeology, psychology, and other fields. Topics include population dynamics, subsistence transitions, family organization, disease, economics, warfare, politics, and resource conservation. (ESP 101.) GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 103—Indigenous Peoples and Natural Resource Conservation (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 or GEL 001 or ESP 030 recommended. Integration of the interests of resident and indigenous peoples with the conservation of natural resources and ecosystems, using case study examples from both the developing and developed world. Not open for credit for students who have completed ANT 121N. (Former ANT 121N.). GE credit: ACGH, DD, OL, SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 104N—Cultural Politics of the Environment (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Political economy of environmental struggles. Relationship between social inequality (based on race, class and/or gender) and ecological degradation. Articulation of local peoples, national policy, and the international global economy in the contestation over the use of environmental resources. Not open for credit to students who have completed ANT 134N. (Former ANT 134N.). GE credit: ACGH, DD, SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 105—Evolution of Societies and Cultures (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 001 or ANT 002 or ESP 030 or EVE 100 or BIS 101 recommended. Interdisciplinary study of social and cultural evolution in humans. Culture as a system of inheritance,psychology of cultural learning, culture as an adaptive system,evolution of maladaptations, evolution of technology and institutions,evolutionary transitions in human history, coevolution of genetic and cultural variation. Only two units of credit for students who have completed ESP 101 or ANT 101 prior to fall 2004. (ESP 105.) GE credit: QL, SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 109—Visualization in Science: A Critical Introduction (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 or STS 001 or STS 020 recommended. Anthropological approaches to scientific visualization techniques, informatics, simulations. Examination of different visualization techniques toward understanding the work involved in producing them, critical assessment of their power and limits, especially when visualizations are used socially to make claims. (STS 109.) GE credit: SS, VL, WE. Effective: 2016 Fall Quarter.

ANT 110—Language and Sociocultural Anthropology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Role of language analysis and linguistic theory in the development of sociocultural anthropology. Language, culture, and thought; the linguistic accomplishment of social action; language ideology; language and social power. Language as cultural mediator of politicoeconomic process. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 117—Language and Society (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 004 or LIN 001 recommended; ANT 002 recommended. Consideration of language in its social context. Methods of data collection and analysis; identification of socially significant linguistic variables. Contributions of the study of contextualized speech to linguistic theory. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 120—Language and Culture (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 004 or LIN 001 recommended; ANT 002 recommended. Culture, cognition, meaning, and interpretation; language and the classification of experience; communication and learning in crosscultural perspective. GE credit: ACGH, DD, SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 121—Special Topics in Medical Anthropology (4)
Lecture/Discussion—4 hours. Prerequisite(s): ANT 002 recommended. Introduction to critical medical anthropology. Topics include anthropological analysis of bio-medicine, psychiatry, systems of knowledge and healing, the body, emotions, and clinical encounters in a cross-cultural perspective. (STS 121.) GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 122A—Economic Anthropology (4)
Discussion—1 hour; Lecture—3 hours. The varieties of production, exchange, and consumption behavior in precapitalist economies, their interaction with culture and social-political organization, and the theories that account for these phenomena. The effects of capitalism on precapitalist sectors. Not open for credit to students who have completed ANT 122. (Former ANT 122.). GE credit: ACGH, DD, SS, WC, WE. Effective: 2001 Winter Quarter.

ANT 122B—Anthropology and Political Economy (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Survey of anthropological approaches to the study of political organizations; inter-relationships among political institutions, economic infrastructures and cultural complexity. Not open for credit to students who have completed ANT 123A. (Former ANT 123A.). GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 123AN—Resistance, Rebellion, and Popular Movements (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Analysis of popular protest in Third World and indigenous societies ranging from covert resistance to national revolts. Comparative case studies and theories of peasant rebellions, millenarian movements, social bandits, Indian "wars", ethnic and regional conflicts, gender and class conflicts. Not open for credit to students who have completed ANT 123B. (Former ANT 123B.). GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 124—Religion in Society and Culture (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 Discussion of anthropological theories of religion with emphasis on non-literate societies. Survey of shamanism, magic and witchcraft, ritual and symbols, and religious movements. Extensive discussion of ethnographic examples and analysis of social functions of religious institutions. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

ANT 124—Religion in Society and Culture (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Discussion of anthropological theories of religion with emphasis on non-literate societies. Survey of shamanism, magic and witchcraft, ritual and symbols, and religious movements. Extensive discussion of ethnographic examples and analysis of social functions of religious institutions. GE credit: AH, WC, WE. Effective: 2018 Fall Quarter.

ANT 125A—Structuralism and Symbolism (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Survey of anthropological approaches to understanding the logic of structuralism and symbolism in cultural analysis. Focus on how structural and symbolic interpretations relate to cultural and linguistic universals and to the philosophical basis of relativism in the social sciences. (Former course 125.) GE credit: SS, WC, WE. Effective: 2017 Winter Quarter.

ANT 125B—Postmodernism(s) and Culture (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. U.S.-European postmodern condition. "Modernity" as an incomplete project for subordinated groups. The economic, social, technological and political conditions leading to postmodern aesthetics, in comparison with postcolonialism, feminism and minority discourse. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 126A—Anthropology of Development (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Theories of development and current critiques. Colonial legacies and post-colonial realities. Roles of the state and NGOs, population migrations, changing gender identities, cash-earning strategies, and sustainability issues. Stresses importance of cultural understandings in development initiatives. Case studies emphasizing non-industrial societies. Not open for credit to students who have completed ANT 126. (Former ANT 126.). GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 126B—Women and Development (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Current Third World and Western development issues concerning women in agriculture, industry, international division of labor, political movements, revolutions, politics of health, education, family and reproduction. Impact of colonialism, capitalism, the world system, and international feminism on women and development. No credit if taken ANT 131. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 127—Urban Anthropology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002; or Consent of Instructor. Survey of approaches to urban living: political structures, organization
of labor, class relations, world views. The evolution of urban life and its contemporary dilemmas. Cross-cultural comparisons discussed through
case studies. GE credit: SS, WC, WE. Effective: 1997 Winter Quarter.

ANT 128A—Kinship and Social Organization (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Comparative examination of personal kinship, descent, marriage, household and family organizations; the theories that account for variation, and recent advances in the treatment of these data. Not open for credit to students who have completed ANT 128. (Former ANT 128.). GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 128B—Self, Identity, and Family (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Exploration of self, identity, and family systems cross-culturally. Impact of class, gender, race, ethnicity, ruralization, urbanization, and globalization on notions of selfhood in different social/cultural systems. Not open for credit to students who have completed ANT 129. (Former ANT 129.). GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 129—Health and Medicine in a Global Context (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ANT 002 recommended. Recent works in medical anthropology and the science studies of medicine dealing with social and cultural aspects of global health issues such as AIDS, pandemics, clinical trials, cultural differences in illnesses, diabetes, organ trafficking, medical technologies, illness narratives, and others. (STS 129.) GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 130A—Cultural Dimensions of Globalization (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Cultural dimensions of recent economic and political developments frequently termed "globalization." GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 130BN—Migration and the Politics of Place and Identity (4)
Lecture/Discussion—4 hours. Prerequisite(s): ANT 002 recommended. Internal and international migration from an anthropological perspective, including causes, processes, and political, economic, and cultural effects of spatial mobility and displacement. Emphasizes the interplay of identity, place, and power in diverse cultural and historical contexts. Not open for credit to students who have completed ANT 123D. (Former ANT 123D.). GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 131—Ecology and Politics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Analysis of the complex interactions between ecological dynamics and political processes employing the emerging approach of political ecology. Case studies of environmental degradation (e.g., desertification, logging, mineral extraction, petroleum, water) from various cultural and geographic regions. GE credit: SS. Effective: 2016 Fall Quarter.

ANT 132—Psychological Anthropology (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. History of the relationship between anthropology and psychoanalysis. Exploration of anthropology of emotions, colonial psychology, contemporary ethno-psychiatry, studies on personhood, possession, magic, altered states, subjectivity, and definitions of the normal and the pathological in different contexts and cultures. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 133—Anthropology of Ocean Worlds (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Exploration of various oceanic cultures and their engagement with the sea. Piracy, smuggling, exchange, maritime legal regimes, offshore policing, media infrastructures, and ocean ecologies. GE credit: SS, WC, WE. Effective: 2017 Winter Quarter.

ANT 134—Buddhism in Global Culture (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Class size limited to 50 students. Buddhist meditation and ritual as a cultural system that adapts to global and local forces of change. Anthropological theory and method in understanding global culture transmission, including Buddhist reform movements in Asia and Buddhist practice in the West. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 135—Media Anthropology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Upper division standing. Examining human practices through their inscription in old and new media; evaluating the emergent fields of "cyber" and "digital" anthropology; and problematizing terms and concepts routinely deployed in studies of media worlds—platform, social media, hologram, algorithm, remediation, curation, animation. GE credit: AH, SS, VL, WC. Effective: 2017 Winter Quarter.

ANT 136—Ethnographic Film (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Overview of the use of film in anthropology and its advantages and limitations in comparison to written ethnographic descriptions. Essential features of ethnographic films. Film production in anthropological research and problems encountered in producing films in the field. GE credit: SS, VL, WC, WE. Effective: 2016 Fall Quarter.

ANT 137—Meditation and Culture (4)
Discussion—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): ANT 002 recommended. Class size limited to 50 students. Study and practice of the relation between meditation and cultural conditioning; comparison of Buddhist practice with other cultural constructions of mind, body, brain, thought, emotion, and self. Effective: 2016 Fall Quarter.

ANT 138—Ethnographic Research Methods in Anthropology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Basic concepts in and approaches to ethnographic field research. Problem formulation, research design, qualitative and quantitative data collection procedures, and techniques for organizing, retrieving, and analyzing information. Ethnographic description and constructed inference. Students will organize and conduct individual research projects. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 139AN—Race, Class, Gender Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Comparative analysis of class/race/gender inequality, concentrating on the ways in which beliefs about descent, "blood," and biological difference interact with property and marital systems to affect the distribution of power in society. Not open for credit to students who have completed ANT 139. (Former ANT 139.). GE credit: ACGH, DD, SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 139BN—Gender and Sexuality (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Gender and sexuality in foraging bands, horticultural and pastoral tribes, agricultural and industrial states. Debates on cultural evolution and distribution of gender hierarchies. Impact of politics, economics, religion, social practices, women's movements on gender and sexuality. Culture, nature and sexuality. Not open for credit to students who have completed ANT 130. (Former ANT 130.). GE credit: ACGH, DD, SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 140A—Cultures and Societies of West and Central Africa (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Ethnographic survey of West Africa and Congo Basin with analyses of representative societies which illustrate problems of general theoretical concern. Major consideration will be the continuities and discontinuities between periods prior to European contact and the present. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 140B—Cultures and Societies of East and South Africa (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Ethnographic survey of Eastern and Southern Africa with analyses of selected societies which illustrate problems of interest to anthropologists. Major consideration will be given to continuities and discontinuities between periods prior to European contact and the present. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 141B—Ethnography of California and the Great Basin (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. ANT 002 recommended. Description and analysis of the native peoples of California and the Great Basin, and their lifeways at the time of European contact. (Former course 141C.) GE credit: ACGH, DD, SS, WE. Effective: 2016 Fall Quarter.

ANT 141C—People of the Arctic: Contemporary and Historic Cultures of the Circumpolar Region (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 or ANT 003 recommended. Social, economic, political, and religious lives of Russian, American, Canadian, and Greenlandic Arctic people (Yup'ik, Iñupiat, Inuit). Topics include Arctic ecosystems, archaeological record of human occupation, ethnohistorical and ethnographic accounts, arctic people in popular culture, and contemporary issues. Effective: 2016 Fall Quarter.

ANT 142—Peoples of the Middle East (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Peoples of the Middle East (including North Africa). Discussions of class relations, kinship organization, sex/gender systems, religious beliefs and behavior, ethnic relations, political systems. Impact of world systems, political and religious movements and social change. (Former course 136.) GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 143A—Ethnology of Southeast Asia (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Patterns of culture and social organization from prehistory to the present, in the context of historical, ecological, economic, and political settings. Emphasis on the relation of ethnic minorities to national states. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 144—Contemporary Societies and Cultures of Latin America (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Introduction to contemporary social structure of Latin America. Origins, maintenance and changes in inequality: economic responses to poverty, sociocultural responses to discrimination, and political responses to powerlessness. GE credit: SS, WC, WE. Effective: 2017 Winter Quarter.

ANT 145—Performance, Embodiment, and Space in South Asia (4)
Lecture/Discussion—4 hours. Prerequisite(s): ANT 002; or Consent of Instructor. South Asian cultures and societies with a focus on performance, embodiment, and space from several disciplinary fields. Topics may include colonialism, nationalism, religious traditions, media, popular culture, cities, social movements, modernity, body-cultures, identity, gender, and diasporas. GE credit: AH, SS, WC, WE. Effective: 2005 Winter Quarter.

ANT 146N—Topics in the Anthropology of Europe (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Recent ethnographies of different nation-states and socio-political spaces in Europe. Topics include the question of old and new boundaries, historical and contemporary constructions of Europe, migration and ethnicity, citizenship, belonging, multiculturalism, and post/socialisms. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 147—Modern South Asia Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): Upper-division standing or consent of instructor. South Asian cinema of last 100 years in the context of cultural, social, and political changes. South Asian history, Independence, Partition, urban life, class, migration, postcolonial identity, diaspora, gender, sexuality, religion, sport, performance, etc. (MSA 131B and CTS 146B.) GE credit: AH, SS, VL, WC, WE. Effective: 2017 Winter Quarter.

ANT 148A—Culture and Political Economy in Contemporary China (4)
Lecture/Discussion—4 hours. Prerequisite(s): ANT 002 recommended. Examining contemporary Chinese culture and political economy through reading ethnographic studies on recent transformations in rural and urban Chinese society. Special attention is given to state power, popular culture, spatial mobility, city space, and gender. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 149A—Traditional Japanese Society (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Patterns of culture and social organization from prehistoric to early twentieth-century Japan. Origins, prehistory, and traditional religious and political systems, marriage and kinship, language and culture. Changes and continuities in traditional and contemporary Japanese culture are addressed. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 149B—Contemporary Japanese Society (4)
Discussion—1 hour; Lecture—3 hours. Introduction to contemporary Japanese social structure, social organization, and patterns of culture. Analysis of ruralurban
cultural continuities and contrasts, class relations, political and economic systems, kinship, sex/gender systems, contemporary religious beliefs and behavior, conflict, consensus, and cultural stereotypes. GE credit: SS, WC, WE. Effective: 1997 Winter Quarter.

ANT 151—Primate Evolution (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 001 or BIS 002B or BIS 002C or EVE 010 recommended. Origin and relationships of the prosimians, monkeys, and apes. GE credit: SE, WE. Effective: 2016 Fall Quarter.

ANT 152—Human Evolution (5)
Discussion—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): ANT 001 recommended. Nature and results of the evolutionary processes involved in the formation and differentiation of humankind. GE credit: SE, WE. Effective: 2016 Fall Quarter.

ANT 153—Human Biological Variation (5)
Discussion—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): ANT 001 or BIS 002B recommended. Origin, adaptive significance and methods of analysis of genetic differences among human populations. Special attention given to racial differences such as those in blood groups, plasma proteins, red cell enzymes, physiology, morphology, pigmentation and dermatoglyphics. GE credit: QL, SE, WE. Effective: 2016 Fall Quarter.

ANT 154A—The Evolution of Primate Behavior (5) ***Review all entries***
Discussion—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): ANT 001 or ANT 054 or EVE 010 recommended. Examines ecological diversity and evolution of social systems of prosimians, monkeys, and apes, placing the social behavior of the primates in the context of appropriate ecological and evolutionary theory. GE credit: SE, VL, WE. Effective: 2016 Fall Quarter.

ANT 154A—The Evolution of Primate Behavior (5) ***Review all entries***
Discussion—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): ANT 001 or ANT 054 or EVE 010 recommended. Examines ecological diversity and evolution of social systems of prosimians, monkeys, and apes, placing the social behavior of the primates in the context of appropriate ecological and evolutionary theory. GE credit: SE, WE. Effective: 2018 Fall Quarter.

ANT 154B—Primate Evolutionary Ecology (5)
Discussion/Laboratory—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): ANT 001 or EVE 010 recommended. Examination of the ecology of primates within an evolutionary framework. Theoretical concepts in individual, population, and community ecology, illustrated with primate (and other vertebrate) examples, with additional discussion of primate and rainforest conservation. GE credit: QL, SE, WE. Effective: 2017 Winter Quarter.

ANT 154C—Primate Behavior: Methods & Experimental Design (2)
Lecture/Discussion—2 hours. Prerequisite(s): (ANT 054 or ANT 154A or ANT 154B or NPB 102); (STA 013 or STA 013Y or STA 032 or STA 100 or SOC 046B); ANT 154CL (can be concurrent) Pass One restricted to upper division ANT majors; concurrent enrollment in ANT 154CL required. Scientific methods of studying, describing and analyzing the behavior and ecology of primates. (P/NP grading only.) GE credit: QL, SE, SL. Effective: 2018 Spring Quarter.

ANT 154CL—Laboratory in Primate Behavior (4) ***Review all entries***
Laboratory—6 hours; Term Paper. Prerequisite(s): (ANT 054 or ANT 154A or ANT 154BN); STA 013; Or equivalent of STA 013. Design and conduct of scientific "field studies" of the behavior of group-living primates at the California National Primate Research Center. GE credit: OL, SE, WE. Effective: 2008 Fall Quarter.

ANT 154CL—Laboratory in Primate Behavior (4) ***Review all entries***
Laboratory—6 hours; Term Paper. Prerequisite(s): (ANT 054 or ANT 154A or ANT 154B or NPB 102); (STA 013 or STA 013Y or STA 032 or STA 100 or SOC 046B); ANT 154C (can be concurrent); Concurrent enrollment with ANT 154C required. Pass One restricted to upper division Anthropology majors only. Design and conduct of scientific "field studies" of the behavior of group-living primates at the California National Primate Research Center. GE credit: OL, SE, WE. Effective: 2018 Fall Quarter.

ANT 155—Primate Conservation Biology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 001 or ANT 054 recommended. Study of the taxonomic, ecological and cultural diversity of Primates and how human activities impact tropical ecosystems. Emphasis on case studies and applied research methods. Includes discussion about career opportunities in conservation. GE credit: QL, SL. Effective: 2018 Spring Quarter.

ANT 156A—Human Osteology (4)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): ANT 001 or ANT 001Y recommended. Not open to students who have previously completed course 156. Human skeleton from archaeological, forensic, and paleontological perspectives, including anatomical nomenclature, variation with sex and age, function, evolution, growth, and development of bones and teeth. Hands-on study and identification of human skeletal remains. GE credit: SE. Effective: 2016 Fall Quarter.

ANT 156B—Advanced Human Osteology (4)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): ANT 156A; Or equivalent. Human skeletons from archaeological, forensic, and paleontological contexts. Bone and tooth structure, growth, and development; measurement, statistics, and biomechanics; assessment of age, sex, weight, height, and ancestry; and indicators of illness, injuries, diet, and activities. GE credit: SE. Effective: 2009 Spring Quarter.

ANT 157—Anthropological Genetics (3)
Lecture—3 hours. Prerequisite(s): ANT 001 or BIS 002C recommended. Method and theory of genetic and genomic analysis of molecular evolution of human and non-human primate populations. Special attention to the molecular evolutionary transition to humans and genetic differences among extant human populations and their adaptive significance. GE credit: QL, SE. Effective: 2016 Fall Quarter.

ANT 157L—Laboratory in Anthropological Genetics (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): ANT 157 (can be concurrent); ANT 001 or BIS 002C recommended; enrolled in ANT 157 concurrently or following. Methods for identifying genetic variation in human blood group antigens, serum proteins and red cell enzymes (hemaglutination), general electrophoresis on starch, cellulose acetate and polyacrylamide, immunodiffusion and immunoelectrophoresis on agarase. (P/NP grading only.) GE credit: QL, SE. Effective: 2016 Fall Quarter.

ANT 158—The Evolution of Females and Males: Biological Perspective (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 001 recommended. Current theoretical frameworks for explaining the evolution of sex differences and for understanding the interrelationship between biological processes and cultural construction of gender roles. GE credit: OL, SE, WE. Effective: 2016 Fall Quarter.

ANT 159—Molecular Anthropology of Native America (4)
Seminar—3 hours; Term Paper. Prerequisite(s): ANT 001 or ANT 001Y or BIS 002B; or Consent of Instructor. Use of DNA and other genetic polymorphisms to test hypotheses regarding genetic relationships among different Native American tribal groups and about prehistoric population replacements and migrations to and within the Americas. Integration with craniometric, archaeological, paleoenvironmental, linguistic and ethnohistorical evidence. GE credit: QL, SE. Effective: 2018 Spring Quarter.

ANT 160—Neandertals and Modern Human Origins (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 001 or ANT 001Y or equivalent recommended. Origins, evolution, and disappearance of Neandertals. Emergence of humans like us in both anatomy and behavior. Interpretation of the fossil and archaeological records of Europe and Africa. Genetics of living and fossil humans. GE credit: SE. Effective: 2016 Fall Quarter.

ANT 170—Archeological Theory and Method (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 003 recommended. Introduction to history and development of archeological theory and method, with particular emphasis on the basic dependence of the latter on the former. Stress is on historical development of archaeology in the New World. GE credit: SS, WE. Effective: 2016 Fall Quarter.

ANT 172—New World Prehistory: The First Arrivals (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 003 recommended. Survey of data relating to the peopling of the New World. Cultural adaptation and development of early inhabitants of North and South America. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 173—New World Prehistory: Archaic Adaptations (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. ANT 003 recommended. Introduction to and survey of prehistoric hunting and gathering adaptations across North America with particular emphasis on the East, Southeast, Midwest, Plains, Southwest, and Northwest. GE credit: SS, WE. Effective: 2016 Fall Quarter.

ANT 174—European Prehistory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 003 recommended. Survey of the prehistory of Europe from its earliest human inhabitants, to the Neandertals and first modern humans, and through early agricultural and complex societies. Analysis and interpretation of the European archaeological record for understanding human dispersals into Europe. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 175—Andean Prehistory: Archaeology of the Incas and their Ancestors (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 003 recommended. Prehistory of the Andean region, especially Peru, from the earliest hunting and gathering societies through the Inca. Focus on the use of archaeological data to reconstruct ancient human adaptations to the varied Andean environments. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 176—Prehistory of California and the Great Basin (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. ANT 003 recommended. Description and analysis of the prehistoric peoples of California and the Great Basin from earliest times to European contact. GE credit: ACGH, DD, SS, WE. Effective: 2016 Fall Quarter.

ANT 177—African Prehistory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 003 recommended. Survey of prehistory of Africa from early human ancestors, through modern human origins, and into early agricultural and complex societies and the Bantu expansion. Analysis and interpretation of the African archaeological record, incorporating human paleontology and genetics. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 178—Hunter-Gatherers (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 003 recommended. Study and interpretation of the ancient and modern lifeway in which peoples support themselves with primitive technologies and without benefit of domesticated plants and animals. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 179—Asian Prehistory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 003 recommended. Survey of the prehistory of Asia from the earliest human occupations to the rise of complex societies. Special focus on fossil and archeological records. GE credit: SS. Effective: 2016 Fall Quarter.

ANT 180—Zooarchaeology (4)
Discussion/Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): ANT 001 or ANT 003 recommended. Restricted to junior or senior standing. Theories and methods for studying animal skeletal remains from archaeological sites. Identification and quantification of zooarchaeological material, cultural and natural processes affecting animal bones pre- and postburial, and use of faunal remains for determining past human diets and past environments. GE credit: SE. Effective: 2016 Fall Quarter.

ANT 181— Archaeological Field Methods (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): ANT 003 Survey of archeological field methods and techniques. Strategies for survey and site location, mapping of artifacts and features, geophysical techniques, and hand excavation and analysis of stratigraphy. GE credit: DD, SE, SL, SS. Effective: 2017 Fall Quarter.

ANT 181L—Field Course in Archeological Methods (4)
Fieldwork—5 sessions; Lecture/Discussion—5 sessions. Prerequisite(s): ANT 181; or Consent of Instructor. On-site course using archaeological methods and techniques held at a field location in the western United States, generally California or Nevada. Incorporates basic methods of archaeological survey, mapping, and excavation. GE credit: SE. Effective: 2017 Summer Special Session.

ANT 182—Archaeometry (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): ANT 003 recommended. Scientific techniques used to study the chemical and physical properties of archaeological materials. Types of anthropological questions that can be addressed with different methods. Preparation and analysis of archaeological materials. GE credit: QL, SE, VL, WE. Effective: 2016 Fall Quarter.

ANT 183—Laboratory in Archeological Analysis (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. ANT 003 recommended. Limited enrollment. Museum preparation, advanced field investigation, and guidance in preparation of museum material for publication. May be repeated for credit with consent of instructor. GE credit: OL, QL, SE, WE. Effective: 2016 Fall Quarter.

ANT 184—Prehistoric Technology: The Material Aspects of Prehistoric Adaptation (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 003 recommended. Examination of the role of lithic, ceramic, textile and wooden implements as elements in prehistoric survival and development. Emphasis is descriptive, but the significance of material resources as factors in prehistoric adaptation, settlement patterns, and culture change are discussed. GE credit: SS, WE. Effective: 2016 Fall Quarter.

ANT 185—Lithic Analysis (4)
Lecture/Lab—4 hours. Prerequisite(s): ANT 003 recommended. Basic concepts of lithic analysis. General introduction on the place of stone tool technology in the archeological record. Physics, terminology and methodological concepts behind the study of stone tools. Review of the development of stone tool technology from its emergence. GE credit: SS. Effective: 2016 Fall Quarter.

ANT 186A—Museum Studies: Analysis of Native American Basketry (4)
Discussion/Laboratory—1 hour; Lecture/Lab—3 hours. Class size limited to 25 students. Study of ethnographic and prehistoric basketry from North America, especially California and Oregon, in a multidisciplinary anthropological context. Techniques for basketry attribution and textile analysis. GE credit: ACGH, AH, DD, OL, SS, VL, WE. Effective: 2015 Fall Quarter.

ANT 191—Topics in Anthropology (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Upper division standing. Intensive treatment of a special anthropological topic or problem. May be repeated for credit. Effective: 2017 Fall Quarter.

ANT 192—Internship in Anthropology (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Work experience off and on campus in all subject areas offered in the
Department of Anthropology under the supervision of a member of the faculty. Limited to Anthropology majors. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

ANT 194H—Special Study for Honors Students (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Open only to majors of senior standing who qualify for honors program. Independent study of an anthropological problem involving the writing
of an honors thesis. May be repeated for a total of 12 units. May be repeated up to 12 unit(s). (P/NP grading only.) GE credit: WE. Effective: 1997 Winter Quarter.

ANT 197T—Tutoring in Anthropology (1-5)
Tutorial—1-5 hours. Prerequisite(s): Upper division standing with major in Anthropology and consent of Department Chairperson. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

ANT 198—Directed Group Study (1-5)
Discussion—3 hours. Prerequisite(s): Consent of Instructor. Directed reading and group discussion of selected anthropological problems. (P/NP grading only.) Effective: 1997 Winter Quarter.

ANT 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

ANT 200—History of Anthropology (4)
Lecture/Discussion—2 hours; Term Paper. Historical development of socio-cultural theory within anthropology, from mid-19th to mid-20th Centuries. Focus on original theory texts in context of historical developments in the field as a whole. Effective: 2007 Fall Quarter.

ANT 201—Critical Readings in Ethnography (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate student in Anthropology or consent of instructor. Critical readings of selected ethnographies that examine a wide range of important topics and analytical issues in social and cultural anthropology. Emphasis on how and why ethnographic writing has changed over time and its relationship with contemporary theoretical explorations. Effective: 2005 Spring Quarter.

ANT 202—History and Theory of Biological Anthropology (4)
Seminar—3 hours; Term Paper. History of thought in biological anthropology and analysis of major theoretical problems in the field. Suggested for all first-year graduate students lacking intensive preparation in biological anthropology. Effective: 1997 Winter Quarter.

ANT 203—History and Theory of Archaeology (4)
Seminar—3 hours; Term Paper. Generally restricted to graduate students; outstanding undergraduates with extensive training in archaeology with consent of instructor. History of archaeology and archaeological theory and analysis of archaeological research methodology. Effective: 2005 Fall Quarter.

ANT 204—Contemporary Issues in Anthropological Theory (4)
Seminar—3 hours; Term Paper. Prerequisite(s): ANT 002; ANT 137; or Consent of Instructor. Advanced consideration of fundamental issues in anthropological theory.
Emphasis on critical examination of major contemporary debates between proponents of competing theories. Effective: 1997 Winter Quarter.

ANT 205—History and Theory in Anthropological Linguistics (4)
Seminar—3 hours; Term Paper. History of thought in anthropological linguistics. Consideration of the historical development of fundamental ideas in anthropological linguistics, of major theoretical issues, and of research methodology. Effective: 1997 Winter Quarter.

ANT 206—Research Design and Method in Social Anthropology (5)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Formulation of research problems and preparation of research proposals; relationships between theory and method, funding, pre-fieldwork preparations, entering the community, field research techniques, and problems of ethics; intensive work on proposal writing. May be repeated up to 1 time(s). Effective: 1997 Winter Quarter.

ANT 207—Ethnographic Writing (4)
Seminar—3 hours; Term Paper. Prerequisite(s): ANT 137; ANT 201; Or the equivalent. Relationship between conducting participant observation of others and
writing it up,emphasizing the processual rift between the reality of fieldwork and its written representation. Study of various literary genres and textual strategies used in cultural anthropology. May be repeated for credit. Effective: 1997 Winter Quarter.

ANT 210—Aspects of Culture Structure (4)
Seminar—3 hours; Term Paper. Analysis of various phases of culture, such as religion, economics, law,
and folklore. May be repeated for credit when topic differs. May be repeated for credit. Effective: 1997 Winter Quarter.

ANT 212—Political Ecology (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Interdisciplinary seminar evaluating contributions from ecological anthropology, political economy, cultural constructivism, postmodernism, and feminism towards development of theories of political ecology. Historical relationships between local/global power structures, environmental degradation, and resistance movements. Case studies of desertification, deforestation, mining, conservation, development. Effective: 1999 Spring Quarter.

ANT 216—Problems in Archeological Method (4)
Seminar—3 hours; Term Paper. Techniques for analyzing archeological data; application to various prehistoric cultures. May be repeated for credit with consent of instructor. May be repeated for credit. Effective: 1997 Winter Quarter.

ANT 217—Quantitative Modeling in Archaeology (4)
Lecture/Discussion—3 hours; Term Paper. Examination of the nature of archaeological data with a focus on the quantitative and statistical techniques available to model, analyze, display, and make sense of such data. Effective: 2007 Fall Quarter.

ANT 218—Topics in New World Prehistory (4)
Seminar—3 hours; Term Paper. Advanced study on current problems in New World Prehistory and archaeology. May be repeated for credit only if material is unique for that student and with consent of instructor. May be repeated for credit. Effective: 2008 Fall Quarter.

ANT 219—Topics in Old World Prehistory (4)
Seminar—3 hours; Term Paper. Advanced study on current problems in Old World prehistory and archaeology. May be repeated for credit only if material is unique for that student and with consent of instructor. Effective: 2008 Fall Quarter.

ANT 220—Field Course in Linguistics (4)
Laboratory—2 hours; Seminar—2 hours. Prerequisite(s): ANT 110; ANT 111 Techniques of eliciting, recording, and analyzing; work with a native
speaker. Effective: 1997 Winter Quarter.

ANT 221—Rural Transformation in Postcolonial Societies (4)
Seminar—3 hours; Term Paper. Prerequisite(s): ANT 223; ANT 265; or Consent of Instructor. Problems of rural transformation arising out of political and economic interaction between national elites and rural regional and local populations under varying conditions of induced change in postcolonial societies. Attention will be given to the implications of this interaction for rapid economic growth. May be repeated for credit. Effective: 1997 Winter Quarter.

ANT 222—Cities and Citizenship (4)
Seminar—3 hours; Term Paper—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Explores the nature of modern cities, urban socioeconomic life, and urban culture and politics from an anthropological perspective. Effective: 2000 Fall Quarter.

ANT 223—Economic Anthropology (4)
Seminar—3 hours; Term Paper. Prerequisite(s): ANT 122; or Consent of Instructor. Selected current methodological and theoretical problems in the analysis
of nonindustrial economic systems. Effective: 1997 Winter Quarter.

ANT 224—Problems in Comparative Religion (4)
Seminar—3 hours; Term Paper. Advanced study of current problems in the anthropological study of religion. Effective: 1997 Winter Quarter.

ANT 225—State and Nation in the Modern World (4)
Seminar—3 hours; Term Paper. A presentation of current anthropological theories of the origins and nature of the modern nation-state in both the First and Third Worlds, with special reference to state ideology (nationalism) and forms of control. Effective: 1997 Winter Quarter.

ANT 226—Consciousness and Resistance (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Completion of first-year graduate work or consent of instructor. Consideration of approaches to the study of social inequality, and responses of subordinated groups. Emphasis on situating approaches to contemporary social theory, concrete research problems, and political strategies. Topics: formation of consciousness and identity; collective action, accommodation to frontal resistance. Effective: 1997 Winter Quarter.

ANT 228—Culture and Power (4)
Extensive Writing; Seminar—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Exploration of one of the core paradigms within contemporary anthropological inquiry, "culture and power." Focus on how distinct theoretical perspectives--Marxism, post-Marxism, structuralism, post-structuralism, and feminism--have examined the mutually constitutive nature of culture and power. Effective: 1999 Fall Quarter.

ANT 229—Gender, Identity, and Self (4)
Seminar—3 hours; Term Paper—1 hour. Intersections of gender, identity, and selfhood cross-culturally and historically. How the self is feminized and masculinized, and interfaces with sexual, race, class, work, national, minority, and majority identities under different historical, cultural, and social structural conditions. May be repeated for credit. Effective: 1997 Winter Quarter.

ANT 230—Family Systems and Reproduction: Theory and Comparisons (4)
Lecture—1.5 hours; Seminar—1.5 hours; Term Paper. Prerequisite(s): Graduate standing in one of the social sciences including History. Comparative examination of family systems in historical context and of reproductive behaviors and strategizing. A major theme is how family-system norms specify the relative desirability of differently configured offspring sets.Cases are drawn from Western Europe and South and East Asia. Effective: 1997 Winter Quarter.

ANT 232—Political Movements (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Completion of first-year graduate work recommended. An interdisciplinary approach to political movements of protest, reform, and revolution emphasizing historical comparison and evaluation of major theoretical approaches including world systems, resource mobilization,
state and culture, rational choice, moral economy, social class and gender. Effective: 1997 Winter Quarter.

ANT 239—Problems in African Society and Culture (4)
Seminar—3 hours; Term Paper. Diachronic analyses of traditional institutions in sub-Saharan Africa. Effective: 1997 Winter Quarter.

ANT 241—Topics in North American Ethnology (4)
Seminar—3 hours; Term Paper. Advanced study on current problems in North American ethnography and culture history. May be repeated for credit with consent of instructor. May be repeated for credit. Effective: 1997 Winter Quarter.

ANT 245—Ethnology of Northern and Central Asia (4)
Seminar—3 hours; Term Paper. Prerequisite(s): A reading knowledge of German, Russian, Chinese, or Japanese. Lectures on the culture aboriginally found north of the Caucasus-Korea line. Supervised study of the primary and secondary sources. Work with
informants when available. Effective: 1997 Winter Quarter.

ANT 246—Ethnology of Europe (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Reading knowledge of a European language other than English. Supervised study of the primary and secondary sources dealing with the ethnography and ethnology of the peoples of Europe. Emphasis upon folk, peasant, and minority groups. Effective: 1997 Winter Quarter.

ANT 248—Topics in Chinese Culture and Society (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing in the social sciences, history, or the humanities. Selected topics in the anthropology of Chinese society. Focus on one or more of the following topics: state-society dynamics, family and gender, city formation and urban life, social movement, labor politics, and religion and ideology in Chinese society. May be repeated for credit when topic differs. Effective: 1999 Fall Quarter.

ANT 250—Behavioral Ecology of Primates (4)
Seminar—3 hours; Term Paper. Prerequisite(s): ANT 154A (can be concurrent); Or the equivalent, graduate standing. Concepts, issues, and hypotheses in primate behavioral ecology, with emphasis on the social and ecological determinants and consequences of variation in social organization for individuals. Effective: 2003 Fall Quarter.

ANT 252—Human Evolution Seminar (4)
Seminar—3 hours; Term Paper. Prerequisite(s): ANT 152; and Consent of Instructor. Or the equivalent of ANT 152. Study of selected topics in human evolutionary studies. Each year course will focus on one or more of the following: molecular evolution, primate evolutionary biology, Tertiary hominoids, Australopithecus, Homo erectus, archaic Homo sapiens, brain evolution. May be repeated for credit. May be repeated for credit. Effective: 1997 Winter Quarter.

ANT 253—Seminar in Human Biology (4)
Seminar—3 hours; Term Paper. Prerequisite(s): ANT 153; ANT 157; or Consent of Instructor. Study of selected topics in human biology. May be repeated for credit when topics vary. Effective: 1997 Winter Quarter.

ANT 254—Current Issues in Primate Sociobiology (4)
Seminar—3 hours; Term Paper. Prerequisite(s): ANT 154B; Or the equivalent. Analysis of primate behavior, with particular emphasis on preparation for field studies. May be repeated for credit when topic differs. May be repeated for credit. Effective: 1997 Winter Quarter.

ANT 256—Primate Conservation Biology (4)
Seminar—3 hours; Term Paper. Prerequisite(s): ANT 154; Graduate standing, or upper division undergraduates with consent of instructor. Class size limited to 10 students. Application of understanding of primate biology to conservation of primates and their habitat. Topics include evolutionary anthropology, behavioral ecology, biogeography, macroecology, population biology, and socio-ecology of primates. May be repeated up to 1 time(s) term paper differs. (S/U grading only.) Effective: 2003 Spring Quarter.

ANT 261—Modeling the evolution of social behavior (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 016C; or Consent of Instructor. Or equivalent of MAT 016C. Tools and topics in modeling the evolution of social behavior in humans and other animals. Game theory, basic population genetics, animal conflict, altruism, reciprocity, signaling, and group selection. Effective: 2003 Spring Quarter.

ANT 262—Evolution and Human Behavior (4)
Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing, or consent of instructor. Exploration of the links between behavioral ecological theory and human cultural variation, focusing on reproduction, marriage, parental investment and family structure; implications of evolutionary theory for social organization in human communities, historical and contemporary. Effective: 2005 Spring Quarter.

ANT 263—Human Applications of Foraging Theory (4)
Discussion—3 hours; Laboratory—3 hours. Foraging theory models and their use in ethnographic and archaeological analyses of human behavior, with a focus on hunter-gatherers and resource selection, patch use, population and habitat, central places, sharing, stochastic processes, population dynamics, and conservation behavior. Not open for credit to students who have completed ANT 258. Effective: 2004 Fall Quarter.

ANT 265—Language, Performance, and Power (4)
Seminar—3 hours; Term Paper. Restricted to graduate standing or consent of instructor. Exploration of the intersection between linguistic and social theories in the language-state relation and the performance of identity. Ideological sources of language differentiation; nation-building and linguistic difference. Political economic, sociolinguistic, and ethnographic approaches to understanding linguistic inequality. (LIN 265.) Effective: 2003 Fall Quarter.

ANT 270—Anthropology Colloquium Seminar (1)
Seminar—1 hour. Reports and discussions of recent advances in the four subfields of anthropology. To be presented by guest speakers. May be repeated twice for credit. May be repeated up to 2 time(s). (S/U grading only.) Effective: 1997 Winter Quarter.

ANT 280—Current Anthropology Journal Editorial Workshop (4)
Independent Study—3 hours; Workshop—1 hour. Prerequisite(s): Consent of Instructor. Students must enroll for all three quarters. Reading and offering workshop critiques of manuscripts submitted for publication, and reading and discussion of other relevant work in anthropology and human ecology. Track and edit published comments and authors' replies that accompany major features. Participation in the development of new sections for the electronic edition of the journal, including a "news and views" section and a debate section. May be repeated up to 12 unit(s) with consent of instructor. (ECL 280.) (S/U grading only.) Effective: 2000 Fall Quarter.

ANT 291—Advanced Topics in Human Behavioral Ecology (4)
Discussion—3 hours; Term Paper. Prerequisite(s): ANT 261 or ANT 262 or ANT 263; and Consent of Instructor. Or comparable experience in anthropology or related disciplines. Topically focused, critical discussion of current and emerging research in the field of human behavioral ecology, giving special attention to theory, concepts, models, and methods for the evolutionary analysis of ethnographic and archaeological evidence. May be repeated up to 1 time(s) the topic differs and the material covered is substantially different. Effective: 2004 Fall Quarter.

ANT 292—Seminar in Linguistic Anthropology (4)
Seminar—3 hours; Term Paper—1 hour. Selected topics in linguistic anthropology. May be repeated for credit
when topic differs. May be repeated for credit. Effective: 1997 Winter Quarter.

ANT 298—Group Study (1-4)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

ANT 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

ANT 299D—Dissertation Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

ANT 390—Teaching Anthropology (4)
Practice—1 hour; Seminar—3 hours. Prerequisite(s): Graduate standing in Anthropology or closely related discipline. Intellectual and practical elements of college teaching in the field of Anthropology, from curriculum design and the syllabus through grading and course evaluations, including classroom and information technology methods, and problems and rewards of teaching in higher education. Effective: 2004 Fall Quarter.

ANT 396—Teaching Assistant Training Practicum (1-4)
Variable—3-36 hours. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Applied Biological Systems Technology

Applied Biological Systems Technology | ABT Information

(College of Agricultural and Environmental Sciences)

Faculty. http://bae.engineering.ucdavis.edu/faculty-directory/

Applied Biological Systems Technology | ABT Courses

Courses in ABT:

ABT 015—Wood Properties and Fabrication (2)
Laboratory—3 hours; Lecture/Discussion—1 hour. Study of wood properties and techniques for fabrication with wood. Gain experience working with various woods and woodworking tools for specific applications. (P/NP grading only.) GE credit: OL, QL, SE, VL. Effective: 2010 Fall Quarter.

ABT 016—Metal Properties and Fabrication (2)
Laboratory—3 hours; Lecture—1 hour. Study of metal properties and of techniques for fabricating in metal. Physical principles, design considerations, effects of techniques on quality and appearance, and evaluation procedures. Experience in working
with metal. (P/NP grading only.) GE credit: QL, SE, VL. Effective: 1997 Spring Quarter.

ABT 017—Plastic Properties and Fabrication (2)
Laboratory—3 hours; Lecture—1 hour. Study of the properties of plastic materials and the fundamentals of fabrication techniques. Experience in working with common plastics, with applications to biological systems. (P/NP grading only.) GE credit: QL, SE, VL. Effective: 1997 Winter Quarter.

ABT 049—Field Equipment Operation (2)
Laboratory—3 hours; Lecture—1 hour. Operation, adjustment, and troubleshooting of farm tractors and field equipment. Principles of operation, equipment terminology and uses of tilling, cultivating, thinning, and planting equipment. Typical sequences in cropping practices. (P/NP grading only.) GE credit: QL, SE, VL. Effective: 1997 Spring Quarter.

ABT 052—Field Equipment Welding (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): ABT 016; or Consent of Instructor. Intermediate welding to include hardfacing and inert gas welding. Class projects on repair and fabrication by welding. Troubleshooting and major repair of field equipment. (P/NP grading only.) GE credit: QL, SE, VL. Effective: 2000 Winter Quarter.

ABT 098—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ABT 099—Special Study for Lower Division Students (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ABT 101—Engine Technology (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Upper division standing or consent of instructor. Principles of 2-stroke cycle, 4-stroke cycle gasoline and 4-stroke cycle diesel engine construction and operation. Engine systems, performance, troubleshooting, and overhaul. GE credit: QL, SE, VL. Effective: 2000 Winter Quarter.

ABT 110L—Experiments in Food Engineering (2)
Laboratory—6 hours. Prerequisite(s): FST 110B (can be concurrent) Use of temperature sensors; measurement of thermal conductivity and heat transfer in foods; refrigeration, freezing, concentration and dehydration of foods. GE credit: QL, SE, VL, WE. Effective: 1997 Spring Quarter.

ABT 121—Animal Housing and Environment Management (2)
Lecture—2 hours. Prerequisite(s): ANS 001 or ANS 002 Optimal structures and environments for animal growth and comfort; heat and moisture transfer principles; heating, cooling, ventilating principles and equipment; animal housing design; environmental regulations and waste management practices. GE credit: SE. Effective: 1997 Spring Quarter.

ABT 142—Equipment and Technology for Small Farms (2)
Laboratory—3 hours; Lecture—1 hour. Types and characteristics of agricultural equipment and technologies
appropriate for small commercial farming. Adjustment and calibration of equipment. Selection of and budgeting for equipment. (IAD 142.) GE credit: QL, SE, VL. Effective: 1997 Spring Quarter.

ABT 150—Introduction to Geographic Information Systems (4)
Laboratory—3 hours; Lecture—3 hours. Pass One restricted to Landscape Architecture and Sustainable Environmental Design majors. Basic concepts, principles, and methods of GIS are presented. Data structures, database design, GIS data creation, GPS, and spatial analysis. Not open for credit to students who have completed ABT 180/PLS 180 or ABT 181N. (LDA 150.) GE credit: SE, VL. Effective: 2018 Winter Quarter.

ABT 161—Water Quality Management for Aquaculture (3)
Lecture—3 hours. Prerequisite(s): BIS 001B; MAT 016B; CHE 002B Basic principles of water chemistry and water treatment processes as they relate to aquacultural systems. GE credit: QL, SE, SL, VL. Effective: 1997 Spring Quarter.

ABT 163—Aquaculture Systems Engineering (3)
Lecture—3 hours. Prerequisite(s): ABT 161 Design of aquacultural systems: design methodology, principles of fluid mechanics, site selection and facility planning, management operations, computer modeling. GE credit: OL, QL, SE, SL, VL, WE. Effective: 1997 Spring Quarter.

ABT 165—Irrigation Practices for an Urban Environment (2)
Lecture—2 hours. Prerequisite(s): PHY 001A Basic design, installation, and operation principles of irrigation systems for turf and landscape: golf courses, parks, highways, public buildings, etc. Emphasis on hardware association with sprinkler and drip/trickle systems. GE credit: QL, SE, VL. Effective: 1997 Spring Quarter.

ABT 181N—Concepts and Methods in Geographic Information Systems (4)
Lecture/Lab—8 hours. Prerequisite(s): ABT 150; LDA 150; or Consent of Instructor. Data representation and analysis in geographic information systems (GIS). Creation of spatial data sets from analog and digital sources such as aerial photography and maps; data structures, data management, database design, georeferencing, georectification, surface models, analysis, and spatial data visualization. GE credit: SE, SL, VL. Effective: 2018 Winter Quarter.

ABT 182—Environmental Analysis using GIS (4)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): ABT 150 or LDA 150; Or equivalent GIS experience and skills; general biology and/or ecology courses are recommended. Ecosystem and landscape modeling with emphasis on hydrology and solute transport. Spatial analysis of environmental risk analysis including ecological risk assessment, natural resource management. Spatial database structures, scripting, data models, and error analysis in GIS. (HYD 182.) GE credit: QL, SE, SL, VL. Effective: 2018 Winter Quarter.

ABT 190C—Research Conference for Advanced Undergraduates (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Research conferences for specialized study in applied biological systems technology. May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ABT 192—Internship in Applied Biological Systems Technology (1-5)
Internship—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing; approval of project prior to period of internship. Supervised internship in applied biological systems technology. May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ABT 197T—Tutoring in Applied Biological Systems Technology (1-5)
Tutorial. Prerequisite(s): Consent of Instructor. Upper division standing. Tutoring individual students, leading small voluntary discussion groups, or assisting the instructor in laboratories affiliated with one of the department's regular courses. May be repeated for credit if topic differs. (P/NP grading only.) GE credit: SE. Effective: 2004 Spring Quarter.

ABT 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ABT 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ABT 212—Path to Zero Net Energy (4) ***Review all entries***
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): EBS 216; or Consent of Instructor. Open to upper division or graduate students. Zero Net Energy concepts and social, technical, economic, and environmental considerations. Multidisciplinary research and analysis for clients. Effective: 2017 Fall Quarter.

ABT 212—Path to Zero Net Energy (4) ***Review all entries***
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to upper division or graduate students. Zero Net Energy concepts and social, technical, economic, and environmental considerations. Multidisciplinary research and analysis for clients. Effective: 2018 Fall Quarter.

ABT 233—Pest Control Practices (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Graduate standing or consent of instructor. Practical and theoretical considerations of pest control systems and techniques. Design, selection, and use of mechanical systems for field, orchard, greenhouse, and vector control use. Biological, legal, and environmental considerations in pest control and pesticide application. Effective: 2001 Winter Quarter.

ABT 289A—Selected Topic in Applied Biological Systems Technology: Agricultural and Natural Resources (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special topic. May be repeated for credit. Effective: 2015 Fall Quarter.

ABT 289B—Selected Topics in Applied Biological Systems Technology: Biotechnology (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special topic. May be repeated for credit. Effective: 2015 Fall Quarter.

ABT 289C—Selected Topics in Applied Biological Systems Technology: Food Technology (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special topic. May be repeated for credit. Effective: 2015 Fall Quarter.

ABT 290C—Graduate Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Research problems, progress, and techniques in applied biological systems technology. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

ABT 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

ABT 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

ABT 317—Teaching Agricultural Mechanics (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): A course in physics; 6 units related to agricultural mechanics; enrolled in Agricultural Education Teacher Credential Program. Preparation of the teacher to plan, organize, and conduct an agricultural mechanics program in secondary schools. Development of and presentation of lesson plans and teaching aids. Review of subject matter in metal fabrication, power and machinery and agricultural structures areas. Effective: 1997 Spring Quarter.

Applied Computing & Information Systems Minor; Plant Sciences

Applied Computing & Information Systems Minor; Plant Sciences | Applied Computing & Information Systems Minor

(College of Agricultural and Environmental Sciences)

Advising Center is located in 1220 Plant and Environmental Sciences; 530-752-1715.

This minor is for students interested in applying modern computer technology to management problems in agriculture, resource management, and other areas. Course work provides knowledge of the use of information technology and the methodology of applied quantitative and systems analysis. The minor is offered by the Department of Plant Sciences.

Minor Advisor. T. R. Famula (Animal Science)

Applied Computing and Information Systems **Units:** 18

Choose two or three:
With prior consultation with an advisor, students can petition in advance to accept other relevant courses toward the minor program.

PLS 120	Applied Statistics in Agricultural Sciences	4
ANS 128	Agricultural Applications of Linear Programming	4

The third course may be taken in substitution for a course from either of the elective groups. Remainder of the units to be made up of courses in one or both of the following elective groups:
With prior consultation with an advisor, students can petition in advance to accept other relevant courses toward the minor program.

Computer Applications, Computer Assisted Analysis in Data Manipulation:

ARE 106	Econometric Theory and Applications	4
ARE 155	Operations Research and Management Science	4
ABT 182	Environmental Analysis using GIS	4
ECN 102	Analysis of Economic Data	4
ECS 124	Theory and Practice of Bioinformatics	4
HYD 182	Environmental Analysis using GIS	4
IAD 170	Program Development for International Agriculture	4

Communication and Business Organization:

ARE 112	Fundamentals of Organization Management	4
CMN 130	Group Communication	4
CMN 136	Organizational Communication	4

Total: 18

Applied Mathematics (Graduate Group)

Applied Mathematics (Graduate Group) | Applied Mathematics (Graduate Group) Information

Group Office. 1130 Mathematical Sciences Bldg.; 530-752-8130; studentservices@math.ucdavis.edu; http://appliedmath.ucdavis.edu/

Faculty. The Group includes approximately 90 faculty members, of whom about one-third are in the Department of Mathematics. Membership comprises chemists, biologists, physicists, geologists, statisticians, computer scientists, and engineers. Research interests include biology, atmospheric sciences, mechanics, solid and fluid dynamics, optimization and control, theoretical chemistry, computer and engineering sciences, mathematical physics, signal and image processing, harmonic analysis, numerical analysis and nonlinear partial differential equations. A complete list of faculty and their research areas are available at http://appliedmath.ucdavis.edu/people.

Applied Mathematics (Graduate Group) | Applied Mathematics M.S.

Group Office. 1130 Mathematical Sciences Bldg.; 530-752-8130; studentservices@math.ucdavis.edu; http://appliedmath.ucdavis.edu/

Faculty. The Group includes approximately 90 faculty members, of whom about one-third are in the Department of Mathematics. Membership comprises chemists, biologists, physicists, geologists, statisticians, computer scientists, and engineers. Research interests include biology, atmospheric sciences, mechanics, solid and fluid dynamics, optimization and control, theoretical chemistry, computer and engineering sciences, mathematical physics, signal and image processing, harmonic analysis, numerical analysis and nonlinear partial differential equations. A complete list of faculty and their research areas are available at http://appliedmath.ucdavis.edu/people.

Graduate Study. Students prepare for careers where mathematics is applied to problems in the physical and life sciences, engineering, and management. The degree requirements consist of rigorous training in applied mathematics, including course work and a research dissertation under the direction of a member of the Graduate Group in Applied Mathematics. The M.S. degree provides preparation for further study in applied mathematics or an application area, or for a career in industry or public service. The Ph.D. degree provides preparation for a career in research and/or teaching, or in industrial or national research laboratories. For further information, please contact studentservices@math.ucdavis.edu or 530-752-8130.

The Master of Science degree is offered only en route to the Ph.D.

New applicants are admitted to the fall quarter only.

Preparation. The program admits qualified students with a bachelor's degree in mathematics, physics, chemistry, engineering, economics, the life sciences and related fields. General and advanced mathematics GRE scores are required, and applicants should display evidence of strong quantitative skills. Undergraduate courses should include calculus (including vector calculus), linear algebra, and ordinary differential equations. Advanced calculus (introduction to real analysis) is strongly recommended. Additional background in probability, partial differential equations, and/or numerical analysis is a plus. The ability to program in a high-level computer programming language (e.g., C, Fortran, MATLAB, Python, R, etc.) is assumed.

Graduate Advisor. Contact the Student Services Office at 530-752-8130 or at studentservices@math.ucdavis.edu.

Courses. For a list of the courses in applied mathematics and mathematics, see Mathematics.

Applied Mathematics (Graduate Group) | Applied Mathematics Ph.D.

Group Office. 1130 Mathematical Sciences Bldg.; 530-752-8130; studentservices@math.ucdavis.edu; http://appliedmath.ucdavis.edu/

Faculty. The Group includes approximately 90 faculty members, of whom about one-third are in the Department of Mathematics. Membership comprises chemists, biologists, physicists, geologists, statisticians, computer scientists, and engineers. Research interests include biology, atmospheric sciences, mechanics, solid and fluid dynamics, optimization and control, theoretical chemistry, computer and engineering sciences, mathematical physics, signal and image processing, harmonic analysis, numerical analysis and nonlinear partial differential equations. A complete list of faculty and their research areas are available at http://appliedmath.ucdavis.edu/people.

Graduate Study. Students prepare for careers where mathematics is applied to problems in the physical and life sciences, engineering, and management. The degree requirements consist of rigorous training in applied mathematics, including course work and a research dissertation under the direction of a member of the Graduate Group in Applied Mathematics. The M.S. degree provides preparation for further study in applied mathematics or an application area, or for a career in industry or public service. The Ph.D. degree provides preparation for a career in research and/or teaching, or in industrial or national research laboratories. For further information, please contact studentservices@math.ucdavis.edu or 530-752-8130.

The Master of Science degree is offered only en route to the Ph.D.

New applicants are admitted to the fall quarter only.

Preparation. The program admits qualified students with a bachelor's degree in mathematics, physics, chemistry, engineering, economics, the life sciences and related fields. General and advanced mathematics GRE scores are required, and applicants should display evidence of strong quantitative skills. Undergraduate courses should include calculus (including vector calculus), linear algebra, and ordinary differential equations. Advanced calculus (introduction to real analysis) is strongly recommended. Additional background in probability, partial differential equations, and/or numerical analysis is a plus. The ability to program in a high-level computer programming language (e.g., C, Fortran, MATLAB, Python, R, etc.) is assumed.

Graduate Advisor. Contact the Student Services Office at 530-752-8130 or at studentservices@math.ucdavis.edu.

Courses. For a list of the courses in applied mathematics and mathematics, see Mathematics.

Applied Mathematics; Mathematics

Applied Mathematics; Mathematics | Applied Mathematics B.S.

(College of Letters and Science)

Abigail Thomspon, Ph.D., Chairperson

Department Office. 1130 Mathematical Sciences Bldg.; 530-752-0827; studentservices@math.ucdavis.edu; http://www.math.ucdavis.edu

Faculty. https://www.math.ucdavis.edu/people/faculty/

The Major Programs

Mathematics is the study of abstract structures, space, change, and the interrelations of these concepts. It also is the language of the exact sciences.

The Program. Students majoring in mathematics may follow a program leading to either the Bachelor of Arts or the Bachelor of Science degree. After completing basic introductory courses such as calculus and linear algebra, students plan an upper division program in consultation with a faculty advisor. Upper division courses include real analysis, probability, modern algebra, as well as a variety of other courses that allow students to further mathematical knowledge and skills that feature their research or career interests. This individualized program can lead to graduate study in pure or applied mathematics, elementary or secondary level teaching, or to other professional goals. It can also reflect a special interest such as computational and applied mathematics, computer science, or statistics, or may be combined with a major in some other field.

Career Alternatives. A degree in mathematics provides entry to many careers in industry in addition to teaching. For instance, operations research, data analysis, systems analysis, computing, actuarial work, insurance, and financial services are only a few such careers. Mathematics is also a sound basis for graduate work in a variety of fields, such as law, engineering, and economics.

Recommended Language Preparation. Bachelor of Science degree candidates are advised, but not required, to satisfy the same language requirement as that for a Bachelor of Arts degree candidate, and to fulfill it in French, German, or Russian.

Major Advisors. For a current list of faculty and staff advisors, see https://www.math.ucdavis.edu/undergrad/advising/advisers/ or contact the Student Services office at studentservices@math.ucdavis.edu.

Depth Subject Matter Requirements. The upper division course offering is grouped into core and enrichment courses. The core classes are intended to provide basic mathematical techniques, whereas the enrichment choices allow students to further mathematical knowledge and skills that feature their research or career interests. Certain mathematically oriented courses given by other departments are admissible in partial satisfaction of the depth subject matter requirements with prior departmental approval. Before graduating, students also complete a mathematics capstone, which can be satisfied by completing an undergraduate thesis, an approved internship, or one of the approved capstone courses.

Statement of Objectives. As early as possible, but no later than the last quarter of the sophomore year or no later than the beginning of the first quarter of the junior year for transfer students, each prospective mathematics major, in consultation with an advisor, should file a formal program of study in one of the majors offered in mathematics. Forms to be used for this are available on OASIS (students.ucdavis.edu), our website or from the Department office. Failure to file a formal program could lead to a delay in graduation.

Information for Undergraduates. Assistance in planning an undergraduate major program in mathematics is available on our website, as well as by consulting an advisor. Information about the Department's advisors can be found on our website: https://www.math.ucdavis.edu/undergrad/advising/advisers/.

Mathematics Placement Requirement. Students who wish to enroll in MAT 012, 016A, 017A, 021A, 021AH, and 021M must satisfy the mathematics placement requirement by taking an online exam. Students who do not satisfy the requirement will be administratively dropped from these courses. For more information, including preparation tips and how to access the online exam, please see the Department of Mathematics' website, at http://www.math.ucdavis.edu/undergrad/math_placement, well in advance of enrolling.

Department Honors. Students who have completed at least 135 units with a minimum GPA of 3.500 in courses counted towards their major will be considered for Department Honors.

Students who meet the minimum GPA requirement for honors at graduation for the College of Letters and Science and who complete a senior project as part of MAT 194 or 199 units in consultation with their faculty adviser may also be recommended by the department for graduation with High Honors or Highest Honors. Recommendations will be based on evaluations of students' academic achievements in their major and the quality of their senior project. For complete details, see our website at https://www.math.ucdavis.edu/undergrad/honors/.

Teaching Credential Subject Representative. Dr. Ali Dad-del

Graduate Study. The Department offers programs of study and research leading to the M.A. and Ph.D. degrees in Mathematics. Information regarding graduate study may be obtained by consulting our website, and by sending an email to studentservices@math.ucdavis.edu.

Preparatory Subject Matter **Units:** 39-45

MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022B	Differential Equations	3

Choose one option:

(a)

MAT 022A	Linear Algebra	3
MAT 108	Introduction to Abstract Mathematics	4

(b)

MAT 067	Modern Linear Algebra	4

MAT 022AL	Linear Algebra Computer Laboratory	1

OR

Equivalent MATLAB knowledge.

ECS 032A	Introduction to Programming	4

Choose one two-quarter sequence:

PHY 009A	Classical Physics	5

PHY 009B	Classical Physics	5
BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
ECN 001A	Principles of Microeconomics	4
ECN 001B	Principles of Macroeconomics	4
STA 032	Gateway to Statistical Data Science	4
STA 100	Applied Statistics for Biological Sciences	4

Or other applied preparatory courses approved by your advisor.

NOTE: Basic knowledge of MATLAB is required for both MAT 0022A and MAT 067. Students can learn it on their own, enroll in ENG 006, EME 005, or in the one unit course MAT 022AL (can be taken concurrently).

Depth Subject Matter **Units:** 51

A. Core

MAT 119A	Ordinary Differential Equations	4
MAT 127A	Real Analysis	4
MAT 127B	Real Analysis	4
MAT 127C	Real Analysis	4
MAT 135A	Probability	4
MAT 150A	Modern Algebra	4
MAT 185A	Complex Analysis	4

Choose two:

MAT 128A	Numerical Analysis	4
MAT 128B	Numerical Analysis in Solution of Equations	4
MAT 128C	Numerical Analysis in Differential Equations	4

B. Enrichment Courses

1. Choose two:

MAT 111	History of Mathematics	4
MAT 114	Convex Geometry	4
MAT 115A	Number Theory	4
MAT 115B	Number Theory	4
MAT 116	Differential Geometry	4
MAT 118A	Partial Differential Equations: Elementary Methods	4
MAT 118B	Partial Differential Equations: Eigenfunction Expansions	4
MAT 118C	Partial Differential Equations: Green's Functions and Transforms	4
MAT 119A	Ordinary Differential Equations	4
MAT 119B	Ordinary Differential Equations	4
MAT 124	Mathematical Biology	4
MAT 125A	Real Analysis	4
MAT 125B	Real Analysis	4
MAT 127A	Real Analysis	4

MAT 127B	Real Analysis	4
MAT 127C	Real Analysis	4
MAT 128A	Numerical Analysis	4
MAT 128B	Numerical Analysis in Solution of Equations	4
MAT 128C	Numerical Analysis in Differential Equations	4
MAT 129	Fourier Analysis	4
MAT 133	Mathematical Finance	4
MAT 135A	Probability	4
MAT 135B	Stochastic Processes	4
MAT 141	Euclidean Geometry	4
MAT 145	Combinatorics	4
MAT 146	Algebraic Combinatorics	4
MAT 147	Topology	4
MAT 148	Discrete Mathematics	4
MAT 150A	Modern Algebra	4
MAT 150B	Modern Algebra	4
MAT 150C	Modern Algebra	4
MAT 160	Mathematics for Data Analytics and Decision Making	4
MAT 165	Mathematics and Computers	4
MAT 167	Applied Linear Algebra	4
MAT 168	Optimization	4
MAT 185A	Complex Analysis	4
MAT 185B	Complex Analysis	4

2. One approved upper division course outside the Department of Mathematics with extensive use of mathematics.

C. Capstone Course

Choose one:

MAT 180	Special Topics	3
MAT 189	Advanced Problem Solving	3
MAT 192	Internship in Applied Mathematics	1-3
MAT 194	Undergraduate Thesis	3

Total: 90-96

Applied Mathematics; Mathematics | MAT Courses

Note: Mathematics 016A, 016B, and 016C are intended for students who will take no more Mathematics courses. Mathematics 017A, 017B, and 017C have the same level of rigor as 016A, 016B, and 016C, yet are much more broad mathematically (containing algebra, differential equations and probability, besides traditional calculus), and are intended for biology.

Courses in MAT:

MAT 000B—Elementary Algebra (no credit) (0)
Lecture—3 hours. Not open to Concurrent student enrollment. Basic concepts of algebra, including polynomials, factoring, equations, graphs, and inequalities. Offered only if sufficient number of students enroll. (P/NP grading only.) Effective: 1997 Winter Quarter.

MAT 000C—Trigonometry (no credit) (0)
Lecture—2 hours. Not open to Concurrent student enrollment. Basic concepts of trigonometry, including trigonometric functions, identities, inverse functions, and applications. Offered only if sufficient number of students enroll. (P/NP grading only.) Effective: 1997 Winter Quarter.

MAT 000D—Intermediate Algebra (no credit) (0)
Lecture—3 hours. Not open to Concurrent student enrollment. Basic concepts of algebra, prepares student for college work in mathematics, such as course 16A or 21A. Functions, equations, graphs, logarithms, and systems of equations. Offered only if sufficient number of students enroll. (P/NP grading only.) Effective: 1997 Winter Quarter.

MAT 012—Precalculus (3)
Lecture—3 hours. Prerequisite(s): Two years of high school algebra, plane geometry, plane trigonometry; and obtaining required score on the Precalculus Diagnostic Examination. Topics selected for their use in calculus, including functions and their graphs, slope, zeroes of polynomials, exponential, logarithmic and trigonometric functions, sketching surfaces and solids. Not open for credit to students who have completed any of courses MAT 016A, MAT 016B, MAT 016C, MAT 017A, MAT 017B, MAT 017C, MAT 021A, MAT 021B, or MAT 021C with a C- or better. GE credit: QL, SE, SL. Effective: 2012 Winter Quarter.

MAT 016A—Short Calculus (3)
Lecture—3 hours. Prerequisite(s): Two years of high school algebra, plane geometry, plane trigonometry, and satisfying the Mathematics Placement Requirement. Limits; differentiation of algebraic functions; analytic geometry; applications, in particular to maxima and minima problems. Not open for credit to students who have completed MAT 017B, MAT 017C, MAT 021A, MAT 021B, or MAT 021C; only 2 units of credit to students who have completed MAT 17A. GE credit: QL, SE, SL. Effective: 2012 Winter Quarter.

MAT 016B—Short Calculus (3)
Lecture—3 hours. Prerequisite(s): MAT 016A C- or better or MAT 017A C- or better or MAT 021A C- or better or MAT 021AH C- or better Integration; calculus for trigonometric, exponential, and logarithmic functions; applications. Not open for credit to students who have completed MAT 017C, MAT 021B, or MAT 021C; only 2 units of credit to students who have completed MAT 017B. GE credit: QL, SE, SL. Effective: 2017 Winter Quarter.

MAT 016C—Short Calculus (3)
Lecture—3 hours. Prerequisite(s): MAT 016B C- or better or MAT 017B C- or better or MAT 021B C- or better or MAT 021BH C- or better Differential equations; partial derivatives; double integrals; applications; series. Not open for credit to students who have completed MAT 021C; only 2 units of credit to students who have completed MAT 017C. GE credit: QL, SE, SL. Effective: 2017 Winter Quarter.

MAT 017A—Calculus for Biology and Medicine (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Two years of high school algebra, plane geometry, plane trigonometry, and analytical geometry, and satisfying the Mathematics Placement Requirement. Introduction to differential calculus via applications in biology and medicine. Limits, derivatives of polynomials, trigonometric, and exponential functions, graphing, applications of the derivative to biology and medicine. Not open for credit to students who have completed MAT 016B, MAT 016C, MAT 021A, MAT 021B, or MAT 021C; only 2 units of credit to students who have completed MAT 016A. GE credit: QL, SE, SL. Effective: 2014 Fall Quarter.

MAT 017B—Calculus for Biology and Medicine (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016A C- or better or MAT 017A C- or better or MAT 021A C- or better or MAT 021AH C- or better Introduction to integral calculus and elementary differential equations via applications to biology and medicine. Fundamental theorem of calculus, techniques of integration including integral tables and numerical methods, improper integrals, elementary first order differential equations, applications in biology and medicine. Not open for credit to students who have completed MAT 016C, MAT 021B, or MAT 021C; only 2 units of credit for students who have completed MAT 016B. GE credit: QL, SE, SL. Effective: 2017 Winter Quarter.

MAT 017C—Calculus for Biology and Medicine (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 017B C- or better Matrix algebra, functions of several variables, partial derivatives, systems of differential equations, and applications to biology and medicine. Not open for credit to students who have completed MAT 21C; only 2 units of credit to students who have completed MAT 16C. GE credit: SE, SL. Effective: 2016 Fall Quarter.

MAT 021A—Calculus (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Two years of high school algebra, plane geometry, plane trigonometry, and analytical geometry, and satisfying the Mathematics Placement Requirement. Functions, limits, continuity. Slope and derivative. Differentiation of algebraic and transcendental functions. Applications to motion, natural growth, graphing, extrema of a function. Differentials. L'Hopital's rule. Not open for credit to students who have completed MAT 016B, MAT 016C, MAT 017B, or MAT 017C; only 2 units of credit to students who have completed MAT 016A or MAT 017A. GE credit: QL, SE, SL. Effective: 2012 Winter Quarter.

MAT 021AH—Honors Calculus (4)
Lecture/Discussion—4 hours. Prerequisite(s): A Precalculus Diagnostic Examination score significantly higher than the minimum for MAT 021A is required. More intensive treatment of material covered in course 21A. GE credit: QL, SE. Effective: 1997 Winter Quarter.

MAT 021AL—Emerging Scholars Program Calculus Workshop (2)
Workshop—6 hours. Prerequisite(s): MAT 021A (can be concurrent); MAT 021A required concurrently. Functions, limits, continuity. Slope and derivative. Same course content as course 21A. Enrollment for students in the Emerging Scholars Program by instructor's invitation only. (P/NP grading only.) GE credit: SE. Effective: 2006 Fall Quarter.

MAT 021B—Calculus (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (MAT 021A C- or better or MAT 021AH C- or better) or MAT 017A B or better Continuation of course 21A. Definition of definite integral, fundamental theorem of calculus, techniques of integration. Application to area, volume, arc length, average of a function, improper integral, surface of revolution. Only 2 units of credit to students who have completed MAT 016B, MAT 016C, MAT 017B, or MAT 017C. GE credit: QL, SE. Effective: 2017 Winter Quarter.

MAT 021BH—Honors Calculus (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021A B or better or MAT 021AH B or better More intensive treatment of material covered in course 21B. Students completing 21BH can continue with course 21CH or the regular 21C. GE credit: SE. Effective: 1997 Winter Quarter.

MAT 021BL—Emerging Scholars Program Calculus Workshop (2)
Workshop—6 hours. Prerequisite(s): MAT 021B (can be concurrent); Concurrent enrollment in MAT 021B. Continuation of course 21A. Same course content as 21B. Enrollment for students in the Emerging Scholars Program by instructor's invitation only. (P/NP grading only.) GE credit: SE. Effective: 2016 Fall Quarter.

MAT 021C—Calculus (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016C C- or better or MAT 017C C- or better or MAT 021B C- or better or MAT 021BH C- or better or MAT 017B B or better; Continuation of course 21B. Sequences, series, tests for convergence, Taylor expansions. Vector algebra, vector calculus, scalar and vector fields. Partial derivatives, total differentials. Applications to maximum and minimum problems in two or more variables. Applications to physical systems. GE credit: QL, SE. Effective: 2017 Winter Quarter.

MAT 021CH—Honors Calculus (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021B B or better or MAT 021BH B or better More intensive treatment of material covered in course 21C. GE credit: SE. Effective: 1997 Winter Quarter.

MAT 021CL—Emerging Scholars Program Calculus Workshop (2)
Workshop—6 hours. Prerequisite(s): MAT 021C (can be concurrent); Concurrent enrollment in MAT 021C. Continuation of course 21B. Same course content as course 21C. Enrollment for students in the Emerging Scholars Program by instructor's invitation only. (P/NP grading only.) GE credit: SE. Effective: 2016 Fall Quarter.

MAT 021D—Vector Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (MAT 021C C- or better or MAT 021CH C- or better) or MAT 017C B or better Continuation of course 21C. Definite integrals over plane and solid regions in various coordinate systems. Line and surface integrals. Green's theorem, Stoke's theorem, divergence theorem. GE credit: QL, SE. Effective: 2017 Winter Quarter.

MAT 021M—Accelerated Calculus (5)
Discussion/Laboratory—1 hour; Lecture/Discussion—4 hours. Prerequisite(s): Grade of B or higher in both semesters of high school calculus or a score of 4 or higher on the Advanced Placement Calculus AB exam, and obtaining the required score on the Precalculus Diagnostic Examination and its trigonometric component. Accelerated treatment of material from courses 21A and 21B, with detailed presentation of theory, definitions, and proofs, and treatment of computational aspects of calculus at a condensed but sophisticated level. Not open for credit to students who have completed MAT 021A or MAT 021B. GE credit: SE. Effective: 1997 Winter Quarter.

MAT 022A—Linear Algebra (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): MAT 016C C- or better or MAT 017C C- or better or MAT 021C C- or better or MAT 021CH C- or better; (ENG 006 or EME 005 or MAT 022AL (can be concurrent)) Matrices and linear transformations, determinants, eigenvalues, eigenvectors, diagonalization, factorization. Not open for credit to students who have completed course 67. GE credit: QL, SE. Effective: 2017 Winter Quarter.

MAT 022A—Linear Algebra (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): (MAT 016C C- or better or MAT 017C C- or better or MAT 021C C- or better or MAT 021CH C- or better); (ENG 006 or EME 005 or ECH 060 or MAT 022AL (can be concurrent)) Matrices and linear transformations, determinants, eigenvalues, eigenvectors, diagonalization, factorization. Not open for credit to students who have completed course 67. GE credit: QL, SE. Effective: 2018 Summer Session 1.

MAT 022AL—Linear Algebra Computer Laboratory (1)
Laboratory—3 hours. Prerequisite(s): MAT 016C or MAT 017C or MAT 021C or MAT 021CH Introduction to Matlab and its use in linear algebra. (P/NP grading only.) GE credit: QL, SE. Effective: 2017 Winter Quarter.

MAT 022B—Differential Equations (3)
Lecture—3 hours. Prerequisite(s): (MAT 022A C- or better or MAT 067 C- or better) Solutions of elementary differential equations. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 025—Advanced Calculus (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021C C- or better or MAT 021CH C- or better Introduction to the rigorous treatment of abstract mathematical analysis. Proofs in mathematics, induction, sets, cardinality; real number system, theory of convergence of sequences. Not open for credit to students who have completed former MAT 127A. GE credit: SE. Effective: 2017 Spring Quarter.

MAT 036—Fundamentals of Mathematics (3)
Lecture—3 hours. Prerequisite(s): Satisfaction of the Mathematics Placement Requirement. Introduction to fundamental mathematical ideas selected from the principal areas of modern mathematics. Properties of the primes, the fundamental theorems of arithmetic, properties of the rationals and irrationals, binary and other number systems. Not open for credit to students who have taken MAT 108. Effective: 2001 Winter Quarter.

MAT 067—Modern Linear Algebra (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021C C- or better or MAT 021CH C- or better Rigorous treatment of linear algebra; topics include vector spaces, bases and dimensions, orthogonal projections, eigenvalues and eigenvectors, similarity transformations, singular value decomposition and positive definiteness. Only one unit of credit to students who have completed MAT 022A. GE credit: SE. Effective: 2017 Winter Quarter.

MAT 071A—Explorations in Elementary Mathematics (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Two years of high school mathematics. Weekly explorations of mathematical ideas related to the elementary school curriculum will be carried out by cooperative learning groups. Lectures will provide background and synthesize the results of group exploration. Effective: 1997 Winter Quarter.

MAT 071B—Explorations in Elementary Mathematics (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Two years of high school mathematics. Weekly explorations of mathematical ideas related to the elementary school curriculum will be carried out by cooperative learning groups. Lectures will provide background and synthesize the results of group exploration. Effective: 1997 Winter Quarter.

MAT 089—Elementary Problem Solving (1)
Lecture—1 hour. Prerequisite(s): High school mathematics through precalculus. Solve and present solutions to challenging and interesting problems in elementary mathematics. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 2001 Winter Quarter.

MAT 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

MAT 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

MAT 108—Introduction to Abstract Mathematics (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021B A rigorous treatment of mathematical concepts with emphasis on developing the ability to understand abstract mathematical ideas, to read and write mathematical concepts, and to prove theorems. Designed to serve as preparation for the more rigorous upper division courses. GE credit: SE. Effective: 2008 Spring Quarter.

MAT 111—History of Mathematics (4) ***Review all entries***
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 025 or MAT 067 or MAT 108 or MAT 114 or MAT 115A or MAT 141 or MAT 145; One of the courses mentioned; eight units of upper division Mathematics. History of mathematics from ancient times through the development of calculus. Mathematics from Arab, Hindu, Chinese and other cultures. Selected topics from the history of modern mathematics. GE credit: SE. Effective: 2010 Fall Quarter.

MAT 111—History of Mathematics (4) ***Review all entries***
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 025 or MAT 127A or MAT 067 or MAT 108 or MAT 114 or MAT 115A or MAT 141 or MAT 145; Eight units of upper division Mathematics. History of mathematics from ancient times through the development of calculus. Mathematics from Arab, Hindu, Chinese and other cultures. Selected topics from the history of modern mathematics. GE credit: SE. Effective: 2018 Fall Quarter.

MAT 114—Convex Geometry (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021C; (MAT 022A or MAT 067) Topics selected from the theory of convex bodies, convex functions, geometric inequalities, combinatorial geometry, and integral geometry. Designed to serve as preparation for the more rigorous upper-division courses. GE credit: SE. Effective: 2007 Winter Quarter.

MAT 115A—Number Theory (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021B Divisibility and related topics, diophantine equations, selected topics from the theory of prime numbers. Designed to serve as preparation for the more rigorous upper division courses. GE credit: QL, SE. Effective: 2006 Fall Quarter.

MAT 115B—Number Theory (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 115A; (MAT 022A or MAT 067) Euler function, Moebius function, congruences, primitive roots, quadratic reciprocity law. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

MAT 116—Differential Geometry (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 021D; MAT 022B; (MAT 022A or MAT 067) Vector analysis, curves, and surfaces in three dimensions. GE credit: SE. Effective: 2017 Winter Quarter.

MAT 118A—Partial Differential Equations: Elementary Methods (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 021D; MAT 022B; (MAT 022A or MAT 067) Derivation of partial differential equations; separation of variables; equilibrium solutions and Laplace's equation; Fourier series; method of characteristics for the one dimensional wave equation. Solution of nonhomogeneous equations. GE credit: QL, SE. Effective: 2006 Fall Quarter.

MAT 118B—Partial Differential Equations: Eigenfunction Expansions (4)
Lecture—3 hours. Prerequisite(s): MAT 118A Sturm-Liouville Theory; selfadjoint operators; mixed boundary conditions; partial differential equations in two and three dimensions;
Eigenvalue problems in circular domains; nonhomogeneous problems and the method of eigenfunction expansions; Poisson's Equations. GE credit: QL, SE. Effective: 2000 Fall Quarter.

MAT 118C—Partial Differential Equations: Green's Functions and Transforms (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 118B Green's functions for one-dimensional problems and Poisson's equation; Fourier transforms; Green's Functions for time dependent problems; Laplace transform and solution of partial differential equations. GE credit: QL, SE. Effective: 2000 Fall Quarter.

MAT 119A—Ordinary Differential Equations (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 021D; MAT 022B; (MAT 022A or MAT 067) Scalar and planar autonomous systems; nonlinear systems and linearization; existence and uniqueness of solutions; matrix solution of linear systems; phase plane analysis; stability analysis; bifurcation theory; Liapunov's method; limit cycles; Poincare Bendixon theory. GE credit: QL, SE. Effective: 2007 Winter Quarter.

MAT 119B—Ordinary Differential Equations (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 119A Lorentz equations; Poincare maps; center manifolds and normal forms; scalar and planar maps; phase space analysis for iterated maps; period-doubling bifurcation; Lyapunov exponent; chaos and symbolic dynamics; strange attractors; fractals. GE credit: QL, SE. Effective: 2007 Spring Quarter.

MAT 124—Mathematical Biology (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): MAT 022B; (MAT 022A or MAT 067) Methods of mathematical modeling of biological systems including difference equations, ordinary differential equations, stochastic and dynamic programming models. Computer simulation methods applied to biological systems. Applications to population growth, cell biology, physiology, evolutionary ecology and protein clustering. MATLAB programming required. GE credit: QL, SE. Effective: 2007 Spring Quarter.

MAT 125A—Real Analysis (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 025 Functions, limits of functions, continuity and uniform continuity, sequences of functions, series of real numbers, series of functions, power series. Not open for credit to students who have completed former MAT 127B. GE credit: SE. Effective: 2006 Fall Quarter.

MAT 125B—Real Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 125A; (MAT 067 or (MAT 022A, MAT 108)) Theory of the derivative, Taylor series, integration, partial derivatives, Implicit Function Theorem. Not open for credit to students who have completed former MAT 127C. GE credit: SE. Effective: 2017 Winter Quarter.

MAT 127A—Real Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021C or MAT 021CH; MAT 067 or (MAT 022A, MAT 108) Real numbers, sequences, series, and continuous functions. Effective: 2017 Fall Quarter.

MAT 127B—Real Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 127A Derivatives, integrals, sequences of functions, and power series. Effective: 2017 Fall Quarter.

MAT 127C—Real Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 127B Metric spaces and multi-variable calculus. Effective: 2017 Fall Quarter.

MAT 128A—Numerical Analysis (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): MAT 021C; ECS 030 Error analysis, approximation, interpolation, numerical differentiation and integration. Programming in language such as Pascal, Fortran, or BASIC required. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 128B—Numerical Analysis in Solution of Equations (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): MAT 021C; (MAT 022A or MAT 067); ECS 030 Solution of nonlinear equations and nonlinear systems. Minimization of functions of several variables. Simultaneous linear equations. Eigenvalue problems. Linear programming. Programming in language such as Pascal, Fortran, or BASIC required. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 128C—Numerical Analysis in Differential Equations (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): MAT 022B; (MAT 022A or MAT 067); ECS 030 Difference equations, operators, numerical solutions of ordinary and partial differential equations. Programming in language such as Pascal, Fortran, or BASIC required. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 129—Fourier Analysis (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 021D; MAT 022B; (MAT 022A or MAT 067); MAT 025 Fourier series and integrals, orthogonal sets of functions. Topics selected from trigonometric approximation, orthogonal polynomials, applications to signal and image processing, numerical analysis, and differential equations. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 133—Mathematical Finance (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): (MAT 067 or (MAT 022A, MAT 108)), MAT 135A Analysis and evaluation of deterministic and random cash flow streams, yield and pricing of basic financial instruments, interest rate theory, mean-variance portfolio theory, capital asset pricing models, utility functions and general principles. MATLAB programming required. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

MAT 135A—Probability (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021C; (MAT 108 or MAT 025) Probability space; discrete probability, combinatorial analysis; independence, conditional probability; random variables, discrete and continuous distributions, probability mass function, joint and marginal density functions; expectation, moments, variance, Chebyshev inequality; sums of random variables, random walk, large number law, central limit theorem. Not open for credit to students who have completed former MAT 131. GE credit: SE. Effective: 2018 Spring Quarter.

MAT 135B—Stochastic Processes (4)
Discussion/Laboratory—4 hours. Prerequisite(s): MAT 135A; (MAT 022A or MAT 067) Generating functions, branching processes, characteristic function; Markov chains; convergence of random variables, law of iterated logarithm; random processes, Brownian motion, stationary processes, renewal processes, queueing theory, martingales. Not open for credit to students who have completed former MAT 132A. GE credit: QL, SE. Effective: 2009 Spring Quarter.

MAT 141—Euclidean Geometry (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021B; (MAT 022A or MAT 067) Axiomatic and analytic examination of Euclidean geometry from an advanced point of view. In particular, a discussion of its relation to other geometries. Designed to serve as preparation for the more rigorous upper division courses. GE credit: SE. Effective: 2018 Winter Quarter.

MAT 145—Combinatorics (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021C Combinatorial methods using basic graph theory, counting methods, generating functions, and recurrence relations. Designed to serve as preparation for the more rigorous upper division courses. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 146—Algebraic Combinatorics (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): MAT 145; MAT 025; (MAT 022A or MAT 067) Enumeration, Polya theory, generating functions, current topics in algebraic combinatorics. Not open for credit to students who have completed former course 149A. GE credit: SE. Effective: 2007 Spring Quarter.

MAT 146—Algebraic Combinatorics (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): ((MAT 022A, MAT 108) or MAT 067)); MAT 145 Enumeration, Polya theory, generating functions, current topics in algebraic combinatorics. Not open for credit to students who have completed former MAT 149A. GE credit: SE. Effective: 2018 Fall Quarter.

MAT 147—Topology (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 025 Basic notions of point-set and combinatorial topology. GE credit: SE. Effective: 2016 Fall Quarter.

MAT 148—Discrete Mathematics (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 067 or (MAT 022A, MAT 108) Coding theory, error correcting codes, finite fields and the algebraic concepts needed in their development. Not open for credit to students who have completed former MAT 149B. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 150A—Modern Algebra (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 067 or (MAT 022A, MAT 108) Basic concepts of groups, symmetries of the plane. Emphasis on the techniques used in the proof of the ideas (Lemmas, Theorems, etc.) developing these concepts. Precise thinking, proof writing, and the ability to deal with abstraction. GE credit: SE. Effective: 2016 Fall Quarter.

MAT 150B—Modern Algebra (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 150A Bilinear forms, rings, factorization, modules. GE credit: SE. Effective: 2007 Winter Quarter.

MAT 150C—Modern Algebra (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 150B Group representations, fields, Galois theory. GE credit: SE. Effective: 2007 Spring Quarter.

MAT 160—Mathematics for Data Analytics and Decision Making (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): MAT 167 Relational model; relational algebra, relational calculus, normal forms, functional and multivalued dependencies, separability. Cost benefit analysis of physical database design and reorganization. Performance via analytical modeling, simulation, and queueing theory. Block accesses; buffering; operating system contention; CPU intensive operations. GE credit: SE. Effective: 2018 Spring Quarter.

MAT 165—Mathematics and Computers (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): MAT 022A or MAT 067; (MAT 025 or MAT 108 or MAT 114 or MAT 115A or MAT 145) Introduction to computational mathematics, symbolic computation, and computer generated/verified proofs in algebra, analysis and geometry. Investigation of rigorous new mathematics developed in conjunction with modern computational questions and the role that computers play in mathematical conjecture and experimentation. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 167—Applied Linear Algebra (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 022A or MAT 067 Applications of linear algebra; LU and QR matrix factorizations, eigenvalue and singular value matrix decompositions. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 168—Optimization (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 021C; ((MAT 022A, MAT 108) or MAT 067) Linear programming, simplex method. Basic properties of unconstrained nonlinear problems, descent methods, conjugate direction method. Constrained minimization. Programming language required. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 180—Special Topics (3)
Lecture—3 hours. Prerequisite(s): MAT 025; (MAT 067 or (MAT 022A, MAT 108)) Special topics from various fields of modern, pure, and applied mathematics. Some recent topics include Knot Theory, General Relativity, and Fuzzy Sets. May be repeated for credit when topics differs. GE credit: SE. Effective: 2016 Fall Quarter.

MAT 185A—Complex Analysis (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): (MAT 067 or (MAT 022A, MAT 108)), MAT 125A Complex number system, analyticity and the Cauchy-Riemann equations, elementary functions, complex integration, power and Laurent series expansions, residue theory. GE credit: SE. Effective: 2016 Fall Quarter.

MAT 185B—Complex Analysis (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 185A Analytical functions, elementary functions and their mapping properties, applications of Cauchy's integral theorem, conformal mapping and applications to heat flow and fluid mechanics. GE credit: SE. Effective: 2007 Spring Quarter.

MAT 189—Advanced Problem Solving (3)
Lecture—3 hours. Prerequisite(s): MAT 025; ((MAT 022A, MAT 108) or MAT 067) Solution and presentation of advanced problem solving techniques. Solve and present interesting and challenging problems of all areas of mathematics. GE credit: OL, QL, SE, WE. Effective: 2016 Fall Quarter.

MAT 192—Internship in Applied Mathematics (1-3)
Internship. Prerequisite(s): Consent of Instructor. Supervised work experience in applied mathematics. Final report. May be repeated up to 10 unit(s). (P/NP grading only.) Effective: 2016 Fall Quarter.

MAT 194—Undergraduate Thesis (3)
Independent Study. Prerequisite(s): Consent of Instructor. Independent research under supervision of a faculty member. Student will submit written report in thesis form. May be repeated for credit with consent of Vice Chairperson. (P/NP grading only.) GE credit: SE. Effective: 2016 Fall Quarter.

MAT 197TC—Tutoring Mathematics in the Community (1-5)
Laboratory—2-6 hours; Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. Special projects in mathematical education developing techniques for mathematics instruction and tutoring on an individual or small group basis. May be repeated once for credit. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 2016 Fall Quarter.

MAT 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2016 Fall Quarter.

MAT 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

MAT 200A—Problem-Solving in Analysis (1)
Extensive Problem Solving; Lecture—1 hour. Prerequisite(s): MAT 201A; MAT 201B; MAT 201C Problem-solving in graduate analysis: continuous functions, metric spaces, Banach and Hilbert spaces, bounded linear operators, the spectral theorem, distributions, Fourier series and transforms, Lp spaces, Sobolev spaces. May be repeated up to 2 time(s). Effective: 2010 Spring Quarter.

MAT 200B—Problem-Solving in Analysis (2)
Extensive Problem Solving; Lecture—1 hour. Prerequisite(s): MAT 201A; MAT 201B; MAT 201C Problem-solving in graduate analysis: continuous functions, metric spaces, Banach and Hilbert spaces, bounded linear operators, the spectral theorem, distributions, Fourier series and transforms, Lp spaces, Sobolev spaces. May be repeated up to 2 time(s). Effective: 2010 Fall Quarter.

MAT 201A—Analysis (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing in Mathematics or Applied Mathematics, or consent of instructor. Metric and normed spaces. Continuous functions. Topological, Hilbert, and Banach spaces. Fourier series. Spectrum of bounded and compact linear operators. Linear differential operators and Green's functions. Distributions. Fourier transform. Measure theory. Lp and Sobolev spaces. Differential calculus and variational methods. Effective: 2004 Fall Quarter.

MAT 201B—Analysis (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing in Mathematics or Applied Mathematics, or consent of instructor. Metric and normed spaces. Continuous functions. Topological, Hilbert, and Banach spaces. Fourier series. Spectrum of bounded and compact linear operators. Linear differential operators and Green's functions. Distributions. Fourier transform. Measure theory. Lp and Sobolev spaces. Differential calculus and variational methods. Effective: 2005 Winter Quarter.

MAT 201C—Analysis (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing in Mathematics or Applied Mathematics, or consent of instructor. Metric and normed spaces. Continuous functions. Topological, Hilbert, and Banach spaces. Fourier series. Spectrum of bounded and compact linear operators. Linear differential operators and Green's functions. Distributions. Fourier transform. Measure theory. Lp and Sobolev spaces. Differential calculus and variational methods. Effective: 2005 Spring Quarter.

MAT 202—Functional Analysis (4)
Lecture—3 hours; Term Paper. Prerequisite(s): MAT 201A; MAT 201B Hahn-Banach, Open mapping, Closed graph, Banach-Steinhaus, and Krein-Milman. Subspaces and quotient spaces. Projections. Weak and weak-star topologies. Compact and adjoint operators in Banach spaces. Fredholm theory. Functions of operators. Spectral theory of self-adjoint operators. Effective: 2009 Winter Quarter.

MAT 205—Complex Analysis (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 185A; Or equivalent to MAT 185A, or consent of instructor. Analytic continuation, Riemann surfaces, conformal mappings, Riemann mapping theorem, entire functions, special functions, elliptic functions. Effective: 2009 Spring Quarter.

MAT 205A—Complex Analysis (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 185A; Or equivalent to MAT 185A, or consent of instructor. Cauchy's theorem, Cauchy's integral formulas, meromorphic functions, complex logarithm, entire functions, Weierstrass infinite product formula, the gamma and zeta functions, and prime number theorem. No credit given to students who have completed MAT 205. Effective: 2011 Fall Quarter.

MAT 205B—Complex Analysis (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 205A; or Consent of Instructor. Conformal mappings, the Schwarz lemma, analytic automorphisms, the Riemann mapping theorem, elliptic functions, Eisenstein series, the Jacobi theta functions, asymptotics, Bessel functions, the Airy function, topics on special functions and Riemann surfaces. May be repeated up to 2 time(s) if topic varies. Effective: 2011 Spring Quarter.

MAT 206—Measure Theory (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 125B Introduction to measure theory. The study of lengths, surface areas, and volumes in general spaces, as related to integration theory. Effective: 2007 Spring Quarter.

MAT 207A—Methods of Applied Mathematics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Ordinary differential equations and dynamical systems. Variational principles. Eigenfunctions, integral equations and Green's functions. Complex analysis and contour integration. Laplace's equation. Diffusion equations. Wave phenomena. Dimensional analysis and scaling. Asymptotic expansions and perturbation theory. Stochastic processes and Brownian motion. Effective: 2010 Fall Quarter.

MAT 207B—Methods of Applied Mathematics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Ordinary differential equations and dynamical systems. Variational principles. Eigenfunctions, integral equations and Green's functions. Complex analysis and contour integration. Laplace's equation. Diffusion equations. Wave phenomena. Dimensional analysis and scaling. Asymptotic expansions and perturbation theory. Stochastic processes and Brownian motion. Effective: 2011 Winter Quarter.

MAT 207C—Methods of Applied Mathematics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Ordinary differential equations and dynamical systems. Variational principles. Eigenfunctions, integral equations and Green's functions. Complex analysis and contour integration. Laplace's equation. Diffusion equations. Wave phenomena. Dimensional analysis and scaling. Asymptotic expansions and perturbation theory. Stochastic processes and Brownian motion. Effective: 2011 Spring Quarter.

MAT 215A—Topology (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Fundamental group and covering space theory. Homology and cohomology. Manifolds and duality. CW complexes. Fixed point theorems. Effective: 2002 Fall Quarter.

MAT 215B—Topology (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Fundamental group and covering space theory. Homology and cohomology. Manifolds and duality. CW complexes. Fixed point theorems. Effective: 2002 Fall Quarter.

MAT 215C—Topology (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Fundamental group and covering space theory. Homology and cohomology. Manifolds and duality. CW complexes. Fixed point theorems. Effective: 2002 Fall Quarter.

MAT 216—Geometric Topology (4)
Extensive Problem Solving—1 hour; Lecture—3 hours. Prerequisite(s): MAT 215A Topology of two- and three-dimensional manifolds. Surfaces and their diffeomorphisms. Dehn twists. Heegaard surfaces. Theory of 3-dimensional manifolds. Knots and knot theory. Hyperbolic manifolds and geometric structures. <p> May be repeated up to 1 time(s). Effective: 2010 Spring Quarter.

MAT 218A—Partial Differential Equations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 201A; MAT 201B; MAT 201C; or Consent of Instructor. Year-long sequence on PDEs which covers linear transport, Laplace, heat, and wave equations, maximum principles, method of characteristics, Sobelev and Hölder space theory, weak derivatives, semilinear, quasilinear, and fully nonlinear elliptic/parabolic equations, nonlinear hyperbolic equations, and compensated compactness. Effective: 2009 Fall Quarter.

MAT 218B—Partial Differential Equations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 218A; or Consent of Instructor. Year-long sequence on PDEs which covers linear transport, Laplace, heat, and wave equations, maximum principles, method of characteristics, Sobelev and Hölder space theory, weak derivatives, semilinear, quasilinear, and fully nonlinear elliptic/parabolic equations, nonlinear hyperbolic equations, and compensated compactness. Effective: 2010 Winter Quarter.

MAT 218C—Partial Differential Equations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 218B; or Consent of Instructor. Year-long sequence on PDEs which covers linear transport, Laplace, heat, and wave equations, maximum principles, method of characteristics, Sobelev and Hölder space theory, weak derivatives, semilinear, quasilinear, and fully nonlinear elliptic/parabolic equations, nonlinear hyperbolic equations, and compensated compactness. Effective: 2010 Spring Quarter.

MAT 221A—Mathematical Fluid Dynamics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 118B; or Consent of Instructor. Kinematics and dynamics of fluids. The Euler and Navier-Stokes equations. Vorticity dynamics. Irrotational flow. Low Reynolds number flows and the Stokes equations. High Reynolds number flows and boundary layers. Compressible fluids. Shock waves. Effective: 2002 Fall Quarter.

MAT 221B—Mathematical Fluid Dynamics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 118B; or Consent of Instructor. Kinematics and dynamics of fluids. The Euler and Navier-Stokes equations. Vorticity dynamics. Irrotational flow. Low Reynolds number flows and the Stokes equations. High Reynolds number flows and boundary layers. Compressible fluids. Shock waves. Effective: 2003 Winter Quarter.

MAT 226A—Numerical Methods: Fundamentals (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 128A; MAT 128B; Or equivalent, or consent of instructor; familiarity with some programming language. Fundamental principles and methods in numerical analysis, including the concepts of stability of algorithms and conditioning of numerical problems, numerical methods for interpolation and integration, eigenvalue problems, singular value decomposition and its applications. Effective: 2009 Fall Quarter.

MAT 226B—Numerical Methods: Large-Scale Matrix Computations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 167; Or equivalent, or consent of instructor; familiarity with some programming language. Numerical methods for large-scale matrix computations, including direct and iterative methods for the solution of linear systems, the computation of eigenvalues and singular values, the solution of least-squares problems, matrix compression, methods for the solution of linear programs. Effective: 2010 Winter Quarter.

MAT 226C—Numerical Methods: Ordinary Differential Equations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 022B; Or equivalent, or consent of instructor; familiarity with some programming language. Numerical methods for the solution of ordinary differential equations, including methods for initial-value problems and two-point boundary-value problems, theory of and methods for differential algebraic equations, dimension reduction of large-scale dynamical systems. Effective: 2010 Spring Quarter.

MAT 227—Mathematical Biology (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Nonlinear ordinary and partial differential equations and stochastic processes of cell and molecular biology. Scaling, qualitative, and numerical analysis of mathematical models. Applications to nerve impulse, chemotaxis, muscle contraction, and morphogenesis. Effective: 2002 Fall Quarter.

MAT 228A—Numerical Solution of Differential Equations (4)
Discussion; Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 128C Numerical solutions of initial-value, eigenvalue and boundary-value problems for ordinary differential equations. Numerical solution of parabolic and hyperbolic partial differential equations. Effective: 1998 Fall Quarter.

MAT 228B—Numerical Solution of Differential Equations (4)
Discussion; Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 128C Numerical solutions of initial-value, eigenvalue and boundary-value problems for ordinary differential equations. Numerical solution of parabolic and hyperbolic partial differential equations. Effective: 1998 Fall Quarter.

MAT 228C—Numerical Solution of Differential Equations (4)
Discussion; Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 128C Numerical solutions of initial-value, eigenvalue and boundary-value problems for ordinary differential equations. Numerical solution of parabolic and hyperbolic partial differential equations. Effective: 1998 Fall Quarter.

MAT 235A—Probability Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 125B; (MAT 135A or STA 131A); or Consent of Instructor. Measure-theoretic foundations, abstract integration, independence, laws of large numbers, characteristic functions, central limit theorems. Weak convergence in metric spaces, Brownian motion, invariance principle. Conditional expectation. Topics selected from: martingales, Markov chains, ergodic theory. (Statistics 235A.) Effective: 2007 Fall Quarter.

MAT 235B—Probability Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 235A or STA 235A; or Consent of Instructor. Measure-theoretic foundations, abstract integration, independence, laws of large numbers, characteristic functions, central limit theorems. Weak convergence in metric spaces, Brownian motion, invariance principle. Conditional expectation. Topics selected from: martingales, Markov chains, ergodic theory. (Statistics 235B.) Effective: 2008 Spring Quarter.

MAT 235C—Probability Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 235B or STA 235B; or Consent of Instructor. Measure-theoretic foundations, abstract integration, independence, laws of large numbers, characteristic functions, central limit theorems. Weak convergence in metric spaces, Brownian motion, invariance principle. Conditional expectation. Topics selected from: martingales, Markov chains, ergodic theory. (Statistics 235C.) Effective: 2008 Spring Quarter.

MAT 236A—Stochastic Dynamics and Applications (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 201C or (MAT 235B or STA 235B); MAT 235A, MAT 235B, MAT 235C/ STA 235A, STA 235B, STA 235C recommended. Stochastic processes, Brownian motion, Stochastic integration, martingales, stochastic differential equations. Diffusions, connections with partial differential equations, mathematical finance. Effective: 2002 Fall Quarter.

MAT 236B—Stochastic Dynamics and Applications (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 201C or (MAT 235B or STA 235B); MAT 235A, MAT 235B, MAT 235C/ STA 235A, STA 235B, STA 235C recommended. Stochastic processes, Brownian motion, Stochastic integration, martingales, stochastic differential equations. Diffusions, connections with partial differential equations, mathematical finance. Effective: 2002 Fall Quarter.

MAT 239—Differential Topology (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 201A; or Consent of Instructor. Vector calculus, point-set topology; MAT 250A and MAT 250B is highly recommended. Topics include: differentiable manifolds, vector fields, transversality, Sard's theorem, examples of differentiable manifolds; orientation, intersection theory, index of vector fields; differential forms, integration, Stokes' theorm, deRham cohomology; Morse functions, Morse lemma, index of critical points. Effective: 2007 Spring Quarter.

MAT 240A—Differential Geometry (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 201A; MAT 239; MAT 250A and MAT 250B highly recommended; intended primarily for second-year graduate students. Riemannian metrics, connections, geodesics, Gauss lemma, convex neighborhoods, curvature tensor, Ricci and scalar curvature, connections and curvature on vector bundles. Effective: 2008 Fall Quarter.

MAT 240B—Differential Geometry (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 240A; Intended primarily for second-year graduate students. Jacobi fields, conjugate points, completeness, Hopf-Rinow theorem, Cartan-Hadamard theorem, energy, variation theorems and their applications, Rauch comparison theorem and its applications. Effective: 2009 Winter Quarter.

MAT 245—Enumerative Combinatorics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 145; MAT 150; or the equivalent, or consent of instructor. Introduction to modern combinatorics and its applications. Emphasis on enumerative aspects of combinatorial theory. Effective: 2004 Fall Quarter.

MAT 246—Algebraic Combinatorics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 245; or Consent of Instructor. Algebraic and geometric aspects of combinatorics. The use of structures such as groups, polytopes, rings, and simplicial complexes to solve combinatorial problems. Effective: 2005 Winter Quarter.

MAT 248A—Algebraic Geometry (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 250A; MAT 250B; MAT 250C Affine varieties and radical ideals. Projective varieties. Abstract varieties. Morphisms and rational maps. Smoothness. Algebraic curves and the Riemann-Roch theorem. Special topics. Effective: 2009 Fall Quarter.

MAT 248B—Algebraic Geometry (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 248A Complex varieties and the analytic topology. Sheaves and schemes.
Fiber products. Separatedness and properness. Applications of scheme
theory. Effective: 2010 Winter Quarter.

MAT 249A—Problem-Solving in Algebra (1)
Extensive Problem Solving; Lecture—1 hour. Prerequisite(s): MAT 250A; MAT 250B Problem-solving in graduate algebra: groups, rings, modules, matrices, tensor products, representations, Galois theory, ring extensions, commutative algebra and homological algebra. May be repeated up to 2 time(s). Effective: 2011 Spring Quarter.

MAT 249B—Problem-Solving in Algebra (2)
Extensive Problem Solving; Lecture—1 hour. Prerequisite(s): MAT 250A; MAT 250B Problem-solving in graduate algebra: groups, rings, modules, matrices, tensor products, representations, Galois theory, ring extensions, commutative algebra and homological algebra. May be repeated up to 2 time(s). Effective: 2011 Fall Quarter.

MAT 250A—Algebra (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing in mathematics or consent of instructor. Group and rings. Sylow theorems, abelian groups, Jordan-Holder theorem. Rings, unique factorization. Algebras, and modules. Fields and vector spaces over fields. Field extensions. Commutative rings. Representation theory and its applications. Effective: 2002 Fall Quarter.

MAT 250B—Algebra (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing in mathematics or consent of instructor. Group and rings. Sylow theorems, abelian groups, Jordan-Holder theorem. Rings, unique factorization. Algebras, and modules. Fields and vector spaces over fields. Field extensions. Commutative rings. Representation theory and its applications. Effective: 2002 Fall Quarter.

MAT 250C—Algebra (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing in mathematics or consent of instructor. Group and rings. Sylow theorems, abelian groups, Jordan-Holder theorem. Rings, unique factorization. Algebras, and modules. Fields and vector spaces over fields. Field extensions. Commutative rings. Representation theory and its applications. Effective: 2002 Fall Quarter.

MAT 258A—Numerical Optimization (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 025; MAT 167 Numerical methods for infinite dimensional optimization problems. Newton and Quasi-Newton methods, linear and sequential quadratic programming, barrier methods; large-scale optimization; theory of approximations; infinite and semi-infinite programming; applications to optimal control, stochastic optimization and distributed systems. Effective: 2007 Fall Quarter.

MAT 258B—Discrete and Mixed-Integer Optimization (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 025; MAT 167; or Consent of Instructor. Combinatorial, integer, and mixed-integer linear optimization problems. Ideal and strong formulations, cutting planes, branch and cut, decomposition methods. Effective: 2014 Fall Quarter.

MAT 261A—Lie groups and their representations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 215A; MAT 240A; MAT 250A; MAT 250B; Or the equivalent, or consent of instructor. Lie groups and Lie algebras. Classification of semi-simple Lie groups. Classical and compact Lie groups. Representations of Lie groups and Lie algebras. Root systems, weights, Weil character formula. Kac-Moody and Virasoro algebras. Applications. Effective: 2002 Fall Quarter.

MAT 261B—Lie groups and their representations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 215A; MAT 240A; MAT 250A; MAT 250B; Or the equivalent, or consent of instructor. Lie groups and Lie algebras. Classification of semi-simple Lie groups. Classical and compact Lie groups. Representations of Lie groups and Lie algebras. Root systems, weights, Weil character formula. Kac-Moody and Virasoro algebras. Applications. Effective: 2002 Fall Quarter.

MAT 265—Mathematical Quantum Mechanics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 201; or Consent of Instructor. Mathematical foundations of quantum mechanics: the Hilbert space and Operator Algebra formulations; the Schrödinger and Heisenberg equations, symmetry in quantum mechanics, basics of spectral theory and perturbation theory. Applications to atoms and molecules. The Dirac equation. Effective: 2003 Fall Quarter.

MAT 266—Mathematical Statistical Mechanics and Quantum Field Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 265; or Consent of Instructor. Mathematical principles of statistical mechanics and quantum field theory. Topics include classical and quantum lattice systems, variational principles, spontaneous symmetry breaking and phase transitions, second quantization and Fock space, and fundamentals of quantum field theory. May be repeated up to 1 time(s). Effective: 2010 Spring Quarter.

MAT 271—Applied and Computational Harmonic Analysis (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): (MAT 125B or MAT 201C); (MAT 128B or MAT 167); MAT 129; Or the equivalent, or consent of instructor. Introduction to mathematical basic building blocks (wavelets, local Fourier basis, and their relatives) useful for diverse fields (signal and image processing, numerical analysis, and statistics). Emphasis on the connection between the continuum and the discrete worlds. Effective: 2007 Fall Quarter.

MAT 280—Topics in Pure and Applied Mathematics (3)
Lecture—3 hours. Prerequisite(s): Graduate standing. Special topics in various fields of pure and applied mathematics. Topics selected based on the mutual interests of students and faculty. May be repeated for credit when topic differs. May be repeated for credit May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

MAT 290—Seminar (1-6)
Seminar—1-6 hours. Advanced study in various fields of mathematics, including analysis, applied mathematics, discrete mathematics, geometry, mathematical biology, mathematical physics, optimization, partial differential equations, probability, and topology. May be repeated for credit. (S/U grading only.) Effective: 2003 Spring Quarter.

MAT 298—Group Study (1-5)
Variable. Effective: 1997 Winter Quarter.

MAT 299—Individual Study (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

MAT 299D—Dissertation Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

MAT 301A—Mathematics Teaching Practicum (3)
Discussion—1 hour; Fieldwork—5 hours. Prerequisite(s): MAT 302A (can be concurrent); MAT 303A (can be concurrent); MAT 302A and MAT 303A required concurrently or consent of instructor. Specialist training in mathematics teaching. Teaching, training, and cross observing classes taught using large group Socratic techniques, small group guided inquiry experiences, and/or other approaches to teaching at various grade levels. Required for advanced degrees in mathematics education. May be repeated up to 1 time(s). Effective: 2001 Fall Quarter.

MAT 301B—Mathematics Teaching Practicum (3)
Discussion—1 hour; Fieldwork—5 hours. Prerequisite(s): MAT 302B (can be concurrent); MAT 303B (can be concurrent); MAT 302B and MAT 303B required concurrently or consent of instructor. Specialist training in mathematics teaching. Teaching, training, and cross observing classes taught using large group Socratic techniques, small group guided inquiry experiences, and/or other approaches to teaching at various grade levels. Required for advanced degrees in mathematics education. May be repeated up to 1 time(s). Effective: 2002 Winter Quarter.

MAT 301C—Mathematics Teaching Practicum (3)
Discussion—1 hour; Fieldwork—5 hours. Prerequisite(s): MAT 302C (can be concurrent); MAT 303B (can be concurrent); MAT 302C and MAT 303C required concurrently or consent of instructor. Specialist training in mathematics teaching. Teaching, training, and cross observing classes taught using large group Socratic techniques, small group guided inquiry experiences, and/or other approaches to teaching at various grade levels. Required for advanced degrees in mathematics education. May be repeated up to 1 time(s). Effective: 2002 Spring Quarter.

MAT 302A—Curriculum Development in Mathematics (1)
Lecture/Discussion—1 hour. Prerequisite(s): MAT 303A (can be concurrent); MAT 303A required concurrently or consent of instructor. Mathematics curriculum development for all grade levels. Required for advanced degrees in mathematics education. May be repeated up to 1 time(s). Effective: 2001 Fall Quarter.

MAT 302B—Curriculum Development in Mathematics (1)
Lecture/Discussion—1 hour. Prerequisite(s): MAT 303B (can be concurrent); MAT 303B required concurrently or consent of instructor. Mathematics curriculum development for all grade levels. Required for advanced degrees in mathematics education. May be repeated up to 1 time(s). Effective: 2002 Winter Quarter.

MAT 302C—Curriculum Development in Mathematics (1)
Lecture/Discussion—1 hour. Prerequisite(s): MAT 303C (can be concurrent); MAT 303C required concurrently or consent of instructor. Mathematics curriculum development for all grade levels. Required for advanced degrees in mathematics education. May be repeated for credit. Effective: 2002 Spring Quarter.

MAT 303A—Mathematics Pedagogy (1)
Lecture/Discussion—1 hour. Prerequisite(s): MAT 302A (can be concurrent) or MAT 210AL (can be concurrent); MAT 302A or MAT 210AL required concurrently or consent of instructor. An investigation of the interplay of mathematical pedagogy and mathematical content, including a historical survey of past and present methods in view of some of the influences that shaped their development. May be repeated up to 1 time(s). Effective: 2001 Fall Quarter.

MAT 303B—Mathematics Pedagogy (1)
Lecture/Discussion—1 hour. Prerequisite(s): MAT 302B (can be concurrent) or MAT 210BL (can be concurrent); MAT 302A or MAT 210AL required concurrently or consent of instructor. An investigation of the interplay of mathematical pedagogy and mathematical content, including a historical survey of past and present methods in view of some of the influences that shaped their development. May be repeated up to 1 time(s). Effective: 2002 Winter Quarter.

MAT 303C—Mathematics Pedagogy (1)
Lecture/Discussion—1 hour. Prerequisite(s): MAT 302C (can be concurrent) or MAT 210CL (can be concurrent); MAT 302C or MAT 210CL required concurrently or consent of instructor. An investigation of the interplay of mathematical pedagogy and mathematical content, including a historical survey of past and present methods in view of some of the influences that shaped their development. May be repeated up to 1 time(s). Effective: 2002 Spring Quarter.

MAT 390—Teaching Assistantship Training (3)
Lecture—3 hours. Prerequisite(s): Graduate standing in the Department of Mathematics. Experience in methods of assisting and teaching of mathematics at the university level. Includes discussion of lecturing techniques, running discussion sessions, holding office hours, preparing and grading of examinations, student-teacher interaction, and related topics. Required of departmental teaching assistants. (S/U grading only.) Effective: 2008 Fall Quarter.

MAT 399—Individual Study (2-4)
Discussion—1 hour; Independent Study—2-3 hours. Individual study of some aspect of mathematics education or a focused work on a curriculum design project under supervision of a faculty member in mathematics. May be repeated up to 1 time(s). (S/U grading only.) Effective: 2002 Spring Quarter.

Applied Physics; Physics

Applied Physics; Physics | Applied Physics B.S.

(College of Letters and Science)

Robert Svoboda, Ph.D., Chairperson of the Department

Lori Lubin, Ph.D., Vice Chairperson of the Department (Administration and Undergraduate Matters)

Rajiv Singh, Ph.D., Vice Chairperson of the Department (Graduate Matters)

Department Office. 174 Physics Building; 530-752-1500; http://www.physics.ucdavis.edu

Faculty. http://physics.ucdavis.edu/people/faculty

The Major Program

From the smallest subatomic particles to atoms, molecules, stars, and galaxies, the study of physics is the study of what makes the universe work. Knowledge gained using atomic-scale microscopes and high-energy particle accelerators and nuclear reactors teaches us not only what holds the atomic nucleus together but also how proteins function and why stars shine.

The Program. The Department of Physics offers a Bachelor of Arts in Physics and two Bachelor of Science degree programs: in Physics (which also offers an emphasis in Astrophysics), and in Applied Physics. The A.B. degree provides a broad coverage of classical and modern physics while permitting a broader liberal arts education than is possible with the other two programs. The B.S. degree in either Physics or Applied Physics should be followed by the student who plans to enter physics as a profession, and also provides excellent training for a wide variety of technical career

options. The B.S. in Applied Physics provides the student with a solid introduction to a particular applied physics specialty. For the student who plans to enter the job market upon completing a B.S. degree, the applied physics orientation would be an asset. Either B.S. program provides a solid foundation in physics for the student interested in graduate work in either pure or applied physics.

Career Alternatives. Careers in physics and applied physics include research and development, either in universities, government laboratories, or industry; teaching in high schools, junior colleges, and universities; management and administration in industrial laboratories and in government agencies; and in production and sales in industry. A major in physics also provides a strong base for graduate-level work in such interdisciplinary areas as chemical physics, biophysics and medical physics, geophysics and environmental physics, astrophysics and astronomy, computer science, and materials science.

Graduate Study. The Department of Physics offers programs of study and research leading to the M.S. and Ph.D. degrees. Further information regarding requirements for these three degrees, graduate research, teaching assistantships, and research assistantships may be obtained by writing to the Chairperson, Department of Physics, One Shields Avenue, University of California, Davis, CA 95616.

Applied Physics—Atmospheric Physics Concentration **Units:** 106-115

Preparatory Subject Matter

PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5
PHY 009D	Modern Physics	4
OR		
PHY 009HA	Honors Physics	5
PHY 009HB	Honors Physics	5
PHY 009HC	Honors Physics	5
PHY 009HD	Honors Physics	5
PHY 009HE	Honors Physics	5
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3
MAT 022B	Differential Equations	3
PHY 040	Introduction to Physics Computation	4

Depth Subject Matter

PHY 104A	Introductory Methods of Mathematical Physics	4
PHY 105A	Analytical Mechanics	4
PHY 110A	Electricity and Magnetism	4
PHY 110B	Electricity and Magnetism	4
PHY 112	Thermodynamics and Statistical Mechanics	4
PHY 115A	Foundation of Quantum Mechanics	4
PHY 116A	Electronic Instrumentation	4
PHY 116B	Electronic Instrumentation	4
PHY 102	Computational Laboratory in Physics	1
OR		
PHY 104B	Computational Methods of Mathematical Physics	4

Laboratory Requirement; choose one:

PHY 116C	Introduction to Computer-Based Experiments in Physics	4
PHY 122A	Advanced Laboratory in Condensed Matter Physics	4
PHY 122B	Advanced Laboratory in Particle Physics	4

Concentration Courses

PHY 105C	Continuum Mechanics	4
ATM 120	Atmospheric Thermodynamics and Cloud Physics	4
ATM 121A	Atmospheric Dynamics	4
ATM 121B	Atmospheric Dynamics	4
GEL 150A	Physical and Chemical Oceanography	4

Additional Electives; choose one:

PHY 104B	Computational Methods of Mathematical Physics	4
PHY 116C	Introduction to Computer-Based Experiments in Physics	4
GEL 116N	Oceanography	3
ATM 128	Radiation and Satellite Meteorology	4
MAT 118A	Partial Differential Equations: Elementary Methods	4
MAT 118B	Partial Differential Equations: Eigenfunction Expansions	4

Program Variance

Similar courses from other departments may be substituted for courses in the depth subject matter requirements by obtaining prior written permission from the Undergraduate Curriculum Committee Chairperson.

Applied Physics—Chemical Physics Concentration **Units:** 108-114

Preparatory Subject Matter

PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5
PHY 009D	Modern Physics	4
OR		
PHY 009HA	Honors Physics	5
PHY 009HB	Honors Physics	5
PHY 009HC	Honors Physics	5
PHY 009HD	Honors Physics	5
PHY 009HE	Honors Physics	5
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3
MAT 022B	Differential Equations	3
PHY 040	Introduction to Physics Computation	4
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5

CHE 002C	General Chemistry	5

Depth Subject Matter

PHY 102	Computational Laboratory in Physics	1
PHY 104A	Introductory Methods of Mathematical Physics	4
PHY 105A	Analytical Mechanics	4
PHY 110A	Electricity and Magnetism	4
PHY 110B	Electricity and Magnetism	4
PHY 112	Thermodynamics and Statistical Mechanics	4
PHY 115A	Foundation of Quantum Mechanics	4
PHY 116A	Electronic Instrumentation	4
PHY 116B	Electronic Instrumentation	4

Laboratory Requirement; choose one:

PHY 122A	Advanced Laboratory in Condensed Matter Physics	4
PHY 122B	Advanced Laboratory in Particle Physics	4
PHY 116C	Introduction to Computer-Based Experiments in Physics	4

Concentration Courses

PHY 115B	Applications of Quantum Mechanics	4
PHY 140A	Introduction to Solid State Physics	4
CHE 124A	Inorganic Chemistry: Fundamentals	3

Program Variance

Similar courses from other departments may be substituted for courses in the depth subject matter requirements by obtaining prior written permission from the Undergraduate Curriculum Committee Chairperson.

Applied Physics—Computational Physics Concentration **Units:** 109-115

Preparatory Subject Matter

PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5
PHY 009D	Modern Physics	4
OR		
PHY 009HA	Honors Physics	5
PHY 009HB	Honors Physics	5
PHY 009HC	Honors Physics	5
PHY 009HD	Honors Physics	5
PHY 009HE	Honors Physics	5
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3
MAT 022B	Differential Equations	3
ECS 036A	Programming and Problem Solving	4
ECS 036B	Software Development and Object-Oriented Programming in C++	4

Depth Subject Matter

PHY 104A	Introductory Methods of Mathematical Physics	4
PHY 105A	Analytical Mechanics	4
PHY 110A	Electricity and Magnetism	4
PHY 110B	Electricity and Magnetism	4
PHY 112	Thermodynamics and Statistical Mechanics	4
PHY 115A	Foundation of Quantum Mechanics	4
PHY 116A	Electronic Instrumentation	4
PHY 116B	Electronic Instrumentation	4

Concentration Courses

PHY 104B	Computational Methods of Mathematical Physics	4
PHY 116C	Introduction to Computer-Based Experiments in Physics	4
ECS 036C	Data Structures, Algorithms, and Programming	4
ECS 122A	Algorithm Design and Analysis	4

Additional Electives; choose three:

ECS 120	Theory of Computation	4
OR		
ECS 122B	Algorithm Design and Analysis	4
OR		
ECS 130	Scientific Computation	4
MAT 128A	Numerical Analysis	4
OR		
MAT 128B	Numerical Analysis in Solution of Equations	4
OR		
MAT 128C	Numerical Analysis in Differential Equations	4
PHY 105C	Continuum Mechanics	4
OR		
PHY 115B	Applications of Quantum Mechanics	4
OR		
PHY 140A	Introduction to Solid State Physics	4

Program Variance

Similar courses from other departments may be substituted for courses in the depth subject matter requirements by obtaining prior written permission from the Undergraduate Curriculum Committee Chairperson.

Applied Physics—Physical Electronics Concentration **Units:** 111-117

Preparatory Subject Matter

PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5
PHY 009D	Modern Physics	4
OR		
PHY 009HA	Honors Physics	5
PHY 009HB	Honors Physics	5
PHY 009HC	Honors Physics	5
PHY 009HD	Honors Physics	5
PHY 009HE	Honors Physics	5
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4

MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3
MAT 022B	Differential Equations	3
PHY 040	Introduction to Physics Computation	4
ENG 017	Circuits I	4
PHY 080	Experimental Techniques	4

Depth Subject Matter

PHY 102	Computational Laboratory in Physics	1
PHY 104A	Introductory Methods of Mathematical Physics	4
PHY 105A	Analytical Mechanics	4
PHY 110A	Electricity and Magnetism	4
PHY 110B	Electricity and Magnetism	4
PHY 112	Thermodynamics and Statistical Mechanics	4
PHY 115A	Foundation of Quantum Mechanics	4

Laboratory Requirement

PHY 122A	Advanced Laboratory in Condensed Matter Physics	4
OR		
PHY 122B	Advanced Laboratory in Particle Physics	4

Concentration Courses

PHY 110C	Electricity and Magnetism	4
PHY 140A	Introduction to Solid State Physics	4
EEC 100	Circuits II	5

Additional Concentration Electives; choose four:

EEC 110A	Electronic Circuits I	4
EEC 110B	Electronic Circuits II	4
EEC 140A	Principles of Device Physics I	4
EEC 140B	Principles of Device Physics II	4
EEC 150A	Introduction to Signals and Systems I	4
EEC 150B	Introduction to Signals and Systems II	4

Program Variance

Similar courses from other departments may be substituted for courses in the depth subject matter requirements by obtaining prior written permission from the Undergraduate Curriculum Committee Chairperson.

Applied Physics—Geophysics Concentration **Units:** 102-109

Preparatory Subject Matter

PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5
PHY 009D	Modern Physics	4
OR		
PHY 009HA	Honors Physics	5
PHY 009HB	Honors Physics	5
PHY 009HC	Honors Physics	5
PHY 009HD	Honors Physics	5
PHY 009HE	Honors Physics	5

MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3
MAT 022B	Differential Equations	3
PHY 040	Introduction to Physics Computation	4

Depth Subject Matter

PHY 104A	Introductory Methods of Mathematical Physics	4
PHY 105A	Analytical Mechanics	4
PHY 110A	Electricity and Magnetism	4
PHY 110B	Electricity and Magnetism	4
PHY 112	Thermodynamics and Statistical Mechanics	4
PHY 115A	Foundation of Quantum Mechanics	4
PHY 116A	Electronic Instrumentation	4
PHY 116B	Electronic Instrumentation	4

Laboratory Requirement; choose one:

PHY 122A	Advanced Laboratory in Condensed Matter Physics	4
PHY 122B	Advanced Laboratory in Particle Physics	4
PHY 116C	Introduction to Computer-Based Experiments in Physics	4

Concentration Courses

PHY 104B	Computational Methods of Mathematical Physics	4
GEL 161	Geophysical Field Methods	3
GEL 162	Geophysics of the Solid Earth	3

Courses offered in alternating years.

Additional Electives; choose three:

PHY 105B	Analytical Mechanics	4
OR		
PHY 116C	Introduction to Computer-Based Experiments in Physics	4
OR		
PHY 151	Stellar Structure and Evolution	4
GEL 146	Radiogenic Isotope Geochemistry and Cosmochemistry	3
OR		
GEL 163	Planetary Geology and Geophysics	3
ATM 120	Atmospheric Thermodynamics and Cloud Physics	4
OR		
ATM 121A	Atmospheric Dynamics	4
OR		
ATM 121B	Atmospheric Dynamics	4

Program Variance

Similar courses from other departments may be substituted for courses in the depth subject matter requirements by obtaining prior written permission from the Undergraduate Curriculum Committee Chairperson.

Applied Physics—Materials Science Concentration **Units:** 102-111

Preparatory Subject Matter

PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5
PHY 009D	Modern Physics	4
OR		
PHY 009HA	Honors Physics	5
PHY 009HB	Honors Physics	5
PHY 009HC	Honors Physics	5
PHY 009HD	Honors Physics	5
PHY 009HE	Honors Physics	5
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3
MAT 022B	Differential Equations	3
PHY 040	Introduction to Physics Computation	4

Depth Subject Matter

PHY 104A	Introductory Methods of Mathematical Physics	4
PHY 105A	Analytical Mechanics	4
PHY 110A	Electricity and Magnetism	4
PHY 110B	Electricity and Magnetism	4
PHY 112	Thermodynamics and Statistical Mechanics	4
PHY 115A	Foundation of Quantum Mechanics	4
PHY 116A	Electronic Instrumentation	4
PHY 116B	Electronic Instrumentation	4
PHY 102	Computational Laboratory in Physics	1
OR		
PHY 104B	Computational Methods of Mathematical Physics	4

Laboratory Requirement; choose one:

PHY 122A	Advanced Laboratory in Condensed Matter Physics	4
PHY 122B	Advanced Laboratory in Particle Physics	4
PHY 116C	Introduction to Computer-Based Experiments in Physics	4

Concentration Courses

PHY 115B	Applications of Quantum Mechanics	4
PHY 140A	Introduction to Solid State Physics	4
PHY 140B	Introduction to Solid State Physics	4
EMS 174	Mechanical Behavior of Materials	4
EMS 180	Materials in Engineering Design	4

Program Variance

Similar courses from other departments may be substituted for courses in the depth subject matter requirements by obtaining prior written permission from the Undergraduate Curriculum Committee Chairperson.

Applied Physics—Physical Oceanography Concentration **Units:** 108-114

Preparatory Subject Matter

PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5
PHY 009D	Modern Physics	4
OR		
PHY 009HA	Honors Physics	5
PHY 009HB	Honors Physics	5
PHY 009HC	Honors Physics	5
PHY 009HD	Honors Physics	5
PHY 009HE	Honors Physics	5
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3
MAT 022B	Differential Equations	3
PHY 040	Introduction to Physics Computation	4

Depth Subject Matter

PHY 102	Computational Laboratory in Physics	1
PHY 104A	Introductory Methods of Mathematical Physics	4
PHY 105A	Analytical Mechanics	4
PHY 110A	Electricity and Magnetism	4
PHY 110B	Electricity and Magnetism	4
PHY 115A	Foundation of Quantum Mechanics	4
PHY 116A	Electronic Instrumentation	4
PHY 116B	Electronic Instrumentation	4

Laboratory Requirement; choose one:

PHY 122A	Advanced Laboratory in Condensed Matter Physics	4
PHY 122B	Advanced Laboratory in Particle Physics	4
PHY 116C	Introduction to Computer-Based Experiments in Physics	4

Concentration Courses

PHY 105C	Continuum Mechanics	4
ATM 120	Atmospheric Thermodynamics and Cloud Physics	4
ATM 121A	Atmospheric Dynamics	4
ATM 121B	Atmospheric Dynamics	4
GEL 116N	Oceanography	3
GEL 150A	Physical and Chemical Oceanography	4

Additional Electives; choose one:

PHY 104B	Computational Methods of Mathematical Physics	4
	Substitutions: Physics 102 is waived for students who take Physics 104B.	
PHY 112	Thermodynamics and Statistical Mechanics	4
PHY 116C	Introduction to Computer-Based Experiments in Physics	4

MAT 118A	Partial Differential Equations: Elementary Methods	4
OR		
MAT 118B	Partial Differential Equations: Eigenfunction Expansions	4

Program Variance

Similar courses from other departments may be substituted for courses in the depth subject matter requirements by obtaining prior written permission from the Undergraduate Curriculum Committee Chairperson.

Total: 108-114

Applied Physics; Physics | PHY Courses

Physics 001 is a two-quarter sequence requiring some mathematics (trigonometry). Either 001A alone or both quarters may be taken. The sequence is not intended to satisfy entrance requirements of a year of physics for professional schools, but will satisfy requirements of 3 or 6 units of physics.

Physics 007 is a one-year (three-quarter) introductory physics course with laboratory intended for students majoring in the biological sciences. It has a calculus prerequisite. If you don't want a full year of introductory physics, you should take one or two quarters of Physics 1 instead. Read the following information carefully if you are using Physics 007 to complete an introductory course you have already begun.

The sequence of material in Physics 007 is different from that in most traditionally taught introductory physics courses. Physics 007B is most like the first quarter or semester of traditionally taught courses which treat classical mechanics. Physics 007C is most like the last quarter or semester which, in traditionally taught courses, treats optics, electricity and magnetism, and modern physics. The content and sequence of Physics 007A is unlike that of most other traditionally taught courses.

If you have completed one introductory quarter or semester of a traditionally taught physics course and want to continue with Physics 007, you should first take (and will receive full credit for) Physics 007A. Then, either skip 007B, but self-study the last three weeks of material, or take 007B and receive reduced credit. Finally, take 007C for full credit.

If you have taken two quarters of a year-long introductory physics course and have not had extensive work in optics, electricity and magnetism, and modern physics, you should take Physics 007C. In no case should you take Physics 007B without first taking Physics 007A. All other situations should be discussed directly with a Physics 007 instructor.

Students not intending to take the entire sequence should instead take Physics 001.

Physics 009 is a four-quarter sequence using calculus throughout and including laboratory work as an integral component. The course is primarily for students in the physical sciences and engineering.

Physics 009H is a five-quarter honors physics sequence, which may be taken instead of Physics 009. It is intended primarily for first-year students with a strong interest in physics and with advanced placement in mathematics to Mathematics 021B. Students who plan to major in physics, and also motivated non-majors, should take Physics 009H instead of Physics 009 if they are ready to begin Mathematics 021B in fall quarter. In course requirements and prerequisites, Physics 009HA-009HE can be substituted for Physics 009A-009D. Students may not switch between the 009H and 009 series beyond 009HA or 009A.

Physics 010 is primarily a concept-oriented one-quarter lecture/discussion course requiring relatively little mathematical background.

Courses in PHY:

PHY 001A—Principles of Physics (3)
Lecture—3 hours. Prerequisite(s): Trigonometry or consent of instructor. Mechanics. Introduction to general principles and analytical methods used in physics with emphasis on applications in applied agricultural and biological sciences and in physical education. Not open to students who have received credit for PHY 007B or PHY 009A. GE credit: SE. Effective: 1997 Winter Quarter.

PHY 001B—Principles of Physics (3)
Lecture—3 hours. Prerequisite(s): PHY 001A or PHY 009A Not open for credit to students who have received credit for course 7A, 7B, 7C, 9B, 9C, or 9D. Continuation of course 1A. Heat, optics, electricity, modern physics. Not open for credit to students who have received credit for course 7A, 7B, 7C, 9B, 9C, or 9D. GE credit: SE. Effective: 1997 Winter Quarter.

PHY 007A—General Physics (4)
Discussion/Laboratory—5 hours; Lecture—1.5 hours. Prerequisite(s): MAT 016B (can be concurrent) or MAT 017B (can be concurrent) or MAT 021B (can be concurrent); Completion or concurrent enrollment in MAT 016B or MAT 017B or MAT 021B. Introduction to general principles and analytical methods used in physics for students majoring in a biological science. Only two units of credit allowed to students who have completed PHY 001B or PHY 009B. GE credit: SE. Effective: 2010 Winter Quarter.

PHY 007B—General Physics (4)
Discussion/Laboratory—5 hours; Lecture—1.5 hours. Prerequisite(s): PHY 007A Continuation of course 7A. Only two units of credit allowed to students who have completed course 9A, or 1A. GE credit: SE. Effective: 1997 Winter Quarter.

PHY 007C—General Physics (4)
Discussion/Laboratory—5 hours; Lecture—1.5 hours. Prerequisite(s): PHY 007B Continuation of course 7B. Only two units of credit allowed to students who have completed course 9C or 5C. GE credit: SE. Effective: 1997 Winter Quarter.

PHY 009A—Classical Physics (5) ***Review all entries***
Discussion—1 hour; Laboratory—2.5 hours; Lecture—3 hours. Prerequisite(s): MAT 021B; MAT 021M Introduction to general principles and analytical methods used in physics for physical science and engineering majors. Classical mechanics. Only 2 units of credit for students who have completed 1A or 7B. Not open for credit to students who have completed course 9HA. GE credit: SE. Effective: 2018 Winter Quarter.

PHY 009A—Classical Physics (5) ***Review all entries***
Discussion—1 hour; Laboratory—2.5 hours; Lecture—3 hours. Prerequisite(s): MAT 021B or MAT 021M; or Consent of Instructor. Introduction to general principles and analytical methods used in physics for physical science and engineering majors. Classical mechanics. Only 2 units of credit for students who have completed PHY 001A or PHY 007B; not open for credit to students who have completed course PHY 009HA. GE credit: SE. Effective: 2018 Summer Session 1.

PHY 009B—Classical Physics (5)
Discussion—1 hour; Laboratory—2.5 hours; Lecture—3 hours. Prerequisite(s): PHY 009A; MAT 021C; MAT 021D (can be concurrent) Continuation of course 9A. Fluid mechanics, thermodynamics, wave phenomena, optics. Only two units of credit for students who have completed PHY 007A; not open for credit to students who have completed PHY 009HB, PHY 009HC, or ENG 105. GE credit: SE. Effective: 2004 Fall Quarter.

PHY 009C—Classical Physics (5)
Discussion—1 hour; Laboratory—2.5 hours; Lecture—3 hours. Prerequisite(s): PHY 009B; MAT 021D; MAT 022A (can be concurrent) Electricity and magnetism including circuits and Maxwell's equations. Only 3 units of credit for students who have completed PHY 007C; not open for credit to students who have completed PHY 009HD. GE credit: SE. Effective: 2005 Winter Quarter.

PHY 009D—Modern Physics (4)
Discussion—1.5 hours; Lecture—3 hours. Prerequisite(s): PHY 009C; MAT 022A; MAT 022B recommended (may be taken concurrently). Not open for credit to students who have completed course 9HB, 9HC, or 9HE. Introduction to physics concepts developed since 1900. Special relativity, quantum mechanics, atoms, molecules, condensed matter, nuclear and particle physics. Not open for credit to students who have completed course 9HB, 9HC, or 9HE. GE credit: SE. Effective: 1999 Spring Quarter.

PHY 009HA—Honors Physics (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): MAT 021B (can be concurrent); or Consent of Instructor. Classical mechanics. Same material as course 9A in greater depth. For students in physical sciences, mathematics, and engineering. Only 2 units of credit for students who have completed PHY 007B; not open for credit to students who have completed PHY 009A. GE credit: SE. Effective: 2003 Fall Quarter.

PHY 009HB—Honors Physics (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): (PHY 009HA or PHY 009A); MAT 021C (can be concurrent) Special relativity, thermal physics. Continuation of course 9HA. Only 2 units of credit for students who have completed PHY 007A; not open for credit to students who have completed PHY 009B or PHY 009D. GE credit: SE. Effective: 2004 Winter Quarter.

PHY 009HC—Honors Physics (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): PHY 009HB; MAT 021D (can be concurrent) Waves, sound, optics, quantum physics. Continuation of Physics 9HB. Only 2 units of credit for students who have completed PHY 007C; not open for credit to students who have completed PHY 009B or PHY 009D. GE credit: SE. Effective: 2004 Spring Quarter.

PHY 009HD—Honors Physics (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): PHY 009HC; MAT 021D Electricity and magnetism. Continuation of Physics 9HC. Not open for credit to students who have completed PHY 009C. GE credit: SE. Effective: 2003 Fall Quarter.

PHY 009HE—Honors Physics (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): PHY 009HD; MAT 022B (can be concurrent) Application of quantum mechanics. Not open for credit to students who have completed PHY 009D. GE credit: SE. Effective: 2004 Winter Quarter.

PHY 010—Topics in Physics for Nonscientists (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): High school algebra. Emphasis varies: survey of basic principles or a deeper exploration of some particular branch. Past topics included black holes, space time, and relativity; physics of music; history and philosophy; energy and the environment; and natural phenomena. No units of credit allowed if taken after any other PHY course. GE credit: SE. Effective: 1997 Winter Quarter.

PHY 010C—Physics of California (3)
Lecture—3 hours. Atmospheric phenomena common in CA, local weather patterns and microclimes. Applications to CA energy, water, and resource management policies. Physics underlying regional sports in CA. Not open for credit to students who have completed any quarter of PHY 009 or PHY 009H, or any upper division PHY course. GE credit: SE, SL, VL. Effective: 2014 Fall Quarter.

PHY 010CY—Physics of California (3)
Discussion—1.5 hours; Web Electronic Discussion—0.5 hours; Web Virtual Lecture—1 hour. Conceptual understanding of the physics underlying regional sports in CA. Focus on skiing, surfing, and scuba diving. Atmospheric phenomena common in CA, local weather patterns and microclimes, applications to CA energy, and water are also discussed. Not open for credit to students who have completed PHY 010C, any quarter of PHY 09A, PHY 009B, PHY 009C, PHY 009D, PHY 009HA, PHY 009HB, PHY 009HC, PHY 009HD, or PHY 009HE, or any upper division PHY course. GE credit: SE, SL, VL. Effective: 2017 Winter Quarter.

PHY 012—Visualization in Science (3)
Lecture—3 hours. Production, interpretation, and use of images in physics, astronomy, biology, and chemistry as scientific evidence and for communication of research results. GE credit: SE, SL, VL. Effective: 2017 Winter Quarter.

PHY 030—Fractals, Chaos and Complexity (3)
Lecture/Discussion—3 hours. Prerequisite(s): MAT 016A or MAT 021A Modern ideas about the unifying ideas of fractal geometry, chaos and complexity. Basic theory and applications with examples from physics, earth sciences, mathematics, population dynamics, ecology, history, economics, biology, computer science, art and architecture. (Geology 30.) GE credit: QL, SE. Effective: 2010 Winter Quarter.

PHY 049—Supplementary Work in Lower Division Physics (1-3)
Variable. Students with partial credit in lower division physics courses may, with consent of instructor, complete the credit under this heading. May be repeated for credit. May be repeated for credit. GE credit: SE. Effective: 1999 Fall Quarter.

PHY 080—Experimental Techniques (4)
Laboratory—5 hours; Lecture—2 hours. Prerequisite(s): PHY 009D or PHY 009HD Open to Physics and Applied Physics majors only. Experimental techniques. Design of circuits. Data analysis, sources of noise, statistical and systematic uncertainties. Light sources, detection, and measurement in basic optical systems. Effective: 2017 Fall Quarter.

PHY 090X—Lower Division Seminar (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Limited enrollment. Examination of a special topic in Physics through shared readings, discussions, written assignments, or special activities such as laboratory work. May be repeated for credit. GE credit: SE. Effective: 1998 Fall Quarter.

PHY 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Primary for lower division students. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

PHY 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

PHY 102—Computational Laboratory in Physics (1)
Laboratory—4 hours. Prerequisite(s): MAT 021D; ECS 030; (PHY 009D or PHY 009HD); PHY 104A (can be concurrent); MAT 22AB; PHY 104A required concurrently. Introduction to computational physics and to the computational resources in the physics department. Preparation for brief programming assignments required in other upper division physics classes. Not open to students who have completed PHY 104B or PHY 105AL. GE credit: SE. Effective: 2008 Summer Session 1.

PHY 104A—Introductory Methods of Mathematical Physics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): (PHY 009B C- or better, PHY 009C C- or better, PHY 009D C- or better); (MAT 021D C- or better, MAT 022A C- or better, MAT 022B C- or better); or Consent of Instructor. Introduction to the mathematics used in upper-division physics courses, including applications of vector spaces, Fourier analysis, partial differential equations. Effective: 2000 Fall Quarter.

PHY 104B—Computational Methods of Mathematical Physics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): PHY 104A C- or better; PHY 105AL; or Consent of Instructor. Introduction to the use of computational techniques to solve the mathematical problems that arise in advanced physics courses, complementing the analytical approaches emphasized in course 104A. GE credit: SE. Effective: 2000 Fall Quarter.

PHY 104C—Intermediate Methods of Mathematical Physics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): PHY 104A C- or better; or Consent of Instructor. Applications of complex analysis, conditional probability, integral transformations and other advanced topics. Effective: 2000 Fall Quarter.

PHY 105A—Analytical Mechanics (4)
Lecture—3 hours. Prerequisite(s): (PHY 009B C or better, PHY 009C C or better, PHY 009D C or better); (MAT 021D C or better, MAT 022A C or better, MAT 022B C or better); Or consent of department for any of the courses. Principles and applications of Newtonian mechanics; introduction to Lagrange's and Hamilton's equations GE credit: SE. Effective: 1999 Fall Quarter.

PHY 105B—Analytical Mechanics (4)
Lecture—3 hours. Prerequisite(s): PHY 104A C or better; PHY 105A C or better; Or consent of department for any of the courses. Principles and applications of Newtonian mechanics; introduction to Lagrange's and Hamilton's equations GE credit: SE. Effective: 1999 Fall Quarter.

PHY 105C—Continuum Mechanics (4)
Lecture—3 hours. Prerequisite(s): PHY 104A C- or better; PHY 105A C- or better; or Consent of Instructor. The continuum hypothesis and limitations, tensors, isotropic constitutive equations, and wave propagation. Applications such as elastic solids,heat flow, aerodynamics, and ocean waves. GE credit: SE. Effective: 2006 Spring Quarter.

PHY 108—Optics (3)
Lecture—3 hours. Prerequisite(s): ((PHY 009A, PHY 009B, PHY 009C, PHY 009D) or (PHY 007A, PHY 007B, PHY 007C)); (MAT 021A, MAT 021B, MAT 021C, MAT 021D); or Consent of Instructor. The phenomena of diffraction, interference, and polarization of light, with applications to current problems in astrophysics, material science,
and atmospheric science. Study of modern optical instrumentation. Open to non-majors. GE credit: SE. Effective: 1997 Winter Quarter.

PHY 108L—Optics Laboratory (1)
Laboratory—3 hours. Prerequisite(s): PHY 108 (can be concurrent); PHY 108 required concurrently. The laboratory will consist of one major project pursued throughout the quarter, based on modern applications of optical techniques. GE credit: SE. Effective: 1997 Winter Quarter.

PHY 110A—Electricity and Magnetism (4)
Lecture—3 hours. Prerequisite(s): PHY 009B C- or better; PHY 009C C- or better; PHY 009D C- or better; MAT 021D C- or better; MAT 022A C- or better; MAT 022B C- or better; PHY 104A; PHY 105A; Or consent of department. Theory of electrostatics, electromagnetism, Maxwell's equations, electromagnetic waves. GE credit: SE. Effective: 2018 Winter Quarter.

PHY 110B—Electricity and Magnetism (4)
Lecture—3 hours. Prerequisite(s): PHY 110A C- or better; PHY 104A C- or better; Or consent of department. Theory of electrostatics, electromagnetism, Maxwell's equations, electromagnetic waves. GE credit: SE. Effective: 2010 Winter Quarter.

PHY 110C—Electricity and Magnetism (4)
Lecture—3 hours. Prerequisite(s): PHY 110B C- or better; Or consent of department. Theory of electrostatics, electromagnetism, Maxwell's equations, electromagnetic waves. GE credit: SE. Effective: 2010 Winter Quarter.

PHY 112—Thermodynamics and Statistical Mechanics (4)
Lecture—3 hours. Prerequisite(s): PHY 115A; Or the equivalent. Introduction to classical and quantum statistical mechanics and their
connections with thermodynamics. The theory is developed for the ideal gas model and simple magnetic models and then extended to studies of solids, quantum fluids, and chemical equilibria. GE credit: SE. Effective: 2000 Winter Quarter.

PHY 115A—Foundation of Quantum Mechanics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): PHY 104A C- or better; PHY 105A C- or better; Or consent of department. Introduction to the methods of quantum mechanics with applications to atomic, molecular, solid state, nuclear and elementary particle physics. Extensive problem solving. GE credit: SE. Effective: 2007 Winter Quarter.

PHY 115B—Applications of Quantum Mechanics (4)
Lecture—3 hours. Prerequisite(s): PHY 115A C- or better; Or consent of department. Angular momentum and spin; hydrogen atom and atomic spectra; perturbation theory; scattering theory. GE credit: SE. Effective: 1999 Fall Quarter.

PHY 116A—Electronic Instrumentation (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): PHY 009C; MAT 022B; or Consent of Instructor. Experimental and theoretical study of important analog electronic circuits. Linear circuits, transmission lines, input impedance, feedback, amplifiers, oscillators, noise. GE credit: SE, VL. Effective: 2008 Fall Quarter.

PHY 116B—Electronic Instrumentation (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): PHY 009C or PHY 009HD; or Consent of Instructor. Continuation of course 116A. Introduction to the use of digital electronics and microcomputers in experimental physics. Nonlinear electronics, integrated circuits, analog-to-digital and digital-to-analog converters, transducers, actuators. GE credit: SE. Effective: 2008 Spring Quarter.

PHY 116C—Introduction to Computer-Based Experiments in Physics (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (PHY 009D or PHY 009HD); PHY 116B; MAT 022B; or Consent of Instructor. Introduction to techniques for making physical measurements using computer-based instrumentation. GE credit: SE, WE. Effective: 2004 Spring Quarter.

PHY 122A—Advanced Laboratory in Condensed Matter Physics (4)
Laboratory—8 hours. Prerequisite(s): PHY 104A; PHY 105A; PHY 110B; PHY 115A; PHY 112 (can be concurrent); Or consent of the department. Registration by Permission to Add (PTA) number only; priority given to graduating PHY and APP majors. Experimental techniques and measurements in solid-state physics. Student performs three to six experiments depending on difficulty. Individual work is stressed. Thorough write-ups of the experiments are required. GE credit: SE, WE. Effective: 2018 Winter Quarter.

PHY 122B—Advanced Laboratory in Particle Physics (4)
Laboratory—8 hours. Prerequisite(s): PHY 104A; PHY 105A; PHY 110B; PHY 115A; PHY 112 (can be concurrent); Or consent of the department. Registration by Permission to Add (PTA) number only; priority given to graduating PHY and APP majors. Experimental techniques and measurements in nuclear and particle physics. Students perform three to six experiments depending on difficulty. Individual work is stressed. Thorough write-ups of the experiments are required. GE credit: SE, WE. Effective: 2018 Winter Quarter.

PHY 123—Signals and Noise in Physics (4)
Lecture—3 hours; Project (Term Project)—1 hour. Prerequisite(s): PHY 009A; PHY 009B; PHY 009C; PHY 009D; PHY 104A; or Consent of Instructor. Not open to students who have taken this course previously as course 198. Techniques of measurement and analysis designed to avoid systematic error and maximize signal/noise ratio. Illustrative examples of optimal filters ranging from condensed matter to cosmology. GE credit: SE. Effective: 2007 Winter Quarter.

PHY 129A—Introduction to Nuclear Physics (4)
Lecture—3 hours. Prerequisite(s): PHY 115A C- or better; or Consent of Instructor. Survey of basic nuclear properties and concepts requiring introductory
knowledge of quantum mechanics: nuclear models and forces, radioactive decay and detecting nuclear radiation and nuclear reaction products,
alpha, beta and gamma decay. GE credit: SE. Effective: 2000 Winter Quarter.

PHY 129B—Nuclear Physics, Extensions and Applications (4)
Lecture—3 hours; Term Paper. Prerequisite(s): PHY 129A Continuation of course 129A. Nuclear reactions, neutrons, fission, fusion accelerators, introduction to meson and particle physics, nuclear

astrophysics, and applications of nuclear physics and techniques to mass spectrometry, nuclear medicine, trace element analysis. GE credit: SE. Effective: 1997 Winter Quarter.

PHY 130A—Elementary Particle Physics (4)
Lecture—3 hours. Prerequisite(s): PHY 115A C- or better; or Consent of Instructor. Properties and classification of elementary particles and their interactions. Experimental techniques. Conservation laws and symmetries. Strong, electromagnetic, and weak interactions. Introduction to Feynman calculus. GE credit: SE. Effective: 2000 Winter Quarter.

PHY 130B—Elementary Particle Physics (4)
Lecture—3 hours. Prerequisite(s): PHY 115A C- or better; or Consent of Instructor. Properties and classification of elementary particles and their interactions. Experimental techniques. Conservation laws and symmetries. Strong, electromagnetic, and weak interactions. Introduction to Feynman calculus. GE credit: SE. Effective: 2000 Winter Quarter.

PHY 140A—Introduction to Solid State Physics (4)
Lecture—3 hours. Prerequisite(s): PHY 115A C- or better; or Consent of Instructor. Or equivalent course passed with C- or better. Survey of fundamental ideas in the physics of solids, with selected device applications. Crystal structure, x-ray and neutron diffraction, phonons, simple metals, energy bands and Fermi surfaces, semiconductors, optical properties, magnetism, superconductivity. GE credit: SE. Effective: 2000 Winter Quarter.

PHY 140B—Introduction to Solid State Physics (4)
Lecture—3 hours. Prerequisite(s): PHY 115A C- or better; or Consent of Instructor. Or equivalent course passed with C- or better. Survey of fundamental ideas in the physics of solids, with selected device applications. Crystal structure, x-ray and neutron diffraction, phonons, simple metals, energy bands and Fermi surfaces, semiconductors, optical properties, magnetism, superconductivity. GE credit: SE. Effective: 2000 Winter Quarter.

PHY 150—Special Topics in Physics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): (PHY 009A, PHY 009B, PHY 009C, PHY 009D) or (PHY 009HA, PHY 009HB, PHY 009HC, PHY 009HD, PHY 009HE); or Consent of Instructor. Topics vary, covering areas of contemporary research in physics. May be repeated for credit. GE credit: SE. Effective: 2007 Fall Quarter.

PHY 151—Stellar Structure and Evolution (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): PHY 009A; PHY 009B; PHY 009C; PHY 009D; or Consent of Instructor. The chemical composition, structure, energy sources and evolutionary history of stars, with equal emphasis on both the observational data and theoretical models, including black holes, neutron stars and white dwarfs and the formation of substellar masses. GE credit: SE. Effective: 2007 Fall Quarter.

PHY 152—Galactic Structure and the Interstellar Medium (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): PHY 009A; PHY 009B; PHY 009C; PHY 009D; PHY 105A (can be concurrent); or Consent of Instructor. PHY 105A required concurrently. The structure, contents, and formation of our Milky Way galaxy, viz. its shape and size, the nature of the interstellar medium, stellar populations, rotation curves, mass determination and evidence of dark matter. GE credit: SE. Effective: 2007 Spring Quarter.

PHY 153—Extragalactic Astrophysics (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): PHY 009A; PHY 009B; PHY 009C; PHY 009D; PHY 104A; PHY 105A; or Consent of Instructor. Structure and evolution of galaxies and clusters of galaxies, including distance and mass determination, galaxy types and environments, active galactic nuclei and quasars, gravitational lensing and dark matter, global cosmological properties. Not open to students who have taken PHY 127. GE credit: SE. Effective: 2007 Winter Quarter.

PHY 154—Astrophysical Applications of Physics (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): PHY 105A; PHY 105B; PHY 110B (can be concurrent); PHY 115A (can be concurrent); PHY 112; PHY 112 or consent of instructor; PHY 110B and 115A required concurrently. Not open to students who have taken this course previously as course 198. Applications of classical and quantum mechanics, thermodynamics, statistical mechanics, and electricity and magnetism to astrophysical settings such as the Big Bang, degenerate white dwarf and neutron stars, and solar neutrinos. GE credit: SE. Effective: 2007 Spring Quarter.

PHY 155—General Relativity (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): PHY 104A; PHY 105A; PHY 105B; PHY 110A; PHY 105B and PHY 110A or consent of instructor. Definition of the mathematical frame work for the description of the gravitational field, introduction of the dynamical equations of Einstein governing its evolution and review of the key solutions, including black holes and expanding universes. GE credit: SE. Effective: 2007 Fall Quarter.

PHY 156—Introduction to Cosmology (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): PHY 009A; PHY 009B; PHY 009C; PHY 009D; PHY 105A (can be concurrent); or Consent of Instructor. PHY 105A required concurrently. Contemporary knowledge regarding the origin of the universe, including the Big Bang and nucleosynthesis, microwave background radiation, formation of cosmic structure, cosmic inflation, cosmic acceleration and dark energy. Not open to students who have completed PHY 126. GE credit: SE. Effective: 2007 Fall Quarter.

PHY 157—Astronomy Instrumentation and Data Analysis Laboratory (4)
Laboratory—8 hours. Prerequisite(s): PHY 104A; PHY 105A; PHY 110A; PHY 115A (can be concurrent); PHY 110B (can be concurrent); and Consent of Instructor. Registration by Permission to Add (PTA) number only; priority given to graduating PHY astrophysics emphasis seniors. Experimental techniques, data acquisition and analysis involving laboratory astrophysics plus stellar, nebular and galaxy digital imaging, photometry and/or spectroscopy. Students perform three experiments. Individual work stressed. Minimum 10-15 page journal style articles of two experiments are required. GE credit: SE, WE. Effective: 2018 Winter Quarter.

PHY 160—Environmental Physics and Society (3)
Lecture—3 hours. Prerequisite(s): (PHY 009D or PHY 007C); (PHY 010 or PHY 001B); MAT 016B; Or the equivalent. Impact of humankind on the environment will be discussed from the point of view of the physical sciences. Calculations based on physical principles will be made, and the resulting policy implications will be considered. (Engineering 160.) GE credit: SE, SL. Effective: 1997 Winter Quarter.

PHY 185—Alumni Seminar Series (1)
Seminar—1 hour. Weekly guest speakers (usually a physics alumnus or alumna) tell students about their careers. Speakers use their experience to give students valuable perspectives on life after a degree in physics. May be repeated up to 2 time(s). (P/NP grading only.) GE credit: SE. Effective: 2013 Fall Quarter.

PHY 190—Careers in Physics (1)
Seminar—2 hours. Restricted to Physics and Applied Physics majors only. Overview of important research areas in physics, discussions of research opportunities and internships, strategies for graduate school and industrial careers, the fellowship and assistantship selection process, preparation of resumes, personal statements, and letters of recommendation. (P/NP grading only.) GE credit: SE. Effective: 2007 Fall Quarter.

PHY 194HA—Special Study for Honors Students (4)
Independent Study—12 hours. Prerequisite(s): Consent of Instructor. Open only to Physics and Applied Physics majors who satisfy the College of Letters and Science requirements for entrance into the Honors Program. Independent research project at a level significantly beyond that defined by the normal physics curriculum. GE credit: SE. Effective: 1997 Winter Quarter.

PHY 194HB—Special Study for Honors Students (4)
Independent Study—12 hours. Prerequisite(s): Consent of Instructor. Open only to Physics and Applied Physics majors who satisfy the College of Letters and Science requirements for entrance into the Honors Program. Independent research project at a level significantly beyond that defined by the normal physics curriculum. GE credit: SE. Effective: 1997 Winter Quarter.

PHY 195—Senior Thesis (5)
Independent Study—15 hours. Prerequisite(s): Consent of Instructor. Open only to Physics and Applied Physics majors with senior standing. Preparation of a senior thesis on a topic selected by the student with approval of the department. May be repeated for a total of 15 units. May be repeated up to 15 unit(s). GE credit: SE. Effective: 1997 Winter Quarter.

PHY 197T—Tutoring in Physics and Astronomy (1-5)
Tutorial. Tutoring of students in lower division courses. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. Weekly meeting with instructor (P/NP grading only.) GE credit: SE. Effective: 2004 Spring Quarter.

PHY 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

PHY 199—Special Study for Advanced Undergraduates (1-5)
Variable. June 2012: GE2 Topical Breadth updated per Davis Division of the Academic Senate May 18th announcement of an administrative correction "To allow Topical Breadth designations of GE3 to apply to GE2." (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

PHY 200A—Theory of Mechanics and Electromagnetics (4)
Independent Study—1 hour; Lecture—3 hours. Prerequisite(s): PHY 204A (can be concurrent); PHY 104B; PHY 105B; PHY 110C; Or equivalent to PHY 110C; PHY 204A required concurrently. Theoretical approaches in classical mechanics including the use of generalized coordinates and virtual work; variational calculus; Lagrange equations; symmetries, conservation laws, and Noether theorem; Lagrangian density; Hamilton formalism; canonical transformations; Poisson brackets; and Hamilton-Jacobi equations. Effective: 1997 Winter Quarter.

PHY 200B—Theory of Mechnics and Electromagnetics (4)
Independent Study—1 hour; Lecture—3 hours. Prerequisite(s): PHY 200A; PHY 204B (can be concurrent); PHY 204B concurrently. Theoretical approaches in electromagnetics including static electromagnetic fields; Maxwell's equations; plane waves in various media; magnetohydrodynamics; diffraction theory; radiating systems; and special relativity. Effective: 1997 Winter Quarter.

PHY 200C—Theory of Mechanics and Electromagnetics (4)
Independent Study—1 hour; Lecture—3 hours. Prerequisite(s): PHY 200A; PHY 204B (can be concurrent); PHY 204B concurrently. Theoretical approaches in electromagnetics including static electromagnetic fields; Maxwell's equations; plane waves in various media; magnetohydrodynamics; diffraction theory; radiating systems; and special relativity. Effective: 1997 Winter Quarter.

PHY 204A—Methods of Mathematical Physics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): PHY 104A; Or the equivalent. Linear vector spaces, operators and their spectral analysis, complete sets of functions, complex variables, functional analysis, Greens functions, calculus of variations, introduction to numerical analysis. Effective: 2016 Spring Quarter.

PHY 204B—Methods of Mathematical Physics (4)
Independent Study—1 hour; Lecture—3 hours. Prerequisite(s): PHY 104A; PHY 104B; Or the equivalent. Linear vector spaces, operators and their spectral analysis, complete sets of functions, complex variables, functional analysis, Green's functions, calculus of variations, introduction to numerical analysis. Effective: 1997 Winter Quarter.

PHY 210—Computational Physics (3)
Lecture—3 hours. Prerequisite(s): Knowledge of Fortran or C. Analytic techniques to solve differential equations and eignevalue problems. Physics content of course will be self-contained, and adjusted according to background of students. Effective: 1999 Spring Quarter.

PHY 215A—Quantum Mechanics (4)
Independent Study—1 hour; Lecture—3 hours. Prerequisite(s): PHY 115B; Or the equivalent. Formal development and interpretation of non-relativistic quantum mechanics; its application to atomic, nuclear, molecular, and solid-state problems; brief introduction to relativistic quantum mechanics and the Dirac equation. Effective: 1997 Winter Quarter.

PHY 215B—Quantum Mechanics (4)
Independent Study—1 hour; Lecture—3 hours. Prerequisite(s): PHY 115B; Or the equivalent. Formal development and interpretation of non-relativistic quantum mechanics; its application to atomic, nuclear, molecular, and solid-state problems; brief introduction to relativistic quantum mechanics and the Dirac equation. Effective: 1997 Winter Quarter.

PHY 215C—Quantum Mechanics (4)
Independent Study—1 hour; Lecture—3 hours. Prerequisite(s): PHY 115B; Or the equivalent. Formal development and interpretation of non-relativistic quantum mechanics; its application to atomic, nuclear, molecular, and solid-state problems; brief introduction to relativistic quantum mechanics and the Dirac equation. Effective: 1997 Winter Quarter.

PHY 219A—Statistical Mechanics (4)
Extensive Problem Solving—1 hour; Lecture—3 hours. Prerequisite(s): PHY 215B; Or equivalent. Foundations of thermodynamics and classical and quantum statistical mechanics with simple applications to properties of solids, real gases, nuclear matter, etc. and a brief introduction to phase transitions. Effective: 2002 Winter Quarter.

PHY 219B—Statistical Mechanics (4)
Extensive Problem Solving—1 hour; Lecture—3 hours. Prerequisite(s): PHY 219A Further applications of thermodynamics and classical and quantum statistical mechanics. The modern theory of fluctuations about the equilibrium state, phase transitions and critical phenomena. Effective: 2002 Winter Quarter.

PHY 223A—Group Theoretical Methods of Physics-Condensed Matter (3)
Lecture—3 hours. Prerequisite(s): PHY 215A; PHY 215B; PHY 215C (can be concurrent); or Consent of Instructor. PHY 215C required concurrently. Theory of groups and their representations with applications in condensed matter. Effective: 1997 Winter Quarter.

PHY 223B—Group Theoretical Methods of Physics-Elementary Particles (3)
Lecture—3 hours. Prerequisite(s): PHY 215A; PHY 215B; PHY 215C (can be concurrent); or Consent of Instructor. PHY 215C required concurrently. Theory of groups and their representations with applications in elementary particle physics. Effective: 1997 Winter Quarter.

PHY 224A—Nuclear Physics (3)
Lecture—3 hours. Prerequisite(s): PHY 215B Comprehensive study of the nucleon-nucleon interaction including the deuteron, nucleon-nucleon scattering, polarization, determination of real parameters of Smatrix, and related topics. Effective: 1997 Winter Quarter.

PHY 224B—Nuclear Physics (3)
Lecture—3 hours. Prerequisite(s): PHY 224A Study of nuclear models, including shell model, collective model, unified model. Energy level spectra, static momenta, and electromagnetic transition rates. Effective: 1997 Winter Quarter.

PHY 224C—Nuclear Physics (3)
Lecture—3 hours. Prerequisite(s): PHY 224B Study of nuclear scattering and reactions including the optical model and direct interactions. Beta decay and an introduction to weak interactions. Effective: 1997 Winter Quarter.

PHY 229A—Advanced Nuclear Theory (3)
Lecture—3 hours. Prerequisite(s): PHY 224C Advanced topics in nuclear theory; theory of quantum-mechanical scattering processes. Exact formal theory and models for two-body scattering. Effective: 1997 Winter Quarter.

PHY 229B—Advanced Nuclear Theory (3)
Lecture—3 hours. Prerequisite(s): PHY 229A Advanced topics in nuclear theory; theory of quantum-mechanical scattering processes. Exact formal theory and models for three-body scattering. Effective: 1997 Winter Quarter.

PHY 230A—Quantum Theory of Fields (3)
Lecture—3 hours. Prerequisite(s): PHY 215C Relativistic quantum mechanics of particles; techniques and applications of second quantization; Feynman diagrams; renormalization. Effective: 1997 Winter Quarter.

PHY 230B—Quantum Theory of Fields (3)
Lecture—3 hours. Prerequisite(s): PHY 230A Continuation of 230A, with selected advanced topics, such as S-matrix theory, dispersion relations, axiomatic formulations. Effective: 1997 Winter Quarter.

PHY 230C—Quantum Theory of Fields (3)
Lecture—3 hours. Prerequisite(s): PHY 230A; PHY 230B; or Consent of Instructor. Renormalization theory and applications, including dimensional regularization, Ward identities, renormalization group equations, coupling constant unification, and precision electroweak calculations. May be repeated for credit with consent of instructor. Effective: 2007 Winter Quarter.

PHY 240A— Condensed Matter Physics A (3)
Lecture—3 hours. Prerequisite(s): PHY 215C; PHY 219A; PHY 140A and PHY 140B or equivalent recommended. Topics in condensed matter physics: Crystal structure; one-electron theory; transport and optical properties of semiconductors; phonons, electron-phonon scattering. Effective: 2007 Fall Quarter.

PHY 240B—Condensed Matter Physics B (3)
Lecture—3 hours. Prerequisite(s): PHY 240A Topics in condensed matter physics: transport and optical properties of metals and quantum structures; experimental measurement the Fermi surface and of phonon spectra. Effective: 2008 Spring Quarter.

PHY 240C—Condensed Matter Physics (3)
Lecture—3 hours. Prerequisite(s): PHY 240A; PHY 240B Review of second quantization. Interacting electron gas, electron-phonon interaction and effects, including instabilities of electronic systems. Topics in the theory of superconductivity and magnetism. Effective: 2005 Spring Quarter.

PHY 241—Advanced Topics in Magnetism (3)
Lecture—3 hours. Prerequisite(s): PHY 240A; PHY 240B; PHY 240C; PHY 240D; or Consent of Instructor. Topics chosen from areas of current research interest. Effective: 1997 Winter Quarter.

PHY 242—Advanced Topics in Superconductivity (3)
Lecture—3 hours. Prerequisite(s): PHY 240A; PHY 240B; PHY 240C; PHY 240D; or Consent of Instructor. Topics chosen from areas of current research interest. Effective: 1997 Winter Quarter.

PHY 243A—Surface Physics of Materials (3)
Lecture—3 hours. Prerequisite(s): PHY 140A; PHY 140B; PHY 115A; PHY 115B; Or the equivalent to any; PHY 215A, PHY 240A, or the equivalents recommended. Experimental and theoretical fundamentals of surface and interface physics and chemistry, including electronic and magnetic structure, thermodynamics, adsorption kinetics, epitaxial growth, and a discussion of various spectroscopic and structural probes based on photons, electrons, ions, and scanning probes. Effective: 1999 Winter Quarter.

PHY 243B—Surface Physics of Materials (3)
Lecture—3 hours. Prerequisite(s): PHY 140A; PHY 140B; PHY 115A; PHY 115B; Or the equivalent to any; PHY 215A, PHY 240A, or the equivalents recommended. Experimental and theoretical fundamentals of surface and interface physics and chemistry, including electronic and magnetic structure, thermodynamics, adsorption kinetics, epitaxial growth, and a discussion of various spectroscopic and structural probes based on photons, electrons, ions, and scanning probes. Effective: 1999 Winter Quarter.

PHY 243C—Surface Physics of Materials (3)
Lecture—3 hours. Prerequisite(s): PHY 140A; PHY 140B; PHY 115A; PHY 115B; Or the equivalent to any; PHY 215A, PHY 240A, or equivalents recommended. Experimental and theoretical fundamentals of surface and interface physics and chemistry, including electronic and magnetic structure, thermodynamics, adsorption kinetics, epitaxial growth, and a discussion of various spectroscopic and structural probes based on photons, electrons, ions, and scanning probes. Effective: 2000 Spring Quarter.

PHY 245A—High-Energy Physics (3)
Lecture—3 hours. Prerequisite(s): PHY 230A Phenomenology and systematics of strong, electromagnetic, and weak interactions of hadrons and leptons; determination of quantum numbers; quarks and quarkonia; deep inelastic scattering; the quark parton model; experiments at hadron colliders and electron-positron colliders. Effective: 1997 Winter Quarter.

PHY 245B—High-Energy Physics (3)
Lecture—3 hours. Prerequisite(s): PHY 245A Electroweak interactions; phenomenology of the Standard Model of SU(2)LxU(1); weak interaction experiments; properties of and experiments with W and Z vector bosons; Glashow-Weinberg-Salam model and the Higgs boson; introduction to supersymmetry and other speculations. Effective: 1997 Winter Quarter.

PHY 245C—Collider Physics (3)
Lecture—3 hours. Prerequisite(s): PHY 245A; PHY 252B (can be concurrent); or Consent of Instructor. PHY 252B taken previously or concurrently. Collider physics. Topics include quark and gluon distribution functions and the computation of cross sections; Large Hadron Collider and International Linear Collider phenomenology; collider and detector characteristics; extracting models from data; software tools for analyzing experimental data. May be repeated for credit with consent of instructor. Effective: 2008 Spring Quarter.

PHY 246—Supersymmetry: Theory and Phenomenology (3)
Lecture—3 hours. Prerequisite(s): PHY 230A, PHY 230B, PHY 245A, PHY 245B recommended, or consent of instructor. Construction of supersymmetric models of particle physics; superfields; supersymmetry breaking the minimal supersymmetric standard model; supergravity. Collider phenomenology of supersymmetry. Dark matter phenomenology. Effective: 1998 Spring Quarter.

PHY 246A—Supersymmetry: Theory and Phenomenology (3)
Lecture—3 hours. Prerequisite(s): PHY 230A; PHY 230B; PHY 245A, PHY 245B recommended or consent of instructor. Construction of supersymmetric models of particle physics; superfields; supersymmetry breaking the minimal supersymmetric standard model; supergravity. Collider phenomenology of supersymmetry. Dark matter phenomenology. Not offered every year. Effective: 2008 Spring Quarter.

PHY 246B—Advanced Supersymmetry (3)
Lecture—3 hours. Prerequisite(s): PHY 246A Advanced topics in supersymmetry. Topics include holomorphy, the Affleck-Dine-Seiberg superpotential, Seiberg duality for SUSY QCD, dynamical SUSY breaking, Seiberg-Witten theory, superconformal field theories, supergravity, anomaly and gaugino mediation, and the AdS/CFT correspondence. Effective: 2007 Fall Quarter.

PHY 250—Special Topics in Physics (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Topic varies. May be repeated for credit. Effective: 1997 Fall Quarter.

PHY 252A—Techniques of Experimental Physics (3)
Lecture—3 hours. Introduction to techniques and methods of designing and executing experiments. Problems and examples from condensed matter research will be utilized. Effective: 1997 Winter Quarter.

PHY 252B—Techniques of Experimental Physics (3)
Lecture—3 hours. Introduction to techniques and methods of designing and executing experiments. Problems and examples from nuclear and particle research will be utilized. Effective: 1997 Winter Quarter.

PHY 252C—Statistics and Data Analysis for Particle Physics (3)
Lecture—3 hours. Introduction to statistical data analysis methods in particle physics. Theoretical lectures combined with practical computer laboratory work. Effective: 2007 Spring Quarter.

PHY 253—Signals and Noise in Physics (3)
Lecture—3 hours. Techniques for extracting signals from noise, systematic error. Effective: 2007 Winter Quarter.

PHY 256A—Physics of Information (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Advanced undergraduate or introductory graduate differential equations, applied linear algebra, and probability theory; e.g., Mathematics 119A/B or 207A, 167 or 226A, and 135A/B or 235A, respectively; or in Physics 104A/C or 204A/B. Class size limited to 30 students. Nonlinear dynamics, deterministic chaos, bifurcations, pattern formation, symbolic dynamics, measurement theory, stochastic processes, elementary information theory, information in complex systems, computational laboratory. Effective: 2017 Spring Quarter.

PHY 256B—Physics of Computation (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): PHY 256A; Consent of Instructor. Advanced undergraduate or introductory graduate differential equations, applied linear algebra, and probability theory; e.g., Mathematics 119A/B or 207A, 167 or 226A, and 135A/B or 235A, respectively; or in Physics 104A/C or 204A/B. Class size limited to 30 students. Structural complexity, computational mechanics, information measures, causal inference, applications to complex materials, quantum dynamics, and nonequilibrium thermodynamics, computational laboratory. Effective: 2017 Spring Quarter.

PHY 260—Introduction to General Relativity (3)
Lecture—3 hours. Prerequisite(s): PHY 200A; PHY 200B An introduction to general relativity. Differential geometry and curved spacetime; the Einstein field equations; gravitational fields of stars and black holes; weak fields and gravitational radiation; experimental tests; Big Bang cosmology. Effective: 1999 Spring Quarter.

PHY 262—Early Universe Cosmology (3)
Lecture—3 hours. Prerequisite(s): Second year standing in Physics Graduate Program or consent of instructor. Introduction to early universe cosmology: the Big Bang, inflation, primordial nucleosynthesis, dark matter, dark energy, and other topics of current interest Effective: 2005 Spring Quarter.

PHY 263—Cosmic Structure Formation (3)
Lecture—3 hours. Prerequisite(s): PHY 260 Growth of structure from small density inhomogeneities in the early universe to the diverse structures observable today. Use of observable properties (cosmic microwave background, gravitational lensing, peculiar velocities, number density, etc.) to constrain models of structure formation and fundamental physics. Effective: 2005 Spring Quarter.

PHY 265—High Energy Astrophysics and Radiative Processes (3)
Lecture—3 hours. Prerequisite(s): Graduate standing in Physics or consent of instructor. Survey course covering galactic and extragalactic X-ray and gamma-ray astronomy, radiative processes, and techniques of high-energy astrophysics. Effective: 2004 Fall Quarter.

PHY 266—Data Analysis for Astrophysics (3)
Lecture—3 hours. Prerequisite(s): Graduate standing in Physics or consent of instructor. Survey course covering measurement and signal analysis techniques for astrophysics and cosmology throughout the electromagnetic spectrum. Effective: 2005 Winter Quarter.

PHY 267—Observational Extragalactic Astronomy & Cosmology (3)
Lecture—3 hours. Prerequisite(s): Graduate standing in Physics or consent of instructor. Survey course covering current areas of research on extragalactic objects, their physical properties, origin, evolution, and distribution in space. Effective: 2005 Spring Quarter.

PHY 270—Current Topics in Physics Research (3)
Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing in Physics or consent of instructor. Reading and discussion to help physics graduate students develop and maintain familiarity with the current and past literature in their immediate field of research and related areas. May be repeated for credit. (S/U grading only.) Effective: 2013 Fall Quarter.

PHY 285—Careers in Physics (1)
Seminar—1.5 hours. Prerequisite(s): Graduate standing in Physics. Designed to give Physics graduate students an in-depth appreciation of career opportunities with a graduate degree in physics. Professional physicists, mainly from outside academia, will give seminars describing both research and career insights. May be repeated for credit. (S/U grading only.) Effective: 2005 Winter Quarter.

PHY 290—Seminar in Physics (1)
Seminar. Prerequisite(s): Graduate standing in Physics or consent of instructor. Presentation and discussion of topics of current research interest in physics. Topics will vary weekly and will cover a broad spectrum of the active fields of physics research at a level accessible to all physics graduate students. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

PHY 291—Seminar in Nuclear Physics (1)
Seminar—1 hour. Prerequisite(s): Graduate standing in Physics or consent of instructor. Presentation and discussion of topics of current research interest in nuclear physics. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

PHY 292A—Seminar in Elementary Particle Physics (1)
Seminar—1 hour. Prerequisite(s): Graduate standing in Physics or consent of instructor. Presentation and discussion of topics of current research interest in elementary particle physics. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 2008 Fall Quarter.

PHY 292B—High Energy Frontier Initiative And Cosmology Theory Seminar (1)
Seminar—1 hour. Prerequisite(s): Physics graduate students. May be repeated up to 5 time(s). (S/U grading only.) Effective: 2007 Fall Quarter.

PHY 293—Seminar in Condensed Matter Physics (1)
Seminar—1 hour. Prerequisite(s): Graduate standing in Physics or consent of instructor. Presentation and discussion of topics of current research interest in condensed matter physics. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

PHY 294—Seminar in Cosmology (1)
Seminar—1 hour. Prerequisite(s): Graduate standing in Physics or consent of instructor. Presentation and discussion of topics of current research interest in Cosmology. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1999 Winter Quarter.

PHY 295—Introduction to Departmental Research (1)
Seminar—1 hour. Seminar to introduce first- and second-year physics graduate students to the fields of specialty and research of the Physics staff. (S/U grading only.) Effective: 1997 Winter Quarter.

PHY 297—Research on the Teaching and Learning of Physics (3)
Seminar—3 hours. Prerequisite(s): Graduate standing in Physics or consent of instructor. Discussion and analysis of recent research in how students construct understanding of physics and other science concepts and the implications of this research for instruction. Effective: 1997 Winter Quarter.

PHY 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

PHY 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

PHY 371—Teaching in an Active-Engagement Physics Discussion/Lab Setting (1)
Lecture/Discussion—1 hour. Prerequisite(s): PHY 009D; Or equivalent. Open to graduate students only. Analysis of recent research on science/physics teaching and learning and its implications for teaching labs, discussions, and discussion/labs with an emphasis on differences between conventional and active-engagement instructional settings. The appropriate role of the instructor in specific instructional settings. May be repeated up to 2 time(s). Effective: 2008 Summer Session 1.

PHY 390—Methods of Teaching Physics (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing in Physics. Practical experience in methods and problems related to teaching physics laboratories at the university level, including discussion of teaching techniques, analysis of quizzes and laboratory reports and related topics. Required of all Physics Teaching Assistants. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

PHY 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Applied Science Engineering; Engineering

Applied Science Engineering; Engineering | EAD Information

(College of Engineering)

The Department of Applied Science is not accepting new graduate students.

Applied Science Engineering; Engineering | EAD M.S.

(College of Engineering)

The Department of Applied Science is not accepting new graduate students.

Applied Science Engineering; Engineering | EAD Ph.D.

(College of Engineering)

The Department of Applied Science is not accepting new graduate students.

Applied Science Engineering; Engineering | EAD Courses

Courses in EAD:

EAD 230—Topics in Computational Fluid Dynamics (3)
Lecture—3 hours. Prerequisite(s): EAD 210A; EAD 210B; or Consent of Instructor. Hands-on approach to numerical methods for compressible fluid flow.Readings and discussions of solution strategies will be complemented with programming exercises and projects to give first-hand experience with performance and accuracy of several computational methods;from upwind differencing to Godunov methods. Effective: 2000 Fall Quarter.

EAD 289A—Special Topics in Applied Science: Atomic, Molecular, and Optical Physics (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Special topic in Atomic, Molecular, and Optical Physics. May be repeated up to 5 unit(s) per segment when topic differs. Effective: 2008 Fall Quarter.

EAD 289B—Special Topics in Applied Science: Chemical Physics (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Special topic in Chemical Physics. May be repeated up to 5 unit(s) per segment when topic differs. Effective: 2008 Fall Quarter.

EAD 289C—Computational Physics: Computational Physics (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Special topic in Computational Physics. May be repeated up to 5 unit(s) per segment when topic differs. Effective: 2008 Fall Quarter.

EAD 289D—Special Topics in Applied Science: Biophotonics/Biotechnology (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Special topic in Biophotonics/Biotechnology. May be repeated up to 5 unit(s) per segment when topic differs. Effective: 2008 Fall Quarter.

EAD 289E—Special Topics in Applied Science: Materials Science (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Special topic in Materials Science. May be repeated up to 5 unit(s) per segment when topic differs. Effective: 2008 Fall Quarter.

EAD 289F—Special Topics in Applied Science: Imaging Science and Photonics (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Special topic in Imaging Science and Photonics. May be repeated up to 5 unit(s) per segment when topic differs. Effective: 2008 Fall Quarter.

EAD 289G—Special Topics in Applied Science: Nonlinear Optics (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Special topic in Nonlinear Optics. May be repeated up to 5 unit(s) per segment when topic differs. Effective: 2008 Fall Quarter.

EAD 289H—Special Topics in Applied Science: Plasma/Fusion Energy Physics (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Special topic in Plasma/Fusion Energy Physics. May be repeated up to 5 unit(s) per segment when topic differs. Effective: 2008 Fall Quarter.

EAD 289I—Special Topics in Applied Science: Quantum Electronics (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Special topic in Quantum Electronics. May be repeated up to 5 unit(s) per segment when topic differs. Effective: 2008 Fall Quarter.

EAD 289J—Special Topics in Applied Science: Condensed Matter/Statistical Physics (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Special topic in Condensed Matter/Statistical Physics. May be repeated up to 5 unit(s) per segment when topic differs. Effective: 2008 Fall Quarter.

EAD 289K—Special Topics in Applied Science: Classical Optics (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Special topic in Classical Optics. May be repeated up to 5 unit(s) per segment when topic differs. Effective: 2008 Fall Quarter.

EAD 289L—Special Topics in Applied Science: Microwave and Millimeter-Wave Technology (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Special topic in Microwave and Millimeter-Wave Technology. May be repeated up to 5 unit(s) per segment when topic differs. Effective: 2008 Fall Quarter.

EAD 289M—Special Topics in Applied Science: Synchrotron Radiation Science (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Special topic in Synchrotron Radiation Science. May be repeated up to 5 unit(s) per segment when topic differs. Effective: 2008 Fall Quarter.

EAD 289N—Special Topics in Applied Science: Space Physics (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Special topic in Space Physics. May be repeated up to 5 unit(s) per segment when topic differs. Effective: 2008 Fall Quarter.

EAD 290—Seminar (1-2)
Seminar—1-2 hours. (S/U grading only.) Effective: 1997 Winter Quarter.

EAD 290C—Graduate Research Group Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

EAD 298—Group Study (1-5)
Lecture—3-15 hours. (S/U grading only.) Effective: 1997 Winter Quarter.

EAD 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

Applied Science Engineering; Engineering | BPT Courses

Courses in BPT:

BPT 201—Current Topics in Biophotonics and Bioimaging Research (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Designed to help graduate students develop and maintain familiarity with the current and past literature in the field of Biophotonics and Bioimaging research and related areas. May be repeated up to 4 time(s) when subject differs. Effective: 2016 Fall Quarter.

Arab Studies Minor; Middle East/South Asia Studies

(College of Letters and Science)

Smriti Srinivas, Ph.D., Program Director

Program Office. 155 Kerr Hall; 530-754-4926; http://mesa.ucdavis.edu

Faculty. http://mesa.ucdavis.edu/directory-of-people/affiliated-faculty

The minor in Arab Studies covers an area of utmost historical, cultural, economic and geopolitical significance. Several key contemporary issues make the region as a whole a focus of interest for scholarly study. The Arab Studies minor is an interdisciplinary minor open to undergraduates in all four colleges.

Minor Advisor. Consult the Middle East/South Asia Studies Program in 155 Kerr Hall 530-754-4926 or the Middle East/South Asia Studies website at http://mesa.ucdavis.edu.

Arab Studies **Units:** 20-24

MSA 100	Middle East and South Asia: Comparative Perspectives	4
MSA 180	Topics in Middle East and South Asian Studies	4

Choose one:

HIS 193A	History of the Modern Middle East, 1750-1914	4
HIS 193B	History of the Modern Middle East, From 1914	4

Choose one:

MSA 181C	Topics in Regional ME/SA Studies: Arab Studies	4
MSA 182C	Undergraduate Proseminar in Middle East/South Asia: Arab Studies Seminar	4

Choose additional electives from the Core Course list:

Core Course List:

MSA 111A	Great Cities of Arab Middle East and South Asia	4
MSA 121A	Shahnameh: The Persian Book of Kings	4
OR		
ARB 140	A Story for a Life: The Arabian Nights	4
MSA 122A	Themes in the Arabic Novel	4
MSA 150	Women and Islamic Discourses	4
OR		
WMS 185	Women and Islamic Discourses	4
MSA 181C	Topics in Regional ME/SA Studies: Arab Studies	4
MSA 182C	Undergraduate Proseminar in Middle East/South Asia: Arab Studies Seminar	4
ANT 142	Peoples of the Middle East	4
ARB 001	Elementary Arabic 1	5
OR		
ARB 001A	Accelerated Intensive Elementary Arabic	15
ARB 002	Elementary Arabic 2	5
ARB 003	Elementary Arabic 3	5
ARB 021	Intermediate Arabic 21	4
ARB 022	Intermediate Arabic 22	4
ARB 023	Intermediate Arabic 23	4
ARB 121	Advanced Arabic	4
ARB 122	Advanced Arabic	4
ARB 123	Advanced Arabic	4
ARB 198	Directed Group Study	1-5
AHI 155	The Islamic City	4
COM 053C	Literatures of the Islamic World	4
COM 155	Classical Literatures of the Islamic World 600-1900	4
COM 166	Literatures of the Modern Middle East	4
HIS 006	Introduction to the Middle East	4
HIS 102R	Undergraduate Proseminar in History; Muslim Societies	5
HIS 112C	History of Jews in the Muslim World	4
HIS 115F	History of Modern North Africa, 1800 to the Present	4
HIS 190A	Middle Eastern History I: The Rise of Islam, 600-1000	4
HIS 190B	Middle Eastern History II: The Age of the Crusades, 1001-1400	4
HIS 190C	Middle Eastern History III: The Ottomans, 1401-1730	4
HIS 193A	History of the Modern Middle East, 1750-1914	4
HIS 193B	History of the Modern Middle East, From 1914	4
POL 135	International Politics of the Middle East	4
POL 136	The Arab-Israeli Conflict	4

RST 060	Introduction to Islam	4
RST 065C	The Qur'an and Its Interpretation	4
RST 160	Introduction to Islamic Thought	4
RST 161	Modern Islam	4
RST 162	Introduction to Islamic Law	4
RST 163	Social Life of Islam	4
RST 167	Iraq	4
WMS 178A	Women Writers and the Transnational Imaginary; The Arab World	4
WMS 184	Gender in the Arab World	4

With prior consultation with an advisor, students can petition in advance the Program Committee to accept:

Other elective courses toward the minor program if the content is 50% or more on the Arab World. Under no circumstances may more than one lower division course be offered in satisfaction of requirements for the minor.

More than four units of Middle East/South Asia 181C and/or Middle East/South Asia 182C towards the minor program.

Total: 20-24

Arab Studies Minor; Middle East/South Asia Studies | Arab Studies Minor Information

(College of Letters and Science)

Smriti Srinivas, Ph.D., Program Director

Program Office. 155 Kerr Hall; 530-754-4926; http://mesa.ucdavis.edu

Faculty. http://mesa.ucdavis.edu/directory-of-people/affiliated-faculty

The minor in Arab Studies covers an area of utmost historical, cultural, economic and geopolitical significance. Several key contemporary issues make the region as a whole a focus of interest for scholarly study. The Arab Studies minor is an interdisciplinary minor open to undergraduates in all four colleges.

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Arab Studies **Units:** 20-24

MSA 100	Middle East and South Asia: Comparative Perspectives	4
MSA 180	Topics in Middle East and South Asian Studies	4

Choose one:

HIS 193A	History of the Modern Middle East, 1750-1914	4
HIS 193B	History of the Modern Middle East, From 1914	4

Choose one:

MSA 181C	Topics in Regional ME/SA Studies: Arab Studies	4
MSA 182C	Undergraduate Proseminar in Middle East/South Asia: Arab Studies Seminar	4

Choose additional electives from the Core Course list:

Core Course List:

MSA 111A	Great Cities of Arab Middle East and South Asia	4

MSA 121A	Shahnameh: The Persian Book of Kings	4
OR		
ARB 140	A Story for a Life: The Arabian Nights	4
MSA 122A	Themes in the Arabic Novel	4
MSA 150	Women and Islamic Discourses	4
OR		
WMS 185	Women and Islamic Discourses	4
MSA 181C	Topics in Regional ME/SA Studies: Arab Studies	4
MSA 182C	Undergraduate Proseminar in Middle East/South Asia: Arab Studies Seminar	4
ANT 142	Peoples of the Middle East	4
ARB 001	Elementary Arabic 1	5
OR		
ARB 001A	Accelerated Intensive Elementary Arabic	15
ARB 002	Elementary Arabic 2	5
ARB 003	Elementary Arabic 3	5
ARB 021	Intermediate Arabic 21	4
ARB 022	Intermediate Arabic 22	4
ARB 023	Intermediate Arabic 23	4
ARB 121	Advanced Arabic	4
ARB 122	Advanced Arabic	4
ARB 123	Advanced Arabic	4
ARB 198	Directed Group Study	1-5
AHI 155	The Islamic City	4
COM 053C	Literatures of the Islamic World	4
COM 155	Classical Literatures of the Islamic World 600-1900	4
COM 166	Literatures of the Modern Middle East	4
HIS 006	Introduction to the Middle East	4
HIS 102R	Undergraduate Proseminar in History; Muslim Societies	5
HIS 112C	History of Jews in the Muslim World	4
HIS 115F	History of Modern North Africa, 1800 to the Present	4
HIS 190A	Middle Eastern History I: The Rise of Islam, 600-1000	4
HIS 190B	Middle Eastern History II: The Age of the Crusades, 1001-1400	4
HIS 190C	Middle Eastern History III: The Ottomans, 1401-1730	4
HIS 193A	History of the Modern Middle East, 1750-1914	4
HIS 193B	History of the Modern Middle East, From 1914	4
POL 135	International Politics of the Middle East	4
POL 136	The Arab-Israeli Conflict	4
RST 060	Introduction to Islam	4
RST 065C	The Qur'an and Its Interpretation	4
RST 160	Introduction to Islamic Thought	4
RST 161	Modern Islam	4
RST 162	Introduction to Islamic Law	4
RST 163	Social Life of Islam	4
RST 167	Iraq	4
WMS 178A	Women Writers and the Transnational Imaginary; The Arab World	4
WMS 184	Gender in the Arab World	4

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More than four units of Middle East/South Asia 181C and/or Middle East/South Asia 182C towards the minor program.

Total: 20-24

Arab Studies Minor; Middle East/South Asia Studies | MSA Courses

Courses in MSA:

MSA 092—ME/SA 92. Internship in Middle East/South Asia Studies (3-15)
Internship. Prerequisite(s): Consent of Instructor. Work experience on and off campus in all subject areas offered as part of the ME/SA Studies program. Internship supervised by a member of the ME/SA faculty. May be repeated up to 15 unit(s). (P/NP grading only.) Effective: 2007 Fall Quarter.

MSA 098—Directed Group Study (1-5)
Variable—3-15 hours. May be repeated for credit. (P/NP grading only.) Effective: 2006 Fall Quarter.

MSA 099—Special Study for Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2006 Fall Quarter.

MSA 100—Middle East and South Asia: Comparative Perspectives (4)
Extensive Writing; Lecture—3 hours. Ethnographic and historical points of intersection and divergence in various aspects of the Middle East and South Asia in precolonial, colonial, and postcolonial societies. Anthropological, historical, and theoretical debates surrounding the region. GE credit: AH, SS, WC, WE. Effective: 2004 Summer Session 1.

MSA 111A—Great Cities of Arab Middle East and South Asia (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Some knowledge of Islamic/Middle Eastern history is very useful. In-depth examination of the great cities of North Africa, the Middle East and South Asia as cultural and historical artifacts. Topics include: the concept of the Islamic city, processes of modernity, and representations that reinforce imagination, memory and personal identity. GE credit: AH, SS, WC, WE. Effective: 2013 Fall Quarter.

MSA 112—History of South Asian Islam (4)
Discussion—1 hour; Lecture—3 hours. Comparative study of Muslim communities of South Asia. Commonalities in cultural identity and historical experience. Rise and spread of Islam, comparative history of Islamic Empires, colonial rule, and post-colonial nationalism. Effective: 2007 Fall Quarter.

MSA 121A—Shahnameh: The Persian Book of Kings (4)
Lecture/Discussion—3 hours; Term Paper. In-depth analysis of the Persian Book of Kings (Shahnameh) by Abu al-Qasim Ferdowsi (d. 1020 CE) in its historical context with a comparative perspective on the role of this work in Persian and world literature. (Comparative Literature 175.) GE credit: AH, WC, WE. Effective: 2015 Winter Quarter.

MSA 121C—A Story for a Life: The Arabian Nights (4)
Lecture/Discussion—3 hours; Term Paper. In-depth exploration of The Arabian Nights, the best-known work of pre-modern Arabic literature and a major work of world literature. Analysis of the work in its historical context and in comparison to other frame tales in world literature. (Comparative Literature 172 and Arabic 140.) GE credit: AH, WC, WE. Effective: 2016 Winter Quarter.

MSA 122A—Themes in the Arabic Novel (4)
Extensive Writing; Independent Study; Lecture/Discussion—3 hours. Class size limited to 30 students. Select modern Arabic fiction (novels and short stories) in translation. Thematically connected readings supplemented by non-fictional writings when appropriate. May be repeated up to 2 time(s) if the texts/theme of required course readings sufficiently change. GE credit: AH, OL, WC, WE. Effective: 2013 Fall Quarter.

MSA 131A—Modern Iranian Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): Upper division standing, or consent of instructor. Iranian cinema of the 20th century in the context of profound cultural and social changes in Iran especially since the Iranian Revolution. Productions by representative directors such as Kiarostami, Makhmalbaf, Bahram Beizaie are included. Knowledge of Persian not required. (Cinema & Technocultural Studies 146A.) GE credit: AH, OL, VL, WC, WE. Effective: 2013 Fall Quarter.

MSA 131B—Modern South Asia Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): Upper-division standing or consent of instructor. South Asian cinema of last 100 years in the context of cultural, social, and political changes. South Asian history, Independence, Partition, urban life, class, migration, postcolonial identity, diaspora, gender, sexuality, religion, sport, performance, etc (CTS146B/ANT147) GE credit: AH, SS, VL, WC, WE. Effective: 2017 Winter Quarter.

MSA 131C—Religion and Media in Arab World (4)
Lecture—4 hours. Exploration of the role and experience of media technologies in the Arab world. Study of digital and electronic media as well as alternative media practices. Investigation of new trends in political activism and identity formation. (Religious Studies 166.) GE credit: OL, SS, VL, WC, WE. Effective: 2014 Fall Quarter.

MSA 131D—Modern Turkish Cinema (4)
Film Viewing—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): Upper-division standing or consent of instructor. Turkish cinema of the 20th & 21st century in the context of cultural, social, & political changes. Issues covered include history, nationalism, political dissent, identity, migration, diaspora, gender, sexuality, religion, and incorporate viewpoints of Kurdish & other minority members. (CTS 146D and HIS 193E) GE credit: AH, OL, SS, VL, WC, WE. Effective: 2016 Winter Quarter.

MSA 150—Women and Islamic Discourses (4)
Lecture/Discussion—4 hours. Prerequisite(s): WMS 050; Or comparable course. Introduction to the debates/discourses about women and Islam. Transformations in debates/discourses in colonial and postcolonial periods in the Middle East & South Asia. Comparative study of debates/discourses on family, work, law, sexuality, religion, comportment, human rights, feminist and religious movements. (Women's Studies 185.) GE credit: AH, SS, WC. Effective: 2008 Fall Quarter.

MSA 151A—Iranian Society & Culture (4)
Discussion—1 hour; Lecture—2 hours; Term Paper. In-depth investigation of modern Iranian society and culture. Exploration of structures of Iranian society: family, gender, religion, minorities, economy, politics, and state. Iran’s role in the globalizing world, and the role of Iranian diasporas. GE credit: AH, OL, VL, WC, WE. Effective: 2013 Spring Quarter.

MSA 180—Topics in Middle East and South Asian Studies (4)
Extensive Writing; Lecture—3 hours. Comparative perspective on the Middle East and South Asia. Topics may include: modernity, religious traditions, colonialism, subalternity and social movements, gender and sexuality, history and memory, science and development, ritual and performance, public culture, diasporas. May be repeated up to 1 time(s) topic varies. GE credit: AH, SS, WC, WE. Effective: 2004 Fall Quarter.

MSA 181A—Topics in Regional ME/SA Studies (4)
Lecture—3 hours; Term Paper. Iran & Persian topics for students specializing in region-specific Middle East and South Asia Studies. May be repeated up to 3 time(s). GE credit: AH, SS, WC, WE. Effective: 2015 Winter Quarter.

MSA 181B—Topics in Regional ME/SA Studies (4)
Lecture—3 hours; Term Paper. Indian/South Asia topics for students specializing in region-specific Middle East and South Asia Studies. May be repeated up to 3 time(s). GE credit: AH, SS, WC, WE. Effective: 2013 Fall Quarter.

MSA 181C—Topics in Regional ME/SA Studies: Arab Studies (4)
Lecture—3 hours; Term Paper. Arab Studies topics. May be repeated up to 3 time(s) when different topics and themes are studied. GE credit: AH, SS. Effective: 2013 Fall Quarter.

MSA 182A—Undergraduate Proseminar in Middle East/South Asia (4)
Seminar—3 hours; Term Paper. Prerequisite(s): MSA 100 recommended. Class size limited to 15 students. Seminar in Iran & Persian topics specializing in region-specific Middle East and South Asia studies. May be repeated up to 3 time(s). Effective: 2015 Winter Quarter.

MSA 182B—Undergraduate Proseminar in Middle East/South Asia (4)
Seminar—3 hours; Term Paper. Prerequisite(s): MSA 100 recommended. Class size limited to 15 students. Seminar in India/South Asia topics specializing in region-specific Middle East and South Asia studies. May be repeated up to 3 time(s) when different topics and themes are studied. Effective: 2012 Fall Quarter.

MSA 182C—Undergraduate Proseminar in Middle East/South Asia: Arab Studies Seminar (4)
Seminar—3 hours; Term Paper. Prerequisite(s): MSA 100 recommended. Class size limited to 15 students. Seminar in Arab Studies topics. May be repeated up to 3 time(s). GE credit: WE. Effective: 2013 Fall Quarter.

MSA 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Supervised internship on and off campus in the area of Middle East and South Asia Studies. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2018 Spring Quarter.

MSA 194H—Special Study for Honors Students (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Open only to majors of senior standing who qualify for honors program. Independent study of a problem in Middle East/South Asian studies involving the writing of an honors thesis. May be repeated up to 12 unit(s). Effective: 2009 Winter Quarter.

MSA 198—Directed Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2018 Spring Quarter.

MSA 199—Special Study for Advanced Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2018 Spring Quarter.

Arabic Minor; Classics

Arabic Minor; Classics | Arabic Minor Information

(College of Letters and Science)

Carey Seal, Ph.D., Program Director

Department Office. Classics Program; 216 Sproul Hall; 530-752-1219; http://classics.ucdavis.edu/arabic

Faculty. http://classics.ucdavis.edu/people/arabic

The Department offers minors in Arabic, Classical Civilization, GreekandLatin for those wishing to follow a shorter but formally recognized program of study in Classics.

Arabic **Units:** 20

ARB 121	Advanced Arabic	4

ARB 122	Advanced Arabic	4
ARB 123	Advanced Arabic	4

Choose one upper division course in Arabic language or literature.

Choose one upper division course in Arabic language or literature, or one humanities or social science course:

MSA 111A	Great Cities of Arab Middle East and South Asia	4
MSA 121A	Shahnameh: The Persian Book of Kings	4
OR		
ARB 140	A Story for a Life: The Arabian Nights	4
MSA 122A	Themes in the Arabic Novel	4
MSA 150	Women and Islamic Discourses	4
OR		
WMS 185	Women and Islamic Discourses	4
MSA 181C	Topics in Regional ME/SA Studies: Arab Studies	4
MSA 182C	Undergraduate Proseminar in Middle East/South Asia: Arab Studies Seminar	4
ANT 142	Peoples of the Middle East	4
AHI 155	The Islamic City	4
COM 053C	Literatures of the Islamic World	4
COM 155	Classical Literatures of the Islamic World 600-1900	4
COM 166	Literatures of the Modern Middle East	4
HIS 006	Introduction to the Middle East	4
HIS 102R	Undergraduate Proseminar in History; Muslim Societies	5
HIS 112C	History of Jews in the Muslim World	4
HIS 115F	History of Modern North Africa, 1800 to the Present	4
HIS 190A	Middle Eastern History I: The Rise of Islam, 600-1000	4
HIS 190B	Middle Eastern History II: The Age of the Crusades, 1001-1400	4
HIS 190C	Middle Eastern History III: The Ottomans, 1401-1730	4
HIS 193A	History of the Modern Middle East, 1750-1914	4
HIS 193B	History of the Modern Middle East, From 1914	4
POL 135	International Politics of the Middle East	4
POL 136	The Arab-Israeli Conflict	4
RST 060	Introduction to Islam	4
RST 065C	The Qur'an and Its Interpretation	4
RST 160	Introduction to Islamic Thought	4
RST 161	Modern Islam	4
RST 162	Introduction to Islamic Law	4
RST 163	Social Life of Islam	4
RST 167	Iraq	4
WMS 178A	Women Writers and the Transnational Imaginary; The Arab World	4
WMS 184	Gender in the Arab World	4

Total: 20

Arabic Minor; Classics | ARB Courses

Courses in ARB:

ARB 001—Elementary Arabic 1 (5)
Lecture/Discussion—5 hours. Introduction to basic Arabic. Interactive and integrated presentation of listening, speaking, reading, and writing skills, including the alphabet and basic syntax. Focus on standard Arabic with basic skills in spoken Egyptian and/or one other colloquial dialect. GE credit: AH, WC. Effective: 2014 Fall Quarter.

ARB 001A—Accelerated Intensive Elementary Arabic (15)
Lecture/Discussion—15 hours. Special 12-week accelerated, intensive summer session course that combines the work of courses ARB 1, 2, and 3. Introduction to Modern Standard Arabic through development of all language skills in a cultural context with emphasis on communicative proficiency. Not open for credit to students who have completed ARB 001, ARB 002, or ARB 003. GE credit: AH, WC. Effective: 2014 Summer Special Session.

ARB 002—Elementary Arabic 2 (5)
Lecture/Discussion—5 hours. Prerequisite(s): ARB 001; or Consent of Instructor. Continuation of basic Arabic from course 1. Interactive and integrated presentation of listening, speaking, reading, and writing skills, including syntax. Focus on standard Arabic and limited use of spoken Egyptian and/or one other colloquial dialect. GE credit: AH, WC. Effective: 2016 Spring Quarter.

ARB 003—Elementary Arabic 3 (5)
Lecture/Discussion—5 hours. Prerequisite(s): ARB 002; or Consent of Instructor. Continuation of introduction to basic Arabic from courses 1 and 2. Interactive and integrated presentation of listening, speaking, reading, and writing skills, including syntax. Focus on standard Arabic with limited use of spoken Egyptian and/or one other colloquial dialect. GE credit: AH, WC. Effective: 2016 Spring Quarter.

ARB 021—Intermediate Arabic 21 (4)
Lecture/Discussion—4 hours. Prerequisite(s): ARB 003; or Consent of Instructor. Builds on courses 1, 2, and 3. Interactive and integrated presentation of listening, speaking, reading, and writing skills, including idiomatic expression. Focus on standard Arabic with limited use of Egyptian and/or one other colloquial dialect. GE credit: AH, OL, WC. Effective: 2017 Spring Quarter.

ARB 021A—Accelerated Intensive Intermediate Arabic (15)
Lecture/Discussion—15 hours. Special 12-week accelerated, intensive summer session course that combines the work of courses ARB 21, 22, and 23. Modern Standard Arabic through development of all language skills in a cultural context with emphasis on communicative proficiency. Not open for credit to students who have completed ARB 021, ARB 022, or ARB 023. GE credit: AH, WC. Effective: 2017 Summer Special Session.

ARB 021C—Colloquial Egyptian Arabic (4)
Lecture/Discussion—3 hours; Lecture/Lab—1 hour. Prerequisite(s): ARB 003; or Consent of Instructor. Continuation of the Colloquial Egyptian Arabic covered in the first year of Arabic; courses 1, 2, and 3. May be repeated up to 1 time(s) if instruction material changes. GE credit: AH, OL, WC. Effective: 2017 Spring Quarter.

ARB 021L—Colloquial Levantine Arabic (4)
Lecture/Discussion—4 hours. Prerequisite(s): ARB 003; or Consent of Instructor. Continuation of colloquial Levantine Arabic presented in Arabic 1,2 and 3. Integrated presentation of speaking and listening skills in colloquial Levantine Arabic, with reading and writing in Modern Standard Arabic that is related to Levantine cultural production and social life. GE credit: AH, OL, WC. Effective: 2017 Fall Quarter.

ARB 022—Intermediate Arabic 22 (4)
Lecture/Discussion—4 hours. Prerequisite(s): ARB 021; or Consent of Instructor. Continuation of course 21. Interactive and integrated presentation of listening, speaking, reading, and writing, including idiomatic expression. Focus on standard Arabic with limited use of Egyptian and/or one other colloquial dialect. GE credit: AH, OL, WC. Effective: 2017 Spring Quarter.

ARB 022C—Colloquial Egyptian Arabic (4)
Lecture/Discussion—3 hours; Lecture/Lab—1 hour. Prerequisite(s): ARB 021C; or Consent of Instructor. Continuation of the Colloquial Egyptian Arabic covered in first year of Arabic; courses 1, 2, and 3 and the first quarter of Colloquial Arabic course 21C. May be repeated up to 1 time(s) if instruction material changes. GE credit: AH, OL, WC. Effective: 2017 Spring Quarter.

ARB 022L—Colloquial Levantine Arabic (4)
Lecture/Discussion—4 hours. Prerequisite(s): ARB 021L; or Consent of Instructor. Continuation of colloquial Levantine Arabic presented in Arabic 021L. Integrated presentation of speaking and listening skills in colloquial Levantine Arabic; reading and writing in Modern Standard Arabic related to Levantine social life. GE credit: AH, OL, WC. Effective: 2018 Winter Quarter.

ARB 023—Intermediate Arabic 23 (4)
Lecture/Discussion—4 hours. Prerequisite(s): ARB 022; or Consent of Instructor. Continuation of courses 21 and 22. Interactive and integrated presentation of Arabic listening, speaking, reading, and writing skills, including idiomatic expression. GE credit: AH, OL, WC. Effective: 2017 Fall Quarter.

ARB 023C—Colloquial Egyptian Arabic (4)
Lecture/Discussion—3 hours; Lecture/Lab—1 hour. Prerequisite(s): ARB 022C; or Consent of Instructor. Continuation of Colloquial Egyptian Arabic covered in course 22C. May be repeated up to 1 time(s) if instruction material changes. GE credit: AH, OL, WC. Effective: 2017 Spring Quarter.

ARB 023L—Colloquial Levantine Arabic (4)
Lecture/Discussion—4 hours. Prerequisite(s): ARB 022L; or Consent of Instructor. Continuation of colloquial Levantine Arabic presented in Arabic 022L. Integrated presentation of speaking and listening skills in colloquial Levantine Arabic; reading and writing in Modern Standard Arabic related to Levantine social life. GE credit: AH, OL, WC. Effective: 2017 Fall Quarter.

ARB 098—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Directed group study. May be repeated for credit. (P/NP grading only.) Effective: 2017 Winter Quarter.

ARB 099—Special Study for Undergraduates (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special study. May be repeated for credit. (P/NP grading only.) Effective: 2017 Winter Quarter.

ARB 101A—Readings in Arabic: 600-1850 (4)
Discussion—3 hours; Extensive Writing. Prerequisite(s): ARB 123; or Consent of Instructor. Readings in Arabic. Poetry, prose literature, and selections from texts on religion, history, politics, science, philosophy and mysticism. May be repeated up to 1 time(s) Students can repeat the course if the instructor decides that they would benefit from additional practice working on the different selections from the same texts or if 50% or more of the texts are different. GE credit: AH, OL, SS, WC, WE. Effective: 2016 Fall Quarter.

ARB 121—Advanced Arabic (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ARB 023; or Consent of Instructor. Review, refinement, and development of skills learned in intermediate Arabic through work with texts, video, and audio on cultural and social issues. Integrated approach to reading, writing, listening, speaking primarily standard Arabic, with limited use of one colloquial dialect. May be repeated up to 2 time(s) based on different readings. GE credit: AH, WC. Effective: 2011 Fall Quarter.

ARB 122—Advanced Arabic (4)
Lecture/Discussion—3 hours. Prerequisite(s): ARB 121; or Consent of Instructor. Continuation of course 121. Further development of advanced skills in reading, listening, writing, and speaking standard Arabic through work with texts, video, and audio on cultural and social issues. Limited use of one colloquial dialect. GE credit: AH, WC. Effective: 2009 Winter Quarter.

ARB 123—Advanced Arabic (4)
Lecture/Discussion—3 hours. Prerequisite(s): ARB 122; or Consent of Instructor. Continuation of course 122. Further development of advanced skills in reading, listening, writing, and speaking standard Arabic through work with texts, video, and audio on cultural and social issues. Limited use of one colloquial dialect. GE credit: AH, WC. Effective: 2009 Spring Quarter.

ARB 140—A Story for a Life: The Arabian Nights (4)
Lecture/Discussion—3 hours; Term Paper. In-depth exploration of The Arabian Nights, the best-known work of pre-modern Arabic literature and a major work of world literature. Analysis of the work in its historical context and in comparison to other frame tales in world literature. (COM 172 and MSA 121C.) GE credit: AH, WC, WE. Effective: 2016 Winter Quarter.

ARB 141—Readings in Modern Arabic Literature (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): ARB 123; or Consent of Instructor. Readings of modern Arabic poetry and fiction in original format, assisted by instructor-prepared glossaries and other supplementary material. Readings to be followed by class discussion and short writing assignments in Arabic. Open to students at advanced proficiency in Arabic. May be repeated up to 1 time(s) if reading material changes. GE credit: AH, WC. Effective: 2014 Fall Quarter.

ARB 198—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Development of reading, writing, speaking, and listening skills in advanced Arabic. Materials may include al-Kitaab Part Two or Three, news articles and broadcasts, short stories, poetry, novels, essays, scripture, prophetic traditions, audio recordings, and television and film. May be repeated up to 4 time(s) content differs. Effective: 2008 Fall Quarter.

ARB 297—Directed Independent Study (4)
Discussion—1 hour; Independent Study. Prerequisite(s): Graduate standing or consent of instructor. Restricted to graduate students. Directed Independent Study on a topic culminating in a term paper. Independent Study may only be arranged with consent of the instructor when graduate seminars are unavailable. Topic varies by instructor. May be repeated up to 5 time(s) when no graduate seminars are available and topic differs. Effective: 2015 Fall Quarter.

ARB 299—Individual Study (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. Restricted to graduate students. May be repeated for credit. (S/U grading only.) Effective: 2014 Winter Quarter.

ARB 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. Restricted to graduate students. May be repeated up to 18 time(s). (S/U grading only.) Effective: 2014 Winter Quarter.

Art History

Art History | AHI Information

(College of Letters and Science)

Department Office. 101 Art Building 530-752-0105; http://arthistory.ucdavis.edu

Faculty. http://arts.ucdavis.edu/art-history-people

Art History | AHI A.B.

(College of Letters and Science)

Department Office. 101 Art Building 530-752-0105; http://arthistory.ucdavis.edu

Faculty. http://arts.ucdavis.edu/art-history-people

The Major Program

Art History studies the changing visual expression of values, beliefs and experiences across diverse cultures and over time. It provides training in historical, social and aesthetic understanding, critical

thinking, scholarly research, and lucid, thoughtful analysis and writing. More than any other discipline art history sharpens its students' visual acuity and deepens their visual literacy. In so doing, it prepares them to face the increasingly complex visual world we find ourselves in today.

The Program. The major begins with a series of courses that surveys major landmarks in the history of visual culture, art and architecture in Asia, Europe, and the United States. More advanced lecture courses and proseminars focus on particularly important periods and issues. Students are encouraged to personalize their training with internships, independent study, and focused upper-division study. Top students considering graduate study are encouraged to engage in more advance study in the Honors program.

Career Options. A major in Art History develops critical thinking and the integration of research, interpretation and understanding. It provides an excellent liberal arts basis for professions as far ranging as advertising, law, medicine, politics and business. The major prepares students for advanced study in Art History, Architecture, Museum Studies and Cultural Studies. It also serves as the foundation for careers in teaching, arts, administration, museums, galleries, historic preservation, art libraries, publishing, journalism, advertising, art conservation, and art investment. As the world becomes increasingly flooded with images, the critical visual literacy gained through the study of art history becomes more important for a wide variety of careers.

Honors Program. The Honors Program is encouraged for Art History majors who are considering attending graduate school. To be eligible for the program, a student must have a grade point average of 3.700 in the major or consent of the major advisor. In addition to meeting the standard major requirements, the honors student completes one undergraduate seminar (course 100 or 190A-L), and writes an honors thesis (course 194H) after completing Art History 100 or equivalent, and after satisfactorily preparing a preliminary thesis draft through a preparatory special study (Art History 199), supervised by the prospective thesis advisor. Students participating in this Program are candidates for Departmental recommendation for graduation with High or Highest Honors. See the Academic Information chapter, Letters and Science honors section, of this catalog and consult the department website for more information.

Teaching Credential Subject Representative. Department Chairperson; see the Teacher Education program.

Graduate Study. The Program in Art History offers studies leading to the Master of Arts degree in History of Art as preparation for further graduate study or professional work. For more information, contact the Graduate Staff Advisor at 530-752-8710, or see http://arthistory.ucdavis.edu.

Preparatory Subject Matter **Units:** 20

Choose four:

AHI 001A	Ancient Mediterranean Art	4
AHI 001B	Medieval and Renaissance Art	4
AHI 001C	Baroque to Modern Art	4
AHI 001D	Arts of Asia	4
AHI 001DY	Arts of Asia	5
AHI 001E	Islamic Art and Architecture	4
AHI 005	Understanding Visual Culture	4
AHI 025	Understanding Architecture	4

Any lower division Art Studio (ART) course except ART 010 or ART 030.

Depth Subject Matter **Units:** 40

Choose four, one each in four of the following six areas; two must be from areas a, b, c; two must be from areas d, e, f.

(a) Ancient Mediterranean Art:

AHI 172A	Early Greek Art and Architecture	4

AHI 172B	Later Greek Art and Architecture	4
AHI 173	Roman Art and Architecture	4
AHI 175	Architecture and Urbanism in Mediterranean Antiquity	4

(b) East Asian Art:

AHI 163A	Early Chinese Art	4
AHI 163B	Chinese Painting	4
AHI 163C	Early Modern Chinese Painting	4
AHI 163D	Art from China 1900 to the Present	4
AHI 164	The Arts of Japan	4

(c) Islamic Art:

AHI 155	The Islamic City	4
AHI 156	Arts of the Islamic Book	4

(d) European Art before 1700:

AHI 110	Cultural History of Museums	4
AHI 120A	Art, Architecture, and Human Rights	4
AHI 176A	Art of the Middle Ages: Early Christian and Byzantine Art	4
AHI 176B	Art of the Middle Ages: Early Medieval and Romanesque Art	4
AHI 176C	Art of the Middle Ages: Gothic	4
AHI 178B	Early Italian Renaissance Art and Architecture	4
AHI 178C	High and Late Italian Renaissance Art and Architecture	4
AHI 179B	Baroque Art	4

(e) Western Art 1700-1900:

AHI 110	Cultural History of Museums	4
AHI 168	Great Cities	4
AHI 182	British Art and Culture (1750-1900)	4
AHI 183A	Art in the Age of Revolution, 1750-1850	4
AHI 183B	Impressionism and Post-Impressionism: Manet to 1900	4
AHI 183C	Modernism in France, 1880-1940	4
AHI 188A	The American Home	4
AHI 188B	Architecture of the United States	4
AHI 188C	American Art to 1910	4

(f) Art after 1900:

AHI 110	Cultural History of Museums	4
AHI 148	Theory and Criticism: Painting & Sculpture	4
AHI 163D	Art from China 1900 to the Present	4
AHI 183C	Modernism in France, 1880-1940	4
AHI 184	Twentieth Century Architecture	4
AHI 185	Avant-Gardism and its Aftermath, 1917-1960	4
AHI 186	Contemporary Art 1960-Present	4
AHI 187	Contemporary Architecture	4
AHI 189	Photography in History	4

Undergraduate Seminar in Art History:

AHI 190A	Undergraduate Seminar in Art History: Mediterranean Antiquity	4
AHI 190B	Undergraduate Seminar in Art History: Medieval	4
AHI 190C	Undergraduate Seminar in Art History: Renaissance	4
AHI 190D	Undergraduate Seminar in Art History: American	4
AHI 190E	Undergraduate Seminar in Art History: Gendering of Culture	4

AHI 190F	Undergraduate Seminar in Art History: Chinese	4
AHI 190G	Undergraduate Seminar in Art History: Japanese	4
AHI 190H	Undergraduate Seminar in Art History: Modern-Contemporary	4
AHI 190I	Undergraduate Seminar in Art History: 17th-18th Century	4
AHI 190J	Undergraduate Seminar in Art History: Islamic	4
AHI 190K	Undergraduate Seminar in Art History: 19th Century	4
AHI 190L	Undergraduate Seminar in Art History: Architecture & Heritage	4

Electives

Choose five additional upper-division Art History courses in consultation with the major advisor. Appropriate course substitutions may be made with the consent of the major advisor. Art History 401 and 402 may be counted among the elective units.

Emphasis in Architectural History **Units:** 60

Emphasis in Architectural History follows the same requirements as for the Art History major above, applying at least six of the following to their respective required areas or as electives:

AHI 025	Understanding Architecture	4
AHI 110	Cultural History of Museums	4
AHI 120A	Art, Architecture, and Human Rights	4
AHI 155	The Islamic City	4
AHI 163A	Early Chinese Art	4
AHI 168	Great Cities	4
AHI 172A	Early Greek Art and Architecture	4
AHI 172B	Later Greek Art and Architecture	4
AHI 173	Roman Art and Architecture	4
AHI 175	Architecture and Urbanism in Mediterranean Antiquity	4
AHI 176A	Art of the Middle Ages: Early Christian and Byzantine Art	4
AHI 176B	Art of the Middle Ages: Early Medieval and Romanesque Art	4
AHI 176C	Art of the Middle Ages: Gothic	4
AHI 178B	Early Italian Renaissance Art and Architecture	4
AHI 178C	High and Late Italian Renaissance Art and Architecture	4
AHI 184	Twentieth Century Architecture	4
AHI 188A	The American Home	4
AHI 188B	Architecture of the United States	4

Fulfilling the undergraduate seminar requirement (AHI 190A-H) through an architectural topic is highly recommended.

Total: 60

Art History | AHI M.A.

(College of Letters and Science)

Department Office. 101 Art Building 530-752-0105; http://arthistory.ucdavis.edu

Faculty. http://arts.ucdavis.edu/art-history-people

The Program in Art History offers studies leading to the Master of Arts degree in History of Art as preparation for further graduate study or professional work. For more information, contact the Graduate Staff Advisor at 530-752-8710, or see http://arthistory.ucdavis.edu.

Art History | AHI Minor

(College of Letters and Science)

Department Office. 101 Art Building 530-752-0105; http://arthistory.ucdavis.edu

Faculty. http://arts.ucdavis.edu/art-history-people

Art History studies the changing visual expression of values, beliefs and experiences across diverse cultures and over time. It provides training in historical, social and aesthetic understanding, critical thinking, scholarly research, and lucid, thoughtful analysis and writing. More than any other discipline art history sharpens its students' visual acuity and deepens their visual literacy. In so doing, it prepares them to face the increasingly complex visual world we find ourselves in today.

Art History Minor **Units:** 20

Choose three from three of the following six areas with at least one in area a, b, or c, and one in area d, e, or f:

(a) Ancient Mediterranean Art:

AHI 172A	Early Greek Art and Architecture	4
AHI 172B	Later Greek Art and Architecture	4
AHI 173	Roman Art and Architecture	4
AHI 175	Architecture and Urbanism in Mediterranean Antiquity	4

(b) East Asian Art:

AHI 163A	Early Chinese Art	4
AHI 163B	Chinese Painting	4
AHI 163C	Early Modern Chinese Painting	4
AHI 163D	Art from China 1900 to the Present	4
AHI 164	The Arts of Japan	4

(c) Islamic Art:

AHI 120A	Art, Architecture, and Human Rights	4
AHI 155	The Islamic City	4
AHI 156	Arts of the Islamic Book	4

(d) European Art before 1700:

AHI 178B	Early Italian Renaissance Art and Architecture	4
AHI 178C	High and Late Italian Renaissance Art and Architecture	4
AHI 179B	Baroque Art	4

(e) Western Art 1700-1900:

AHI 110	Cultural History of Museums	4
AHI 130	Landscape, Nature, and Art	4
AHI 168	Great Cities	4
AHI 182	British Art and Culture (1750-1900)	4
AHI 183A	Art in the Age of Revolution, 1750-1850	4
AHI 183B	Impressionism and Post-Impressionism: Manet to 1900	4
AHI 188A	The American Home	4
AHI 188B	Architecture of the United States	4
AHI 188C	American Art to 1910	4

(f) Art after 1900:

AHI 148	Theory and Criticism: Painting & Sculpture	4
AHI 163D	Art from China 1900 to the Present	4
AHI 183C	Modernism in France, 1880-1940	4
AHI 184	Twentieth Century Architecture	4

AHI 185	Avant-Gardism and its Aftermath, 1917-1960	4
AHI 186	Contemporary Art 1960-Present	4
AHI 189	Photography in History	4

Choose two additional upper division art history courses which may include an Undergraduate Seminar, AHI 190A-H strongly recommended.

One lower division course may be substituted for upper-division study in any of these areas. Other appropriate substitutions may be made for the course options listed above with the prior consent of the major advisor.

Total: 20

Art History | AHI Courses

Courses in AHI:

AHI 001A—Ancient Mediterranean Art (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the art and architecture of the ancient Mediterranean world, including Mesopotamia, Egypt, Greece, and Rome. GE credit: AH, VL, WC. Effective: 2002 Fall Quarter.

AHI 001B—Medieval and Renaissance Art (4)
Discussion—1 hour; Lecture—3 hours. Christian, Barbarian, Moslem, and Classical traditions in European
Art from the fourth through the sixteenth centuries. GE credit: AH, VL, WC. Effective: 1997 Winter Quarter.

AHI 001C—Baroque to Modern Art (4)
Discussion—1 hour; Lecture—3 hours. Introduction to visual analysis through study of western art 1600-present, examining major artists and movements from Europe to North America. Study of the relationship of art and artists to political, religious, social change, and to changes in ideology, patronage, audience. GE credit: AH, VL, WC. Effective: 2016 Winter Quarter.

AHI 001D—Arts of Asia (4)
Discussion—1 hour; Lecture—3 hours. Introduction to major forms and trends in the arts, architecture, and material culture of Asia from the Neolithic to the contemporary emphasizing the visual manifestation of secular and religious ideas and ideals. Not open for credit to students who have completed AHI 1DV. GE credit: AH, VL, WC. Effective: 2015 Winter Quarter.

AHI 001DY—Arts of Asia (5)
Discussion—1 hour; Lecture/Discussion—1.5 hours; Web Virtual Lecture—2.5 hours. Introduction to major forms and trends in the arts and material culture of Asia from the Neolithic to the contemporary, emphasizing the visual manifestation of secular and religious ideas and ideals. Not open for credit to students who have completed AHI 1D. GE credit: AH, VL, WC, WE. Effective: 2014 Spring Quarter.

AHI 001E—Islamic Art and Architecture (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the art and architecture of the Islamic world including the Middle East, Africa, Europe, and South Asia, from the 7th century CE to the 20th. GE credit: AH, VL, WC. Effective: 2006 Fall Quarter.

AHI 005—Understanding Visual Culture (4)
Discussion—1 hour; Lecture/Discussion—3 hours. Development of visual literacy for an increasingly visual world; critical analyses focusing on the widest variety of visual imagery: the fine arts across media and eras of world culture, television, film, and advertising. Intended for a diverse spectrum of audiences. GE credit: AH, VL, WC. Effective: 2015 Winter Quarter.

AHI 025—Understanding Architecture (4)
Discussion—1 hour; Lecture—3 hours. Development of architecture and urban design; how form, space, order are conceived and used across eras and cultures. Examines the function and organization of space, technological problems of construction, visual qualities of architecture, and social issues connected to architecture. GE credit: AH, DD, VL, WC. Effective: 2014 Fall Quarter.

AHI 098—Directed Group Study (1-5)
Discussion—1-5 hours. Prerequisite(s): Consent of Instructor. Restricted to lower division students. Directed Group Study (P/NP grading only.) Effective: 1997 Winter Quarter.

AHI 099—Special Study for Undergraduates (1-5)
Discussion—1-5 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

AHI 100—Methods of Art History (4)
Extensive Writing/Discussion—3 hours; Term Paper. Prerequisite(s): Prior completion of two upper-division Art History courses recommended. Methods of art historical research and analysis, and general issues in critical thought. Writing skills appropriate to a range of art-historical exposition. GE credit: AH, VL. Effective: 2016 Fall Quarter.

AHI 110—Cultural History of Museums (4)
Lecture/Discussion—3 hours; Term Paper. Evolution of museums in the western world from the "cabinet of curiosities" of sixteenth-century Europe to the modern "art center." The changing motives behind collecting, exhibiting, and interpretation of objects. Attention to museums' historical legacies and continuing philosophical dilemmas. GE credit: AH, VL, WC, WE. Effective: 2014 Fall Quarter.

AHI 120A—Art, Architecture, and Human Rights (4)
Lecture/Discussion—4 hours. Study of human rights as they relate to art, architecture, and cultural heritage. Examines museums, art collections, and cultural-heritage management, their relation to the cultural prerogatives of communities and indigenous groups, and protection of cultural heritage during war and conflict. (HMR 120A.) GE credit: AH, DD, SS, VL, WC, WE. Effective: 2014 Fall Quarter.

AHI 121—Politics of Public Art (4)
Lecture/Discussion—4 hours. Politics of public art. Role of contemporary artists, public monuments, urban spaces, the movie industry, photography, propaganda art, and comics in construction of political ideologies and collective identities. GE credit: AH, VL, WE. Effective: 2018 Winter Quarter.

AHI 122—Sex and Space (4)
Lecture/Discussion—4 hours. Relationship between space and sexuality. Sexual metaphors in art and architecture, gender identity formation via images and space. Diverse intersections of sexuality and art history. GE credit: AH, DD, VL, WE. Effective: 2016 Fall Quarter.

AHI 130—Landscape, Nature, and Art (4)
Lecture—3 hours; Term Paper. Interpretation of the natural world in the western world 1600-1900, with perspectives on the present; landscape painting, ideology of picturesque and sublime, landscape art and travel, reshaping the land as art; dialogues between art and science; nature as national identity. GE credit: AH, VL, WC, WE. Effective: 2014 Fall Quarter.

AHI 148—Theory and Criticism: Painting & Sculpture (4)
Lecture—3 hours; Term Paper. Prerequisite(s): ART 005 or 007 recommended. Study of forms and symbols in historic and contemporary masterpieces. (ART 148.) GE credit: AH, VL, WE. Effective: 2017 Winter Quarter.

AHI 150—Arts of Subsaharan Africa (4)
Lecture/Discussion—3 hours; Term Paper. Traditional arts and crafts of subsaharan Africa from prehistoric times to the present; the relationships among art, nature, cycles of life, and religion; art as expression of power; sculpture and culture in West and Central Africa; Colonialism and collecting. GE credit: AH, VL, WC. Effective: 2015 Winter Quarter.

AHI 151—Arts of the Indians of the Americas (4)
Lecture/Discussion—3 hours; Term Paper. Development of art in North America, emphasizing ancient Mexico. South American relationships and parallels. Recent and contemporary Indian arts and crafts from Alaska to Chile. GE credit: AH, VL, WE. Effective: 2015 Spring Quarter.

AHI 152—Arts of Oceania and Prehistoric Europe (4)
Lecture—3 hours; Term Paper. Traditional arts of aboriginal Australia, Melanesia, Polynesia, and Micronesia, as seen in their cultural contexts. Prehistoric art of Europe and the Near East. GE credit: AH, VL, WC. Effective: 1997 Winter Quarter.

AHI 154—The Hindu Temple (4)
Lecture—3 hours; Term Paper. Comparative history of architecture and symbolism of the Hindu Temple in India, Southeast Asia and the United States. Attention to the temple as expression of religious knowledge, political authority, and cultural heritage through the lens of colonialism and postcolonialism. (REL 154.) GE credit: AH, SS, VL, WC, WE. Effective: 2015 Fall Quarter.

AHI 155—The Islamic City (4)
Lecture—3 hours; Term Paper. Prerequisite(s): AHI 001E recommended. Introduction to the urban history of the Islamic world. Critical study of the historiography of the Islamic city, development of urban form, institutions and rituals, and analysis of selected themes. GE credit: AH, SS, VL, WC. Effective: 2016 Spring Quarter.

AHI 156—Arts of the Islamic Book (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Prior completion of AHI 001E recommended. Critical study of the arts of the luxury book in the pre-modern Islamic world. Representation in Islam, the relationship of word and image, the discipline of calligraphy, aesthetics and representation in Persianate painting. GE credit: AH, VL, WC. Effective: 2016 Spring Quarter.

AHI 163A—Early Chinese Art (4)
Lecture/Discussion—4 hours. Thematic and chronological examination of 3000 years of Chinese art and culture from Neolithic through Tang Dynasty (10th c. CE). Study of ceremonial and secular objects manifesting folk beliefs and belief systems of ancestor worship, Buddhism, Daoism, and Confucianism. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

AHI 163B—Chinese Painting (4)
Lecture/Discussion—4 hours. Thematic and chronological examination of Chinese painting and culture from the Tang Dynasty (7th c. CE) through the early 20th century. Issues considered include political art (made to support or protest regimes), art and the market, art and individual expression. GE credit: AH, VL, WC, WE. Effective: 2015 Winter Quarter.

AHI 163C—Early Modern Chinese Painting (4)
Lecture/Discussion—4 hours. Topics in Chinese Art History, 13th-19th century. Study of issues pertaining to self and society; gender and gendering; religion and philosophy; political engagement and protest; economy and the market; the effects created by periods of transition on visual expression. GE credit: AH, VL, WC, WE. Effective: 2014 Fall Quarter.

AHI 163D—Art from China 1900 to the Present (4)
Lecture/Discussion—4 hours. Forms of modern and avant-garde expression from China's industrialization to the 21st century. Interactions of art and politics, individual and state, art for the free market versus art for the state, expressions of modernity; China on the world stage. GE credit: AH, VL, WC, WE. Effective: 2017 Spring Quarter.

AHI 164—The Arts of Japan (4)
Lecture/Discussion—3 hours; Term Paper. Japan’s painting, architecture, decorative arts, and print heritage, ancient times to the 20th century in literary, political, intellectual, and spiritual contexts; impact of Japanese art on the West and the West’s transformative impact upon Japan’s opening in the 19th century. GE credit: AH, VL, WC. Effective: 2016 Winter Quarter.

AHI 168—Great Cities (4)
Lecture—3 hours; Term Paper. Transformation in architecture and urban form in Paris, London, and Vienna in the context of varying social, political, and economic systems as well as very different cultural traditions, concentrating on the years 1830-1914. GE credit: AH, VL, WE. Effective: 1997 Winter Quarter.

AHI 172A—Early Greek Art and Architecture (4)
Lecture—3 hours; Term Paper. Examination of the origin and development of the major monuments of Greek art and architecture from the eighth century to the mid-fifth century B.C. (CLA 172A.) GE credit: AH, VL, WE. Effective: 2015 Fall Quarter.

AHI 172B—Later Greek Art and Architecture (4)
Lecture—3 hours; Term Paper. Study of the art and architecture of later Classical and Hellenistic Greece, from the mid-fifth century to the first century B.C. (CLA 172B.) GE credit: AH, VL. Effective: 2015 Fall Quarter.

AHI 173—Roman Art and Architecture (4)
Lecture—3 hours; Term Paper. Art and architecture of Rome and the Roman Empire, from the founding of Rome through the fourth century C.E. (CLA 173.) GE credit: AH, VL, WE. Effective: 2014 Fall Quarter.

AHI 175—Architecture and Urbanism in Mediterranean Antiquity (4)
Extensive Writing; Lecture—3 hours. Architecture and urban development in the ancient Near East, Greece, and Rome. Special emphasis on the social structure of the ancient city as expressed in its architecture, and on the interaction between local traditions and the impact of Greco-Roman urbanism. (CLA 175.) GE credit: AH, VL, WC, WE. Effective: 2017 Spring Quarter.

AHI 176A—Art of the Middle Ages: Early Christian and Byzantine Art (4)
Lecture—3 hours. Term paper or gallery studies and review. Painting, sculpture and architecture of the early Christian era and Byzantine Empire: through the later Roman Empire in the West and to the final capture of Constantinople in the East. GE credit: AH, VL, WC, WE. Effective: 1997 Winter Quarter.

AHI 176B—Art of the Middle Ages: Early Medieval and Romanesque Art (4)
Lecture—3 hours. Term paper or gallery studies and review. Painting, sculpture and architecture of western Europe in the early medieval era: from the rise of the barbarian kingdoms through the twelfth century. GE credit: AH, VL, WC, WE. Effective: 1997 Winter Quarter.

AHI 176C—Art of the Middle Ages: Gothic (4)
Lecture—3 hours. Term paper or gallery studies and review. Painting, sculpture and architecture in northern Europe from the twelfth through the fifteenth centuries. GE credit: AH, VL, WC, WE. Effective: 1997 Winter Quarter.

AHI 177—Northern Renaissance Art (4)
Lecture/Discussion—3 hours; Term Paper. Artistic culture of Western and Central Europe c. 1350-1600. Topics include the development of "realism" in portraiture and landscape, prints and print culture, urbanism, science and the exotic, anti-religious artworks, religious attacks on art, contacts with Renaissance Italy. GE credit: AH, VL, WC, WE. Effective: 2015 Spring Quarter.

AHI 178B—Early Italian Renaissance Art and Architecture (4)
Lecture—3 hours; Term Paper. Fifteenth-century artists, with a focus on Florence; Donatello and Masaccio through Botticelli, in their artistic, architectural, and cultural setting; the impact of Humanism and the rebirth of classical learning. GE credit: AH, VL, WE. Effective: 2014 Fall Quarter.

AHI 178C—High and Late Italian Renaissance Art and Architecture (4)
Lecture—3 hours; Term Paper. High Renaissance and Mannerism in 16th-century Italy: Leonardo, Michelangelo, Raphael, and Titian in their artistic and cultural settings—Florence, Rome, and Venice; the architecture of Bramante, Michelangelo, and Palladio. GE credit: AH, VL, WE. Effective: 2014 Fall Quarter.

AHI 179B—Baroque Art (4)
Lecture—3 hours; Term Paper. Seventeenth-century painting, sculpture and graphic arts, including such artists as Caravaggio, Rubens, Rembrandt, and Velázquez in their political and social context. GE credit: AH, VL, WE. Effective: 2015 Winter Quarter.

AHI 182—British Art and Culture (1750-1900) (4)
Lecture—3 hours; Term Paper. British painting in relation to the position of women in society and the rise of the middle-class art market. Topics covered Hogarth and popular culture, Queen Victoria and the female gaze, and Pre-Raphaelite artists and collectors. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

AHI 183A—Art in the Age of Revolution, 1750-1850 (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Prior completion of AHI 001C recommended. Emergence of modernism in Europe from the late l8th century to the middle of the l9th century. Major artistic events viewed against a revolutionary backdrop of changing attitudes toward identity, race, and gender. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

AHI 183B—Impressionism and Post-Impressionism: Manet to 1900 (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Prior completion of AHI 001C recommended. Innovations of Impressionists, Post-Impressionists, and Symbolists in relation to social changes. Assessment of role of dealers and critics, myth of the artist-genius, and gender relations in French art and culture of the late 1800s. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

AHI 183C—Modernism in France, 1880-1940 (4)
Lecture—3 hours; Term Paper. Development of modern art in France, its social context, and its transnational aspects. Post-Impressionism, Fauvism, Cubism, Expressionism, and Surrealism are considered in relation to secessionist movements, the formation of other artistic groups, new forms of patronage, and new audiences. GE credit: AH, VL, WC, WE. Effective: 2015 Winter Quarter.

AHI 184—Twentieth Century Architecture (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Prior completion of AHI 025 recommended. Major movements in architecture of the twentieth century in Europe and America. Formal innovations are examined within the social, political, and economic circumstances in which they emerged. GE credit: AH, VL, WE. Effective: 2016 Spring Quarter.

AHI 185—Avant-Gardism and its Aftermath, 1917-1960 (4)
Lecture/Discussion—4 hours. Social, cultural, aesthetic, and theoretical development for artists and their audiences in the context of larger issues like the Mexican, Russian and German revolutions, WWI, the Depression, WWII, etc., and a critical-theoretical inquiry into questions of modernism, modernity, and avant-gardism. GE credit: AH, VL, WC. Effective: 2016 Spring Quarter.

AHI 186—Contemporary Art 1960-Present (4)
Lecture/Discussion—4 hours; Term Paper. Development of new media and aesthetics in the context of such cultural and political phenomena as the New Left, feminism, and globalization; investigation of the critical-theoretical questions of neo avant-gardism, postmodernism, and postmodernity. GE credit: ACGH, AH, VL, WE. Effective: 2014 Fall Quarter.

AHI 187—Contemporary Architecture (4)
Lecture—3 hours; Term Paper. Introduction to world architecture and urban design since circa 1966. Relation of influential styles, buildings, and architects to postmodern debates and to cultural, economic, technological and environmental change. GE credit: AH, VL, WE. Effective: 2017 Spring Quarter.

AHI 188A—The American Home (4)
Lecture/Discussion—4 hours; Term Paper. American domestic architecture and its responsiveness to changes in daily life from Colonial times to the 1960s. Vernacular developments, effects of different socioeconomic conditions, and women's role in shaping the home receive special attention. GE credit: ACGH, AH, DD, VL, WE. Effective: 2014 Fall Quarter.

AHI 188B—Architecture of the United States (4)
Lecture/Discussion—3 hours; Term Paper. Major movements from colonial times to the present. The role of buildings in a changing American society, the interplay of styles with technologies of construction, relationship between American and European developments and evolution of the architectural and planning professions. GE credit: ACGH, AH, VL, WE. Effective: 2015 Winter Quarter.

AHI 188C—American Art to 1910 (4)
Lecture/Discussion—4 hours; Term Paper. Major movements in American art from the 17th-century English-speaking colonies to the onset of World War I. GE credit: ACGH, AH, VL, WE. Effective: 2014 Fall Quarter.

AHI 189—Photography in History (4)
Lecture/Discussion—4 hours. Social, cultural, aesthetic and technical developments in the history of photography including patronage and reception, commercial, scientific, political and artistic applications, and a critical-theoretical inquiry into photography's impact on the social category "art" and the history of subjectivity. GE credit: AH, VL. Effective: 2016 Spring Quarter.

AHI 190A—Undergraduate Seminar in Art History: Mediterranean Antiquity (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated up to 2 time(s) when topic differs. GE credit: AH, OL, VL, WE. Effective: 2014 Fall Quarter.

AHI 190B—Undergraduate Seminar in Art History: Medieval (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated up to 2 time(s) when topic differs. GE credit: AH, OL, VL, WE. Effective: 2014 Fall Quarter.

AHI 190C—Undergraduate Seminar in Art History: Renaissance (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated up to 2 time(s) when topic differs. GE credit: AH, OL, VL, WE. Effective: 2014 Fall Quarter.

AHI 190D—Undergraduate Seminar in Art History: American (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated up to 2 time(s) when topic differs. GE credit: AH, OL, VL, WE. Effective: 2014 Fall Quarter.

AHI 190E—Undergraduate Seminar in Art History: Gendering of Culture (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated up to 2 time(s) when topic differs. GE credit: OL, VL, WE. Effective: 2014 Fall Quarter.

AHI 190F—Undergraduate Seminar in Art History: Chinese (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated up to 2 time(s) when topic differs. GE credit: AH, OL, VL, WE. Effective: 2014 Fall Quarter.

AHI 190G—Undergraduate Seminar in Art History: Japanese (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated up to 2 time(s) when topic differs. GE credit: AH, OL, VL, WE. Effective: 2014 Fall Quarter.

AHI 190H—Undergraduate Seminar in Art History: Modern-Contemporary (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Art History major, minor or other significant training recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated up to 2 time(s) when topic differs. GE credit: AH, OL, VL, WE. Effective: 2014 Fall Quarter.

AHI 190I—Undergraduate Seminar in Art History: 17th-18th Century (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated up to 2 time(s) when topic differs. GE credit: AH, OL, VL, WE. Effective: 2014 Fall Quarter.

AHI 190J—Undergraduate Seminar in Art History: Islamic (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated up to 2 time(s) when topic differs. GE credit: AH, OL, VL, WE. Effective: 2014 Fall Quarter.

AHI 190K—Undergraduate Seminar in Art History: 19th Century (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated up to 2 time(s) when topic differs. GE credit: AH, OL, VL, WE. Effective: 2014 Fall Quarter.

AHI 190L—Undergraduate Seminar in Art History: Architecture & Heritage (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated up to 2 time(s) when topic differs. GE credit: AH, OL, VL, WE. Effective: 2014 Fall Quarter.

AHI 192—Internship (2-12)
Internship. Supervised program of internships at professional art institutions
such as museums, galleries, and art archives including collections of slides and photographs. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

AHI 194H—Special Study for Honor Students (4)
Independent Study—12 hours. Prerequisite(s): AHI 190; Or the equivalent, as determined by the major advisor. Open only to students in the Art History Honors Program. Independent study of an art historical problem culminating in the writing of an honors thesis under the supervision of a faculty guidance committee. Effective: 1997 Winter Quarter.

AHI 198—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

AHI 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

AHI 200A—Visual Theory and Interpretive Methods (4)
Discussion—3 hours; Extensive Writing—1 hour. Close study of selected recent developments in interpretive methodology used by art historians and other analysts of visual culture and the place of those developments within art history's history and in the larger field of social, cultural and historical analysis. May be repeated up to 1 time(s). Effective: 2000 Fall Quarter.

AHI 200B—Research and Writing Methods in Art History (4)
Discussion—3 hours; Term Paper. Restricted to graduate students in Art History. Development of the research, writing, and editing skills necessary for producing publishable work. Focus on reference tools used by art historians and the mechanics of scholarship, from question framing and organization of ideas to writing clear, effective prose. Effective: 2001 Winter Quarter.

AHI 200C—Thesis Writing Colloquium (1)
Auto Tutorial; Discussion—1.5 hours. Prerequisite(s): AHI 200B; Taken by all Art History M.A. students in their first year. Restricted to graduate students in Art History. Meeting concurrently with course 200B, the colloquium provides a structured, supportive environment for second-year Art History graduate students drafting masters' theses. Offers a forum for technical discussions, discussion of writing/editing procedures, and peer review of writing in progress. (S/U grading only.) Effective: 2008 Summer Session 1.

AHI 210—Museums, Art Exhibitions and Culture (4)
Extensive Writing/Discussion; Seminar—3 hours; Term Paper. Prerequisite(s): Graduate status in art history or an allied field. Class size limited to 20 students. Issues accompanying the evolution and function of museums from cabinets of curiosities in sixteenth-century Europe to modern art centers. Examination of divergent motives behind collecting, exhibiting, and interpretation of objects. Investigation of museums' historical legacies and continuing philosophical dilemmas. Effective: 2015 Winter Quarter.

AHI 250—Problems in Art Historical Research (4)
Seminar—3 hours; Term Paper. Major topics in art historical research, emphasizing special methods of
investigation, and of historical and critical analysis. May be repeated for credit. Effective: 1997 Winter Quarter.

AHI 254—Seminar in Classical Art (4)
Seminar—3 hours; Term Paper. Selected areas of special study in classical art of the Greek and Roman tradition. Course may be repeated for credit with consent of instructor. May be repeated for credit / with consent of instructor. Effective: 1997 Winter Quarter.

AHI 263—Seminar in Chinese Art (4)
Seminar—3 hours; Term Paper. Selected areas of special study in Chinese Art. May be repeated for credit with consent of instructor. May be repeated for credit /with consent of instructor. Effective: 1997 Winter Quarter.

AHI 276—Seminar in Medieval Art (4)
Seminar—3 hours; Term Paper. Selected areas of special study in medieval art from Early Christian to
late Gothic. May be repeated for credit with consent of instructor. May be repeated for credit /with consent of instructor. Effective: 1997 Winter Quarter.

AHI 278—Seminar in Italian Renaissance Art (4)
Seminar—3 hours; Term Paper. Selected areas of special study in Italian art from the fourteenth to the sixteenth century. May be repeated for credit with consent of instructor. Effective: 1997 Winter Quarter.

AHI 283—Seminar in Visual Culture and Gender (4)
Seminar—3 hours; Term Paper. Selected areas of special study in the relationship between visual culture and gender in Europe and America from 1750 to present. May be repeated for credit with consent of instructor. May be repeated for credit /with consent of instructor. Effective: 2000 Fall Quarter.

AHI 288—Seminar in European and American Architecture (4)
Seminar—3 hours; Term Paper. Exploration of selected topics in European and American architectural
history with concentration on the Modern Period. May be repeated for credit with consent of instructor. May be repeated for credit /with consent of instructor. Effective: 1997 Winter Quarter.

AHI 290—Special topics in Art History (4)
Seminar—3 hours; Term Paper. Special research seminar in the theory or methods of Art History, or in a period of Art History. Topic will vary depending on the interests of the instructor or students. May be repeated for credit topic differs and with consent of instructor. Effective: 2002 Fall Quarter.

AHI 292—Internship (1-4)
Internship—3-12 hours. Prerequisite(s): Consent of Instructor. Graduate student. Restricted to graduate students in Art History only. Supervised internship at professional art or cultural institution including museum, galleries, archives, government offices, visual resources libraries, etc. May be repeated up to 8 unit(s). (S/U grading only.) Effective: 2007 Fall Quarter.

AHI 298—Directed Group Study (1-5)
Seminar. May be repeated for credit. (S/U grading only.) Effective: 2002 Winter Quarter.

AHI 299—Individual Study (1-6)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

AHI 390—Introduction to Teaching Art History for Teaching Assistants (1)
Discussion—1 hour. Designed for teaching assistants with emphasis on problems and procedures encountered by teachers of undergraduate art history. (S/U grading only.) Effective: 1997 Winter Quarter.

AHI 396—Teaching Assistant Training Practicum (1-4)
Practice; Seminar. Prerequisite(s): Graduate standing. May be repeated for credit. (S/U grading only.) Effective: 2008 Summer Session 1.

AHI 401—Museum Training: Curatorial Principles (4)
Seminar—3 hours. Approved for graduate degree credit. Study of private and public collections. Museum personalities. Appraisal of works of art; appraisal ethics. Auction and sales: methods and catalogues. Registration. Museum technical problems. Connoisseurship. Collateral reading. Visits to museums. Seminar with assigned papers. Effective: 1997 Winter Quarter.

AHI 402—Museum Training: Exhibition Methods (4)
Seminar—3 hours. Approved for graduate degree credit. History of exhibition methods in private and public collections. Comparisons of different types of museums and their exhibition problems. Lighting and techniques of display with emphasis on actual design. Experimentation with unusual presentation forms. Effective: 1997 Winter Quarter.

Art Studio

Art Studio | ART Information

(College of Letters and Science)

Annabeth Rosen, M.F.A., Chairperson of the Department

Department Office. 101 Art Building 530-752-0105; http://art.ucdavis.edu

Faculty. http://arts.ucdavis.edu/art-studio-faculty

Art Studio | ART A.B.

(College of Letters and Science)

Annabeth Rosen, M.F.A., Chairperson of the Department

Department Office. 101 Art Building 530-752-0105; http://art.ucdavis.edu

Faculty. http://arts.ucdavis.edu/art-studio-faculty

The Major Program

The Art Studio major provides the studio experience necessary for a broad understanding of the practice and interpretation of the visual arts.

The Program. The Art Studio program is designed to deliver a broad range of hands-on studio practices to the art major. Areas of focus include painting, sculpture, drawing, photography, ceramics, printmaking, and time-based media. Course choices/sequences are determined by the student according to major distribution requirements. Students are encouraged to explore a broad range of disciplines and are expected to take advantage of beginning classes which provide a critical introduction to the research possibilities within the major, across disciplines. In addition to studio classes, students are encouraged to participate in a distinguished visiting artist lecture series, professional practice seminars, student exhibitions/competitions, internships, and benefit from exposure to cultural events and exhibitions in Davis, Sacramento, and the Greater Bay Area.

Major Advisor. Information on the current Academic Advisor can be obtained by contacting the Art Department Main Office at 530-752-0105 or at http://arts.ucdavis.edu/arts-group-undergraduate-advising.

Portfolios. While portfolios are not required for admission to the art major, students at all levels are expected to maintain current portfolios of completed work in order to qualify and compete for the numerous internships, fellowships, grants, awards, and exhibitions the program has to offer, as well as to better prepare for the rigors of graduate school and/or an independent studio practice.

Career Options. Graduates of the Art Studio Program attend prestigious post-baccalaureate and graduate programs in studio art. Alumni often go on to develop professional studio practices. Commitment to the development of one's studio work leads to exhibition opportunities as well as accomplishments in the realm of fellowships, commissions, collaborations, and a host of other professional projects and opportunities. For the student wishing to explore additional arts-related trajectories, in the private or public sector, a studio arts education provides a strong foundation for careers and/or graduate work in K-12 art education, art therapy, arts administration, curatorial studies, set design, architecture, culinary arts, design, film, animation, art criticism/journalism among others.

Teaching Credential Subject Representative. See the Teacher Education program.

Preparatory Subject Matter **Units:** 24

Choose four:

ART 002	Beginning Drawing	4
ART 005	Beginning Sculpture	4
ART 007	Beginning Painting	4
ART 008	Beginning Ceramic Sculpture	4
ART 009	Beginning Photography	4
ART 011	Beginning Printmaking	4
ART 012	Beginning Video	4

Choose two:

ART 024	Introduction to Experimental Video and Film	4
ART 030	Introduction to Contemporary Visual Culture	4
AHI 001A	Ancient Mediterranean Art	4
AHI 001B	Medieval and Renaissance Art	4
AHI 001C	Baroque to Modern Art	4
AHI 001D	Arts of Asia	4
AHI 001E	Islamic Art and Architecture	4
AHI 005	Understanding Visual Culture	4
AHI 025	Understanding Architecture	4

Depth Subject Matter **Units:** 44

36 upper division units in Art Studio

Chooses any two upper division theory or history courses:
Art History, Cinema and Technocultural Studies, Design, Music, or Theatre and Dance.

Total: 68

Art Studio | ART M.F.A.

(College of Letters and Science)

Hearne Pardee, M.F.A., Chairperson of the Department

Department Office. 101 Art Building; 530-752-0105; http://art.ucdavis.edu

Faculty. http://arts.ucdavis.edu/art-studio-people

Graduate Study. The Department of Art offers programs of study and research leading to the M.F.A. degree in the practice of art. For more information contact the Graduate Staff Advisor at 530-752-8710 or at http://arts.ucdavis.edu/art-studio-graduate-program.

Art Studio | ART Minor

(College of Letters and Science)

Annabeth Rosen, M.F.A., Chairperson of the Department

Department Office. 101 Art Building 530-752-0105; http://art.ucdavis.edu

Faculty. http://arts.ucdavis.edu/art-studio-faculty

The Minor Program. The Art Studio program delivers a broad range of hands-on studio practices to the art minor. Areas of focus include painting, sculpture, drawing, photography, ceramics, printmaking, and time-based media. Course choices/sequences are determined by the student according to minor requirements. Students are encouraged to explore different areas of focus and are expected to take advantage of beginning classes which provide a critical introduction to the research possibilities within studio art. In addition to studio classes, students are encouraged to participate in the department's distinguished visiting artist lecture series, professional practice seminars, student exhibitions/competitions, internships, and benefit from exposure to cultural events and exhibitions in Davis, Sacramento, and the Greater Bay Area.

Prerequisite courses must be taken prior to enrollment in upper division courses. Independent study courses are not applicable.

Art Studio **Units:** 20

Upper division art studio courses in two of the following areas:
Area 1 (Painting, Drawing, Printmaking)
Area 2 (Sculpture and Ceramic Sculpture)
Area 3 (Photography and Video)
Note: One lower division substitute course permissible.

Total: 20

Art Studio | ART Courses

Various of the Professional courses (400+) are not offered each year.

Courses in ART:

ART 002—Beginning Drawing (4)
Studio—6 hours. Introduction to drawing using various black and white media to articulate forms and organize space, with reference to historical and contemporary works. GE credit: AH, VL. Effective: 2015 Winter Quarter.

ART 005—Beginning Sculpture (4)
Studio—6 hours. Basic sculpture techniques using a variety of media. Form in space using cardboard, plaster, and/or cement, wood and/or metal and other media. GE credit: AH, VL. Effective: 2015 Winter Quarter.

ART 007—Beginning Painting (4)
Studio—6 hours. Introduction to techniques and concepts in the practice of painting. GE credit: AH, VL. Effective: 2016 Spring Quarter.

ART 008—Beginning Ceramic Sculpture (4)
Studio—6 hours. Introduction to ceramic sculpture construction and processes. Large scale hand-building, glazing, kilns and kiln firing technology. GE credit: AH, VL. Effective: 2016 Spring Quarter.

ART 009—Beginning Photography (4)
Studio—6 hours. Introduction to the fundamental technical, aesthetic, and formal aspects of photography. Camera skills, film developing and printing in the black and white darkroom. GE credit: AH, VL. Effective: 2015 Winter Quarter.

ART 010—Fine Art Appreciation (4)
Discussion—1 hour; Lecture—3 hours. Survey of contemporary artists since 1970. Topics explore contemporary thought within the visual arts using the forms and strategies of painting, sculpture, installation, performance, photography, and video in collaborative, ephemeral and multimedia approaches. Intended for Art and non-Art majors. GE credit: AH, VL. Effective: 2017 Winter Quarter.

ART 011—Beginning Printmaking (4)
Studio—6 hours. Introduction to printmaking techniques such as monography, relief, and intaglio. Investigation of personal imagery through use of these techniques. GE credit: AH, VL. Effective: 2015 Winter Quarter.

ART 012—Beginning Video (4)
Studio—6 hours. Production techniques of video shooting, editing, lighting, sound and effects. A conceptual framework for video-art techniques. GE credit: AH, VL. Effective: 2015 Winter Quarter.

ART 024—Introduction to Experimental Video and Film (4)
Discussion—1 hour; Lecture—3 hours; Term Paper. Evolution of moving image technologies. Shifts within avant-garde artistic practices. Conceptual and historical differences between film and video. Relationship of film and video to fine arts. GE credit: AH, VL, WE. Effective: 2013 Spring Quarter.

ART 030—Introduction to Contemporary Visual Culture (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Establishing visual literacy across the media of fine art, photography, advertising, television and film; media culture; focus on critical decoding of contemporary visual culture. GE credit: AH, VL. Effective: 1997 Winter Quarter.

ART 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Restricted to lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

ART 099—Special Study for Undergraduates (1-5)
Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

ART 101—Intermediate Painting (4)
Studio—6 hours. Prerequisite(s): ART 002; ART 007 Individualized projects exploring color and space in a variety of subject matter and approaches. Builds on basic skills and concepts from beginning drawing and painting courses. Study of historical and contemporary art in relation to studio practice. May be repeated up to 1 time(s) when topic differs. GE credit: AH, VL. Effective: 2013 Fall Quarter.

ART 102A—Advanced Painting: Studio Projects (4)
Studio—6 hours. Prerequisite(s): ART 101 Pass One restricted to Art Studio majors. Sustained development of painting for advanced students. Approaches will vary according to the instructor. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 102B—Advanced Painting: Figure (4)
Studio—6 hours. Prerequisite(s): ART 101 Pass One restricted to Art Studio majors. Advanced painting using the human figure as subject. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 102C—Advanced Painting: Special Topics (4)
Studio—6 hours. Prerequisite(s): (ART 002, ART 007, ART 101); (ART 102A or ART 102B) Pass One restricted to Art Studio majors. Special topics in painting for upper division students. Emphasis on development of a personal practice of painting informed by awareness of contemporary issues in painting and their historical background. Topics will vary with instructor. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 103A—Intermediate Drawing: Black and White (4)
Studio—6 hours. Prerequisite(s): ART 002 Pass One restricted Art Studio majors. Advanced study of drawing composition using black and white media. GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 103B—Intermediate Drawing: Color (4)
Studio—6 hours. Prerequisite(s): ART 002 Pass One restricted Art Studio majors. Study of drawing composition in color media. GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 103C—Intermediate Drawing: 3 Dimensions (4)
Studio—6 hours. Prerequisite(s): ART 002 Pass One restricted to Art Studio Major. Intermediate study of drawing composition using three dimensional media. GE credit: AH, VL. Effective: 2017 Fall Quarter.

ART 105A—Advanced Drawing: Studio Projects (4)
Studio—6 hours. Prerequisite(s): ART 002; (ART 103A or ART 103B) Pass One restricted to Art Studio majors. Exploration of composition and process in drawing. Emphasis on the role of drawing in contemporary art and on drawing as an interdisciplinary practice. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 105B—Advanced Drawing: Figure (4)
Studio—6 hours. Prerequisite(s): (ART 103A or ART 103B); ART 002 Pass One restricted Art Studio majors. Study of the figure through drawing of the model. Exploration of different methods and process of figure-drawing. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2018 Winter Quarter.

ART 110A—Intermediate Photography: Black and White Analog (4)
Studio—6 hours. Prerequisite(s): ART 009 Pass One restricted to Art Studio majors. Introduction to 35mm and medium format camera. Development of personal aesthetic and portfolio of black and white prints. GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 110B—Intermediate Photography: Digital Imaging (4)
Studio—6 hours. Prerequisite(s): ART 009 Pass One restricted to Art Studio majors. Comprehensive introduction to all elements of digital photography, including scanning, imaging software and printing. GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 111A—Advanced Photography: Special Topics (4)
Studio—6 hours. Prerequisite(s): ART 009; (ART 110A or ART 110B) Pass One open to Art Studio majors. Special topics related to photography and contemporary art practice. Multiple projects in a variety of approaches. May be repeated up to 2 time(s) when topic differs. GE credit: AH, VL. Effective: 2013 Fall Quarter.

ART 111B—Advanced Photography: Digital Imaging (4)
Studio—6 hours. Prerequisite(s): ART 009; ART 110B Pass One restricted to Art Studio majors. In-depth exploration of digital photography, including refined digital imaging techniques. Theoretical issues involved in digital media. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 112—Sound for Vision (4)
Studio—6 hours. Prerequisite(s): ART 012 or TCS 100 Pass One restricted to Art Studio majors. Sound composition and development of an audio databank. Study of repetition and phase shifts. Creation of descriptive acoustic space recordings in combination with other artistic media. Audio as stand alone or accompaniment. May be repeated up to 1 time(s). GE credit: AH. Effective: 2007 Fall Quarter.

ART 113—Interdisciplinary Art (4)
Studio—6 hours. Prerequisite(s): Upper division standing in Art Studio, Theater and Dance, Design, Technocultural Studies, or Music. Experimental interdisciplinary strategies. Use of various media in creation of collaborative or independent works. Production of participatory audio-visual works, installations, or two dimensional explorations. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 114A—Intermediate Video: Animation (4)
Studio—6 hours. Prerequisite(s): ART 012 or CTS 020; One drawing course. Pass One restricted to Art Studio majors. Exploration of animation. Relationship between drawing, digital stills, and multiple images. Animation using traditional drawing techniques, collage, and digital processes. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2018 Winter Quarter.

ART 114B—Intermediate Video: Experimental Documentary (4)
Studio—6 hours. Prerequisite(s): ART 012 or CTS 020 Pass One restricted to Art Studio majors. Experimental documentary practice. Use of interviews, voice-overs, and still and moving images. Production of alternative conceptual and visual projects. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2018 Winter Quarter.

ART 114C—Intermediate Video: Performance Strategies (4)
Studio—6 hours. Prerequisite(s): ART 012 or CTS 020 Pass One restricted to Art Studio majors. Use of video to expand performance art production. Exploration of improvisation, direction, projection, and image processing in real time. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2018 Winter Quarter.

ART 117—Advanced Video and Electronic Arts (4)
Studio—6 hours. Prerequisite(s): ART 012 or TCS 100; (ART 112 or ART 114A or ART 114B or ART 114C); Upper division standing Art Studio majors. Pass One restricted to Art Studio majors; upper division standing. Independently driven video, digital, and/or performance projects. Further development in the electronic arts ranging from video installation to performance. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 121—Reinterpreting Landscape (4)
Studio—6 hours. Prerequisite(s): ART 002; ART 007 Pass One restricted to Art Studio majors. Interpretation of landscape through painting, drawing, and related media. Emphasis on the integration of historical, cultural, natural, and artistic contexts. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 125A—Intermediate Printmaking: Relief (4)
Studio—6 hours. Prerequisite(s): ART 011 Pass One restricted to Art Studio majors. Woodcut linocut, metal-plate, relief, and experimental uses of other materials for printmaking. Additive and reductive relief techniques. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 125B—Intermediate Printmaking: Intaglio (4)
Studio—6 hours. Prerequisite(s): ART 011 Pass One restricted to Art Studio majors. Metal plate etching, aquatint, hard and soft ground, burin engraving and related printmaking techniques. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 125C—Intermediate Printmaking: Lithography (4)
Studio—6 hours. Prerequisite(s): ART 011 Pass One restricted to Art Studio majors. Stone and metal-plate lithography and other planographic printmaking methods. Exploration of the basic chemistry and printing procedure inherent in stone lithogrphay. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 125D—Intermediate Printmaking: Serigraphy (4)
Studio—6 hours. Prerequisite(s): ART 011 Pass One restricted to Art Studio majors. Printmaking techniques in silk screen and related stencil methods. Development of visual imagery using the language of printmaking. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 129—Advanced Printmaking (4) ***Review all entries***
Studio—6 hours. Prerequisite(s): ART 125A or ART 125B or ART 125C or ART 125D; Completion of two of the courses listed above. Pass One restricted to Art Studio majors. Development of intermedia printmaking. Advanced modes in print technologies: relief, serigraphy, intaglio, surface, as well as addition of digitized imagery. Production of prints using multi-plate prints and other methods. May be repeated up to 2 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 129—Advanced Printmaking (4) ***Review all entries***
Studio—6 hours. Prerequisite(s): ART 011; ART 125A or ART 125B or ART 125C or ART 125D Pass One restricted to Art Studio majors. Development of intermedia printmaking. Advanced modes in print technologies: relief, serigraphy, intaglio, surface, as well as addition of digitized imagery. Production of prints using multi-plate prints and other methods. May be repeated up to 2 time(s). GE credit: AH, VL. Effective: 2018 Fall Quarter.

ART 138—The Artist's Book (4)
Studio—6 hours. Prerequisite(s): Completion of three upper division Art Studio courses. Pass One restricted to Art Studio majors. Creation of an artist's book in an edition of three. Use of a variety of media. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 142A—Intermediate Ceramic Sculpture: Industrial Production Methods (4)
Studio—6 hours. Prerequisite(s): ART 008 Pass One restricted to Art Studio majors. Ceramic sculpture creation using two forms of industrial processes: plaster mold design, fabrication and casting; and extrusion with dies, including die fabrication. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2016 Spring Quarter.

ART 142B—Intermediate Ceramic Sculpture: Material Study (4)
Studio—6 hours. Prerequisite(s): ART 008 Pass One restricted to Art Studio majors. Study of ceramic materials and processes. Areas studied include clay and clay bodies; glaze materials through temperature, color and texture; history and technology of kilns and kiln firing. Examination of material properties and characteristics through experimentation. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2016 Spring Quarter.

ART 142C—Intermediate Ceramic Sculpture: Special Topics (4)
Studio—6 hours. Prerequisite(s): ART 008 Pass One restricted to Art Studio majors. Exploration of the ceramic surface for creative expression. Use of glazing techniques including china paint, decals, luster, and silkscreen with underglaze and overglaze as well as the use of common materials such as epoxy, paint, oil and wax. May be repeated up to 2 time(s). GE credit: AH, VL. Effective: 2016 Spring Quarter.

ART 143—Advanced Ceramic Sculpture: Studio Projects (4)
Studio—6 hours. Prerequisite(s): ART 008; ART 142A or ART 142B or ART 142C Pass One restricted to Art Studio majors. Experimentation with all techniques learned in prerequisite ceramics classes. Course will include class projects in consultation with faculty. May be repeated up to 2 time(s) Consent of instructor required for students taking the course a third time. GE credit: AH, VL. Effective: 2017 Spring Quarter.

ART 147—Theory and Criticism of Photography (4)
Lecture—3 hours; Term Paper. Prerequisite(s): ART 009 Development of camera vision, ideas, and aesthetics and their relationship to the fine arts from 1839 to the present. GE credit: AH, VL. Effective: 2012 Fall Quarter.

ART 148—Theory and Criticism: Painting & Sculpture (4)
Lecture—3 hours; Term Paper. Prerequisite(s): ART 005 or ART 007 recommended. Study of forms and symbols in historic and contemporary masterpieces. (AHI 148.) GE credit: AH, VL, WE. Effective: 2014 Fall Quarter.

ART 149—Introduction to Critical Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): AHI 001B or AHI 001C; or AHI 183F; Two of the Art History courses listed above. An overview of 20th century critical theories of culture and their relation to visual art and mass media culture. GE credit: AH, VL. Effective: 1997 Winter Quarter.

ART 150—Theory and Criticism of Electronic Media (4)
Lecture—3 hours; Term Paper. Prerequisite(s): ART 024 recommended. Study of electronic media, focusing on critique, application, and relationship to art practice. Analysis of the conceptual basis of electronic media as an artistic mode of expression. GE credit: AH. Effective: 2007 Fall Quarter.

ART 151—Intermediate Sculpture (4)
Studio—6 hours. Prerequisite(s): ART 005 Individualized explorations through multiple projects in a variety of sculpture media and techniques. Builds upon technical skills and concepts covered in course 5. May be repeated up to 2 time(s) when topic differs. GE credit: AH, VL. Effective: 2013 Fall Quarter.

ART 152A—Advanced Sculpture: Studio Projects (4)
Studio—6 hours. Prerequisite(s): ART 005; ART 151 Pass One restricted to Art Studio majors. Sculpture for advanced students. Emphasis on concept, idea development and honing technical skills. Approaches and projects will vary according to the instructor. May be repeated up to 1 time(s) topic differs. GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 152B—Advanced Sculpture: Material Explorations (4)
Studio—6 hours. Prerequisite(s): ART 005; ART 151 Pass One restricted to Art Studio majors. Primary application and exploration of a single sculpture material chosen by the student. Examination of its properties, qualities, and characteristics for three-dimensional expression. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 152C—Advanced Sculpture: Concepts (4)
Studio—6 hours. Prerequisite(s): ART 005; ART 151 Pass One restricted to Art Studio majors. Investigation of a specific idea chosen by the class. Relationship of idea to form and content. Individual development of conceptual awareness. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 152D—Advanced Sculpture: Metals (4)
Studio—6 hours. Prerequisite(s): ART 005; ART 151 Pass One restricted to Art Studio majors. Technical aspects of the use of metals in contemporary art practice. Projects assigned to demonstrate the evolution of concepts and processes. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 152E—Advanced Sculpture: Site Specific Public Sculpture (4)
Studio—6 hours. Prerequisite(s): ART 005; ART 151 Pass One restricted to Art Studio majors. Place and site specificity in contemporary sculpture. Individual and group work to conceive and fabricate sculpture in a public space. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 152F—Advanced Sculpture: Figure (4)
Studio—6 hours. Prerequisite(s): ART 005; ART 151 Pass One restricted to Art Studio majors. Exploration of historical and contemporary approaches to the body in three-dimensions. Projects based on observational and conceptual strategies. Variety of media and techniques, including clay, wax, plaster, plastics, found objects, and others. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 152G—Advanced Sculpture: The Miniature and Gigantic (4)
Studio—6 hours. Prerequisite(s): ART 005; ART 151 Pass One restricted to Art Studio majors. Exploration of scale, from the very small to the very large in a series of projects in a variety of media. Tools and techniques of enlargement and miniaturization. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 171—Mexican and Chicano Mural Workshop (4)
Independent Study—1 hour; Studio—8 hours. Prerequisite(s): CHI 070; and Consent of Instructor. The Mural: a collective art process that empowers students and people through design and execution of mural paintings in the tradition of the Mexican Mural Movement; introduces materials and techniques. May be repeated up to 1 time(s). (CHI 171.) GE credit: AH, VL. Effective: 1997 Winter Quarter.

ART 190—Seminar in Art Practice (4)
Studio—6 hours. Prerequisite(s): Upper division standing Art Studio major. Pass One restricted to Art Studio majors. Introduction to professional practices. Development of an artist's packet including a resume, cover letter, artist statement, and statement of purpose. Ongoing independent studio work with group critiques. Research on galleries and museums, and readings in contemporary theory and criticism. GE credit: AH, VL, WE. Effective: 2013 Spring Quarter.

ART 192—Internship (2-12)
Internship. Supervised program of internships in artists' studios and at professional art institutions such as museums, galleries, and art archives including collections of slides and photographs. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Fall Quarter.

ART 195—Expanded Field: Artist Lecture Series (1)
Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Exploration of the expanded field of practice, theory and criticism in the visual arts. Presentations and discussions with professional practitioners in the field. May be repeated up to 12 unit(s) when topic differs. (P/NP grading only.) Effective: 2012 Fall Quarter.

ART 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Restricted to lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

ART 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

ART 290—Seminar (4)
Seminar—3 hours. Original works produced for group discussion and criticism; associated topics of a contemporary and historical nature. May be repeated for credit. Effective: 1997 Winter Quarter.

ART 291—Seminar: Critical Evaluation (1)
Seminar—1 hour. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

ART 292—Seminar: Comprehensive Qualifying (1)
Seminar—1 hour. Further critical evaluation of the student's work to determine his eligibility to begin the Comprehensive Project. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

ART 299—Individual Study (1-6)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

ART 299D—Comprehensive Project (9)
Variable. An original body of work accompanied by a catalog summarizing the student's aesthetic position. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

ART 401—Museum Training: Curatorial Principles (4)
Seminar—3 hours. Approved for graduate degree credit. Study of private and public collections. Museum personalities. Appraisal of works of art; ethics of appraisal. Auction and sales: methods and catalogues. Registration. Technical problems of the museum. Connoisseurship. Collateral reading. Visits to museums. Effective: 1997 Winter Quarter.

ART 402—Museum Training: Exhibition Methods (4)
Seminar—3 hours. Approved for graduate degree credit. History of exhibition methods in private and public collections. Comparisons of different types of museums and their exhibition problems. Lighting and techniques of display with emphasis on actual design. Experimentation with unusual presentation forms. Effective: 1997 Winter Quarter.

Asian American Studies

Asian American Studies | ASA Information

(College of Letters and Science)

Richard S. Kim, Ph.D., Chairperson of the Department

Department Office. 3102 Hart Hall; 530-752-2069; http://asa.ucdavis.edu

Faculty. http://asa.ucdavis.edu/people/faculty

Asian American Studies | ASA A.B.

(College of Letters and Science)

Richard S. Kim, Ph.D., Chairperson of the Department

Department Office. 3102 Hart Hall; 530-752-2069; http://asa.ucdavis.edu

Faculty. http://asa.ucdavis.edu/people/faculty

The Major Program

The Department of Asian American Studies offers an interdisciplinary major that examines the experiences of various Asian American groups in the United States. Pertinent to these experiences are the historical, cultural, legal, political, social-psychological, class, racial, and gender contexts for Asian Americans.

The Program. Majors take a prescribed set of lower division and upper division courses in Asian American Studies. These courses offer diverse theoretical and methodological tools to develop and encourage student critical thinking, creativity, initiative, and independent research about a complex, multiethnic and racialized society in the United States and in a global world.

Major Advisor. Joe Nguyen, Student Affairs Officer (SAO); 530-752-8617 or jovnguyen@ucdavis.edu.

Substitutions for disciplinary track courses will be considered by the Department Chair on a case by case basis. Likewise, any substitutions of Major/Minor criteria will be considered by the Department Chair.

Direct questions pertaining to the following courses to the instructor or to the Department of Asian American Studies in 3102 Hart Hall; 530-752-2069.

Career Alternatives. Asian American Studies prepares students for a variety of careers. Given the multicultural nature of society and the increasing relations with different societies, many occupations seek individuals with background and expertise in ethnic relations and cultural issues. Graduates often enter the fields of teaching, research, government service, law, social services, etc., as well as graduate schools for advanced degrees in various disciplines.

American History and Institutions. This university requirement can be satisfied by one of the following courses in Asian American Studies: 1, 2; see also under Bachelor's Degree Requirements.

Preparatory Subject Matter **Units:** 32

ASA 001	Historical Experience of Asian Americans	4
ASA 002	Contemporary Issues of Asian Americans	4
ASA 003	Social and Psychological Perspectives of Asian Americans	4
ASA 004	Asian American Cultural Studies	4

Choose at least two lower division courses from the following departments or programs:

African American and African Studies (AAS), American Studies (AMS), Chicana/o Studies (CHI), Middle East and South Asia Studies (ME/SA), Native American Studies (NAS), Women and Gender Studies (WGS); all lower division courses of at least four units are acceptable except those numbered 092, 097T, 098, 099.

Methodology

Choose at least two courses from any of the following methods courses:

AAS 101	Introduction to Research in the Afro-American Community	4
AMS 100	Methods in American Studies	4
ANT 013	Scientific Method in Physical Anthropology	4
AHI 005	Understanding Visual Culture	4
AHI 100	Methods of Art History	4
ART 010	Fine Art Appreciation	4
ART 030	Introduction to Contemporary Visual Culture	4
CHI 023	Qualitative Research Methods	4
ENL 042	Approaches to Reading	4
ENL 110A	Introduction to Literary Theory	4
ENL 110B	Introduction to Modern Literary and Critical Theory	4
HIS 101	Introduction to Historical Thought and Writing	5
HDE 120	Research Methods in Human Development	4
PHI 005	Critical Reasoning	4
POL 051	Scientific Study of Politics	4
PSC 041	Research Methods in Psychology	4
SOC 046A	Introduction to Social Research	4
SOC 046B	Introduction to Social Research	5
STA 013	Elementary Statistics	4
WMS 104	Feminist Research	4

Depth Subject Matter **Units:** 36

ASA 192	Internships	4

ASA 192 Required.

Major Emphasis

As part of the depth subject matter requirement, all Asian American Studies majors must develop a major emphasis by choosing either a disciplinary or thematic specialization in consultation with the Student Affairs Officer (SAO) and/or faculty advisors. The major emphasis must include six Asian American Studies upper-division courses and two upper-division elective courses from other departments or programs.

Choose at least six upper-division Asian American Studies courses:

ASA 100	Asian American Communities	4
ASA 102	Theoretical Perspective in Asian American Studies	4
ASA 112	Asian American Women	4
ASA 113	Asian American Sexuality	4
ASA 114	Asian Diasporas	4
ASA 115	Multiracial Asian Pacific American Issues	4
ASA 116	Asian American Youth	4
ASA 121	Asian American Performance	4
ASA 130	Asian American Literature	4
ASA 131	Ethnicity, Culture, and the Self	4
ASA 132	Health Issues Confronting Asian Americans and Pacific Islanders	4
ASA 140	Asian Americans and Media	4
ASA 141	Asian Americans and the Political Culture of Fashion in the U.S. and Asia	4
ASA 150	Filipino American Experience	4
ASA 150B	Japanese American Experience	4
ASA 150C	Chinese American Experience	4
ASA 150D	Korean American Experience	4
ASA 150E	Southeast Asian American Experience	4
ASA 150F	South Asian American History, Culture, & Politics	4
ASA 155	Asian American Legal History	4
ASA 189A	Topics in Asian American Studies: History	4
ASA 189B	Topics in Asian American Studies: Culture	4
ASA 189C	Topics in Asian American Studies: Physical and Mental Health	4
ASA 189D	Topics in Asian American Studies: Policy and Community	4
ASA 189E	Topics in Asian American Studies: Comparative Racial Studies	4
ASA 189F	Topics in Asian American Studies: Asian Studies and Asian American Studies	4
ASA 189G	Topics in Asian American Studies: Race, Class, Gender, and Sexuality	4
ASA 189H	Topics in Asian American Studies: Society and Institutions	4
ASA 189I	Topics in Asian American Studies: Politics and Social Movements	4
ASA 194	Asian American Studies Capstone Course	4
AND		
ASA 195	Asian American Studies Senior Thesis Seminar	4
ASA 198	Directed Group Study	1-5
	Up to six units in ASA 198 and/or ASA 199 can be used to satisfy the Asian American Studies upper division course requirements.	
ASA 199	Special Study for Advanced Undergraduates	1-5

Up to six units in ASA 198 and/or ASA 199 can be used to satisfy the Asian American Studies upper division course requirements.

At least two upper-division elective courses from other departments or programs that relate to chosen emphasis

Two courses (of up to eight units) from Study Abroad can be substituted for major requirements upon approval from the SAO or faculty advisor.

Substitutions for disciplinary track courses will be considered by the Department Chair on a case by case basis. Likewise, any substitutions of Major/Minor criteria will be considered by the Department Chair.

Total: 68

Asian American Studies | ASA Minor

(College of Letters and Science)

Richard S. Kim, Ph.D., Chairperson of the Department

Department Office. 3102 Hart Hall; 530-752-2069; http://asa.ucdavis.edu

Faculty. http://asa.ucdavis.edu/people/faculty

Direct questions pertaining to the following courses to the instructor or to the Department of Asian American Studies in 3102 Hart Hall; 530-752-2069.

Minor Advisor. Joe Nguyen, Student Affairs Officer (SAO), 530-752-8617 or jovnguyen@ucdavis.edu.

American History and Institutions. This university requirement can be satisfied by one of the following courses in Asian American Studies: 1, 2; see also under University Requirements.

Asian American Studies **Units:** 28

Choose two:

ASA 001	Historical Experience of Asian Americans	4
ASA 002	Contemporary Issues of Asian Americans	4
ASA 003	Social and Psychological Perspectives of Asian Americans	4
ASA 004	Asian American Cultural Studies	4

Choose five:

ASA 100	Asian American Communities	4
ASA 102	Theoretical Perspective in Asian American Studies	4
ASA 112	Asian American Women	4
ASA 113	Asian American Sexuality	4
ASA 114	Asian Diasporas	4
ASA 115	Multiracial Asian Pacific American Issues	4
ASA 116	Asian American Youth	4
ASA 121	Asian American Performance	4
ASA 130	Asian American Literature	4
ASA 131	Ethnicity, Culture, and the Self	4
ASA 132	Health Issues Confronting Asian Americans and Pacific Islanders	4
ASA 140	Asian Americans and Media	4

ASA 141	Asian Americans and the Political Culture of Fashion in the U.S. and Asia	4
ASA 150	Filipino American Experience	4
ASA 150B	Japanese American Experience	4
ASA 150C	Chinese American Experience	4
ASA 150D	Korean American Experience	4
ASA 150E	Southeast Asian American Experience	4
ASA 150F	South Asian American History, Culture, & Politics	4
ASA 155	Asian American Legal History	4
ASA 189A	Topics in Asian American Studies: History	4
ASA 189B	Topics in Asian American Studies: Culture	4
ASA 189C	Topics in Asian American Studies: Physical and Mental Health	4
ASA 189D	Topics in Asian American Studies: Policy and Community	4
ASA 189E	Topics in Asian American Studies: Comparative Racial Studies	4
ASA 189F	Topics in Asian American Studies: Asian Studies and Asian American Studies	4
ASA 189G	Topics in Asian American Studies: Race, Class, Gender, and Sexuality	4
ASA 189H	Topics in Asian American Studies: Society and Institutions	4
ASA 189I	Topics in Asian American Studies: Politics and Social Movements	4
ASA 192	Internships No more than four units of ASA 192 may be counted toward this total.	1-5
ASA 198	Directed Group Study No more than four units of ASA 198 may be counted toward this total.	1-5
ASA 199	Special Study for Advanced Undergraduates No more than four units of ASA 199 may be counted toward this total.	1-5

Total: 28

Asian American Studies | ASA Courses

Direct questions pertaining to the following courses to the instructor or to the Department of Asian American Studies in 3102 Hart Hall; 530-752-2069.

Courses in ASA:

ASA 001—Historical Experience of Asian Americans (4)
Discussion—1 hour; Lecture—3 hours. Introduction to Asian American Studies through an overview of the history of Asians in America from the 1840s to the present within the context of the development of the United States. GE credit: ACGH, AH, DD, SS, VL, WC, WE. Effective: 1997 Winter Quarter.

ASA 002—Contemporary Issues of Asian Americans (4)
Discussion—1 hour; Lecture—3 hours. Introduction to Asian American Studies through the critical analysis of the impact of race, racism, ethnicity, imperialism, militarism, and immigration since post-World War II on Asian Americans. Topics may include sexuality, criminality, class, hate crimes, and inter-ethnic relations. GE credit: ACGH, AH, DD, SS, VL, WC, WE. Effective: 2017 Spring Quarter.

ASA 003—Social and Psychological Perspectives of Asian Americans (4)
Discussion—1 hour; Lecture—3 hours. Major psychosocial issues of Asian Americans. Theories and empirical research that address cultural values, behavioral norms, ethnic stereotypes, racism, acculturation, ethnic identity development, family communication, stressors and social support systems, academic achievement, interpersonal effectiveness, and psychopathology. GE credit: ACGH, DD, SS. Effective: 2003 Fall Quarter.

ASA 004—Asian American Cultural Studies (4)
Discussion—1 hour; Lecture—3 hours. This interdisciplinary course examines the multiple ways in which race, class, sexuality and gender, as well as the recent turn to transnationalism and postcolonial theory, have changed the ways we read Asian American literature and see art, theater and film. GE credit: ACGH, AH, DD, OL, VL, WE. Effective: 2006 Fall Quarter.

ASA 092—Internship (1-3)
Internship—3-9 hours. Prerequisite(s): Consent of Instructor. Enrollment dependent on availability of intern positions. Supervised internship in community and institutional settings related to Asian American concerns. (P/NP grading only.) Effective: 1997 Winter Quarter.

ASA 098—Directed Group Study (1-5)
Lecture—1-5 hours. Primarily intended for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

ASA 098F—Student Facilitated Course (1-4)
Variable—1-4 hours. Student-facilitated (taught) course intended for lower division students. (P/NP grading only.) Effective: 2016 Spring Quarter.

ASA 099—Special Study for Undergraduates (3-15)
Variable—3-15 hours. (P/NP grading only.) Effective: 1997 Winter Quarter.

ASA 100—Asian American Communities (4)
Lecture/Discussion—4 hours. Survey and analysis of Asian American communities within both historical and contemporary contexts. Presentation of the analytical skills, theories, and concepts needed to describe, explain, and understand the diversity of Asian American communities within the larger, dominant society. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

ASA 102—Theoretical Perspective in Asian American Studies (4)
Lecture/Discussion—4 hours. Prerequisite(s): ASA 001 or ASA 002 or ASA 003 or ASA 004; or Consent of Instructor. Upper division standing. Explores major theories of race and its intersections with class, gender, and sexuality from interdisciplinary perspective. Introduces key theoretical developments, issues, debates. Through case studies, analyzes ways various theoretical frameworks and perspectives have been incorporated into range of scholarship. Effective: 2010 Winter Quarter.

ASA 112—Asian American Women (4)
Lecture/Discussion—4 hours. Experiences of Asian American women from major ethnic subgroups comparatively examined in their social, economic and historical contexts using theoretical perspectives from social sciences, humanities/arts: identity, racialization, immigration, gender, sexuality, labor, socialization, cultural expression, social movements and feminist theorizing. GE credit: ACGH, AH, DD, SS, VL, WC, WE. Effective: 2016 Fall Quarter.

ASA 113—Asian American Sexuality (4)
Discussion/Laboratory—4 hours. Restrictive US immigration laws, labor exploitation, race-based exclusionary laws, removal and internment, anti-miscegenation laws, and other examples of social control are surveyed to assess their role in shaping the sexuality of the different Asian American groups. GE credit: ACGH, AH, DD, SS, WC, WE. Effective: 2016 Fall Quarter.

ASA 114—Asian Diasporas (4)
Lecture—4 hours. Asian diasporic communities and the experiences of its members in the United States and internationally. Community building, cyberspace, gender issues, labor, transnational practices, effects of globalization, political organizing, homeland politics, humanitarian projects, citizenship and nationalism. GE credit: ACGH, DD, SS, WC. Effective: 2016 Fall Quarter.

ASA 115—Multiracial Asian Pacific American Issues (4)
Lecture/Discussion—4 hours. Introduction to the experiences of biracial and multiracial Asian Pacific people in the U.S., concentrating on theories of race, racial identity formation, culture, media, and anti-racist struggles. Critical approaches to the analysis of popular media and academic representations. GE credit: ACGH, DD, OL, SS, WC, WE. Effective: 2016 Fall Quarter.

ASA 116—Asian American Youth (4)
Lecture—3 hours; Term Paper. Social experiences of diverse groups of Asian American youth. Ways in which youth themselves actively create cultural expressions and political interventions. GE credit: ACGH, AH, DD, OL, SS, WE. Effective: 2016 Fall Quarter.

ASA 121—Asian American Performance (4)
Lecture/Discussion—4 hours. Performance work by, for, and/or about Asian Pacific Americans including dramatic literature, performance art, dance, and film. Ethnicity, gender and sexuality, class and age as they intersect with Asian Pacific American identities in and through dramatic performance. GE credit: ACGH, AH, DD, OL, WE. Effective: 2016 Fall Quarter.

ASA 130—Asian American Literature (4)
Lecture/Discussion—4 hours. Works of Asian American literature by writers from the major ethnic subgroups, examined in their social, economic and historical contexts. Intertextual analysis of their thematic and formal elements to form an understanding of Asian American literary traditions. GE credit: ACGH, AH, DD, OL, WE. Effective: 2016 Fall Quarter.

ASA 131—Ethnicity, Culture, and the Self (4)
Discussion—1 hour; Lecture—3 hours. Cultural and social psychological influences on Asian Americans focusing on the individual. GE credit: ACGH, DD, SS. Effective: 2016 Fall Quarter.

ASA 132—Health Issues Confronting Asian Americans and Pacific Islanders (4)
Lecture/Discussion—4 hours. Health issues confronting Asian Americans and Pacific Islanders. (SPH 132.) GE credit: SS. Effective: 2009 Winter Quarter.

ASA 141—Asian Americans and the Political Culture of Fashion in the U.S. and Asia (4)
Lecture/Discussion—4 hours; Project (Term Project); Term Paper. Historical, cultural and sociopolitical development of fashion in Asia and the U.S. as it relates to the Asian Diasporas. Specific aspects of material culture: textiles, clothing and fashion. GE credit: ACGH, AH, DD, OL, SS, VL, WC, WE. Effective: 2016 Fall Quarter.

ASA 150—Filipino American Experience (4)
Discussion/Laboratory—4 hours. Examination of the relationship between the Filipino-American community, the Philippine home community and the larger American society through a critical evaluation of the historical and contemporary conditions, problems and prospects of Filipinos in the U.S. GE credit: ACGH, DD, SS, WC. Effective: 2016 Fall Quarter.

ASA 150B—Japanese American Experience (4)
Lecture—3 hours; Term Paper. Different analytical approaches to understand Japanese American history, culture and society. GE credit: ACGH, AH, DD, SS, VL, WC, WE. Effective: 2016 Fall Quarter.

ASA 150C—Chinese American Experience (4)
Lecture/Discussion—4 hours. Survey of the historical and contemporary experiences of Chinese in the United States, starting with the gold rush era and concluding with the present-day phenomenon of Chinese transnational movement to the United States and its diasporic significance. GE credit: ACGH, AH, DD, SS, VL, WC. Effective: 2016 Fall Quarter.

ASA 150D—Korean American Experience (4)
Lecture/Discussion—4 hours. Interdisciplinary survey of the historical and contemporary experiences of Koreans in the United States from the late nineteenth century to the present. GE credit: ACGH, AH, DD, SS, WC. Effective: 2016 Fall Quarter.

ASA 150E—Southeast Asian American Experience (4)
Lecture/Discussion—4 hours. Historical survey of Southeast Asian experiences with special focus on United States involvement and post 1975 migrations. Defines international and transnational conditions that led up to the large exodus and resettlement of Southeast Asians. GE credit: ACGH, AH, DD, OL, SS, WC, WE. Effective: 2016 Fall Quarter.

ASA 150F—South Asian American History, Culture, & Politics (4)
Lecture/Discussion—4 hours. South Asian American experiences, focusing on the histories, cultures, and politics of Indian, Pakistani, Bangladeshi, and Sri Lankan communities in the U.S. Interdisciplinary approaches to migration, labor, gender, racialization, ethnicity, youth, community mobilization. GE credit: ACGH, AH, DD, OL, SS, WE. Effective: 2016 Fall Quarter.

ASA 155—Asian American Legal History (4)
Lecture/Discussion—4 hours. Legal history of Asian Americans, from the mid-19th century to present. Laws and administrative policies affecting Asian American communities, including those governing immigration, social and economic participation, WWII internment, and affirmative action. GE credit: ACGH, DD, SS. Effective: 2016 Fall Quarter.

ASA 189A—Topics in Asian American Studies: History (4)
Lecture—4 hours. Intensive treatment of a topic in Asian American Studies; history. May be repeated for credit when topic differs. GE credit: ACGH, DD, SS, WC. Effective: 2016 Fall Quarter.

ASA 189B—Topics in Asian American Studies: Culture (4)
Lecture—4 hours. Intensive treatment of a topic in Asian American Studies; culture. May be repeated for credit when topic differs. GE credit: AH, SS. Effective: 2016 Fall Quarter.

ASA 189C—Topics in Asian American Studies: Physical and Mental Health (4)
Lecture—4 hours. Intensive treatment of a topic in Asian American Studies; physical and mental health. May be repeated for credit when topic differs. GE credit: SS. Effective: 2016 Fall Quarter.

ASA 189D—Topics in Asian American Studies: Policy and Community (4)
Lecture—4 hours. Intensive treatment of a topic in Asian American Studies: policy and community. May be repeated for credit when topic differs. GE credit: ACGH, DD, SS. Effective: 2016 Fall Quarter.

ASA 189E—Topics in Asian American Studies: Comparative Racial Studies (4)
Lecture—4 hours. Intensive treatment of a topic in Asian American Studies: comparative racial studies. May be repeated for credit when topic differs. GE credit: ACGH, AH, DD, OL, SS, WE. Effective: 2016 Fall Quarter.

ASA 189F—Topics in Asian American Studies: Asian Studies and Asian American Studies (4)
Lecture—4 hours. Intensive treatment of a topic in Asian American Studies: asian studies and asian american studies. May be repeated for credit when topic differs. GE credit: SS. Effective: 2016 Fall Quarter.

ASA 189G—Topics in Asian American Studies: Race, Class, Gender, and Sexuality (4)
Lecture—4 hours. Intensive treatment of a topic in Asian American Studies: race, class, gender, and sexuality. May be repeated for credit when topic differs. GE credit: SS. Effective: 2016 Fall Quarter.

ASA 189H—Topics in Asian American Studies: Society and Institutions (4)
Lecture—4 hours. Intensive treatment of a topic in Asian American Studies: society and institutions. May be repeated for credit when topic differs. GE credit: AH, SS. Effective: 2016 Fall Quarter.

ASA 189I—Topics in Asian American Studies: Politics and Social Movements (4)
Lecture—4 hours. Intensive treatment of a topic in Asian American Studies: politics and social movements. May be repeated for credit when topic differs. GE credit: ACGH, AH, DD, OL, SS, WE. Effective: 2017 Spring Quarter.

ASA 192—Internships (1-5)
Internship—3-15 hours. Prerequisite(s): Consent of Instructor. Enrollment dependent on availability of intern position with priority to Asian American Studies minors; consent of instructor. Supervised internship in community and institutional settings related to Asian American concerns. (P/NP grading only.) Effective: 1997 Winter Quarter.

ASA 194—Asian American Studies Capstone Course (4)
Extensive Writing; Lecture/Discussion—4 hours; Project (Term Project). Open to junior or senior level standing in Asian American Studies or consent of instructor. Synthesis of the approaches and methods learned by students in Asian American Studies and development of specialization in their areas of interest. Development of a research proposal for thesis project. Effective: 2017 Winter Quarter.

ASA 195—Asian American Studies Senior Thesis Seminar (4)
Extensive Writing; Lecture/Discussion—3 hours; Project (Term Project). Restricted to junior and senior level standing in Asian American Studies. Completion of ASA 194 required. Synthesis of the approaches and methods learned in Asian American Studies. Production of an original research paper on a topic of student's interest, building on the research proposal submitted in the capstone seminar. Effective: 2016 Fall Quarter.

ASA 197T—Tutoring in Asian American Studies (1-5)
Tutorial—1-5 hours. Prerequisite(s): Consent of Instructor. Tutoring in lower division Asian American Studies courses in small group discussion. Weekly meetings with instructor. May be repeated up to 1 time(s) for a given course and also for a different course. (P/NP grading only.) Effective: 2016 Fall Quarter.

ASA 198—Directed Group Study (1-5)
Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Primarily intended for upper division students. (P/NP grading only.) Effective: 2016 Fall Quarter.

ASA 198F—Student Facilitated Course (1-4)
Variable—1-4 hours. Student-facilitated (taught) course intended for upper division students. (P/NP grading only.) Effective: 2017 Fall Quarter.

ASA 199—Special Study for Advanced Undergraduates (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special study for advanced undergraduates. (P/NP grading only.) Effective: 2016 Fall Quarter.

ASA 199FA—Student Facilitated Course Development (1-4)
Variable—1-4 hours. Under the supervision of a faculty member, an undergraduate student plans and develops the course they will offer under 98F/198F. (P/NP grading only.) Effective: 2016 Spring Quarter.

ASA 199FB—Student Facilitated Teaching (1-4)
Variable—1-4 hours. Prerequisite(s): ASA 199FA Student facilitated. Under the supervision of a faculty member, an undergraduate student teaches a course under 98F/198F. (P/NP grading only.) Effective: 2016 Spring Quarter.

Atmospheric Science

Atmospheric Science | ATM Information

(College of Agricultural and Environmental Sciences)

Randy Southard, Chairperson (Land, Air and Water Resources)

Cort Anastasio, Vice Chairperson (Atmospheric Science)

Department Office. 1110 Plant and Environmental Sciences Building; 530-752-1130; http://lawr.ucdavis.edu

Faculty. http://lawr.ucdavis.edu/people/faculty/atmospheric-science

Atmospheric Science | ATM B.S.

(College of Agricultural and Environmental Sciences)

Randy Southard, Chairperson (Land, Air and Water Resources)

Cort Anastasio, Vice Chairperson (Atmospheric Science)

Department Office. 1110 Plant and Environmental Sciences Building; 530-752-1130; http://lawr.ucdavis.edu

Faculty. http://lawr.ucdavis.edu/people/faculty/atmospheric-science

The Major Program

Atmospheric science is the study of the air that surrounds the planet. It includes all weather phenomena and climate including global and regional climate change, the chemistry of trace constituents and cloud and particle formation, interactions between ecosystems and the atmosphere, as well as quantitative studies of climate extremes and severe weather, including droughts, floods, hurricanes and tornadoes. The study of the impacts of human and other biotic activity on the quality of the air we breathe are important topics in the major.

The Program. Modern atmospheric science is a quantitative science that is reflected in the major's curriculum. In addition to the study of daily weather events, the program deals with fundamental dynamical and physical processes that involve the general circulation of the atmosphere; turbulent mass and energy transfer at the planetary surface as well as within the free atmosphere; the transfer of solar and terrestrial radiation throughout the atmosphere; atmospheric interaction with the biosphere; climate variations; and developments in remote sensing using satellites with modern meteorological instrumentation. In addition, the program has significant expertise in the areas of air quality and its related atmospheric chemistry. As well as providing a broad background in meteorology, the major includes an informal minor area to be chosen from mathematics, computer science, environmental studies, resource management or a physical or biological science. For more information, see http://atm.ucdavis.edu.

Internships and Career Opportunities. Atmospheric science students have participated in internships with the California Air Resources Board, various county Air Pollution Control Districts, the National Weather Service, and performing research. Job opportunities include: national weather services, weather forecasting for broadcast media or private forecasting firms, environmental consulting firms (such as environmental impact reports, wind farm siting), government agencies at all levels from local (air quality districts, planning departments, etc.) to state (Air Resources Board) to national (NOAA), and companies whose operations are impacted by weather (such as airlines, futures markets). About half of our graduates continue their education by seeking the M.S. or Ph.D. degree in atmospheric science or related areas.

Note. Alternative options for students who are interested in atmospheric science are to minor in ATM or to major in ESM choosing the climate change and air quality track. However, both the ATM minor and the ESM climate change and air quality track do not meet the Federal civil service requirements for meteorologists.

Graduate Study. You can specialize in particular areas of atmospheric science through graduate study and research leading to the M.S. and Ph.D. degrees. For details, see Atmospheric Science (Graduate Group) and Graduate Studies.

Related Courses. See ESP 150A; PHY104A, 104B; ESM 131.

Major Advisor. Kyaw Tha Paw U

Advising Center for the major, is located in 1150 Plant and Environmental Sciences Building in Land, Air and Water Resources Teaching Center; 530-752-1603.

Atmospheric Science Advisor. Lacole Brooks; lawradvising@ucdavis.edu.

Written Expression. Also counts toward College English Composition Requirement **Units:** 4

UWP 101	Advanced Composition	4
OR		
Choose one:		
UWP 102A	Writing in the Disciplines: Special Topics	4
UWP 102B	Writing in the Disciplines: Biology	4
UWP 102C	Writing in the Disciplines: History	4
UWP 102D	Writing in the Disciplines: International Relations	4
UWP 102E	Writing in the Disciplines: Engineering	4
UWP 102F	Writing in the Disciplines: Food Science and Technology	4
UWP 102G	Writing in the Disciplines: Environmental Writing	4
UWP 102H	Writing in the Disciplines: Human Development and Psychology	4
UWP 102I	Writing in the Disciplines: Ethnic Studies	4
UWP 102J	Writing in the Disciplines: Fine Arts	4
UWP 102L	Writing in the Disciplines: Film Studies	4
UWP 102M	Writing in the Disciplines: Community and Regional Development	4
UWP 102N	Writing in the Disciplines: Anthropology	4
UWP 104A	Writing in the Professions: Business Writing	4
UWP 104B	Writing in the Professions: Law	4
UWP 104C	Writing in the Professions: Journalism	4
UWP 104D	Writing in the Professions: Elementary and Secondary Education	4
UWP 104E	Writing in the Professions: Science	4
UWP 104F	Writing in the Professions: Health	4
OR		
UWP 104FV	Writing in the Professions: Health (Online)	4
OR		
UWP 104FY	Writing in the Professions: Health	4
UWP 104I	Writing in the Professions: Internships	4
UWP 104J	Writing in the Professions: Writing for Social Justice	4
UWP 104T	Writing in the Professions: Technical Writing	4
OR		
Course selected with advisor's approval.		

Preparatory Subject Matter **Units:** 63

PLS 002	Botany and Physiology of Cultivated Plants	4
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
ECS 030	Programming and Problem Solving (Discontinued)	4
OR		
Course selected with advisor's approval.		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3
MAT 022B	Differential Equations	3

ATM 060	Introduction to Atmospheric Science	4
PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5
STA 013	Elementary Statistics	4

Depth Subject Matter **Units:** 41

ATM 110	Weather Observation and Analysis	4
ATM 111	Weather Analysis and Prediction	3
ATM 111LY	Weather Analysis and Prediction Laboratory	2
ATM 120	Atmospheric Thermodynamics and Cloud Physics	4
ATM 121A	Atmospheric Dynamics	4
ATM 121B	Atmospheric Dynamics	4
ATM 124	Meteorological Instruments and Observations	3
ATM 128	Radiation and Satellite Meteorology	4

Internship; two units from:

ATM 192	Atmospheric Science Internship	1-12
OR		
ATM 199	Special Study for Advanced Undergraduates	1-5

Choose two upper division Atmospheric Science courses selected with advisor's approval; excluding 192 and 199.

Choose one computer numerical programming class:

ENG 006	Engineering Problem Solving	4
ATM 150	Introduction to Computer Methods in Physical Sciences	4
OR		
Course selected with advisor's approval.		

Restricted Electives **Units:** 15

Coordinated group of courses (informal minor area) to be chosen with advisor's approval from mathematics, computer science, environmental studies, communication, resource management, or a physical or biological science (at least 10 upper division units)

Total: 123

Atmospheric Science | ATM Minor

(College of Agricultural and Environmental Sciences)

Randy Southard, Chairperson (Land, Air and Water Resources)

Cort Anastasio, Vice Chairperson (Atmospheric Science)

Department Office. 1110 Plant and Environmental Sciences Building; 530-752-1130; http://lawr.ucdavis.edu

Faculty. http://lawr.ucdavis.edu/people/faculty/atmospheric-science

Minor Program. The minor in Atmospheric Science provides a broad treatment of weather and climate, with the option to focus on such topics as climate change, meteorological instrumentation, and satellite remote sensing. Students undertaking the minor should have completed minimum preparatory course work in calculus and physics (MAT 016A-016B, PHY 005A or 007A). Some upper division courses in Atmospheric Science have the MAT 021 and 022 series and the PHY 009 series as prerequisites.

Minor Advisor. Kyaw Tha Paw U

Atmospheric Science **Units:** 20-24

ATM 060	Introduction to Atmospheric Science	4
ATM 110	Weather Observation and Analysis	4

Choose four upper division courses, with the approval of the minor program advisor:

Four upper division Atmospheric Science courses (excluding 192 or 199).
OR
Three upper division Atmospheric Science Courses (excluding 192 or 199).
AND

ESM 131	Air as a Resource	3

Total: 20-24

Atmospheric Science | ATM Courses

Questions pertaining to the following courses should be directed to the instructor or to the Land, Air and Water Resources Teaching Center in 1150 Plant & Environmental Sciences Building; 530-752-1603.

Courses in ATM:

ATM 005—Global Climate Change (3)
Discussion—1 hour; Lecture—2 hours. Scientific concepts needed to understand climate and climate change. Principles of regional variations in climate. Understanding observed seasonal, decadal and millennial changes. Analysis of the Antarctic ozone hole, El Nino and human-induced global warming. GE credit: QL, SE, SL, VL. Effective: 2007 Spring Quarter.

ATM 006—Fundamentals of Atmospheric Pollution (3)
Lecture—3 hours. Effects of human emissions on the atmosphere: smog, ozone pollution, and ozone depletion; indoor air pollution; global warming; acid rain. Impacts of these problems on the earth, ecosystems, and humans. Strategies to reduce atmospheric pollution. GE credit: SE, SL, VL. Effective: 2003 Fall Quarter.

ATM 010—Severe and Unusual Weather (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): High school physics. Introduction to physical principles of severe and unusual weather: flood, blizzards, thunderstorms, lightning, tornadoes, and hurricanes. Emphasis on scientific perspective and human context. Not open to students who have received credit for course 100. (Former course 100.) GE credit: QL, SE, SL, VL. Effective: 1997 Spring Quarter.

ATM 060—Introduction to Atmospheric Science (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (MAT 016A or MAT 021A); PHY 007A or PHY 009A) Fundamental principles of the physics, chemistry, and fluid dynamics underlying weather and climate. Solar radiation, the greenhouse effect, and the thermal budget of the Earth. Clouds and their formation, convection, precipitation, mid-latitude storm systems. GE credit: QL, SE, VL. Effective: 2011 Fall Quarter.

ATM 092—Atmospheric Science Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Internship off and on campus in atmospheric science. Internship supervised by a member of the faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

ATM 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

ATM 099—Special Study for Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

ATM 110—Weather Observation and Analysis (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ATM 060 Acquisition, distribution and analysis of meteorological data. Vertical sounding analysis, stability indices, probability of local severe weather, weather map analysis. Use of National Weather Service analyses and forecast products. Laboratory makes use of computer-generated analyses. GE credit: OL, QL, SE, VL. Effective: 1997 Winter Quarter.

ATM 111—Weather Analysis and Prediction (3)
Lecture—3 hours. Prerequisite(s): ATM 110; ATM 121B; (ATM 111L (can be concurrent) or ATM 111LY (can be concurrent)); Knowledge of a programming language. Tools for analyzing observed properties of mid-latitude weather systems. The analysis-forecast system, including various weather forecast models. General structure and properties of mid-latitude weather systems. GE credit: QL, SE, VL. Effective: 2018 Winter Quarter.

ATM 111LY—Weather Analysis and Prediction Laboratory (2)
Laboratory—2 hours; Web Virtual Lecture—4 hours. Prerequisite(s): ATM 111 (can be concurrent) Subjective and objective analysis of weather data. Web-based learning of the analysis-forecast system and various weather forecasting situations. Weather map interpretation and forecast discussions. (P/NP grading only.) GE credit: OL, QL, SE, VL. Effective: 2013 Fall Quarter.

ATM 112—Weather Forecasting Practice (2)
Discussion—2 hours; Laboratory—1 hour. Prerequisite(s): ATM 110 Formal practice in preparing local weather forecasts. Analysis of current weather conditions and recent model performance. Verification
and discussion of prior forecast. Interpretation of current forecast model guidance. Posting of forecast. May be repeated up to 3 time(s). (P/NP grading only.) Effective: 1999 Fall Quarter.

ATM 115—Hydroclimatology (3)
Lecture—3 hours. Prerequisite(s): ATM 060 Examination of climate as the forcing function for the hydrologic system. Emphasis on seasonal variations in the relationship between precipitation and evapotranspiration for meso-scale areas. Watershed modeling of floods and drought for evaluating the effects of climatic
fluctuations. GE credit: SE, SL. Effective: 1997 Winter Quarter.

ATM 116—Modern Climate Change (3)
Lecture—3 hours. Factors that determine the Earth's climate, including natural and human-caused changes. Impacts of climate change. Possible future climates and policies to reduce human emissions of greenhouse gases. GE credit: QL, SE, SL, VL. Effective: 2017 Fall Quarter.

ATM 120—Atmospheric Thermodynamics and Cloud Physics (4)
Extensive Problem Solving—3 hours; Lecture—3 hours. Prerequisite(s): MAT 021C; PHY 009B; ATM 060 (can be concurrent) Atmospheric composition and structure, thermodynamics of atmospheric gases, thermal properties of dry and moist air, atmospheric stability; cloud nucleation, cloud growth by condensation and collision, cloud models. GE credit: QL, SE, VL. Effective: 2000 Fall Quarter.

ATM 121A—Atmospheric Dynamics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): ATM 120; MAT 021D; PHY 009B Fundamental forces of atmospheric flow; noninertial reference frames; development of the equations of motion for rotating stratified atmospheres; isobaric and natural coordinate systems; geostrophic flow; thermal wind; circulation and vorticity. GE credit: QL, SE. Effective: 2001 Winter Quarter.

ATM 121B—Atmospheric Dynamics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): ATM 121A Dynamics of fluid motion in geophysical systems; quasi-geostrophic theory; fundamentals of wave propagation in fluids; Rossby waves; gravity waves; fundamentals of hydrodynamic instability; two-level model; baroclinic instability and cyclogenesis. GE credit: QL, SE. Effective: 2001 Spring Quarter.

ATM 124—Meteorological Instruments and Observations (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): ATM 060 Modern meteorological instruments and their use in meteorological observations and measurements. Both standard and micrometeorological instruments are included. GE credit: QL, SE, SL, VL. Effective: 1997 Winter Quarter.

ATM 128—Radiation and Satellite Meteorology (4)
Discussion/Laboratory—3 hours; Extensive Problem Solving—1 hour. Prerequisite(s): ATM 060; PHY 009B; MAT 022B; MAT 021D Concepts of atmospheric radiation and the use of satellites in remote sensing. Emphasis on the modification of solar and infrared radiation by the atmosphere. Estimation from satellite data of atmospheric variables such as temperatures and cloudiness. GE credit: QL, SE, VL. Effective: 2011 Spring Quarter.

ATM 133—Biometeorology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016B; And one course in a biological discipline or consent of instructor. Atmospheric and biological interactions. Physical and biological basis for water vapor, carbon dioxide and energy exchanges with the atmosphere associated with plants and animals, including humans. Microclimate of plant canopies and microclimatic modification such as frost protection and windbreaks. GE credit: QL, SE, SL, VL. Effective: 2001 Winter Quarter.

ATM 149—Air Pollution (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021D; MAT 022B; CHE 002B C- or better; (ATM 121A or ENG 103 C- or better or ECI 100 C- or better) Physical and technical aspects of air pollution. Emphasis on geophysical processes and air pollution meteorology as well as physical and chemical properties of pollutants. (ECI 149.) GE credit: QL, SE, SL. Effective: 2018 Winter Quarter.

ATM 150—Introduction to Computer Methods in Physical Sciences (4)
Discussion/Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): MAT 022B; PHY 009B; And a computer programming course such as ECS 030; additional courses in fluid dynamics (ATM 121A or ENG 103) and in Fourier transforms (MAT 118C or PHY 104A) are helpful but not required. Enrollment limited to 12, preference to Atmospheric Science majors. Computational techniques used in physical sciences. Integral and differential equation numerical solution: mainly finite differencing and spectral (Fourier transform) methods. Time series applications (time-permitting). Specific applications drawn from meteorology. Accelerated introduction to FORTRAN including programming assignments. (P/NP grading only.) GE credit: SE. Effective: 2005 Fall Quarter.

ATM 158—Boundary-Layer Meteorology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ATM 121A Dynamics of the atmosphere nearest the Earth's surface. Friction and heat transfer. Properties of turbulent flows; statistical and spectral techniques; use and interpretation of differential equations.
Emphasis on the importance to weather, air pollution, and the world's oceans. GE credit: QL, SE, VL. Effective: 2011 Spring Quarter.

ATM 160—Introduction to Atmospheric Chemistry (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 002B Quantitative examination of current local, regional and global problems in atmospheric chemistry (including photochemical smog, acid deposition, climate change, and stratospheric ozone depletion) using fundamental concepts from chemistry. Basic chemical modeling of atmospheric reaction systems. GE credit: QL, SE, SL, VL. Effective: 2000 Winter Quarter.

ATM 192—Atmospheric Science Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Internship off and on campus in atmospheric science. Internship supervised by a member of the faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

ATM 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Three upper division units in Atmospheric Science. (P/NP grading only.) Effective: 1997 Winter Quarter.

ATM 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Three upper division units in Atmospheric Science and at least an overall B average. (P/NP grading only.) Effective: 1997 Winter Quarter.

ATM 215—Advanced Hydroclimatology (3)
Lecture—3 hours. Prerequisite(s): ATM 115 Theoretical and applied aspects of energy and mass fluxes linking the earth's surface, atmosphere, and hydrologic system. Emphasis on regional scale analysis and modeling, spatial data representation, and climate change influences on precipitation and its hydroclimatic expression. Effective: 1998 Spring Quarter.

ATM 221—Advanced Atmospheric Dynamics (3)
Lecture—3 hours. Prerequisite(s): ATM 121B Conditions for instability in stratified atmospheres; baroclinic instability; forced topographic Rossby Waves; wave-mean flow interaction theory; tropical dynamics; stratospheric dynamics. Effective: 1997 Winter Quarter.

ATM 223—Advanced Boundary-Layer Meteorology (3)
Lecture—3 hours. Prerequisite(s): ATM 230 Characteristics of the atmospheric boundary layer under convective and nocturnal conditions. Heat budget at the surface and boundary layer forcing. Similarity theory and scaling of the boundary layer. Measurement and simulation techniques. Effective: 1997 Winter Quarter.

ATM 230—Atmospheric Turbulence (3)
Lecture—3 hours. Prerequisite(s): ATM 121B or ATM 158 Dynamics and energetics of turbulence in the atmosphere including vorticity dynamics. Statistical description of turbulence; Eulerian and Lagrangian scales, spectral analysis, conditional sampling techniques. Turbulent diffusion; the closure problem, gradient-diffusion and second-order methods. Effective: 1997 Winter Quarter.

ATM 231—Advanced Air Pollution Meteorology (3)
Lecture—3 hours. Prerequisite(s): ATM 160; ATM 149A; One course in fluid dynamics. Processes determining transport and diffusion of primary and secondary pollutants. Models of chemical transformation, of the atmospheric boundary layer and of mesoscale wind fields, as applicable to pollutant dispersion problems. Effective: 1997 Spring Quarter.

ATM 233—Advanced Biometeorology (3)
Lecture/Discussion—3 hours. Prerequisite(s): ATM 133; or Consent of Instructor. Current topics in biometeorology. Physical and biological basis for water vapor, other gases, and energy exchange with the atmosphere. Topics include modeling and measuring turbulent transport from plant canopies, surface temperatures and energy budgets, bio-aerosol physics and aerobiology. Effective: 1997 Winter Quarter.

ATM 240—General Circulation of the Atmosphere (4)
Lecture/Discussion—4 hours. Prerequisite(s): ATM 121B Large-scale, observed atmospheric properties. Radiation, momentum, and energy balances derived and compared with observations. Lectures and homework synthesize observations and theories, then apply them to understand the large-scale circulations. Effective: 2000 Winter Quarter.

ATM 241—Climate Dynamics (3)
Lecture/Discussion—3 hours. Prerequisite(s): ATM 121B Dynamics of large-scale climatic variations over time periods from weeks to centuries. Description of the appropriate methods of analysis of atmospheric and oceanic observations. Conservation of mass, energy and momentum. Introduction to the range of climate simulations. Effective: 1997 Winter Quarter.

ATM 245—Climate Change, Water and Society (4)
Lecture—4 hours. Class size limited to 25 students. Integration of climate science and hydrology with policy to understand hydroclimatology and its impact upon natural and human systems. Assignments: readings, take-home examination on climate and hydrologic science, paper that integrates course concepts into a research prospectus or review article. (HYD 245 and ECL 245.) Effective: 2015 Spring Quarter.

ATM 250—Meso-Scale Meteorology (3)
Lecture—3 hours. Prerequisite(s): ATM 150; Graduate standing, a course in partial differential equations or consent of instructor. The study of weather phenomena with horizontal spatial dimensions between 2.5 and 2500 kilometers. Methods of observational study and numerical modeling of the structure and temporal behavior of these weather systems. Effective: 1997 Winter Quarter.

ATM 255—Numerical Modeling of the Atmosphere (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): ATM 121B; ENG 005; ATM 150 recommended. Principles of numerical modeling of the dynamic, thermodynamic and physical processes of the atmosphere. Hands-on experiments on model development using the shallow water equations and the primitive equations. Operational forecast models. Effective: 1997 Winter Quarter.

ATM 260—Atmospheric Chemistry (3)
Lecture—3 hours. Prerequisite(s): ATM 160 Chemistry and photochemistry in tropospheric condensed phases (fog, cloud, and rain drops and aerosol particles). Gas-drop and gas-particle partitioning of compounds and effects of reactions in condensed phases on the fates and transformations of tropospheric chemical species. Effective: 1998 Spring Quarter.

ATM 265—The Art of Climate Modeling (3)
Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): ATM 121A Over the past fifty years, global models have given us incredible insight into the Earth system. This course provides an introduction to these models, with a focus on their design and the science questions they have been built to address. Effective: 2016 Spring Quarter.

ATM 270A—Topics in Atmospheric Science: Meteorological Statistics (1-3)
Discussion—1-3 hours. Applications and concepts in meteorological statistics. Effective: 1997 Winter Quarter.

ATM 270B—Topics in Atmospheric Science: Computer Modeling of the Atmosphere (1-3)
Discussion—1-3 hours. Applications and concepts in computer modeling of the atmosphere. Effective: 1997 Winter Quarter.

ATM 270C—Topics in Atmospheric Science: Design of Experiments and Field Studies in Meteorology (1-3)
Discussion—1-3 hours. Applications and concepts in design of experiments and field studies in meteorology. Effective: 1997 Winter Quarter.

ATM 270D—Topics in Atmospheric Science: Solar and Infrared Radiation in the Atmosphere (1-3)
Discussion—1-3 hours. Applications and concepts in solar and infrared radiation in the atmosphere. Effective: 1997 Winter Quarter.

ATM 270E—Topics in Atmospheric Science: Aerosol and Cloud Physics (1-3)
Discussion—1-3 hours. Applications and concepts in aerosol and cloud physics. Effective: 1997 Winter Quarter.

ATM 270F—Topics in Atmospheric Science: Atmospheric Chemistry (1-3)
Discussion—1-3 hours. Applications and concepts in atmospheric chemistry. Effective: 1997 Winter Quarter.

ATM 270G—Topics in Atmospheric Science: General Meteorology (1-3)
Discussion—1-3 hours. Applications and concepts in general meteorology. Effective: 1997 Winter Quarter.

ATM 280A—Air Quality Policy in the Real World (4)
Project (Term Project). Prerequisite(s): (ATM 149 or ECI 149); ECI 242; Consent of Instructor. Or equivalent of ECI 242. In-depth investigation of an air quality problem with a team and mentor from government or industry. Science, engineering and policy will be involved. Findings will be presented orally and in writing. (Deferred grading only, pending completion of sequence.) Effective: 2007 Winter Quarter.

ATM 280B—Air Quality Policy in the Real World (4)
Project (Term Project). Prerequisite(s): ATM 280A; and Consent of Instructor. In-depth investigation of an air quality problem with a team and mentor from government or industry. Science, engineering and policy will be involved. Findings will be presented orally and in writing. (Deferred grading only, pending completion of sequence.) Effective: 2007 Winter Quarter.

ATM 290—Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing in Atmospheric Science or related field. Current developments in selected areas of atmospheric research. Topics will vary according to student and faculty interests. (S/U grading only.) Effective: 1997 Winter Quarter.

ATM 291A—Research Conference in Atmospheric Science; Air Quality Meteorology (1-3)
Lecture/Discussion—1-3 hours. Prerequisite(s): Consent of Instructor. Review and discussion of current literature and research in Air Quality Meteorology. May be repeated up to 6 unit(s). (S/U grading only.) Effective: 2010 Fall Quarter.

ATM 291B—Research Conference in Atmospheric Science; Biometeorology (1-3)
Lecture/Discussion—1-3 hours. Prerequisite(s): Consent of Instructor. Review and discussion of current literature and research in Biometeorology. May be repeated up to 6 unit(s). (S/U grading only.) Effective: 2010 Fall Quarter.

ATM 291C—Research Conference in Atmospheric Science; Boundary Layer Meteorology (1-3)
Lecture/Discussion—1-3 hours. Prerequisite(s): Consent of Instructor. Review and discussion of current literature and research in Boundary Layer Meteorology. May be repeated up to 6 unit(s). (S/U grading only.) Effective: 2010 Fall Quarter.

ATM 291D—Research Conference in Atmospheric Science; Climate Change (1-3)
Lecture/Discussion—1-3 hours. Prerequisite(s): Consent of Instructor. Review and discussion of current literature and research in Climate Change. May be repeated up to 6 unit(s). (S/U grading only.) Effective: 2010 Fall Quarter.

ATM 291E—Research Conference in Atmospheric Science; General Meteorology (1-3)
Lecture/Discussion—1-3 hours. Prerequisite(s): Consent of Instructor. Review and discussion of current literature and research in General Meteorology. May be repeated up to 6 unit(s). (S/U grading only.) Effective: 2010 Fall Quarter.

ATM 291F—Research Conference in Atmospheric Science; Atmospheric Chemistry (1-3)
Lecture/Discussion—1-3 hours. Prerequisite(s): Consent of Instructor. Review and discussion of current literature and research in Atmospheric Chemistry. May be repeated up to 6 unit(s). (S/U grading only.) Effective: 2010 Fall Quarter.

ATM 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

ATM 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

ATM 393—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

ATM 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Atmospheric Science (Graduate Group)

Atmospheric Science (Graduate Group) | ATM Information

Shu-Hua Chen, Ph.D., Chairperson of the Group; 530-752-1822

Group Office. 1152 Plant and Environmental Sciences Building; 530-752-1669; http://atm.ucdavis.edu

Faculty. http://atm.ucdavis.edu/people/faculty/

Atmospheric Science (Graduate Group) | ATM M.S.

Shu-Hua Chen, Ph.D., Chairperson of the Group; 530-752-1822

Group Office. 1152 Plant and Environmental Sciences Building; 530-752-1669; http://atm.ucdavis.edu

Faculty. http://atm.ucdavis.edu/people/faculty/

Graduate Study. The Graduate Group in Atmospheric Science offers both the M.S. and Ph.D. degree programs. A student may place emphasis on graduate work in one or more of the following fields: air quality meteorology, atmospheric chemistry, cloud physical processes, biometeorology, micrometeorology, numerical weather prediction, remote sensing, climate dynamics, large-scale dynamics, and meso-scale and boundary-layer meteorology. The diverse and extensive backgrounds of the faculty allow opportunities for interdisciplinary training and research.

Preparation. The Group encourages applications from all interested students with backgrounds in the physical or natural sciences. Basic qualifications for students entering the Atmospheric Science graduate program include mathematics to the level of vector calculus and partial differential equations, and one year of college-level physics. Flexibility may be allowed for students with high academic potential, but it is expected that deficiencies in preparatory material and in key undergraduate atmospheric science courses be completed within the first year of graduate study.

Graduate Advisor. Paul Ullrich, Ph.D.

Graduate Admissions Officer. Ian Faloona, Ph.D.

Atmospheric Science (Graduate Group) | ATM Ph.D

Shu-Hua Chen, Ph.D., Chairperson of the Group; 530-752-1822

Group Office. 1152 Plant and Environmental Sciences Building; 530-752-1669; http://atm.ucdavis.edu

Faculty. http://atm.ucdavis.edu/people/faculty/

Graduate Study. The Graduate Group in Atmospheric Science offers both the M.S. and Ph.D. degree programs. A student may place emphasis on graduate work in one or more of the following fields: air quality meteorology, atmospheric chemistry, cloud physical processes, biometeorology, micrometeorology, numerical weather prediction, remote sensing, climate dynamics, large-scale dynamics, and meso-scale and boundary-layer meteorology. The diverse and extensive backgrounds of the faculty allow opportunities for interdisciplinary training and research.

Preparation. The Group encourages applications from all interested students with backgrounds in the physical or natural sciences. Basic qualifications for students entering the Atmospheric Science graduate program include mathematics to the level of vector calculus and partial differential equations, and one year of college-level physics. Flexibility may be allowed for students with high academic potential, but it is expected that deficiencies in preparatory material and in key undergraduate atmospheric science courses be completed within the first year of graduate study.

Graduate Advisor. Paul Ullrich, Ph.D.

Graduate Admissions Officer. Ian Faloona, Ph.D.

Atmospheric Science (Graduate Group) | ATM Courses

Questions pertaining to the following courses should be directed to the instructor or to the Land, Air and Water Resources Teaching Center in 1150 Plant & Environmental Sciences Building; 530-752-1603.

Courses in ATM:

ATM 005—Global Climate Change (3)
Discussion—1 hour; Lecture—2 hours. Scientific concepts needed to understand climate and climate change. Principles of regional variations in climate. Understanding observed seasonal, decadal and millennial changes. Analysis of the Antarctic ozone hole, El Nino and human-induced global warming. GE credit: QL, SE, SL, VL. Effective: 2007 Spring Quarter.

ATM 006—Fundamentals of Atmospheric Pollution (3)
Lecture—3 hours. Effects of human emissions on the atmosphere: smog, ozone pollution, and ozone depletion; indoor air pollution; global warming; acid rain. Impacts of these problems on the earth, ecosystems, and humans. Strategies to reduce atmospheric pollution. GE credit: SE, SL, VL. Effective: 2003 Fall Quarter.

ATM 010—Severe and Unusual Weather (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): High school physics. Introduction to physical principles of severe and unusual weather: flood, blizzards, thunderstorms, lightning, tornadoes, and hurricanes. Emphasis on scientific perspective and human context. Not open to students who have received credit for course 100. (Former course 100.) GE credit: QL, SE, SL, VL. Effective: 1997 Spring Quarter.

ATM 060—Introduction to Atmospheric Science (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (MAT 016A or MAT 021A); PHY 007A or PHY 009A) Fundamental principles of the physics, chemistry, and fluid dynamics underlying weather and climate. Solar radiation, the greenhouse effect, and the thermal budget of the Earth. Clouds and their formation, convection, precipitation, mid-latitude storm systems. GE credit: QL, SE, VL. Effective: 2011 Fall Quarter.

ATM 092—Atmospheric Science Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Internship off and on campus in atmospheric science. Internship supervised by a member of the faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

ATM 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

ATM 099—Special Study for Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

ATM 110—Weather Observation and Analysis (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ATM 060 Acquisition, distribution and analysis of meteorological data. Vertical sounding analysis, stability indices, probability of local severe weather, weather map analysis. Use of National Weather Service analyses and forecast products. Laboratory makes use of computer-generated analyses. GE credit: OL, QL, SE, VL. Effective: 1997 Winter Quarter.

ATM 111—Weather Analysis and Prediction (3)
Lecture—3 hours. Prerequisite(s): ATM 110; ATM 121B; (ATM 111L (can be concurrent) or ATM 111LY (can be concurrent)); Knowledge of a programming language. Tools for analyzing observed properties of mid-latitude weather systems. The analysis-forecast system, including various weather forecast models. General structure and properties of mid-latitude weather systems. GE credit: QL, SE, VL. Effective: 2018 Winter Quarter.

ATM 111LY—Weather Analysis and Prediction Laboratory (2)
Laboratory—2 hours; Web Virtual Lecture—4 hours. Prerequisite(s): ATM 111 (can be concurrent) Subjective and objective analysis of weather data. Web-based learning of the analysis-forecast system and various weather forecasting situations. Weather map interpretation and forecast discussions. (P/NP grading only.) GE credit: OL, QL, SE, VL. Effective: 2013 Fall Quarter.

ATM 112—Weather Forecasting Practice (2)
Discussion—2 hours; Laboratory—1 hour. Prerequisite(s): ATM 110 Formal practice in preparing local weather forecasts. Analysis of current weather conditions and recent model performance. Verification
and discussion of prior forecast. Interpretation of current forecast model guidance. Posting of forecast. May be repeated up to 3 time(s). (P/NP grading only.) Effective: 1999 Fall Quarter.

ATM 115—Hydroclimatology (3)
Lecture—3 hours. Prerequisite(s): ATM 060 Examination of climate as the forcing function for the hydrologic system. Emphasis on seasonal variations in the relationship between precipitation and evapotranspiration for meso-scale areas. Watershed modeling of floods and drought for evaluating the effects of climatic
fluctuations. GE credit: SE, SL. Effective: 1997 Winter Quarter.

ATM 116—Modern Climate Change (3)
Lecture—3 hours. Factors that determine the Earth's climate, including natural and human-caused changes. Impacts of climate change. Possible future climates and policies to reduce human emissions of greenhouse gases. GE credit: QL, SE, SL, VL. Effective: 2017 Fall Quarter.

ATM 120—Atmospheric Thermodynamics and Cloud Physics (4)
Extensive Problem Solving—3 hours; Lecture—3 hours. Prerequisite(s): MAT 021C; PHY 009B; ATM 060 (can be concurrent) Atmospheric composition and structure, thermodynamics of atmospheric gases, thermal properties of dry and moist air, atmospheric stability; cloud nucleation, cloud growth by condensation and collision, cloud models. GE credit: QL, SE, VL. Effective: 2000 Fall Quarter.

ATM 121A—Atmospheric Dynamics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): ATM 120; MAT 021D; PHY 009B Fundamental forces of atmospheric flow; noninertial reference frames; development of the equations of motion for rotating stratified atmospheres; isobaric and natural coordinate systems; geostrophic flow; thermal wind; circulation and vorticity. GE credit: QL, SE. Effective: 2001 Winter Quarter.

ATM 121B—Atmospheric Dynamics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): ATM 121A Dynamics of fluid motion in geophysical systems; quasi-geostrophic theory; fundamentals of wave propagation in fluids; Rossby waves; gravity waves; fundamentals of hydrodynamic instability; two-level model; baroclinic instability and cyclogenesis. GE credit: QL, SE. Effective: 2001 Spring Quarter.

ATM 124—Meteorological Instruments and Observations (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): ATM 060 Modern meteorological instruments and their use in meteorological observations and measurements. Both standard and micrometeorological instruments are included. GE credit: QL, SE, SL, VL. Effective: 1997 Winter Quarter.

ATM 128—Radiation and Satellite Meteorology (4)
Discussion/Laboratory—3 hours; Extensive Problem Solving—1 hour. Prerequisite(s): ATM 060; PHY 009B; MAT 022B; MAT 021D Concepts of atmospheric radiation and the use of satellites in remote sensing. Emphasis on the modification of solar and infrared radiation by the atmosphere. Estimation from satellite data of atmospheric variables such as temperatures and cloudiness. GE credit: QL, SE, VL. Effective: 2011 Spring Quarter.

ATM 133—Biometeorology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016B; And one course in a biological discipline or consent of instructor. Atmospheric and biological interactions. Physical and biological basis for water vapor, carbon dioxide and energy exchanges with the atmosphere associated with plants and animals, including humans. Microclimate of plant canopies and microclimatic modification such as frost protection and windbreaks. GE credit: QL, SE, SL, VL. Effective: 2001 Winter Quarter.

ATM 149—Air Pollution (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021D; MAT 022B; CHE 002B C- or better; (ATM 121A or ENG 103 C- or better or ECI 100 C- or better) Physical and technical aspects of air pollution. Emphasis on geophysical processes and air pollution meteorology as well as physical and chemical properties of pollutants. (ECI 149.) GE credit: QL, SE, SL. Effective: 2018 Winter Quarter.

ATM 150—Introduction to Computer Methods in Physical Sciences (4)
Discussion/Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): MAT 022B; PHY 009B; And a computer programming course such as ECS 030; additional courses in fluid dynamics (ATM 121A or ENG 103) and in Fourier transforms (MAT 118C or PHY 104A) are helpful but not required. Enrollment limited to 12, preference to Atmospheric Science majors. Computational techniques used in physical sciences. Integral and differential equation numerical solution: mainly finite differencing and spectral (Fourier transform) methods. Time series applications (time-permitting). Specific applications drawn from meteorology. Accelerated introduction to FORTRAN including programming assignments. (P/NP grading only.) GE credit: SE. Effective: 2005 Fall Quarter.

ATM 158—Boundary-Layer Meteorology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ATM 121A Dynamics of the atmosphere nearest the Earth's surface. Friction and heat transfer. Properties of turbulent flows; statistical and spectral techniques; use and interpretation of differential equations.
Emphasis on the importance to weather, air pollution, and the world's oceans. GE credit: QL, SE, VL. Effective: 2011 Spring Quarter.

ATM 160—Introduction to Atmospheric Chemistry (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 002B Quantitative examination of current local, regional and global problems in atmospheric chemistry (including photochemical smog, acid deposition, climate change, and stratospheric ozone depletion) using fundamental concepts from chemistry. Basic chemical modeling of atmospheric reaction systems. GE credit: QL, SE, SL, VL. Effective: 2000 Winter Quarter.

ATM 192—Atmospheric Science Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Internship off and on campus in atmospheric science. Internship supervised by a member of the faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

ATM 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Three upper division units in Atmospheric Science. (P/NP grading only.) Effective: 1997 Winter Quarter.

ATM 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Three upper division units in Atmospheric Science and at least an overall B average. (P/NP grading only.) Effective: 1997 Winter Quarter.

ATM 215—Advanced Hydroclimatology (3)
Lecture—3 hours. Prerequisite(s): ATM 115 Theoretical and applied aspects of energy and mass fluxes linking the earth's surface, atmosphere, and hydrologic system. Emphasis on regional scale analysis and modeling, spatial data representation, and climate change influences on precipitation and its hydroclimatic expression. Effective: 1998 Spring Quarter.

ATM 221—Advanced Atmospheric Dynamics (3)
Lecture—3 hours. Prerequisite(s): ATM 121B Conditions for instability in stratified atmospheres; baroclinic instability; forced topographic Rossby Waves; wave-mean flow interaction theory; tropical dynamics; stratospheric dynamics. Effective: 1997 Winter Quarter.

ATM 223—Advanced Boundary-Layer Meteorology (3)
Lecture—3 hours. Prerequisite(s): ATM 230 Characteristics of the atmospheric boundary layer under convective and nocturnal conditions. Heat budget at the surface and boundary layer forcing. Similarity theory and scaling of the boundary layer. Measurement and simulation techniques. Effective: 1997 Winter Quarter.

ATM 230—Atmospheric Turbulence (3)
Lecture—3 hours. Prerequisite(s): ATM 121B or ATM 158 Dynamics and energetics of turbulence in the atmosphere including vorticity dynamics. Statistical description of turbulence; Eulerian and Lagrangian scales, spectral analysis, conditional sampling techniques. Turbulent diffusion; the closure problem, gradient-diffusion and second-order methods. Effective: 1997 Winter Quarter.

ATM 231—Advanced Air Pollution Meteorology (3)
Lecture—3 hours. Prerequisite(s): ATM 160; ATM 149A; One course in fluid dynamics. Processes determining transport and diffusion of primary and secondary pollutants. Models of chemical transformation, of the atmospheric boundary layer and of mesoscale wind fields, as applicable to pollutant dispersion problems. Effective: 1997 Spring Quarter.

ATM 233—Advanced Biometeorology (3)
Lecture/Discussion—3 hours. Prerequisite(s): ATM 133; or Consent of Instructor. Current topics in biometeorology. Physical and biological basis for water vapor, other gases, and energy exchange with the atmosphere. Topics include modeling and measuring turbulent transport from plant canopies, surface temperatures and energy budgets, bio-aerosol physics and aerobiology. Effective: 1997 Winter Quarter.

ATM 240—General Circulation of the Atmosphere (4)
Lecture/Discussion—4 hours. Prerequisite(s): ATM 121B Large-scale, observed atmospheric properties. Radiation, momentum, and energy balances derived and compared with observations. Lectures and homework synthesize observations and theories, then apply them to understand the large-scale circulations. Effective: 2000 Winter Quarter.

ATM 241—Climate Dynamics (3)
Lecture/Discussion—3 hours. Prerequisite(s): ATM 121B Dynamics of large-scale climatic variations over time periods from weeks to centuries. Description of the appropriate methods of analysis of atmospheric and oceanic observations. Conservation of mass, energy and momentum. Introduction to the range of climate simulations. Effective: 1997 Winter Quarter.

ATM 245—Climate Change, Water and Society (4)
Lecture—4 hours. Class size limited to 25 students. Integration of climate science and hydrology with policy to understand hydroclimatology and its impact upon natural and human systems. Assignments: readings, take-home examination on climate and hydrologic science, paper that integrates course concepts into a research prospectus or review article. (HYD 245 and ECL 245.) Effective: 2015 Spring Quarter.

ATM 250—Meso-Scale Meteorology (3)
Lecture—3 hours. Prerequisite(s): ATM 150; Graduate standing, a course in partial differential equations or consent of instructor. The study of weather phenomena with horizontal spatial dimensions between 2.5 and 2500 kilometers. Methods of observational study and numerical modeling of the structure and temporal behavior of these weather systems. Effective: 1997 Winter Quarter.

ATM 255—Numerical Modeling of the Atmosphere (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): ATM 121B; ENG 005; ATM 150 recommended. Principles of numerical modeling of the dynamic, thermodynamic and physical processes of the atmosphere. Hands-on experiments on model development using the shallow water equations and the primitive equations. Operational forecast models. Effective: 1997 Winter Quarter.

ATM 260—Atmospheric Chemistry (3)
Lecture—3 hours. Prerequisite(s): ATM 160 Chemistry and photochemistry in tropospheric condensed phases (fog, cloud, and rain drops and aerosol particles). Gas-drop and gas-particle partitioning of compounds and effects of reactions in condensed phases on the fates and transformations of tropospheric chemical species. Effective: 1998 Spring Quarter.

ATM 265—The Art of Climate Modeling (3)
Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): ATM 121A Over the past fifty years, global models have given us incredible insight into the Earth system. This course provides an introduction to these models, with a focus on their design and the science questions they have been built to address. Effective: 2016 Spring Quarter.

ATM 270A—Topics in Atmospheric Science: Meteorological Statistics (1-3)
Discussion—1-3 hours. Applications and concepts in meteorological statistics. Effective: 1997 Winter Quarter.

ATM 270B—Topics in Atmospheric Science: Computer Modeling of the Atmosphere (1-3)
Discussion—1-3 hours. Applications and concepts in computer modeling of the atmosphere. Effective: 1997 Winter Quarter.

ATM 270C—Topics in Atmospheric Science: Design of Experiments and Field Studies in Meteorology (1-3)
Discussion—1-3 hours. Applications and concepts in design of experiments and field studies in meteorology. Effective: 1997 Winter Quarter.

ATM 270D—Topics in Atmospheric Science: Solar and Infrared Radiation in the Atmosphere (1-3)
Discussion—1-3 hours. Applications and concepts in solar and infrared radiation in the atmosphere. Effective: 1997 Winter Quarter.

ATM 270E—Topics in Atmospheric Science: Aerosol and Cloud Physics (1-3)
Discussion—1-3 hours. Applications and concepts in aerosol and cloud physics. Effective: 1997 Winter Quarter.

ATM 270F—Topics in Atmospheric Science: Atmospheric Chemistry (1-3)
Discussion—1-3 hours. Applications and concepts in atmospheric chemistry. Effective: 1997 Winter Quarter.

ATM 270G—Topics in Atmospheric Science: General Meteorology (1-3)
Discussion—1-3 hours. Applications and concepts in general meteorology. Effective: 1997 Winter Quarter.

ATM 280A—Air Quality Policy in the Real World (4)
Project (Term Project). Prerequisite(s): (ATM 149 or ECI 149); ECI 242; Consent of Instructor. Or equivalent of ECI 242. In-depth investigation of an air quality problem with a team and mentor from government or industry. Science, engineering and policy will be involved. Findings will be presented orally and in writing. (Deferred grading only, pending completion of sequence.) Effective: 2007 Winter Quarter.

ATM 280B—Air Quality Policy in the Real World (4)
Project (Term Project). Prerequisite(s): ATM 280A; and Consent of Instructor. In-depth investigation of an air quality problem with a team and mentor from government or industry. Science, engineering and policy will be involved. Findings will be presented orally and in writing. (Deferred grading only, pending completion of sequence.) Effective: 2007 Winter Quarter.

ATM 290—Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing in Atmospheric Science or related field. Current developments in selected areas of atmospheric research. Topics will vary according to student and faculty interests. (S/U grading only.) Effective: 1997 Winter Quarter.

ATM 291A—Research Conference in Atmospheric Science; Air Quality Meteorology (1-3)
Lecture/Discussion—1-3 hours. Prerequisite(s): Consent of Instructor. Review and discussion of current literature and research in Air Quality Meteorology. May be repeated up to 6 unit(s). (S/U grading only.) Effective: 2010 Fall Quarter.

ATM 291B—Research Conference in Atmospheric Science; Biometeorology (1-3)
Lecture/Discussion—1-3 hours. Prerequisite(s): Consent of Instructor. Review and discussion of current literature and research in Biometeorology. May be repeated up to 6 unit(s). (S/U grading only.) Effective: 2010 Fall Quarter.

ATM 291C—Research Conference in Atmospheric Science; Boundary Layer Meteorology (1-3)
Lecture/Discussion—1-3 hours. Prerequisite(s): Consent of Instructor. Review and discussion of current literature and research in Boundary Layer Meteorology. May be repeated up to 6 unit(s). (S/U grading only.) Effective: 2010 Fall Quarter.

ATM 291D—Research Conference in Atmospheric Science; Climate Change (1-3)
Lecture/Discussion—1-3 hours. Prerequisite(s): Consent of Instructor. Review and discussion of current literature and research in Climate Change. May be repeated up to 6 unit(s). (S/U grading only.) Effective: 2010 Fall Quarter.

ATM 291E—Research Conference in Atmospheric Science; General Meteorology (1-3)
Lecture/Discussion—1-3 hours. Prerequisite(s): Consent of Instructor. Review and discussion of current literature and research in General Meteorology. May be repeated up to 6 unit(s). (S/U grading only.) Effective: 2010 Fall Quarter.

ATM 291F—Research Conference in Atmospheric Science; Atmospheric Chemistry (1-3)
Lecture/Discussion—1-3 hours. Prerequisite(s): Consent of Instructor. Review and discussion of current literature and research in Atmospheric Chemistry. May be repeated up to 6 unit(s). (S/U grading only.) Effective: 2010 Fall Quarter.

ATM 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

ATM 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

ATM 393—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

ATM 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Avian Sciences

Avian Sciences | AVS Minor

(College of Agricultural and Environmental Sciences)

James Murray Ph.D., Chairperson of the Department (Animal Science)

Department Office. 2223 Meyer Hall; 530-752-1250; http://animalscience.ucdavis.edu/

Faculty. http://animalscience.ucdavis.edu/faculty/index.html

The Program. The flexibility of the program and the close personal interaction between students, faculty, and specialists in the field give students a large role in selecting and designing their own course work.

Internships and Career Alternatives. Independent study, undergraduate research, and internships are emphasized in the Avian Sciences program. Birds for laboratory or special study are housed within the main building as well as at the research farm and the experimental aviary.

Advising Center for the minor and course offerings is located in the Animal Science Advising Center in 1202 Meyer Hall; 530-754-7915; http://asac.ucdavis.edu/.

Avian Sciences **Units:** 18

Choose one:

AVS 011	Introduction to Poultry Science	3
AVS 013	Birds, Humans and the Environment	3
AVS 014L	Management of Captive Birds	2
AVS 015L	Captive Raptor Management	2
AVS 016L (Nonexistent)		

Choose remaining units from:

AVS 100	Avian Biology	3
AVS 103	Avian Development and Genomics	3
AVS 115	Raptor Biology	3
AVS 121	Avian Reproduction	2
AVS 123	Management of Birds	3
AVS 149	Egg Production Management	2
AVS 150	Nutrition of Birds	1
AVS 160	Designing and Performing Experiments in Avian Sciences	2
ANS 143	Pig and Poultry Care and Management	4
NPB 117	Avian Physiology	3
WFC 111	Biology and Conservation of Wild Birds	3
WFC 136	Ecology of Waterfowl and Game Birds	4

Related Courses

ARE 130	Agricultural Markets	4
ANS 143	Pig and Poultry Care and Management	4
MCB 150	Developmental Biology	4
NUT 123	Comparative Animal Nutrition	3
NUT 123L	Comparative Animal Nutrition Laboratory	1

Total: 18

Avian Sciences | AVS Courses

Courses in AVS:

AVS 011—Introduction to Poultry Science (3)
Lecture—3 hours. The mosaic of events that have tied poultry science to other scientific disciplines and poultry to humans. Poultry science techniques and production methods from the time of domestication to the present. One field trip required. GE credit: SE. Effective: 1997 Winter Quarter.

AVS 013—Birds, Humans and the Environment (3)
Discussion—1 hour; Lecture—2 hours. Restricted to students with lower division standing. Interrelationships of the worlds of birds and humans. Lectures, discussions, field trips and projects focus on ecology, avian evolution, physiology, reproduction, flight, behavior, folklore, identification, ecotoxicology and conservation. Current environmental issues are emphasized. Half-day field trip. GE credit: SE, SL. Effective: 2017 Winter Quarter.

AVS 014L—Management of Captive Birds (2)
Fieldwork—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. One weekly discussion and field trip to study practical captive management (housing, feeding, equipment, marketing, diseases). Visit facilities rearing birds such as commercial parrots, hobbyist exotics, ostrich, raptors, waterfowl, game birds, poultry and pigeons. GE credit: SE. Effective: 1997 Winter Quarter.

AVS 015L—Captive Raptor Management (2)
Independent Study—3 hours; Laboratory—3 hours. Hands-on experience handling birds of prey. Students are taught all of the skills required to handle and care for raptors, including husbandry, biology, habitat requirements, cage design, veterinary care, rehabilitation methods, research potential and long-term care requirements. One Saturday fieldtrip. GE credit: SE. Effective: 1997 Winter Quarter.

AVS 016LA—Raptor Migration and Population Fluctuations (2)
Discussion—1 hour; Fieldwork—3 hours. Prerequisite(s): Consent of Instructor. Identify raptors: study of effects of weather, crops, agricultural practices on fluctuations in raptor species and numbers. Familiarize with literature; design a project; survey study sites; collect, computerize, analyze data, compare with previous years. Species, observations, emphasis different each quarter. One Saturday field trip. GE credit: SE. Effective: 1997 Winter Quarter.

AVS 016LB—Raptor Migration and Population Fluctuations (2)
Discussion—1 hour; Fieldwork—3 hours. Prerequisite(s): Consent of Instructor. Identify raptors: study of effects of weather, crops, agricultural practices on fluctuations in raptor species and numbers. Familiarize with literature; design a project; survey study sites; collect, computerize, analyze data, compare with previous years. Species, observations, emphasis different each quarter. One Saturday field trip. GE credit: SE. Effective: 1997 Winter Quarter.

AVS 016LC—Raptor Migration and Population Fluctuations (2)
Discussion—1 hour; Fieldwork—3 hours. Prerequisite(s): Consent of Instructor. Identify raptors: study of effects of weather, crops, agricultural practices on fluctuations in raptor species and numbers. Familiarize with literature; design a project; survey study sites; collect, computerize, analyze data, compare with previous years. Species, observations, emphasis different each quarter. One Saturday field trip. GE credit: SE. Effective: 1997 Winter Quarter.

AVS 092—Internship in the Avian Sciences (1-12)
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. Sophomore standing preferred. Internship on and off campus in poultry, game birds or exotic bird production, management and research; or in a business, industry, or agency concerned with these entities. Compliance with Internship Approval form essential. (P/NP grading only.) Effective: 1997 Winter Quarter.

AVS 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Fall Quarter.

AVS 099—Special Study for Undergraduates (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

AVS 100—Avian Biology (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B; ANS 002 preferred. Biology of domesticated poultry, specifically chickens and turkeys. Avian genetics, immunology, reproduction, growth and development, broiler and layer management. GE credit: SE. Effective: 2016 Spring Quarter.

AVS 103—Avian Development and Genomics (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B Unique features of avian development and genomics: Incubation; Staging; Egg Structure/Function; Fertilization; Pre-ovipositал; Oviposition, Cold Torpor; Post-ovipositал Development; Organogenesis, Growth; Sexual Differentiation; Extraembryonic Membranes; Mortality/Hatching; Genome Organization; Comparative Avian Genomics; Telomere Biology; Sex Chromosomes/Sex Determination; Advanced Technologies; Genome Manipulation; Mutations. GE credit: SE. Effective: 2016 Fall Quarter.

AVS 115—Raptor Biology (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; Or equivalent. Study of birds of prey: classification, distribution, habits, migration, unique anatomical and physiological adaptations, natural and captive breeding, health and diseases, environmental concerns, conservation, legal considerations, rehabilitation, and falconry. Includes two Saturday field trips. GE credit: SE. Effective: 2016 Fall Quarter.

AVS 121—Avian Reproduction (2)
Lecture—2 hours. Prerequisite(s): BIS 002A; BIS 002B Breeding cycles and reproductive strategies, egg and sperm formation, incubation, sexual development, imprinting, hormonal control of reproductive behavior and song. Species coverage includes wild and companion birds. Course has a physiological orientation. GE credit: SE, SL. Effective: 2016 Fall Quarter.

AVS 123—Management of Birds (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B Captive propagation of birds, including reproduction, genetic management, health, feeding, artificial incubation, artificial insemination, and related legal aspects, including trade and smuggling. Emphasis on exotic species and the role of captive propagation in conservation. GE credit: SE, SL, WE. Effective: 2016 Fall Quarter.

AVS 149—Egg Production Management (2)
Lecture—2 hours. Prerequisite(s): AVS 011; or Consent of Instructor. Management of commercial table egg flocks as related to environment, nutrition, disease control, economics, housing, equipment, egg processing and raising replacement pullets. Offered in alternate years. One Saturday field trip required. GE credit: SE. Effective: 2016 Fall Quarter.

AVS 150—Nutrition of Birds (1)
Lecture—1 hour. Prerequisite(s): ABI 103 (can be concurrent) or BIS 103 (can be concurrent) Principles of nutrition specific to avian species, including feedstuffs, feed additives, nutrient metabolism, energy systems, and nutritional support of egg production and growth. Use of computers for feed formulation to support production. GE credit: QL, SE. Effective: 2016 Fall Quarter.

AVS 160—Designing and Performing Experiments in Avian Sciences (2)
Laboratory—6 hours. Prerequisite(s): AVS 100 or WFC 111; or Consent of Instructor. Experiments in current problems in avian biology. Introduction to experimental design. Students choose a project, design a protocol, perform an experiment and report their findings. May be repeated for credit with consent of instructor. May be repeated for credit with consent of instructor. GE credit: SE. Effective: 2016 Fall Quarter.

AVS 170—Advanced Avian Biology (4)
Lecture/Discussion—3 hours; Project (Term Project)—1 hour. Prerequisite(s): AVS 100 or WFC 111 Ecology, behavior, functional morphology and lifehistory evolution of birds. Emphasis on the importance of body size as a principle determinant of most aspects of avian performance from lifespan to reproduction and species abundance. Analytical synthesis and critical thought emphasized. GE credit: SE. Effective: 2016 Fall Quarter.

AVS 190—Seminar in Avian Sciences (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. May be repeated up to 3 time(s). (P/NP grading only.) Effective: 2016 Fall Quarter.

AVS 192—Internship in Avian Sciences (1-12)
Laboratory—3-36 hours. Prerequisite(s): Consent of Instructor. Internship on and off campus in poultry, game birds or exotic bird production, management and research; or in a business, industry, or agency concerned with these entities. Compliance with Internship Approval form essential. (P/NP grading only.) Effective: 2016 Fall Quarter.

AVS 195—Topics in Current Research (1-3)
Lecture/Discussion; Variable—1-3 hours. Prerequisite(s): Consent of Instructor. Discussion of topics of current interest in avian sciences. May be repeated three times for credit. May be repeated up to 3 time(s). Effective: 1997 Winter Quarter.

AVS 197T—Tutoring in Avian Sciences (1-3)
Tutorial—1-3 hours. Prerequisite(s): Consent of Instructor. Tutoring of students in lower division avian sciences courses; weekly conference with instructors in charge of courses; written critiques of teaching procedures. (P/NP grading only.) Effective: 2016 Fall Quarter.

AVS 198—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Restricted to upper division students. Directed group study. (P/NP grading only.) Effective: 2017 Winter Quarter.

AVS 199—Special Study for Advanced Undergraduates (1-5)
Variable—1-5 hours. (P/NP grading only.) Effective: 1997 Winter Quarter.

AVS 203—Advanced Avian Development and Genomics (1)
Discussion—1 hour. Prerequisite(s): AVS 103 (can be concurrent); Graduate standing. In consultation with the instructor, students develop a lecture and associated instructional materials, i.e., lesson plan, including justification, reading and presentation and evaluation aids. The topic must complement a topic covered in Avian Sciences 103. Effective: 2013 Fall Quarter.

AVS 290—Seminar (1)
Seminar—1 hour. Reports and discussions of recent advances and selected topics of current interest in avian genetics, physiology, nutrition, and poultry technology. Effective: 1997 Winter Quarter.

AVS 290C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Major professors lead research discussions with their graduate students. Research papers are reviewed and project proposals
presented and evaluated. Format will combine seminar and discussion. (S/U grading only.) Effective: 1997 Winter Quarter.

AVS 297T—Supervised Teaching in Avian Sciences (1-4)
Tutorial—1-4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Tutoring of students in lower, upper division, and graduate courses in Avian Sciences; weekly conference with instructor in charge of course; written critiques of teaching methods in lectures and laboratories. (S/U grading only.) Effective: 1997 Winter Quarter.

AVS 298—Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Effective: 1997 Winter Quarter.

AVS 299—Research (1-12)
Variable—1-12 hours. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

Avian Sciences (Graduate Group)

Avian Sciences (Graduate Group) | AVS M.S.

Annie King, Ph.D., Chairperson of the Group

Group Office. 1249 Meyer Hall; 530-752-2382; http://aviansciences.ucdavis.edu

Faculty. http://aviansciences.ucdavis.edu/people/faculty.html

Graduate Study. The Graduate Group in Avian Sciences offers the M.S. degree program to students who wish to pursue specialized advanced work on avian species. Specializations students may choose include behavior, nutrition, physiology, reproduction, pathology, immunology, toxicology, food chemistry, management, ecology, genetics, comparative incubation, environmental physiology, and cellular and developmental studies using wild and domestic birds as experimental animals. Both master's degree plans, thesis and comprehensive examination, are available.

Preparation. Applicants should have undergraduate preparation in a field appropriate to the course of study selected, including courses in most of the following subjects: general biology, general and organic chemistry, biochemistry, avian biology, genetics, nutrition, physiology, and statistics.

Graduate Advisors. A.J. King, J.M. Eadie, K.C. Klasing

Avian Sciences (Graduate Group) | AVS Courses

Courses in AVS:

AVS 011—Introduction to Poultry Science (3)
Lecture—3 hours. The mosaic of events that have tied poultry science to other scientific disciplines and poultry to humans. Poultry science techniques and production methods from the time of domestication to the present. One field trip required. GE credit: SE. Effective: 1997 Winter Quarter.

AVS 013—Birds, Humans and the Environment (3)
Discussion—1 hour; Lecture—2 hours. Restricted to students with lower division standing. Interrelationships of the worlds of birds and humans. Lectures, discussions, field trips and projects focus on ecology, avian evolution, physiology, reproduction, flight, behavior, folklore, identification, ecotoxicology and conservation. Current environmental issues are emphasized. Half-day field trip. GE credit: SE, SL. Effective: 2017 Winter Quarter.

AVS 014L—Management of Captive Birds (2)
Fieldwork—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. One weekly discussion and field trip to study practical captive management (housing, feeding, equipment, marketing, diseases). Visit facilities rearing birds such as commercial parrots, hobbyist exotics, ostrich, raptors, waterfowl, game birds, poultry and pigeons. GE credit: SE. Effective: 1997 Winter Quarter.

AVS 015L—Captive Raptor Management (2)
Independent Study—3 hours; Laboratory—3 hours. Hands-on experience handling birds of prey. Students are taught all of the skills required to handle and care for raptors, including husbandry, biology, habitat requirements, cage design, veterinary care, rehabilitation methods, research potential and long-term care requirements. One Saturday fieldtrip. GE credit: SE. Effective: 1997 Winter Quarter.

AVS 016LA—Raptor Migration and Population Fluctuations (2)
Discussion—1 hour; Fieldwork—3 hours. Prerequisite(s): Consent of Instructor. Identify raptors: study of effects of weather, crops, agricultural practices on fluctuations in raptor species and numbers. Familiarize with literature; design a project; survey study sites; collect, computerize, analyze data, compare with previous years. Species, observations, emphasis different each quarter. One Saturday field trip. GE credit: SE. Effective: 1997 Winter Quarter.

AVS 016LB—Raptor Migration and Population Fluctuations (2)
Discussion—1 hour; Fieldwork—3 hours. Prerequisite(s): Consent of Instructor. Identify raptors: study of effects of weather, crops, agricultural practices on fluctuations in raptor species and numbers. Familiarize with literature; design a project; survey study sites; collect, computerize, analyze data, compare with previous years. Species, observations, emphasis different each quarter. One Saturday field trip. GE credit: SE. Effective: 1997 Winter Quarter.

AVS 016LC—Raptor Migration and Population Fluctuations (2)
Discussion—1 hour; Fieldwork—3 hours. Prerequisite(s): Consent of Instructor. Identify raptors: study of effects of weather, crops, agricultural practices on fluctuations in raptor species and numbers. Familiarize with literature; design a project; survey study sites; collect, computerize, analyze data, compare with previous years. Species, observations, emphasis different each quarter. One Saturday field trip. GE credit: SE. Effective: 1997 Winter Quarter.

AVS 092—Internship in the Avian Sciences (1-12)
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. Sophomore standing preferred. Internship on and off campus in poultry, game birds or exotic bird production, management and research; or in a business, industry, or agency concerned with these entities. Compliance with Internship Approval form essential. (P/NP grading only.) Effective: 1997 Winter Quarter.

AVS 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Fall Quarter.

AVS 099—Special Study for Undergraduates (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

AVS 100—Avian Biology (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B; ANS 002 preferred. Biology of domesticated poultry, specifically chickens and turkeys. Avian genetics, immunology, reproduction, growth and development, broiler and layer management. GE credit: SE. Effective: 2016 Spring Quarter.

AVS 103—Avian Development and Genomics (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B Unique features of avian development and genomics: Incubation; Staging; Egg Structure/Function; Fertilization; Pre-ovipositал; Oviposition, Cold Torpor; Post-ovipositал Development; Organogenesis, Growth; Sexual Differentiation; Extraembryonic Membranes; Mortality/Hatching; Genome Organization; Comparative Avian Genomics; Telomere Biology; Sex Chromosomes/Sex Determination; Advanced Technologies; Genome Manipulation; Mutations. GE credit: SE. Effective: 2016 Fall Quarter.

AVS 115—Raptor Biology (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; Or equivalent. Study of birds of prey: classification, distribution, habits, migration, unique anatomical and physiological adaptations, natural and captive breeding, health and diseases, environmental concerns, conservation, legal considerations, rehabilitation, and falconry. Includes two Saturday field trips. GE credit: SE. Effective: 2016 Fall Quarter.

AVS 121—Avian Reproduction (2)
Lecture—2 hours. Prerequisite(s): BIS 002A; BIS 002B Breeding cycles and reproductive strategies, egg and sperm formation, incubation, sexual development, imprinting, hormonal control of reproductive behavior and song. Species coverage includes wild and companion birds. Course has a physiological orientation. GE credit: SE, SL. Effective: 2016 Fall Quarter.

AVS 123—Management of Birds (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B Captive propagation of birds, including reproduction, genetic management, health, feeding, artificial incubation, artificial insemination, and related legal aspects, including trade and smuggling. Emphasis on exotic species and the role of captive propagation in conservation. GE credit: SE, SL, WE. Effective: 2016 Fall Quarter.

AVS 149—Egg Production Management (2)
Lecture—2 hours. Prerequisite(s): AVS 011; or Consent of Instructor. Management of commercial table egg flocks as related to environment, nutrition, disease control, economics, housing, equipment, egg processing and raising replacement pullets. Offered in alternate years. One Saturday field trip required. GE credit: SE. Effective: 2016 Fall Quarter.

AVS 150—Nutrition of Birds (1)
Lecture—1 hour. Prerequisite(s): ABI 103 (can be concurrent) or BIS 103 (can be concurrent) Principles of nutrition specific to avian species, including feedstuffs, feed additives, nutrient metabolism, energy systems, and nutritional support of egg production and growth. Use of computers for feed formulation to support production. GE credit: QL, SE. Effective: 2016 Fall Quarter.

AVS 160—Designing and Performing Experiments in Avian Sciences (2)
Laboratory—6 hours. Prerequisite(s): AVS 100 or WFC 111; or Consent of Instructor. Experiments in current problems in avian biology. Introduction to experimental design. Students choose a project, design a protocol, perform an experiment and report their findings. May be repeated for credit with consent of instructor. May be repeated for credit with consent of instructor. GE credit: SE. Effective: 2016 Fall Quarter.

AVS 170—Advanced Avian Biology (4)
Lecture/Discussion—3 hours; Project (Term Project)—1 hour. Prerequisite(s): AVS 100 or WFC 111 Ecology, behavior, functional morphology and lifehistory evolution of birds. Emphasis on the importance of body size as a principle determinant of most aspects of avian performance from lifespan to reproduction and species abundance. Analytical synthesis and critical thought emphasized. GE credit: SE. Effective: 2016 Fall Quarter.

AVS 190—Seminar in Avian Sciences (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. May be repeated up to 3 time(s). (P/NP grading only.) Effective: 2016 Fall Quarter.

AVS 192—Internship in Avian Sciences (1-12)
Laboratory—3-36 hours. Prerequisite(s): Consent of Instructor. Internship on and off campus in poultry, game birds or exotic bird production, management and research; or in a business, industry, or agency concerned with these entities. Compliance with Internship Approval form essential. (P/NP grading only.) Effective: 2016 Fall Quarter.

AVS 195—Topics in Current Research (1-3)
Lecture/Discussion; Variable—1-3 hours. Prerequisite(s): Consent of Instructor. Discussion of topics of current interest in avian sciences. May be repeated three times for credit. May be repeated up to 3 time(s). Effective: 1997 Winter Quarter.

AVS 197T—Tutoring in Avian Sciences (1-3)
Tutorial—1-3 hours. Prerequisite(s): Consent of Instructor. Tutoring of students in lower division avian sciences courses; weekly conference with instructors in charge of courses; written critiques of teaching procedures. (P/NP grading only.) Effective: 2016 Fall Quarter.

AVS 198—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Restricted to upper division students. Directed group study. (P/NP grading only.) Effective: 2017 Winter Quarter.

AVS 199—Special Study for Advanced Undergraduates (1-5)
Variable—1-5 hours. (P/NP grading only.) Effective: 1997 Winter Quarter.

AVS 203—Advanced Avian Development and Genomics (1)
Discussion—1 hour. Prerequisite(s): AVS 103 (can be concurrent); Graduate standing. In consultation with the instructor, students develop a lecture and associated instructional materials, i.e., lesson plan, including justification, reading and presentation and evaluation aids. The topic must complement a topic covered in Avian Sciences 103. Effective: 2013 Fall Quarter.

AVS 290—Seminar (1)
Seminar—1 hour. Reports and discussions of recent advances and selected topics of current interest in avian genetics, physiology, nutrition, and poultry technology. Effective: 1997 Winter Quarter.

AVS 290C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Major professors lead research discussions with their graduate students. Research papers are reviewed and project proposals
presented and evaluated. Format will combine seminar and discussion. (S/U grading only.) Effective: 1997 Winter Quarter.

AVS 297T—Supervised Teaching in Avian Sciences (1-4)
Tutorial—1-4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Tutoring of students in lower, upper division, and graduate courses in Avian Sciences; weekly conference with instructor in charge of course; written critiques of teaching methods in lectures and laboratories. (S/U grading only.) Effective: 1997 Winter Quarter.

AVS 298—Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Effective: 1997 Winter Quarter.

AVS 299—Research (1-12)
Variable—1-12 hours. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

Biochemistry, Molecular, Cellular & Developmental Biology (Graduate Group)

Biochemistry, Molecular, Cellular & Developmental Biology (Graduate Group) | BMC&D (Graduate Group) Information

Bruce Draper, Ph.D., Chairperson of the Group; 530-752-0833

Group Office. 227B Life Sciences; 530-752-9091; http://bmcdb.ucdavis.edu/

Faculty. http://bmcdb.ucdavis.edu/faculty/

Biochemistry, Molecular, Cellular & Developmental Biology (Graduate Group) | BMC&D Biology M.S.

Bruce Draper, Ph.D., Chairperson of the Group; 530-752-0833

Group Office. 227B Life Sciences; 530-752-9091; http://bmcdb.ucdavis.edu/

Faculty. http://bmcdb.ucdavis.edu/faculty/

Graduate Study. The Graduate Group in Biochemistry, Molecular, Cellular, and Developmental Biology offers programs of study and research leading to the M.S. and Ph.D. degrees. While an M.S. may be obtained while pursuing a Ph.D., only Ph.D. applications will be accepted. Biochemistry, Molecular, Cellular, and Developmental Biology is a broad interdepartmental program.

Master's degree offered only en route to Ph.D.

Preparation. Appropriate preparation is an undergraduate degree in a biological or physical science. Preparation should include a year of calculus, physics, general chemistry and organic chemistry, and courses in statistics, biochemistry, genetics and cell biology.

Graduate Advisors. F. McNally (Molecular and Cellular Biology), E. Diaz (Pharmacology), R. Tucker (Med: Cell Biology), R. Fairclough (Neurology), T. Powers (Molecular and Cellular Biology), L. Rose (Molecular and Cellular Biology), J. Engebrecht (Molecular and Cellular Biology), C. Fraser (Molecular and Cellular Biology), E. Baldwin (Molecular and Cellular Biology), P. Knoepfler (Med: Cell Biology), K. Carraway (Med: Biochem and Molecular Medicine), K. Zito (Center for Neuroscience), D. Genetos (Vet. Anatomy & Cell Biology), M. Singer(Microbiology and Molecular Genetics), B. Draper (Molecular and Cellular Biology)

Biochemistry, Molecular, Cellular & Developmental Biology (Graduate Group) | BMC&D Biology Ph.D.

Bruce Draper, Ph.D., Chairperson of the Group; 530-752-0833

Group Office. 227B Life Sciences; 530-752-9091; http://bmcdb.ucdavis.edu/

Faculty. http://bmcdb.ucdavis.edu/faculty/

Graduate Study. The Graduate Group in Biochemistry, Molecular, Cellular, and Developmental Biology offers programs of study and research leading to the M.S. and Ph.D. degrees. While an M.S. may be obtained while pursuing a Ph.D., only Ph.D. applications will be accepted. Biochemistry, Molecular, Cellular, and Developmental Biology is a broad interdepartmental program.

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Graduate Advisors. E. Diaz (Pharmacology), R. Tucker (Med: Cell Biology), L. Rose (Molecular and Cellular Biology), J. Engebrecht (Molecular and Cellular Biology), C. Fraser (Molecular and Cellular Biology), E. Baldwin (Molecular and Cellular Biology), P. Knoepfler (Med: Cell Biology), K. Carraway (Med: Biochem and Molecular Medicine), K. Zito (Center for Neuroscience), D. Genetos (Vet. Anatomy & Cell Biology), M. Singer (Microbiology and Molecular Genetics), B. Draper (Molecular and Cellular Biology), Q. Gong (Med. Cell Biology), J. Sack (Med. Physiology and Membrane Biology), D. Starr (Molecular and Cellular Biology)

Biochemical Engineering; Engineering

Biochemical Engineering; Engineering | Biochemical Engineering B.S.

(College of Engineering)

Roland Faller, Ph.D., Chairperson of the Department 530-752-6496; Fax 530-752-1031

Department Office. 3001 Ghausi Hall; Fax 530-752-1031; http://che.engineering.ucdavis.edu/

Faculty. https://che.engineering.ucdavis.edu/people/faculty/

The Department of Chemical Engineering offers two undergraduate programs: Chemical Engineering and Biochemical Engineering.

Mission Statement. To advance, through teaching and research programs, the frontiers of chemical and biochemical engineering; to educate students with a sense of professionalism and community; and to serve the public of California through outreach efforts.

Honors Program. An Honors Program is available to qualified students in the Chemical Engineering and Biochemical Engineering majors. It is a two-year program designed to challenge the most talented students in these majors. Students are invited to participate in their sophomore year. In the upper division, students will complete either an honors thesis or a project that might involve local industry. Students must maintain a grade point average of 3.500 to continue in the program. Successful completion of the Honors Program will be acknowledged on the student's transcript.

Biochemical Engineering Undergraduate Program

The Biochemical Engineering program is accredited by the Engineering Accreditation Commission of ABET; see http://www.abet.org.

As the biotechnology industry expands and matures, there is increasing need for engineers who can move products from the research stage to large-scale manufacturing. As they fill this need, engineers must also understand the production, purification, and regulatory issues surrounding biopharmaceutical manufacturing.

Biochemical engineers—with their strong foundations in chemistry, biological sciences, and chemical process engineering—are in a unique position to tackle these problems. Biochemical engineers apply the principles of cell and molecular biology, biochemistry, and engineering to develop, design, scale up, optimize, and operate processes that use living cells, organisms, or biological molecules for the production and purification of products (such as monoclonal antibodies, vaccines, therapeutic proteins, antibiotics, and industrial enzymes); for health and/or environmental monitoring (such as diagnostic kits, microarrays, biosensors); or for environmental improvement (such as bioremediation). An understanding of biological processes is also becoming increasingly important in the industries that traditionally employ chemical engineers, including the industries that process materials, chemicals, foods, energy, fuels, and semiconductors.

Objectives. We educate students in the fundamentals of chemical and biochemical engineering, balanced with the application of these principles to practical problems; educate students as independent, critical thinkers who can also function effectively in a team; prepare students with a sense of community, ethical responsibility, and professionalism; prepare students for careers in industry, government, and academia; teach students the necessity for continuing education and self-learning; and foster proficiency in written and oral communications.

Students are encouraged to adhere carefully to all prerequisite requirements. The instructor is authorized to drop students from a course for which stated prerequisites have not been completed.

Exclusive of General Education units, the minimum number of units required for the Biochemical Engineering major is 162.

Lower Division Required Courses **Units:** 73

MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3
MAT 022B	Differential Equations	3
PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 002C	General Chemistry	5
OR		
CHE 002AH	Honors General Chemistry	5
CHE 002BH	Honors General Chemistry	5
CHE 002CH	Honors General Chemistry	5
BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
ECH 005	Introduction to Analysis and Design in Chemical Engineering	3

ECH 051	Material Balances	4
ECH 060	Engineering Problem Solving Using MATLAB	4
ECH 080	Chemical Engineering Profession	1

Choose one; a grade of C- or better is required:

ENL 003	Introduction to Literature	4
UWP 001	Expository Writing	4
UWP 001V	Expository Writing	4
UWP 001Y	Expository Writing	4
COM 001	Major Books of Western Culture: The Ancient World	4
COM 002	Major Books of Western Culture: From the Middle Ages to the Enlightenment	4
COM 003	Major Books of Western Culture: The Modern Crisis	4
COM 004	Major Books of the Contemporary World	4
NAS 005	Introduction to Native American Literature	4

Upper Division Required Courses **Units:** 89-93

ECH 140	Mathematical Methods in Biochemical and Chemical Engineering	4
ECH 141	Fluid Mechanics for Biochemical and Chemical Engineers	4
ECH 142	Heat Transfer for Biochemical and Chemical Engineers	4
ECH 143	Mass Transfer for Biochemical and Chemical Engineers	4
ECH 145A	Chemical Engineering Thermodynamics Laboratory	3
ECH 145B	Chemical Engineering Transport Lab	3
ECH 148A	Chemical Kinetics and Reaction Engineering	3
ECH 152A	Chemical Engineering Thermodynamics	3
ECH 152B	Chemical Engineering Thermodynamics	4
ECH 157	Process Dynamics and Control	4
ECH 158A	Process Economics and Green Design	4
ECH 158C	Plant Design Project	4
ECH 161A	Biochemical Engineering Fundamentals	4
ECH 161B	Bioseparations	4
ECH 161C	Biotechnology Facility Design and Regulatory Compliance	4
ECH 161L	Bioprocess Engineering Laboratory	4
BIS 102	Structure and Function of Biomolecules	3
MIC 102	Introductory Microbiology	3
MIC 103L	Introductory Microbiology Laboratory	2
CHE 110A	Physical Chemistry: Introduction to Quantum Mechanics	4
CHE 128A	Organic Chemistry	3
CHE 128B	Organic Chemistry	3
CHE 129A	Organic Chemistry Laboratory	2

Biochemical Engineering Electives
Choose at least one laboratory course from the Laboratory Elective list; additional courses may be chosen from either list. You may receive biochemical engineering elective credit up to a maximum of two units of an internship (192) or independent study (199), or Biotechnology 189L with the approval of a petition, provided that the course is a laboratory-based experimental project, related to the biological and/or biochemical engineering sciences, and you submit a written report that demonstrates proficiency in laboratory skills, techniques, or method. Research does not replace the required lab elective.
Laboratory Electives:

BIM 161L	Biomolecular Engineering Laboratory	3
BIT 161A	Genetics and Biotechnology Laboratory	6
BIT 161B	Plant Genetics and Biotechnology Laboratory	4

FST 102B	Practical Malting and Brewing	4
FST 104L	Food Microbiology Laboratory	4
FST 123L	Enzymology Laboratory	2
MCB 120L	Molecular Biology and Biochemistry Laboratory	3
MCB 160L	Principles of Genetics Laboratory	5
NPB 101L	Systemic Physiology Laboratory	3
NPB 104L	Cellular Physiology/Neurobiology Laboratory	4
VEN 123L	Analysis of Musts & Wines Laboratory	2
VEN 124L	Wine Production Laboratory	3

Lecture Electives:

BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
BIS 002C	Introduction to Biology: Biodiversity and the Tree of Life	5
BIS 101	Genes and Gene Expression	4
BIS 103	Bioenergetics and Metabolism	3
BIS 104	Cell Biology	3
EBS 165	Bioinstrumentation and Control	4
BIM 102	Cellular Dynamics	4
BIM 107	Mathematical Methods for Biological Systems	4
BIM 109	Biomaterials	4
BIM 117	Modeling Strategies for Biomedical Engineering	4
BIM 140	Protein Engineering	4
BIM 161A	Biomolecular Engineering	4
BIM 162	Introduction to the Biophysics of Molecules and Cells	4
BIT 160	Principles of Plant Biotechnology	3
BIT 188	Undergraduate Research Proposal	3
ECH 144	Rheology and Polymer Processing	3
ECH 166	Catalysis	3
ECH 170	Introduction to Colloid and Surface Phenomena	3
CHE 130A	Pharmaceutical Chemistry	3
CHE 130B	Pharmaceutical Chemistry	3
FST 102A	Malting and Brewing Science	4
FST 104	Food Microbiology	3
FST 123	Introduction to Enzymology	3
MIC 140	Bacterial Physiology	3
MIC 150	Genomes of Pathogenic Bacteria	3
MCB 123	Behavior and Analysis of Enzyme and Receptor Systems	3
NPB 101	Systemic Physiology	5
NPB 107	Cell Signaling in Health and Disease	3
PLB 112	Plant Growth and Development	3
PLS 100A	Metabolic Processes of Cultivated Plants	3
PLS 152	Plant Genetics	4
STA 120	Probability and Random Variables for Engineers (Discontinued)	4
STA 130A	Mathematical Statistics: Brief Course	4
STA 131A	Introduction to Probability Theory	4
VEN 123	Analysis of Musts and Wines	2
VEN 124	Wine Production	2

Upper Division Composition Requirement

Choose one; a grade of C- or better is required:

UWP 102E	Writing in the Disciplines: Engineering	4
UWP 102F	Writing in the Disciplines: Food Science and Technology	4
UWP 104A	Writing in the Professions: Business Writing	4

UWP 104E	Writing in the Professions: Science	4
UWP 104T	Writing in the Professions: Technical Writing	4

Passing the Upper Division Composition Exam.

Total: 162-166

Biochemical Engineering; Engineering | ECH Courses

Courses in ECH:

ECH 001—Design of Coffee–An Introduction to Chemical Engineering (3)
Laboratory—2 hours; Lecture—1 hour; Project (Term Project)—1 hour. Non-mathematical introduction to how chemical engineers think, illustrated by elucidation of the process of roasting and brewing coffee. Qualitative overview of the basic principles of engineering analysis and design. Corresponding experiments testing design choices on the sensory qualities of coffee. Not open for credit to students who have completed ECM 1, ECM 5, or ECH 5. GE credit: SE, SL, VL. Effective: 2017 Spring Quarter.

ECH 005—Introduction to Analysis and Design in Chemical Engineering (3)
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): MAT 021A; MAT 021B (can be concurrent) Quantitative introduction to the engineering principles of analysis and design. Applications of differential and integral calculus. Laboratory experiments using coffee to illustrate chemical engineering concepts and to conduct an engineering design competition. Only two units of credit to students who have completed ECM 001 or ECH 001; not open for credit to students who have completed ECM 005. GE credit: QL, SE. Effective: 2017 Winter Quarter.

ECH 051—Material Balances (4)
Lecture—4 hours. Prerequisite(s): MAT 021C C- or better; MAT 021D (can be concurrent) Application of the principle of conservation of mass to single and multicomponent systems in chemical process calculations. Studies of batch, semi-batch, and continuous processes involving mass transfer, phase change, and reaction stoichiometry. Not open for credit to students who have completed ECH 151. GE credit: SE. Effective: 2017 Fall Quarter.

ECH 060—Engineering Problem Solving Using MATLAB (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021C Problem solving in chemical, biochemical and materials engineering using MATLAB. Programming styles, data structures, working with lists, functions and rules. Applications drawn from material balances, statistics, numerical methods, bioinformatics, transport phenomena, kinetics, and computational analysis. GE credit: QL, SE. Effective: 2017 Spring Quarter.

ECH 080—Chemical Engineering Profession (1)
Lecture/Discussion—1 hour; Term Paper. Professional opportunities and professional responsibilities of chemical engineers. Opportunities and needs for post-baccalaureate education. Relationship of chemical engineering to contemporary issues. GE credit: SE, SS. Effective: 2017 Winter Quarter.

ECH 090X—Honors Discussion Section (1)
Discussion—1 hour. Open only to students in the Chemical Engineering or Biochemical Engineering Honors Programs. Examination of special topics covered in selected lower-division courses through additional readings, discussions, collaborative work, or special activities which may include projects, laboratory experience or computer simulations. Repeat credit allowed if topic differs. May be repeated for credit When topic differs. Effective: 2017 Fall Quarter.

ECH 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. Directed Group Study. (P/NP grading only.) GE credit: SE. Effective: 2017 Winter Quarter.

ECH 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special Study for Undergraduates (P/NP grading only.) GE credit: SE. Effective: 2017 Winter Quarter.

ECH 140—Mathematical Methods in Biochemical and Chemical Engineering (4)
Laboratory—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): MAT 022B; (ECH 060 or ENG 006); or equivalents of ECH 060 or ENG 006. Mathematical methods for solving problems in chemical and biochemical engineering, with emphasis on transport phenomena. Fourier series and separation of variables. Sturm-Liouville eigenvalue problems. Similarity transformations. Tensor analysis. Finite difference methods for solving time-dependent diffusion problems. Not open for credit to students who have completed ECH 159. GE credit: SE. Effective: 2017 Spring Quarter.

ECH 141—Fluid Mechanics for Biochemical and Chemical Engineers (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): ECH 140; ECH 051 (can be concurrent) Principles and applications of fluid mechanics in chemical and biochemical engineering. Hydrostatics. The stress tensor and Newton's law of viscosity. Not open for credit to students who have completed course 150B. GE credit: QL, SE. Effective: 2017 Winter Quarter.

ECH 141—Fluid Mechanics for Biochemical and Chemical Engineers (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): ECH 051 C- or better; ECH 140 Principles and applications of fluid mechanics in chemical and biochemical engineering. Hydrostatics. The stress tensor and Newton's law of viscosity. Not open for credit to students who have completed ECH 150B. GE credit: QL, SE. Effective: 2019 Winter Quarter.

ECH 142—Heat Transfer for Biochemical and Chemical Engineers (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): ECH 051 C- or better; ECH 141 Conduction, convection, and radiation of thermal energy in applications to chemical and biochemical engineering. Derivation of thermal and mechanical energy equations. Thermal boundary layers. Macroscopic balances. Applications: heat transfer in tubes, channels, and integrated circuits, and analysis of heat exchangers. Not open for credit to students who have completed course 153. GE credit: QL, SE. Effective: 2017 Winter Quarter.

ECH 142—Heat Transfer for Biochemical and Chemical Engineers (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): ECH 141 Conduction, convection, and radiation of thermal energy in applications to chemical and biochemical engineering. Derivation of thermal and mechanical energy equations. Thermal boundary layers. Macroscopic balances. Applications: heat transfer in tubes, channels, and integrated circuits, and analysis of heat exchangers. Not open for credit to students who have completed ECH 153. GE credit: QL, SE. Effective: 2019 Spring Quarter.

ECH 143—Mass Transfer for Biochemical and Chemical Engineers (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): ECH 051 C- or better; ECH 141 Derivation of species conservation equations describing convective and diffusive mass transfer. Fick's law and the Stefan-Maxwell constitutive equations. Mass transfer coefficients. Multicomponent mass transfer across gas/liquid interfaces. Applications include drying, heterogeneous chemical reactions, and membrane separations. GE credit: SE. Effective: 2017 Winter Quarter.

ECH 143—Mass Transfer for Biochemical and Chemical Engineers (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): ECH 141 Derivation of species conservation equations describing convective and diffusive mass transfer. Fick's law and the Stefan-Maxwell constitutive equations. Mass transfer coefficients. Multicomponent mass transfer across gas/liquid interfaces. Applications include drying, heterogeneous chemical reactions, and membrane separations. GE credit: SE. Effective: 2019 Spring Quarter.

ECH 144—Rheology and Polymer Processing (3)
Lecture/Discussion—3 hours. Prerequisite(s): ECH 141 Deformation in steady shear, unsteady shear, and elongational flows. Linear and non-linear viscoelastic constitutive models. The principle of material indifference and admissibility of constitutive equations. Introduction to the unit operations of polymer processing. Not open for credit to students who have completed ECH 150C. GE credit: SE. Effective: 2017 Winter Quarter.

ECH 145A—Chemical Engineering Thermodynamics Laboratory (3)
Discussion—2 hours; Extensive Writing; Laboratory—2 hours. Prerequisite(s): ECH 152A; ECH 152B (can be concurrent) Open to majors in Chemical Engineering, Chemical Engineering/Materials Science, & Biochemical Engineering. Laboratory experiments in chemical engineering thermodynamics. GE credit: SE, WE. Effective: 2017 Winter Quarter.

ECH 145B—Chemical Engineering Transport Lab (3)
Discussion—2 hours; Extensive Writing; Laboratory—2 hours. Prerequisite(s): ECH 141; ECH 145A Open to majors in Chemical Engineering, Chemical Engineering/Materials Science, & Biochemical Engineering. Laboratory experiments in chemical engineering transport phenomena. GE credit: SE, WE. Effective: 2017 Spring Quarter.

ECH 148A—Chemical Kinetics and Reaction Engineering (3)
Lecture—3 hours. Prerequisite(s): ECH 143; ECH 152B Ideal chemical reactors. Rate laws and stoichiometry. Design and
analysis of isothermal reactors with multiple reactions. Not open for credit to students who have taken ECH 146. GE credit: SE. Effective: 2017 Winter Quarter.

ECH 148B—Chemical Kinetics and Reaction Engineering (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECH 148A Design and analysis of non-isothermal reactors. Reactions in packed beds with pressure drop. Adsorption and heterogeneous catalysis. Transport limitations. Not open for credit to students who have taken ECH 146. GE credit: SE. Effective: 2017 Winter Quarter.

ECH 152A—Chemical Engineering Thermodynamics (3)
Lecture—3 hours. Prerequisite(s): ECH 060 or ENG 006; or equivalents. Application of principles of thermodynamics to chemical processes. Not open for credit to students who have completed ENG 105 or ENG 105A. GE credit: SE. Effective: 2017 Spring Quarter.

ECH 152B—Chemical Engineering Thermodynamics (4)
Lecture/Discussion—4 hours. Prerequisite(s): ECH 152A Continuation of course 152A. GE credit: SE. Effective: 2017 Spring Quarter.

ECH 155—Chemical Engineering Kinetics and Reactor Design Laboratory (4)
Discussion—1 hour; Laboratory—6 hours; Term Paper. Prerequisite(s): ECH 145B; ECH 148A; ECH 148B (can be concurrent); ECH 157 (can be concurrent); Upper division English composition requirement (can be concurrent). Open to majors in Chemical Engineering, Chemical Engineering/Materials Science, and Biochemical Engineering. Laboratory experiments in chemical kinetics, reactor design and process control. Not open for credit to students who have taken ECH 155B. GE credit: OL, SE, VL, WE. Effective: 2017 Spring Quarter.

ECH 155A—Chemical Engineering Laboratory (4)
Discussion—1 hour; Laboratory—6 hours; Term Paper. Prerequisite(s): ECH 141 (can be concurrent); ECH 142 (can be concurrent); ECH 143 (can be concurrent); Satisfaction of the upper division English composition requirement. Open to majors in Chemical Engineering, Chemical Engineering/Materials Science, Biochemical Engineering, Biomedical Engineering, and Biological Systems Engineering. Laboratory experiments in transport phenomena, chemical kinetics, and thermodynamics. GE credit: OL, QL, SE, VL, WE. Effective: 2017 Winter Quarter.

ECH 155B—Chemical Engineering Laboratory (4)
Discussion—1 hour; Extensive Writing—1 hour; Laboratory—6 hours. Prerequisite(s): ECH 143 (can be concurrent); ECH 155A; Satisfaction of the upper division English composition requirement. Open to majors in Chemical Engineering, Chemical Engineering/Materials Science, Biochemical Engineering, Biomedical Engineering, Food Engineering, and Biosystems Engineering. Continuation of course 155A. Laboratory experiments in transport phenomena, chemical kinetics, and thermodynamics. GE credit: QL, SE, VL, WE. Effective: 2017 Winter Quarter.

ECH 157—Process Dynamics and Control (4)
Lecture/Discussion—4 hours. Prerequisite(s): ECH 140 Fundamentals of dynamics and modeling of chemical processes. Design and analysis of feedback control of chemical processes. GE credit: QL, SE. Effective: 2017 Winter Quarter.

ECH 158A—Process Economics and Green Design (4)
Lecture/Discussion—4 hours. Prerequisite(s): ECH 142; ECH 143 Senior design experience in process and product creation and design with multiple realistic constraints. Cost accounting and capital investment estimation. Profitability analysis techniques. Green chemistry, health risk assessment and life cycle assessment concepts. GE credit: SE, SL, SS, VL. Effective: 2017 Winter Quarter.

ECH 158B—Separations and Unit Operations (4)
Lecture—4 hours. Prerequisite(s): ECH 158A Senior design experience with multiple realistic constraints. Heuristic and rigorous design of chemical process equipment. Separation by filtration, distillation and extraction. Synthesis of reactor and separation networks, heat and power integration. GE credit: QL, SE. Effective: 2017 Winter Quarter.

ECH 158C—Plant Design Project (4)
Discussion/Laboratory—2 hours; Project (Term Project)—2 hours. Prerequisite(s): ECH 158B or ECH 161C Senior design experience for chemical and biochemical processes. Impact of multiple realistic constraints. Design, costing and profitability analysis of complete plants. Use of computer-aided design techniques. GE credit: SE, SS, VL. Effective: 2018 Winter Quarter.

ECH 160—Fundamentals of Biomanufacturing (3)
Lecture—3 hours. Prerequisite(s): MIC 102 or BIS 102 or ABI 102 Principles of large scale bioreactor production of metabolites, enzymes, and recombinant proteins including the development of strains/cell lines, fermentor/bioreactor design, monitoring and operation, product recovery and purification, and biomanufacturing economics. Not open for credit to students who have completed ECH 161C or both ECH 161A and ECH 161B; only two units of credit to students who have completed either ECH 161A or ECH 161B. GE credit: QL, SE, VL. Effective: 2017 Winter Quarter.

ECH 161A—Biochemical Engineering Fundamentals (4)
Lecture/Discussion—4 hours. Prerequisite(s): ECH 148A Biokinetics; bioreactor design and operation; transport phenomena in bioreactors; microbial, plant, and animal cell cultures. GE credit: QL, SE, VL. Effective: 2017 Winter Quarter.

ECH 161B—Bioseparations (4)
Lecture/Discussion—4 hours. Prerequisite(s): ECH 143 Product recovery and purification of biochemicals. Cell disruption, centrifugation, filtration, membrane separations, extraction, and chromatographic separation. GE credit: QL, SE. Effective: 2017 Winter Quarter.

ECH 161C—Biotechnology Facility Design and Regulatory Compliance (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECH 161A (can be concurrent), ECH 161B (can be concurrent)) or MCB 263 (can be concurrent); Course(s) required concurrently. Design of biotechnology manufacturing facilities. Fermentation and purification equipment, and utility systems. Introduction to current good manufacturing practices, regulatory compliance, and documentation. GE credit: QL, SE, SL, SS, VL. Effective: 2017 Winter Quarter.

ECH 161L—Bioprocess Engineering Laboratory (4)
Discussion—1 hour; Laboratory—9 hours; Term Paper. Prerequisite(s): (ECH 161A, ECH 161B) or VEN 186 or (BIS 103, MCB 120L) Pass One restricted to chemical/biochemical engineering majors. Laboratory experiments in the operation and analysis of bioreactors; determination of oxygen mass transfer coefficients in bioreactors and ion exchange chromatography. GE credit: QL, SE, VL, WE. Effective: 2017 Winter Quarter.

ECH 166—Catalysis (3)
Lecture—3 hours. Prerequisite(s): ECH 148A; and Consent of Instructor. Principles of catalysis based on an integration of principles of physical, organic, and inorganic chemistry and chemical kinetics and chemical reaction engineering. Catalysis in solution; catalysis by enzymes; catalysis in swellable polymers; catalysis in microscopic cages (zeolites); catalysis on surfaces. GE credit: SE. Effective: 2017 Winter Quarter.

ECH 169—The Design of Cocktails: Applied Thermodynamics and Transport Phenomena in Mixed Drinks (1)
Discussion/Laboratory—1 hour. Prerequisite(s): ECH 145B; ECH 152B; and Consent of Instructor. Enrollment by permission of instructors only; limited to students over 21 years old. Scientific and engineering principles underlying the preparation of mixed drinks. Thermodynamics and kinetics of ice crystallization; phase diagram of ethanol-water-ice mixtures; mass transfer of aromatics; solubility of sucrose and carbon dioxide; colloidal behavior of dispersed solids and emulsified oils. Corresponding laboratory experiments testing the effect of design choices on the sensory quality of cocktails. (P/NP grading only.) GE credit: SE. Effective: 2018 Spring Quarter.

ECH 170—Introduction to Colloid and Surface Phenomena (3)
Lecture—3 hours. Prerequisite(s): CHE 110A Introduction to the behavior of surfaces and disperse systems. Fundamentals will be applied to the solution of practical problems in colloid science. Course should be of value to engineers, chemists, biologists, soil scientists, and related disciplines. GE credit: SE. Effective: 2017 Winter Quarter.

ECH 190C—Research Group Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing in Chemical Engineering. Research group conferences. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 2017 Winter Quarter.

ECH 190X—Honors Discussion Section (1)
Discussion—1 hour. Open only to students in the Chemical Engineering or Biochemical Engineering Honors Programs. Examination of special topics covered in selected upper division courses through additional readings, discussions, collaborative work, or special activities which may include projects, laboratory experience or computer simulations. May be repeated for credit when topic differs. Effective: 2017 Fall Quarter.

ECH 192—Internship in Chemical or Biochemical Engineering (1-5)
Internship—3-15 hours. Prerequisite(s): Consent of Instructor. Completion of a minimum of 84 units; project approval before period of internship. Supervised work experience in Chemical or Biochemical Engineering. May be repeated for credit when project differs. (P/NP grading only.) GE credit: SE. Effective: 2017 Winter Quarter.

ECH 198—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Group study. (P/NP grading only.) GE credit: SE. Effective: 2017 Winter Quarter.

ECH 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special study. (P/NP grading only.) GE credit: SE. Effective: 2017 Winter Quarter.

ECH 206—Biochemical Engineering (3)
Lecture—3 hours. Prerequisite(s): MIC 102; MIC 102L; BIS 101; BIS 102; BIS 103; MCB 120L; MCB 200A; or Consent of Instructor. FST 205 recommended. Interaction of chemical engineering, biochemistry, and microbiology. Mathematical representations of microbial systems. Kinetics of growth, death, and metabolism. Continuous fermentation, agitation, mass transfer and scale-up in fermentation systems, product recovery, enzyme technology. Effective: 2017 Winter Quarter.

ECH 226—Enzyme Engineering (3)
Lecture—3 hours. Prerequisite(s): MIC 102; MIC 102L; BIS 102; BIS 103; MCB 122; MCB 120L; MCB 200A; or Consent of Instructor. Application of basic biochemical and engineering principles of practical enzymatic processes. Lectures cover large scale production and separation of enzymes, immobilized enzyme systems, enzyme related biotechnology, reactor design and optimization, and new application of enzymes in genetic engineering. Effective: 2017 Winter Quarter.

ECH 245—Micro- and Nano-Technology in Life Sciences (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Survey of biomedical device design from the engineering and biological perspectives; micro-/nano-fabrication and characterization techniques; surface chemistry and mass transfer; essential biological processes and models; proposal development skills to merge aforementioned themes in a multidisciplinary project. (EEC 245 and EMS 245.) Effective: 2017 Winter Quarter.

ECH 246—Advanced Biochemical Engineering (2)
Lecture—2 hours. Prerequisite(s): ECH 206; or Consent of Instructor. Advances in the field of biotechnology including genetic engineering, enzyme engineering, fermentation science, and renewable resources development. The important results of original research will be evaluated for understanding of the fundamental principles and for potential practical application. Effective: 2017 Winter Quarter.

ECH 252—Statistical Thermodynamics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECH 152B; ENG 105B or the equivalent. A treatment of the statistical basis of thermodynamics;introduction to statistical mechanics; discussion of the laws of thermodynamics; application of thermodynamic relationships to phase and chemical reaction equilibrium; introduction to molecular simulations and the evaluation of thermodynamic properties from molecular simulations. Effective: 2017 Winter Quarter.

ECH 253A—Advanced Fluid Mechanics (4)
Lecture—4 hours. Prerequisite(s): ECH 141; ECH 259 Kinematics and basic principles of fluid flow. Principles of constitutive equations. Navier-Stokes equations for Newtonian fluids. Survey of rectilinear creeping flow, lubrication flow and boundary layer theory. Effective: 2017 Winter Quarter.

ECH 253B—Advanced Heat Transport (4)
Lecture—4 hours. Prerequisite(s): ECH 142; ECH 259; Or the equivalent. Fundamental energy postulates and derivation of microscopic and macroscopic energy equations. Mechanisms of conduction. Isotropic, thermoelastic and anisotropic materials solution problems using Greens functions and perturbation theory. Effective: 2017 Winter Quarter.

ECH 253C—Advanced Mass Transfer (4)
Lecture—4 hours. Prerequisite(s): ECH 253A; Or the equivalent. Kinematics and basic conservation principles for multicomponent systems. Constitutive equations for momentum, heat and mass transfer, applications to binary and ternary systems. Details of diffusion with reaction, and the effects of concentration. Effective: 2017 Winter Quarter.

ECH 254—Colloid and Surface Phenomena (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Graduate standing in science or engineering or consent of instructor. Thermodynamics and rate processes at interfaces. These fundamental processes will be applied to determine the collective properties
of thin films and membranes, self-assembled systems, liquid crystals and colloidal systems. Experimental techniques in surface analysis. Effective: 2017 Winter Quarter.

ECH 256—Chemical Kinetics and Reaction Engineering (4)
Lecture—4 hours. Prerequisite(s): ECH 146; Or the equivalent. Analysis of the performance of chemical reactors and design of chemical reactors based on the principles of chemical kinetics and transport phenomena. Consideration of noncatalytic/catalytic reactions in single fluid phases and emphasis on reactions in multiphase mixtures, especially gas-solid reactors. Effective: 2017 Winter Quarter.

ECH 259—Advanced Engineering Mathematics (4)
Lecture—4 hours. Prerequisite(s): MAT 021D; MAT 022A; MAT 022B Applications of methods of applied mathematics to the analytical and numerical solution of linear and nonlinear ordinary and partial differential equations arising in the study of transport phenomena. Effective: 2017 Winter Quarter.

ECH 261—Molecular Modelling of Soft and Biological Matter (4)
Lecture/Discussion—4 hours. Prerequisite(s): EMS 247 or ECH 252; or equivalent course in advanced thermodynamics/statistical mechanics. Modern molecular simulation techniques with a focus on soft matter like polymers, biologically relevant systems, and glasses. Effective: 2017 Winter Quarter.

ECH 262—Transport Phenomena in Multiphase Systems (3)
Discussion/Laboratory—3 hours. Prerequisite(s): ECH 253C Heat, mass and momentum transfer in multiphase, multicomponent systems with special emphasis on transport processes in porous media. Derivation of the averaging theorem and application of the method of volume averaging to multicomponent, reacting systems. Effective: 2017 Winter Quarter.

ECH 263—Rheology and Mechanics of Non-Newtonian Fluids (3)
Lecture—3 hours. Prerequisite(s): ECH 253A; ECH 259; or Consent of Instructor. Mechanics of polymer solutions and suspension, especially the development of properly invariant constitutive equations. Topics include: viscometry, linear and nonlinear viscoelasticity, continuum mechanics, kinetic theory. Effective: 2017 Winter Quarter.

ECH 265—Emulsions, Microemulsions and Bilayers (3)
Lecture—3 hours. Prerequisite(s): An undergraduate course in physical chemistry. Thermodynamic and mechanical descriptions of surfactant-laden interfaces. Forces between and within interfaces. Physics of micelle and microemulsion formation. Structure and stability of emulsions. Properties of phospholipid bilayers, with emphasis on vesicles. Effective: 2017 Winter Quarter.

ECH 267—Advanced Process Control (3)
Lecture—3 hours. Prerequisite(s): ECH 157; Or the equivalent. Advanced course in analysis and synthesis of linear multivariable systems. Emphasis on frequency domain techniques and applications to chemical processes. Topics include singular value analysis, internal model control, robust controller design methods as well as self-tuning control techniques. Effective: 2017 Winter Quarter.

ECH 268—Polysaccharides Surface Interactions (3)
Lecture—3 hours. Prerequisite(s): Graduate students in science or engineering. Study of fundamental surface science theories as applied to physical and chemical interactions of carbohydrates and polysaccharides. (EBS 268.) Effective: 2017 Winter Quarter.

ECH 269—Cell and Molecular Biophysics for Bioengineers (4)
Lecture—4 hours. Prerequisite(s): BIM 284; or equivalent; graduate standing; undergraduate students by consent of instructor. Introduction to fundamental mechanisms governing the structure, function, and assembly of bio-macromolecules. Emphasis is on a quantitative understanding of the nano-to-microscale interactions between and within individual molecules, as well as of their assemblies, in particular membranes. Not open for credit to students who have completed BIM 162. (BIM 262.) Effective: 2017 Winter Quarter.

ECH 289A—Special Topics in Chemical Engineering; Fluid Mechanics (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Fluid Mechanics. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289B—Special Topics in Chemical Engineering; Nonlinear Analysis and Numerical Methods (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Nonlinear Analysis and Numerical Methods. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289C—Special Topics in Chemical Engineering; Process Control (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Process Control. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289D—Special Topics in Chemical Engineering; Chemistry of Catalytic Processes (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Chemistry of Catalytic Processes. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289E—Special Topics in Chemical Engineering; Biotechnology (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Biotechnology. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289F—Special Topics in Chemical Engineering; Interfacial Engineering (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Interfacial Engineering. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289G—Special Topics in Chemical Engineering; Molecular Thermodynamics (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Molecular Thermodynamics. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289H—Special Topics in Chemical Engineering; Membrane Separations (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Membrane Separations. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289I—Special Topics in Chemical Engineering; Advanced Materials Processing (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Advanced Materials Processing. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289J—Special Topics in Chemical Engineering; Novel Experimental Methods (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Novel Experimental Methods. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289K—Special Topics in Chemical Engineering; Advanced Transport Phenomena (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Advanced Transport Phenomena. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289L—Special Topics in Chemical Engineering; Biomolecular Engineering (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Biomolecular Engineering. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 290—Seminar (1)
Seminar—1 hour. Seminar. (S/U grading only.) Effective: 2017 Winter Quarter.

ECH 290C—Graduate Research Group Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Research problems, progress and techniques in chemical engineering. May be repeated for credit. (S/U grading only.) Effective: 2017 Winter Quarter.

ECH 294—Current Progress in Biotechnology (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Seminars presented by guest lecturers on subjects of their own research activities. May be repeated for credit. (BIT 294.) (S/U grading only.) Effective: 2018 Winter Quarter.

ECH 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Group study. (S/U grading only.) Effective: 2017 Winter Quarter.

ECH 299—Research (1-12)
Variable. Research. (S/U grading only.) Effective: 2017 Winter Quarter.

ECH 390—Teaching of Chemical Engineering (1) ***Review all entries***
Discussion—1 hour. Prerequisite(s): Qualifications and acceptance as teaching assistant and/or associate-in in chemical engineering. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated up to 2 time(s). (S/U grading only.) Effective: 2017 Winter Quarter.

ECH 390—Teaching of Chemical Engineering (1) ***Review all entries***
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Qualifications and acceptance as teaching assistant and/or associate-in in chemical engineering. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit. (S/U grading only.) Effective: 2018 Fall Quarter.

Departments, Programs, & Degrees | Biochemistry & Molecular Biology; Molecular & Cellular Biology

Biochemistry & Molecular Biology; Molecular & Cellular Biology | Biochemistry & Molecular Biology B.S.

(College of Biological Sciences)

Jodi Nunnari, Ph.D., Professor, Chairperson of the Department

Department Office. 149 Briggs Hall; 530-752-3611; http://www.mcb.ucdavis.edu

Faculty. http://biosci3.ucdavis.edu/Faculty/Profile/FacultyByDept/MCB

The Biochemistry and Molecular Biology Major Program

The Biochemistry and Molecular Biology major introduces students to the chemistry of living organisms and the experimental techniques that are used to probe the structures and functions of biologically important molecules. Students who enjoy both chemistry and biology and who are comfortable with quantitative approaches to problem solving will find this major a rewarding field of study.

The Program. The Biochemistry and Molecular Biology program begins with the four-course, upper division common curriculum that introduces the principles of biochemistry, genetics, and cell biology. Majors then take a comprehensive and rigorous laboratory course to familiarize them with the most important aspects of biochemical research. Additional upper division courses in biochemistry and molecular biology examine detailed aspects of these subjects. Students are also required to take courses in other biological sciences and a full year of physical chemistry.

Career Alternatives. The Biochemistry and Molecular Biology program provides a solid scientific background for students seeking a research, teaching, or service career in the life sciences. Positions are open to biochemists in bio-medical, bio-technological, pharmaceutical, agricultural research and chemical industries. Also, university-affiliated research laboratories, hospital laboratories, and government-sponsored research facilities provide employment opportunities. The major provides excellent preparation for advanced study in graduate or professional schools.

Master Advisor. Davis Wilson

Advising. Biology Academic Success Center (BASC); 1023 Sciences Laboratory Building; 530-752-0410; http://www.biosci.ucdavis.edu/BASC.

Graduate Study. See Biochemistry, Molecular, Cellular, and Developmental Biology (Graduate Group).

Preparatory Subject Matter **Units:** 50-57

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
BIS 002C	Introduction to Biology: Biodiversity and the Tree of Life	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 002C	General Chemistry	5
OR		
CHE 002AH	Honors General Chemistry	5
CHE 002BH	Honors General Chemistry	5
CHE 002CH	Honors General Chemistry	5
OR		
CHE 003A	Chemistry for Life Sciences: Determining Structure and Predicting Properties	5
CHE 003B	Chemistry for Life Sciences: Predicting and Characterizing Chemical Change	5
CHE 003C	Chemistry for Life Sciences: Controlling Processes and Synthetic Pathways	5
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
MAT 017C	Calculus for Biology and Medicine	4
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021C Recommended.		
PHY 007A	General Physics	4
PHY 007B	General Physics	4
PHY 007C	General Physics	4
OR		
PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5

Depth Subject Matter **Units:** 56-68

BIS 101	Genes and Gene Expression	4
BIS 102	Structure and Function of Biomolecules	3
BIS 103	Bioenergetics and Metabolism	3
BIS 104	Cell Biology	3
CHE 118A	Organic Chemistry for Health and Life Sciences	4
CHE 118B	Organic Chemistry for Health and Life Sciences	4
CHE 118C	Organic Chemistry for Health and Life Sciences	4
OR		
CHE 128A	Organic Chemistry	3
CHE 128B	Organic Chemistry	3
CHE 128C	Organic Chemistry	3
CHE 129A	Organic Chemistry Laboratory	2
CHE 129B	Organic Chemistry Laboratory	2
CHE 107A	Physical Chemistry for the Life Sciences	3

CHE 107B	Physical Chemistry for the Life Sciences	3
OR		
CHE 110A	Physical Chemistry: Introduction to Quantum Mechanics	4
CHE 110B	Physical Chemistry: Properties of Atoms and Molecules	4
CHE 110C	Physical Chemistry: Thermodynamics, Equilibria and Kinetics	4
MCB 120	Molecular Biology and Biochemistry Laboratory Associated Lecture	3
MCB 120L	Molecular Biology and Biochemistry Laboratory	3
MCB 121	Advanced Molecular Biology	3
MCB 123	Behavior and Analysis of Enzyme and Receptor Systems	3
MCB 124	Macromolecular Structure and Function	4
OR		
MCB 143	Cell and Molecular Biophysics	3
STA 100	Applied Statistics for Biological Sciences	4
OR		
STA 130A	Mathematical Statistics: Brief Course	4
STA 130B	Mathematical Statistics: Brief Course	4

Restricted Electives

Six units of upper division courses in biological sciences or chemistry relevant to the student's interest chosen in consultation with the advisor. Students are encouraged to obtain additional laboratory experience; however, no more than 3 units of 192, 193 or 199 research may be counted toward restricted elective units.

Total: 106-125

Biochemistry & Molecular Biology; Molecular & Cellular Biology | MCB Courses

Courses in MCB:

MCB 010—Introduction to Human Heredity (4)
Discussion—1 hour; Lecture—3 hours. Topics in human heredity and human gene structure and function, including the genetic basis of human development, causes of birth defects, mental retardation, genetic diseases, sexual determination, development, and behavior. GE credit: QL, SE, SL. Effective: 2004 Spring Quarter.

MCB 023—Biography of Cancer: Past, Present and Future (3)
Lecture/Discussion—3 hours. Historical account of the progression of cancer treatment, prevention, and human understanding of the biological basis of cancer. Past, present and future social implications of cancer treatment and prevention. GE credit: ACGH, SE, SL, SS, WE. Effective: 2018 Spring Quarter.

MCB 099—Special Study (1-5)
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

MCB 110Y—iBioseminars in Cell and Molecular Biology (3)
Lecture/Discussion—2 hours; Web Electronic Discussion—1.5 hours; Web Virtual Lecture—1.5 hours. Prerequisite(s): BIS 101; BIS 102; (BIS 103 or BIS 105); BIS 104 Hybrid course in Cell and Molecular Biology for senior level (1) Biochemistry/Molecular Biology; (2) Genetics; or (3) Cell Biology majors. Face-to-face instruction combined with online lectures available at iBioseminars website delivered by leading researchers in Cell and Molecular Biology. Students who have previously taken MCB 110V cannot receive credit for MCB 110Y. GE credit: SE, SL. Effective: 2014 Fall Quarter.

MCB 120—Molecular Biology and Biochemistry Laboratory Associated Lecture (3)
Discussion/Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): BIS 102; or Consent of Instructor. Pass One restricted to upper division Biochemistry & Molecular Biology majors; concurrent enrollment in MCB 120L required; on-time attendance for first lecture is mandatory. Introduction to laboratory methods and procedures employed in studying molecular biology and biochemical processes. Lecture component for MCB 120L. GE credit: SE, SL. Effective: 2018 Winter Quarter.

MCB 120L—Molecular Biology and Biochemistry Laboratory (3)
Laboratory—10 hours. Prerequisite(s): BIS 102; or Consent of Instructor. Must be taken concurrently with MCB 120. Pass One restricted to upper division Biochemistry & Molecular Biology majors; concurrent enrollment in MCB 120 required; on-time attendance for first lab is mandatory. Introduction to laboratory methods and procedures employed in studying molecular biology and biochemical processes. Designed for students who need experience in use of molecular biology and biochemical techniques as research and analytical tools. GE credit: QL, SE, VL, WE. Effective: 2018 Winter Quarter.

MCB 121—Advanced Molecular Biology (3)
Lecture—3 hours. Prerequisite(s): BIS 101; (BIS 102 (can be concurrent) or BIS 105 (can be concurrent) or ABI 102 (can be concurrent)); BIS 102 or BIS 105 or ABI 102 can be concurrent although prior completion is recommended. Structure, expression, and regulation of eukaryotic genes. Chromosome structure and replication; gene structure, transcription, and RNA processing; protein synthesis and translation control; development, immune system, and oncogenes. Not open for credit to students who have completed MCB 161. GE credit: QL, SE, SL. Effective: 2014 Fall Quarter.

MCB 123—Behavior and Analysis of Enzyme and Receptor Systems (3)
Lecture—3 hours. Prerequisite(s): BIS 103 Introduction to the principles of enzyme kinetics and receptor-ligand interactions with emphasis on metabolic regulation and data analysis. Topics include simultaneous equilibria, chemical and steady-state kinetics, allosteric enzymes, mulitreactant systems, enzyme assays, membrane transport and computer-assisted simulations and analyses. GE credit: QL, SE. Effective: 1997 Winter Quarter.

MCB 124—Macromolecular Structure and Function (4)
Lecture—4 hours. Prerequisite(s): BIS 103; CHE 118C An in-depth investigation into protein and nucleic acid structure and thermodynamics and how these properties influence their biological functions. Key examples of important functional classes of these molecules will be examined. Not open for credit to students who have completed MCB 122 or CHE 108. GE credit: SE. Effective: 2012 Fall Quarter.

MCB 126—Plant Biochemistry (3)
Lecture—3 hours. Prerequisite(s): BIS 103 or BIS 105 The biochemistry of important plant processes and metabolic pathways. Discussion of methods used to understand plant processes, including use of transgenic plants. (Plant Biology 126.) GE credit: SE, SL. Effective: 2008 Spring Quarter.

MCB 138—Undergraduate Seminar in Biochemistry (1)
Seminar—1 hour. Prerequisite(s): BIS 103 Discussion of the historical developments of modern biochemistry or current major research problems. May be repeated twice for credit when topic differs. May be repeated up to 2 time(s). (P/NP grading only.) GE credit: OL, SE. Effective: 1997 Winter Quarter.

MCB 139—Undergraduate Seminar in Biochemistry (2)
Seminar—2 hours. Prerequisite(s): BIS 103 Discussion of the historical developments of modern biochemistry or current major research problems. May be repeated up to 2 time(s) when topic differs. (P/NP grading only.) GE credit: OL, SE. Effective: 2015 Spring Quarter.

MCB 140—Cell Biology Laboratory Associated Lecture (3)
Discussion/Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): BIS 104; or Consent of Instructor. Pass One restricted to upper division Cell Biology majors; concurrent enrollment in MCB 140L required; on-time attendance for first lecture is mandatory. Lectures illustrating the principles of cell biology with emphasis on light microscopy. Accompanies MCB 140L. GE credit: OL, SE, SL, WE. Effective: 2018 Winter Quarter.

MCB 140L—Cell Biology Laboratory (5)
Discussion—1 hour; Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): BIS 104 (can be concurrent) Exercises illustrating the principles of cell biology with emphasis on light microscopy. GE credit: OL, QL, SE, SL, VL. Effective: 2009 Winter Quarter.

MCB 142—Advanced Cell Biology: Contractile and Motile Systems (4)
Lecture—3 hours; Term Paper. Prerequisite(s): BIS 102; BIS 104 (can be concurrent); MAT 016B Advanced cell biology with emphasis on molecular, biophysical and cellular properties of contractile and motile systems. GE credit: SE. Effective: 1998 Spring Quarter.

MCB 143—Cell and Molecular Biophysics (3)
Lecture—3 hours. Prerequisite(s): BIS 101; BIS 102; BIS 103; BIS 104 Physical chemical principles by which molecules form living, moving, reproducing cells. Physical nature of cytoplasm; molecular structure/bonding in macromolecules, macromolecular assemblies and protein machines. Physical techniques and modeling of cytoskeletal polymer-motor dynamics and function during intracellular transport, mitosis and motility. GE credit: QL, SE. Effective: 2008 Fall Quarter.

MCB 144—Mechanisms of Cell Division (3)
Lecture—3 hours. Prerequisite(s): BIS 101; BIS 102; BIS 104 The molecules and mechanisms that allow eukaryotic cells to coordinate cell growth, DNA replication, segregation of chromosomes and cell division. GE credit: SE, WE. Effective: 2002 Winter Quarter.

MCB 145—Assembly and Function of Cell Signaling Machinery (3)
Lecture—3 hours. Prerequisite(s): BIS 101; BIS 102; BIS 104 Molecular basis of cell signaling, including positioning of cellular machinery, components of various signaling pathways, and downstream effects of signaling on cell adhesion, cell differentiation, and programmed cell death. GE credit: SE. Effective: 2002 Spring Quarter.

MCB 148—Undergraduate Seminar in Cell Biology (2)
Seminar—2 hours. Prerequisite(s): Upper division standing in the biological sciences or a related discipline. Student reports on current topics in cell biology with emphasis on integration of concepts, synthesis, and state-of-the-art research approaches. Reviews of literature and reports of undergraduate research may be included. May be repeated for credit. (P/NP grading only.) GE credit: OL, SE. Effective: 1997 Winter Quarter.

MCB 150—Developmental Biology (4)
Lecture—4 hours. Prerequisite(s): BIS 101 Analysis of the mechanistic basis for animal development with a focus on experimental evidence and the relevant fundamental experimental strategies. Fertilization and early development, morphogenesis and patterning, cell differentiation, regulation of cell proliferation and tissue growth. GE credit: SE, SL. Effective: 2012 Fall Quarter.

MCB 158—Undergraduate Seminar in Developmental Biology (2)
Seminar—2 hours. Prerequisite(s): Upper division standing in the biological sciences or a related discipline. Student reports on current topics in cell biology with emphasis on integration of concepts, synthesis, and state-of-the-art research approaches. Reviews of literature and reports of undergraduate research may be included. May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: OL, SE. Effective: 1997 Winter Quarter.

MCB 160—Genetics Laboratory Associated Lecture (3)
Discussion/Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): BIS 101; or Consent of Instructor. Pass One restricted to upper division Genetics and Genomics majors; concurrent enrollment in MCB 160L required; on-time attendance for first lecture is mandatory. Lecture instruction in the theoretical basis of laboratory techniques in transmission and molecular genetics, discussion of lab results and experiment interpretation. GE credit: QL, SE, WE. Effective: 2018 Winter Quarter.

MCB 160L—Principles of Genetics Laboratory (5)
Discussion/Laboratory—1 hour; Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): BIS 101 Laboratory work in basic and molecular genetics including gene mapping, isolation and characterization of mutants in eukaryotic model systems, reverse genetics, gel electrophoresis, recombinant DNA techniques, and PCR. GE credit: QL, SE, VL, WE. Effective: 2012 Fall Quarter.

MCB 162—Human Genetics and Genomics (3)
Lecture—3 hours. Prerequisite(s): BIS 101 The human genome and genetic variation in human populations, molecular and genomic approaches in the practice of human genetics, epigenetic gene regulation, personal genetics and genomic medicine. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

MCB 163—Developmental Genetics (3)
Lecture—3 hours. Prerequisite(s): MCB 121 (can be concurrent) Current aspects of developmental genetics. Historical background and current genetic approaches to the study of development of higher animals. GE credit: SE. Effective: 2017 Fall Quarter.

MCB 164—Advanced Eukaryotic Genetics (3)
Lecture—3 hours. Prerequisite(s): MCB 121 Five basic operations of genetic analysis: mutation, segregation, recombination, complementation, and regulation. Emphasis on the theory and practice of isolating and analyzing mutations, as well as understanding mechanisms underlying both Mendelian and epigenetic inheritance. GE credit: SE, SL. Effective: 2011 Fall Quarter.

MCB 178—Undergraduate Seminar in Molecular Genetics (1)
Seminar—1 hour. Prerequisite(s): BIS 101; MCB 121 (can be concurrent); Upper division standing, and completion or concurrent enrollment in MCB 121. Discussion of current topics in molecular genetics to show advanced applications of basic principles and to highlight professional career opportunities. May be repeated up to 1 time(s) when topic differs. (P/NP grading only.) GE credit: OL, SE. Effective: 2011 Fall Quarter.

MCB 182—Principles of Genomics (3)
Lecture—3 hours. Prerequisite(s): BIS 101 Fundamentals of genomics, including structural genomics, functional genomics, proteomics, and bioinformatics, focusing on the impact of these disciplines on research in the biological sciences. Social impacts of genomic research. GE credit: SE. Effective: 2017 Winter Quarter.

MCB 190C—Undergraduate Research Conference (1)
Discussion—1 hour. Prerequisite(s): MCB 193 (can be concurrent) or MCB 199 (can be concurrent); and Consent of Instructor. Upper division standing; MCB 193 or MCB 199 required concurrently. Presentation and discussion of current research by faculty and students. May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

MCB 191—Introduction to Research (1)
Seminar—1 hour. Prerequisite(s): BIS 102 (can be concurrent); or Consent of Instructor. Various topics in molecular and cellular biology including biochemistry, genetics, and cell biology will be discussed, along with ways undergraduates can participate in research projects of faculty members. May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

MCB 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Technical and/or practical experience on and off campus, supervised by a member of the Section of Molecular and Cellular Biology faculty. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

MCB 193—Advanced Research (3)
Discussion—1 hour; Laboratory—6 hours. Prerequisite(s): Consent of Instructor. Upper division standing, completion of an upper division Molecular and Cellular Biology laboratory course. Research project carried out under the supervision of a faculty sponsor.
Discussion and analysis of results and proposed experiments on a weekly basis with faculty sponsor. May include presentation of a seminar to a research group.May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

MCB 194—Thesis Research (3)
Independent Study—9 hours. Prerequisite(s): Consent of Instructor. 6 units of course 193 and/or 199 with faculty director; senior standing. Continuation of an intensive, individual laboratory research project in biochemistry, genetics, or cell biology culminating with the presentation of the work in a written thesis and in a seminar. (P/NP grading only.) GE credit: OL, SE, WE. Effective: 2015 Fall Quarter.

MCB 194H—Research Honors (3)
Independent Study—9 hours. Prerequisite(s): Consent of Instructor. 6 units of MCB 193 and/or MCB 199 with faculty director; senior standing; GPA of at least 3.250. Honors project. Continuation of an intensive, individual laboratory research project in biochemistry, genetics, or cell biology culminating with the presentation of the work in a written thesis and in a seminar. (P/NP grading only.) GE credit: OL, SE, WE. Effective: 1997 Winter Quarter.

MCB 197T—Tutoring in Molecular and Cellular Biology (1-5)
Tutorial—2-6 hours. Prerequisite(s): Consent of Instructor. Upper division standing, completion of course to be tutored. Assisting the instructor in one of the section's regular courses by tutoring individual or small groups of students in a laboratory, in voluntary discussion groups, or other voluntary course activities. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 2004 Fall Quarter.

MCB 198—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

MCB 199—Special Study for Advanced Undergraduates (1-5)
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

MCB 248—Seminar in Cell Biology (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. Discussion of recent literature on the physical and chemical aspects of organization and function of living systems, topics of current interest in ultrastructure and function of cells. Organizational and functional properties of the molecular and cellular levels of biological systems. May be repeated for credit. Effective: 1997 Winter Quarter.

MCB 258—Seminar in Development (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. Reports and discussion on embryology, morphogenesis, and developmental mechanisms. May be repeated for credit. May be repeated for credit. Effective: 1997 Winter Quarter.

MCB 259—Literature in Developmental Biology (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Critical presentation and analysis of recent journal articles in developmental biology. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

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MCB 282—Biotechnology Internship (7-12)
Internship—21-36 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Open only to students participating in the Designated Emphasis in Biotechnology program. Research at a biotechnology company or interdisciplinary cross-college lab for a minimum of 3 months as part of the Designated Emphasis in Biotechnology Program. (S/U grading only.) Effective: 2004 Winter Quarter.

MCB 290C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Presentations and critical discussions of faculty and graduate student research in molecular and cellular biology including biochemistry,
genetics, and cell biology. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

MCB 291—Current Progress in Molecular and Cellular Biology (1)
Seminar—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Seminars presented by guest lecturers on subject of their own research activities. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

MCB 295—Literature in Molecular and Cellular Biology (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Critical reading and evaluation of current literature in molecular and cellular biology disciplines. Papers will be presented and discussed in detail. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

MCB 298—Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

MCB 299—Research (1-12)
Independent Study—3-36 hours. (S/U grading only.) Effective: 1997 Winter Quarter.

MCB 390—Methods of Teaching (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Practical experience in the methods and problems of teaching biochemistry/genetics/cell biology.Includes analysis of texts and
supporting material,discussion of teaching techniques, preparing for and conducting discussion and laboratory sections,formulating examinations under supervision of instructor.Participating in the teaching program required for Ph.D. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

Biological & Agricultural Engineering; Agricultural & Environmental Sciences, Engineering

Biological & Agricultural Engineering; Agricultural & Environmental Sciences, Engineering | Biological & Agricultural Engineering Information

(College of Agricultural and Environmental Sciences and College of Engineering)

Bryan M. Jenkins, Ph.D., Chair of the Department

Department Office. 2030 Bainer Hall; 530-752-0102; http://bae.engineering.ucdavis.edu

Faculty. http://bae.engineering.ucdavis.edu/faculty-directory/

Major Programs and Graduate Study. For the Bachelor of Science program, see the major in Engineering: Biological and Agricultural; for graduate study, see also Graduate Studies.

Minor Programs. The Department of Biological and Agricultural Engineering offers two minors through the College of Agricultural and Environmental Sciences: Geographic Information Systems and Precision Agriculture.

The minor in Geographic Information Systems is open to all majors, including those in engineering. This minor is for students interested in information processing of spatial data related to remote sensing for geographical and environmental planning and related areas.

The minor in Precision Agriculture is open to all majors, including those in engineering, and acquaints students with recent developments and their applications to agriculture, in geographic information systems, global positioning systems, and variable rate technologies.

The Department of Biological and Agricultural Engineering also administers three minors through the College of Engineering in Energy Science and Technology, Energy Efficiency, and Energy Policy.

Courses. Courses are listed under Applied Biological Systems Technology, and Engineering: Biological and Agricultural (Biological Systems Engineering).

Biological Sciences

Biological Sciences | BIS Information

(College of Biological Sciences)

Biology Academic Success Center (BASC). 1023 Sciences Laboratory Building; 530-752-0410; http://biosci.ucdavis.edu; http://basc.ucdavis.edu/

Faculty. https://biology.ucdavis.edu/faculty

Biological Sciences | BIS A.B.

(College of Biological Sciences)

Biology Academic Success Center (BASC). 1023 Sciences Laboratory Building; 530-752-0410; http://biosci.ucdavis.edu; http://basc.ucdavis.edu/

Faculty. https://biology.ucdavis.edu/faculty

The Biological Sciences Major

Departments of Evolution and Ecology; Microbiology and Molecular Genetics; Molecular and Cellular Biology; Neurobiology, Physiology, and Behavior; and Plant Biology

The Program. The Biological Sciences major is broad in concept, spanning the numerous core disciplines of biology. The Bachelor of Science (B.S.) and Bachelor of Arts (A.B.) programs includes preparatory work in mathematics, general and organic chemistry, physics, and introductory level biology, as well as upper division core classes emphasizing the breadth of biological sciences. Students in the B.S. degree program complete additional upper division biology coursework, for which they can choose classes from a variety of different areas such as molecular biology and genetics, animal behavior, plant growth and development, bioinformatics, marine biology, forensics, and microbiology. Students in the Bachelor of Arts (A.B.) program can pursue upper division coursework outside of the biological sciences. Research and internships are encouraged in both programs.

Career Alternatives. Both degree programs prepare students for admission to graduate schools or professional schools, leading to either a variety of professional health careers or further study in basic and applied areas of biology. They provide suitable preparation for careers in teaching, biological and biotechnological research with various governmental agencies or private companies, government regulatory agencies, environmental consulting, biological illustration and writing, pharmaceutical sales, biological/environmental law, and biomedical engineering.

Advisors and Advising. Information on the Biological Sciences major or minor can be obtained at the Biology Academic Success Center (BASC) in 1023 Sciences Laboratory Building; 530-752-0410; http://basc.ucdavis.edu/.

Citation for Outstanding Performance. The College of Biological Sciences confers Citations for Outstanding Performance on undergraduates majoring in Biological Sciences who have demonstrated superior academic performance and individual achievement in research. Students who wish to be considered for a citation must first meet or exceed a specified grade point average and participate in an appropriate research project.

Teaching Credential Subject Representative. Associate Director of Teacher Education (School of Education); see the Teaching Credential/M.A. Program.

Bodega Marine Laboratory Program. Students interested in Marine Biology should visit Marine and Coastal Science Major and http://bml.ucdavis.edu/.

Preparatory Subject Matter **Units:** 45-57

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
BIS 002C	Introduction to Biology: Biodiversity and the Tree of Life	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
OR		
CHE 003A	Chemistry for Life Sciences: Determining Structure and Predicting Properties	5
CHE 003B	Chemistry for Life Sciences: Predicting and Characterizing Chemical Change	5
CHE 008A	Organic Chemistry: Brief Course	2
CHE 008B	Organic Chemistry: Brief Course	4
OR		
CHE 118A	Organic Chemistry for Health and Life Sciences	4
CHE 118B	Organic Chemistry for Health and Life Sciences	4
CHE 118C	Organic Chemistry for Health and Life Sciences	4
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
PHY 001A	Principles of Physics	3
PHY 001B	Principles of Physics	3
OR		
PHY 007A	General Physics	4
PHY 007B	General Physics	4
PHY 007C	General Physics	4

Recommended:

CHE 002C	General Chemistry	5
OR		
CHE 003C	Chemistry for Life Sciences: Controlling Processes and Synthetic Pathways	5
MAT 017C	Calculus for Biology and Medicine	4
OR		

MAT 021C	Calculus	4

Depth Subject Matter **Units:** 28-36

BIS 101	Genes and Gene Expression	4
BIS 105	Biomolecules and Metabolism	3
OR		
BIS 102	Structure and Function of Biomolecules	3
BIS 103	Bioenergetics and Metabolism	3
STA 100	Applied Statistics for Biological Sciences	4
OR		
STA 013	Elementary Statistics	4
EVE 100	Introduction to Evolution	4

Choose one from each topic:

Ecology:

ESP 100	General Ecology	4
EVE 101	Introduction to Ecology	4

Microbiology:

FST 104	Food Microbiology	3
MIC 102	Introductory Microbiology	3
MIC 162	General Virology	4
MIC 170	Yeast Molecular Genetics	3

Animal Physiology, Behavior or Development:

BIS 104	Cell Biology	3
MCB 150	Developmental Biology	4
NPB 100	Neurobiology	4
NPB 101	Systemic Physiology	5
NPB 102	Animal Behavior	3
NPB 141	Physiological Adaptation of Marine Organisms	3

Plant Physiology or Development:

PLB 105	Developmental Plant Anatomy	5
PLB 111	Plant Physiology	3
PLB 112	Plant Growth and Development	3
PLB 113	Molecular and Cellular Biology of Plants	3
PLB 116	Plant Morphology and Evolution	5
PLB 126	Plant Biochemistry	3

Laboratory Requirement **Units:** 0

Choose course(s) for a minimum total of six hours/week of laboratory or field work from the list of courses below:

Choose two with three hours lab or field work/week:

EVE 110	Running, Swimming and Flying	3
EVE 117	Plant Ecology	4
EVE 119	Population Biology of Invasive Plants and Weeds	3
EVE 140	Paleobotany	4
EVE 180A	Experimental Ecology and Evolution in the Field	4
EVE 180B	Experimental Ecology and Evolution in the Field	4
EXB 104L	Exercise Biology Laboratory	3

EXB 115	Biomechanical Bases of Movement	3
MIC 103L	Introductory Microbiology Laboratory	2
NPB 100L	Neurobiology Laboratory	3
NPB 101L	Systemic Physiology Laboratory	3
NPB 121L	Physiology of Reproduction Laboratory	1
NPB 123	Comparative Vertebrate Organology	4
PLB 117	Plant Ecology	4
PLB 119	Population Biology of Invasive Plants and Weeds	3

Other courses with approval of the master advisor.

Choose one with six hours lab or field work/week; a course may fulfill both the lab and a depth topic requirement:

BIS 180L	Genomics Laboratory	5
EVE 105	Phylogenetic Analysis of Vertebrate Structure	4
EVE 106	Mechanical Design in Organisms	3
EVE 108	Systematics and Evolution of Angiosperms	5
EVE 112L	Biology of Invertebrates Laboratory	2
EVE 114	Experimental Invertebrate Biology	3
EXB 106L	Human Gross Anatomy Laboratory	3
FST 104L	Food Microbiology Laboratory	4
MIC 104L	General Microbiology Laboratory	3
MIC 105L	Microbial Diversity Laboratory	3
MCB 120L	Molecular Biology and Biochemistry Laboratory	3
MCB 140L	Cell Biology Laboratory	5
MCB 160L	Principles of Genetics Laboratory	5
NPB 111L	Advanced Systemic Physiology Laboratory	4
NPB 141P	Physiological Adaptation of Marine Organisms/Advanced Laboratory Topics	5
PLB 102	California Floristics	5
PLB 105	Developmental Plant Anatomy	5
PLB 116	Plant Morphology and Evolution	5
PLB 148	Introductory Mycology	4

Other courses with approval of the Master Advisor.

Total: 73-93

Biological Sciences | BIS B.S.

(College of Biological Sciences)

Biology Academic Success Center (BASC). 1023 Sciences Laboratory Building; 530-752-0410; http://biosci.ucdavis.edu; http://basc.ucdavis.edu/

Faculty. https://biology.ucdavis.edu/faculty

The Biological Sciences Major

Departments of Evolution and Ecology; Microbiology and Molecular Genetics; Molecular and Cellular Biology; Neurobiology, Physiology, and Behavior; and Plant Biology

The Program. The Biological Sciences major is broad in concept, spanning the numerous core disciplines of biology. The Bachelor of Science (B.S.) and Bachelor of Arts (A.B.) programs includes preparatory work in mathematics, general and organic chemistry, physics, and introductory level biology, as well as upper division core classes emphasizing the breadth of biological sciences. Students in the B.S. degree program complete additional upper division biology coursework, for which they can choose classes from a variety of different areas such as molecular biology and genetics, animal behavior, plant growth and development, bioinformatics, marine biology, forensics, and microbiology. Students in the Bachelor of Arts (A.B.) program can pursue upper

division coursework outside of the biological sciences. Research and internships are encouraged in both programs.

Career Alternatives. Both degree programs prepare students for admission to graduate schools or professional schools, leading to either a variety of professional health careers or further study in basic and applied areas of biology. They provide suitable preparation for careers in teaching, biological and biotechnological research with various governmental agencies or private companies, government regulatory agencies, environmental consulting, biological illustration and writing, pharmaceutical sales, biological/environmental law, and biomedical engineering.

Advisors and Advising. Information on the Biological Sciences major or minor can be obtained at the Biology Academic Success Center (BASC) in 1023 Sciences Laboratory Building; 530-752-0410; http://basc.ucdavis.edu/.

Citation for Outstanding Performance. The College of Biological Sciences confers Citations for Outstanding Performance on undergraduates majoring in Biological Sciences who have demonstrated superior academic performance and individual achievement in research. Students who wish to be considered for a citation must first meet or exceed a specified grade point average and participate in an appropriate research project.

Teaching Credential Subject Representative. Associate Director of Teacher Education (School of Education); see the Teaching Credential/M.A. Program.

Bodega Marine Laboratory Program. Students interested in Marine Biology should visit Marine and Coastal Science Major and http://bml.ucdavis.edu/.

Preparatory Subject Matter **Units:** 56-66

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
BIS 002C	Introduction to Biology: Biodiversity and the Tree of Life	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 002C	General Chemistry	5
OR		
CHE 003A	Chemistry for Life Sciences: Determining Structure and Predicting Properties	5
CHE 003B	Chemistry for Life Sciences: Predicting and Characterizing Chemical Change	5
CHE 003C	Chemistry for Life Sciences: Controlling Processes and Synthetic Pathways	5
CHE 008A	Organic Chemistry: Brief Course	2
CHE 008B	Organic Chemistry: Brief Course	4
OR		
CHE 118A	Organic Chemistry for Health and Life Sciences	4
CHE 118B	Organic Chemistry for Health and Life Sciences	4
CHE 118C	Organic Chemistry for Health and Life Sciences	4
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
MAT 017C	Calculus for Biology and Medicine	4
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4

MAT 021C Recommended.

PHY 007A	General Physics	4
PHY 007B	General Physics	4
PHY 007C	General Physics	4

Depth Subject Matter **Units:** 42-51

Section 1: Common Curriculum

BIS 101	Genes and Gene Expression	4
BIS 105	Biomolecules and Metabolism	3
OR		
BIS 102	Structure and Function of Biomolecules	3
BIS 103	Bioenergetics and Metabolism	3
BIS 104	Cell Biology	3

Section 2: Depth Subject Topics

STA 100	Applied Statistics for Biological Sciences	4
EVE 100	Introduction to Evolution	4

Choose one course from each topic:

Evolution:

EVE 101	Introduction to Ecology	4
ESP 100	General Ecology	4

Microbiology:

MIC 102	Introductory Microbiology	3
MIC 162	General Virology	4
MIC 170	Yeast Molecular Genetics	3
FST 104	Food Microbiology	3

Plant Physiology or Development:

PLB 105	Developmental Plant Anatomy	5
PLB 111	Plant Physiology	3
PLB 112	Plant Growth and Development	3
PLB 113	Molecular and Cellular Biology of Plants	3
PLB 116	Plant Morphology and Evolution	5
PLB 126	Plant Biochemistry	3

Animal Physiology, Behavior or Development:

NPB 100	Neurobiology	4
NPB 101	Systemic Physiology	5
NPB 102	Animal Behavior	3
NPB 141	Physiological Adaptation of Marine Organisms	3
MCB 150	Developmental Biology	4

Section 3: Laboratory Requirement **Units:** 6

Course(s) selected to fulfill the laboratory requirement may also satisfy restricted elective or depth subject matter units (but not both).

Choose course(s) for a minimum total of six hours/week of laboratory or field work from the list of courses below:

Choose two with three hours lab or field work/week:

EVE 110	Running, Swimming and Flying	3
EVE 117	Plant Ecology	4

EVE 119	Population Biology of Invasive Plants and Weeds	3
EVE 140	Paleobotany	4
EVE 180A	Experimental Ecology and Evolution in the Field	4
EVE 180B	Experimental Ecology and Evolution in the Field	4
EXB 104L	Exercise Biology Laboratory	3
EXB 115	Biomechanical Bases of Movement	3
MIC 103L	Introductory Microbiology Laboratory	2
NPB 100L	Neurobiology Laboratory	3
NPB 101L	Systemic Physiology Laboratory	3
NPB 121L	Physiology of Reproduction Laboratory	1
NPB 123	Comparative Vertebrate Organology	4
PLB 119	Population Biology of Invasive Plants and Weeds	3

Other courses with approval of the Master Advisor.

Choose one course with six hours lab or field work/week:

BIS 180L	Genomics Laboratory	5
EVE 105	Phylogenetic Analysis of Vertebrate Structure	4
EVE 106	Mechanical Design in Organisms	3
EVE 108	Systematics and Evolution of Angiosperms	5
EVE 112L	Biology of Invertebrates Laboratory	2
EVE 114	Experimental Invertebrate Biology	3
EXB 106L	Human Gross Anatomy Laboratory	3
FST 104L	Food Microbiology Laboratory	4
MIC 104L	General Microbiology Laboratory	3
MIC 105L	Microbial Diversity Laboratory	3
MCB 120L	Molecular Biology and Biochemistry Laboratory	3
MCB 140L	Cell Biology Laboratory	5
MCB 160L	Principles of Genetics Laboratory	5
NPB 111L	Advanced Systemic Physiology Laboratory	4
NPB 141P	Physiological Adaptation of Marine Organisms/Advanced Laboratory Topics	5
PLB 102	California Floristics	5
PLB 105	Developmental Plant Anatomy	5
PLB 108	Systematics and Evolution of Angiosperms	5
PLB 116	Plant Morphology and Evolution	5
PLB 148	Introductory Mycology	4

Other courses with approval of the master advisor.

Section 4: Restricted Electives **Units:** 11

Choose at least three or more courses for a minimum of 11 units from the list of Approved Upper Division Restrictive Electives and/or laboratory courses. No class or laboratory used to satisfy a section 1 or a section 2 course requirement may be used as a restricted elective.

Students may choose any combination of approved courses that align with their academic or career objectives, or choose courses from a list of sample themes available on the BASC website at http://basc.ucdavis.edu. Up to three of the 11 units may be fulfilled by approved seminar or research courses.

Approved Upper Division Restricted Electives:

ANG 105	Horse Genetics	2
ANG 107	Genetics and Animal Breeding	5
ANS 104	Principles and Applications of Domestic Animal Behavior	4
ANS 119	Invertebrate Aquaculture	4
ANS 123	Animal Growth and Development	4

ANS 131	Reproduction and Early Development in Aquatic Animals	4
ANS 142	Companion Animal Care and Management	4
ANS 170	Ethics of Animal Use	4
ANT 151	Primate Evolution	4
ANT 152	Human Evolution	5
ANT 153	Human Biological Variation	5
ANT 154A	The Evolution of Primate Behavior	5
ANT 154B	Primate Evolutionary Ecology	5
ANT 157	Anthropological Genetics	3
APC 100	Comparative Vertebrate Organology	4
AVS 100	Avian Biology	3
AVS 150	Nutrition of Birds	1
BIM 117	Modeling Strategies for Biomedical Engineering	4
BIM 140	Protein Engineering	4
BIS Biological Sciences - all upper division courses***		
BIT 150	Applied Bioinformatics	4
BIT 160	Principles of Plant Biotechnology	3
BIT 161A	Genetics and Biotechnology Laboratory	6
BIT 161B	Plant Genetics and Biotechnology Laboratory	4
BIT 171	Professionalism and Ethics in Genomics and Biotechnology	3
CHA 101	Human Gross Anatomy	4
CHA 101L	Human Gross Anatomy Laboratory	3
CHE 104	Forensic Applications of Analytical Chemistry	3
CHE 107A	Physical Chemistry for the Life Sciences	3
CHE 107B	Physical Chemistry for the Life Sciences	3
CHE 108	Molecular Biochemistry	3
CHE 130A	Pharmaceutical Chemistry	3
CHE 130B	Pharmaceutical Chemistry	3
CHE 150	Chemistry of Natural Products	3
ECS 124	Theory and Practice of Bioinformatics	4
EDU 100	Introduction to Schools	4
EDU 181	Teaching in Science and Mathematics	2
EDU 183	Teaching High School Mathematics and Science	3
ENH 102	Physiological Principles in Environmental Horticulture	4
ENH 105	Taxonomy and Ecology of Environmental Plant Families	4
ENT Entomology - all upper division courses***		
ESP 110	Principles of Environmental Science	4
ESP 116N	Oceanography	3
ESP 121	Population Ecology	4
ESP 123	Introduction to Field and Laboratory Methods in Ecology	4
ESP 124	Marine and Coastal Field Ecology	3
ESP 150A	Physical and Chemical Oceanography	4
ESP 150B	Geological Oceanography	3
ESP 150C	Biological Oceanography	4
ESP 151	Limnology	4
ESP 151L	Limnology Laboratory	3
ESP 155	Wetland Ecology	4
ETX 101	Principles of Environmental Toxicology	4
ETX 102B	Quantitative Analysis of Environmental Toxicants	5
ETX 103A	Biological Effects of Toxicants	4
ETX 104	Environmental and Nutritional Factors in Cellular Regulation and Nutritional Toxicants	4
EVE Evolution and Ecology - all upper division courses***		
EXB 101	Exercise Physiology	4
EXB 106	Human Gross Anatomy	4

EXB 106L	Human Gross Anatomy Laboratory	3
EXB 110	Exercise Metabolism	3
EXB 111	Environmental Effects on Physical Performance	3
EXB 124	Physiology of Maximal Human Performance	4
FST 102A	Malting and Brewing Science	4
FST 104	Food Microbiology	3
GEL 107	Earth History: Paleobiology	3
GEL 107L	Earth History: Paleobiology Laboratory	2
GEL 108	Earth History: Paleoclimates	3
GEL 116N	Oceanography	3
GEL 141	Evolutionary History of Vertebrates	3
GEL 141L	Evolutionary History of Vertebrates Laboratory	1
GEL 144	Historical Ecology	3
GEL 150A	Physical and Chemical Oceanography	4
GEL 150B	Geological Oceanography	3
GEL 150C	Biological Oceanography	4
MAT 124	Mathematical Biology	4
MCB Molecular and Cellular Biology - all upper division courses***		
MIC Microbiology - all upper division courses***		
MMI 188	Human Immunology	3
NPB Neurobiology, Physiology, and Behavior - all upper division courses ***		
PHI 108	Philosophy of the Biological Sciences	4
PLB Plant Biology - all upper division courses***		
PLP 120	Introduction to Plant Pathology	4
PLP 130	Fungal Biotechnology and Biochemistry	3
PLS 130	Rangelands: Ecology, Conservation and Restoration	3
PLS 131	Identification and Ecology of Grasses	2
PLS 135	Ecology and Community Structure of Grassland and Savannah Herbivores	3
PLS 144	Trees and Forests	4
PLS 150	Sustainability and Agroecosystem Management	4
PLS 153	Plant, Cell, Tissue and Organ Culture	4
PLS 154	Introduction to Plant Breeding	4
PLS 157	Physiology of Environmental Stresses in Plants	4
PLS 158	Mineral Nutrition of Plants	4
PMI 126	Fundamentals of Immunology	3
PMI 126L	Immunology Laboratory	2
PMI 128	Biology of Animal Viruses	3
PSC 121	Physiological Psychology	4
PSC 122	Advanced Animal Behavior	4
PSC 123	Hormones and Behavior	3
PSC 124	Comparative Neuroanatomy	3
SOC 154	Health and Illness	4
SSC 111	Soil Microbiology	4
STS 108	Intellectual Property in Science	4
STS 129	Health and Medicine in a Global Context	4
STS 130A	From Natural History to the History of Nature	4
STS 131	Darwin	4
STS 164	Writing Science	4
STS 180	Topics in Science and Technology Studies	4
UWP 111C	Specialized Topics in Journalism: Science Journalism	4
UWP 112A	Introduction to Professional Editing	4
UWP 120	Rhetorical Approaches to Scientific and Technological Issues	4
UWP 121	History of Scientific Writing	4

WFC 100	Field Methods in Wildlife, Fish, & Conservation Biology	4
WFC 101	Field Research in Wildlife Ecology	2
WFC 110	Biology and Conservation of Wild Mammals	3
WFC 110L	Laboratory in Biology and Conservation of Wild Mammals	3
WFC 111	Biology and Conservation of Wild Birds	3
WFC 111L	Laboratory in Biology and Conservation of Wild Birds	3
WFC 120	Biology and Conservation of Fishes	3
WFC 120L	Laboratory in Biology and Conservation of Fishes	2
WFC 121	Physiology of Fishes	4
WFC 122	Population Dynamics and Estimation	4
WFC 130	Physiological Ecology of Wildlife	4
WFC 134	Herpetology	3
WFC 134L	Herpetology Laboratory	3
WFC 141	Behavioral Ecology	4
WFC 136	Ecology of Waterfowl and Game Birds	4
WFC 151	Wildlife Ecology	4
WFC 154	Conservation Biology	4
WFC 157	Coastal Ecosystems	4

***Courses numbered 198 do not fulfill restricted elective units without advisor approval. Discussion section courses, those noted with a "D" do not fulfill restricted elective units. Only 3 units of approved seminar or research courses can be applied to the restrictive electives.

Approved Seminar/Research Courses **Units:** 1-3

Courses numbered 189, 190/190C, 192, 194H, and 199 in ABI, ANS, BIS, BIT, ENH, ENT, ETX, EVE, MCB, MIC, NPB, PLB, PLP, PLS, VEN, WFC as well as:

BIS 122P	Population Biology and Ecology/Advanced Laboratory Topics	5
BIS 123	Undergraduate Colloquium in Marine Science	1
BIS 133	Collaborative Studies in Mathematical Biology	3
EVE 111	Marine Environmental Issues	1
MIC 191	Introduction to Research for Advanced Undergraduates	1
MCB 138	Undergraduate Seminar in Biochemistry	1
MCB 139	Undergraduate Seminar in Biochemistry	2
MCB 148	Undergraduate Seminar in Cell Biology	2
MCB 158	Undergraduate Seminar in Developmental Biology	2
MCB 178	Undergraduate Seminar in Molecular Genetics	1
MCB 191	Introduction to Research	1
MCB 193	Advanced Research	3
NPB 139	Frontiers in Physiology	3
NPB 159	Frontiers in Behavior	3

NPB 169	Frontiers in Neurobiology	3

Total: 98-117

Biological Sciences | BIS Minor

(College of Biological Sciences)

Biology Academic Success Center (BASC). 1023 Sciences Laboratory Building; 530-752-0410; http://biosci.ucdavis.edu; http://basc.ucdavis.edu/

Faculty. https://biology.ucdavis.edu/faculty

Departments of Evolution and Ecology; Microbiology and Molecular Genetics; Molecular and Cellular Biology; Neurobiology, Physiology, and Behavior; and Plant Biology

The Program. The Biological Sciences minor provides an opportunity for students in programs outside of the College of Biological Sciences to complement their studies with a concentration in biology. Student in the minor experience the breadth of biology by taking courses in five core areas: molecular biology/ biochemistry, animal biology, plant biology, microbiology and ecology/evolution.

Advisors and Advising. Information on the Biological Sciences major or minor can be obtained at the Biology Academic Success Center (BASC) in 1023 Sciences Laboratory Building; 530-752-0410; http://basc.ucdavis.edu/.

Biological Sciences **Units:** 18

Complete at least three units from each of the five numbered groups to total at least 18 units. Appropriate alternative courses may be used with approval of an advisor.

(1) Cell and Molecular Biology:

BIS 101	Genes and Gene Expression	4
BIS 102	Structure and Function of Biomolecules	3
BIS 105	Biomolecules and Metabolism	3

(2) Animal Biology:

ANT 151	Primate Evolution	4
APC 100	Comparative Vertebrate Organology	4
OR		
NPB 123	Comparative Vertebrate Organology	4
ENT 100	General Entomology	4
EVE 105	Phylogenetic Analysis of Vertebrate Structure	4
EVE 112	Biology of Invertebrates	3
AND		
EVE 112L	Biology of Invertebrates Laboratory	2
NEM 100	General Plant Nematology	4
NEM 110	Introduction to Nematology	2
NPB 100	Neurobiology	4
NPB 101	Systemic Physiology	5
NPB 102	Animal Behavior	3
NPB 117	Avian Physiology	3
WFC 110	Biology and Conservation of Wild Mammals	3
WFC 111	Biology and Conservation of Wild Birds	3

WFC 120	Biology and Conservation of Fishes	3

(3) Microbiology:

MIC 101	Introductory Microbiology	5
MIC 102	Introductory Microbiology	3
MIC 162	General Virology	4
PMI 128	Biology of Animal Viruses	3
PLB 148	Introductory Mycology	4
OR		
PLP 148	Introductory Mycology	4

(4) Plant Biology:

PLS 144	Trees and Forests	4
PLB 105	Developmental Plant Anatomy	5
PLB 111	Plant Physiology	3
PLB 112	Plant Growth and Development	3
PLB 116	Plant Morphology and Evolution	5
PLB 126	Plant Biochemistry	3
PLB 148	Introductory Mycology	4
OR		
PLP 148	Introductory Mycology	4
PLS 141	Ethnobotany	4
PLS 171	Principles and Practices of Plant Propagation	4

(5) Evolution and Ecology:

ANT 151	Primate Evolution	4
ANT 152	Human Evolution	5
ANT154 (Nonexistent)		
ENT 100	General Entomology	4
EVE 100	Introduction to Evolution	4
EVE 101	Introduction to Ecology	4
EVE 108	Systematics and Evolution of Angiosperms	5
EVE 115	Marine Ecology	4
EVE 117	Plant Ecology	4
EVE 119	Population Biology of Invasive Plants and Weeds	3
EVE 138	Ecology of Tropical Latitudes	5
EVE 140	Paleobotany	4
EVE 147	Biogeography	4
PLB 102	California Floristics	5
PLB 108	Systematics and Evolution of Angiosperms	5
PLB 117	Plant Ecology	4
PLB 119	Population Biology of Invasive Plants and Weeds	3
PLB 143	Evolution of Crop Plants	4
PLP 150	Fungal Ecology	3
WFC 151	Wildlife Ecology	4

Additional courses (if necessary) from above numbered groups to reach 18 units.

Total: 18

Biological Sciences | BIS Courses

Courses in BIS:

BIS 002A—Introduction to Biology: Essentials of Life on Earth (5)
Discussion—2 hours; Lecture—3 hours. Essentials of life including sources and use of energy, information storage, responsiveness to natural selection and cellularity. Origin of life and influence of living things on the chemistry of the Earth. Not open for credit to students who have completed BIS 001A with a grade of C- or better. GE credit: SE. Effective: 2013 Winter Quarter.

BIS 002B—Introduction to Biology: Principles of Ecology and Evolution (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Introduction to basic principles of ecology and evolutionary biology, focusing on the fundamental mechanisms that generate and maintain biological diversity across scales ranging from molecules and genes to global processes and patterns. Not open for credit to students who have completed BIS 001B with a grade of C- or better. GE credit: QL, SE, SL, VL. Effective: 2017 Fall Quarter.

BIS 002C—Introduction to Biology: Biodiversity and the Tree of Life (5)
Laboratory—3 hours; Lecture—4 hours. Prerequisite(s): BIS 001B C- or better or BIS 002B C- or better Introduction to organismal diversity, using the phylogenetic tree of life as an organizing theme. Lectures and laboratories cover methods of phylogenetic reconstruction, current knowledge of the tree of life, and the evolution of life's most important and interesting innovations. Not open for credit to students who have completed BIS 001C with a grade of C- or better. GE credit: OL, QL, SE, SL, VL. Effective: 2010 Fall Quarter.

BIS 005—Exploring Biological Sciences (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Enrollment limited to first year CBS students. Introduction to biology at UC Davis through discussions with faculty and speakers from industry and medicine. (P/NP grading only.) Effective: 2015 Fall Quarter.

BIS 010—Everyday Biology (4)
Discussion—1 hour; Lecture—3 hours. Everyday biological concepts using contemporary readings for non-scientists. Key topics include: personal genomics; food and health; climate and evolution; brain biology and the law. Innovative projects apply biological concepts to current events. For students not specializing in biology. Not open for credit to students who have completed BIS 002A, or 002B, or 002C, or 010V or NEM 010V or equivalent. GE credit: SE, SL, WE. Effective: 2016 Winter Quarter.

BIS 011—Issues in the Life Sciences (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): Consent of Instructor. Enrollment limited to BUSP students. The range of subjects and approaches in the field of biology, including both basic and applied research topics. Effective: 2002 Fall Quarter.

BIS 011L—Basic Life Sciences Laboratory (1)
Laboratory—3 hours. Prerequisite(s): Consent of Instructor. Limited to Biology Undergraduate Scholars Program (BUSP) students. Basic laboratory skills in life sciences research, including microbiology, molecular biology, and genetics. Effective: 2018 Winter Quarter.

BIS 020Q—Modeling in Biology (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): MAT 016B (can be concurrent) Introduction to the application of quantitative methods to biological problems. Students will use a mathematical software package to tackle problems drawn from all aspects of biology. Effective: 2005 Spring Quarter.

BIS 092—Internship in Biological Sciences (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Restricted to lower division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

BIS 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Primarily for lower division students (P/NP grading only.) Effective: 1997 Winter Quarter.

BIS 099—Special Study for Undergraduates (1-5)
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Restricted to lower division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

BIS 101—Genes and Gene Expression (4)
Lecture—4 hours. Prerequisite(s): (BIS 002A C- or better, BIS 002B C- or better); (CHE 008A or CHE 118A or CHE 128A); ((STA 013 or STA 013Y) or STA 100 or STA 102 or STA 130A); STA 100 preferred. Nucleic acid structure and function; gene expression and its regulation; replication; transcription and translation; transmission genetics; molecular evolution. GE credit: QL, SE, SL. Effective: 2018 Winter Quarter.

BIS 101D—Genes and Gene Expression Discussion (1)
Discussion—1 hour. Prerequisite(s): BIS 101 (can be concurrent); and Consent of Instructor. Discussion and problem solving related to fundamental principles of classical and molecular genetics as presented in course 101. (P/NP grading only.) Effective: 2000 Fall Quarter.

BIS 102—Structure and Function of Biomolecules (3)
Lecture—3 hours. Prerequisite(s): (BIS 001A or BIS 002A); (CHE 008B or CHE 118B or CHE 128B) Structure and function of macromolecules with emphasis on proteins, catalysis, enzyme kinetics, lipids, membranes, and proteins as machines. Only one unit of credit for students who have completed ABI 102 & 1.5 units of credit for students who have completed BIS 105. GE credit: QL, SE. Effective: 2014 Winter Quarter.

BIS 102Q—Quantitative Biomolecule Concepts (1)
Auto Tutorial; Extensive Problem Solving—1 hour. Prerequisite(s): BIS 102 (can be concurrent) Study of the quantitative concepts and mathematical models fundamental to biochemistry. GE credit: QL, SE. Effective: 2008 Spring Quarter.

BIS 103—Bioenergetics and Metabolism (3)
Lecture—3 hours. Prerequisite(s): BIS 102 Fundamentals of the carbon, nitrogen, and sulfur cycles in nature, including key reactions of biomolecules such as carbohydrates, amino acids, lipids, and nucleotides, and of energy production and use in different types of organisms. Principles of metabolic regulation. 1.5 units of credit for students who have completed BIS 105; 1 unit of credit if students who have completed ABI 103. GE credit: SE. Effective: 2013 Winter Quarter.

BIS 104—Cell Biology (3)
Lecture—3 hours. Prerequisite(s): BIS 101; (BIS 102 or BIS 105) Membrane receptors and signal transduction; cell trafficking; cell cycle; cell growth and division; extracellular matrix and cell-cell junctions; cell development; immune system. GE credit: SE. Effective: 2011 Spring Quarter.

BIS 105—Biomolecules and Metabolism (3)
Lecture—3 hours. Prerequisite(s): ((BIS 001A, BIS 001B, BIS 001C) or (BIS 002A, BIS 002B, BIS 002C)); (CHE 008B or CHE 118B or CHE 128B) Fundamentals of biochemical processes, with emphasis on protein structure and activity; energy metabolism; catabolism of sugars, amino acids, and lipids; and gluconeogenesis. 1.5 units of credit for students who have completed BIS 102 or BIS 103; no credit for students who have completed both BIS 102 and BIS 103; 1 unit of credit for students who have completed ABI 102 or ABI 103; no credit for students who have completed both ABI 102 and ABI 103. GE credit: QL, SE. Effective: 2014 Fall Quarter.

BIS 122—Population Biology and Ecology (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): (BIS 001A, BIS 001B, BIS 001C) or (BIS 002A, BIS 002B, BIS 002C); Residence at Bodega Marine Laboratory required. Biological and physical processes affecting plant and animal populations in the rich array of habitats at the Bodega Marine Laboratory ecological preserve. Emphasis on field experience, with complementing lectures to address population and community processes. (See Bodega Marine Laboratory Program) GE credit: OL, QL, SE, SL, VL, WE. Effective: 2008 Spring Quarter.

BIS 122P—Population Biology and Ecology/Advanced Laboratory Topics (5)
Discussion—1 hour; Laboratory—12 hours. Prerequisite(s): BIS 122 (can be concurrent) Residence at Bodega Marine Laboratory required. Training in scientific research, from hypothesis testing to publication, including methods of library research. Research will be related to a topic covered in course 122. Final presentation both oral and written. See Bodega Marine Laboratory Program. GE credit: SE, VL, WE. Effective: 2000 Spring Quarter.

BIS 123—Undergraduate Colloquium in Marine Science (1)
Seminar—1 hour. Prerequisite(s): Enrolled student at the Bodega Marine Laboratory. Series of weekly seminars by recognized authorities in various disciplines of marine science from within and outside the UC system. Includes informal discussion with speaker.Course will be held at Bodega Marine Laboratory.(See above description for Bodega Marine Laboratory Program.) (P/NP grading only.) Effective: 1997 Winter Quarter.

BIS 124—Coastal Marine Research (3) ***Review all entries***
Discussion/Laboratory—1 hour; Fieldwork—6 hours; Laboratory—6 hours. Prerequisite(s): (ESP 124 (can be concurrent), ESP 152 (can be concurrent), EVE 106 (can be concurrent), EVE 110 (can be concurrent), EVE 114 (can be concurrent)); Concurrent enrollment in at least one of the above listed courses; upper division standing or consent of instructor; residence at or near Bodega Marine Lab required. Student must complete the application at http://www.bml.ucdavis.edu. Independent research on topics related to the accompanying core Bodega Marine Laboratory summer courses. Students will select one instructor to be primary mentor, but integrative topics that draw on the expertise of several BML faculty members will be encouraged. May be repeated up to 2 time(s). GE credit: OL, QL, SE, VL, WE. Effective: 2006 Summer Session 1.

BIS 124—Coastal Marine Research (6) ***Review all entries***
Discussion/Laboratory—2 hours; Fieldwork—12 hours; Laboratory—12 hours. Prerequisite(s): (EVE 114 (can be concurrent) or EVE 106 (can be concurrent) or ESP 152 (can be concurrent) or ESP 124 (can be concurrent)); Concurrent enrollment in one of the above listed courses required; upper division standing or consent of instructor. Student must complete the application at http://www.bml.ucdavis.edu. Independent research on topics related to an accompanying core Bodega Marine Laboratory summer course. Students will receive training in generating hypotheses, designing experiments, collecting and analyzing data, and scientific communication. May be repeated up to 2 time(s). GE credit: OL, QL, SE, VL, WE. Effective: 2018 Summer Session 1.

BIS 132—Introduction to Dynamic Models in Modern Biology (4)
Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): MAT 016C; (STA 013 or STA 013Y); Or equivalents and one lower division course in biology or equivalent. Dynamic modeling in the biological sciences, including matrix models, difference equations, differential equations, and complex dynamics. Examples include classic models in ecology, cell biology, physiology, and neuroscience. Emphasis on understanding models, their assumptions, and implications for modern biology. GE credit: QL, SE, SL, VL, WE. Effective: 2018 Spring Quarter.

BIS 133—Collaborative Studies in Mathematical Biology (3)
Lecture/Discussion—3 hours. Prerequisite(s): MAT 016A; MAT 016B; MAT 016C; (BIS 001A or BIS 001B or BIS 001C or BIS 002A or BIS 002B or BIS 002C or BIS 010); and Consent of Instructor. Or equivalents. Interdisciplinary research and training that uses mathematics and computation to solve current problems in biology. May be repeated up to 6 time(s). GE credit: QL, SE, SL, VL, WE. Effective: 2008 Fall Quarter.

BIS 134—Systems Biology: From Biological Circuits to Biological Systems (2)
Lecture/Discussion—2 hours; Term Paper. Prerequisite(s): BIS 101; (MCB 121 or MCB 161 or PLB 113); (MAT 016A, MAT 016B, MAT 016C) or (MAT 017A, MAT 017B, MAT 017C); or Consent of Instructor. Applying systems theory to understand the properties of biological networks in a variety of model organisms. Emphasis on both local biological circuits, and genome-scale biological networks. Topics include network motifs, robustness, modeling, emergent properties and integration of networks. GE credit: OL, QL, SE, VL. Effective: 2011 Winter Quarter.

BIS 180L—Genomics Laboratory (5)
Discussion—1 hour; Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): BIS 181; BIS 183 (can be concurrent); MCB 182 Computational approaches to model and analyze biological information about genomes, transcriptomes, and proteomes. Topics include genome assembly and annotation, mRNA and small RNA profiling, proteomics, protein-DNA and protein-protein interactions, network analysis, and comparative genomics. Computer programming experience not required. Students who have received credit for taking ECS 124 or BIT 150 will receive 3 units for completing course 180L. GE credit: QL, SE, VL. Effective: 2013 Spring Quarter.

BIS 181—Comparative Genomics (3)
Lecture—3 hours. Comparison of genomes at the population and species level. Genomic techniques for mapping disease (and other) genes, reconstruction of evolutionary history and migration patterns, determination of gene function, prediction of organismal traits, and metagenomics: determination of community composition and function. GE credit: QL, SE, SL. Effective: 2012 Fall Quarter.

BIS 183—Functional Genomics (3)
Lecture—3 hours. Prerequisite(s): BIS 101; BIS 102 or BIS 105 recommended. Overview of genomic methodologies and key biological findings obtained using genome-wide analyses. RNA profiling, small RNAs, epigenomics, chromatin immunoprecipitation, protein-DNA interactions, proteomics and network analysis. GE credit: QL, SE, VL. Effective: 2012 Spring Quarter.

BIS 192—Internship in Biological Sciences (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

BIS 194H—Research Honors (2)
Independent Study—6 hours. Prerequisite(s): Senior standing. Students majoring in Biological Sciences who have completed two quarters (3-5 units per quarter) of 199 and who qualify for the honors program as defined by the current catalog. Opportunity for Biological Sciences majors to pursue intensive research culminating in the writing of a senior thesis with the guidance of faculty advisors. (P/NP grading only.) GE credit: SE, WE. Effective: 1997 Winter Quarter.

BIS 195A—Science Teaching Internship Program (4)
Internship—6 hours; Lecture/Discussion—2 hours. Prerequisite(s): Upper division standing in a science major or consent of instructor. Major in science; junior or senior status (based on units); application and interview; class size limited to 24 students. Basic teaching techniques including lesson planning, classroom management, and presentation skills. Interns spend time in K-12 science classrooms working with a master teacher observing, assisting with labs and activities, managing students, and teaching lessons. (P/NP grading only.) Effective: 2002 Spring Quarter.

BIS 195B—Science Teaching Internship (1-5)
Internship—1-5 hours. Prerequisite(s): BIS 195A Reinforcement of teaching techniques learned in 195A with additional classroom experience in K-12 science classrooms wirking with a master teacher observing, assisting with labs and activities, managing students and teaching lessons. May be repeated up to 1 time(s) with consent of instructor. (P/NP grading only.) Effective: 2002 Spring Quarter.

BIS 197T—Tutoring in Biological Sciences (1-5)
Discussion—2-6 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Assisting the instructor by tutoring students in one of the Biological Sciences' regular courses. May be repeated for credit. (P/NP grading only.) Effective: 2004 Spring Quarter.

BIS 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

BIS 199—Special Study in Biological Sciences (1-5)
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

BIS 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. College of Biological Sciences staff members may offer group study courses under this number. Effective: 1997 Winter Quarter.

Biological Systems Engineering; Agricultural & Environmental Sciences, Engineering

Biological Systems Engineering; Agricultural & Environmental Sciences, Engineering | EBS Information

(College of Engineering and College of Agricultural and Environmental Sciences)

Bryan M. Jenkins, Ph.D., Chairperson of the Department

Department Office. 2030 Bainer Hall 530-752-0102; http://bae.engineering.ucdavis.edu

Biological Systems Engineering; Agricultural & Environmental Sciences, Engineering | EBS B.S.

(College of Engineering and College of Agricultural and Environmental Sciences)

Bryan M. Jenkins, Ph.D., Chairperson of the Department

Department Office. 2030 Bainer Hall; 530-752-0102; http://bae.engineering.ucdavis.edu

Mission. The Department of Biological and Agricultural Engineering is dedicated to the advancement of the discipline of biological engineering and to the conduct of research under its many diverse areas of application. Biological engineering or biological systems engineering is the biology-based engineering discipline that integrates life sciences with engineering in the advancement and application of fundamental concepts of biological systems from molecular to ecosystem levels. Within this discipline, our faculty members work in a range of research areas including biotechnology engineering, agricultural and natural resources engineering, and food engineering.

The mission of the Department of Biological and Agricultural Engineering is to discover, develop, apply, and disseminate knowledge for the sustainable production, management, and use of biological materials, and to educate students for this work.

Objectives. We educate students in the fundamentals of mathematics, physical and biological sciences, and engineering, balanced with the application of principles to practical problems. We teach students to develop skills for solving engineering problems in biological systems through use of appropriate analysis, synthesis, and engineering design techniques. We prepare students for entry into engineering practice and graduate education, as well as for engagement in life-long learning. We foster the ability of our students to collaborate and communicate effectively, and provide an awareness of the importance of economics, professional responsibility, and the environment.

Students graduating with a B.S. degree in Biological Systems Engineering from UC Davis are prepared to:

- Apply life sciences in engineering at the biochemical, cellular, organism, and ecosystem levels,
- Solve biological systems engineering problems while employed in the private or public sector,
- Consider the environmental and social consequences of their engineering activities,
- Communicate effectively with professional colleagues and public constituencies,
- Act in an ethical manner, and
- Continue their education in a changing professional world.

The Biological Systems Engineering Undergraduate Program

Biological Systems Engineering is an engineering major that uses biology as its main scientific base. With rapid advances in biology and biotechnology, engineers are needed to work side by side with life scientists to bring laboratory developments into commercial production or field application. Industries in bioenergy, bioprocessing, biotechnology, food processing, aquaculture, agriculture, plant production, animal production, and forest production all need engineers with strong training in biology. The heightened concern for environmental resources and their preservation generates many engineering opportunities as society strives to maintain balance within the biosphere.

In the freshman and sophomore years, the Biological Systems Engineering major requires sequences of courses in mathematics, physics, chemistry, engineering science, and humanities, similar to all accredited engineering programs. In addition to these course sequences, the Biological Systems Engineering major also requires courses in the biological sciences. Exclusive of

General Education units, the Biological Systems Engineering major requires a minimum of 161 units (90 units in the lower division; 71 units in the upper division).

Biological Systems Engineering graduates take jobs in the biotechnology, energy, food, and medical industries; work for state and federal agencies; or pursue graduate work. Students also can use the program as a pathway to professional schools in medicine, veterinary medicine, dentistry, or business.

The Biological Systems Engineering program is accredited by the Engineering Accreditation Commission of ABET; see http://www.abet.org.

Students are encouraged to adhere carefully to all prerequisite requirements. The instructor is authorized to drop students from a course for which stated prerequisites have not been completed.

Lower Division Required Courses

See the Degree Requirements section, below.

Upper Division Requirements

If your career objective is a professional degree in the health sciences (e.g., medicine, veterinary medicine, or dentistry), you should consult with advisors from the appropriate school to plan for successful admission and to ensure that you take specific courses that may be required and that you have the necessary experience. The upper division requirements are listed following the areas of specialization:

- Biotechnology Engineering
- Agricultural and Natural Resources Engineering
- Food Engineering

Areas of Specialization

Biotechnology Engineering. Biotechnology involves the handling and manipulation of living organisms or their components to produce useful products. Students specializing in biotechnology engineering integrate analysis and design with applied biology to solve problems in renewable energy production, large-scale biotechnical production, control of biological systems, and bio-based materials production.

Students may focus on the mechanisms and processes for the sustainable production and use of energy from renewable biological sources. Students may also focus on the challenges in scaling up laboratory developments to industrial production, including production, packaging, and application of biocontrol agents for plant pests and diseases; genetically altered plants; plant materials and food products; and microbial production of biological products, tissue culture, and bioremediation. Students may also focus on the development of biosensors to detect microorganisms and specific substances, useful in the development of products based on biological processes and materials.

Biotechnical engineers work in the biotech industries on process design and operation, scale-up, and instrumentation and control.

Recommended biological science electives:

- Biological Sciences 101, 102, 103
- Microbiology 102
- Molecular and Cellular Biology 120L
- Plant Biology 113

Recommended engineering electives:

- Biological Systems Engineering 161
- Chemical Engineering 161B, 161C, 161L
- Civil and Environmental Engineering 143, 148A, 149, 150, 153
- Engineering 180
- Mechanical Engineering 161, 162, 163

Suggested Advisors. J. Fan, K. Giles, M. Grismer, B. Jenkins, T. Jeoh, N. Nitin, N. Pan, D. Slaughter, J. VanderGheynst, R. Zhang

Agricultural and Natural Resources Engineering. With the world population expected to grow over the next several decades, major concerns lie with meeting the needs of agriculture and with the sustainable use of limited natural resources. Students specializing in agricultural and natural resources engineering combine analysis and design with applied biology to solve problems in producing, transporting, and processing biological products leading to food, fiber, energy, pharmaceuticals, and other human needs.

Students may focus on automation and control of field operations and engineered systems, robotics, and on the biomechanics of humans and animals. They may also focus on engineering issues related to the sustainable use of natural resources, particularly energy and water, but also land and air. Agricultural and natural resources engineers design machinery, processes, and systems for productive plant and animal culture, while improving overall sustainability.

Agricultural and natural resources engineers are employed as practicing professionals and managers with agricultural producers, equipment manufacturers, irrigation districts, food processors, consulting engineering firms, start-up companies, and government agencies. Graduates with interest in biomechanics work in industry on the design, evaluation, and application of human-centered devices and systems, as well as on improving worker health and safety.

Recommended biological science electives:

Animal Emphasis

- Avian Sciences 100
- Animal Science 143, 144, 146
- Neurobiology, Physiology and Behavior 101
- Soil Science 100

Aquaculture Emphasis

- Animal Science 118, 131, 136A
- Applied Biological Systems Technology 163
- Wildlife, Fish, and Conservation Biology 120, 121

Biomechanics Emphasis

- Biological Sciences 102
- Neurobiology, Physiology and Behavior 101
- Exercise Biology 103
- Cell Biology and Human Anatomy 101

Plant Emphasis

- Entomology 100
- Environmental Horticulture 102
- Environmental Science and Policy 100
- Environmental Toxicology 101
- Hydrologic Sciences 124
- Microbiology 120
- Plant Biology 111
- Soil Science 100
- Plant Sciences 101, 110A, 114, 142

Recommended engineering electives:

- Biological Systems Engineering 128, 145
- Biomedical Engineering 109, 116, 126
- Civil and Environmental Engineering 140, 141, 142, 144, 145, 148A, 171
- Engineering 111, 121, 180

Additional recommended electives:

- Applied Biological Systems Technology 150, 161, 165

Suggested Advisors. A. Daccache, J. Fan, F. Fathallah, K. Giles, M. Grismer, T-C. Hung, B. Jenkins, I. Kisekka, K. Kornbluth, D. Slaughter, S. Upadhyaya, S. Vougioukas, J. VanderGheynst, R. Zhang

Food Engineering. Producing the food we eat every day constitutes the largest industrial sector of the U.S. economy, and this production involves the work of engineers in a wide variety of food industries, both at home and around the world. Students specializing in food engineering design food processes and operate equipment and facilities for production of high quality, safe, and nutritious food with minimal impact of these operations on the environment.

Students learn to apply engineering principles and concepts to handle, store, process, package, and distribute food and related products. In addition to engineering principles, the food engineering specialization provides an understanding of the chemical, biochemical, microbiological, and physical characteristics of food. Students study concepts of food refrigeration, freezing, thermal processing, drying, and other food operations, food digestion, and health and nutrition in food system design.

Food engineers work as practicing engineers, scientists, and managers in the food industry.

Recommended biological science electives:

- Biological Sciences 101, 102, 103
- Environmental Science and Policy 110
- Environmental Toxicology 101
- Food Science and Technology 104, 104L, 119, 128
- Plant Sciences 172

Recommended engineering electives:

- Biological Systems Engineering 161
- Chemical Engineering 157
- Mechanical Engineering 171, 172

Suggested Advisors. G. Bornhorst, J. de Moura Bell, T. Jeoh, M. McCarthy, N. Nitin, Z. Pan, D. Slaughter

Master Undergraduate Advisor. T. Jeoh

Lower Division Required Courses **Units:** 82-84

MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3
MAT 022B	Differential Equations	3
PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 008A	Organic Chemistry: Brief Course	2
OR		
CHE 118A	Organic Chemistry for Health and Life Sciences	4

CHE 008B	Organic Chemistry: Brief Course	4
OR		
CHE 118B	Organic Chemistry for Health and Life Sciences	4
BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
BIS 002C	Introduction to Biology: Biodiversity and the Tree of Life	5
ENG 006	Engineering Problem Solving	4
ENG 035	Statics	4
ENG 017	Circuits I	4
EBS 001	Foundations of Biological Systems Engineering	4
EBS 075	Properties of Materials in Biological Systems	4

Choose one; a grade of C- or better is required:

UWP 001	Expository Writing	4
UWP 001V	Expository Writing	4
UWP 001Y	Expository Writing	4

Choose one:

ENG 003	Introduction to Engineering Design	4
CMN 001	Introduction to Public Speaking	4
CMN 003	Interpersonal Communication Competence	4

Upper Division Required Courses **Units:** 65

ENG 100	Electronic Circuits and Systems	3
ENG 102	Dynamics	4
ENG 104	Mechanics of Materials	4
ENG 105	Thermodynamics	4
ENG 106	Engineering Economics	3
EBS 103	Fluid Mechanics Fundamentals	4
OR		
ENG 103	Fluid Mechanics	4
EBS 125	Heat Transfer in Biological Systems	4
EBS 127	Mass Transfer and Kinetics in Biological Systems	4
EBS 130	Modeling of Dynamic Processes in Biological Systems	4
EBS 165	Bioinstrumentation and Control	4
EBS 170A	Engineering Design and Professional Responsibilities	3
EBS 170B	Engineering Projects: Design	2
EBS 170BL	Engineering Projects: Design Laboratory	1
EBS 170C	Engineering Projects: Design Evaluation	1
EBS 170CL	Engineering Projects: Design Evaluation	2
STA 100	Applied Statistics for Biological Sciences	4

Biological Systems Engineering Electives

Choose a minimum of four units from all upper division Biological Systems Engineering courses not otherwise required, with the exception of:

EBS 189 series

EBS 199	Special Study for Advanced Undergraduates	1-5

Engineering Electives

Choose a minimum of three units; all upper division courses offered by the College of Engineering may be taken as engineering electives with the exception of the following:

ECI 123	Urban Systems and Sustainability	4
ECS 188	Ethics in an Age of Technology	4
ENG 103	Fluid Mechanics	4
ENG 160	Environmental Physics and Society	3

All courses 190-197, 199; except ENG 190, may be taken for 2 units of engineering elective credit.

Biological Science Electives

All upper division courses in the College of Biological Sciences may be used as biological science electives; with the exception of:

BIS 132	Introduction to Dynamic Models in Modern Biology	4
EVE 175	Computational Genetics	3
EXB 102	Introduction to Motor Learning and the Psychology of Sport and Exercise	4
EXB 112	Clinical Exercise Physiology	4
EXB 115	Biomechanical Bases of Movement	3
EXB 120	Sport in American Society	3
EXB 121	Advanced Sport Psychology	3
EXB 124	Physiology of Maximal Human Performance	4
EXB 125	Neuromuscular and Behavioral Aspects of Motor Control	3
EXB 148	Theory and Practice of Exercise Testing	1

All 190-199.

May also be taken as biological science electives:

ABT 161	Water Quality Management for Aquaculture	3
ANS 118	Fish Production	4
ANS 143	Pig and Poultry Care and Management	4
ANS 144	Beef Cattle and Sheep Production	4
ANS 146	Dairy Cattle Production	5
ATM 133	Biometeorology	4
AVS 100	Avian Biology	3
CHA 101	Human Gross Anatomy	4
CHA 101L	Human Gross Anatomy Laboratory	3
ENT 100	General Entomology	4
ENH 102	Physiological Principles in Environmental Horticulture	4
ESM 120	Global Environmental Interactions	4
ESP 100	General Ecology	4
ESP 110	Principles of Environmental Science	4
ESP 155	Wetland Ecology	4
ETX 101	Principles of Environmental Toxicology	4
ETX 131	Environmental Toxicology of Air Pollutants	3
FST 102A	Malting and Brewing Science	4
FST 104L	Food Microbiology Laboratory	4
FST 119	Chemistry and Technology of Milk and Dairy Products	4
FST 128	Food Toxicology	3
FST 159	New Food Product Ideas	3
IDI 141	Infectious Diseases of Humans	1
SSC 100	Principles of Soil Science	5
WFC 121	Physiology of Fishes	4

Students may choose other upper division courses with substantial biological content offered by the College of Agricultural and Environmental Sciences; consultation with a faculty advisor and approval by petition is required.

Upper Division Composition Requirement

Choose one; a grade of C- or better is required:

UWP 101	Advanced Composition	4
UWP 102B	Writing in the Disciplines: Biology	4
UWP 102E	Writing in the Disciplines: Engineering	4
UWP 102F	Writing in the Disciplines: Food Science and Technology	4
UWP 102G	Writing in the Disciplines: Environmental Writing	4
UWP 104A	Writing in the Professions: Business Writing	4
UWP 104E	Writing in the Professions: Science	4
UWP 104F	Writing in the Professions: Health	4
UWP 104T	Writing in the Professions: Technical Writing	4

The Upper-Division composition exam administered by the College of Letters and Sciences cannot be used to satisfy the upper-division composition requirement for students in the Biological Systems Engineering program.

Total: 147-149

Biological Systems Engineering; Agricultural & Environmental Sciences, Engineering | EBS B.S./M.S. Integrated

The Graduate Program in Biological Systems Engineering

Integrated B.S./M.S, M.S., M.Engr., D.Engr., and Ph.D. in Biological Systems Engineering
Designated Ph.D. emphasis available in Biotechnology

http://bae.engineering.ucdavis.edu; 530-752-0102

Graduate students in Biological Systems Engineering focus on finding economically and environmentally sustainable solutions to many of the most important global issues of our time-the safety, security and abundance of our food, detection of pathogens, development of bioenergy and other sustainable energy systems, control of insect-borne disease and damage, as well as the preservation of our land, air and water resources.

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Research Highlights:

- Automation and Control
- Bioenvironmental engineering
- Renewable energy
- Industrial biotechnology
- Food safety
- Biosensors
- Bioprocess engineering

- Bioinstrumentation
- Ergonomics, health and safety
- Aquacultural engineering
- Ecological systems engineering
- Food engineering
- Forest and fiber engineering
- Postharvest engineering
- Remote sensing
- Robotics and autonomous systems
- Soil and water engineering
- Machine systems and precision agriculture

Research Facilities and Partnerships:

- Agricultural Ergonomics Research Center
- Fish Conservation and Culture Laboratory
- GIS Visualization Lab
- Energy Institute
- Bodega Marine Lab
- Western Center for Agricultural Equipment

Complete information is available on the departmental website.

Biological Systems Engineering; Agricultural & Environmental Sciences, Engineering | EBS D.Engr.

The Graduate Program in Biological Systems Engineering

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Biological Systems Engineering; Agricultural & Environmental Sciences, Engineering | EBS M.Engr.

The Graduate Program in Biological Systems Engineering

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Biological Systems Engineering; Agricultural & Environmental Sciences, Engineering | EBS M.S.

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Biological Systems Engineering; Agricultural & Environmental Sciences, Engineering | EBS Ph.D.

The Graduate Program in Biological Systems Engineering

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Biological Systems Engineering; Agricultural & Environmental Sciences, Engineering | EBS Courses

Courses in EBS:

EBS 001—Foundations of Biological Systems Engineering (4)
Laboratory—6 hours; Lecture—2 hours; Project (Term Project). Open only to students in Biological Systems Engineering. Introduction to engineering and the engineering design process with examples drawn from the field of biological systems engineering. Introduction to computer-aided design and mechanical fabrication of designs. Students work on a quarter-long group design project. GE credit: OL, QL, SE, SL, VL. Effective: 2009 Fall Quarter.

EBS 075—Properties of Materials in Biological Systems (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): BIS 002A; PHY 009C (can be concurrent) Properties of typical biological materials; composition and structure with emphasis on the effects of physical and biochemical properties on design of engineered systems; interactions of biological materials with typical engineering materials. GE credit: QL, SE, SL, VL, WE. Effective: 2016 Fall Quarter.

EBS 090C—Research Group Conference in Biological Systems Engineering (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Lower division standing in Biological Systems Engineering or Food Engineering. Research group conference. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

EBS 092—Internship in Biological Systems Engineering (1-5)
Internship. Prerequisite(s): Consent of Instructor. Lower division standing; project approval prior to period of internship. Supervised work experience in biological systems engineering. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

EBS 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Group study of selected topics; restricted to lower division students. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

EBS 099—Special Study for Lower Division Students (1-5)
Variable. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

EBS 103—Fluid Mechanics Fundamentals (4)
Lecture—4 hours. Prerequisite(s): PHY 009B Fluid mechanics axioms, fluid statics, kinematics, velocity fields for one-dimensional incompressible flow and boundary layers, turbulent flow time averaging, potential flow, dimensional analysis, and macroscopic balances to solve a range of practical problems. (HYD 103N.) GE credit: QL, SE, VL. Effective: 2005 Spring Quarter.

EBS 114—Principles of Field Machinery Design (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): ENG 102; ENG 104 Traction and stability of vehicles with wheels or tracks. Operating principles of field machines and basic mechanisms used in their design. GE credit: QL, SE, VL, WE. Effective: 1998 Spring Quarter.

EBS 115—Forest Engineering (3)
Lecture—3 hours. Prerequisite(s): ENG 104 Applications of engineering principles to problems in forestry including those in forest regeneration, harvesting, residue utilization, and transportation. GE credit: QL, SE, SL, VL. Effective: 2016 Fall Quarter.

EBS 120—Power Systems Design (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 017; ENG 102; ENG 103; ENG 105 Design and performance of power devices and systems including combustion engines, electric generators and motors, fluid power systems, fuels, and emerging technologies. Selection of units for power matching and optimum performance. GE credit: QL, SE, SL, VL, WE. Effective: 2002 Fall Quarter.

EBS 125—Heat Transfer in Biological Systems (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EBS 075; ENG 105; BIS 002A; BIS 002B; BIS 002C Fundamentals of heat transfer with application to biological systems. Steady and transient heat transfer. Analysis and simulation of heat conduction, convection and radiation. Heat transfer operations. GE credit: OL, QL, SE, VL, WE. Effective: 2009 Spring Quarter.

EBS 127—Mass Transfer and Kinetics in Biological Systems (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EBS 125 Fundamentals of mass transfer and kinetics in biological systems. Molecular diffusion and convection. Thermodynamics and bioenergetics. Biological and chemical rate equations. Heterogeneous kinetics. Batch and continuous reaction processes. Mass transfer operations. GE credit: QL, SE, VL, WE. Effective: 2009 Fall Quarter.

EBS 128—Biomechanics and Ergonomics (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): STA 100; ENG 102 Limited enrollment. Anatomical, physiological, and biomechanical bases of physical ergonomics. Human motor capabilities, body mechanics, kinematics and anthropometry. Use of bioinstrumentation, industrial surveillance techniques and the NIOSH lifting guide. Cumulative trauma disorders. Static and dynamic biomechanical modeling. Emphasis on low back, shoulder and hand/wrist biomechanics. GE credit: QL, SE, SL, VL, WE. Effective: 2000 Spring Quarter.

EBS 130—Modeling of Dynamic Processes in Biological Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EBS 075; (ENG 006 or ECS 030); MAT 022B C- or better Techniques for modeling processes through mass and energy balance, rate equations, and equations of state. Computer problem solution of models. Example models include package design, evaporation, respiration heating, thermal processing of foods, and plant growth. GE credit: QL, SE, SL, VL. Effective: 2011 Fall Quarter.

EBS 135—Bioenvironmental Engineering (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EBS 125; EBS 130 Biological responses to environmental conditions. Principles and engineering design of environmental control systems. Overview of environmental pollution problems and legal restrictions for biological systems, introduction of environmental quality assessment techniques, and environmental pollution control technologies. GE credit: QL, SE, SL, VL, WE. Effective: 1998 Spring Quarter.

EBS 144—Groundwater Hydrology (4)
Lecture—4 hours. Prerequisite(s): MAT 016B or MAT 021A; HYD 103 or ENG 103 recommended. Fundamentals of groundwater flow and contaminant hydrology. Occurrence, distribution, and movement of groundwater. Well-flow systems. Aquifer tests. Well construction operation and maintenance. Groundwater exploration and quality assessment. Agricultural threats to groundwater quality: fertilizers, pesticides, and salts. (HYD 144.) GE credit: QL, SE, SL, VL. Effective: 2003 Fall Quarter.

EBS 145—Irrigation and Drainage Systems (4)
Lecture—4 hours. Prerequisite(s): EBS 103 or HYD 103N Engineering and scientific principles applied to the design of surface, sprinkle and micro irrigation systems and drainage systems within economic, biological, and environmental constraints. Interaction between irrigation and drainage. GE credit: QL, SE, SL, VL. Effective: 2016 Fall Quarter.

EBS 147—Runoff, Erosion and Water Quality Management (3)
Fieldwork; Lecture/Lab—3 hours. Prerequisite(s): (PHY 007B or PHY 009B); (MAT 016C or MAT 017C or MAT 021C); (ECI 142 or HYD 141 or ESM 100); or equivalent. Practical hydrology and runoff water quality management from disturbed watersheds. Development of hillslope and soils restoration concepts and practice, modeling and application. (HYD 147.) GE credit: SE. Effective: 2018 Spring Quarter.

EBS 161—Kinetics and Bioreactor Design (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EBS 127 Provide the basic principles of reactor design for bioprocess applications. This course emphasizes the following topics: 1) kinetics and reactor engineering principles; 2) bio-reaction kinetics; and 3) bioreactor design. GE credit: QL, SE, VL. Effective: 2012 Spring Quarter.

EBS 165—Bioinstrumentation and Control (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 100 Instrumentation and control for biological production systems. Measurement system concepts, instrumentation and transducers for sensing
physical and biological parameters, data acquisition and control. GE credit: QL, SE, SL, VL, WE. Effective: 1998 Fall Quarter.

EBS 170A—Engineering Design and Professional Responsibilities (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): EBS 001; ENG 102; ENG 104 Engineering design including professional responsibilities. Emphasis on project selection, data sources, specifications, human factors, biological materials, safety systems, and professionalism. Detailed design proposals will be developed for courses 170B and 170BL. GE credit: OL, QL, SE, SL, VL, WE. Effective: 1998 Spring Quarter.

EBS 170B—Engineering Projects: Design (2)
Discussion—2 hours. Prerequisite(s): EBS 170A; EBS 170BL (can be concurrent); EBS 170BL required concurrently. Individual or group projects involving the design of devices, structures, or systems to solve specific engineering problems in biological systems. Project for study is jointly selected by student and instructor. GE credit: OL, QL, SE, SL, VL, WE. Effective: 2006 Spring Quarter.

EBS 170BL—Engineering Projects: Design Laboratory (1)
Laboratory—3 hours. Prerequisite(s): EBS 170B (can be concurrent); EBS 170B required concurrently. Individual or group projects involving the design of devices, structures, or systems to solve specific engineering problems in biological systems. GE credit: OL, QL, SE, SL, VL, WE. Effective: 2006 Spring Quarter.

EBS 170C—Engineering Projects: Design Evaluation (1)
Discussion—1 hour. Prerequisite(s): EBS 170B; EBS 170CL (can be concurrent); EBS 170CL required concurrently. Individual or group projects involving the fabrication, assembly and testing of components, devices, structures, or systems designed to solve specific engineering problems in biological systems. Project for study
previously selected by student and instructor in course 170B. GE credit: OL, QL, SE, SL, VL, WE. Effective: 1999 Winter Quarter.

EBS 170CL—Engineering Projects: Design Evaluation (2)
Laboratory—6 hours. Prerequisite(s): EBS 170C (can be concurrent); EBS 170C required concurrently. Individual or group projects involving the fabrication, assembly and testing of components, devices, structures, or systems designed to solve specific engineering problems in biological systems. GE credit: OL, QL, SE, SL, VL, WE. Effective: 1999 Winter Quarter.

EBS 175—Rheology of Biological Materials (3)
Lecture—3 hours. Prerequisite(s): EBS 103 or ENG 103 Fluid and solid rheology, viscoelastic behavior of foods and other biological materials, and application of rheological properties to food and biological systems (i.e., pipeline design, extrusion, mixing, coating). GE credit: QL, SE, VL. Effective: 2016 Fall Quarter.

EBS 189A—Special Topics in Biological Systems Engineering; Agricultural Engineering (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing in Engineering. Special topics in Agricultural Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1998 Fall Quarter.

EBS 189B—Special Topics in Biological Systems Engineering; Aquacultural Engineering (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing in Engineering. Special topics in Aquacultural Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1998 Fall Quarter.

EBS 189C—Special Topics in Biological Systems Engineering; Biomedical Engineering (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing in Engineering. Special topics in Biomedical Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1998 Fall Quarter.

EBS 189D—Special Topics in Biological Systems Engineering; Biotechnical Engineering (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing in Engineering. Special topics in Biotechnical Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1998 Fall Quarter.

EBS 189E—Special Topics in Biological Systems Engineering; Ecological Systems Engineering (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing in Engineering. Special topics in Ecological Systems Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1998 Fall Quarter.

EBS 189F—Special Topics in Biological Systems Engineering; Food Engineering (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing in Engineering. Special topics in Food Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1998 Fall Quarter.

EBS 189G—Special Topics in Biological Systems Engineering; Forest Engineering (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing in Engineering. Special topics in Forest Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1998 Fall Quarter.

EBS 190C—Research Group Conference in Biological Systems Engineering (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing in Biological Systems Engineering of Food Engineering. Research group conference. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

EBS 192—Internship in Biological Systems Engineering (1-5)
Internship. Prerequisite(s): Consent of Instructor. Upper division standing; approval of project prior to period of internship. Supervised work experience in biological systems engineering. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

EBS 197T—Tutoring in Biological Systems Engineering (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Tutoring individual students, leading small voluntary discussion groups, or assisting the instructor in laboratories affiliated with one of the department's regular courses. May be repeated for credit topic differs. (P/NP grading only.) GE credit: SE. Effective: 2004 Winter Quarter.

EBS 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

EBS 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

EBS 200—Research Methods in Biological Systems Engineering (2)
Lecture—2 hours. Prerequisite(s): Graduate standing. Planning, execution and reporting of research projects. Literature review techniques and proposal preparation. Record keeping and patents. Uncertainty analysis in experiments and computations. Graphic analysis. Oral and written presentation of research results, manuscript preparation, submission and review. Effective: 1997 Spring Quarter.

EBS 205—Continuum Mechanics of Natural Systems (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021D; MAT 022B; PHY 009B Continuum mechanics of static and dynamic air, water, earth and biological systems using hydraulic, heat and electrical conductivity; diffusivity; dispersion; strain; stress; deformation gradient; velocity gradient; stretch and spin tensors. (HYD 205.) Effective: 2002 Fall Quarter.

EBS 215—Soil-Machine Relations in Tillage and Traction (3)
Lecture—3 hours. Prerequisite(s): EBS 114 Mechanics of interactions between agricultural soils and tillage and traction devices; determination of relevant physical properties of soil; analyses of stress and strains in soil due to machine-applied loads; experimental and analytical methods for synthesizing characteristics
of overall systems. Effective: 1997 Winter Quarter.

EBS 216—Energy Systems (4)
Lecture/Discussion—4 hours. Prerequisite(s): ENG 105; or equivalent. Theory and application of energy systems. Systems analysis, energy conversion technologies, environmental considerations, economics and system optimization. (EGG 200.) Effective: 2018 Spring Quarter.

EBS 218—Solar Thermal Engineering (4)
Lecture/Discussion—4 hours. Prerequisite(s): Course in heat transfer. Analysis and design of solar energy collection systems. Sun-earth geometry and estimation of solar radiation. Steady-state and dynamic models of solar collectors. Modeling of thermal energy storage devices. Computer simulation. Effective: 2014 Spring Quarter.

EBS 220—Pilot Plant Operations in Aquacultural Engineering (3)
Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): (ECI 243A, ECI 243B) or (ABT 161, ABT 163) Topics in water treatment as they apply to aquaculture operations. Laboratory study of unit operations in aquaculture. Effective: 1997 Winter Quarter.

EBS 228—Occupational Musculoskeletal Disorders (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Epidemiology and etiology of occupational musculoskeletal disorders (MSDs) with focus on low back and upper extremities disorders; anatomical and biomechanical functions of lower back and upper extremities; MSDs risk factors assessment and control; research opportunities related to MSDs. Effective: 2002 Spring Quarter.

EBS 231—Mass Transfer in Food and Biological Systems (3)
Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing. Application of mass transfer principles to food and biological systems. Study of mass transfer affecting food quality and shelf life. Analysis of mass transfer in polymer films used for coating and packaging foods and controlling release of biologically active compounds. Effective: 1997 Spring Quarter.

EBS 233—Analysis of Processing Operations: Drying and Evaporation (3)
Lecture—3 hours. Prerequisite(s): Course in food or process engineering, familiarity with FORTRAN. Diffusion theory in drying of solids. Analysis of fixed-bed and continuous-flow dryers. Steady-state and dynamic models to predict performance evaporators: multiple effects, mechanical and thermal recompression, control systems. Effective: 1997 Winter Quarter.

EBS 235—Advanced Analysis of Unit Operations in Food and Biological Engineering (3)
Lecture—3 hours. Prerequisite(s): EBS 132 Analysis and design of food processing operations. Steady state and dynamic heat and mass transfer models for operations involving phase change such as freezing and frying. Separation processes including membrane applications in food and fermentation systems. Effective: 1997 Winter Quarter.

EBS 237—Thermal Process Design (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): Course in heat transfer. Heat transfer and biological basis for design of heat sterilization of foods and other biological materials in containers or in bulk. Effective: 1997 Spring Quarter.

EBS 239—Magnetic Resonance Imaging in Biological Systems (3)
Lecture—3 hours. Prerequisite(s): Graduate standing. Theory and applications of magnetic resonance imaging to biological systems. Classical Bloch model of magnetic resonance. Applications to be studied are drying of fruits, flow of food suspensions, diffusion of moisture, and structure of foods. Effective: 1997 Winter Quarter.

EBS 240—Infiltration and Drainage (3)
Lecture—3 hours. Prerequisite(s): SSC 107; ENG 103 Aspects of multi-phase flow in soils and their application to infiltration and immiscible displacement problems. Gas phase transport and entrapment during infiltration, and oil-water-gas displacement will be considered. Effective: 1999 Fall Quarter.

EBS 241—Sprinkle and Trickle Irrigation Systems (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): EBS 145; HYD 115 Computerized design of sprinkle and trickle irrigation systems. Consideration of emitter mechanics, distribution functions and water yield functions. Effective: 1997 Winter Quarter.

EBS 242—Hydraulics of Surface Irrigation (3)
Lecture—3 hours. Prerequisite(s): EBS 145; HYD 115 Mathematical models of surfaceirrigation systems for prediction of the ultimate disposition of water flowing onto a field. Quantity of runoff and distribution of infiltrated water over field length as a function of slope, roughness, infiltration and inflow rates. Effective: 1997 Winter Quarter.

EBS 243—Water Resource Planning and Management (3)
Lecture—3 hours. Prerequisite(s): HYD 141; Or equivalent. Applications of deterministic and stochastic mathematical programming techniques to water resource planning, analysis, design, and management. Water allocation, capacity expansion, and reservoir operation. Conjunctive use of surface water and groundwater. Water quality management. Irrigation planning and operation models. (HYD 243.) Effective: 1997 Fall Quarter.

EBS 245—Waste Management for Biological Production Systems (3)
Lecture—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Characterization of solid and liquid wastes from animal, crop, and food production systems. Study of methods and system design for handling, treatment, and disposal/utilization of these materials. Effective: 1997 Spring Quarter.

EBS 260—Analog Instrumentation (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 100 Instrument characteristics: generalized instrument models, calibration, and frequency response. Signal conditioning: operational amplifier
circuits, filtering, and noise. Transducers: motion, force, pressure, flow, temperature, and photoelectric. Effective: 1997 Winter Quarter.

EBS 262—Computer Interfacing and Control (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 100; EBS 165 Procedural and object-oriented programming in C++, analog and digital signal conversion, data acquisition and computer control. Effective: 2000 Winter Quarter.

EBS 265—Design and Analysis of Engineering Experiments (5)
Lecture—3 hours; Lecture/Discussion—2 hours. Prerequisite(s): STA 100; ASE 120; or an introductory course in statistics. Simple linear, multiple, and polynomial regression, correlation, residuals, model selection, one-way ANOVA, fixed and random effect models, sample size, multiple comparisons, randomized block, repeated measures, and Latin square designs, factorial experiments, nested design and subsampling, split-plot design, statistical software packages. Effective: 2000 Spring Quarter.

EBS 267—Renewable Bioprocessing (3)
Lecture—3 hours. Prerequisite(s): EBS 160; (BIS 101 or MIC 102) Applications of biotechnology and bioprocess engineering toward the use of agricultural and renewable feedstocks for the production of biochemicals. Design and modeling of microbial- and plant-based production systems including associated fermentation, extraction, and purification processes. Effective: 2005 Winter Quarter.

EBS 268—Polysaccharides Surface Interactions (3)
Lecture—3 hours. Prerequisite(s): Graduate students in science or engineering. Study of fundamental surface science theories as applied to physical and chemical interactions of carbohydrates and polysaccharides. (ECH 268.) Effective: 2017 Winter Quarter.

EBS 270—Modeling and Analysis of Biological and Physical Systems (3)
Lecture—3 hours. Prerequisite(s): Familiarity with a programming language. Mathematical modeling of biological systems: model development; analytical and numerical solutions. Case studies from various specializations within Biological and Agricultural Engineering. Effective: 2001 Spring Quarter.

EBS 275—Physical Properties of Biological Materials (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Selected topics on physical properties, such as mechanical, optical, rheological, and aerodynamic properties, as related to the design of harvesting, handling, sorting, and processing equipment. Techniques for measuring and recording physical properties of biological materials. Effective: 1997 Winter Quarter.

EBS 289A—Selected Topics in Biological Systems Engineering; Animal Systems Engineering (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Animal Systems Engineering. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EBS 289B—Selected Topics in Biological Systems Engineering; Aquacultural Engineering (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Aquacultural Engineering. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EBS 289C—Selected Topics in Biological Systems Engineering; Biological Engineering (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Biological Engineering. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EBS 289D—Selected Topics in Biological Systems Engineering; Energy Systems (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Energy Systems. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EBS 289E—Selected Topics in Biological Systems Engineering; Environmental Quality (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special topic in Environmental Quality. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EBS 289F—Selected Topics in Biological Systems Engineering; Food Engineering (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Food Engineering. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EBS 289G—Selected Topics in Biological Systems Engineering; Forest Engineering (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Forest Engineering. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EBS 289H—Selected Topics in Biological Systems Engineering; Irrigation and Drainage (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Irrigation and Drainage. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EBS 289I—Selected Topics in Biological Systems Engineering; Plant Production and Harvest (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Plant Production and Harvest. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EBS 289J—Selected Topics in Biological Systems Engineering; Postharvest Engineering (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Postharvest Engineering. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EBS 289K—Selected Topics in Biological Systems Engineering; Sensors and Actuators (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Sensors and Actuators. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EBS 290—Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Weekly seminars on recent advances and selected topics in biological systems engineering. Course theme will change from quarter to quarter. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

EBS 290C—Graduate Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Research problems, progress and techniques in biological systems engineering. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

EBS 298—Group Study (1-5)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

EBS 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

EBS 390—Supervised Teaching in Biological and Agricultural Engineering (1-3)
Laboratory—3 hours; Tutorial—3-9 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Tutoring and teaching students in undergraduate courses offered in the Department of Biological and Agricultural Engineering. Weekly conferences with instructor; evaluation of teaching. Preparing for and
conducting demonstrations, laboratories and discussions. Preparing and grading exams. May be repeated up to 6 unit(s). (S/U grading only.) Effective: 1997 Winter Quarter.

Biomedical Engineering; Engineering

Biomedical Engineering; Engineering | BIM Information

(College of Engineering)

Alyssa Panitch, Ph.D., Chairperson of the Department

Anthony Passerini, Ph.D., Vice Chair for Education

Department Office. 2303 Genome and Biomedical Sciences Facility; 530-752-1033; https://bme.ucdavis.edu

Faculty. https://bme.ucdavis.edu/people/departmental -faculty/

Biomedical Engineering; Engineering | BIM B.S.

(College of Engineering)

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The Biomedical Engineering Undergraduate Major

The Biomedical Engineering program is accredited by the Engineering Accreditation Commission of ABET; see http://www.abet.org.

Biomedical engineering is an interdisciplinary area of study that integrates knowledge of engineering principles with the biomedical sciences. It is a very diverse field, with biomedical engineers working in areas ranging from medical imaging to regenerative medicine. Some major contributions of biomedical engineering include the left ventricular assist device (LVAD), artificial joints, hemodialysis, bioengineered skin, coronary stents, computed tomography (CT), and flexible endoscopes. Students who choose biomedical engineering are interested in contributing to human health but do not routinely interact directly with patients, as do physicians. Due to the need to complete additional coursework beyond BME degree requirements, this major is not a primary route for pre-medical studies.

The mission of the BS degree program of the Department of Biomedical Engineering is to combine exceptional teaching with state-of-the-art research for the advancement of technologies and computational techniques that meet medical and societal challenges.

The educational objectives of our program are that our graduates be successfully engaged in their chosen career through engineering practice, academic or clinical research, healthcare, education, service, or related activities, or through pursuit of graduate or professional degrees; and contribute effectively to society through responsible professional practice, fostering of cross-disciplinary collaboration, generation of innovative solutions to problems, and continuous pursuit of knowledge for personal and technological advancement.

The biomedical engineering curriculum has been designed to provide a solid foundation in mathematics, life and physical sciences, and engineering, and to provide sufficient flexibility in the upper division requirements to encourage students to explore specializations within the field. Our instructional program is designed to impart knowledge of contemporary issues at the forefront of biomedical engineering research. Employment opportunities exist in industry, hospitals, academic research and teaching institutes, national laboratories, or government regulatory agencies. The major also provides excellent grounding in the skills necessary for professional or graduate-level studies in biological and health sciences. Exclusive of General Education units, the minimum number of units required for the Biomedical Engineering degree is 157.

For information about graduate degree options, see Biomedical Engineering (Graduate Group).

Areas of Specialization

As Biomedical engineering is defined so broadly, specializing in a subfield of engineering can provide more in-depth expertise in a focus area. Through the judicious selection of upper division engineering and science electives, students can create this depth in one of our suggested areas of specialization or in an area of the student's choosing. One of the strengths of the UC Davis program is the flexibility to design one's own emphasis of study. These specializations are neither required nor degree-notated.

Biomechanics. This is a broad subfield that includes orthopedic/rehabilitation engineering (including the design of wheelchairs and prosthetics) as well as the study of mechanical forces produced by biological systems. Biomechanics allows a better understanding of the fluid dynamics of blood flow and the forces acting on tissue in the artery to allow the design of better cardiovascular interventions. This field involves more intensive study of mechanics, dynamics and thermodynamics.

Cellular and Tissue. This focus area applies biomedical engineering principles to control behavior at the gene, protein, cell, and tissue level. Scientists in this area can work in diverse areas including cellular therapies, protein production, gene therapy, tissue engineering and regeneration, and biomaterials development. This field can require study in biomedical transport, natural or

synthetic biomaterials, pharmacokinetics and pharmacodynamics. It draws heavily from knowledge in the chemical and biological sciences.

Imaging. The visualization of anatomical structure, physiological processes, metabolic activity and molecular expression in living tissues is important to accomplish goals that include the diagnosis of disease, the development of new therapeutics, the evaluation of the response to therapeutics, and the guidance of interventional procedures. Our program has a particular strength in molecular imaging, in which molecular-scale events are detected within living systems. An imaging bioengineer can work in areas ranging from developing instruments for imaging, to creating algorithms for three-dimensional reconstruction of imaging data, to generating new contrast agents for enhancing image quality. Depending upon the area of interest, this field can require further study in electronics signal processing, chemistry or computer programming.

Medical Devices. This is a diverse area that can include the development of instruments, apparatuses, machines, implants, or in-vitro reagents intended for use in the diagnosis, treatment or prevention of disease. Biomedical engineers have begun to combine technologies including pharmaceuticals, electronics and mechanical devices in the development of combination medical treatments.

Systems & Synthetic Biology. In this area, concepts, principles and techniques from engineering are applied to understand and build biological processes and systems at a fundamental level. Engineers describe biochemical, genetic and mechanical processes mathematically and integrate this information into models of natural and synthetic systems. These models are studied analytically, computationally and statistically to uncover design principles of natural systems and to guide development of methods capable of redirecting normal expression for biotechnological purposes or correcting pathological expression for therapeutic purposes.

Pre-Medical Student. Engineering is playing an increasing role in the practice of medicine, and students interested in medicine can focus on the intersection of engineering and medicine. To meet admission requirements for medical school, students must complete extra course work. These courses are in addition to the listed Department of Biomedical Engineering curricular requirements.

The Graduate Program in Biomedical Engineering. Doctoral and master's degrees in Biomedical Engineering are offered through the interdisciplinary Graduate Group in Biomedical Engineering. Please see http://www.bme.ucdavis.edu and Biomedical Engineering (Graduate Group).

Lower Division Required Courses **Units:** 81

Students are encouraged to adhere carefully to all prerequisite requirements. The instructor is authorized to drop students from a course for which stated prerequisites have not been completed.

MAT 021A	Calculus	4
OR		
MAT 021AH	Honors Calculus	4
AND		
MAT 021B	Calculus	4
OR		
MAT 021BH	Honors Calculus	4
AND		
MAT 021C	Calculus	4
OR		
MAT 021CH	Honors Calculus	4
AND		
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3
MAT 022B	Differential Equations	3

PHY 009A	Classical Physics	5
OR		
PHY 009HA	Honors Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5
CHE 002A	General Chemistry	5
OR		
CHE 002AH	Honors General Chemistry	5
AND		
CHE 002B	General Chemistry	5
OR		
CHE 002BH	Honors General Chemistry	5
AND		
CHE 002C	General Chemistry	5
OR		
CHE 002CH	Honors General Chemistry	5
CHE 008A	Organic Chemistry: Brief Course	2
OR		
CHE 118A	Organic Chemistry for Health and Life Sciences	4
AND		
CHE 008B	Organic Chemistry: Brief Course	4
OR		
CHE 118B	Organic Chemistry for Health and Life Sciences	4
ENG 006	Engineering Problem Solving	4
ENG 017	Circuits I	4
BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIM 001	Introduction to Biomedical Engineering	2
BIM 020	Fundamentals of Bioengineering	4

Choose one; a grade of C- or better is required:

UWP 001	Expository Writing	4
UWP 001Y	Expository Writing	4
UWP 001V	Expository Writing	4
ENL 003	Introduction to Literature	4
COM 001	Major Books of Western Culture: The Ancient World	4
COM 002	Major Books of Western Culture: From the Middle Ages to the Enlightenment	4
COM 003	Major Books of Western Culture: The Modern Crisis	4
COM 004	Major Books of the Contemporary World	4
NAS 005	Introduction to Native American Literature	4

Upper Division Required Courses **Units:** 76-80

ENG 100	Electronic Circuits and Systems	3
OR		
EEC 100	Circuits II	5
ENG 105	Thermodynamics	4
ENG 190	Professional Responsibilities of Engineers	3
BIM 116	Physiology for Biomedical Engineers	5

OR

NPB 101	Systemic Physiology	5

BIM 105	Probability and Statistics for Biomedical Engineers	4
BIM 106	Biotransport Phenomena	4
BIM 108	Biomedical Signals and Control	4
BIM 109	Biomaterials	4
BIM 110A	Biomedical Engineering Senior Design Experience	3
BIM 110B	Biomedical Engineering Senior Design Experience	3
BIM 110L	Biomedical Engineering Senior Design Lab	2
BIM 111	Biomedical Instrumentation Laboratory	6

Science and Engineering electives are to be selected in consultation with a staff or faculty advisor.

Science Electives

To be chosen according to specialization.

BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
BIS 002C	Introduction to Biology: Biodiversity and the Tree of Life	5
ECS 030	Programming and Problem Solving (Discontinued)	4
ECS 040	Software Development and Object-Oriented Programming (Discontinued)	4
PHY 009D	Modern Physics	4
BIM 102	Cellular Dynamics	4
BIM 161A	Biomolecular Engineering	4
BIM 161L	Biomolecular Engineering Laboratory	3
BIM 161S	Biomolecular Engineering: Brief Course	1
CHE 118C	Organic Chemistry for Health and Life Sciences	4

OR

Any graded upper division course in the Biological Sciences, Chemistry or Physics that is designated as Science and Engineering topical breadth.

With the approval of the Biomedical Engineering Undergraduate Committee; four units:

BIM 192	Internship in Biomedical Engineering	1-12

OR

BIM 199	Special Study for Advanced Undergraduates	1-5

Engineering Electives

Any graded upper division Biomedical Engineering course; except:

BIM 102	Cellular Dynamics	4
BIM 161A	Biomolecular Engineering	4
BIM 161L	Biomolecular Engineering Laboratory	3
BIM 161S	Biomolecular Engineering: Brief Course	1

With the approval of the Biomedical Engineering Undergraduate Committee; four units:

BIM 192	Internship in Biomedical Engineering	1-12

OR

BIM 199	Special Study for Advanced Undergraduates	1-5

No more than four units allowed from lower division coursework.

ENG 004	Engineering Graphics in Design	3

ENG 035	Statics	4
ENG 045	Properties of Materials	4
OR		
ENG 045Y	Properties of Materials	4
ENG 102	Dynamics	4
ENG 103	Fluid Mechanics	4
ENG 104	Mechanics of Materials	4
ENG 104L	Mechanics of Materials Laboratory	1
ENG 106	Engineering Economics	3
EEC 110A	Electronic Circuits I	4
EEC 110B	Electronic Circuits II	4
EEC 118	Digital Integrated Circuits	4
EEC 130A	Electromagnetics I	4
EEC 130B	Introductory Electromagnetics II	4
EEC 140A	Principles of Device Physics I	4
EEC 140B	Principles of Device Physics II	4
EEC 150A	Introduction to Signals and Systems I	4
EEC 150B	Introduction to Signals and Systems II	4
EEC 157A	Control Systems	4
EEC 157B	Control Systems	4
EEC 160	Signal Analysis and Communications	4
EBS 128	Biomechanics and Ergonomics	4
EBS 130	Modeling of Dynamic Processes in Biological Systems	4
EBS 165	Bioinstrumentation and Control	4
EBS 175	Rheology of Biological Materials	3
ECH 141	Fluid Mechanics for Biochemical and Chemical Engineers	4
ECH 144	Rheology and Polymer Processing	3
ECH 145A	Chemical Engineering Thermodynamics Laboratory	3
ECH 145B	Chemical Engineering Transport Lab	3
ECH 155	Chemical Engineering Kinetics and Reactor Design Laboratory	4
ECH 160	Fundamentals of Biomanufacturing	3
ECH 161A	Biochemical Engineering Fundamentals	4
ECH 161B	Bioseparations	4
ECH 161L	Bioprocess Engineering Laboratory	4
ECH 170	Introduction to Colloid and Surface Phenomena	3
ECS 124	Theory and Practice of Bioinformatics	4
EMS 147	Principles of Polymer Materials Science	3
EMS 160	Thermodynamics of Materials Processes and Phase Stability	4
EMS 162	Structure and Characterization of Engineering Materials	4
EMS 162L	Structure and Characterization of Materials Laboratory	2
EMS 164	Rate Processes in Materials Science	4
EMS 172	Electronic, Optical and Magnetic Properties of Materials	4
EMS 172L	Electronic, Optical and Magnetic Properties Laboratory	2
EMS 174	Mechanical Behavior of Materials	4
EMS 174L	Mechanical Behavior Laboratory	2

EMS 180	Materials in Engineering Design	4
EMS 181	Materials Processing	4
EMS 182	Failure Analysis	4
EME 050	Manufacturing Processes	4
EME 150A	Mechanical Design	4
EME 150B	Mechanical Design	4
EME 151	Statistical Methods in Design and Manufacturing	4
EME 152	Computer-Aided Mechanism Design	4
EME 154	Mechatronics	4
EME 165	Heat Transfer	4
EME 171	Analysis, Simulation and Design of Mechatronic Systems	4
EME 172	Automatic Control of Engineering Systems	4

Upper Division Composition Requirement

Choose one; grade of C- or better is required:

UWP 101	Advanced Composition	4
UWP 102B	Writing in the Disciplines: Biology	4
UWP 102E	Writing in the Disciplines: Engineering	4
UWP 104A	Writing in the Professions: Business Writing	4
UWP 104E	Writing in the Professions: Science	4
UWP 104F	Writing in the Professions: Health	4
UWP 104I	Writing in the Professions: Internships	4
UWP 104T	Writing in the Professions: Technical Writing	4

Passing the Upper Division Composition Exam offered by the College of Letters & Science.

Additional upper division elective policies:

Two units from Chemistry 118A may be applied towards Science electives if 118A is also used to satisfy lower division subject credit.

Two units from Electrical and Computer Engineering 100 may be applied towards Engineering electives if Electrical and Computer Engineering 100 is taken to satisfy upper division subject credit.

Total: 157-161

Biomedical Engineering; Engineering | BIM Minor

(College of Engineering)

Alyssa Panitch, Ph.D., Chairperson of the Department

Department Office. 2303 Genome and Biomedical Sciences Facility 530-752-1033; https://bme.ucdavis.edu

The minor in Biomedical Engineering is restricted to enrolled College of Engineering students. The intent is to build upon their existing core strengths and add expertise in biomedical applications. This additional training would make students more attractive to employers in the medical device industry, and would also position students for graduate training in health related applications of engineering. The minor requires two life sciences courses not typically required for engineering students, one at the cellular level (Biomedical Engineering 102) and the other at the physiological level (Neurobiology, Physiology, and Behavior 101 or Biomedical Engineering 116). The remaining 12 units are to be selected in consultation with an advisor from the list of upper division Biomedical Engineering courses. Students will be advised to select additional courses to complement their existing curricula. Examples of relevant coursework for different majors are provided as a reference. These listings classify the upper division Biomedical Engineering courses into categories

and provide a suggested subset of coursework for the majors most likely to have students interested in health-related applications.

Minor Requirements

All courses must be taken for a letter grade. A grade of C- or better is required for all courses used to satisfy minor requirements with an overall GPA of 2.000 or better in courses required for the minor. No more than one course can be counted towards both the student's major and the minor.

Minor Advisors. Rosalind Christian, Anthony Passerini

Biomedical Engineering **Units:** 21

NPB 101	Systemic Physiology	5
OR		
BIM 116	Physiology for Biomedical Engineers	5
BIM 102	Cellular Dynamics	4

Electives

Electives to be chosen in consultation with the Biomedical Engineering Departmental Advisor.

BIM 117	Modeling Strategies for Biomedical Engineering	4
BIM 141	Cell and Tissue Mechanics	4
BIM 142	Principles and Practices of Biomedical Imaging	4
BIM 143	Biomolecular Systems Engineering: Synthetic Biology	4
BIM 143L	Synthetic Biology Laboratory	2
BIM 144	Fundamentals of Biophotonics and Bioimaging	4
BIM 152	Molecular Control of Biosystems	4
BIM 161A	Biomolecular Engineering	4
BIM 162	Introduction to the Biophysics of Molecules and Cells	4
BIM 163	Bioelectricity, Biomechanics, and Signaling Systems	4
BIM 167	Biomedical Fluid Mechanics	4
BIM 171	Clinical Applications for Biomedical Device Design	4
BIM 173	Cell and Tissue Engineering	4
BIM 189A	Topics in Biomedical Engineering; Cellular and Molecular Engineering	1-5
BIM 189B	Topics in Biomedical Engineering; Biomedical Imaging	1-5
BIM 189C	Topics in Biomedical Engineering; Biomedical Engineering	1-5

Total: 21

Biomedical Engineering; Engineering | BIM Courses

Courses in BIM:

BIM 001—Introduction to Biomedical Engineering (2)
Laboratory—3 hours; Lecture—1 hour. Pass One open to freshmen. Introduction to the field of biomedical engineering with emphasis on design, careers, and specializations, including (1) medical devices (2) cellular & tissue engineering, (3) biomechanics, (4) systems & synthetic biology, and (5) biomedical imaging. GE credit: SE. Effective: 2016 Fall Quarter.

BIM 020—Fundamentals of Bioengineering (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 002B C- or better; MAT 021D C- or better; PHY 009B Basic principles of mass, energy and momentum conservation equations applied to solve problems in the biological and medical sciences. Only two units of credit to students who have previously taken Chemical Engineering 51, Engineering 105. GE credit: QL, SE, VL. Effective: 2013 Fall Quarter.

BIM 020—Fundamentals of Bioengineering (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 002B C- or better or CHE 002BH C- or better; MAT 021D C- or better; PHY 009B Basic principles of mass, energy and momentum conservation equations applied to solve problems in the biological and medical sciences. Only two units of credit to students who have previously taken ECH 051, ENG 105. GE credit: QL, SE, VL. Effective: 2018 Fall Quarter.

BIM 088V—Introduction to Research (2)
Web Virtual Lecture—2 hours. Introduction to types of research, including the basics of joint research with a faculty mentor. Self-assessments to identify areas of interest, priorities, and fit. Literature search and library skills used in early stages of research. Research safety, integrity, and intellectual property. Effective: 2018 Winter Quarter.

BIM 089A—Topics in Biomedical Engineering (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Restricted to lower division students. Topics in Biomedical Engineering. (A) Cellular and Molecular Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 2012 Spring Quarter.

BIM 089B—Topics in Biomedical Engineering (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Restricted to lower division students. Topics in Biomedical Engineering. (B) Biomedical Imaging. May be repeated for credit when topic differs. GE credit: SE. Effective: 2012 Spring Quarter.

BIM 089C—Topics in Biomedical Engineering (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Restricted to lower division students. Topics in Biomedical Engineering. (C) Biomedical Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 2012 Spring Quarter.

BIM 099—Special Study for Undergraduates (1-5)
Variable. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 2003 Winter Quarter.

BIM 102—Cellular Dynamics (4)
Lecture/Discussion—4 hours. Prerequisite(s): BIS 002A; CHE 008B or CHE 118B Open to College of Engineering students only. Fundamental cell biology for bioengineers. Emphasis on physical concepts underlying cellular processes including protein trafficking, cell motility, cell division and cell adhesion. Current topics including cell biology of cancer and stem cells will be discussed. Only two units of credit for students who have completed BIS 104. GE credit: SE. Effective: 2017 Spring Quarter.

BIM 105—Probability and Statistics for Biomedical Engineers (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021D C- or better; ENG 006 (can be concurrent) Concepts of probability, random variables and processes, and statistical analysis with applications to engineering problems in biomedical sciences. Includes discrete and continuous random variables, probability distributions and models, hypothesis testing, statistical inference and Matlab applications. Emphasis on BME applications. GE credit: QL, SE, VL. Effective: 2013 Fall Quarter.

BIM 106—Biotransport Phenomena (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIM 020 C- or better; (BIM 116 or NPB 101); PHY 009B; MAT 022B Open to Biomedical Engineering majors only. Principles of momentum and mass transfer with applications to biomedical systems; emphasis on basic fluid transport related to blood flow, mass transfer across cell membranes, and the design and analysis of artificial human organs. GE credit: QL, SE, SL, VL. Effective: 2015 Winter Quarter.

BIM 107—Mathematical Methods for Biological Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 006 C- or better; BIM 020; MAT 022B Restricted to Biomedical Engineering majors only. Mathematical and computational modeling to solve biomedical problems. Topics include stochastic processes and Monte Carlo simulations, and partial differential equations. Introduced to numerical techniques in MATLAB. GE credit: QL, SE, VL. Effective: 2013 Fall Quarter.

BIM 108—Biomedical Signals and Control (4)
Lecture—4 hours. Prerequisite(s): MAT 022B C- or better; ENG 006; ENG 017 Restricted to Biomedical Engineering majors only. Systems and control theory applied to biomedical engineering problems. Time-domain and frequency-domain analyses of signals and systems, convolution, Laplace and Fourier transforms, transfer function, dynamic behavior of first and second order processes, and design of control systems for biomedical applications. No credit for students who have taken EEC 150A; two units of credit for students who have taken EME 171. GE credit: QL, SE. Effective: 2012 Fall Quarter.

BIM 109—Biomaterials (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): BIM 106; BIS 002A; CHE 002C Restricted to upper-division Engineering majors. Introduce important concepts for design, selection and application of biomaterials. Given the interdisciplinary nature of the subject, principles of polymer science, surface science, materials science and biology will be integrated into the course. GE credit: SE, SL, VL. Effective: 2013 Fall Quarter.

BIM 109—Biomaterials (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): BIS 002A; CHE 002C or CHE 002CH; BIM 106 Restricted to upper-division Engineering majors. Introduce important concepts for design, selection and application of biomaterials. Given the interdisciplinary nature of the subject, principles of polymer science, surface science, materials science and biology will be integrated into the course. GE credit: SE, SL, VL. Effective: 2018 Fall Quarter.

BIM 110A—Biomedical Engineering Senior Design Experience (3)
Lecture/Discussion—1 hour; Project (Term Project)—6 hours. Prerequisite(s): BIM 110L (can be concurrent); BIM 111 (can be concurrent) Restricted to senior Biomedical Engineering majors (or by consent of instructor). Application of bioengineering theory and experimental analysis to a design project culminating in the design of a unique solution to a problem. Design may be geared towards current applications in biotechnology or medical technology. Continues in course 110B. GE credit: OL, SE, SL, VL. Effective: 2017 Spring Quarter.

BIM 110B—Biomedical Engineering Senior Design Experience (3)
Lecture/Discussion—1 hour; Project (Term Project)—6 hours. Prerequisite(s): BIM 110A Application of bioengineering theory and experimental analysis to a design project culminating in the design of a unique solution to a problem. Design may be geared towards current applications in biotechnology or medical technology. GE credit: OL, SE, SL, VL. Effective: 2014 Spring Quarter.

BIM 110L—Biomedical Engineering Senior Design Lab (2)
Discussion/Laboratory—2 hours; Laboratory—3 hours. Prerequisite(s): BIM 105; BIM 108; BIM 109 Restricted to Biomedical Engineering majors. Manufacturing processes, safety, computer-aided design techniques applied to fabrication of biomedical devices. Application of engineering principles & design theory to build a functional prototype to solve a biomedical problem. Continues in 110AB. GE credit: SE. Effective: 2017 Fall Quarter.

BIM 111—Biomedical Instrumentation Laboratory (6)
Discussion/Laboratory—4 hours; Lecture—4 hours. Prerequisite(s): BIM 105; BIM 108; (ENG 100 or EEC 100); (BIM 116 or NPB 101) Open to Biomedical Engineering majors only. Basic biomedical signals and sensors. Topics include analog and digital records using electronic, hydrodynamic, and optical sensors, and measurements made at cellular, tissue and whole organism level. GE credit: SE. Effective: 2015 Fall Quarter.

BIM 116—Physiology for Biomedical Engineers (5)
Discussion—3 hours; Lecture—2 hours. Prerequisite(s): BIS 002A C- or better; PHY 009C; MAT 022B recommended. Basic human physiology for the nervous, musculoskeletal, cardiovascular, respiratory, gastrointestinal, renal, and endocrine systems. Emphasis on small group design projects and presentations in interdisciplinary topics relating biomedical engineering to medical diagnostic and therapeutic applications. GE credit: OL, SE, SL, VL, WE. Effective: 2013 Fall Quarter.

BIM 117—Modeling Strategies for Biomedical Engineering (4)
Lecture—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): BIS 002A C- or better; MAT 022A C- or better Restricted to upper division standing. Non-simulation strategies for modeling biomedical engineering systems, including natural and synthetic systems at the cell and molecular level. Formulating and testing hypotheses by translating real-world problems into appropriate mathematical models, translating mathematical results into real-world understanding, and gaining appreciation for how models contribute to the development cycle of biomedical engineering applications. GE credit: SE. Effective: 2018 Spring Quarter.

BIM 118—Microelectromechanical Systems (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): CHE 002A; ENG 017 Pass One restricted to upper division standing in Biomedical Engineering. Introduction to the theory and practice of micro-electromechanical systems (MEMS), including fundamentals of micro-nanofabrication, microscale sensing and actuation, self assembly, microfluidics and lab-on-a-chip. Weekly hands-on laboratory sections are emphasized on implementation and utilization of MEMS technologies. GE credit: SE. Effective: 2017 Winter Quarter.

BIM 125—Introduction to Design and Analysis of Experiments for BME (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIM 105 or STA 100 Basic concepts and methods in design of experiments with biomedical engineering applications. Statistical concepts and methods to study strategies to design efficient industrial experiments that can improve data quality and simplify data analysis. GE credit: SE. Effective: 2018 Winter Quarter.

BIM 126—Tissue Mechanics (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): EXB 103 or ENG 045 or ENG 045Y Structural and mechanical properties of biological tissues, including bone, cartilage, ligaments, tendons, nerves, and skeletal muscle. GE credit: SE. Effective: 2018 Spring Quarter.

BIM 140—Protein Engineering (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 002A Introduction to protein structure and function. Modern methods for designing, producing, and characterizing novel proteins and peptides. Design strategies, computer modeling, heterologous expression, in vitro mutagenesis. Protein crystallography, spectroscopic and calorimetric methods for characterization, and other techniques. GE credit: QL, SE, SL, VL. Effective: 2013 Fall Quarter.

BIM 140L—Protein Engineering Laboratory (2)
Discussion—1 hour; Laboratory—3 hours. Prerequisite(s): BIM 140 (can be concurrent); Concurrent enrollment in BIM 140 required. Optional hands-on laboratory for BIM 140. Students use the engineering design process to design, build, and test a solution to a practical problem in the field of protein engineering. Problems change each offering. GE credit: SE. Effective: 2017 Spring Quarter.

BIM 141—Cell and Tissue Mechanics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PHY 009B; ENG 006; ENG 035 Mechanical properties that govern blood flow in the microcirculation. Concepts in blood rheology and cell and tissue viscoelasticity, biophysical aspects of cell migration, adhesion, and motility. GE credit: QL, SE, VL. Effective: 2013 Fall Quarter.

BIM 142—Principles and Practices of Biomedical Imaging (4)
Lecture—4 hours. Prerequisite(s): BIM 108 (can be concurrent); MAT 022B Basic physics, engineering principles, and applications of biomedical imaging techniques including x-ray imaging, computed tomography, magnetic resonance imaging, ultrasound and nuclear imaging. GE credit: SE. Effective: 2018 Spring Quarter.

BIM 143—Biomolecular Systems Engineering: Synthetic Biology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 002A; (MAT 016C or MAT 017C or MAT 021C) Includes analysis, design, construction and characterization of molecular systems. Process and biological parts standardization, computer aided design, gene synthesis, directed evolution, protein engineering, issues of human practice, biological safety, security, innovation, and ethics are covered. GE credit: SE. Effective: 2014 Fall Quarter.

BIM 143L—Synthetic Biology Laboratory (2)
Discussion—1 hour; Laboratory—3 hours. Prerequisite(s): BIM 143 (can be concurrent); Concurrent enrollment in BIM 143 required. Optional hands-on laboratory for BIM 143. Students solve a practical problem in the field of synthetic biology by designing, building, and testing an appropriate solution or product. Problems change each offering. GE credit: SE. Effective: 2017 Spring Quarter.

BIM 144—Fundamentals of Biophotonics and Bioimaging (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 022B; PHY 009B; or Consent of Instructor. BIM 108 or equivalent helpful; Biology or Physiology course recommended. Biophotonics and bioimaging, emphasizing quantitative description of light propagation & light tissue interactions. Key technologies and illustrative applications in basic research, clinical diagnostics and therapy. GE credit: SE. Effective: 2017 Winter Quarter.

BIM 151—Mechanics of DNA (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; MAT 022B Structural, mechanical and dynamic properties of DNA. Topics include DNA structures and their mechanical properties, in vivo topological constraints on DNA, mechanical and thermodynamic equilibria, DNA dynamics, and their roles in normal and pathological biological processes. GE credit: OL, QL, SE. Effective: 2012 Fall Quarter.

BIM 152—Molecular Control of Biosystems (4)
Lecture—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): BIS 002A; PHY 009B; MAT 022B Fundamentals of molecular biomedicine covering state-of-the-art methods for quantitative understanding of gene regulation and signal transduction networks at different levels of organization in health and disease. Topics include classic genetic systems, synthetic circuits, networks disrupted in disease and cancer. GE credit: OL, SE. Effective: 2012 Fall Quarter.

BIM 161A—Biomolecular Engineering (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 002A; CHE 008B or CHE 118B Restricted to upper division standing. Introduction to the basic concepts and techniques of biomolecular engineering such as recombinant DNA technology, protein engineering, and molecular diagnostics. Three units of credit for students who have taken BIM 161S. GE credit: QL, SE. Effective: 2017 Spring Quarter.

BIM 161L—Biomolecular Engineering Laboratory (3)
Laboratory—4.5 hours; Lecture/Discussion—1.5 hours. Prerequisite(s): BIM 161A or BIS 101 Introduction to the basic techniques in biomolecular engineering. Lectures, laboratory, and discussion sessions will cover basic techniques in DNA cloning, bacterial cell culture, gene regulation, protein expression, and data analysis. GE credit: QL, SE, SL. Effective: 2013 Fall Quarter.

BIM 161S—Biomolecular Engineering: Brief Course (1)
Lecture—1 hour. Prerequisite(s): BIS 002A; CHE 008B; BIM 161L (can be concurrent) Basic concepts and techniques in biomolecular analysis, recombinant DNA technology, and protein purification and analysis. Not open for credit to students who have taken BIM 161A. GE credit: QL, SE. Effective: 2012 Summer Session 2.

BIM 162—Introduction to the Biophysics of Molecules and Cells (4)
Lecture—4 hours. Prerequisite(s): MAT 022B C- or better; PHY 009C C- or better Introduction to fundamental physical mechanisms governing structure and function of bio-macromolecules. Emphasis on a quantitative understanding of the nano- to microscale biomechanics of interactions between and within individual molecules, as well as of their assemblies, in particular membranes. GE credit: QL, SE, SL. Effective: 2013 Fall Quarter.

BIM 163—Bioelectricity, Biomechanics, and Signaling Systems (4)
Lecture—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): MAT 022B C- or better; (BIM 116 or NPB 101) Fundamentals of bioelectricity in cells, the calcium signaling system, and mechanical force generation in muscle. Combination of lecture and projects to promote learning of important concepts in hands-on projects using neurons and muscle as microcosms. GE credit: QL, SE. Effective: 2014 Fall Quarter.

BIM 167—Biomedical Fluid Mechanics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIM 106 C- or better; NPB 101 or BIM 116 Theories of fluid mechanics, including Navier Stokes Equation and Conservation Laws, will be presented to understand dynamics of human circulatory systems. Fluid dynamics will be analyzed using partial differential equations. GE credit: SE. Effective: 2017 Spring Quarter.

BIM 170—Aspects of Medical Device Design and Manufacturing (2)
Lecture—2 hours. Prerequisite(s): Consent of Instructor. Open to upper division Biomedical Engineering majors only. Survey of medical device design & impact on manufacturing operations. Introduction to medical device design process & product lifecycle. Principles of Design for Manufacturability, Design for Lean Manufacturing, and quality management systems. GE credit: SE. Effective: 2017 Winter Quarter.

BIM 171—Clinical Applications for Biomedical Device Design (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIM 116 C- or better or NPB 101 C- or better; NPB 101 recommended. Restricted to Biomedical Engineering majors only. Clinical applications for biomedical devices with emphasis in the pathophysiology of common diseases as it relates to the biodesign process, biosensors principles, in vitro diagnostics, needs assessment, and regulatory considerations. GE credit: SE. Effective: 2017 Fall Quarter.

BIM 173—Cell and Tissue Engineering (4)
Lecture/Discussion—4 hours. Prerequisite(s): BIM 106 C- or better; BIM 109 C- or better Engineering principles to direct cell and tissue behavior and formation. Cell sourcing, controlled delivery of macromolecules, transport within and around biomaterials, bioreactor design, tissue design criteria and outcomes assessment. GE credit: OL, SE, SL, WE. Effective: 2012 Fall Quarter.

BIM 189A—Topics in Biomedical Engineering; Cellular and Molecular Engineering (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Topics in Biomedical Engineering; Cellular and Molecular Engineering. May be repeated for credit topic differs. GE credit: SE. Effective: 2004 Fall Quarter.

BIM 189B—Topics in Biomedical Engineering; Biomedical Imaging (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Topics in Biomedical Engineering; Biomedical Imaging. May be repeated for credit topic differs. GE credit: SE. Effective: 2004 Fall Quarter.

BIM 189C—Topics in Biomedical Engineering; Biomedical Engineering (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Topics in Biomedical Engineering; Biomedical Engineering. May be repeated for credit topic differs. GE credit: SE. Effective: 2004 Fall Quarter.

BIM 190A—Upper Division Seminar in Biomedical Engineering (1)
Seminar—1 hour. Restricted to upper division standing. In depth examination of research topics in a small group setting. Question and answer session with faculty members. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 2006 Spring Quarter.

BIM 192—Internship in Biomedical Engineering (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Restricted to upper division majors. Supervised work experience in the Biomedical Engineering field. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 2012 Fall Quarter.

BIM 198—Directed Group Study (1-5)
Variable—3-15 hours. May be repeated up to 3 time(s) content changes. (P/NP grading only.) GE credit: SE. Effective: 2005 Fall Quarter.

BIM 199—Special Study for Advanced Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Special study for advanced undergraduates. (P/NP grading only.) GE credit: SE. Effective: 2012 Fall Quarter.

BIM 201—Scientific Communication for Biomedical Engineers (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Course is designed to improve the written and oral communication skills of first-year graduate students through writing fellowship proposals, analyzing data, and critically reviewing research papers. (S/U grading only.) Effective: 2016 Fall Quarter.

BIM 202—Cell and Molecular Biology for Engineers (4)
Lecture/Discussion—4 hours. Prerequisite(s): BIS 104 or MCB 121 Preparation for research and critical review in the field of cell and molecular biology for biomedical or applied science engineers Emphasis on biophysical and engineering concepts intrinsic to specific topics including receptor-ligand dynamics in cell signaling and function, cell motility, DNA replication and RNA processing, cellular energetics and protein sorting. Modern topics in bioinformatics and proteomics. Effective: 2000 Fall Quarter.

BIM 204—Physiology for Bioengineers (5)
Lecture—4 hours. Prerequisite(s): BIS 001A; Or equivalent; graduate standing or consent of instructor. Basic human physiology of the nervous, muscular, cardiovascular, respiratory, and renal systems and their interactions; Emphasis on the physical and engineering principles governing these systems, including control and transport processes, fluid dynamics, and electrochemistry. Effective: 2007 Fall Quarter.

BIM 209—Scientific Integrity for Biomedical Engineers (2)
Discussion—1 hour; Lecture—1 hour. Open to Biomedical Engineering majors only. Scientific integrity and ethics for biomedical engineers, with emphasis and discussion on mentoring, authorship and peer review, use of humans and animals in biomedical research, conflict of interest, intellectual property, genetic technology and scientific record keeping. (S/U grading only.) Effective: 2006 Spring Quarter.

BIM 210—Introduction to Biomaterials (4)
Lecture—4 hours. Prerequisite(s): ENG 045 or ENG 045Y; or Consent of Instructor. Mechanical and atomic properties of metallic,ceramic, and polymeric implant materials of metallic, ceramic, and polymeric implant materials; corrosion, degradation, and failure of implants;inflammation, wound and fracture healing, blood coagulation;properties of bones, joints, and blood vessels;biocompatibility of orthopaedic and cardiovascular materials. Effective: 2018 Spring Quarter.

BIM 211—Design of Polymeric Biomaterials and Biological Interfaces (4)
Lecture—4 hours. Prerequisite(s): ENG 045 or ENG 045Y; or Consent of Instructor. Open to upper division undergraduates or graduate students. Design, selection and application of polymeric biomaterials. Integration of the principles of polymer science, surface science, materials science and biology. Effective: 2018 Spring Quarter.

BIM 212—Biomedical Heat and Mass Transport Processes (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EME 165; EBS 125; ECH 153; Or equivalent. Application of principles of heat and mass transfer to biomedical systems related to heat exchange between the biomedical system and its environment, mass transfer across cell membranes and the design and analysis of artificial human organs. (MAE 212.) Effective: 2000 Winter Quarter.

BIM 213—Principles and Applications of Biological Sensors (4)
Lecture—4 hours. Prerequisite(s): CHE 002C Biological sensors based on principles of electrochemical, optical and affinity detection. Methods for integration of sensing elements (e.g. enzymes) into biosensors and miniaturization of biosensors. Effective: 2007 Fall Quarter.

BIM 214—Continuum Biomechanics (4)
Lecture—4 hours. Prerequisite(s): BIM 141; ENG 102; Or equivalent. Continuum mechanics relevant to bioengineering. Concepts in tensor calculus, kinematics, stress and strain, and constitutive theories of continua. Selected topics in bone, articular cartilage, blood/circulation, and cell biomechanics will illustrate the derivation of appropriate continuum mechanics theories. Effective: 2017 Fall Quarter.

BIM 216—Advanced topics in Cellular Engineering (4)
Lecture—4 hours. Prerequisite(s): BIM 214; or Consent of Instructor. Advanced research strategies and technologies used in the study of immune function and inflammation. Static and dynamic measurements of stress, strain, and molecular scale forces in blood and vascular cells, as well as genetic approaches to the study of disease. Effective: 2000 Spring Quarter.

BIM 217—Mechanobiology in Health and Disease (4)
Lecture/Discussion—4 hours. Prerequisite(s): BIM 106; BIS 101; NPB 101; Or equivalents. Principles by which biomechanical forces affect cell and tissue function to impact human health and disease. Emphasis on cardiovascular system: structure and function, biofluid mechanics and mechanotransduction, disease mechanisms and research methods. Cartilage, bone and other systems; current topics discussed. Effective: 2008 Spring Quarter.

BIM 218—Microsciences (4)
Lecture/Discussion—4 hours. Introduction to the theory of physical and chemical principles at the microscale. Scale effects, surface tension, microfluidic mechanics, micromechanical properties, intermolecular interactions and micro tribology. (EEC 244B.) Effective: 2011 Fall Quarter.

BIM 221—Drug Delivery Systems (4)
Lecture/Discussion—4 hours. Prerequisite(s): BIM 204 recommended but not required. Fundamental engineering and biotechnology principles critical for the formulation and delivery of therapeutic agents, including peptide/protein drugs and small molecules. Effective: 2017 Winter Quarter.

BIM 222—Cytoskeletal Mechanics (4)
Lecture/Discussion—4 hours. Prerequisite(s): BIM 202 Current topics in cytoskeletal mechanics including physical properties of the cytoskeleton and motor proteins, molecular force sensor and generator, cytoskeletal regulation of cell motility and adhesion. Effective: 2010 Fall Quarter.

BIM 223—Multibody Dynamics (4)
Lecture—4 hours. Prerequisite(s): ENG 102 Coupled rigid-body kinematics/dynamics; reference frames; vector differentiation; configuration and motion constraints; holonomicity; generalized speeds; partial velocities; mass; inertia tensor/theorems;
angular momentum; generalized forces; comparing Newton/Euler, Lagrange's, Kane's methods; computer-aided equation derivation; orientation; Euler; Rodrigues parameters. (MAE 223.) Effective: 2000 Winter Quarter.

BIM 225—Spatial Kinematics and Robotics (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): BIM 222; C Language. Spatial kinematics, screw theory, spatial mechanisms analysis and synthesis, robot kinematics and dynamics, robot workspace, path planning, robot programming, real-time architecture and software implementation. (MAE 225.) Effective: 2000 Winter Quarter.

BIM 228—Skeletal Muscle Mechanics: Form, Function, Adaptability (4)
Lecture—4 hours. Prerequisite(s): ENG 035; (ENG 045 or ENG 045Y); MAT 021D; Basic background in biology, physiology, and engineering; NPB 101 recommended. Basic structure and function of skeletal muscle examined at the microscopic and macroscopic level. Muscle adaptation in response to aging, disease, injury, exercise, and disuse. Analytic models of muscle function are discussed. Effective: 2018 Spring Quarter.

BIM 232—Skeletal Tissue Mechanics (3)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): Engineering 104B. Overview of the mechanical properties of the various tissues in the musculoskeletal system, the relationship of these properties to
anatomic and histologic structure, and the changes in these properties caused by aging and disuse. (MAE 232.) Effective: 1997 Winter Quarter.

BIM 233—Soft Tissue Mechanics (4)
Lecture—4 hours. Presentation of structure and function of musculoskeletal soft tissues: cartilage, tendon, ligament, meniscus, and intervertebral disc. Instruction in engineering principals governing the mechanical behavior of these tissues: viscoelasticity, quasilinear viscoelasticity, and biphasic theory. Effective: 2013 Fall Quarter.

BIM 239—Advanced Finite Elements and Optimization (4)
Lecture—4 hours. Prerequisite(s): ENG 180 or MAT 128C or EAD 115 Introduction to advanced finite elements and design optimization methods, with application to modeling of complex mechanical, aerospace and biomedical systems. Application of states of the art in finite elements in optimum design of components under realistic loading conditions and constraints. (EME 239.) Effective: 2007 Fall Quarter.

BIM 240—Computational Methods in Nonlinear Mechanics (4)
Lecture—4 hours. Prerequisite(s): MAT 128B or ENG 180 or EAD 115 Deformation of solids and the motion of fluids treated with state-of-the-art computational methods. Numerical treatment of nonlinear dynamics; classification of coupled problems; applications of finite element methods to mechanical, aeronautical, and biological systems. (MAE 240.) Effective: 1999 Winter Quarter.

BIM 241—Introduction to Magnetic Resonance Imaging (3)
Lecture—3 hours. Prerequisite(s): PHY 009D; MAT 022B Equipment, methods, medical applications of MRI. Lectures review basic, advanced pulse sequences, image reconstruction, display and technology
and how these are applied clinically. Lecture complements a more technical course. (course 246 can be taken concurrently.) Effective: 1999 Fall Quarter.

BIM 242—Introduction to Biomedical Imaging (4)
Lecture—4 hours. Prerequisite(s): PHY 009D; Electrical and Computer Engineering 106 or consent of instructor. Basic physics and engineering principles of image science. Emphasis on ionizing and nonionizing radiation production and interactions with the body and detectors. Major imaging systems: radiography, computed tomography, magnetic resonance, ultrasound, and optical microscopy. Effective: 2004 Fall Quarter.

BIM 243—Radiation Detectors for Biomedical Applications (4)
Lecture/Discussion—4 hours. Prerequisite(s): PHY 009D; MAT 021D; MAT 022B Radiation detectors and sensors used for biomedical applications. Emphasis on radiation interactions, detection, measurement and use of radiation sensors for imaging. Operating principles of gas, semiconductor, and scintillation detectors. Effective: 2005 Winter Quarter.

BIM 246—Magnetic Resonance Technology (3)
Lecture—3 hours. Prerequisite(s): PHY 009D; MAT 022B Course covers MRI technology at an advanced level with emphasis on mathematical descriptions and problem solving. Topics include spin dynamics, signal generation, image reconstruction, pulse sequences, biophysical basis of T1, T2, RF, gradient coil design, signal to noise, image artifacts. Effective: 1997 Winter Quarter.

BIM 251—Medical Image Analysis (4)
Lecture—4 hours. Prerequisite(s): EEC 106 Techniques for assessing the performance of medical imaging systems. Principles of digital image formation and processing. Measurements that summarize diagnostic image quality and the performance of human observers viewing those images. Definition of ideal observer and other mathematical observers that may be used to predict performance from system design features. Students will obtain hands-on experience in computer vision by completing individual Matlab assignments that they select from topics in the course. Effective: 2001 Spring Quarter.

BIM 252—Computational Methods in Biomedical Imaging (4)
Lecture—4 hours. Prerequisite(s): (BIM 105 or STA 120); (BIM 108 or EEC 150A) Analytic tomographic reconstruction from projections in 2D and
3D; model-based image reconstruction methods; maximum likelihood and Bayesian methods; applications to CT, PET, and SPECT. (EEC 205.) Effective: 2011 Fall Quarter.

BIM 254—Statistical Methods in Genomics (4)
Lecture—4 hours. Statistical approaches to problems in computational molecular biology and genomics; formulation of questions via probabilistic modeling, statistical inference methods for parameter estimation, and interpretation of results to address biological questions; application to high-impact problems in functional genomics and molecular biology. Effective: 2017 Winter Quarter.

BIM 255—Nanoscale Imaging for Molecular Medicine (3)
Lecture/Discussion—3 hours. Prerequisite(s): BIM 202 highly recommended; graduate standing. Current and emerging technologies to visualize biological structures and processes at size scales = 100 nanometers – and their application towards the advancement of molecular medicine. Technologies include superresolution optical microscopy, electron microscopy and tomography. Emphasis on quantitative imaging. (BPH 255.) Effective: 2017 Spring Quarter.

BIM 257—Fundamentals of Tissue Optics and Biomedical Applications (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Fundamentals of optical properties of tissue. Range of optical technologies and their applications to tissue characterization and diagnostics. Effective: 2011 Fall Quarter.

BIM 258—Advanced Biophotonics and Bioimaging (4)
Lecture—4 hours. Prerequisite(s): BIM 108; PHY 108; Or an equivalent undergraduate optics course to PHY 108. Quantitative basis for biophotonics and bioimaging, with an emphasis on the physical and mathematical description of optics, light propagation, and light-tissue interactions. Advantages and limitations of various optical imaging and sensing technologies. Illustrative applications in diagnostics, basic research, and therapy. Effective: 2017 Winter Quarter.

BIM 262—Cell and Molecular Biophysics for Bioengineers (4)
Lecture—4 hours. Prerequisite(s): BIM 284; Or equivalent; graduate standing; undergraduate students by consent of instructor. Introduction to fundamental mechanisms governing the structure, function, and assembly of bio-macromolecules. Emphasis is on a quantitative understanding of the nano-to-microscale interactions between and within individual molecules, as well as of their assemblies, in particular membranes. Not open for credit to students who have completed BIM 162. (ECH 269.) Effective: 2017 Winter Quarter.

BIM 264—Synthetic and Systems Engineering of Cells (4)
Lecture—4 hours. Introduction to the design, engineering, and control of biological systems for biotechnological applications and biological studies. Effective: 2016 Fall Quarter.

BIM 270—Biochemical Systems Theory (4)
Lecture—4 hours. Prerequisite(s): BIM 202 (can be concurrent); or Consent of Instructor. Systems biology at the biochemical level. Mathematical and computational methods emphasizing nonlinear representation, dynamics, robustness, and optimization. Case studies of signal-transduction cascades, metabolic networks and regulatory mechanisms. Focus on formulating and answering fundamental questions concerning network function, design, and evolution. Effective: 2004 Winter Quarter.

BIM 271—Gene Circuit Theory (4)
Lecture—4 hours. Prerequisite(s): BIM 270 or BIM 202; and Consent of Instructor. Analysis, design, and construction of gene circuits. Modeling strategies, elements of design, and methods for studying variations in design. Case studies involving prokaryotic gene circuits to illustrate natural selection, discovery of design principles, and construction of circuits for engineering objectives. Effective: 2004 Winter Quarter.

BIM 272—Tissue Engineering (3)
Lecture/Discussion—3 hours. Prerequisite(s): BIS 104 or MCB 121 Based on morphogenetic signals, responding stem cells and extracellular matrix scaffolding. Design and development of tissues for functional restoration of various organs damaged/lost due to cancer, disease and trauma. Fundamentals of morphogenetic signals, responding stem cells and extracellular matrix scaffolding. Effective: 2007 Winter Quarter.

BIM 273—Integrative Tissue Engineering and Technologies (4)
Lecture/Discussion—4 hours. Prerequisite(s): BIM 202; BIM 204; Or equivalent; strongly encourage completion of BIM 272 although not a prerequisite. Restricted to graduate standing. Engineering principles to direct cell and tissue behavior and formation. Contents include controlled delivery of macromolecules, transport within and around biomaterials, examination of mechanical forces of engineered constructs, and current experimental techniques used in the field. Effective: 2007 Spring Quarter.

BIM 281—Acquisition and Analysis of Biomedical Signals (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 100; STA 130A Restricted to upper division engineering. Basic concepts of digital signal recording and analysis; sampling; empirical modeling; Fourier analysis, random processes, spectral analysis, and correlation applied to biomedical signals. Effective: 2002 Fall Quarter.

BIM 283—Advanced Design of Experiments for Biomedical Engineers (4)
Lecture—4 hours. Open to graduate students only. Provides biomedical engineering graduate students with the tools to properly design experiments, collect and analyze data, and extract, communicate and act on information generated. Not open for credit to students who have taken EBS 265. Effective: 2017 Spring Quarter.

BIM 284—Mathematical Methods for Biomedical Engineers (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 022B; STA 130A; Or consent of instructor; upper division biomedical engineering majors, and graduate students in sciences and engineering; priority given to Biomedical Engineering graduate students. Theoretical applications of linear systems, ordinary and partial differential equations, and probability theory and random processes that describe biological systems and instruments that measure them. Students will be introduced to numerical solution techniques in MATLAB. Effective: 2007 Fall Quarter.

BIM 286—Nuclear Imaging in Medicine and Biology (4)
Lecture/Discussion—4 hours. Prerequisite(s): BIM 243; or Consent of Instructor. Radioactive decay, interaction of radiation with matter, radionuclide production, radiation detection, digital autoradiography, gamma camera imaging, single photon emission computed tomography, positron emission tomography and applications of these techniques in biology and medicine. Effective: 2005 Spring Quarter.

BIM 287—Concepts in Molecular Imaging (4)
Lecture—2 hours; Lecture/Discussion—2 hours; Term Paper. Prerequisite(s): CHE 002C; MAT 021C; PHY 009D; and Consent of Instructor. Current techniques and tools for molecular imaging. Emphasis on learning to apply principles from the physical sciences to imaging problems in medicine and biology. Effective: 2004 Spring Quarter.

BIM 288—Living Matter: Physical Biology of the Cell (3)
Lecture—3 hours. Open to any student possessing general background in any disciplines of physical or biological sciences and engineering. Introduction to the origin, maintenance, and regulation of the dynamic architecture of the cell, including cellular modes of organization, dynamics and energy dissipation, molecular transport, motility, regulation, and adaptability. (EMS 288 and BPH 288.) Effective: 2017 Winter Quarter.

BIM 289A—Selected Topics in Biomedical Engineering; Cellular and Molecular Systems Engineering (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Selected topics in Cellular and Molecular Systems Engineering. May be repeated for credit when topic differs. Effective: 2011 Fall Quarter.

BIM 289B—Selected Topics in Biomedical Engineering; Biomedical Imaging (1-5)
Variable. Prerequisite(s): Consent of Instructor. Selected topics in Biomedical Imaging. May be repeated for credit when topic differs. Effective: 2011 Fall Quarter.

BIM 289C—Selected Topics in Biomedical Engineering; Computational Bioengineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Selected topics in Computational Bioengineering. May be repeated for credit when topic differs. Effective: 2011 Fall Quarter.

BIM 289D—Selected Topics in Biomedical Engineering; Cell and Tissue Biomechanics (1-5)
Variable. Prerequisite(s): Consent of Instructor. Selected topics in Cell and Tissue Biomechanics. May be repeated for credit when topic differs. Effective: 2011 Fall Quarter.

BIM 289E—Selected Topics in Biomedical Engineering; Analysis of Human Movement (1-5)
Variable. Prerequisite(s): Consent of Instructor. Selected topics in Analysis of Human Movement. May be repeated for credit when topic differs. Effective: 2011 Fall Quarter.

BIM 290—Seminar (1)
Seminar—1 hour. Seminar in biomedical engineering (S/U grading only.) Effective: 1997 Winter Quarter.

BIM 290C—Graduate Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Individual and/or group conference on problems, progress, and techniques in biomedical engineering research. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

BIM 298—Directed Group Study (1-5)
Variable—1-5 hours. Open to graduate students in the Biomedical Engineering Graduate Group, or consent of instructor. Directed group study in Biomedical Engineering. May be repeated for credit. (S/U grading only.) Effective: 2011 Fall Quarter.

BIM 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

BIM 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Biomedical Engineering (Graduate Group)

Biomedical Engineering (Graduate Group) | Biomedical Engineering Information

David Hawkins, Ph.D., Chairperson of the Group 530-752-2748

Group Office. 2306B Genome and Biomedical Sciences Facility; 530-752-2611; https://bmegg.ucdavis.edu/

Faculty. https://bmegg.ucdavis.edu/contacts/graduate-group-faculty/

Biomedical Engineering (Graduate Group) | Biomedical Engineering M.S.

David Hawkins, Ph.D., Chairperson of the Group 530-752-2748

Group Office. 2306B Genome and Biomedical Sciences Facility; 530-752-2611; https://bmegg.ucdavis.edu/

Faculty. https://bmegg.ucdavis.edu/contacts/graduate-group-faculty/

Graduate Study. The Graduate Group in Biomedical Engineering offers programs of study and research leading to the M.S. and Ph.D. degrees. The programs of study prepare students for professional work in the effective integration of engineering with medical and biological sciences. Research strengths lie in the areas of imaging, tissue engineering and regenerative medicine, sensor and MEMs systems, cellular and molecular mechanics, computational modeling, targeted

therapeutics, orthopedic biomechanics, biofluids and transport, and human movement. This broad interdepartmental program is best suited for students who are capable of and comfortable with considerable independence. Each student, together with an adviser, defines a specific course of study suited to individual goals.

Preparation. The Group regards strong competence in mathematics and engineering as necessary for successful completion of study. Prior course work in these areas is emphasized in the evaluation of applications. Some undergraduate training can be acquired after admission to the Group, but it may require an additional year of study.

Courses. See Engineering: Biomedical.

Biomedical Engineering (Graduate Group) | Biomedical Engineering Ph.D.

David Hawkins, Ph.D., Chairperson of the Group 530-752-2748

Group Office. 2306B Genome and Biomedical Sciences Facility; 530-752-2611; https://bmegg.ucdavis.edu/

Faculty. https://bmegg.ucdavis.edu/contacts/graduate-group-faculty/

Graduate Study. The Graduate Group in Biomedical Engineering offers programs of study and research leading to the M.S. and Ph.D. degrees. The programs of study prepare students for professional work in the effective integration of engineering with medical and biological sciences. Research strengths lie in the areas of imaging, tissue engineering and regenerative medicine, sensor and MEMs systems, cellular and molecular mechanics, computational modeling, targeted therapeutics, orthopedic biomechanics, biofluids and transport, and human movement. This broad interdepartmental program is best suited for students who are capable of and comfortable with considerable independence. Each student, together with an adviser, defines a specific course of study suited to individual goals.

Preparation. The Group regards strong competence in mathematics and engineering as necessary for successful completion of study. Prior course work in these areas is emphasized in the evaluation of applications. Some undergraduate training can be acquired after admission to the Group, but it may require an additional year of study.

Courses. See Engineering: Biomedical.

Biostatistics (Graduate Group)

Biostatistics (Graduate Group) | BST Information

Kyoungmi Kim, Ph.D. (Public Health Sciences), Chairperson of the Group

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Faculty. http://biostat.ucdavis.edu/about/faculty.html

Biostatistics (Graduate Group) | BST M.S.

Kyoungmi Kim, Ph.D. (Public Health Sciences), Chairperson of the Group

Group Office. 4118 Mathematical Sciences Building; 530-341-2987; http://biostat.ucdavis.edu/

Faculty. http://biostat.ucdavis.edu/about/faculty.html

Graduate Study. Biostatistics is a field of science that uses quantitative methods to study life sciences related problems that arise in a broad array of fields. The program provides students with, first, solid training in the biostatistical core disciplines and theory; second, with state-of-the art knowledge and skills for biostatistical data analysis; third, substantial exposure to the biological and epidemiological sciences; and fourth, with a strong background in theoretical modeling, statistical techniques and quantitative as well as computational methods. Programs of study and

research are offered leading to the M.S. and Ph.D. degrees. The program prepares students for interdisciplinary careers ranging from bioinformatics, environmental toxicology and stochastic modeling in biology and medicine to clinical trials, drug development, epidemiological and medical statistics. The program draws on the strengths of the Biostatistics faculty at UC Davis.

Preparation. Students should have one year of calculus; a course in linear algebra or one year of biological course work; facility with a programming language; and upper-division work in at least one of Mathematics, Statistics and Biology.

Graduate Advisor. Ana-Maria Iosif (Public Health Sciences)

Biostatistics (Graduate Group) | BST Ph.D.

Kyoungmi Kim, Ph.D. (Public Health Sciences), Chairperson of the Group

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Preparation. Students should have one year of calculus; a course in linear algebra or one year of biological course work; facility with a programming language; and upper-division work in at least one of Mathematics, Statistics and Biology.

Graduate Advisor. Christiana Drake (Statistics)

Biostatistics (Graduate Group) | BST Courses

Courses in BST:

BST 222—Biostatistics: Survival Analysis (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 131C Incomplete data; life tables; nonparametric methods; parametric methods; accelerated failure time models; proportional hazards models; partial likelihood; advanced topics. (STA 222.) Effective: 2002 Fall Quarter.

BST 223—Biostatistics: Generalized Linear Models (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 131C Likelihood and linear regression; generalized linear model; Binomial regression; case-control studies; dose-response and bioassay; Poisson regression; Gamma regression; quasi-likelihood models; estimating equations; multivariate GLMs. (STA 223.) Effective: 2002 Fall Quarter.

BST 224—Analysis of Longitudinal Data (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): (BST 222 or STA 222); (BST 223 or STA 223); STA 232B; or Consent of Instructor. Standard and advanced methodology, theory, algorithms, and applications relevant for analysis of repeated measurements and longitudinal data in biostatistical and statistical settings. (STA 224.) Effective: 2005 Spring Quarter.

BST 225—Clinical Trials (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): BST 223 or STA 223; or Consent of Instructor. Basic statistical principles of clinical designs, including bias, randomization, blocking, and masking. Practical applications of widely-used designs, including dose-finding, comparative and cluster randomization designs. Advanced statistical procedures for analysis of data collected in clinical trials. (STA 225.) Effective: 2005 Spring Quarter.

BST 226—Statistical Methods for Bioinformatics (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): BST 131C or Consent of Instructor; Data analysis experience recommended. Standard and advanced statistical methodology, theory, algorithms, and applications relevant to the analysis of -omics data. (STA 226.) Effective: 2007 Winter Quarter.

BST 252—Advanced Topics in Biostatistics (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): BST 222; BST 223 Biostatistical methods and models selected from the following: genetics, bioinformatics and genomics;longitudinal or functional data; clinical trials and experimental design; analysis of environmental data; dose-response, nutrition and toxicology; survival analysis; observational studies and epidemiology; computer-intensive or Bayesian methods in biostatistics. May be repeated for credit with consent of advisor when topic differs. (STA 252.) Effective: 2002 Fall Quarter.

BST 290—Seminar in Biostatistics (1)
Seminar—1 hour. Restricted to graduate standing. Seminar on advanced topics in the field of biostatistics. Presented by members of the Biostatistics Graduate Group and other guest speakers. May be repeated up to 12 time(s). (S/U grading only.) Effective: 2002 Fall Quarter.

BST 298—Directed Group Study (1-5)
Variable—3-15 hours. Special topics in Biostatistics appropriate for group study at the graduate level. May be repeated for credit. Effective: 2004 Spring Quarter.

BST 299—Special Study for Biostat Graduate Students (1-12)
Variable—3-36 hours. Special topics in Biostatistics appropriate for directed individual study on advanced topics not otherwise covered in the Biostatistics curriculum. May be repeated for credit. (S/U grading only.) Effective: 2004 Spring Quarter.

BST 299D—Dissertation Research (1-12)
Variable—3-36 hours. Prerequisite(s): and Consent of Instructor. Advancement to Candidacy for Ph.D. Research in Biostatistics under the supervision of major professor. May be repeated for credit. (S/U grading only.) Effective: 2004 Spring Quarter.

Biophysics (Graduate Group)

Biophysics (Graduate Group) | BPH Ph.D.

John Voss, Ph.D., Chairperson of the Group

Group Office. 227A Life Sciences; 530-752-4863; http://bph.ucdavis.edu/

Faculty. http://bph.ucdavis.edu/faculty/

Graduate Study. The Biophysics Graduate Group offers a program leading to a Ph.D. degree in biophysics. The interdisciplinary program prepares students to conduct independent research at the interface of physics, chemistry, and biology. Faculty members have particular research interests in structural biology, membrane dynamics, mechanisms of catalysis and energy transduction, computational biology, theory, neuroscience, and imaging. Students choose from the broad biophysics research venues a research laboratory that matches their interests and career goals.

The Master of Sciences degree is offered only en route to the Ph.D.

Biophysics (Graduate Group) | BPH Courses

Courses in BPH:

BPH 200A—Current Techniques in Biophysics (3)
Lecture—3 hours. Prerequisite(s): BIS 102; CHE 110A; Or equivalents. Current Technqiues in Biophysics. Topics in 200A include mathematical methods, modeling, mass spectrometry, stochastic process, scanning probe microscopy, electron microscopy, fluorescence, membrane diffusion/mechanics, and single particle tracking. (S/U grading only.) Effective: 2009 Winter Quarter.

BPH 200B—Current Techniques in Biophysics (3)
Lecture—3 hours. Prerequisite(s): CHE 110A; BIS 102; Or equivalent of BIS 102. Current Techniques in Biophysics. Topics include protein folding, membrane structure and dynamics, Raman spectroscopy, fluorescence resonance energy transfer, time resolved fluorescence, quantum dot, fluorescence imaging,esr, high resolution nmr, and in vivo nmr. (S/U grading only.) Effective: 2007 Spring Quarter.

BPH 200LA—Biophysics Laboratory (3)
Laboratory—18 hours. Prerequisite(s): BPH 200 (can be concurrent) One five-week laboratory assignment in the research laboratory of a Biophysics Graduate Group faculty member. Individual research problems with emphasis on methodological/procedural experience and experimental design. May be repeated up to 4 time(s). Effective: 1997 Winter Quarter.

BPH 200LB—Biophysics Laboratory (6)
Laboratory. Prerequisite(s): BPH 200 (can be concurrent) Two fiveweek laboratory assignments in the research laboratories
of Biophysics Graduate Group faculty members. Individual research problems with emphasis on methodological/procedural experience and experimental design. May be repeated up to 2 time(s). Effective: 1997 Winter Quarter.

BPH 231—Biological Nuclear Magnetic Resonance (3)
Lecture—3 hours. Prerequisite(s): MCB 221A; or Consent of Instructor. Or the equivalent. Principles and applications of magnetic resonance in biomedicine. Fundamental concepts and the biophysical basis for magnetic resonance
applications in areas of tissue characterization/imaging, metabolic regulation, and cellular bioenergetics. (BCM 231.) Effective: 1997 Winter Quarter.

BPH 241—Membrane Biology (3)
Lecture—3 hours. Prerequisite(s): BIS 102; BIS 103; BIS 104; or Consent of Instructor. Advanced topics on membrane biochemistry and biophysics. Relationship of the unique properties of biomembranes to their roles in cell biology and physiology. Effective: 2017 Winter Quarter.

BPH 255—Nanoscale Imaging for Molecular Medicine (3)
Lecture/Discussion—3 hours. Prerequisite(s): BIM 202 highly recommended; graduate standing. Current and emerging technologies to visualize biological structures and processes at size scales = 100 nanometers – and their application towards the advancement of molecular medicine. Technologies include superresolution optical microscopy electron microscopy and tomography. Emphasis on quantitative imaging. (BIM 255.) Effective: 2017 Spring Quarter.

BPH 271—Optical Methods in Biophysics (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): BIS 102; EAD 108B; CHE 110A; Or equivalents. Principal optical techniques used to study biological structures and their related functions. Specific optical techniques useful in the studies of protein-nucleic acid, protein-membrane and protein-protein interactions. Biomedical applications of optical techniques. Effective: 2017 Spring Quarter.

BPH 288—Living Matter: Physical Biology of the Cell (3)
Lecture—3 hours. Open to any student possessing general background in any disciplines of physical or biological sciences and
engineering. Introduction to the origin, maintenance, and regulation of the dynamic architecture of the cell, including cellular modes of organization, dynamics and energy dissipation, molecular transport, motility, regulation, and adaptability. (BIM 288 and EMS 288.) Effective: 2017 Winter Quarter.

BPH 290—Biophysics Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Presentation of current research by experts in biophysics. May be repeated for credit. (S/U grading only.) Effective: 2004 Winter Quarter.

BPH 290C—Research Conference in Biophysics (1)
Discussion—1 hour. Prerequisite(s): BPH 299 (can be concurrent); Graduate standing in Biophysics and/or consent of instructor. Presentation and discussion of faculty and graduate-student research in biophysics. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

BPH 293—Introduction to Research Topics (1)
Seminar—1 hour. Presentation of current research activities of the Biophysics Graduate Group faculty. Facilitation of students in developing their research interest, and promoting collegial interactions. May be repeated up to 1 time(s) if topics differ. (S/U grading only.) Effective: 2003 Fall Quarter.

BPH 298—Group Study (1-5)
Variable—1-5 hours. (S/U grading only.) Effective: 1997 Winter Quarter.

BPH 299—Research (1-12)
Variable—3-36 hours. (S/U grading only.) Effective: 1997 Winter Quarter.

Bodega Marine Laboratory Program

Bodega Marine Laboratory Program | BML Program Information

http://bml.ucdavis.edu/

See also Biological Sciences, Bodega Marine Laboratory Program.

Integrative marine science courses at BML offer a multidisciplinary understanding of coastal systems through hands-on research, lab and field based courses. The program includes courses during spring quarter, Summer Sessions One and Two.

Spring Quarter Program

The spring quarter curriculum is currently under revision and a new integrated curriculum will be in place in the near future that is 12-15 units. For updates, please check http://bml.ucdavis.edu/. Scholarships will be available to defray the costs of housing at BML.

For more details, follow developments of the spring quarter curriculum on the BML website at http://bml.ucdavis.edu/.

Summer Session Courses

This integrated program offers students a multidisciplinary understanding of coastal ecosystems and oceanography through intensive, hands on lab and field courses taught at Bodega Marine Laboratory. Students can take up to 10 units in each Summer Session. Applications are due in Spring of each year. Scholarships are available to defray the costs of housing at BML.

For more course detail, see full description under appropriate academic department listing or http://bml.ucdavis.edu/.

Offerings include:

Summer Session One

Coastal Marine Research and Experimental Invertebrate Biology. BIS 124, EVE 114

Effects of Coastal Pollution on Marine Organisms. ETX/NUT 127

Summer Session Two

Biological Oceanography. GEL/ESP 150C

Coastal Oceanography. ESP 152

Global Change Ecology. ESP 120

Marine and Coastal Field Ecology. ESP 124

Course offerings, sequence structure and instructors may vary from year to year.

Bodega Marine Laboratory spring and summer programs are residential, with students housed on the laboratory grounds. Participants are assessed a room and board fee in addition to standard campus registration fees. Financial aid may be available to eligible students from campus. Scholarships are available from Bodega Marine Laboratory. Applications and consent of instructors are required.

Additional information is available directly from:

Bodega Marine Laboratory
P.O. Box 247
Bodega Bay, CA 94923
707-875-2211; http://bml.ucdavis.edu/

Biotechnology

Biotechnology | BIT Information

(College of Agricultural and Environmental Sciences)

Faculty. Faculty includes members of the Departments of Animal Science; Engineering: Chemical Engineering and Materials Science; Computer Science; Engineering: Biological and Agricultural; Food Science and Technology; Land, Air, and Water Resources; Plant Pathology; Plant Sciences; Viticulture and Enology; and the College of Biological Sciences.

Biotechnology | BIT B.S.

(College of Agricultural and Environmental Sciences)

Faculty. Faculty includes members of the Departments of Animal Science; Engineering: Chemical Engineering and Materials Science; Computer Science; Engineering: Biological and Agricultural; Food Science and Technology; Land, Air, and Water Resources; Plant Pathology; Plant Sciences; Viticulture and Enology; and the College of Biological Sciences.

The Major Program

Every living organism, from the smallest and most primitive bacteria to every plant, insect, animal or human being, contains DNA as the primary genetic material. DNA directs all cellular processes, creating the incredible variety and diversity of living organisms in the biosphere. Biotechnology focuses on the mechanics of life processes and their application. Biotechnology means "life technology" and represents an integrated, multidisciplinary field, with a profound impact today on almost every aspect of human endeavor.

Preparatory Requirements. UC Davis students who wish to change their major to Biotechnology must complete the following courses (representing the subject areas of Biological Sciences, Chemistry, and Mathematics) with a grade point average of at least 2.500 in each subject area. All of these courses must be taken for a letter grade:

	UNITS
BIS 002A, 002B, 002C	15
CHE 002A, 002B, 002C	15
Mathematics, one of the following groups: MAT 016A, 016B; or MAT 017A, 017B; or MAT 021A, 021B	6-8

The Program. In the first two years, students develop a strong and general background in biological science with an emphasis on fundamental concepts and basic principles of genetics, molecular biology and cell biology. Four options, Animal Biotechnology, Plant Biotechnology, Fermentation/Microbial Biotechnology, and Bioinformatics, provide in-depth training and specialized knowledge in an aspect of biotechnology. Each option has a strong laboratory component to reinforce the theoretical concepts. Students also do an internship in a biotechnology company or university or government laboratory.

Internships and Career Opportunities. In the last decade, more industries are turning to biotechnology to solve problems and improve products, creating a growing job market for individuals trained in biotechnology in the agricultural, food and beverage, health care, chemical, pharmaceutical and biochemical, and environmental and bioremediation industries.

Graduates trained in the technologies designed for biotechnology will find their training applicable to advanced research in molecular biology, genetics, biochemistry, and the plant and animal sciences.

Major Advisor. J.I. Yoder (Plant Sciences) in 101 Asmundson Hall.

Advising Center for the major is located in 1220 Plant and Environmental Sciences; 530-752-1715.

Preparatory Subject Matter **Units:** 57-69

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
BIS 002C	Introduction to Biology: Biodiversity and the Tree of Life	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 002C	General Chemistry	5
CHE 008A	Organic Chemistry: Brief Course	2
CHE 008B	Organic Chemistry: Brief Course	4
OR		
CHE 118A	Organic Chemistry for Health and Life Sciences	4
CHE 118B	Organic Chemistry for Health and Life Sciences	4
CHE 118C	Organic Chemistry for Health and Life Sciences	4
OR		
CHE 128A	Organic Chemistry	3
CHE 128B	Organic Chemistry	3
CHE 128C	Organic Chemistry	3
CHE 129A	Organic Chemistry Laboratory	2
MAT 016A	Short Calculus	3
MAT 016B	Short Calculus	3
OR		
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
PHY 007A	General Physics	4
PHY 007B	General Physics	4
PLS 120	Applied Statistics in Agricultural Sciences	4

OR

STA 100	Applied Statistics for Biological Sciences	4

BIT 001Y	Introduction to Biotechnology	4

Choose one:

May overlap with college composition requirement; may be waived by passing the upper division composition exam.

UWP 101	Advanced Composition	4
UWP 102A	Writing in the Disciplines: Special Topics	4
UWP 102B	Writing in the Disciplines: Biology	4
UWP 102C	Writing in the Disciplines: History	4
UWP 102D	Writing in the Disciplines: International Relations	4
UWP 102E	Writing in the Disciplines: Engineering	4
UWP 102F	Writing in the Disciplines: Food Science and Technology	4
UWP 102G	Writing in the Disciplines: Environmental Writing	4
UWP 102H	Writing in the Disciplines: Human Development and Psychology	4
UWP 102I	Writing in the Disciplines: Ethnic Studies	4
UWP 102J	Writing in the Disciplines: Fine Arts	4
UWP 102K	Writing in the Disciplines: Sociology	4
UWP 102L	Writing in the Disciplines: Film Studies	4
UWP 104A	Writing in the Professions: Business Writing	4
UWP 104B	Writing in the Professions: Law	4
UWP 104C	Writing in the Professions: Journalism	4
UWP 104D	Writing in the Professions: Elementary and Secondary Education	4
UWP 104E	Writing in the Professions: Science	4
UWP 104F	Writing in the Professions: Health	4
UWP 104I	Writing in the Professions: Internships	4
UWP 104T	Writing in the Professions: Technical Writing	4

Depth Subject Matter **Units:** 16-20

BIS 101	Genes and Gene Expression	4
BIS 104	Cell Biology	3
MCB 121	Advanced Molecular Biology	3
BIT 171	Professionalism and Ethics in Genomics and Biotechnology	3

Internship or independent research; choose one:

BIT 189L	Laboratory Research in Genomics and Biotechnology	2-5
BIT 192	Internship in Biotechnology	1-12
BIT 199	Special Study for Advanced Undergraduates	1-5

BIT 188	Undergraduate Research Proposal	3

Optional

Honors undergraduate thesis

Areas of Specialization; choose one: **Units:** 37-45

Fermentation/Microbiology Biotechnology Option

MIC 102	Introductory Microbiology	3
BIS 102	Structure and Function of Biomolecules	3
BIS 103	Bioenergetics and Metabolism	3

OR		
ABI 102	Animal Biochemistry and Metabolism	5
ABI 103	Animal Biochemistry and Metabolism	5
MIC 104L	General Microbiology Laboratory	3
OR		
FST 104L	Food Microbiology Laboratory	4
MCB 160L	Principles of Genetics Laboratory	5
OR		
BIT 161A	Genetics and Biotechnology Laboratory	6

Choose one:

AND

MIC 115	Recombinant DNA Cloning and Analysis	3
MIC 120	Microbial Ecology	3
MIC 140	Bacterial Physiology	3
MIC 150	Genomes of Pathogenic Bacteria	3
MIC 170	Yeast Molecular Genetics	3
PLP 130	Fungal Biotechnology and Biochemistry	3

Choose one from the previous list or below:

BIS 181	Comparative Genomics	3
BIS 183	Functional Genomics	3
MCB 182	Principles of Genomics	3

Restricted Electives

BIS 132	Introduction to Dynamic Models in Modern Biology	4
BIS 181	Comparative Genomics	3
BIS 183	Functional Genomics	3
BIT 150	Applied Bioinformatics	4
BIT 161B	Plant Genetics and Biotechnology Laboratory	4
BIT 188	Undergraduate Research Proposal	3
CHE 107A	Physical Chemistry for the Life Sciences	3
CHE 107B	Physical Chemistry for the Life Sciences	3
CHE 130A	Pharmaceutical Chemistry	3
CHE 130B	Pharmaceutical Chemistry	3
ECH 161C	Biotechnology Facility Design and Regulatory Compliance	4
ECH 161L	Bioprocess Engineering Laboratory	4
ECS 124	Theory and Practice of Bioinformatics	4
ECS 129	Computational Structural Bioinformatics	4
EVE 100	Introduction to Evolution	4
FST 102A	Malting and Brewing Science	4
FST 102B	Practical Malting and Brewing	4
FST 104	Food Microbiology	3
FST 104L	Food Microbiology Laboratory	4
FST 123	Introduction to Enzymology	3
FST 123L	Enzymology Laboratory	2
MIC 105	Microbial Diversity	3
MIC 105L	Microbial Diversity Laboratory	3
MIC 115	Recombinant DNA Cloning and Analysis	3
MIC 120	Microbial Ecology	3
MIC 140	Bacterial Physiology	3
MIC 150	Genomes of Pathogenic Bacteria	3

MIC 155L	Bacterial Physiology Lab	4
MIC 162	General Virology	4
MIC 170	Yeast Molecular Genetics	3
MCB 120L	Molecular Biology and Biochemistry Laboratory	3
MCB 164	Advanced Eukaryotic Genetics	3
MCB 182	Principles of Genomics	3
PLP 130	Fungal Biotechnology and Biochemistry	3
PLP 140	Agricultural Biotechnology and Public Policy	4
PLS 174	Microbiology and Safety of Fresh Fruits and Vegetables	3
VEN 124	Wine Production	2
VEN 124L	Wine Production Laboratory	3
VEN 128	Wine Microbiology	2
VEN 135	Wine Technology and Winery Systems	4

Plant Biotechnology Option

MIC 102	Introductory Microbiology	3
MIC 103L	Introductory Microbiology Laboratory	2
MCB 126	Plant Biochemistry	3
PLS 152	Plant Genetics	4
BIT 160	Principles of Plant Biotechnology	3
BIT 161A	Genetics and Biotechnology Laboratory	6
BIT 161B	Plant Genetics and Biotechnology Laboratory	4
BIS 105	Biomolecules and Metabolism	3
OR		
BIS 102	Structure and Function of Biomolecules	3
BIS 103	Bioenergetics and Metabolism	3
OR		
ABI 102	Animal Biochemistry and Metabolism	5
ABI 103	Animal Biochemistry and Metabolism	5

Restricted Electives

Choose at least one course from each of the following areas:

(a) Pests, Pathogens and Production:

BIS 181	Comparative Genomics	3
BIS 183	Functional Genomics	3
BIT 150	Applied Bioinformatics	4
BIT 188	Undergraduate Research Proposal	3
CHE 130A	Pharmaceutical Chemistry	3
CHE 130B	Pharmaceutical Chemistry	3
ECS 124	Theory and Practice of Bioinformatics	4
ECS 129	Computational Structural Bioinformatics	4
ENT 110	Arthropod Pest Management	5
EVE 100	Introduction to Evolution	4
MIC 115	Recombinant DNA Cloning and Analysis	3
MIC 162	General Virology	4
MCB 120L	Molecular Biology and Biochemistry Laboratory	3
MCB 164	Advanced Eukaryotic Genetics	3
MCB 182	Principles of Genomics	3
NEM 100	General Plant Nematology	4
OR		
NEM 110	Introduction to Nematology	2

PLP 120	Introduction to Plant Pathology	4
PLP 123	Plant-Virus-Vector Interaction	3
PLP 130	Fungal Biotechnology and Biochemistry	3
PLP 140	Agricultural Biotechnology and Public Policy	4
PLB 143	Evolution of Crop Plants	4
PLS 153	Plant, Cell, Tissue and Organ Culture	4
PLS 154	Introduction to Plant Breeding	4
PLS 172	Postharvest Physiology and Technology	4
PLS 173	Molecular and Cellular Aspects of Postharvest Biology	3
PLS 174	Microbiology and Safety of Fresh Fruits and Vegetables	3

(b) Growth and Development:

BIT 150	Applied Bioinformatics	4
BIT 188	Undergraduate Research Proposal	3
CHE 130A	Pharmaceutical Chemistry	3
CHE 130B	Pharmaceutical Chemistry	3
EVE 100	Introduction to Evolution	4
MIC 115	Recombinant DNA Cloning and Analysis	3
MCB 120L	Molecular Biology and Biochemistry Laboratory	3
PLB 105	Developmental Plant Anatomy	5
PLB 111	Plant Physiology	3
PLB 112	Plant Growth and Development	3
PLB 113	Molecular and Cellular Biology of Plants	3
PLP 140	Agricultural Biotechnology and Public Policy	4
PLS 100A	Metabolic Processes of Cultivated Plants	3
PLS 100AL	Metabolic Processes of Cultivated Plants Laboratory	2
PLS 100B	Growth and Yield of Cultivated Plants	3
PLS 100BL	Growth and Yield of Cultivated Plants Laboratory	2
PLS 100C	Environmental Interactions of Cultivated Plants	3
PLS 100CL	Environmental Interactions of Cultivated Plants Laboratory	2
PLS 157	Physiology of Environmental Stresses in Plants	4
PLS 158	Mineral Nutrition of Plants	4

Animal Biotechnology Option

MIC 101	Introductory Microbiology	5
ANG 111	Molecular Biology Laboratory Techniques	4
NPB 101	Systemic Physiology	5
MCB 150	Developmental Biology	4
OR		
MCB 163	Developmental Genetics	3
MCB 182	Principles of Genomics	3
ANS 170	Ethics of Animal Use	4

BIS 105	Biomolecules and Metabolism	3
OR		
BIS 102	Structure and Function of Biomolecules	3
BIS 103	Bioenergetics and Metabolism	3
OR		
ABI 102	Animal Biochemistry and Metabolism	5
ABI 103	Animal Biochemistry and Metabolism	5

Restricted Electives

Choose at least one from each of the following areas:

(a) Animal Cell Biology/Microbiology/Immunology:

BIS 183	Functional Genomics	3
BIT 150	Applied Bioinformatics	4
BIT 161A	Genetics and Biotechnology Laboratory	6
BIT 161B	Plant Genetics and Biotechnology Laboratory	4
BIT 188	Undergraduate Research Proposal	3
EVE 100	Introduction to Evolution	4
MMI 188	Human Immunology	3
MIC 115	Recombinant DNA Cloning and Analysis	3
MIC 162	General Virology	4
MCB 120	Molecular Biology and Biochemistry Laboratory Associated Lecture	3
MCB 160L	Principles of Genetics Laboratory	5
PMI 126	Fundamentals of Immunology	3
PMI 126L	Immunology Laboratory	2
PMI 127	Medical Bacteria and Fungi	3
PMI 128	Biology of Animal Viruses	3
MCP 200L	Animal Cell Culture Laboratory	4
NPB 132	Nature vs. Nurture: Physiological Interactions Among Genes, Nutrients and Health	3
PLP 140	Agricultural Biotechnology and Public Policy	4

(b) Animal Reproduction and Breeding:

ANG 107	Genetics and Animal Breeding	5
ANS 131	Reproduction and Early Development in Aquatic Animals	4
ANS 140	Management of Laboratory Animals	4
AVS 121	Avian Reproduction	2
BIS 181	Comparative Genomics	3
EVE 102	Population and Quantitative Genetics	4
MCB 164	Advanced Eukaryotic Genetics	3
NPB 121	Physiology of Reproduction	4
NPB 121L	Physiology of Reproduction Laboratory	1
PLP 140	Agricultural Biotechnology and Public Policy	4

Bioinformatics Option

BIS 180L	Genomics Laboratory	5
BIS 181	Comparative Genomics	3
OR		
BIS 183	Functional Genomics	3

MIC 101	Introductory Microbiology	5
ECS 020	Discrete Mathematics For Computer Science	4
ECS 030	Programming and Problem Solving (Discontinued)	4
ECS 124	Theory and Practice of Bioinformatics	4
OR		
ECS 129	Computational Structural Bioinformatics	4
MCB 182	Principles of Genomics	3
BIS 105	Biomolecules and Metabolism	3
OR		
BIS 102	Structure and Function of Biomolecules	3
BIS 103	Bioenergetics and Metabolism	3
OR		
ABI 102	Animal Biochemistry and Metabolism	5
ABI 103	Animal Biochemistry and Metabolism	5

Restricted Electives

ANG 212	Sequence Analysis in Molecular Genetics	2
BIS 132	Introduction to Dynamic Models in Modern Biology	4
BIS 181	Comparative Genomics	3
BIS 183	Functional Genomics	3
BIT 188	Undergraduate Research Proposal	3
ECS 040	Software Development and Object-Oriented Programming (Discontinued)	4
ECS 050	Computer Organization and Machine-Dependent Programming	4
ECS 060	Data Structures and Programming (Discontinued)	4
ECS 122A	Algorithm Design and Analysis	4
ECS 124	Theory and Practice of Bioinformatics	4
ECS 129	Computational Structural Bioinformatics	4
ECS 140A	Programming Languages	4
ECS 150	Operating Systems and System Programming	4
ECS 154A	Computer Architecture	4
EVE 100	Introduction to Evolution	4
EVE 102	Population and Quantitative Genetics	4
EVE 103	Phylogeny, Speciation and Macroevolution	4
MAT 124	Mathematical Biology	4
MIC 115	Recombinant DNA Cloning and Analysis	3
NPB 132	Nature vs. Nurture: Physiological Interactions Among Genes, Nutrients and Health	3
STA 130A	Mathematical Statistics: Brief Course	4
STA 130B	Mathematical Statistics: Brief Course	4
STA 131A	Introduction to Probability Theory	4
STA 131B	Introduction to Mathematical Statistics	4

Total: 110-135

Biotechnology | BIT Courses

Courses in BIT:

BIT 001Y—Introduction to Biotechnology (4)
Discussion—1 hour; Lecture—2 hours; Web Virtual Lecture—1 hour. Principles and technologies of biotechnology as applied to agriculture, the environment, and medicine. Business plans and presentation pitches for new biotechnology products. Bioinformatics approaches exploring genomic databases and DNA manipulations in silica. (BIT 001.) GE credit: SE. Effective: 2014 Spring Quarter.

BIT 091—Undergraduate Seminars in Biotechnology (1)
Seminar—1 hour. Undergraduate oriented seminar series focused on biotechnology research and product development. Speakers from campus and the private sectors discuss ongoing research, product development and biotechnology careers. (P/NP grading only.) Effective: 2017 Winter Quarter.

BIT 092—Internship in Biotechnology (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Work experience on or off campus in subject area pertaining to biotechnology or in a business, industry or agency associated with biotechnology. Internship supervised by faculty member in the animal or plant sciences. (P/NP grading only.) Effective: 1998 Fall Quarter.

BIT 098—Directed Group Study (1-5)
Variable—1-15 hours. Prerequisite(s): Consent of Instructor. Directed group study. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 2016 Fall Quarter.

BIT 099—Special Study for Undergraduates (1-5)
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1998 Fall Quarter.

BIT 150—Applied Bioinformatics (4)
Discussion/Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): BIS 101; (ECS 010 or ECS 015 or PLS 021); (PLS 120 or STA 013 or STA 013Y or STA 100); or Consent of Instructor. Limited enrollment. Concepts and programs needed to apply bioinformatics in biotechnology research. Sequence analysis and annotation and use of plant and animal databases for students in biological and agricultural sciences. Two units of credit for students who have completed ECS 124. GE credit: SE, VL. Effective: 2018 Spring Quarter.

BIT 160—Principles of Plant Biotechnology (3)
Lecture—3 hours. Prerequisite(s): (BIS 001A or BIS 002A); (BIS 101 or PLS 152) Principles and concepts of plant biotechnology including recombinant DNA technology, molecular biology, genomics, cell and tissue culture, gene transfer and crop improvement strategies using transgenic crops. Not open for credit to students who have completed PLB 160. (Former course PLB 160.). GE credit: SE. Effective: 2008 Winter Quarter.

BIT 161A—Genetics and Biotechnology Laboratory (6)
Laboratory—9 hours; Lecture—3 hours. Prerequisite(s): PLS 152 or BIS 101; and Consent of Instructor. Techniques of genetic analysis at the molecular level including recombinant DNA, gene mapping and basic computational biology. Not open for credit to students who have completed PLB 161A. GE credit: SE. Effective: 2010 Winter Quarter.

BIT 161B—Plant Genetics and Biotechnology Laboratory (4)
Laboratory—8 hours; Lecture—1 hour. Prerequisite(s): PLS 152 or BIS 101; and Consent of Instructor. Advanced techniques of genetic analysis at the molecular and cellular levels, including transformation, gene expression and analysis of transgenic plants. Not open for credit to students who have taken PLB 161B. (Former course PLB 161B.). GE credit: SE, SL. Effective: 2011 Fall Quarter.

BIT 171—Professionalism and Ethics in Genomics and Biotechnology (3)
Discussion—2 hours; Lecture—1 hour. Prerequisite(s): Upper division standing in a natural science major. Real and hypothetical case studies to illustrate ethical issues in genomics and biotechnology. Training and practice in difficult ethical situations and evaluating personal and social consequences. GE credit: SE, SL, WE. Effective: 2005 Winter Quarter.

BIT 188—Undergraduate Research Proposal (3)
Lecture/Discussion—3 hours. Prerequisite(s): Upper division standing. Preparation and review of a scientific proposal. Problem definition, identification of objectives, literature survey, hypothesis generation, design of experiments, data analysis planning, proposal outline and preparation. (PLS 188.) GE credit: OL, SE, WE. Effective: 2009 Spring Quarter.

BIT 189L—Laboratory Research in Genomics and Biotechnology (2-5)
Discussion—1 hour; Laboratory—3-12 hours. Prerequisite(s): BIT 188; and Consent of Instructor. Formulating experimental approaches to current questions in biotechnology; performance of proposed experiments. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2000 Spring Quarter.

BIT 192—Internship in Biotechnology (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Work experience on or off campus in a subject area pertaining to biotechnology or in a business, industry or agency associated with biotechnology. Internship supervised by faculty member in the animal or plant sciences. (P/NP grading only.) Effective: 1998 Fall Quarter.

BIT 194H—Honors Thesis in Biotechnology (1-2)
Independent Study—3-6 hours. Prerequisite(s): BIT 188; BIT 189L; Consent of Instructor. Senior standing in Biotechnology with 3.250 GPA or higher. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis. (P/NP grading only.) GE credit: SE, WE. Effective: 2016 Winter Quarter.

BIT 198—Directed Group Study (1-5)
Variable—1-15 hours. Prerequisite(s): Consent of Instructor. Directed group study. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 2016 Fall Quarter.

BIT 199—Special Study for Advanced Undergraduates (1-5)
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1998 Fall Quarter.

Biotechnology | DEB Courses

Courses in DEB:

DEB 263—Biotechnology Fundamentals and Application (2)
Lecture—2 hours. Prerequisite(s): BIS 101; BIS 102; MIC 102; or Consent of Instructor. Must be a graduate student in good standing. Fundamentals of molecular biology and chemical engineering involved in recombinant DNA technology. Topics: principles of rate processes of biological systems, optimization of bioreactors, and issues related to overexpression and production of recombinant molecules. Participation in student-directed team projects. Effective: 2016 Winter Quarter.

DEB 282—Biotechnology Internship (7-12)
Internship—21-36 hours. Prerequisite(s): Graduate standing and Consent of Instructor. Open only to students participating in the Designated Emphasis in Biotechnology program. Research at a biotechnology company or interdisciplinary cross-college lab for a minimum of 3 months as part of the Designated Emphasis in Biotechnology Program. (S/U grading only.) Effective: 2017 Winter Quarter.

DEB 294—Current Progress in Biotechnology (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Seminars presented by guest lecturers on subjects of their own research activities. May be repeated for credit. (ECH 294.) (S/U grading only.) Effective: 2018 Winter Quarter.

Business Analytics; Graduate School of Management

Business Analytics; Graduate School of Management | Business Analytics Information

Ann Huff Stevens, Ph.D., Interim Dean

Kimberly D. Elsbach, Ph.D., Associate Dean

Brad M. Barber, Ph.D., Associate Dean

James T. Kelly, M.B.A., Assistant Dean

James Stevens, M.B.A., Senior Assistant Dean

School Office. Gallagher Hall; 530-752-7658; http://gsm.ucdavis.edu/

Faculty. http://gsm.ucdavis.edu/faculty-and-research-0

The UC Davis Master of Science in Business Analytics program is designed to prepare you to thrive as an innovative leader in the digital economy.

Capital Area North Doctorate in Education Leadership (CANDEL) Education (Graduate Group)

Capital Area North Doctorate in Education Leadership (CANDEL) Education (Graduate Group) | CANDEL Ed.D.

(School of Education)

School of Education Building; 530-752-0757; http://education.ucdavis.edu

Faculty. https://education.ucdavis.edu/candel-program-faculty

The Capital Area North Doctorate in Educational Leadership (CANDEL) program leading to a Doctor of Education (Ed.D.) degree, is intended primarily for working professionals in schools, community colleges, and related educational capacities that reside in the greater Sacramento Valley, Bay Area, and Northern California. Graduates of this program will be prepared to lead in educational environments that promote learning, equity and achievement for all students. Armed with both real-world, problem-based learning, and scholarship skills, program graduates will be uniquely ready to manage the complexities of educational organizations, effect school change processes and shape the educational policies that bear on the practice of education in the public setting.

Cell Biology; Molecular & Cellular Biology

Cell Biology; Molecular & Cellular Biology | Cell Biology B.S.

(College of Biological Sciences)

Jodi Nunnari, Ph.D., Professor, Chairperson of the Department

Department Office. 149 Briggs Hall; 530-752-3611; http://www.mcb.ucdavis.edu

Faculty. http://biosci3.ucdavis.edu/Faculty/Profile/FacultyByDept/MCB

The Cell Biology Major Program

The Cell Biology major provides students with a comprehensive understanding of the cell, the basic structural and functional unit of all living organisms.

The Program. To understand living organisms, the biologist must understand the cell. Hence, cell biology lies at the core of the biological sciences. Students taking this major gain a solid foundation in biological principles. The major emphasizes how cellular organization and function contribute to the development, maintenance and reproduction of adult organisms. The major illustrates the ways in which principles derived from the physical sciences, genetics, biochemistry, molecular biology and physiology are integrated in the study of living cells and emphasizes the experimental nature of the study of cell biology.

Career Alternatives. The major provides an excellent background for students wishing to enter postgraduate and professional programs in biological, health sciences or veterinary sciences; for

students pursuing careers involving teaching or research in the biological sciences; for students interested in careers in the biotechnological or pharmaceutical industries; or for students interested in careers related to the administrative, legal or commercial aspects of biomedical science.

Master Advisor. F.J. McNally

Advising. Biology Academic Success Center (BASC); 1023 Sciences Laboratory Building; 530-752-0410; http://www.biosci.ucdavis.edu/BASC.

Graduate Study. See Biochemistry, Molecular, Cellular, and Developmental Biology (Graduate Group).

Preparatory Subject Matter **Units:** 56-66

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
BIS 002C	Introduction to Biology: Biodiversity and the Tree of Life	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 002C	General Chemistry	5
OR		
CHE 003A	Chemistry for Life Sciences: Determining Structure and Predicting Properties	5
CHE 003B	Chemistry for Life Sciences: Predicting and Characterizing Chemical Change	5
CHE 003C	Chemistry for Life Sciences: Controlling Processes and Synthetic Pathways	5
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
MAT 017C	Calculus for Biology and Medicine	4
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021C recommended.		
PHY 007A	General Physics	4
PHY 007B	General Physics	4
PHY 007C	General Physics	4
CHE 008A	Organic Chemistry: Brief Course	2
CHE 008B	Organic Chemistry: Brief Course	4
OR		
CHE 118A	Organic Chemistry for Health and Life Sciences	4
CHE 118B	Organic Chemistry for Health and Life Sciences	4
recommended		
CHE 118C	Organic Chemistry for Health and Life Sciences	4

Depth Subject Matter **Units:** 44-49

BIS 101	Genes and Gene Expression	4
BIS 102	Structure and Function of Biomolecules	3
BIS 103	Bioenergetics and Metabolism	3
BIS 104	Cell Biology	3

STA 100	Applied Statistics for Biological Sciences	4
OR		
STA 130A	Mathematical Statistics: Brief Course	4
STA 130B	Mathematical Statistics: Brief Course	4
MCB 140L	Cell Biology Laboratory	5

Choose two:

MCB 143	Cell and Molecular Biophysics	3
MCB 144	Mechanisms of Cell Division	3
MCB 145	Assembly and Function of Cell Signaling Machinery	3
MCB 121	Advanced Molecular Biology	3
MCB 150	Developmental Biology	4
OR		
MCB 163	Developmental Genetics	3

Choose at least 10 units:

CHE 107A	Physical Chemistry for the Life Sciences	3
CHE 107B	Physical Chemistry for the Life Sciences	3
EVE 100	Introduction to Evolution	4
EVE 150	Evolution of Animal Development	3
MIC 101	Introductory Microbiology	5
MIC 102	Introductory Microbiology	3
MIC 103L	Introductory Microbiology Laboratory	2
MIC 150	Genomes of Pathogenic Bacteria	3
MIC 170	Yeast Molecular Genetics	3
MCB 120	Molecular Biology and Biochemistry Laboratory Associated Lecture	3
MCB 120L	Molecular Biology and Biochemistry Laboratory	3
MCB 123	Behavior and Analysis of Enzyme and Receptor Systems	3
MCB 124	Macromolecular Structure and Function	4
MCB 126	Plant Biochemistry	3
MCB 138	Undergraduate Seminar in Biochemistry	1
MCB 139	Undergraduate Seminar in Biochemistry	2
MCB 143	Cell and Molecular Biophysics	3
MCB 144	Mechanisms of Cell Division	3
MCB 145	Assembly and Function of Cell Signaling Machinery	3
MCB 148	Undergraduate Seminar in Cell Biology	2
MCB 150	Developmental Biology	4
MCB 158	Undergraduate Seminar in Developmental Biology	2
MCB 160L	Principles of Genetics Laboratory	5
MCB 162	Human Genetics and Genomics	3
MCB 163	Developmental Genetics	3
MCB 164	Advanced Eukaryotic Genetics	3
MCB 178	Undergraduate Seminar in Molecular Genetics	1
MCB 182	Principles of Genomics	3
MCB 191	Introduction to Research	1
NPB 100	Neurobiology	4
NPB 101	Systemic Physiology	5
NPB 103	Cellular Physiology/Neurobiology	3
NPB 161	Developmental Neurobiology	3
PMI 126	Fundamentals of Immunology	3
PMI 126L	Immunology Laboratory	2

PMI 128	Biology of Animal Viruses	3
PLB 111	Plant Physiology	3
PLB 111D	Problems in Plant Physiology	1
PLB 113	Molecular and Cellular Biology of Plants	3
PLB 113D	Problems in Molecular and Cellular Biology of Plants	1
MMI 188	Human Immunology	3

No more than four units of research (193, 194H, 199) may be used for credit in this category.

Total: 100-115

Cell Biology; Molecular & Cellular Biology | MCB Courses

Courses in MCB:

MCB 010—Introduction to Human Heredity (4)
Discussion—1 hour; Lecture—3 hours. Topics in human heredity and human gene structure and function, including the genetic basis of human development, causes of birth defects, mental retardation, genetic diseases, sexual determination, development, and behavior. GE credit: QL, SE, SL. Effective: 2004 Spring Quarter.

MCB 023—Biography of Cancer: Past, Present and Future (3)
Lecture/Discussion—3 hours. Historical account of the progression of cancer treatment, prevention, and human understanding of the biological basis of cancer. Past, present and future social implications of cancer treatment and prevention. GE credit: ACGH, SE, SL, SS, WE. Effective: 2018 Spring Quarter.

MCB 099—Special Study (1-5)
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

MCB 110Y—iBioseminars in Cell and Molecular Biology (3)
Lecture/Discussion—2 hours; Web Electronic Discussion—1.5 hours; Web Virtual Lecture—1.5 hours. Prerequisite(s): BIS 101; BIS 102; (BIS 103 or BIS 105); BIS 104 Hybrid course in Cell and Molecular Biology for senior level (1) Biochemistry/Molecular Biology; (2) Genetics; or (3) Cell Biology majors. Face-to-face instruction combined with online lectures available at iBioseminars website delivered by leading researchers in Cell and Molecular Biology. Students who have previously taken MCB 110V cannot receive credit for MCB 110Y. GE credit: SE, SL. Effective: 2014 Fall Quarter.

MCB 120—Molecular Biology and Biochemistry Laboratory Associated Lecture (3)
Discussion/Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): BIS 102; or Consent of Instructor. Pass One restricted to upper division Biochemistry & Molecular Biology majors; concurrent enrollment in MCB 120L required; on-time attendance for first lecture is mandatory. Introduction to laboratory methods and procedures employed in studying molecular biology and biochemical processes. Lecture component for MCB 120L. GE credit: SE, SL. Effective: 2018 Winter Quarter.

MCB 120L—Molecular Biology and Biochemistry Laboratory (3)
Laboratory—10 hours. Prerequisite(s): BIS 102; or Consent of Instructor. Must be taken concurrently with MCB 120. Pass One restricted to upper division Biochemistry & Molecular Biology majors; concurrent enrollment in MCB 120 required; on-time attendance for first lab is mandatory. Introduction to laboratory methods and procedures employed in studying molecular biology and biochemical processes. Designed for students who need experience in use of molecular biology and biochemical techniques as research and analytical tools. GE credit: QL, SE, VL, WE. Effective: 2018 Winter Quarter.

MCB 121—Advanced Molecular Biology (3)
Lecture—3 hours. Prerequisite(s): BIS 101; (BIS 102 (can be concurrent) or BIS 105 (can be concurrent) or ABI 102 (can be concurrent)); BIS 102 or BIS 105 or ABI 102 can be concurrent although prior completion is recommended. Structure, expression, and regulation of eukaryotic genes. Chromosome structure and replication; gene structure, transcription, and RNA processing; protein synthesis and translation control; development, immune system, and oncogenes. Not open for credit to students who have completed MCB 161. GE credit: QL, SE, SL. Effective: 2014 Fall Quarter.

MCB 123—Behavior and Analysis of Enzyme and Receptor Systems (3)
Lecture—3 hours. Prerequisite(s): BIS 103 Introduction to the principles of enzyme kinetics and receptor-ligand interactions with emphasis on metabolic regulation and data analysis. Topics include simultaneous equilibria, chemical and steady-state kinetics, allosteric enzymes, mulitreactant systems, enzyme assays, membrane transport and computer-assisted simulations and analyses. GE credit: QL, SE. Effective: 1997 Winter Quarter.

MCB 124—Macromolecular Structure and Function (4)
Lecture—4 hours. Prerequisite(s): BIS 103; CHE 118C An in-depth investigation into protein and nucleic acid structure and thermodynamics and how these properties influence their biological functions. Key examples of important functional classes of these molecules will be examined. Not open for credit to students who have completed MCB 122 or CHE 108. GE credit: SE. Effective: 2012 Fall Quarter.

MCB 126—Plant Biochemistry (3)
Lecture—3 hours. Prerequisite(s): BIS 103 or BIS 105 The biochemistry of important plant processes and metabolic pathways. Discussion of methods used to understand plant processes, including use of transgenic plants. (Plant Biology 126.) GE credit: SE, SL. Effective: 2008 Spring Quarter.

MCB 138—Undergraduate Seminar in Biochemistry (1)
Seminar—1 hour. Prerequisite(s): BIS 103 Discussion of the historical developments of modern biochemistry or current major research problems. May be repeated twice for credit when topic differs. May be repeated up to 2 time(s). (P/NP grading only.) GE credit: OL, SE. Effective: 1997 Winter Quarter.

MCB 139—Undergraduate Seminar in Biochemistry (2)
Seminar—2 hours. Prerequisite(s): BIS 103 Discussion of the historical developments of modern biochemistry or current major research problems. May be repeated up to 2 time(s) when topic differs. (P/NP grading only.) GE credit: OL, SE. Effective: 2015 Spring Quarter.

MCB 140—Cell Biology Laboratory Associated Lecture (3)
Discussion/Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): BIS 104; or Consent of Instructor. Pass One restricted to upper division Cell Biology majors; concurrent enrollment in MCB 140L required; on-time attendance for first lecture is mandatory. Lectures illustrating the principles of cell biology with emphasis on light microscopy. Accompanies MCB 140L. GE credit: OL, SE, SL, WE. Effective: 2018 Winter Quarter.

MCB 140L—Cell Biology Laboratory (5)
Discussion—1 hour; Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): BIS 104 (can be concurrent) Exercises illustrating the principles of cell biology with emphasis on light microscopy. GE credit: OL, QL, SE, SL, VL. Effective: 2009 Winter Quarter.

MCB 142—Advanced Cell Biology: Contractile and Motile Systems (4)
Lecture—3 hours; Term Paper. Prerequisite(s): BIS 102; BIS 104 (can be concurrent); MAT 016B Advanced cell biology with emphasis on molecular, biophysical and cellular properties of contractile and motile systems. GE credit: SE. Effective: 1998 Spring Quarter.

MCB 143—Cell and Molecular Biophysics (3)
Lecture—3 hours. Prerequisite(s): BIS 101; BIS 102; BIS 103; BIS 104 Physical chemical principles by which molecules form living, moving, reproducing cells. Physical nature of cytoplasm; molecular structure/bonding in macromolecules, macromolecular assemblies and protein machines. Physical techniques and modeling of cytoskeletal polymer-motor dynamics and function during intracellular transport, mitosis and motility. GE credit: QL, SE. Effective: 2008 Fall Quarter.

MCB 144—Mechanisms of Cell Division (3)
Lecture—3 hours. Prerequisite(s): BIS 101; BIS 102; BIS 104 The molecules and mechanisms that allow eukaryotic cells to coordinate cell growth, DNA replication, segregation of chromosomes and cell division. GE credit: SE, WE. Effective: 2002 Winter Quarter.

MCB 145—Assembly and Function of Cell Signaling Machinery (3)
Lecture—3 hours. Prerequisite(s): BIS 101; BIS 102; BIS 104 Molecular basis of cell signaling, including positioning of cellular machinery, components of various signaling pathways, and downstream effects of signaling on cell adhesion, cell differentiation, and programmed cell death. GE credit: SE. Effective: 2002 Spring Quarter.

MCB 148—Undergraduate Seminar in Cell Biology (2)
Seminar—2 hours. Prerequisite(s): Upper division standing in the biological sciences or a related discipline. Student reports on current topics in cell biology with emphasis on integration of concepts, synthesis, and state-of-the-art research approaches. Reviews of literature and reports of undergraduate research may be included. May be repeated for credit. (P/NP grading only.) GE credit: OL, SE. Effective: 1997 Winter Quarter.

MCB 150—Developmental Biology (4)
Lecture—4 hours. Prerequisite(s): BIS 101 Analysis of the mechanistic basis for animal development with a focus on experimental evidence and the relevant fundamental experimental strategies. Fertilization and early development, morphogenesis and patterning, cell differentiation, regulation of cell proliferation and tissue growth. GE credit: SE, SL. Effective: 2012 Fall Quarter.

MCB 158—Undergraduate Seminar in Developmental Biology (2)
Seminar—2 hours. Prerequisite(s): Upper division standing in the biological sciences or a related discipline. Student reports on current topics in cell biology with emphasis on integration of concepts, synthesis, and state-of-the-art research approaches. Reviews of literature and reports of undergraduate research may be included. May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: OL, SE. Effective: 1997 Winter Quarter.

MCB 160—Genetics Laboratory Associated Lecture (3)
Discussion/Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): BIS 101; or Consent of Instructor. Pass One restricted to upper division Genetics and Genomics majors; concurrent enrollment in MCB 160L required; on-time attendance for first lecture is mandatory. Lecture instruction in the theoretical basis of laboratory techniques in transmission and molecular genetics, discussion of lab results and experiment interpretation. GE credit: QL, SE, WE. Effective: 2018 Winter Quarter.

MCB 160L—Principles of Genetics Laboratory (5)
Discussion/Laboratory—1 hour; Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): BIS 101 Laboratory work in basic and molecular genetics including gene mapping, isolation and characterization of mutants in eukaryotic model systems, reverse genetics, gel electrophoresis, recombinant DNA techniques, and PCR. GE credit: QL, SE, VL, WE. Effective: 2012 Fall Quarter.

MCB 162—Human Genetics and Genomics (3)
Lecture—3 hours. Prerequisite(s): BIS 101 The human genome and genetic variation in human populations, molecular and genomic approaches in the practice of human genetics, epigenetic gene regulation, personal genetics and genomic medicine. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

MCB 163—Developmental Genetics (3)
Lecture—3 hours. Prerequisite(s): MCB 121 (can be concurrent) Current aspects of developmental genetics. Historical background and current genetic approaches to the study of development of higher animals. GE credit: SE. Effective: 2017 Fall Quarter.

MCB 164—Advanced Eukaryotic Genetics (3)
Lecture—3 hours. Prerequisite(s): MCB 121 Five basic operations of genetic analysis: mutation, segregation, recombination, complementation, and regulation. Emphasis on the theory and practice of isolating and analyzing mutations, as well as understanding mechanisms underlying both Mendelian and epigenetic inheritance. GE credit: SE, SL. Effective: 2011 Fall Quarter.

MCB 178—Undergraduate Seminar in Molecular Genetics (1)
Seminar—1 hour. Prerequisite(s): BIS 101; MCB 121 (can be concurrent); Upper division standing, and completion or concurrent enrollment in MCB 121. Discussion of current topics in molecular genetics to show advanced applications of basic principles and to highlight professional career opportunities. May be repeated up to 1 time(s) when topic differs. (P/NP grading only.) GE credit: OL, SE. Effective: 2011 Fall Quarter.

MCB 182—Principles of Genomics (3)
Lecture—3 hours. Prerequisite(s): BIS 101 Fundamentals of genomics, including structural genomics, functional genomics, proteomics, and bioinformatics, focusing on the impact of these disciplines on research in the biological sciences. Social impacts of genomic research. GE credit: SE. Effective: 2017 Winter Quarter.

MCB 190C—Undergraduate Research Conference (1)
Discussion—1 hour. Prerequisite(s): MCB 193 (can be concurrent) or MCB 199 (can be concurrent); and Consent of Instructor. Upper division standing; MCB 193 or MCB 199 required concurrently. Presentation and discussion of current research by faculty and students. May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

MCB 191—Introduction to Research (1)
Seminar—1 hour. Prerequisite(s): BIS 102 (can be concurrent); or Consent of Instructor. Various topics in molecular and cellular biology including biochemistry, genetics, and cell biology will be discussed, along with ways undergraduates can participate in research projects of faculty members. May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

MCB 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Technical and/or practical experience on and off campus, supervised by a member of the Section of Molecular and Cellular Biology faculty. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

MCB 193—Advanced Research (3)
Discussion—1 hour; Laboratory—6 hours. Prerequisite(s): Consent of Instructor. Upper division standing, completion of an upper division Molecular and Cellular Biology laboratory course. Research project carried out under the supervision of a faculty sponsor.
Discussion and analysis of results and proposed experiments on a weekly basis with faculty sponsor. May include presentation of a seminar to a research group.May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

MCB 194—Thesis Research (3)
Independent Study—9 hours. Prerequisite(s): Consent of Instructor. 6 units of course 193 and/or 199 with faculty director; senior standing. Continuation of an intensive, individual laboratory research project in biochemistry, genetics, or cell biology culminating with the presentation of the work in a written thesis and in a seminar. (P/NP grading only.) GE credit: OL, SE, WE. Effective: 2015 Fall Quarter.

MCB 194H—Research Honors (3)
Independent Study—9 hours. Prerequisite(s): Consent of Instructor. 6 units of MCB 193 and/or MCB 199 with faculty director; senior standing; GPA of at least 3.250. Honors project. Continuation of an intensive, individual laboratory research project in biochemistry, genetics, or cell biology culminating with the presentation of the work in a written thesis and in a seminar. (P/NP grading only.) GE credit: OL, SE, WE. Effective: 1997 Winter Quarter.

MCB 197T—Tutoring in Molecular and Cellular Biology (1-5)
Tutorial—2-6 hours. Prerequisite(s): Consent of Instructor. Upper division standing, completion of course to be tutored. Assisting the instructor in one of the section's regular courses by tutoring individual or small groups of students in a laboratory, in voluntary discussion groups, or other voluntary course activities. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 2004 Fall Quarter.

MCB 198—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

MCB 199—Special Study for Advanced Undergraduates (1-5)
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

MCB 248—Seminar in Cell Biology (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. Discussion of recent literature on the physical and chemical aspects of organization and function of living systems, topics of current interest in ultrastructure and function of cells. Organizational and functional
properties of the molecular and cellular levels of biological systems. May be repeated for credit. Effective: 1997 Winter Quarter.

MCB 258—Seminar in Development (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. Reports and discussion on embryology, morphogenesis, and developmental mechanisms. May be repeated for credit. May be repeated for credit. Effective: 1997 Winter Quarter.

MCB 259—Literature in Developmental Biology (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Critical presentation and analysis of recent journal articles in developmental biology. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

MCB 282—Biotechnology Internship (7-12)
Internship—21-36 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Open only to students participating in the Designated Emphasis in Biotechnology program. Research at a biotechnology company or interdisciplinary cross-college lab for a minimum of 3 months as part of the Designated Emphasis in Biotechnology Program. (S/U grading only.) Effective: 2004 Winter Quarter.

MCB 290C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Presentations and critical discussions of faculty and graduate student research in molecular and cellular biology including biochemistry,
genetics, and cell biology. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

MCB 291—Current Progress in Molecular and Cellular Biology (1)
Seminar—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Seminars presented by guest lecturers on subject of their own research activities. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

MCB 295—Literature in Molecular and Cellular Biology (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Critical reading and evaluation of current literature in molecular and cellular biology disciplines. Papers will be presented and discussed in detail. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

MCB 298—Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

MCB 299—Research (1-12)
Independent Study—3-36 hours. (S/U grading only.) Effective: 1997 Winter Quarter.

MCB 390—Methods of Teaching (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Practical experience in the methods and problems of teaching biochemistry/genetics/cell biology.Includes analysis of texts and
supporting material,discussion of teaching techniques, preparing for and conducting discussion and laboratory sections,formulating examinations under supervision of instructor.Participating in the teaching program required for Ph.D. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

Chemical Engineering; Engineering

Chemical Engineering; Engineering | ECH Information

(College of Engineering)

Roland Faller, Ph.D., Chairperson of the Department; 530-752-6496; Fax 530-752-1031

Department Office. 3001 Ghausi Hall; Fax 530-752-1031; http://che.engineering.ucdavis.edu/

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Chemical Engineering; Engineering | ECH B.S.

(College of Engineering)

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The Department of Chemical Engineering offers two undergraduate programs: Chemical Engineering and Biochemical Engineering.

Mission Statement. To advance, through teaching and research programs, the frontiers of chemical and biochemical engineering; to educate students with a sense of professionalism and community; and to serve the public of California through outreach efforts.

Honors Program. An Honors Program is available to qualified students in the Chemical Engineering and Biochemical Engineering majors. It is a two-year program designed to challenge the most talented students in these majors. Students are invited to participate in their sophomore year. In the upper division, students will complete either an honors thesis or a project that might involve local industry. Students must maintain a grade point average of 3.500 to continue in the program. Successful completion of the Honors Program will be acknowledged on the student's transcript.

Chemical Engineering Undergraduate Program

The Chemical Engineering program is accredited by the Engineering Accreditation Commission of ABET; see http://www.abet.org.

Chemical engineers apply the principles of chemistry and engineering to produce useful commodities, ranging from fuels to polymers. Chemical engineers are increasingly concerned with chemical and engineering processes related to the environment and food production. They work in diverse areas ranging from integrated circuits to integrated waste management. Preparation for a career in chemical engineering requires an understanding of both engineering and chemical principles to develop proficiency in conceiving, designing, and operating new processes.

The chemical engineering curriculum has been planned to provide a sound knowledge of engineering and chemical sciences so that you may achieve competence in addressing current and future technical problems.

Objectives. The objectives of the program in Chemical Engineering are to educate students in the fundamentals of chemical engineering, balanced with the application of these principles to practical problems; to train them as independent, critical thinkers who can also function effectively in teams; to foster a sense of community, ethical responsibility, and professionalism; to prepare them for careers in industry, government, and academia; to illustrate the necessity for continuing education and self-learning; and to help students to learn to communicate proficiently in written and oral form.

Students are encouraged to adhere carefully to all prerequisite requirements. The instructor is authorized to drop students from a course for which stated prerequisites have not been completed.

Exclusive of General Education units, the minimum number of units required for the Chemical Engineering major is 156.

Options for Junior and Senior Year. The focus in the junior year is on fundamentals such as thermodynamics, fluid mechanics, energy transfer, and mass transfer phenomena. In the senior year, students draw these fundamentals together and apply them in a study of kinetics, process design, and process dynamics and control. The program's requirement of eight chemical engineering elective units allow students to strengthen specific areas in chemical engineering, explore new areas, or pursue new areas of specialization.

Lower Division Required Courses **Units:** 76-77

MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3
MAT 022B	Differential Equations	3
PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 002C	General Chemistry	5
OR		
CHE 002AH	Honors General Chemistry	5
CHE 002BH	Honors General Chemistry	5
CHE 002CH	Honors General Chemistry	5
ECH 005	Introduction to Analysis and Design in Chemical Engineering	3
ECH 051	Material Balances	4
ECH 060	Engineering Problem Solving Using MATLAB	4
ECH 080	Chemical Engineering Profession	1

Choose one:

ENG 017	Circuits I	4
ENG 035	Statics	4
ENG 045	Properties of Materials	4
ENG 045Y	Properties of Materials	4

Choose one:

BIT 001	Introduction to Biotechnology (Discontinued)	4
BIT 001Y	Introduction to Biotechnology	4
BIS 002A	Introduction to Biology: Essentials of Life on Earth	5

Choose one; a grade of C- or better is required:

ENL 003	Introduction to Literature	4
UWP 001	Expository Writing	4
UWP 001V	Expository Writing	4
UWP 001Y	Expository Writing	4
COM 001	Major Books of Western Culture: The Ancient World	4
COM 002	Major Books of Western Culture: From the Middle Ages to the Enlightenment	4
COM 003	Major Books of Western Culture: The Modern Crisis	4
COM 004	Major Books of the Contemporary World	4
NAS 005	Introduction to Native American Literature	4

Upper Division Required Courses **Units:** 80-84

ECH 140	Mathematical Methods in Biochemical and Chemical Engineering	4
ECH 141	Fluid Mechanics for Biochemical and Chemical Engineers	4
ECH 142	Heat Transfer for Biochemical and Chemical Engineers	4
ECH 143	Mass Transfer for Biochemical and Chemical Engineers	4
ECH 145A	Chemical Engineering Thermodynamics Laboratory	3
ECH 145B	Chemical Engineering Transport Lab	3
ECH 148A	Chemical Kinetics and Reaction Engineering	3
ECH 148B	Chemical Kinetics and Reaction Engineering	4
ECH 152A	Chemical Engineering Thermodynamics	3
ECH 152B	Chemical Engineering Thermodynamics	4
ECH 155	Chemical Engineering Kinetics and Reactor Design Laboratory	4
ECH 157	Process Dynamics and Control	4
ECH 158A	Process Economics and Green Design	4
ECH 158B	Separations and Unit Operations	4
ECH 158C	Plant Design Project	4
CHE 110A	Physical Chemistry: Introduction to Quantum Mechanics	4
CHE 110B	Physical Chemistry: Properties of Atoms and Molecules	4
CHE 128A	Organic Chemistry	3
CHE 128B	Organic Chemistry	3
CHE 129A	Organic Chemistry Laboratory	2

Chemical Engineering and Materials Science Electives

Choose any upper division courses in the areas of Chemistry (CHE), Chemical Engineering (ECH) or Materials Science and Engineering (EMS). You may receive elective credit up to a maximum of four units for any combination of engineering courses numbered 190C, 192, 198, and 199.

Courses may also be selected from the following:

BIS 102	Structure and Function of Biomolecules	3
FST 100A	Food Chemistry	4

FST 102A	Malting and Brewing Science	4
FST 102B	Practical Malting and Brewing	4
FPS 150	Polymer Syntheses and Reactions	3

Upper Division Composition Requirement

Choose one; a grade of C- or better is required:

UWP 102E	Writing in the Disciplines: Engineering	4
UWP 102F	Writing in the Disciplines: Food Science and Technology	4
UWP 104A	Writing in the Professions: Business Writing	4
UWP 104E	Writing in the Professions: Science	4
UWP 104T	Writing in the Professions: Technical Writing	4

Passing the Upper Division Composition Exam.

Total: 156-161

Chemical Engineering; Engineering | ECH M.S.

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Graduate Program in the Department of Chemical Engineering

The Department of Chemical Engineering is home to a top-20 ranked graduate program in Chemical Engineering. We offer a unique environment for graduate studies, we are large enough to boast world-renowned faculty and state-of-the-art research facilities, yet small enough to give every graduate student personal attention.

The Graduate Program in Chemical Engineering

M.S. and Ph.D.
Ph.D. designated emphases are available as specializations in biotechnology, biophysics, and nuclear science.
http://che.engineering.ucdavis.edu; 530-752-7952

The Chemical Engineering Graduate Program provides students with a strong grounding in the fundamentals and explores critical applications in a wide range of process systems.

Doctoral students are typically offered competitive four-year financial offers of fellowships and research/teaching assistantships which include tuition, fees, and a stipend. Financial offers are subject to satisfactory progress towards completion of degree requirements.

Research areas include biochemistry, biomaterials, biotechnology, biomedical engineering, catalysis, colloids and surface science, electrochemical properties and devices, fluid mechanics and rheology, green engineering and design, interfaces, mathematical modeling, molecular modeling, nanotechnology, polymers, process control, reaction engineering, renewable energy, thermochemistry, thin films, and transport phenomena.

Chemical Engineering; Engineering | ECH Ph.D.

(College of Engineering)

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Research areas include biochemistry, biomaterials, biotechnology, biomedical engineering, catalysis, colloids and surface science, electrochemical properties and devices, fluid mechanics and rheology, green engineering and design, interfaces, mathematical modeling, molecular modeling, nanotechnology, polymers, process control, reaction engineering, renewable energy, thermochemistry, thin films, and transport phenomena.

Chemical Engineering; Engineering | ECH Courses

Courses in ECH:

ECH 001—Design of Coffee–An Introduction to Chemical Engineering (3)
Laboratory—2 hours; Lecture—1 hour; Project (Term Project)—1 hour. Non-mathematical introduction to how chemical engineers think, illustrated by elucidation of the process of roasting and brewing coffee. Qualitative overview of the basic principles of engineering analysis and design. Corresponding experiments testing design choices on the sensory qualities of coffee. Not open for credit to students who have completed ECM 1, ECM 5, or ECH 5. GE credit: SE, SL, VL. Effective: 2017 Spring Quarter.

ECH 005—Introduction to Analysis and Design in Chemical Engineering (3)
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): MAT 021A; MAT 021B (can be concurrent) Quantitative introduction to the engineering principles of analysis and design. Applications of differential and integral calculus. Laboratory experiments using coffee to illustrate chemical engineering concepts and to conduct an engineering design competition. Only two units of credit to students who have completed ECM 001 or ECH 001; not open for credit to students who have completed ECM 005. GE credit: QL, SE. Effective: 2017 Winter Quarter.

ECH 051—Material Balances (4)
Lecture—4 hours. Prerequisite(s): MAT 021C C- or better; MAT 021D (can be concurrent) Application of the principle of conservation of mass to single and multicomponent systems in chemical process calculations. Studies of batch, semi-batch, and continuous processes involving mass transfer, phase change, and reaction stoichiometry. Not open for credit to students who have completed ECH 151. GE credit: SE. Effective: 2017 Fall Quarter.

ECH 060—Engineering Problem Solving Using MATLAB (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021C Problem solving in chemical, biochemical and materials engineering using MATLAB. Programming styles, data structures, working with lists, functions and rules. Applications drawn from material balances, statistics, numerical methods, bioinformatics, transport phenomena, kinetics, and computational analysis. GE credit: QL, SE. Effective: 2017 Spring Quarter.

ECH 080—Chemical Engineering Profession (1)
Lecture/Discussion—1 hour; Term Paper. Professional opportunities and professional responsibilities of chemical engineers. Opportunities and needs for post-baccalaureate education. Relationship of chemical engineering to contemporary issues. GE credit: SE, SS. Effective: 2017 Winter Quarter.

ECH 090X—Honors Discussion Section (1)
Discussion—1 hour. Open only to students in the Chemical Engineering or Biochemical Engineering Honors Programs. Examination of special topics covered in selected lower-division courses through additional readings, discussions, collaborative work, or special activities which may include projects, laboratory experience or computer simulations. Repeat credit allowed if topic differs. May be repeated for credit When topic differs. Effective: 2017 Fall Quarter.

ECH 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. Directed Group Study. (P/NP grading only.) GE credit: SE. Effective: 2017 Winter Quarter.

ECH 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special Study for Undergraduates (P/NP grading only.) GE credit: SE. Effective: 2017 Winter Quarter.

ECH 140—Mathematical Methods in Biochemical and Chemical Engineering (4)
Laboratory—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): MAT 022B; (ECH 060 or ENG 006); or equivalents of ECH 060 or ENG 006. Mathematical methods for solving problems in chemical and biochemical engineering, with emphasis on transport phenomena. Fourier series and separation of variables. Sturm-Liouville eigenvalue problems. Similarity transformations. Tensor analysis. Finite difference methods for solving time-dependent diffusion problems. Not open for credit to students who have completed ECH 159. GE credit: SE. Effective: 2017 Spring Quarter.

ECH 141—Fluid Mechanics for Biochemical and Chemical Engineers (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): ECH 140; ECH 051 (can be concurrent) Principles and applications of fluid mechanics in chemical and biochemical engineering. Hydrostatics. The stress tensor and Newton's law of viscosity. Not open for credit to students who have completed course 150B. GE credit: QL, SE. Effective: 2017 Winter Quarter.

ECH 141—Fluid Mechanics for Biochemical and Chemical Engineers (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): ECH 051 C- or better; ECH 140 Principles and applications of fluid mechanics in chemical and biochemical engineering. Hydrostatics. The stress tensor and Newton's law of viscosity. Not open for credit to students who have completed ECH 150B. GE credit: QL, SE. Effective: 2019 Winter Quarter.

ECH 142—Heat Transfer for Biochemical and Chemical Engineers (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): ECH 051 C- or better; ECH 141 Conduction, convection, and radiation of thermal energy in applications to chemical and biochemical engineering. Derivation of thermal and mechanical energy equations. Thermal boundary layers. Macroscopic balances. Applications: heat transfer in tubes, channels, and integrated circuits, and analysis of heat exchangers. Not open for credit to students who have completed course 153. GE credit: QL, SE. Effective: 2017 Winter Quarter.

ECH 142—Heat Transfer for Biochemical and Chemical Engineers (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): ECH 141 Conduction, convection, and radiation of thermal energy in applications to chemical and biochemical engineering. Derivation of thermal and mechanical energy equations. Thermal boundary layers. Macroscopic balances. Applications: heat transfer in tubes, channels, and integrated circuits, and analysis of heat exchangers. Not open for credit to students who have completed ECH 153. GE credit: QL, SE. Effective: 2019 Spring Quarter.

ECH 143—Mass Transfer for Biochemical and Chemical Engineers (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): ECH 051 C- or better; ECH 141 Derivation of species conservation equations describing convective and diffusive mass transfer. Fick's law and the Stefan-Maxwell constitutive equations. Mass transfer coefficients. Multicomponent mass transfer across gas/liquid interfaces. Applications include drying, heterogeneous chemical reactions, and membrane separations. GE credit: SE. Effective: 2017 Winter Quarter.

ECH 143—Mass Transfer for Biochemical and Chemical Engineers (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): ECH 141 Derivation of species conservation equations describing convective and diffusive mass transfer. Fick's law and the Stefan-Maxwell constitutive equations. Mass transfer coefficients. Multicomponent mass transfer across gas/liquid interfaces. Applications include drying, heterogeneous chemical reactions, and membrane separations. GE credit: SE. Effective: 2019 Spring Quarter.

ECH 144—Rheology and Polymer Processing (3)
Lecture/Discussion—3 hours. Prerequisite(s): ECH 141 Deformation in steady shear, unsteady shear, and elongational flows. Linear and non-linear viscoelastic constitutive models. The principle of material indifference and admissibility of constitutive equations. Introduction to the unit operations of polymer processing. Not open for credit to students who have completed ECH 150C. GE credit: SE. Effective: 2017 Winter Quarter.

ECH 145A—Chemical Engineering Thermodynamics Laboratory (3)
Discussion—2 hours; Extensive Writing; Laboratory—2 hours. Prerequisite(s): ECH 152A; ECH 152B (can be concurrent) Open to majors in Chemical Engineering, Chemical Engineering/Materials Science, & Biochemical Engineering. Laboratory experiments in chemical engineering thermodynamics. GE credit: SE, WE. Effective: 2017 Winter Quarter.

ECH 145B—Chemical Engineering Transport Lab (3)
Discussion—2 hours; Extensive Writing; Laboratory—2 hours. Prerequisite(s): ECH 141; ECH 145A Open to majors in Chemical Engineering, Chemical Engineering/Materials Science, & Biochemical Engineering. Laboratory experiments in chemical engineering transport phenomena. GE credit: SE, WE. Effective: 2017 Spring Quarter.

ECH 148A—Chemical Kinetics and Reaction Engineering (3)
Lecture—3 hours. Prerequisite(s): ECH 143; ECH 152B Ideal chemical reactors. Rate laws and stoichiometry. Design and
analysis of isothermal reactors with multiple reactions. Not open for credit to students who have taken ECH 146. GE credit: SE. Effective: 2017 Winter Quarter.

ECH 148B—Chemical Kinetics and Reaction Engineering (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECH 148A Design and analysis of non-isothermal reactors. Reactions in packed beds with pressure drop. Adsorption and heterogeneous catalysis. Transport limitations. Not open for credit to students who have taken ECH 146. GE credit: SE. Effective: 2017 Winter Quarter.

ECH 152A—Chemical Engineering Thermodynamics (3)
Lecture—3 hours. Prerequisite(s): ECH 060 or ENG 006; or equivalents. Application of principles of thermodynamics to chemical processes. Not open for credit to students who have completed ENG 105 or ENG 105A. GE credit: SE. Effective: 2017 Spring Quarter.

ECH 152B—Chemical Engineering Thermodynamics (4)
Lecture/Discussion—4 hours. Prerequisite(s): ECH 152A Continuation of course 152A. GE credit: SE. Effective: 2017 Spring Quarter.

ECH 155—Chemical Engineering Kinetics and Reactor Design Laboratory (4)
Discussion—1 hour; Laboratory—6 hours; Term Paper. Prerequisite(s): ECH 145B; ECH 148A; ECH 148B (can be concurrent); ECH 157 (can be concurrent); Upper division English composition requirement (can be concurrent). Open to majors in Chemical Engineering, Chemical Engineering/Materials Science, and Biochemical Engineering. Laboratory experiments in chemical kinetics, reactor design and process control. Not open for credit to students who have taken ECH 155B. GE credit: OL, SE, VL, WE. Effective: 2017 Spring Quarter.

ECH 155A—Chemical Engineering Laboratory (4)
Discussion—1 hour; Laboratory—6 hours; Term Paper. Prerequisite(s): ECH 141 (can be concurrent); ECH 142 (can be concurrent); ECH 143 (can be concurrent); Satisfaction of the upper division English composition requirement. Open to majors in Chemical Engineering, Chemical Engineering/Materials Science, Biochemical Engineering, Biomedical Engineering, and Biological Systems Engineering. Laboratory experiments in transport phenomena, chemical kinetics, and thermodynamics. GE credit: OL, QL, SE, VL, WE. Effective: 2017 Winter Quarter.

ECH 155B—Chemical Engineering Laboratory (4)
Discussion—1 hour; Extensive Writing—1 hour; Laboratory—6 hours. Prerequisite(s): ECH 143 (can be concurrent); ECH 155A; Satisfaction of the upper division English composition requirement. Open to majors in Chemical Engineering, Chemical Engineering/Materials Science, Biochemical Engineering, Biomedical Engineering, Food Engineering, and Biosystems Engineering. Continuation of course 155A. Laboratory experiments in transport phenomena, chemical kinetics, and thermodynamics. GE credit: QL, SE, VL, WE. Effective: 2017 Winter Quarter.

ECH 157—Process Dynamics and Control (4)
Lecture/Discussion—4 hours. Prerequisite(s): ECH 140 Fundamentals of dynamics and modeling of chemical processes. Design and analysis of feedback control of chemical processes. GE credit: QL, SE. Effective: 2017 Winter Quarter.

ECH 158A—Process Economics and Green Design (4)
Lecture/Discussion—4 hours. Prerequisite(s): ECH 142; ECH 143 Senior design experience in process and product creation and design with multiple realistic constraints. Cost accounting and capital investment estimation. Profitability analysis techniques. Green chemistry, health risk assessment and life cycle assessment concepts. GE credit: SE, SL, SS, VL. Effective: 2017 Winter Quarter.

ECH 158B—Separations and Unit Operations (4)
Lecture—4 hours. Prerequisite(s): ECH 158A Senior design experience with multiple realistic constraints. Heuristic and rigorous design of chemical process equipment. Separation by filtration, distillation and extraction. Synthesis of reactor and separation networks, heat and power integration. GE credit: QL, SE. Effective: 2017 Winter Quarter.

ECH 158C—Plant Design Project (4)
Discussion/Laboratory—2 hours; Project (Term Project)—2 hours. Prerequisite(s): ECH 158B or ECH 161C Senior design experience for chemical and biochemical processes. Impact of multiple realistic constraints. Design, costing and profitability analysis of complete plants. Use of computer-aided design techniques. GE credit: SE, SS, VL. Effective: 2018 Winter Quarter.

ECH 160—Fundamentals of Biomanufacturing (3)
Lecture—3 hours. Prerequisite(s): MIC 102 or BIS 102 or ABI 102 Principles of large scale bioreactor production of metabolites, enzymes, and recombinant proteins including the development of strains/cell lines, fermentor/bioreactor design, monitoring and operation, product recovery and purification, and biomanufacturing economics. Not open for credit to students who have completed ECH 161C or both ECH 161A and ECH 161B; only two units of credit to students who have completed either ECH 161A or ECH 161B. GE credit: QL, SE, VL. Effective: 2017 Winter Quarter.

ECH 161A—Biochemical Engineering Fundamentals (4)
Lecture/Discussion—4 hours. Prerequisite(s): ECH 148A Biokinetics; bioreactor design and operation; transport phenomena in bioreactors; microbial, plant, and animal cell cultures. GE credit: QL, SE, VL. Effective: 2017 Winter Quarter.

ECH 161B—Bioseparations (4)
Lecture/Discussion—4 hours. Prerequisite(s): ECH 143 Product recovery and purification of biochemicals. Cell disruption, centrifugation, filtration, membrane separations, extraction, and chromatographic separation. GE credit: QL, SE. Effective: 2017 Winter Quarter.

ECH 161C—Biotechnology Facility Design and Regulatory Compliance (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECH 161A (can be concurrent), ECH 161B (can be concurrent)) or MCB 263 (can be concurrent); Course(s) required concurrently. Design of biotechnology manufacturing facilities. Fermentation and purification equipment, and utility systems. Introduction to current good manufacturing practices, regulatory compliance, and documentation. GE credit: QL, SE, SL, SS, VL. Effective: 2017 Winter Quarter.

ECH 161L—Bioprocess Engineering Laboratory (4)
Discussion—1 hour; Laboratory—9 hours; Term Paper. Prerequisite(s): (ECH 161A, ECH 161B) or VEN 186 or (BIS 103, MCB 120L) Pass One restricted to chemical/biochemical engineering majors. Laboratory experiments in the operation and analysis of bioreactors; determination of oxygen mass transfer coefficients in bioreactors and ion exchange chromatography. GE credit: QL, SE, VL, WE. Effective: 2017 Winter Quarter.

ECH 166—Catalysis (3)
Lecture—3 hours. Prerequisite(s): ECH 148A; and Consent of Instructor. Principles of catalysis based on an integration of principles of physical, organic, and inorganic chemistry and chemical kinetics and chemical reaction engineering. Catalysis in solution; catalysis by enzymes; catalysis in swellable polymers; catalysis in microscopic cages (zeolites); catalysis on surfaces. GE credit: SE. Effective: 2017 Winter Quarter.

ECH 169—The Design of Cocktails: Applied Thermodynamics and Transport Phenomena in Mixed Drinks (1)
Discussion/Laboratory—1 hour. Prerequisite(s): ECH 145B; ECH 152B; and Consent of Instructor. Enrollment by permission of instructors only; limited to students over 21 years old. Scientific and engineering principles underlying the preparation of mixed drinks. Thermodynamics and kinetics of ice crystallization; phase diagram of ethanol-water-ice mixtures; mass transfer of aromatics; solubility of sucrose and carbon dioxide; colloidal behavior of dispersed solids and emulsified oils. Corresponding laboratory experiments testing the effect of design choices on the sensory quality of cocktails. (P/NP grading only.) GE credit: SE. Effective: 2018 Spring Quarter.

ECH 170—Introduction to Colloid and Surface Phenomena (3)
Lecture—3 hours. Prerequisite(s): CHE 110A Introduction to the behavior of surfaces and disperse systems. Fundamentals will be applied to the solution of practical problems in colloid science. Course should be of value to engineers, chemists, biologists, soil scientists, and related disciplines. GE credit: SE. Effective: 2017 Winter Quarter.

ECH 190C—Research Group Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing in Chemical Engineering. Research group conferences. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 2017 Winter Quarter.

ECH 190X—Honors Discussion Section (1)
Discussion—1 hour. Open only to students in the Chemical Engineering or Biochemical Engineering Honors Programs. Examination of special topics covered in selected upper division courses through additional readings, discussions, collaborative work, or special activities which may include projects, laboratory experience or computer simulations. May be repeated for credit when topic differs. Effective: 2017 Fall Quarter.

ECH 192—Internship in Chemical or Biochemical Engineering (1-5)
Internship—3-15 hours. Prerequisite(s): Consent of Instructor. Completion of a minimum of 84 units; project approval before period of internship. Supervised work experience in Chemical or Biochemical Engineering. May be repeated for credit when project differs. (P/NP grading only.) GE credit: SE. Effective: 2017 Winter Quarter.

ECH 198—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Group study. (P/NP grading only.) GE credit: SE. Effective: 2017 Winter Quarter.

ECH 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special study. (P/NP grading only.) GE credit: SE. Effective: 2017 Winter Quarter.

ECH 206—Biochemical Engineering (3)
Lecture—3 hours. Prerequisite(s): MIC 102; MIC 102L; BIS 101; BIS 102; BIS 103; MCB 120L; MCB 200A; or Consent of Instructor. FST 205 recommended. Interaction of chemical engineering, biochemistry, and microbiology. Mathematical representations of microbial systems. Kinetics of growth, death, and metabolism. Continuous fermentation, agitation, mass transfer and scale-up in fermentation systems, product recovery, enzyme technology. Effective: 2017 Winter Quarter.

ECH 226—Enzyme Engineering (3)
Lecture—3 hours. Prerequisite(s): MIC 102; MIC 102L; BIS 102; BIS 103; MCB 122; MCB 120L; MCB 200A; or Consent of Instructor. Application of basic biochemical and engineering principles of practical enzymatic processes. Lectures cover large scale production and separation of enzymes, immobilized enzyme systems, enzyme related biotechnology, reactor design and optimization, and new application of enzymes in genetic engineering. Effective: 2017 Winter Quarter.

ECH 245—Micro- and Nano-Technology in Life Sciences (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Survey of biomedical device design from the engineering and biological perspectives; micro-/nano-fabrication and characterization techniques; surface chemistry and mass transfer; essential biological processes and models; proposal development skills to merge aforementioned themes in a multidisciplinary project. (EEC 245 and EMS 245.) Effective: 2017 Winter Quarter.

ECH 246—Advanced Biochemical Engineering (2)
Lecture—2 hours. Prerequisite(s): ECH 206; or Consent of Instructor. Advances in the field of biotechnology including genetic engineering, enzyme engineering, fermentation science, and renewable resources development. The important results of original research will be evaluated for understanding of the fundamental principles and for potential practical application. Effective: 2017 Winter Quarter.

ECH 252—Statistical Thermodynamics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECH 152B; ENG 105B or the equivalent. A treatment of the statistical basis of thermodynamics;introduction to statistical mechanics; discussion of the laws of thermodynamics; application of thermodynamic relationships to phase and chemical reaction equilibrium; introduction to molecular simulations and the evaluation of thermodynamic properties from molecular simulations. Effective: 2017 Winter Quarter.

ECH 253A—Advanced Fluid Mechanics (4)
Lecture—4 hours. Prerequisite(s): ECH 141; ECH 259 Kinematics and basic principles of fluid flow. Principles of constitutive equations. Navier-Stokes equations for Newtonian fluids. Survey of rectilinear creeping flow, lubrication flow and boundary layer theory. Effective: 2017 Winter Quarter.

ECH 253B—Advanced Heat Transport (4)
Lecture—4 hours. Prerequisite(s): ECH 142; ECH 259; Or the equivalent. Fundamental energy postulates and derivation of microscopic and macroscopic energy equations. Mechanisms of conduction. Isotropic, thermoelastic and anisotropic materials solution problems using Greens functions and perturbation theory. Effective: 2017 Winter Quarter.

ECH 253C—Advanced Mass Transfer (4)
Lecture—4 hours. Prerequisite(s): ECH 253A; Or the equivalent. Kinematics and basic conservation principles for multicomponent systems. Constitutive equations for momentum, heat and mass transfer, applications to binary and ternary systems. Details of diffusion with reaction, and the effects of concentration. Effective: 2017 Winter Quarter.

ECH 254—Colloid and Surface Phenomena (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Graduate standing in science or engineering or consent of instructor. Thermodynamics and rate processes at interfaces. These fundamental processes will be applied to determine the collective properties
of thin films and membranes, self-assembled systems, liquid crystals and colloidal systems. Experimental techniques in surface analysis. Effective: 2017 Winter Quarter.

ECH 256—Chemical Kinetics and Reaction Engineering (4)
Lecture—4 hours. Prerequisite(s): ECH 146; Or the equivalent. Analysis of the performance of chemical reactors and design of chemical reactors based on the principles of chemical kinetics and transport phenomena. Consideration of noncatalytic/catalytic reactions in single fluid phases and emphasis on reactions in multiphase mixtures, especially gas-solid reactors. Effective: 2017 Winter Quarter.

ECH 259—Advanced Engineering Mathematics (4)
Lecture—4 hours. Prerequisite(s): MAT 021D; MAT 022A; MAT 022B Applications of methods of applied mathematics to the analytical and numerical solution of linear and nonlinear ordinary and partial differential equations arising in the study of transport phenomena. Effective: 2017 Winter Quarter.

ECH 261—Molecular Modelling of Soft and Biological Matter (4)
Lecture/Discussion—4 hours. Prerequisite(s): EMS 247 or ECH 252; or equivalent course in advanced thermodynamics/statistical mechanics. Modern molecular simulation techniques with a focus on soft matter like polymers, biologically relevant systems, and glasses. Effective: 2017 Winter Quarter.

ECH 262—Transport Phenomena in Multiphase Systems (3)
Discussion/Laboratory—3 hours. Prerequisite(s): ECH 253C Heat, mass and momentum transfer in multiphase, multicomponent systems with special emphasis on transport processes in porous media. Derivation of the averaging theorem and application of the method of volume averaging to multicomponent, reacting systems. Effective: 2017 Winter Quarter.

ECH 263—Rheology and Mechanics of Non-Newtonian Fluids (3)
Lecture—3 hours. Prerequisite(s): ECH 253A; ECH 259; or Consent of Instructor. Mechanics of polymer solutions and suspension, especially the development of properly invariant constitutive equations. Topics include: viscometry, linear and nonlinear viscoelasticity, continuum mechanics, kinetic theory. Effective: 2017 Winter Quarter.

ECH 265—Emulsions, Microemulsions and Bilayers (3)
Lecture—3 hours. Prerequisite(s): An undergraduate course in physical chemistry. Thermodynamic and mechanical descriptions of surfactant-laden interfaces. Forces between and within interfaces. Physics of micelle and microemulsion formation. Structure and stability of emulsions. Properties of phospholipid bilayers, with emphasis on vesicles. Effective: 2017 Winter Quarter.

ECH 267—Advanced Process Control (3)
Lecture—3 hours. Prerequisite(s): ECH 157; Or the equivalent. Advanced course in analysis and synthesis of linear multivariable systems. Emphasis on frequency domain techniques and applications to chemical processes. Topics include singular value analysis, internal model control, robust controller design methods as well as self-tuning control techniques. Effective: 2017 Winter Quarter.

ECH 268—Polysaccharides Surface Interactions (3)
Lecture—3 hours. Prerequisite(s): Graduate students in science or engineering. Study of fundamental surface science theories as applied to physical and chemical interactions of carbohydrates and polysaccharides. (EBS 268.) Effective: 2017 Winter Quarter.

ECH 269—Cell and Molecular Biophysics for Bioengineers (4)
Lecture—4 hours. Prerequisite(s): BIM 284; or equivalent; graduate standing; undergraduate students by consent of instructor. Introduction to fundamental mechanisms governing the structure, function, and assembly of bio-macromolecules. Emphasis is on a quantitative understanding of the nano-to-microscale interactions between and within individual molecules, as well as of their assemblies, in particular membranes. Not open for credit to students who have completed BIM 162. (BIM 262.) Effective: 2017 Winter Quarter.

ECH 289A—Special Topics in Chemical Engineering; Fluid Mechanics (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Fluid Mechanics. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289B—Special Topics in Chemical Engineering; Nonlinear Analysis and Numerical Methods (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Nonlinear Analysis and Numerical Methods. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289C—Special Topics in Chemical Engineering; Process Control (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Process Control. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289D—Special Topics in Chemical Engineering; Chemistry of Catalytic Processes (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Chemistry of Catalytic Processes. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289E—Special Topics in Chemical Engineering; Biotechnology (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Biotechnology. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289F—Special Topics in Chemical Engineering; Interfacial Engineering (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Interfacial Engineering. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289G—Special Topics in Chemical Engineering; Molecular Thermodynamics (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Molecular Thermodynamics. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289H—Special Topics in Chemical Engineering; Membrane Separations (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Membrane Separations. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289I—Special Topics in Chemical Engineering; Advanced Materials Processing (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Advanced Materials Processing. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289J—Special Topics in Chemical Engineering; Novel Experimental Methods (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Novel Experimental Methods. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289K—Special Topics in Chemical Engineering; Advanced Transport Phenomena (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Advanced Transport Phenomena. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289L—Special Topics in Chemical Engineering; Biomolecular Engineering (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Biomolecular Engineering. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 290—Seminar (1)
Seminar—1 hour. Seminar. (S/U grading only.) Effective: 2017 Winter Quarter.

ECH 290C—Graduate Research Group Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Research problems, progress and techniques in chemical engineering. May be repeated for credit. (S/U grading only.) Effective: 2017 Winter Quarter.

ECH 294—Current Progress in Biotechnology (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Seminars presented by guest lecturers on subjects of their own research activities. May be repeated for credit. (BIT 294.) (S/U grading only.) Effective: 2018 Winter Quarter.

ECH 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Group study. (S/U grading only.) Effective: 2017 Winter Quarter.

ECH 299—Research (1-12)
Variable. Research. (S/U grading only.) Effective: 2017 Winter Quarter.

ECH 390—Teaching of Chemical Engineering (1) ***Review all entries***
Discussion—1 hour. Prerequisite(s): Qualifications and acceptance as teaching assistant and/or associate-in in chemical engineering. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated up to 2 time(s). (S/U grading only.) Effective: 2017 Winter Quarter.

ECH 390—Teaching of Chemical Engineering (1) ***Review all entries***
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Qualifications and acceptance as teaching assistant and/or associate-in in chemical engineering. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit. (S/U grading only.) Effective: 2018 Fall Quarter.

Chemical Engineering; Engineering | EMS Courses

Courses in EMS:

EMS 002—Materials Marvels: The Science of Superheroes (3)
Discussion—1 hour; Lecture—2 hours. Introduction to science and technology of materials as key engineering ingredients. Explores the relationship between art and materials, and how superheroes are both products and resources of ideas for new materials' technologies. GE credit: SE, SL, WE. Effective: 2018 Winter Quarter.

EMS 006H—Honors Materials Science Computer Applications (1)
Discussion—1 hour. Prerequisite(s): ENG 006 (can be concurrent); Enrollment in the Materials Science and Engineering Honors Program; ENG 006 required concurrently. Restricted to students in the Materials Science and Engineering Honors Program. Examination of materials science computer applications through additional readings, discussions, collaborative work, or special activities which may include projects or computer simulations. Effective: 2017 Winter Quarter.

EMS 009H—Honors Solid-State Materials Science (1)
Discussion—1 hour. Prerequisite(s): PHY 009D (can be concurrent); Enrollment in the Materials Science and Engineering Honors Program; PHY 009D required concurrently. Restricted to students in the Materials Science and Engineering Honors Program. Examination of solid-state materials science and modern physics topics through additional readings, discussions, collaborative work, or special activities which may include projects, laboratory experience or computer simulations. Effective: 2017 Winter Quarter.

EMS 147—Principles of Polymer Materials Science (3)
Lecture—3 hours. Prerequisite(s): CHE 002A; CHE 002B; ((CHE 008A, CHE 008B) or (ENG 045 or ENG 045Y)); introductory physics. Basic principles of polymer science presented including polymer structure and synthesis; polymerization mechanisms, polymer classes, properties, and reactions; polymer morphology, rheology, and characterization; polymer processing. (FPS 100.) GE credit: QL, SE. Effective: 2018 Spring Quarter.

EMS 160—Thermodynamics of Materials Processes and Phase Stability (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 045 C- or better; PHY 009B C- or better; MAT 022B C- or better; CHE 002C recommended. Review of thermodynamic principles of interest to materials scientists and engineers. Application of thermodynamics to material processing, phase stability, corrosion. GE credit: QL, SE, SL, VL. Effective: 2017 Winter Quarter.

EMS 160—Thermodynamics of Materials Processes and Phase Stability (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ENG 045 C- or better or ENG 045Y C- or better); PHY 009B C- or better; MAT 022B C- or better; CHE 002C recommended. Review of thermodynamic principles of interest to materials scientists and engineers. Application of thermodynamics to material processing, phase stability, corrosion. GE credit: QL, SE, SL, VL. Effective: 2018 Fall Quarter.

EMS 162—Structure and Characterization of Engineering Materials (4)
Lecture—4 hours. Prerequisite(s): (ENG 045 C- or better or ENG 045Y C- or better); MAT 022A C- or better; PHY 009B C- or better Description of the structure of engineering materials on the atomic scale by exploring the fundamentals of crystallography. The importance of this structure to materials' properties. Description of experimental determination using x-ray diffraction techniques. GE credit: QL, SE. Effective: 2018 Winter Quarter.

EMS 162L—Structure and Characterization of Materials Laboratory (2)
Discussion—1 hour; Laboratory—3 hours. Prerequisite(s): EMS 162 (can be concurrent); Concurrent enrollment recommended. Experimental investigations of structure of solid materials are combined with techniques for characterization of materials. Laboratory exercises emphasize methods used to study structure of solids at the atomic and microstructural levels. Methods focus on optical, x-ray and electron techniques. Not open for credit to those who have completed EMS 132; can be taken for 2 units of credit by those who have completed EMS 134L; not open for credit to those who have completed both EMS 132L and EMS 134L. GE credit: QL, SE, SL, VL, WE. Effective: 2017 Winter Quarter.

EMS 164—Rate Processes in Materials Science (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ENG 045 C- or better or ENG 045Y C- or better); EMS 160 Basic kinetic laws and the principles governing phase transformations. Applications in diffusion, oxidation, nucleation, growth and spinodal transformations. GE credit: QL, SE, SL, VL. Effective: 2018 Winter Quarter.

EMS 170—Sustainable Energy Technologies: Batteries, Fuel Cells, and Photovoltaic Cells (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 045 or ENG 045Y Open to students in Engineering or related fields. Basic principles of future energy devices such as lithium batteries, fuel cells, and photovoltaic cells. Examines the current status of these energy technologies and analyze challenges that still must be overcome. GE credit: SE. Effective: 2018 Winter Quarter.

EMS 172—Electronic, Optical and Magnetic Properties of Materials (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 110A or PHY 009D; ENG 006 or ECM 006 or equivalent recommended. Electronic, optical, and magnetic properties of materials as related to structure and processing of solid state materials. Physical principles for understanding the properties of metals, semiconductors, ceramics, and amorphous solids and the applications of these materials in engineering. GE credit: QL, SE, SL, VL. Effective: 2017 Winter Quarter.

EMS 172L—Electronic, Optical and Magnetic Properties Laboratory (2)
Laboratory—3 hours; Lecture/Lab—1 hour. Prerequisite(s): EMS 172 (can be concurrent); Concurrent enrollment recommended. Experimental investigation of electronic, optical and magnetic properties of engineering materials, emphasizing the fundamental relationship between microstructure and properties as well as the influence of rate processes on the evolution of the microstructure and properties. GE credit: QL, SE, SL, VL, WE. Effective: 2017 Winter Quarter.

EMS 174—Mechanical Behavior of Materials (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ENG 045 C- or better or ENG 045Y C- or better); EMS 162 recommended. Microscopic and macroscopic aspects of the mechanical behavior of engineering materials, with emphasis on recent development in materials characterization by nondestructive testing. Fundamental aspects of plasticity in engineering materials, strengthening mechanisms and mechanical failure modes of materials systems. GE credit: QL, SE, SL, VL. Effective: 2018 Spring Quarter.

EMS 174L—Mechanical Behavior Laboratory (2)
Laboratory—3 hours; Lecture/Lab—1 hour. Prerequisite(s): EMS 174 (can be concurrent); Concurrent enrollment recommended. Experimental investigation of mechanical behavior of engineering materials. Laboratory exercises emphasize the fundamental relationship between microstructure and mechanical properties, and the evolution of the microstructure as a consequence of rate process. Not open for credit to those who have taken EMS 138L; not open for credit to those who have taken both EMS 134L and EMS 138L. GE credit: QL, SE, SL, VL, WE. Effective: 2016 Winter Quarter.

EMS 180—Materials in Engineering Design (4)
Lecture—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): ENG 045 C- or better or ENG 045Y C- or better Restricted to students with upper division standing. Quantitative treatment of materials selection for engineering applications. Discussion of design and material selection strategy; process and process selection strategy; process economics; life-cycle thinking and eco-design. Use of materials selection software. GE credit: OL, SE, SL, VL, WE. Effective: 2018 Spring Quarter.

EMS 181—Materials Processing (4)
Lecture—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): (ENG 045 C- or better or ENG 045Y C- or better); (ENG 105 or ECH 152B or EEC 140A or EMS 164) Principles of phase equilibria, thermodynamics and reaction kinetics applied to materials processing. Effects of processing variables on the structure-property relationship. Fundamentals of the manufacturing processes for electronic, optical, functional and structural materials. GE credit: OL, SE, VL, WE. Effective: 2018 Spring Quarter.

EMS 182—Failure Analysis (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 045 C- or better or ENG 045Y C- or better; EMS 174 recommended. Analysis of the way materials fail. Effects of temperature, mechanical deformation and corrosion on the properties of materials. forensics and methodologies for investigating failures of materials including optical microscopy, x-ray analysis and scanning electron microscopy. Investigation of practical problems. GE credit: QL, SE, VL, WE. Effective: 2018 Spring Quarter.

EMS 188A—Materials Design Project (4)
Discussion—1 hour; Laboratory—4 hours. Prerequisite(s): EMS 160; EMS 162; EMS 164; EMS 172; EMS 174 Major materials design experience involving analysis of real materials synthesis/processing/fabrication and technological applications including critical assessments of economic, manufacturing, and ethical constraints. Various principles of materials science are integrated into a culminating team design project. GE credit: OL, SE, SL, VL, WE. Effective: 2017 Winter Quarter.

EMS 188AH—Honors Materials Design (1)
Discussion—1 hour. Prerequisite(s): Enrollment in the Materials Science and Engineering Honors Program. Open only to students in the Materials Science and Engineering Honors Program. Examination of special topics covered in the materials design course through additional readings, discussions, collaborative work, or special activities which may include projects, laboratory experience or computer simulations. Effective: 2017 Winter Quarter.

EMS 188B—Materials Design Project (4)
Discussion—1 hour; Laboratory—4 hours. Prerequisite(s): EMS 188A Major materials design experience involving analysis of real materials synthesis/processing/fabrication and technological applications including critical assessments of economic, manufacturing, and ethical constraints. Various principles of materials science are integrated into a culminating team design project. GE credit: OL, SE, SL, VL, WE. Effective: 2017 Winter Quarter.

EMS 188BH—Honors Materials Design (1)
Discussion—1 hour. Prerequisite(s): Enrollment in the Materials Science and Engineering Honors Program. Open only to students in the Materials Science and Engineering Honors Program. Examination of special topics covered in the materials design course through additional readings, discussions, collaborative work, or special activities which may include projects, laboratory experience or computer simulations. Effective: 2017 Winter Quarter.

EMS 190C—Research Group Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing. Individual and/or group conference on problems, progress and techniques in materials research. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 2017 Winter Quarter.

EMS 198—Directed Group Study (1-5)
Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Group study of selected topics. (P/NP grading only.) Effective: 2017 Winter Quarter.

EMS 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special study for advanced undergraduates. (P/NP grading only.) Effective: 2017 Winter Quarter.

EMS 230—Fundamentals of Electron Microscopy (3)
Lecture—2 hours; Lecture/Discussion—1 hour. Prerequisite(s): EMS 162 Principles and techniques of scanning and transmission of electron microscopy used in the study of materials will be described. Emphasis upon practical applications. Effective: 2017 Winter Quarter.

EMS 230L—Laboratory for Electron Microscopy (2)
Laboratory—6 hours. Prerequisite(s): EMS 230 (can be concurrent); EMS 230 required concurrently. Practical application of techniques of electron scanning and transmission microscopy including x-ray microanalysis. Effective: 2017 Winter Quarter.

EMS 232—Advanced Topics in Transmission Electron Microscopy (3)
Discussion—2 hours; Lecture—1 hour. Prerequisite(s): EMS 230 Advanced course in the techniques of electron microscopy including analytical techniques, probe diffraction methods, and high resolution imaging. Effective: 2017 Winter Quarter.

EMS 232L—Laboratory for Advanced Transmission Electron Microscopy (2)
Discussion—1 hour; Laboratory—3 hours. Prerequisite(s): EMS 230L Laboratory in advanced transmission electron microscopy techniques relevant to specific graduate research projects in materials science. Effective: 2017 Winter Quarter.

EMS 241—Principles and Applications of Dislocation Mechanics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing in Engineering. Concepts in dislocation theory are applied to explain plasticity of crystalline solids. Glide and climb of dislocations, strain hardening, recrystallization, theories of creep processes and interaction of dislocation with solute atoms, precipitates and impurity clouds are discussed. Effective: 2017 Winter Quarter.

EMS 243—Kinetics of Phase Transformation in Engineering Materials (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing in Engineering; EMS 160 recommended. Theory of alloying, kinetics of phase changes, homogenous and heterogeneous transformation, transformation by shear, order-disorder reactions. Effective: 2017 Winter Quarter.

EMS 244—Interaction of Materials and their Environment (3)
Lecture—3 hours. Prerequisite(s): (ENG 045 or ENG 045Y); ENG 105A recommended; or consent of instructor. Thermodynamic and kinetic foundations of the corrosion and oxidation processes. Practical aspects of corrosion control and prevention. Stress-corrosion and gas-embrittlement phenomena. Special topics in corrosion; microbiological and atmospheric corrosion. Effective: 2018 Spring Quarter.

EMS 245—Micro- and Nano-Technology in Life Sciences (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Survey of biomedical device design from the engineering and biological perspectives; micro-/nano-fabrication and characterization techniques; surface chemistry and mass transfer; essential biological processes and models; proposal development skills to merge aforementioned themes in a multidisciplinary project. (EEC 245 and ECH 245.) Effective: 2017 Winter Quarter.

EMS 246—Photovoltaics and Solar Cells (3)
Lecture—3 hours. Prerequisite(s): EEC 140B; or Consent of Instructor. Or equivalent. Physics and application of photovoltaics and solar cells, including design, fabrication technology, and grid incorporation. Mono and microcrystalline silicon devices; thin-film technologies, heterojunction and organic-semiconductor technologies. Collectors, electrical inverters and infrastructure issues. Challenges and concerns. (EEC 248.) Effective: 2017 Winter Quarter.

EMS 248—Fracture of Engineering Materials (3)
Lecture—3 hours. Prerequisite(s): EMS 174 Description of the failure of materials by crack propagation. Topics include the stress fields about elastic cracks, the Griffith-Irwin analysis, descriptions of plastic zones, fracture toughness testing, microstructural aspects of fracture and failure at elevated temperatures. Effective: 2017 Winter Quarter.

EMS 249—Mechanisms of Fatigue (3)
Lecture—3 hours. Prerequisite(s): EMS 174; or Consent of Instructor. EMS 248 recommended. Microstructural description of the mechanisms of fatigue in metals. Topics include a phenomenological treatment of cyclic deformation, dislocation processes in cyclic deformation, fatigue crack nucleation, Stage I growth, threshold effects and high temperature cyclic deformation. Effective: 2017 Winter Quarter.

EMS 250A—Special Topics in Polymer and Fiber Science (3)
Lecture—3 hours. Prerequisite(s): EMS 147; or Consent of Instructor. Selected topics of current interest in polymer and fiber sciences. Topics will vary each time the course is offered. (FPS 250A.) Effective: 2017 Winter Quarter.

EMS 250B—Special Topics in Polymer and Fiber Science (3)
Lecture—3 hours. Prerequisite(s): EMS 147; or Consent of Instructor. Selected topics of current interest in polymer and fiber sciences. Topics will vary each time the course is offered. (FPS 250B.) Effective: 2017 Winter Quarter.

EMS 250C—Special Topics in Polymer and Fiber Science (3)
Lecture—3 hours. Prerequisite(s): EMS 147; or Consent of Instructor. Selected topics of current interest in polymer and fiber sciences. Topics will vary each time the course is offered. (FPS 250C.) Effective: 2017 Winter Quarter.

EMS 250D—Special Topics in Polymer and Fiber Science (3)
Lecture—3 hours. Prerequisite(s): EMS 147; or Consent of Instructor. Selected topics of current interest in polymer and fiber sciences. Topics will vary each time the course is offered. (FPS 250D.) Effective: 2017 Winter Quarter.

EMS 250E—Special Topics in Polymer and Fiber Science (3)
Lecture—3 hours. Prerequisite(s): EMS 147; or Consent of Instructor. Selected topics of current interest in polymer and fiber sciences. Topics will vary each time the course is offered. (FPS 250E.) Effective: 2017 Winter Quarter.

EMS 250F—Special Topics in Polymer and Fiber Science (3)
Lecture—3 hours. Prerequisite(s): EMS 147; or Consent of Instructor. Selected topics of current interest in polymer and fiber sciences. Topics will vary each time the course is offered. (FPS 250F.) Effective: 2017 Winter Quarter.

EMS 251—Applications of Solid State Nuclear Magnetic Resonance Spectroscopy (3)
Lecture—3 hours. Prerequisite(s): Graduate standing in chemistry, physics or engineering, or consent of instructor. Fundamentals of solid state NMR spectroscopy and principles of advanced NMR techniques for analyzing structure of solid materials. Effective: 2017 Winter Quarter.

EMS 260—Advanced Thermodynamics of Solids (4)
Lecture/Discussion—4 hours. Prerequisite(s): EMS 160 Thermodynamic principles, formalism and their application to solid materials. Specific examples from ceramic and solid state systems. Use of thermodynamic approach in developing understanding of and constraints for processes in real systems. Effective: 2017 Winter Quarter.

EMS 262—Advanced Topics in Structure of Materials (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EMS 162; EMS 174 recommended; graduate standing in Engineering or consent of instructor. Nature of microstructure in engineering materials. Crystalline and non-crystalline structures, with special emphasis on grain boundary segregation in the development of polycrystalline microstructure and the radial distribution function of amorphous materials. Not open for credit to students who previously completed (cancelled) EMS 245. Effective: 2017 Winter Quarter.

EMS 264—Transport Phenomena in Materials Processes (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing in Engineering. Thermodynamic driving forces and atomic-scale mechanisms underlying diffusive mass transport and interface motion in materials. Nucleation, growth and coarsening dynamics of phase transformations. Not open for credit to students who previously completed EMS 240. Effective: 2017 Winter Quarter.

EMS 272—Advanced Functional Properties of Materials (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing in Physics, Chemistry, and Engineering. Fundamental physical properties of solid materials important to solid state devices, specifically electronic, magnetic, and optical properties. Topics include band structures, metals, superconductors, semiconductors, dielectrics, optical properties, and magnetic properties and implementation of these properties into devices. Effective: 2017 Winter Quarter.

EMS 274—Advanced Mechanical Properties of Materials (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EMS 174 Comprehensive study of mechanical properties of materials, with special attention to dislocations and deformation and fracture control mechanisms. Mechanical properties of conventional engineering materials as well as advanced materials such as nanocrystalline solids and thin films are considered. Effective: 2017 Winter Quarter.

EMS 282—Glass: Science and Technology (3)
Extensive Writing—1 hour; Lecture—2 hours. Prerequisite(s): Graduate standing in Chemistry, Physics or Engineering, or consent of instructor. Modern paradigms in glass science and their applications to technologies. Relation of macroscopic properties of glasses and glass-forming liquids to atomic-level structures, including principles of formation, relaxation, transport phenomena, nucleation, crystallization and phase separation in glasses. Effective: 2017 Winter Quarter.

EMS 288—Living Matter: Physical Biology of the Cell (3)
Lecture—3 hours. Open to any student possessing general background in any disciplines of physical or biological sciences and engineering. Introduction to the origin, maintenance, and regulation of the dynamic architecture of the cell, including cellular modes of organization, dynamics and energy dissipation, molecular transport, motility, regulation, and adaptability. (BIM 288 and BPH 288.) Effective: 2016 Fall Quarter.

EMS 289A—Special Topics in Materials Science; Electronic Materials (1-5)
Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Electronic Materials. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

EMS 289B—Special Topics in Materials Science; Ceramics and Minerals (1-5)
Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Ceramics and Minerals. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

EMS 289C—Special Topics in Materials Science; Physics and Chemistry of Materials (1-5)
Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Physics and Chemistry of Materials. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

EMS 289D—Special Topics in Materials Science; Materials Processing (1-5)
Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Materials Processing. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

EMS 289E—Special Topics in Materials Science; Materials Science and Forensics (1-5)
Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Materials Science and Forensics. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

EMS 289F—Special Topics in Materials Science; Biomaterials (1-5)
Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Biomaterials. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

EMS 289G—Special Topics in Materials Science; Surface Chemistry of Metal Oxides (1-5)
Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Surface Chemistry of Metal Oxides. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

EMS 290—Materials Science and Engineering Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Selected topics of current interest in Materials Science and Engineering. The subjects covered will vary from year to year and will be announced at the beginning of each quarter. May be repeated for credit. (S/U grading only.) Effective: 2017 Fall Quarter.

EMS 290C—Graduate Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Individual and/or group conference on problems, progress, and techniques in materials science and engineering research. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 2017 Winter Quarter.

EMS 294—Materials Science Seminar (1)
Seminar—1 hour. Current literature and developments in materials science with presentations by individual students. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 2017 Winter Quarter.

EMS 298—Group Study (1-5)
Variable. Group study. Effective: 2017 Winter Quarter.

EMS 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Research. (S/U grading only.) Effective: 2017 Winter Quarter.

EMS 390—The Teaching of Materials Science (1)
Discussion—1 hour. Prerequisite(s): Meet qualifications for teaching assistant and/or associate-in in materials science and engineering. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit. (S/U grading only.) Effective: 2017 Winter Quarter.

Chemical Physics; Chemistry

Chemical Physics; Chemistry | Chemical Physics B.S.

(College of Letters and Science)

Department Administration. For a complete list of department administration, see https://chemistry.ucdavis.edu/people.

Department Office. 108 Chemistry Building; 530-752-8900; Fax 530-752-8995; https://chemistry.ucdavis.edu/

Faculty. https://chemistry.ucdavis.edu/people

The Major Programs

Chemistry studies the composition of matter, its structure, and the means by which it is converted from one form to another.

The Program. We offer several degree programs leading to the Bachelor of Arts (A.B.) and the Bachelor of Science (B.S.). To meet and discuss these programs with our staff advisors, see https://chemistry.ucdavis.edu/undergraduate/academic-advising.

The B.S. degree in Chemical Physics provides students with an in-depth understanding of the fundamentals of chemistry, focusing on areas at the interface of chemistry and physics. These include, for example, the experimental measurement and theoretical calculation of the detailed properties and behavior of atoms and molecules. An important experimental tool in chemical physics is spectroscopy, which uses conventional or laser light to probe the atomic and molecular properties of matter.

Career Alternatives. Graduates in Chemical Physics will be prepared for employment in technology, energy, laser science, material science, solid-state chemistry and other fields requiring a strong background in both chemistry and physics. They will also be well-suited for graduate study in a range of areas including chemistry, chemical physics, computational chemistry, material science, nanomaterials and laser science.

Major Advisor. To contact a major advisor in the Department of Chemistry, see https://chemistry.ucdavis.edu/undergraduate/academic-advising.

Honors and Honors Program. The student must take courses 194HA, 194HB, and 194HC.

Graduate Study. The Department of Chemistry offers programs of study and research leading to the M.S. and Ph.D. degrees in Chemistry. Detailed information regarding graduate study may be obtained by contacting the Graduate Advisor, Department of Chemistry. See also Graduate Studies.

Preparatory Subject Matter **Units:** 57

CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 002C	General Chemistry	5
OR		
CHE 002AH	Honors General Chemistry	5
CHE 002BH	Honors General Chemistry	5
CHE 002CH	Honors General Chemistry	5
PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5
PHY 009D	Modern Physics	4
MAT 021A	Calculus	4

MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3
MAT 022AL	Linear Algebra Computer Laboratory	1
MAT 022B	Differential Equations	3

Depth Subject Matter **Units:** 53

CHE 105	Analytical and Physical Chemical Methods	4
CHE 110A	Physical Chemistry: Introduction to Quantum Mechanics	4
CHE 110B	Physical Chemistry: Properties of Atoms and Molecules	4
CHE 110C	Physical Chemistry: Thermodynamics, Equilibria and Kinetics	4
CHE 115	Instrumental Analysis	4
CHE 124A	Inorganic Chemistry: Fundamentals	3
CHE 125	Advanced Methods in Physical Chemistry	4
CHE 128A	Organic Chemistry	3
CHE 128B	Organic Chemistry	3
CHE 129A	Organic Chemistry Laboratory	2
PHY 104A	Introductory Methods of Mathematical Physics	4
PHY 105A	Analytical Mechanics	4
PHY 110A	Electricity and Magnetism	4

Choose at least one:

PHY 105B	Analytical Mechanics	4
PHY 110B	Electricity and Magnetism	4
PHY 112	Thermodynamics and Statistical Mechanics	4
PHY 115A	Foundation of Quantum Mechanics	4
PHY 140A	Introduction to Solid State Physics	4

At least two additional upper division units in chemistry; except CHE 107A, 107B.

Total: 110

Chemical Physics; Chemistry | CHE Courses

Chemistry Placement Requirement. Students who enroll in Chemistry 002A, 002AH or Workload Chemistry 041C must satisfy the Chemistry Placement Requirement. Students who do not meet the placement requirements will be administratively dropped from these Chemistry courses. For more information about the placement requirements, see https://chemistry.ucdavis.edu/undergraduate/general-chemistry-series/chemistry-placement-requirements.

The Student Academic Success Center (SASC) provides review materials, workshops, drop-in and group tutoring, and additional resources.

Chemistry Graduate Students Tutors are also listed on the Department of Chemistry website at https://chemistry.ucdavis.edu/undergraduate/tutors-chemistry.

Courses in CHE:

CHE 002A—General Chemistry (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): High school chemistry and physics, and concurrent enrollment in mathematics at or above the level of MAT 012 strongly recommended; any one of the following: (A) SAT Mathematics score = 600+; (B) ACT Mathematics score = 27+; (C) AP Chemistry exam score of = 3+; (D) SAT Chemistry subject test score = 700+; (E) UC Davis Chemistry Placement Examination score = 24+ on first attempt; in lieu of A-E, either completion of ALEKS online Preparatory Chemistry course with 100% Pie Mastery or completion of Workload 41C with a grade of C or better (Workload 41C offered in fall quarter only to students who do not meet A-E). Periodic table, stoichiometry, chemical equations, physical properties and kinetic theory of gases, atomic and molecular structure and chemical bonding. Laboratory experiments in stoichiometric relations, properties and collection of gases, atomic spectroscopy, and introductory quantitative analysis. Not open for credit to students who have taken CHE 002AH. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

CHE 002AH—Honors General Chemistry (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. High school chemistry and physics. Any ONE of the following: (A) SAT Mathematics score = 670+; (B) ACT Mathematics score = 30+; (C) AP Chemistry exam score = 4+; (D) SAT Chemistry subject test score = 700+; (E) UC Davis Chemistry Placement Examination score = 33+ on first attempt; (F) UC Davis Chemistry Placement Examination score = 30+ AND UC Davis Mathematics Placement Examination score = 45+, both on first attempts; consent of instructor. Limited enrollment course with a more rigorous treatment of material covered in course 2A. Students completing course 2AH can continue with course 2BH or 2B. Not open for credit to students who have taken CHE 002A. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

CHE 002B—General Chemistry (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): CHE 002A C- or better or CHE 002AH C- or better Continuation of course 2A. Condensed phases and intermolecular forces, chemical thermodynamics, chemical equilibria, acids and bases, solubility. Laboratory experiments in thermochemistry, equilibria, and quantitative analysis using volumetric methods. Not open for credit to students who have taken CHE 002BH. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

CHE 002BH—Honors General Chemistry (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): CHE 002A or CHE 002AH C or better; MAT 021B (can be concurrent); or Consent of Instructor. CHE 2A with consent of instructor. Limited enrollment course with a more rigorous treatment of material covered in course 2B. Students completing course 2BH can continue with course 2CH or 2C. Not open for credit to students who have taken CHE 002B. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

CHE 002C—General Chemistry (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): CHE 002B C- or better or CHE 002BH C- or better Continuation of course 2B. Kinetics, electrochemistry, spectroscopy, structure and bonding in transition metal compounds, application of principles to chemical reactions. Laboratory experiments in selected analytical methods and syntheses. Not open for credit to students who have taken CHE 002CH. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

CHE 002CH—Honors General Chemistry (5)
Discussion/Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): CHE 002B or CHE 002BH C or better; MAT 021C (can be concurrent); or Consent of Instructor. CHE 002B with consent of instructor Limited enrollment course with a more rigorous treatment of material covered in course 2C. Not open for credit to students who have taken CHE 002C. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

CHE 003A—Chemistry for Life Sciences: Determining Structure and Predicting Properties (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): High high school chemistry and physics strongly recommended; satisfactory score on the Chemistry and Mathematics Placement Examinations or satisfactory completion of the ALEKS Summer Chemistry Prep Course; a satisfactory grade in WKL 041C ('P' or 'C' or better) will suffice in lieu of a satisfactory Chemistry Placement Examination score. Concurrent enrollment with course 2A, 2B, 2C, 2AH, 2BH, 2CH prohibited; not open for enrollment to students who have completed CHE 2C or 2CH with a C- or better. Integrated General and Organic Chemistry intended for majors in the life sciences. Core concepts of chemical composition, structure and properties. Includes phase changes, separation methods, composition, spectroscopy, atomic and molecular structure, periodicity, bonding, charge distribution, intermolecular forces, and physical properties. Only 3 units credit for students who have completed CHE 002A or CHE 002AH with a C- or better; only 1 unit of credit to students who have completed CHE 002B or CHE 002BH with a C- or better. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

CHE 003B—Chemistry for Life Sciences: Predicting and Characterizing Chemical Change (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 003A C- or better; Note: C- or better in CHE 002A or 002AH does not satisfy the prerequisite requirement. Concurrent enrollment with course 2A, 2B, 2C, 2AH, 2BH, 2CH prohibited. Continuation of course 3A covering core concepts of characterization of chemical processes and predicting chemical changes. Includes modeling chemical reactions, understanding proportions/stoichiometry, tracking energy, activation energy, reaction kinetics, thermodynamics, and equilibrium. Only 3 units credit for students who have completed CHE 002B or CHE 002BH with a C- or better. GE credit: QL, SE, SL. Effective: 2017 Winter Quarter.

CHE 003C—Chemistry for Life Sciences: Controlling Processes and Synthetic Pathways (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 003B C- or better; Note: C- or better in CHE 002B or 002BH does not satisfy the prerequisite requirement. Concurrent enrollment with course 2A, 2B, 2C, 2AH, 2BH, 2CH prohibited. Continuation of course 3B covering core concepts of harnessing energy, controlling reaction extent, and organic chemistry synthetic pathways. Includes acids and bases, thermodynamics, chemical equilibria, organic chemistry terminology and mechanisms. Only 3 units credit for students who have completed CHE 002C or CHE 002CH with a C- or better. GE credit: QL, SE, SL. Effective: 2017 Spring Quarter.

CHE 008A—Organic Chemistry: Brief Course (2)
Lecture—2 hours. Prerequisite(s): CHE 002B C- or better or CHE 002BH C- or better With course 8B, an introduction to the nomenclature, structure, chemistry, and reaction mechanisms of organic compounds. Intended for students majoring in areas other than organic chemistry. No credit to students who have completed CHE 118A or 128A. GE credit: SE. Effective: 2016 Fall Quarter.

CHE 008B—Organic Chemistry: Brief Course (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 008A or CHE 118A or CHE 128A Laboratory concerned primarily with organic laboratory techniques and the chemistry of the common classes of organic compounds. Lecture portion a continuation of course 8A. Varying credit hours according to courses taken previously and corresponding expected workload for this course; full credit to students who complete CHE 118A or 128A; 3 units credit to students who have completed CHE 128A and CHE 129A (students who have completed CHE 129A are exempt from the laboratory portion of CHE 008B); 2 units credit to students who have completed CHE 128B; 1 unit credit to students who have completed CHE 118B or CHE 128B and CHE 129A (students who have completed CHE 118B are exempt from the laboratory portion of CHE 008B). GE credit: SE. Effective: 2016 Fall Quarter.

CHE 010—Concept of Chemistry (4)
Lecture—4 hours. Survey of basic concepts and contemporary applications of chemistry. Designed for non-science majors and not as preparation for Chemistry 2A. Not open for credit to students who have had CHE 002A; but students with credit for CHE 010 may take CHE 002A for full credit. GE credit: SE, SL. Effective: 1997 Winter Quarter.

CHE 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Primarily for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHE 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHE 100—Environmental Water Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 002C or CHE 002CH Practical aspects of water chemistry in the environment, including thermodynamic relations, coordination chemistry, solubility calculations, redox reactions and rate laws. Computer modeling of the evolution in water chemistry from contact with minerals and gases. Effective: 2016 Winter Quarter.

CHE 103A—Chemistry for Life Sciences: Determining Organic Structures and Properties (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 002C C- or better or CHE 002CH C- or better; (CHE 008A or CHE 118A or CHE 128A) Not open for enrollment to students who have completed course 008B, 118B, 118C, 128B, 128C with a C- or better. Continuation of course 3C. Core concepts of organic structure, nomenclature, functional groups, organic acids and bases, resonance and delocalization, aromaticity, intermolecular forces, three-dimensional structure and conformational analysis, spectroscopy. Only 3 Units of credit for students who have completed CHE 008A with a C- or better; only 2 units of credit for students who have completed CHE 118A or CHE 128A with a C- or better; not open for credit to students who have completed CHE 008B, CHE 118B, CHE 118C, CHE 128B, CHE 128C with a C- or better. GE credit: SE, SL. Effective: 2017 Fall Quarter.

CHE 103B—Chemistry for Life Sciences: Predicting and Controlling Organic Pathways (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 103A C- or better Not open for enrollment to students who have completed course 008B, 118B, 118C, 128B, or 128C with a C- or better. Continuation of course 103A. Core concepts of functional group transformations, synthesis, mechanisms, sustainable chemistry, structure and function of biomolecules, organic reactions in biological systems, molecular design, detection, separation, and identification of organic molecules. Not open for credit to students who have completed CHE 008B, CHE 118B, CHE 118C, CHE 128B, or CHE 128C. GE credit: SE, SL. Effective: 2018 Winter Quarter.

CHE 104—Forensic Applications of Analytical Chemistry (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): CHE 002C or CHE 002CH Theory and application of standard methods of chemical analysis to evidentiary samples. Use and evaluation of results from screening tests, FTIR, GC and GCMS to various sample types encountered in forensics. Effective: 2016 Winter Quarter.

CHE 105—Analytical and Physical Chemical Methods (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): CHE 110A (can be concurrent) or CHE 107B (can be concurrent) Fundamental theory and laboratory techniques in; analytical and physical chemistry, errors and data analysis methods, basic electrical circuits in instruments, advanced solution equilibria, potentiometric analysis, chromatographic separations, UV-visible spectroscopy, lasers. GE credit: QL, SE, SL. Effective: 2016 Spring Quarter.

CHE 107A—Physical Chemistry for the Life Sciences (3)
Lecture—3 hours. Prerequisite(s): CHE 002C or CHE 002CH; (MAT 016C or MAT 017C or MAT 021C); (PHY 007C or PHY 009C or PHY 009HC) Physical chemistry intended for majors in the life science area. Introductory development of classical and statistical thermodynamics including equilibrium processes and solutions of both non-electrolytes and electrolytes. The thermodynamic basis of electrochemistry and membrane potentials. GE credit: SE. Effective: 2017 Spring Quarter.

CHE 107B—Physical Chemistry for the Life Sciences (3)
Lecture—3 hours. Prerequisite(s): CHE 107A Continuation of course 107A. Kinetic theory of gases and transport processes in liquids. Chemical kinetics, enzyme kinetics and theories of reaction rates. Introduction to quantum theory, atomic and molecular structure, and spectroscopy. Application to problems in the biological sciences. GE credit: SE. Effective: 2016 Fall Quarter.

CHE 108—Molecular Biochemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 128C or CHE 118C Pass One open to Chemistry majors. Chemical principles and experimental methods applied to the biological sciences to understand the molecular structure and function of proteins, nucleic acids, carbohydrates, and membrane lipids. Effective: 2016 Winter Quarter.

CHE 110A—Physical Chemistry: Introduction to Quantum Mechanics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (PHY 007C or PHY 009C or PHY 009HC); (CHE 002C or CHE 002CH); (MAT 016C or MAT 017C or MAT 021C); Completion of Mathematics 21D, 22A, and 22AL, and Physics 9C or 9HC, strongly recommended. Introduction to the postulates and general principles of quantum mechanics. Approximations based on variational method and time independent perturbation theory. Application to harmonic oscillator, rigid rotor, one-electron and many-electron atoms, and homo-and hetero-nuclear diatomic molecules. GE credit: QL, SE. Effective: 2017 Spring Quarter.

CHE 110B—Physical Chemistry: Properties of Atoms and Molecules (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 110A Group theory. Application of quantum mechanics to polyatomic molecules and molecular spectroscopy. Intermolecular forces and the gas, liquid
and solid states. Distributions, ensembles and partition functions. Transport properties. Effective: 1999 Fall Quarter.

CHE 110C—Physical Chemistry: Thermodynamics, Equilibria and Kinetics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 110B Development and application of the general principles of thermodynamics and statistical thermodynamics. Chemical kinetics, rate laws for chemical reactions and reaction mechanisms. Effective: 1999 Fall Quarter.

CHE 115—Instrumental Analysis (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): CHE 105; (CHE 110B (can be concurrent) or (CHE 107A, CHE 107B)) Intermediate theory and laboratory techniques in analytical and physical chemistry. Advanced data analysis methods and goodness-of-fit criteria. Fourier-transform spectroscopic methods and instrumentation. Mass spectrometry. Electrochemistry. Liquid chromatography. GE credit: QL, SE, WE. Effective: 2006 Fall Quarter.

CHE 118A—Organic Chemistry for Health and Life Sciences (4)
Discussion/Laboratory—1.5 hours; Lecture—3 hours. Prerequisite(s): CHE 002C C- or better or CHE 002CH C- or better The 118A, 118B, 118C series is for students planning professional school studies in health and life sciences. A rigorous, in-depth presentation of basic principles with emphasis on stereochemistry and spectroscopy and preparations and reactions of nonaromatic hydrocarbons, haloalkanes, alcohols and ethers. Only 2 units credit for students who have completed course CHE 008A; not open for credit to students who have completed CHE 008B or CHE 128A. GE credit: SE, SL. Effective: 2017 Spring Quarter.

CHE 118B—Organic Chemistry for Health and Life Sciences (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 118A or CHE 128A Continuation of course 118A, with emphasis on spectroscopy and the preparation and reactions of aromatic hydrocarbons, organometallic
compounds, aldehydes and ketones. Only one unit of credit to students who completed course CHE 128B.; not open for credit to students who have completed 8 or more units of CHE 128 and CHE 129 courses. GE credit: SE, SL. Effective: 2017 Fall Quarter.

CHE 118C—Organic Chemistry for Health and Life Sciences (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 118B or (CHE 128B, CHE 129A) Open to students changing from the CHE 128 course sequence only if they have completed prior organic laboratory work (at least course CHE 129A). Continuation of course 118B, with emphasis on the preparation, reactions and identification of carboxylic acids and their derivatives, alkyl and acyl amines, ß-dicarbonyl compounds, and various classes of naturally occurring, biologically important compounds. Not open for credit to students who have completed course CHE 128C. GE credit: SE, SL. Effective: 2018 Winter Quarter.

CHE 121—Introduction to Molecular Structure and Spectra (4)
Lecture—4 hours. Prerequisite(s): CHE 110B Modern theoretical and experimental methods used to study problems of molecular structure and bonding; emphasis on spectroscopic techniques. Effective: 1997 Winter Quarter.

CHE 122—Chemistry of Nanoparticles (3)
Lecture—3 hours. Prerequisite(s): CHE 110C (can be concurrent) or CHE 107B (can be concurrent) Chemical and physical aspects of inorganic nanoparticles. Topics include synthesis, structure, colloidal behavior, catalytic activity, size and shape dependency of physical properties, analytical methods and applications. Effective: 2016 Winter Quarter.

CHE 124A—Inorganic Chemistry: Fundamentals (3)
Lecture—3 hours. Prerequisite(s): CHE 002C or CHE 002CH Symmetry, molecular geometry and structure, molecular orbital theory of bonding (polyatomic molecules and transition metals), solid state chemistry, energetics and spectroscopy of inorganic compounds. GE credit: SE. Effective: 2016 Fall Quarter.

CHE 124B—Inorganic Chemistry: Main Group Elements (3)
Lecture—3 hours. Prerequisite(s): CHE 124A Synthesis, structure and reactivity of inorganic and heteroorganic
molecules containing the main group elements. Effective: 1997 Winter Quarter.

CHE 124C—Inorganic Chemistry: d and f Block Elements (3)
Lecture—3 hours. Prerequisite(s): CHE 124A Synthesis, structure and reactivity of transition metal complexes,
organometallic and bioinorganic chemistry, the lanthanides and actinides. Effective: 1997 Winter Quarter.

CHE 124L—Laboratory Methods in Inorganic Chemistry (2)
Laboratory—6 hours. Prerequisite(s): CHE 124B or CHE 124C (can be concurrent) The preparation, purification and characterization of main group and
transition metal inorganic and organometallic compounds. Effective: 2000 Spring Quarter.

CHE 125—Advanced Methods in Physical Chemistry (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): CHE 110C (can be concurrent); CHE 115 Advanced theory and laboratory techniques in analytical and physical chemistry. Advanced spectroscopic methods. Thermodynamics. Kinetics.
Chemical literature. Digital electronics and computer interfacing. Laboratory measurements and vacuum techniques. GE credit: QL, SE, WE. Effective: 2000 Spring Quarter.

CHE 128A—Organic Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 002C C or better or CHE 002CH C or better Introduction to the basic concepts of organic chemistry with emphasis on stereochemistry and the chemistry of hydrocarbons. Designed primarily for majors in chemistry. Chemistry majors should enroll in course 129A concurrently. Only two units credit allowed for students who have completed CHE 008A; not open for credit to students who have completed courses CHE 008B or 118A. GE credit: SE. Effective: 2017 Winter Quarter.

CHE 128B—Organic Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 128A; or Consent of Instructor. Continuation of course 128A with emphasis on the chemistry of alcohols, ethers, their sulfur analogs, and carbonyl compounds. Introduction to the application of spectroscopic methods to organic chemistry. Introduction to synthesis of moderately complex organic molecules. Full credit to students who completed CHE 008B or CHE 118A; not open for credit to students who have completed CHE 118B. GE credit: SE. Effective: 2017 Winter Quarter.

CHE 128C—Organic Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 128B Continuation of course 128B with emphasis on enolate condensations and the chemistry of amines, phenols, and sugars; selected biologically important compounds. Full credit to students who completed CHE 118B; Not open for credit to students who have completed CHE 118C. GE credit: SE. Effective: 2017 Winter Quarter.

CHE 129A—Organic Chemistry Laboratory (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): (CHE 002C C or better or CHE 002CH C or better); CHE 128A (can be concurrent) Introduction to laboratory techniques of organic chemistry. Emphasis on methods used for separation and purification of organic compounds. Full credit to students who completed CHE 008B; not open for credit to students who have completed CHE 118B. GE credit: SE. Effective: 2017 Winter Quarter.

CHE 129B—Organic Chemistry Laboratory (2)
Laboratory—6 hours. Prerequisite(s): CHE 129A; CHE 128B (can be concurrent) Continuation of course 129A. Emphasis on methods used for synthesis and isolation of organic compounds. Not open for credit to students who have completed CHE 118C. GE credit: SE. Effective: 2017 Winter Quarter.

CHE 129C—Organic Chemistry Laboratory (2)
Laboratory—6 hours. Prerequisite(s): CHE 128C (can be concurrent); CHE 129B continuation of course 129B Effective: 1997 Winter Quarter.

CHE 130A—Pharmaceutical Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 118C or CHE 128C Examination of the design principles and experimental methods used in pharmaceutical and medicinal chemistry. Effective: 2006 Fall Quarter.

CHE 130B—Pharmaceutical Chemistry (3)
Lecture—2 hours; Lecture/Lab—1 hour. Prerequisite(s): CHE 130A (can be concurrent) Continuation of course 130A with emphasis on case studies of various drugs and the use of computational methods in drug design. Effective: 2017 Spring Quarter.

CHE 130C—Case Studies in Pharmaceutical Chemistry (1)
Independent Study; Seminar—2 hours. Prerequisite(s): CHE 130A (can be concurrent); CHE 130B (can be concurrent) Seminar. Exploration of medicinal and pharmaceutical chemistry topics through seminars presented by professional chemists (and allied professionals). Designed to highlight career opportunities for students with a degree in pharmaceutical chemistry. (P/NP grading only.) Effective: 2017 Spring Quarter.

CHE 131—Modern Methods of Organic Synthesis (3)
Lecture—3 hours. Prerequisite(s): CHE 128C or CHE 118C Introduction to modern synthetic methodology in organic chemistry with emphasis on retrosynthetic analysis, reaction mechanisms, and application to multistep syntheses of pharmaceuticals and natural products. GE credit: SE. Effective: 2016 Fall Quarter.

CHE 135—Advanced Bio-organic Chemistry Laboratory (3)
Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): CHE 130B (can be concurrent) Separation, purification, identification and biological evaluation of organic compounds using modern methods of synthesis, computational chemistry and instrumentation. Emphasis on pharmaceutical and medicinal substances. Effective: 2017 Fall Quarter.

CHE 145—Good Quality Practices (3)
Discussion—1 hour; Laboratory—6 hours. Prerequisite(s): CHE 118B or CHE 129B Open to Chemistry and science majors. Preparation for work in GQP laboratories in both research and industry. Context within GQP-Good Quality Practices (GMP Good Manufacturing Practice, GCP Good Clinical Practices). Lab practice in GQP skills. GE credit: SE. Effective: 2016 Winter Quarter.

CHE 150—Chemistry of Natural Products (3)
Lecture—3 hours. Prerequisite(s): CHE 118C or CHE 128C Chemistry of terpenes, steroids, acetogenins, and alkaloids: isolation, structure determination, biosynthesis, chemical transformations, and total synthesis. GE credit: SE. Effective: 2017 Winter Quarter.

CHE 192—Internship in Chemistry (1-6)
Internship—3-18 hours. Prerequisite(s): Upper division standing; project approval by faculty sponsor prior to enrollment. Supervised internship in chemistry; requires a final written report. May be repeated up to 6 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

CHE 194HA—Undergraduate Honors Research (2)
Independent Study—2 hours. Prerequisite(s): Open only to chemistry majors who have completed 135 units and who qualify for the honors program. Original research under the guidance of a faculty advisor, culminating in the writing of an extensive report. Effective: 1997 Winter Quarter.

CHE 194HB—Undergraduate Honors Research (2)
Independent Study—2 hours. Prerequisite(s): Open only to chemistry majors who have completed 135 units and who qualify for the honors program. Original research under the guidance of a faculty advisor, culminating in the writing of an extensive report. Effective: 1997 Winter Quarter.

CHE 194HC—Undergraduate Honors Research (2)
Independent Study—2 hours. Prerequisite(s): Open only to chemistry majors who have completed 135 units and who qualify for the honors program. Original research under the guidance of a faculty advisor, culminating in the writing of an extensive report. Effective: 2005 Fall Quarter.

CHE 195—Careers in Chemistry (1)
Seminar—2 hours. Prerequisite(s): Junior or senior standing in Chemistry. Designed to give Chemistry undergraduate students an in-depth appreciation of career opportunities with a bachelors degree in chemistry. Professional chemists (and allied professionals) describe research and provide career insights. (P/NP grading only.) Effective: 2001 Fall Quarter.

CHE 197—Projects in Chemical Education (1-4)
Discussion/Laboratory. Prerequisite(s): Consent of Instructor. Participation may include development of laboratory experiments, lecture demonstrations, autotutorial modules or assistance with laboratory sessions. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

CHE 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of instructor based upon adequate preparation in chemistry, mathematics and physics. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHE 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of instructor based upon adequate preparation in chemistry, mathematics, and physics. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHE 201—Chemical Uses of Symmetry and Group Theory (3)
Lecture—3 hours. Prerequisite(s): CHE 124A; CHE 110B; or Consent of Instructor. Symmetry elements and operations, point groups, representations of
groups. Applications to molecular orbital theory, ligand field theory, molecular vibrations, and angular momentum. Crystallographic symmetry. Effective: 1997 Winter Quarter.

CHE 204—Mathematical Methods in Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 110C Graduate standing in Chemistry. Introduction to mathematical and numerical methods in chemistry. Real and complex functions. Methods of integration. Differential equations. Linear algebra and matrices. Special functions. Integral transforms. Statistics. Effective: 2005 Fall Quarter.

CHE 205—Symmetry, Spectroscopy, and Structure (3)
Lecture—3 hours. Prerequisite(s): CHE 201; Or equivalent. Vibrational and rotational spectra; electronic spectra and photoelectron spectroscopy; magnetism; electron spin and nuclear quadrapole resonance spectroscopy; nuclear magnetic resonance spectroscopy; other spectroscopic methods. Effective: 1997 Winter Quarter.

CHE 209—Special Topics in Physical Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 210A; CHE 211A Graduate standing in Chemistry. Advanced topics in physical chemistry, biophysical chemistry or chemical physics chosen from areas of current research interest. May be repeated for credit when topics differ. Effective: 2005 Fall Quarter.

CHE 210A—Quantum Chemistry: Introduction and Stationary-State Properties (3)
Lecture—3 hours. Prerequisite(s): CHE 110B; CHE 110C; or Consent of Instructor. Stationary-state quantum chemistry: postulates of quantum mechanics,
simple solutions, central field problems and angular momenta, hydrogen atom, perturbation theory, variational theory, atoms and molecules. Effective: 1997 Winter Quarter.

CHE 210B—Quantum Chemistry: Time-Dependent Systems (3)
Lecture—3 hours. Prerequisite(s): CHE 210A Matrix mechanics and time-dependent quantum chemistry: matrix formulation of quantum mechanics, Heisenberg representation, time-dependent perturbation theory, selection rules, density matrices, and miscellaneous molecular properties. Effective: 1997 Winter Quarter.

CHE 210C—Quantum Chemistry: Molecular Spectroscopy (3)
Lecture—3 hours. Prerequisite(s): CHE 210B Molecular spectroscopy: Born-Oppenheimer approximation, rotational, vibrational and electronic spectroscopy, spin systems, and molecular photophysics. Effective: 1997 Winter Quarter.

CHE 211A—Advanced Physical Chemistry: Statistical Thermodynamics (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Principles and applications of statistical mechanics; ensemble theory; statistical thermodynamics of gases, solids, liquids, electrolyte solutions and polymers; chemical equilibrium. Effective: 1997 Winter Quarter.

CHE 211B—Statistical Mechanics (3)
Lecture—3 hours. Prerequisite(s): CHE 211A Statistical mechanics of nonequilibrium systems, including the rigorous kinetic theory of gases, continuum mechanics transport in dense fluids, stochastic processes, brownian motion and linear response theory. Effective: 1997 Winter Quarter.

CHE 212—Chemical Dynamics (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Introduction to modern concepts in chemical reaction dynamics for graduate students in chemistry. Emphasis will be placed on experimental techniques as well as emerging physical models for characterizing chemical reactivity at a microscopic level. Effective: 1997 Winter Quarter.

CHE 215—Theoretical and Computational Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 211A; CHE 210B; or Consent of Instructor. Mathematics of wide utility in chemistry, computational methods for guidance or alternative to experiment, and modern formulations of chemical theory. Emphasis will vary in successive years. May be repeated for credit. Effective: 1997 Winter Quarter.

CHE 216—Magnetic Resonance Spectroscopy (3)
Lecture—3 hours. Prerequisite(s): CHE 210A; CHE 210B (can be concurrent) Quantum mechanics of spin and orbital angular momentum, nuclear magnetic resonance, theory of chemical shift and multiplet structures, electron spin resonance, theory of gtensor in organic and transition ions, spin Hamiltonians, nuclear quadrupolar resonance, spin relaxation processes. Effective: 1997 Winter Quarter.

CHE 217—X-Ray Structure Determination (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Introduction to x-ray structure determination; crystals, symmetry, diffraction geometry, sample preparation and handling, diffraction apparatus and data collection, methods of structure solution and refinement, presentation of results, text, tables and graphics,
crystallographic literature. Effective: 1997 Winter Quarter.

CHE 218—Macromolecules: Physical Principles (3)
Lecture—3 hours. Prerequisite(s): CHE 110A; CHE 110B; CHE 110C; Or equivalent. Relationship of higher order macromolecular structure to subunit composition; equilibrium properties and macromolecular dynamics; physical chemical determination of macromolecular structure. Effective: 2001 Winter Quarter.

CHE 219—Spectroscopy of Organic Compounds (4)
Laboratory—2.5 hours; Lecture—3 hours. Prerequisite(s): CHE 128C; Or equivalent. Identification of organic compounds and investigation of stereochemical and reaction mechanism phenomena using spectroscopic methods--principally NMR, IR and MS. Effective: 2006 Fall Quarter.

CHE 219L—Laboratory in Spectroscopy of Organic Compounds (1)
Laboratory—2.5 hours. Prerequisite(s): CHE 219 (can be concurrent) Restricted to Chemistry graduate students only or consent of instructor Practical application of NMR, IR and MS techniques for organic molecules. Effective: 2009 Summer Session 1.

CHE 221A—Special Topics in Organic Chemistry (3)
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. Effective: 1997 Winter Quarter.

CHE 221B—Special Topics in Organic Chemistry (3)
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. Effective: 1997 Winter Quarter.

CHE 221C—Special Topics in Organic Chemistry (3)
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. Effective: 1997 Winter Quarter.

CHE 221D—Special Topics in Organic Chemistry (3)
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. Effective: 1997 Winter Quarter.

CHE 221E—Special Topics in Organic Chemistry (3)
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. Effective: 1997 Winter Quarter.

CHE 221F—Special Topics in Organic Chemistry (3)
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. Effective: 1997 Winter Quarter.

CHE 221G—Special Topics in Organic Chemistry (3)
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. Effective: 1997 Winter Quarter.

CHE 221H—Special Topics in Organic Chemistry (3)
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. Effective: 1997 Winter Quarter.

CHE 222—Chemistry of Nanoparticles (3)
Lecture/Discussion—3 hours. Prerequisite(s): CHE 110C; Or equivalent. Chemical and physical aspects of inorganic nanoparticles, including synthesis, purification, reactivity, characterization, and applications for technology. Emphasis is on problems from the current literature. Not open for credit to students who have taken CHE 122. Effective: 2009 Winter Quarter.

CHE 226—Principles of Transition Metal Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 124A; or equivalent. Electronic structures, bonding, and reactivity of transition metal compounds. Effective: 1997 Winter Quarter.

CHE 228A—Bio-inorganic Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 226; or Consent of Instructor. Defines role of inorganic chemistry in the functioning of biological systems by identifying the functions of metal ions and main group compounds in biological systems and discussing the chemistry of model and isolated biological compounds. Offered every third year. Effective: 1997 Winter Quarter.

CHE 228B—Main Group Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 226; or Consent of Instructor. Synthesis, physical properties, reactions and bonding of main group compounds. Discussions of concepts of electron deficiency, hypervalency,
and non-classical bonding. Chemistry of the main group elements will be treated systematically. Offered every third year. Effective: 1997 Winter Quarter.

CHE 228C—Solid-State Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 124A; CHE 110B; CHE 226; Or equivalent. Design and synthesis, structure and bonding of solid-state compounds; physical properties and characterization of solids; topics of current interest such as low-dimensional materials, inorganic polymers, materials for catalysis. Offered every third year. Effective: 1997 Winter Quarter.

CHE 228D—Homogeneous Catalysis (3)
Lecture—3 hours. Prerequisite(s): CHE 226 Overview of homogeneous catalysis and related methods, with emphasis on kinetics, mechanisms, and applications for organic synthesis. The related methods may include cluster, colloid, phase transfer, enzymatic, heterogeneous and polymer-supported catalysis. Offered every third year. Effective: 2001 Fall Quarter.

CHE 228E—Magnetochemistry (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): CHE 124A or CHE 201; Or an equivalent class from either Physics or Chemical Engineering and Materials Science. Covers the basic principles and concepts of magnetism, methods used for characterization of magnetic properties, as well as specific state-of-the-art magnetic materials and topics from the recent chemistry literature. Effective: 2016 Winter Quarter.

CHE 231A—Organic Synthesis: Methods and Strategies (4)
Discussion/Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 128C; Or equivalent. Current strategies and methods in synthetic organic chemistry. Focus on construction of carbon frameworks, control of relative and absolute stereochemistry and retrosynthetic strategies. Use of databases and molecular modeling software in multistep strategies. Effective: 2017 Winter Quarter.

CHE 231B—Advanced Organic Synthesis (3)
Lecture—3 hours. Prerequisite(s): CHE 231A Current strategies and methods in synthetic organic chemistry. Continuation of course 231A. Organic synthesis of complex target molecules. Stereochemical considerations and asymmetric synthesis. Organometallics for selective transformations. Carbocyclic and heterocyclic ring formation. Effective: 2016 Fall Quarter.

CHE 233—Physical-Organic Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 128A; CHE 128B; CHE 128C; CHE 110A; CHE 110B; CHE 110C; Or equivalent. Introduction to elementary concepts in physicalorganic chemistry including the application of simple numerical techniques in characterizing and modeling organic reactions. Effective: 1997 Winter Quarter.

CHE 235—Organometallic Chemistry in Organic Synthesis (3)
Lecture—3 hours. Prerequisite(s): CHE 128C Current trends in use of organometallics for organic synthesis; preparations, properties, applications, and limitations of organometallic reagents derived from transition and/or main group metals. Effective: 1997 Winter Quarter.

CHE 236—Chemistry of Natural Products (3)
Lecture—3 hours. Prerequisite(s): CHE 128C; Or equivalent. Advanced treatment of chemistry of naturally occurring compounds isolated from a variety of sources. Topics will include isolation, structure determination, chemical transformations, total synthesis,
biological activity, and biosynthesis. Biosynthetic origin will be used as a unifying theme. Effective: 1997 Winter Quarter.

CHE 237—Bio-organic Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 128C; Or equivalent. Structure and function of biomolecules; molecular recognition; enzyme reaction mechanisms; design of suicide substrates for enzymes; enzyme engineering; design of artificial enzymes and application of enzymes in organic synthesis. Effective: 1997 Winter Quarter.

CHE 238—Introduction to Chemical Biology (3)
Lecture—3 hours. Prerequisite(s): CHE 118C or CHE 128C; Or equivalent; CHE 130A, CHE 130B and BIS 102, BIS 103, and BIS 104, or the equivalents recommended. Synthesis of complex molecules in nature. Use of biosynthetic pathways in synthesis of new chemical entities. Applications of small molecules in chemical genetics and structural biology. Solving biological problems using synthetic biomolecules. Effective: 2009 Winter Quarter.

CHE 240—Advanced Analytical Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 110A; CHE 115; Or equivalent. Numerical treatment of experimental data; thermodynamics of electrolyte and non-electrolyte solutions; complex equilibria in aqueous and non-aqueous solutions; potentiometry and specific ion electrodes; mass transfer in liquid solutions; fundamentals of separation science, including column, gas and liquid chromatography. Effective: 1997 Winter Quarter.

CHE 241A—Surface Analytical Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 110C; Or equivalent. Concepts of surfaces and interfaces: physical properties, unique chemistry and electronic effects. Focus on gas-solid interfaces, with some discussion of liquid-solid interfaces. Effective: 2002 Fall Quarter.

CHE 241B—Laser and X-ray Spectroscopy (3)
Lecture—3 hours. Prerequisite(s): CHE 110B; Or equivalent. Concepts and mechanisms of light-matter interactions. Chemical applications of modern spectroscopic methods, including multiphoton spectroscopy, time-resolved laser and x-ray photolysis, and phase-contrast x-ray imaging. Effective: 2002 Fall Quarter.

CHE 241C—Mass Spectrometry (3)
Lecture—3 hours. Prerequisite(s): CHE 110C; CHE 115; Or equivalent. Mass spectrometry and related methods with emphasis on ionization methods, mass analyzers, and detectors. Related methods may include ion-molecule reactions, unimolecular dissociation of organic and bio-organic compounds, and applications in biological and environmental analysis. Effective: 2002 Winter Quarter.

CHE 241D—Electroanalytical Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 110C; CHE 115; Or equivalent. Electroanalytical chemistry with consideration of mass transfer and electrode kinetics for polarizable electrodes. Current-potential curves for a variety of conditions, including both potentiostatic and galvanostatic control, and their application in chemical analysis. Effective: 2002 Winter Quarter.

CHE 241E— Microscopy and Imaging Techniques (3)
Lecture—3 hours. Prerequisite(s): CHE 110C; CHE 115; Or equivalent. Introduction to modern microscopy and imaging techniques: scanning tunneling, atomic force, far-field optical, fluorescence, scanning near-field optical, and scanning electron microscopy. Application to nanoscience and analytical and bioanalytical chemistry. Some laboratory demonstrations. Effective: 2002 Fall Quarter.

CHE 245—Mechanistic Enzymology (3)
Lecture—3 hours. Advanced topics in chemical kinetics relevant to enzymes, enzyme kinetics, theory of enzyme catalysis, and the analysis of a selection of organic enzyme reaction mechanisms by the tools introduced in the first part of the course. Effective: 2013 Fall Quarter.

CHE 261—Current Topics in Chemical Research (2)
Lecture—2 hours. Prerequisite(s): Graduate standing in Chemistry or consent of instructor. Designed to help chemistry graduate students develop and maintain
familiarity with the current and past literature in their immediate field of research and related areas. May be repeated for credit when topics differ. Effective: 1997 Winter Quarter.

CHE 263—Introduction to Chemical Research Methodology (3)
Discussion/Laboratory—9 hours. Prerequisite(s): CHE 293; and Consent of Instructor. Graduate student standing in Chemistry. Introduction to identification, formulation, and solution of meaningful
scientific problems including experimental design and/or theoretical analyses of new and prevailing techniques, theories and hypotheses. May be repeated for credit when topic differs. (S/U grading only.) Effective: 1997 Winter Quarter.

CHE 264—Advanced Chemical Research Methodology (6)
Discussion/Laboratory—18 hours. Prerequisite(s): CHE 263; or Consent of Instructor. Applications of the methodology developed in course 263 to experimental and theoretical studies. Advanced methods of interpretation of results are developed. Includes the preparation of manuscripts for publication. May be repeated for credit for credit when topic differs. (S/U grading only.) Effective: 1997 Winter Quarter.

CHE 290—Seminar (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

CHE 293—Introduction to Chemistry Research (1)
Discussion—2 hours. Designed for incoming graduate students preparing for higher degrees in chemistry. Group and individual discussion of research activities in the Department and research topic selection. (S/U grading only.) Effective: 1997 Winter Quarter.

CHE 294—Presentation of Chemistry Research (1)
Seminar—2 hours. Prerequisite(s): Graduate standing. Restricted to graduate students in Chemistry who have not yet given their departmental presentation. Introduces first- and second-year Chemistry graduate students to the process of giving an effective research presentation. Advanced Ph.D. students give formal seminars describing the design and execution of their research projects. May be repeated up to 3 time(s). (S/U grading only.) Effective: 2009 Winter Quarter.

CHE 295—Careers in Chemistry (1)
Seminar—2 hours. Prerequisite(s): Graduate standing in Chemistry. Designed to give Chemistry graduate students an in-depth appreciation of career opportunities with a M.S. or Ph.D. degree in chemistry. Professional chemists (and allied professionals) give seminars describing both research and career insights. May be repeated up to 3 time(s). (S/U grading only.) Effective: 2001 Fall Quarter.

CHE 296—Research in Pharmaceutical Chemistry (6)
Laboratory—18 hours. Prerequisite(s): CHE 130A; CHE 130B; CHE 135; CHE 233 (can be concurrent); and Consent of Instructor. Restricted to students in the Integrated B.S./M.S. Program in Chemistry. Laboratory provides qualified graduate students with the opportunity to pursue original investigation in Pharmaceutical Chemistry and allied fields in order to fulfill the letter-graded research requirement of the Integrated B.S./M.S. Program in Chemistry (Pharmaceutical Chemistry Emphasis). May be repeated up to 3 time(s) when topic differs. Effective: 2009 Fall Quarter.

CHE 298—Group Study (1-5)
Variable. Effective: 1997 Winter Quarter.

CHE 299—Research (1-12)
Variable. The laboratory is open to qualified graduate students who wish to pursue original investigation. Students wishing to enroll should communicate with the department well in advance of the quarter in which the work is to be undertaken. (S/U grading only.) Effective: 1997 Winter Quarter.

CHE 390—Methods of Teaching Chemistry (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): Consent of Instructor. Graduate student standing in Chemistry. Practical experience in methods and problems of teaching chemistry. Includes analyses of texts and supporting material, discussion of teaching techniques, preparing for and conducting of discussion sessions and student laboratories. Participation in the teaching program required for Ph.D. in chemistry. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

CHE 392—Advanced Methods of Teaching Chemistry (2)
Lecture—2 hours. Prerequisite(s): CHE 390 Advanced topics in teaching chemistry. Analysis and discussion of curricular design, curricula materials, teaching methods and evaluation. For students who are planning a career in teaching chemistry. (S/U grading only.) Effective: 1997 Winter Quarter.

Chemistry

Chemistry | CHE Information

(College of Letters and Science)

Department Administration. For a complete list of department administration, see https://chemistry.ucdavis.edu/people.

Department Office. 108 Chemistry Building; 530-752-8900; Fax 530-752-8995; https://chemistry.ucdavis.edu/

Faculty. https://chemistry.ucdavis.edu/people

Chemistry | CHE A.B.

(College of Letters and Science)

Department Administration. For a complete list of department administration, see https://chemistry.ucdavis.edu/people.

Department Office. 108 Chemistry Building; 530-752-8900; Fax 530-752-8995; https://chemistry.ucdavis.edu/

Faculty. https://chemistry.ucdavis.edu/people

The Major Programs

Chemistry studies the composition of matter, its structure, and the means by which it is converted from one form to another.

The Program. We offer several degree programs leading to the Bachelor of Arts (A.B.) and the Bachelor of Science (B.S.). To meet and discuss these programs with our staff advisors, see https://chemistry.ucdavis.edu/undergraduate/academic-advising.

The curriculum leading to the A.B. degree offers a substantive program in chemistry, while allowing students the freedom to take more courses in other disciplines and pursue a broad liberal arts education. Students with a deeper interest in chemistry should choose one of the several programs leading to the B.S. degree.

Career Alternatives. Chemistry graduates with bachelor's degrees are employed extensively throughout various industries in quality control, research and development, production supervision, technical marketing, and other areas. The types of industries employing these graduates include chemical, energy, pharmaceutical, genetic engineering, biotechnology, food and beverage, petroleum and petrochemical, paper and textile, electronics and computer, and environmental and regulatory agencies. The bachelor's programs also provide chemistry graduates with the rigorous preparation needed for an advanced degree in chemistry and various professional schools in the health sciences.

Major Advisor. To contact a major advisor in the Department of Chemistry, see https://chemistry.ucdavis.edu/undergraduate/academic-advising.

Honors and Honors Program. The student must take courses 194HA, 194HB, and 194HC.

Graduate Study. The Department of Chemistry offers programs of study and research leading to the M.S. and Ph.D. degrees in Chemistry. Detailed information regarding graduate study may be obtained by contacting the Graduate Advisor, Department of Chemistry. See also Graduate Studies.

Preparatory Subject Matter **Units:** 36-42

CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 002C	General Chemistry	5
OR		
CHE 002AH	Honors General Chemistry	5
CHE 002BH	Honors General Chemistry	5
CHE 002CH	Honors General Chemistry	5
PHY 007A	General Physics	4
PHY 007B	General Physics	4
PHY 007C	General Physics	4
OR		
PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5
MAT 016A	Short Calculus	3
MAT 016B	Short Calculus	3
MAT 016C	Short Calculus	3
OR		
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
MAT 017C	Calculus for Biology and Medicine	4
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4

Depth Subject Matter **Units:** 43

CHE 105	Analytical and Physical Chemical Methods	4
CHE 110A	Physical Chemistry: Introduction to Quantum Mechanics	4
CHE 110B	Physical Chemistry: Properties of Atoms and Molecules	4
CHE 110C	Physical Chemistry: Thermodynamics, Equilibria and Kinetics	4
CHE 124A	Inorganic Chemistry: Fundamentals	3
CHE 128A	Organic Chemistry	3
CHE 128B	Organic Chemistry	3
CHE 128C	Organic Chemistry	3
CHE 129A	Organic Chemistry Laboratory	2
CHE 129B	Organic Chemistry Laboratory	2

At least 11 additional upper division units in chemistry (except CHE 107A or 107B) or related areas, including one course with formal lectures. Courses in related areas must be approved in advance by the major advisor.

Total: 79-85

Chemistry | CHE B.S.

(College of Letters and Science)

Department Administration. For a complete list of department administration, see https://chemistry.ucdavis.edu/people.

Department Office. 108 Chemistry Building; 530-752-8900; Fax 530-752-8995; https://chemistry.ucdavis.edu/

Faculty. https://chemistry.ucdavis.edu/people

The Major Programs

Chemistry studies the composition of matter, its structure, and the means by which it is converted from one form to another.

The Program. We offer several degree programs leading to the Bachelor of Arts (A.B.) and the Bachelor of Science (B.S.). To meet and discuss these programs with our staff advisors, see https://chemistry.ucdavis.edu/undergraduate/academic-advising.

The general B.S. degree program, which is accredited by the American Chemical Society, is well-suited for students interested in chemistry as a profession. The other B.S. programs focus on a specific area of applied chemistry: Environmental Chemistry and Forensic Chemistry. These programs are a little less intensive in chemistry and draw on significant course material from areas relevant to their particular field, but fall outside of a classical chemistry degree.

Career Alternatives. Chemistry graduates with bachelor's degrees are employed extensively throughout various industries in quality control, research and development, production supervision, technical marketing, and other areas. The types of industries employing these graduates include chemical, energy, pharmaceutical, genetic engineering, biotechnology, food and beverage, petroleum and petrochemical, paper and textile, electronics and computer, and environmental and regulatory agencies. The bachelor's programs also provide chemistry graduates with the rigorous

preparation needed for an advanced degree in chemistry and various professional schools in the health sciences.

Major Advisor. To contact a major advisor in the Department of Chemistry, see https://chemistry.ucdavis.edu/undergraduate/academic-advising.

Honors and Honors Program. The student must take courses 194HA, 194HB, and 194HC.

Graduate Study. The Department of Chemistry offers programs of study and research leading to the M.S. and Ph.D. degrees in Chemistry. Detailed information regarding graduate study may be obtained by contacting the Graduate Advisor, Department of Chemistry. See also Graduate Studies.

Chemistry—American Chemical Society Accredited Program **Units:** 107

Preparatory Subject Matter

CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 002C	General Chemistry	5
OR		
CHE 002AH	Honors General Chemistry	5
CHE 002BH	Honors General Chemistry	5
CHE 002CH	Honors General Chemistry	5
PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5
PHY 009D	Modern Physics	4
PHY 009D may be taken, but not required.		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3
MAT 022AL	Linear Algebra Computer Laboratory	1
MAT 022B	Differential Equations	3

Depth Subject Matter

CHE 105	Analytical and Physical Chemical Methods	4
CHE 108	Molecular Biochemistry	3
CHE 110A	Physical Chemistry: Introduction to Quantum Mechanics	4
CHE 110B	Physical Chemistry: Properties of Atoms and Molecules	4
CHE 110C	Physical Chemistry: Thermodynamics, Equilibria and Kinetics	4
CHE 115	Instrumental Analysis	4
CHE 124A	Inorganic Chemistry: Fundamentals	3
CHE 124B	Inorganic Chemistry: Main Group Elements	3
OR		
CHE 124C	Inorganic Chemistry: d and f Block Elements	3
CHE 124L	Laboratory Methods in Inorganic Chemistry	2
CHE 125	Advanced Methods in Physical Chemistry	4
CHE 128A	Organic Chemistry	3
CHE 128B	Organic Chemistry	3
CHE 128C	Organic Chemistry	3
CHE 129A	Organic Chemistry Laboratory	2
CHE 129B	Organic Chemistry Laboratory	2

CHE 129C	Organic Chemistry Laboratory	2
At least four additional upper-division units in chemistry; except Chemistry 107A, 107B.		

Recommended

CHE 194HA	Undergraduate Honors Research	2
CHE 194HB	Undergraduate Honors Research	2
CHE 194HC	Undergraduate Honors Research	2
CHE 199	Special Study for Advanced Undergraduates	4

Chemistry—Environmental Chemistry Emphasis **Units:** 95-113

Preparatory Subject Matter

CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 002C	General Chemistry	5
OR		
CHE 002AH	Honors General Chemistry	5
CHE 002BH	Honors General Chemistry	5
CHE 002CH	Honors General Chemistry	5
PHY 007A	General Physics	4
PHY 007B	General Physics	4
PHY 007C	General Physics	4
OR		
PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5
MAT 016A	Short Calculus	3
MAT 016B	Short Calculus	3
MAT 016C	Short Calculus	3
OR		
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
MAT 017C	Calculus for Biology and Medicine	4
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
STA 013	Elementary Statistics	4
OR		
STA 032	Gateway to Statistical Data Science	4
OR		
STA 100	Applied Statistics for Biological Sciences	4

Depth Subject Matter

CHE 100	Environmental Water Chemistry	3
CHE 105	Analytical and Physical Chemical Methods	4
CHE 115	Instrumental Analysis	4
CHE 124A	Inorganic Chemistry: Fundamentals	3
CHE 107A	Physical Chemistry for the Life Sciences	3

CHE 107B	Physical Chemistry for the Life Sciences	3
OR		
CHE 110A	Physical Chemistry: Introduction to Quantum Mechanics	4
CHE 110B	Physical Chemistry: Properties of Atoms and Molecules	4
CHE 110C	Physical Chemistry: Thermodynamics, Equilibria and Kinetics	4
CHE 118A	Organic Chemistry for Health and Life Sciences	4
CHE 118B	Organic Chemistry for Health and Life Sciences	4
CHE 118C	Organic Chemistry for Health and Life Sciences	4
OR		
CHE 128A	Organic Chemistry	3
CHE 128B	Organic Chemistry	3
CHE 128C	Organic Chemistry	3
CHE 129A	Organic Chemistry Laboratory	2
CHE 129B	Organic Chemistry Laboratory	2
ESP 110	Principles of Environmental Science	4
ETX 101	Principles of Environmental Toxicology	4

Choose at least three:

ATM 160	Introduction to Atmospheric Chemistry	4
ESP 151	Limnology	4
ETX 102A	Environmental Fate of Toxicants	4
ETX 102B	Quantitative Analysis of Environmental Toxicants	5
ETX 120	Perspectives in Aquatic Toxicology	4
ETX 131	Environmental Toxicology of Air Pollutants	3
ETX 135	Health Risk Assessment of Toxicants	3
ETX 146	Exposure and Dose Assessment	3
GEL 150A	Physical and Chemical Oceanography	4
SSC 111	Soil Microbiology	4

At least three additional upper division units in chemistry; Chemistry 199 or 194H strongly encouraged.

Chemistry—Forensic Chemistry Emphasis **Units:** 98-115

Preparatory Subject Matter

CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 002C	General Chemistry	5
OR		
CHE 002AH	Honors General Chemistry	5
CHE 002BH	Honors General Chemistry	5
CHE 002CH	Honors General Chemistry	5
PHY 007A	General Physics	4
PHY 007B	General Physics	4
PHY 007C	General Physics	4
OR		
PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5
MAT 016A	Short Calculus	3
MAT 016B	Short Calculus	3

MAT 016C	Short Calculus	3
OR		
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
MAT 017C	Calculus for Biology and Medicine	4
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
ETX 020	Introduction to Forensic Science	3
STA 013	Elementary Statistics	4
OR		
STA 032	Gateway to Statistical Data Science	4
OR		
STA 100	Applied Statistics for Biological Sciences	4

Depth Subject Matter

CHE 104	Forensic Applications of Analytical Chemistry	3
CHE 105	Analytical and Physical Chemical Methods	4
CHE 115	Instrumental Analysis	4
CHE 107A	Physical Chemistry for the Life Sciences	3
CHE 107B	Physical Chemistry for the Life Sciences	3
OR		
CHE 110A	Physical Chemistry: Introduction to Quantum Mechanics	4
CHE 110B	Physical Chemistry: Properties of Atoms and Molecules	4
CHE 110C	Physical Chemistry: Thermodynamics, Equilibria and Kinetics	4
CHE 118A	Organic Chemistry for Health and Life Sciences	4
CHE 118B	Organic Chemistry for Health and Life Sciences	4
CHE 118C	Organic Chemistry for Health and Life Sciences	4
OR		
CHE 128A	Organic Chemistry	3
CHE 128B	Organic Chemistry	3
CHE 128C	Organic Chemistry	3
CHE 129A	Organic Chemistry Laboratory	2
CHE 129B	Organic Chemistry Laboratory	2
ETX 101	Principles of Environmental Toxicology	4
ETX 102A	Environmental Fate of Toxicants	4
ETX 102B	Quantitative Analysis of Environmental Toxicants	5

Choose at least two:

BIS 101	Genes and Gene Expression	4
ESP 161	Environmental Law	4
ETX 103A	Biological Effects of Toxicants	4
ETX 103B	Biological Effects of Toxicants: Experimental Approaches	5
ETX 111	Introduction to Mass Spectrometry	3
ETX 135	Health Risk Assessment of Toxicants	3
ETX 138	Legal Aspects of Environmental Toxicology	3
STA 108	Applied Statistical Methods: Regression Analysis	4

STA 130A	Mathematical Statistics: Brief Course	4

At least three additional upper division units in chemistry; Chemistry 199 or 194H strongly encouraged.

Total: 95-115

Chemistry | CHE Minor

(College of Letters and Science)

Department Administration. For a complete list of department administration, see https://chemistry.ucdavis.edu/people.

Department Office. 108 Chemistry Building; 530-752-8900; Fax 530-752-8995; https://chemistry.ucdavis.edu/

Faculty. https://chemistry.ucdavis.edu/people

Major Advisor. To contact a major advisor in the Department of Chemistry; see https://chemistry.ucdavis.edu/undergraduate/academic-advising.

Note. The minor program has prerequisites of CHE 002A-002B-002C or 02AH-02BH-02CH, MAT 016A-016B-016C or 017A-017B-017C or 021A-021B-021C, and PHY 007A-007B-007C or 009A-009B-009C or their equivalents. Students wishing to earn a Chemistry minor should consult with a Chemistry major advisor.

Chemistry **Units:** 20-21

CHE 105	Analytical and Physical Chemical Methods	4
CHE 107A	Physical Chemistry for the Life Sciences	3
CHE 107B	Physical Chemistry for the Life Sciences	3
CHE 118A	Organic Chemistry for Health and Life Sciences	4
CHE 124A	Inorganic Chemistry: Fundamentals	3

Choose at least one:

CHE 118B	Organic Chemistry for Health and Life Sciences	4
CHE 124B	Inorganic Chemistry: Main Group Elements	3
CHE 124C	Inorganic Chemistry: d and f Block Elements	3

Total: 20-21

Chemistry | CHE M.S.

(College of Letters and Science)

Department Administration. For a complete list of department administration, see https://chemistry.ucdavis.edu/people.

Department Office. 108 Chemistry Building; 530-752-8900; Fax 530-752-8995; https://chemistry.ucdavis.edu/

Faculty. https://chemistry.ucdavis.edu/people

Graduate Study. The Department of Chemistry offers programs of study and research leading to the M.S. and Ph.D. degrees in Chemistry. Detailed information regarding graduate study may be obtained by contacting the Graduate Advisor, Department of Chemistry. See also Graduate Studies.

The Master of Sciences degree is offered only in route to the Ph.D.

Chemistry | CHE Ph.D.

(College of Letters and Science)

Department Administration. For a complete list of department administration, see https://chemistry.ucdavis.edu/people.

Department Office. 108 Chemistry Building; 530-752-8900; Fax 530-752-8995; https://chemistry.ucdavis.edu/

Faculty. https://chemistry.ucdavis.edu/people

Graduate Study. The Department of Chemistry offers programs of study and research leading to the M.S. and Ph.D. degrees in Chemistry. Detailed information regarding graduate study may be obtained by contacting the Graduate Advisor, Department of Chemistry. See also Graduate Studies.

Chemistry | CHE Courses

Chemistry Placement Requirement. Students who enroll in Chemistry 002A, 002AH or Workload Chemistry 041C must satisfy the Chemistry Placement Requirement. Students who do not meet the placement requirements will be administratively dropped from these Chemistry courses. For more information about the placement requirements, see https://chemistry.ucdavis.edu/undergraduate/general-chemistry-series/chemistry-placement-requirements.

The Student Academic Success Center (SASC) provides review materials, workshops, drop-in and group tutoring, and additional resources.

Chemistry Graduate Students Tutors are also listed on the Department of Chemistry website at https://chemistry.ucdavis.edu/undergraduate/tutors-chemistry.

Courses in CHE:

CHE 002A—General Chemistry (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): High school chemistry and physics, and concurrent enrollment in mathematics at or above the level of MAT 012 strongly recommended; any one of the following: (A) SAT Mathematics score = 600+; (B) ACT Mathematics score = 27+; (C) AP Chemistry exam score of = 3+; (D) SAT Chemistry subject test score = 700+; (E) UC Davis Chemistry Placement Examination score = 24+ on first attempt; in lieu of A-E, either completion of ALEKS online Preparatory Chemistry course with 100% Pie Mastery or completion of Workload 41C with a grade of C or better (Workload 41C offered in fall quarter only to students who do not meet A-E). Periodic table, stoichiometry, chemical equations, physical properties and kinetic theory of gases, atomic and molecular structure and chemical bonding. Laboratory experiments in stoichiometric relations, properties and collection of gases, atomic spectroscopy, and introductory quantitative analysis. Not open for credit to students who have taken CHE 002AH. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

CHE 002AH—Honors General Chemistry (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. High school chemistry and physics. Any ONE of the following: (A) SAT Mathematics score = 670+; (B) ACT Mathematics score = 30+; (C) AP Chemistry exam score = 4+; (D) SAT Chemistry subject test score = 700+; (E) UC Davis Chemistry Placement Examination score = 33+ on first attempt; (F) UC Davis Chemistry Placement Examination score = 30+ AND UC Davis Mathematics Placement Examination score = 45+, both on first attempts; consent of instructor. Limited enrollment course with a more rigorous treatment of material covered in course 2A. Students completing course 2AH can continue with course 2BH or 2B. Not open for credit to students who have taken CHE 002A. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

CHE 002B—General Chemistry (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): CHE 002A C- or better or CHE 002AH C- or better Continuation of course 2A. Condensed phases and intermolecular forces, chemical thermodynamics, chemical equilibria, acids and bases, solubility. Laboratory experiments in thermochemistry, equilibria, and quantitative analysis using volumetric methods. Not open for credit to students who have taken CHE 002BH. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

CHE 002BH—Honors General Chemistry (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): CHE 002A or CHE 002AH C or better; MAT 021B (can be concurrent); or Consent of Instructor. CHE 2A with consent of instructor. Limited enrollment course with a more rigorous treatment of material covered in course 2B. Students completing course 2BH can continue with course 2CH or 2C. Not open for credit to students who have taken CHE 002B. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

CHE 002C—General Chemistry (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): CHE 002B C- or better or CHE 002BH C- or better Continuation of course 2B. Kinetics, electrochemistry, spectroscopy, structure and bonding in transition metal compounds, application of principles to chemical reactions. Laboratory experiments in selected analytical methods and syntheses. Not open for credit to students who have taken CHE 002CH. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

CHE 002CH—Honors General Chemistry (5)
Discussion/Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): CHE 002B or CHE 002BH C or better; MAT 021C (can be concurrent); or Consent of Instructor. CHE 002B with consent of instructor Limited enrollment course with a more rigorous treatment of material covered in course 2C. Not open for credit to students who have taken CHE 002C. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

CHE 003A—Chemistry for Life Sciences: Determining Structure and Predicting Properties (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): High high school chemistry and physics strongly recommended; satisfactory score on the Chemistry and Mathematics Placement Examinations or satisfactory completion of the ALEKS Summer Chemistry Prep Course; a satisfactory grade in WKL 041C ('P' or 'C' or better) will suffice in lieu of a satisfactory Chemistry Placement Examination score. Concurrent enrollment with course 2A, 2B, 2C, 2AH, 2BH, 2CH prohibited; not open for enrollment to students who have completed CHE 2C or 2CH with a C- or better. Integrated General and Organic Chemistry intended for majors in the life sciences. Core concepts of chemical composition, structure and properties. Includes phase changes, separation methods, composition, spectroscopy, atomic and molecular structure, periodicity, bonding, charge distribution, intermolecular forces, and physical properties. Only 3 units credit for students who have completed CHE 002A or CHE 002AH with a C- or better; only 1 unit of credit to students who have completed CHE 002B or CHE 002BH with a C- or better. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

CHE 003B—Chemistry for Life Sciences: Predicting and Characterizing Chemical Change (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 003A C- or better; Note: C- or better in CHE 002A or 002AH does not satisfy the prerequisite requirement. Concurrent enrollment with course 2A, 2B, 2C, 2AH, 2BH, 2CH prohibited. Continuation of course 3A covering core concepts of characterization of chemical processes and predicting chemical changes. Includes modeling chemical reactions, understanding proportions/stoichiometry, tracking energy, activation energy, reaction kinetics, thermodynamics, and equilibrium. Only 3 units credit for students who have completed CHE 002B or CHE 002BH with a C- or better. GE credit: QL, SE, SL. Effective: 2017 Winter Quarter.

CHE 003C—Chemistry for Life Sciences: Controlling Processes and Synthetic Pathways (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 003B C- or better; Note: C- or better in CHE 002B or 002BH does not satisfy the prerequisite requirement. Concurrent enrollment with course 2A, 2B, 2C, 2AH, 2BH, 2CH prohibited. Continuation of course 3B covering core concepts of harnessing energy, controlling reaction extent, and organic chemistry synthetic pathways. Includes acids and bases, thermodynamics, chemical equilibria, organic chemistry terminology and mechanisms. Only 3 units credit for students who have completed CHE 002C or CHE 002CH with a C- or better. GE credit: QL, SE, SL. Effective: 2017 Spring Quarter.

CHE 008A—Organic Chemistry: Brief Course (2)
Lecture—2 hours. Prerequisite(s): CHE 002B C- or better or CHE 002BH C- or better With course 8B, an introduction to the nomenclature, structure, chemistry, and reaction mechanisms of organic compounds. Intended for students majoring in areas other than organic chemistry. No credit to students who have completed CHE 118A or 128A. GE credit: SE. Effective: 2016 Fall Quarter.

CHE 008B—Organic Chemistry: Brief Course (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 008A or CHE 118A or CHE 128A Laboratory concerned primarily with organic laboratory techniques and the chemistry of the common classes of organic compounds. Lecture portion a continuation of course 8A. Varying credit hours according to courses taken previously and corresponding expected workload for this course; full credit to students who complete CHE 118A or 128A; 3 units credit to students who have completed CHE 128A and CHE 129A (students who have completed CHE 129A are exempt from the laboratory portion of CHE 008B); 2 units credit to students who have completed CHE 128B; 1 unit credit to students who have completed CHE 118B or CHE 128B and CHE 129A (students who have completed CHE 118B are exempt from the laboratory portion of CHE 008B). GE credit: SE. Effective: 2016 Fall Quarter.

CHE 010—Concept of Chemistry (4)
Lecture—4 hours. Survey of basic concepts and contemporary applications of chemistry. Designed for non-science majors and not as preparation for Chemistry 2A. Not open for credit to students who have had CHE 002A; but students with credit for CHE 010 may take CHE 002A for full credit. GE credit: SE, SL. Effective: 1997 Winter Quarter.

CHE 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Primarily for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHE 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHE 100—Environmental Water Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 002C or CHE 002CH Practical aspects of water chemistry in the environment, including thermodynamic relations, coordination chemistry, solubility calculations, redox reactions and rate laws. Computer modeling of the evolution in water chemistry from contact with minerals and gases. Effective: 2016 Winter Quarter.

CHE 103A—Chemistry for Life Sciences: Determining Organic Structures and Properties (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 002C C- or better or CHE 002CH C- or better; (CHE 008A or CHE 118A or CHE 128A) Not open for enrollment to students who have completed course 008B, 118B, 118C, 128B, 128C with a C- or better. Continuation of course 3C. Core concepts of organic structure, nomenclature, functional groups, organic acids and bases, resonance and delocalization, aromaticity, intermolecular forces, three-dimensional structure and conformational analysis, spectroscopy. Only 3 Units of credit for students who have completed CHE 008A with a C- or better; only 2 units of credit for students who have completed CHE 118A or CHE 128A with a C- or better; not open for credit to students who have completed CHE 008B, CHE 118B, CHE 118C, CHE 128B, CHE 128C with a C- or better. GE credit: SE, SL. Effective: 2017 Fall Quarter.

CHE 103B—Chemistry for Life Sciences: Predicting and Controlling Organic Pathways (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 103A C- or better Not open for enrollment to students who have completed course 008B, 118B, 118C, 128B, or 128C with a C- or better. Continuation of course 103A. Core concepts of functional group transformations, synthesis, mechanisms, sustainable chemistry, structure and function of biomolecules, organic reactions in biological systems, molecular design, detection, separation, and identification of organic molecules. Not open for credit to students who have completed CHE 008B, CHE 118B, CHE 118C, CHE 128B, or CHE 128C. GE credit: SE, SL. Effective: 2018 Winter Quarter.

CHE 104—Forensic Applications of Analytical Chemistry (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): CHE 002C or CHE 002CH Theory and application of standard methods of chemical analysis to evidentiary samples. Use and evaluation of results from screening tests, FTIR, GC and GCMS to various sample types encountered in forensics. Effective: 2016 Winter Quarter.

CHE 105—Analytical and Physical Chemical Methods (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): CHE 110A (can be concurrent) or CHE 107B (can be concurrent) Fundamental theory and laboratory techniques in; analytical and physical chemistry, errors and data analysis methods, basic electrical circuits in instruments, advanced solution equilibria, potentiometric analysis, chromatographic separations, UV-visible spectroscopy, lasers. GE credit: QL, SE, SL. Effective: 2016 Spring Quarter.

CHE 107A—Physical Chemistry for the Life Sciences (3)
Lecture—3 hours. Prerequisite(s): CHE 002C or CHE 002CH; (MAT 016C or MAT 017C or MAT 021C); (PHY 007C or PHY 009C or PHY 009HC) Physical chemistry intended for majors in the life science area. Introductory development of classical and statistical thermodynamics including equilibrium processes and solutions of both non-electrolytes and electrolytes. The thermodynamic basis of electrochemistry and membrane potentials. GE credit: SE. Effective: 2017 Spring Quarter.

CHE 107B—Physical Chemistry for the Life Sciences (3)
Lecture—3 hours. Prerequisite(s): CHE 107A Continuation of course 107A. Kinetic theory of gases and transport processes in liquids. Chemical kinetics, enzyme kinetics and theories of reaction rates. Introduction to quantum theory, atomic and molecular structure, and spectroscopy. Application to problems in the biological sciences. GE credit: SE. Effective: 2016 Fall Quarter.

CHE 108—Molecular Biochemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 128C or CHE 118C Pass One open to Chemistry majors. Chemical principles and experimental methods applied to the biological sciences to understand the molecular structure and function of proteins, nucleic acids, carbohydrates, and membrane lipids. Effective: 2016 Winter Quarter.

CHE 110A—Physical Chemistry: Introduction to Quantum Mechanics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (PHY 007C or PHY 009C or PHY 009HC); (CHE 002C or CHE 002CH); (MAT 016C or MAT 017C or MAT 021C); Completion of Mathematics 21D, 22A, and 22AL, and Physics 9C or 9HC, strongly recommended. Introduction to the postulates and general principles of quantum mechanics. Approximations based on variational method and time independent perturbation theory. Application to harmonic oscillator, rigid rotor, one-electron and many-electron atoms, and homo-and hetero-nuclear diatomic molecules. GE credit: QL, SE. Effective: 2017 Spring Quarter.

CHE 110B—Physical Chemistry: Properties of Atoms and Molecules (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 110A Group theory. Application of quantum mechanics to polyatomic molecules and molecular spectroscopy. Intermolecular forces and the gas, liquid
and solid states. Distributions, ensembles and partition functions. Transport properties. Effective: 1999 Fall Quarter.

CHE 110C—Physical Chemistry: Thermodynamics, Equilibria and Kinetics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 110B Development and application of the general principles of thermodynamics and statistical thermodynamics. Chemical kinetics, rate laws for chemical reactions and reaction mechanisms. Effective: 1999 Fall Quarter.

CHE 115—Instrumental Analysis (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): CHE 105; (CHE 110B (can be concurrent) or (CHE 107A, CHE 107B)) Intermediate theory and laboratory techniques in analytical and physical chemistry. Advanced data analysis methods and goodness-of-fit criteria. Fourier-transform spectroscopic methods and instrumentation. Mass spectrometry. Electrochemistry. Liquid chromatography. GE credit: QL, SE, WE. Effective: 2006 Fall Quarter.

CHE 118A—Organic Chemistry for Health and Life Sciences (4)
Discussion/Laboratory—1.5 hours; Lecture—3 hours. Prerequisite(s): CHE 002C C- or better or CHE 002CH C- or better The 118A, 118B, 118C series is for students planning professional school studies in health and life sciences. A rigorous, in-depth presentation of basic principles with emphasis on stereochemistry and spectroscopy and preparations and reactions of nonaromatic hydrocarbons, haloalkanes, alcohols and ethers. Only 2 units credit for students who have completed course CHE 008A; not open for credit to students who have completed CHE 008B or CHE 128A. GE credit: SE, SL. Effective: 2017 Spring Quarter.

CHE 118B—Organic Chemistry for Health and Life Sciences (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 118A or CHE 128A Continuation of course 118A, with emphasis on spectroscopy and the preparation and reactions of aromatic hydrocarbons, organometallic
compounds, aldehydes and ketones. Only one unit of credit to students who completed course CHE 128B.; not open for credit to students who have completed 8 or more units of CHE 128 and CHE 129 courses. GE credit: SE, SL. Effective: 2017 Fall Quarter.

CHE 118C—Organic Chemistry for Health and Life Sciences (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 118B or (CHE 128B, CHE 129A) Open to students changing from the CHE 128 course sequence only if they have completed prior organic laboratory work (at least course CHE 129A). Continuation of course 118B, with emphasis on the preparation, reactions and identification of carboxylic acids and their derivatives, alkyl and acyl amines, ß-dicarbonyl compounds, and various classes of naturally occurring, biologically important compounds. Not open for credit to students who have completed course CHE 128C. GE credit: SE, SL. Effective: 2018 Winter Quarter.

CHE 121—Introduction to Molecular Structure and Spectra (4)
Lecture—4 hours. Prerequisite(s): CHE 110B Modern theoretical and experimental methods used to study problems of molecular structure and bonding; emphasis on spectroscopic techniques. Effective: 1997 Winter Quarter.

CHE 122—Chemistry of Nanoparticles (3)
Lecture—3 hours. Prerequisite(s): CHE 110C (can be concurrent) or CHE 107B (can be concurrent) Chemical and physical aspects of inorganic nanoparticles. Topics include synthesis, structure, colloidal behavior, catalytic activity, size and shape dependency of physical properties, analytical methods and applications. Effective: 2016 Winter Quarter.

CHE 124A—Inorganic Chemistry: Fundamentals (3)
Lecture—3 hours. Prerequisite(s): CHE 002C or CHE 002CH Symmetry, molecular geometry and structure, molecular orbital theory of bonding (polyatomic molecules and transition metals), solid state chemistry, energetics and spectroscopy of inorganic compounds. GE credit: SE. Effective: 2016 Fall Quarter.

CHE 124B—Inorganic Chemistry: Main Group Elements (3)
Lecture—3 hours. Prerequisite(s): CHE 124A Synthesis, structure and reactivity of inorganic and heteroorganic
molecules containing the main group elements. Effective: 1997 Winter Quarter.

CHE 124C—Inorganic Chemistry: d and f Block Elements (3)
Lecture—3 hours. Prerequisite(s): CHE 124A Synthesis, structure and reactivity of transition metal complexes,
organometallic and bioinorganic chemistry, the lanthanides and actinides. Effective: 1997 Winter Quarter.

CHE 124L—Laboratory Methods in Inorganic Chemistry (2)
Laboratory—6 hours. Prerequisite(s): CHE 124B or CHE 124C (can be concurrent) The preparation, purification and characterization of main group and
transition metal inorganic and organometallic compounds. Effective: 2000 Spring Quarter.

CHE 125—Advanced Methods in Physical Chemistry (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): CHE 110C (can be concurrent); CHE 115 Advanced theory and laboratory techniques in analytical and physical chemistry. Advanced spectroscopic methods. Thermodynamics. Kinetics.
Chemical literature. Digital electronics and computer interfacing. Laboratory measurements and vacuum techniques. GE credit: QL, SE, WE. Effective: 2000 Spring Quarter.

CHE 128A—Organic Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 002C C or better or CHE 002CH C or better Introduction to the basic concepts of organic chemistry with emphasis on stereochemistry and the chemistry of hydrocarbons. Designed primarily for majors in chemistry. Chemistry majors should enroll in course 129A concurrently. Only two units credit allowed for students who have completed CHE 008A; not open for credit to students who have completed courses CHE 008B or 118A. GE credit: SE. Effective: 2017 Winter Quarter.

CHE 128B—Organic Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 128A; or Consent of Instructor. Continuation of course 128A with emphasis on the chemistry of alcohols, ethers, their sulfur analogs, and carbonyl compounds. Introduction to the application of spectroscopic methods to organic chemistry. Introduction to synthesis of moderately complex organic molecules. Full credit to students who completed CHE 008B or CHE 118A; not open for credit to students who have completed CHE 118B. GE credit: SE. Effective: 2017 Winter Quarter.

CHE 128C—Organic Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 128B Continuation of course 128B with emphasis on enolate condensations and the chemistry of amines, phenols, and sugars; selected biologically important compounds. Full credit to students who completed CHE 118B; Not open for credit to students who have completed CHE 118C. GE credit: SE. Effective: 2017 Winter Quarter.

CHE 129A—Organic Chemistry Laboratory (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): (CHE 002C C or better or CHE 002CH C or better); CHE 128A (can be concurrent) Introduction to laboratory techniques of organic chemistry. Emphasis on methods used for separation and purification of organic compounds. Full credit to students who completed CHE 008B; not open for credit to students who have completed CHE 118B. GE credit: SE. Effective: 2017 Winter Quarter.

CHE 129B—Organic Chemistry Laboratory (2)
Laboratory—6 hours. Prerequisite(s): CHE 129A; CHE 128B (can be concurrent) Continuation of course 129A. Emphasis on methods used for synthesis and isolation of organic compounds. Not open for credit to students who have completed CHE 118C. GE credit: SE. Effective: 2017 Winter Quarter.

CHE 129C—Organic Chemistry Laboratory (2)
Laboratory—6 hours. Prerequisite(s): CHE 128C (can be concurrent); CHE 129B continuation of course 129B Effective: 1997 Winter Quarter.

CHE 130A—Pharmaceutical Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 118C or CHE 128C Examination of the design principles and experimental methods used in pharmaceutical and medicinal chemistry. Effective: 2006 Fall Quarter.

CHE 130B—Pharmaceutical Chemistry (3)
Lecture—2 hours; Lecture/Lab—1 hour. Prerequisite(s): CHE 130A (can be concurrent) Continuation of course 130A with emphasis on case studies of various drugs and the use of computational methods in drug design. Effective: 2017 Spring Quarter.

CHE 130C—Case Studies in Pharmaceutical Chemistry (1)
Independent Study; Seminar—2 hours. Prerequisite(s): CHE 130A (can be concurrent); CHE 130B (can be concurrent) Seminar. Exploration of medicinal and pharmaceutical chemistry topics through seminars presented by professional chemists (and allied professionals). Designed to highlight career opportunities for students with a degree in pharmaceutical chemistry. (P/NP grading only.) Effective: 2017 Spring Quarter.

CHE 131—Modern Methods of Organic Synthesis (3)
Lecture—3 hours. Prerequisite(s): CHE 128C or CHE 118C Introduction to modern synthetic methodology in organic chemistry with emphasis on retrosynthetic analysis, reaction mechanisms, and application to multistep syntheses of pharmaceuticals and natural products. GE credit: SE. Effective: 2016 Fall Quarter.

CHE 135—Advanced Bio-organic Chemistry Laboratory (3)
Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): CHE 130B (can be concurrent) Separation, purification, identification and biological evaluation of organic compounds using modern methods of synthesis, computational chemistry and instrumentation. Emphasis on pharmaceutical and medicinal substances. Effective: 2017 Fall Quarter.

CHE 145—Good Quality Practices (3)
Discussion—1 hour; Laboratory—6 hours. Prerequisite(s): CHE 118B or CHE 129B Open to Chemistry and science majors. Preparation for work in GQP laboratories in both research and industry. Context within GQP-Good Quality Practices (GMP Good Manufacturing Practice, GCP Good Clinical Practices). Lab practice in GQP skills. GE credit: SE. Effective: 2016 Winter Quarter.

CHE 150—Chemistry of Natural Products (3)
Lecture—3 hours. Prerequisite(s): CHE 118C or CHE 128C Chemistry of terpenes, steroids, acetogenins, and alkaloids: isolation, structure determination, biosynthesis, chemical transformations, and total synthesis. GE credit: SE. Effective: 2017 Winter Quarter.

CHE 192—Internship in Chemistry (1-6)
Internship—3-18 hours. Prerequisite(s): Upper division standing; project approval by faculty sponsor prior to enrollment. Supervised internship in chemistry; requires a final written report. May be repeated up to 6 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

CHE 194HA—Undergraduate Honors Research (2)
Independent Study—2 hours. Prerequisite(s): Open only to chemistry majors who have completed 135 units and who qualify for the honors program. Original research under the guidance of a faculty advisor, culminating in the writing of an extensive report. Effective: 1997 Winter Quarter.

CHE 194HB—Undergraduate Honors Research (2)
Independent Study—2 hours. Prerequisite(s): Open only to chemistry majors who have completed 135 units and who qualify for the honors program. Original research under the guidance of a faculty advisor, culminating in the writing of an extensive report. Effective: 1997 Winter Quarter.

CHE 194HC—Undergraduate Honors Research (2)
Independent Study—2 hours. Prerequisite(s): Open only to chemistry majors who have completed 135 units and who qualify for the honors program. Original research under the guidance of a faculty advisor, culminating in the writing of an extensive report. Effective: 2005 Fall Quarter.

CHE 195—Careers in Chemistry (1)
Seminar—2 hours. Prerequisite(s): Junior or senior standing in Chemistry. Designed to give Chemistry undergraduate students an in-depth appreciation of career opportunities with a bachelors degree in chemistry. Professional chemists (and allied professionals) describe research and provide career insights. (P/NP grading only.) Effective: 2001 Fall Quarter.

CHE 197—Projects in Chemical Education (1-4)
Discussion/Laboratory. Prerequisite(s): Consent of Instructor. Participation may include development of laboratory experiments, lecture demonstrations, autotutorial modules or assistance with laboratory sessions. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

CHE 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of instructor based upon adequate preparation in chemistry, mathematics and physics. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHE 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of instructor based upon adequate preparation in chemistry, mathematics, and physics. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHE 201—Chemical Uses of Symmetry and Group Theory (3)
Lecture—3 hours. Prerequisite(s): CHE 124A; CHE 110B; or Consent of Instructor. Symmetry elements and operations, point groups, representations of
groups. Applications to molecular orbital theory, ligand field theory, molecular vibrations, and angular momentum. Crystallographic symmetry. Effective: 1997 Winter Quarter.

CHE 204—Mathematical Methods in Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 110C Graduate standing in Chemistry. Introduction to mathematical and numerical methods in chemistry. Real and complex functions. Methods of integration. Differential equations. Linear algebra and matrices. Special functions. Integral transforms. Statistics. Effective: 2005 Fall Quarter.

CHE 205—Symmetry, Spectroscopy, and Structure (3)
Lecture—3 hours. Prerequisite(s): CHE 201; Or equivalent. Vibrational and rotational spectra; electronic spectra and photoelectron spectroscopy; magnetism; electron spin and nuclear quadrapole resonance spectroscopy; nuclear magnetic resonance spectroscopy; other spectroscopic methods. Effective: 1997 Winter Quarter.

CHE 209—Special Topics in Physical Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 210A; CHE 211A Graduate standing in Chemistry. Advanced topics in physical chemistry, biophysical chemistry or chemical physics chosen from areas of current research interest. May be repeated for credit when topics differ. Effective: 2005 Fall Quarter.

CHE 210A—Quantum Chemistry: Introduction and Stationary-State Properties (3)
Lecture—3 hours. Prerequisite(s): CHE 110B; CHE 110C; or Consent of Instructor. Stationary-state quantum chemistry: postulates of quantum mechanics,
simple solutions, central field problems and angular momenta, hydrogen atom, perturbation theory, variational theory, atoms and molecules. Effective: 1997 Winter Quarter.

CHE 210B—Quantum Chemistry: Time-Dependent Systems (3)
Lecture—3 hours. Prerequisite(s): CHE 210A Matrix mechanics and time-dependent quantum chemistry: matrix formulation of quantum mechanics, Heisenberg representation, time-dependent perturbation theory, selection rules, density matrices, and miscellaneous molecular properties. Effective: 1997 Winter Quarter.

CHE 210C—Quantum Chemistry: Molecular Spectroscopy (3)
Lecture—3 hours. Prerequisite(s): CHE 210B Molecular spectroscopy: Born-Oppenheimer approximation, rotational, vibrational and electronic spectroscopy, spin systems, and molecular photophysics. Effective: 1997 Winter Quarter.

CHE 211A—Advanced Physical Chemistry: Statistical Thermodynamics (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Principles and applications of statistical mechanics; ensemble theory; statistical thermodynamics of gases, solids, liquids, electrolyte solutions and polymers; chemical equilibrium. Effective: 1997 Winter Quarter.

CHE 211B—Statistical Mechanics (3)
Lecture—3 hours. Prerequisite(s): CHE 211A Statistical mechanics of nonequilibrium systems, including the rigorous kinetic theory of gases, continuum mechanics transport in dense fluids, stochastic processes, brownian motion and linear response theory. Effective: 1997 Winter Quarter.

CHE 212—Chemical Dynamics (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Introduction to modern concepts in chemical reaction dynamics for graduate students in chemistry. Emphasis will be placed on experimental techniques as well as emerging physical models for characterizing chemical reactivity at a microscopic level. Effective: 1997 Winter Quarter.

CHE 215—Theoretical and Computational Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 211A; CHE 210B; or Consent of Instructor. Mathematics of wide utility in chemistry, computational methods for guidance or alternative to experiment, and modern formulations of chemical theory. Emphasis will vary in successive years. May be repeated for credit. Effective: 1997 Winter Quarter.

CHE 216—Magnetic Resonance Spectroscopy (3)
Lecture—3 hours. Prerequisite(s): CHE 210A; CHE 210B (can be concurrent) Quantum mechanics of spin and orbital angular momentum, nuclear magnetic resonance, theory of chemical shift and multiplet structures, electron spin resonance, theory of gtensor in organic and transition ions, spin Hamiltonians, nuclear quadrupolar resonance, spin relaxation processes. Effective: 1997 Winter Quarter.

CHE 217—X-Ray Structure Determination (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Introduction to x-ray structure determination; crystals, symmetry, diffraction geometry, sample preparation and handling, diffraction apparatus and data collection, methods of structure solution and refinement, presentation of results, text, tables and graphics,
crystallographic literature. Effective: 1997 Winter Quarter.

CHE 218—Macromolecules: Physical Principles (3)
Lecture—3 hours. Prerequisite(s): CHE 110A; CHE 110B; CHE 110C; Or equivalent. Relationship of higher order macromolecular structure to subunit composition; equilibrium properties and macromolecular dynamics; physical chemical determination of macromolecular structure. Effective: 2001 Winter Quarter.

CHE 219—Spectroscopy of Organic Compounds (4)
Laboratory—2.5 hours; Lecture—3 hours. Prerequisite(s): CHE 128C; Or equivalent. Identification of organic compounds and investigation of stereochemical and reaction mechanism phenomena using spectroscopic methods--principally NMR, IR and MS. Effective: 2006 Fall Quarter.

CHE 219L—Laboratory in Spectroscopy of Organic Compounds (1)
Laboratory—2.5 hours. Prerequisite(s): CHE 219 (can be concurrent) Restricted to Chemistry graduate students only or consent of instructor Practical application of NMR, IR and MS techniques for organic molecules. Effective: 2009 Summer Session 1.

CHE 221A—Special Topics in Organic Chemistry (3)
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. Effective: 1997 Winter Quarter.

CHE 221B—Special Topics in Organic Chemistry (3)
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. Effective: 1997 Winter Quarter.

CHE 221C—Special Topics in Organic Chemistry (3)
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. Effective: 1997 Winter Quarter.

CHE 221D—Special Topics in Organic Chemistry (3)
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. Effective: 1997 Winter Quarter.

CHE 221E—Special Topics in Organic Chemistry (3)
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. Effective: 1997 Winter Quarter.

CHE 221F—Special Topics in Organic Chemistry (3)
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. Effective: 1997 Winter Quarter.

CHE 221G—Special Topics in Organic Chemistry (3)
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. Effective: 1997 Winter Quarter.

CHE 221H—Special Topics in Organic Chemistry (3)
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. Effective: 1997 Winter Quarter.

CHE 222—Chemistry of Nanoparticles (3)
Lecture/Discussion—3 hours. Prerequisite(s): CHE 110C; Or equivalent. Chemical and physical aspects of inorganic nanoparticles, including synthesis, purification, reactivity, characterization, and applications for technology. Emphasis is on problems from the current literature. Not open for credit to students who have taken CHE 122. Effective: 2009 Winter Quarter.

CHE 226—Principles of Transition Metal Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 124A; or equivalent. Electronic structures, bonding, and reactivity of transition metal compounds. Effective: 1997 Winter Quarter.

CHE 228A—Bio-inorganic Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 226; or Consent of Instructor. Defines role of inorganic chemistry in the functioning of biological systems by identifying the functions of metal ions and main group compounds in biological systems and discussing the chemistry of model and isolated biological compounds. Offered every third year. Effective: 1997 Winter Quarter.

CHE 228B—Main Group Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 226; or Consent of Instructor. Synthesis, physical properties, reactions and bonding of main group compounds. Discussions of concepts of electron deficiency, hypervalency,
and non-classical bonding. Chemistry of the main group elements will be treated systematically. Offered every third year. Effective: 1997 Winter Quarter.

CHE 228C—Solid-State Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 124A; CHE 110B; CHE 226; Or equivalent. Design and synthesis, structure and bonding of solid-state compounds; physical properties and characterization of solids; topics of current interest such as low-dimensional materials, inorganic polymers, materials for catalysis. Offered every third year. Effective: 1997 Winter Quarter.

CHE 228D—Homogeneous Catalysis (3)
Lecture—3 hours. Prerequisite(s): CHE 226 Overview of homogeneous catalysis and related methods, with emphasis on kinetics, mechanisms, and applications for organic synthesis. The related methods may include cluster, colloid, phase transfer, enzymatic, heterogeneous and polymer-supported catalysis. Offered every third year. Effective: 2001 Fall Quarter.

CHE 228E—Magnetochemistry (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): CHE 124A or CHE 201; Or an equivalent class from either Physics or Chemical Engineering and Materials Science. Covers the basic principles and concepts of magnetism, methods used for characterization of magnetic properties, as well as specific state-of-the-art magnetic materials and topics from the recent chemistry literature. Effective: 2016 Winter Quarter.

CHE 231A—Organic Synthesis: Methods and Strategies (4)
Discussion/Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 128C; Or equivalent. Current strategies and methods in synthetic organic chemistry. Focus on construction of carbon frameworks, control of relative and absolute stereochemistry and retrosynthetic strategies. Use of databases and molecular modeling software in multistep strategies. Effective: 2017 Winter Quarter.

CHE 231B—Advanced Organic Synthesis (3)
Lecture—3 hours. Prerequisite(s): CHE 231A Current strategies and methods in synthetic organic chemistry. Continuation of course 231A. Organic synthesis of complex target molecules. Stereochemical considerations and asymmetric synthesis. Organometallics for selective transformations. Carbocyclic and heterocyclic ring formation. Effective: 2016 Fall Quarter.

CHE 233—Physical-Organic Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 128A; CHE 128B; CHE 128C; CHE 110A; CHE 110B; CHE 110C; Or equivalent. Introduction to elementary concepts in physicalorganic chemistry including the application of simple numerical techniques in characterizing and modeling organic reactions. Effective: 1997 Winter Quarter.

CHE 235—Organometallic Chemistry in Organic Synthesis (3)
Lecture—3 hours. Prerequisite(s): CHE 128C Current trends in use of organometallics for organic synthesis; preparations, properties, applications, and limitations of organometallic reagents derived from transition and/or main group metals. Effective: 1997 Winter Quarter.

CHE 236—Chemistry of Natural Products (3)
Lecture—3 hours. Prerequisite(s): CHE 128C; Or equivalent. Advanced treatment of chemistry of naturally occurring compounds isolated from a variety of sources. Topics will include isolation, structure determination, chemical transformations, total synthesis,
biological activity, and biosynthesis. Biosynthetic origin will be used as a unifying theme. Effective: 1997 Winter Quarter.

CHE 237—Bio-organic Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 128C; Or equivalent. Structure and function of biomolecules; molecular recognition; enzyme reaction mechanisms; design of suicide substrates for enzymes; enzyme engineering; design of artificial enzymes and application of enzymes in organic synthesis. Effective: 1997 Winter Quarter.

CHE 238—Introduction to Chemical Biology (3)
Lecture—3 hours. Prerequisite(s): CHE 118C or CHE 128C; Or equivalent; CHE 130A, CHE 130B and BIS 102, BIS 103, and BIS 104, or the equivalents recommended. Synthesis of complex molecules in nature. Use of biosynthetic pathways in synthesis of new chemical entities. Applications of small molecules in chemical genetics and structural biology. Solving biological problems using synthetic biomolecules. Effective: 2009 Winter Quarter.

CHE 240—Advanced Analytical Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 110A; CHE 115; Or equivalent. Numerical treatment of experimental data; thermodynamics of electrolyte and non-electrolyte solutions; complex equilibria in aqueous and non-aqueous solutions; potentiometry and specific ion electrodes; mass transfer in liquid solutions; fundamentals of separation science, including column, gas and liquid chromatography. Effective: 1997 Winter Quarter.

CHE 241A—Surface Analytical Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 110C; Or equivalent. Concepts of surfaces and interfaces: physical properties, unique chemistry and electronic effects. Focus on gas-solid interfaces, with some discussion of liquid-solid interfaces. Effective: 2002 Fall Quarter.

CHE 241B—Laser and X-ray Spectroscopy (3)
Lecture—3 hours. Prerequisite(s): CHE 110B; Or equivalent. Concepts and mechanisms of light-matter interactions. Chemical applications of modern spectroscopic methods, including multiphoton spectroscopy, time-resolved laser and x-ray photolysis, and phase-contrast x-ray imaging. Effective: 2002 Fall Quarter.

CHE 241C—Mass Spectrometry (3)
Lecture—3 hours. Prerequisite(s): CHE 110C; CHE 115; Or equivalent. Mass spectrometry and related methods with emphasis on ionization methods, mass analyzers, and detectors. Related methods may include ion-molecule reactions, unimolecular dissociation of organic and bio-organic compounds, and applications in biological and environmental analysis. Effective: 2002 Winter Quarter.

CHE 241D—Electroanalytical Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 110C; CHE 115; Or equivalent. Electroanalytical chemistry with consideration of mass transfer and electrode kinetics for polarizable electrodes. Current-potential curves for a variety of conditions, including both potentiostatic and galvanostatic control, and their application in chemical analysis. Effective: 2002 Winter Quarter.

CHE 241E— Microscopy and Imaging Techniques (3)
Lecture—3 hours. Prerequisite(s): CHE 110C; CHE 115; Or equivalent. Introduction to modern microscopy and imaging techniques: scanning tunneling, atomic force, far-field optical, fluorescence, scanning near-field optical, and scanning electron microscopy. Application to nanoscience and analytical and bioanalytical chemistry. Some laboratory demonstrations. Effective: 2002 Fall Quarter.

CHE 245—Mechanistic Enzymology (3)
Lecture—3 hours. Advanced topics in chemical kinetics relevant to enzymes, enzyme kinetics, theory of enzyme catalysis, and the analysis of a selection of organic enzyme reaction mechanisms by the tools introduced in the first part of the course. Effective: 2013 Fall Quarter.

CHE 261—Current Topics in Chemical Research (2)
Lecture—2 hours. Prerequisite(s): Graduate standing in Chemistry or consent of instructor. Designed to help chemistry graduate students develop and maintain
familiarity with the current and past literature in their immediate field of research and related areas. May be repeated for credit when topics differ. Effective: 1997 Winter Quarter.

CHE 263—Introduction to Chemical Research Methodology (3)
Discussion/Laboratory—9 hours. Prerequisite(s): CHE 293; and Consent of Instructor. Graduate student standing in Chemistry. Introduction to identification, formulation, and solution of meaningful
scientific problems including experimental design and/or theoretical analyses of new and prevailing techniques, theories and hypotheses. May be repeated for credit when topic differs. (S/U grading only.) Effective: 1997 Winter Quarter.

CHE 264—Advanced Chemical Research Methodology (6)
Discussion/Laboratory—18 hours. Prerequisite(s): CHE 263; or Consent of Instructor. Applications of the methodology developed in course 263 to experimental and theoretical studies. Advanced methods of interpretation of results are developed. Includes the preparation of manuscripts for publication. May be repeated for credit for credit when topic differs. (S/U grading only.) Effective: 1997 Winter Quarter.

CHE 290—Seminar (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

CHE 293—Introduction to Chemistry Research (1)
Discussion—2 hours. Designed for incoming graduate students preparing for higher degrees in chemistry. Group and individual discussion of research activities in the Department and research topic selection. (S/U grading only.) Effective: 1997 Winter Quarter.

CHE 294—Presentation of Chemistry Research (1)
Seminar—2 hours. Prerequisite(s): Graduate standing. Restricted to graduate students in Chemistry who have not yet given their departmental presentation. Introduces first- and second-year Chemistry graduate students to the process of giving an effective research presentation. Advanced Ph.D. students give formal seminars describing the design and execution of their research projects. May be repeated up to 3 time(s). (S/U grading only.) Effective: 2009 Winter Quarter.

CHE 295—Careers in Chemistry (1)
Seminar—2 hours. Prerequisite(s): Graduate standing in Chemistry. Designed to give Chemistry graduate students an in-depth appreciation of career opportunities with a M.S. or Ph.D. degree in chemistry. Professional chemists (and allied professionals) give seminars describing both research and career insights. May be repeated up to 3 time(s). (S/U grading only.) Effective: 2001 Fall Quarter.

CHE 296—Research in Pharmaceutical Chemistry (6)
Laboratory—18 hours. Prerequisite(s): CHE 130A; CHE 130B; CHE 135; CHE 233 (can be concurrent); and Consent of Instructor. Restricted to students in the Integrated B.S./M.S. Program in Chemistry. Laboratory provides qualified graduate students with the opportunity to pursue original investigation in Pharmaceutical Chemistry and allied fields in order to fulfill the letter-graded research requirement of the Integrated B.S./M.S. Program in Chemistry (Pharmaceutical Chemistry Emphasis). May be repeated up to 3 time(s) when topic differs. Effective: 2009 Fall Quarter.

CHE 298—Group Study (1-5)
Variable. Effective: 1997 Winter Quarter.

CHE 299—Research (1-12)
Variable. The laboratory is open to qualified graduate students who wish to pursue original investigation. Students wishing to enroll should communicate with the department well in advance of the quarter in which the work is to be undertaken. (S/U grading only.) Effective: 1997 Winter Quarter.

CHE 390—Methods of Teaching Chemistry (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): Consent of Instructor. Graduate student standing in Chemistry. Practical experience in methods and problems of teaching chemistry. Includes analyses of texts and supporting material, discussion of teaching techniques, preparing for and conducting of discussion sessions and student laboratories. Participation in the teaching program required for Ph.D. in chemistry. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

CHE 392—Advanced Methods of Teaching Chemistry (2)
Lecture—2 hours. Prerequisite(s): CHE 390 Advanced topics in teaching chemistry. Analysis and discussion of curricular design, curricula materials, teaching methods and evaluation. For students who are planning a career in teaching chemistry. (S/U grading only.) Effective: 1997 Winter Quarter.

Chicana/Chicano Studies

Chicana/Chicano Studies | CHI Information

(College of Letters and Science)

Carlos F. Jackson, M.F.A., Chairperson of the Department

Department Office. 2102 Hart Hall; 530-752-2421; Fax 530-752-8814; http://chi.ucdavis.edu

Faculty. http://chi.ucdavis.edu/faculty

Chicana/Chicano Studies | CHI A.B.

(College of Letters and Science)

Carlos F. Jackson, M.F.A., Chairperson of the Department

Department Office. 2102 Hart Hall; 530-752-2421; Fax 530-752-8814; http://chi.ucdavis.edu

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The Major Program

The Department of Chicana/Chicano Studies offers an interdisciplinary curriculum focusing on the Chicana/Chicano experience through an analysis of class, race, ethnicity, gender and sexuality, and cultural expression. The department offers a major leading to the Bachelor of Arts degree and a minor that can satisfy breadth requirements for the College of Letters and Science. Both the major and minor frame an analysis within the historical and contemporary experiences of Chicanas/os in the Americas. The major gives students an opportunity to specialize in one of two emphases: Cultural Studies or Social/Policy Studies. Students in the major are expected to read, write, and speak Spanish at a level suitable for future study and work in Chicana/o and Latina/o settings. There are no language requirements for the minor, and all Chicana/Chicano Studies courses are open to students in any major.

The Program. At the lower division level, the major curriculum provides an interdisciplinary overview of various topics. Students are advised to take courses that serve as prerequisites for certain upper division courses. At the upper division level, majors pursue advanced interdisciplinary course work in both the humanities/arts and the social sciences. At this level, students will find courses in Chicana/Chicano history, theory, health and several courses taught from a variety of disciplinary perspectives. Majors may specialize in one of two emphases for the A.B. degree. The Cultural Studies emphasis integrates literature, culture, and artistic expression. Social/Policy Studies emphasizes social theory, research methods, area studies in community/political economy, family, societal and health issues.

Career Alternatives. The Cultural Studies emphasis prepares students for professional work in cross-cultural education, cultural/art centers, artistic expression and communications. The Social/Policy Studies emphasis orients students towards professional work in human service delivery, community development, legal services assistance, health services, social welfare and education. Both emphases in the major prepare students for advanced graduate and/or professional studies in related fields.

Major Advisor. Alma Martinez, M.A.

Cultural Studies Emphasis: **Units:** 56-71

Preparatory Subject Matter **Units:** 16-31

CHI 010	Introduction to Chicana/o Studies	4
CHI 050	Chicana and Chicano Culture	4
CHI 021	Chicana/o and Latina/o Health Care Issues	4
OR		
CHI 040	Comparative Health: Top Leading Causes of Death	4

Choose one:

CHI 060	Chicana and Chicano Representation in Cinema	4
CHI 065	New Latin American Cinema	4
CHI 070	Survey of Chicana/ o Art	4
CHI 073	Chicana/ o Art Expression Through Silk Screen	4

SPA 001	Elementary Spanish	5
SPA 002	Elementary Spanish	5
SPA 003	Elementary Spanish	5
OR		
SPA 028	Intermediate Spanish Conversation	2

SPA 031	Intermediate Spanish for Native Speakers I	5
SPA 032	Intermediate Spanish for Native Speakers II	5

OR

The equivalent.

Depth Subject Matter **Units:** 40

Choose one:

CHI 150	The Chicana and Chicano Movement	4
CHI 181	Chicanas and Latinas in the U.S.: Historical Perspectives	4
HIS 165	Latin American Social Revolutions	4
HIS 166B	History of Mexico since 1848	4
HIS 169A	Mexican-American History	4
HIS 169B	Mexican-American History	4

Choose two:

CHI 100	Chicana/ Chicano Theoretical Perspective	4
CHI 110	Sociology of the Chicana/o Experience	4
CHI 111	Chicanas/Mexicanas in Contemporary Society	4
CHI 112	Globalization, Transnational Migration, and Chicana/o and Latina/o Communities	4
CHI 130	United States-Mexican Border Relations	4
CHI 131	Chicanas in Politics and Public Policy	4
CHI 132	Political Economy of Chicana/o Communities	4
CHI 181	Chicanas and Latinas in the U.S.: Historical Perspectives	4

Comparative ethnicity/gender; choose two upper division courses selected from two of the following areas:

African American and African Studies
Asian American Studies
Native American Studies
Gender, Sexuality & Women's Studies

Choose two:

CHI 110	Sociology of the Chicana/o Experience	4
CHI 112	Globalization, Transnational Migration, and Chicana/o and Latina/o Communities	4
CHI 120	Chicana/ o Psychology	4
CHI 121	Chicana/ o Community Mental Health	4
CHI 122	Psychology Perspectives Chicana/o and Latina/o Family	4
CHI 123	Psychological perspectives on Chicana/o and Latina/o Children and Adolescents	4

Choose three:

CHI 154	The Chicana/o Novel	4
CHI 155	Chicana/o Theater	4
CHI 156	Chicana/o Poetry	4
CHI 160	Mexican Film and Greater Mexican Identity	4
CHI 165	Chicanas, Latinas and Mexicanas in Commercial Media	4
CHI 171	Mexican and Chicano Mural Workshop	4
CHI 172	Chicana/o Voice/Poster Silk Screen Workshop	4

Social/Policy Studies Emphasis: **Units:** 60-75

Preparatory Subject Matter

CHI 010	Introduction to Chicana/o Studies	4

CHI 050	Chicana and Chicano Culture	4
CHI 021	Chicana/o and Latina/o Health Care Issues	4
OR		
CHI 040	Comparative Health: Top Leading Causes of Death	4

Choose one:

CHI 060	Chicana and Chicano Representation in Cinema	4
CHI 065	New Latin American Cinema	4
CHI 070	Survey of Chicana/ o Art	4
CHI 073	Chicana/ o Art Expression Through Silk Screen	4

Choose one:

CHI 023	Qualitative Research Methods	4
CHI 140A	Quantitative Methods: Chicano/Latino Health Research	4
SOC 046A	Introduction to Social Research	4
PSC 041	Research Methods in Psychology	4

SPA 001	Elementary Spanish	5
SPA 002	Elementary Spanish	5
SPA 003	Elementary Spanish	5
OR		
SPA 028	Intermediate Spanish Conversation	2
SPA 031	Intermediate Spanish for Native Speakers I	5
SPA 032	Intermediate Spanish for Native Speakers II	5

OR

The equivalent.

Depth Subject Matter

Choose one:

CHI 150	The Chicana and Chicano Movement	4
CHI 181	Chicanas and Latinas in the U.S.: Historical Perspectives	4
HIS 165	Latin American Social Revolutions	4
HIS 166B	History of Mexico since 1848	4
HIS 169A	Mexican-American History	4
HIS 169B	Mexican-American History	4

Choose one:

CHI 154	The Chicana/o Novel	4
CHI 155	Chicana/o Theater	4
CHI 156	Chicana/o Poetry	4
CHI 160	Mexican Film and Greater Mexican Identity	4
CHI 165	Chicanas, Latinas and Mexicanas in Commercial Media	4
CHI 171	Mexican and Chicano Mural Workshop	4
CHI 172	Chicana/o Voice/Poster Silk Screen Workshop	4

Comparative ethnicity/gender; choose two upper division courses selected from two of the following areas:

African American and African Studies
Asian American Studies
Native American Studies
Gender, Sexuality & Women's Studies

Choose three:

CHI 100	Chicana/ Chicano Theoretical Perspective	4
CHI 110	Sociology of the Chicana/o Experience	4
CHI 111	Chicanas/Mexicanas in Contemporary Society	4
CHI 112	Globalization, Transnational Migration, and Chicana/o and Latina/o Communities	4
CHI 130	United States-Mexican Border Relations	4
CHI 131	Chicanas in Politics and Public Policy	4
CHI 132	Political Economy of Chicana/o Communities	4
CHI 181	Chicanas and Latinas in the U.S.: Historical Perspectives	4

Choose two:

CHI 110	Sociology of the Chicana/o Experience	4
CHI 112	Globalization, Transnational Migration, and Chicana/o and Latina/o Communities	4
CHI 120	Chicana/ o Psychology	4
CHI 121	Chicana/ o Community Mental Health	4
CHI 122	Psychology Perspectives Chicana/o and Latina/o Family	4
CHI 123	Psychological perspectives on Chicana/o and Latina/o Children and Adolescents	4

Total: 56-71

Chicana/Chicano Studies | CHI Minor

(College of Letters and Science)

Carlos F. Jackson, M.F.A., Chairperson of the Department

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Faculty. http://chi.ucdavis.edu/faculty

This minor provides a broad overview of the historical, social, political, economic, ideological and cultural forces that shape the Chicana/o and Latina/o experience. The minor is open to all students with or without course work in Spanish. Students should contact the master advisor for a plan approval and verification of the minor.

Minor Advisor. Alma Martinez, M.A.

Chicana/o Studies **Units:** 24

CHI 010	Introduction to Chicana/o Studies	4
OR		
CHI 050	Chicana and Chicano Culture	4

Choose one:

CHI 150	The Chicana and Chicano Movement	4
CHI 181	Chicanas and Latinas in the U.S.: Historical Perspectives	4
HIS 169A	Mexican-American History	4
HIS 169B	Mexican-American History	4

Choose four:

CHI 110	Sociology of the Chicana/o Experience	4
CHI 111	Chicanas/Mexicanas in Contemporary Society	4
CHI 112	Globalization, Transnational Migration, and Chicana/o and Latina/o Communities	4

CHI 120	Chicana/ o Psychology	4
CHI 121	Chicana/ o Community Mental Health	4
CHI 122	Psychology Perspectives Chicana/o and Latina/o Family	4
CHI 123	Psychological perspectives on Chicana/o and Latina/o Children and Adolescents	4
CHI 130	United States-Mexican Border Relations	4
CHI 131	Chicanas in Politics and Public Policy	4
CHI 132	Political Economy of Chicana/o Communities	4
CHI 154	The Chicana/o Novel	4
CHI 155	Chicana/o Theater	4
CHI 156	Chicana/o Poetry	4
CHI 160	Mexican Film and Greater Mexican Identity	4
CHI 165	Chicanas, Latinas and Mexicanas in Commercial Media	4
CHI 171	Mexican and Chicano Mural Workshop	4
CHI 172	Chicana/o Voice/Poster Silk Screen Workshop	4

Total: 24

Chicana/Chicano Studies | CHI Courses

Courses in CHI:

CHI 010—Introduction to Chicana/o Studies (4)
Discussion—1 hour; Lecture—3 hours. Analysis of the situation of the Chicana/o (Mexican-American) people, emphasizing their history, literature, political movements, education and related areas. GE credit: ACGH, AH, DD, OL, SS, WE. Effective: 1997 Winter Quarter.

CHI 021—Chicana/o and Latina/o Health Care Issues (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHI 010 Overview of health issues of Chicanas/os and Latinas/os in the State of California; role of poverty/lack of education in limited access to health care. GE credit: OL, WE. Effective: 1997 Winter Quarter.

CHI 021S—Chicana/o and Latina/o Health Care Issues (4)
Lecture—4 hours. Prerequisite(s): SPA 003 or SPA 003V or SPA 003Y; Or equivalent. Overview of health issues of Chicanas/os and Latinas/os in the State of California; role of poverty/lack of education and limited access to health care. All course instruction for this course will be in Spanish. This course is taught abroad. Not open for credit to students who have completed CHI 021. GE credit: OL, WC, WE. Effective: 2018 Spring Quarter.

CHI 023—Qualitative Research Methods (4)
Discussion—1 hour; Lecture/Discussion—3 hours. Dominant models of qualitative inquiry in educational and social science research as well as mestizo approaches to research with latinos. Emphasis given to choosing and designing culturally appropriate strategies to investigate latino health, education, social context, and policy issues. GE credit: AH, OL, SS, WE. Effective: 2005 Spring Quarter.

CHI 030—United States Political Institutions and Chicanas/ os (4)
Discussion/Laboratory—3 hours; Term Paper. Overview of the major political institutions and ideologies of the United States and the Chicana/o people's historical and contemporary role in, effects from, and responses to them. Theory, method and critical analysis. GE credit: ACGH, DD, OL, SS, WE. Effective: 1997 Winter Quarter.

CHI 040—Comparative Health: Top Leading Causes of Death (4)
Discussion—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): STA 013 or STA 013Y; or Consent of Instructor. Introduction to the epidemiology of the leading causes of death for ethnic/racial minorities. Assessment of disproportionate rates at which ethnic/racial minorities suffer and die from chronic and infectious diseases and injuries and statistical methods used to calculate these rates. Not open for credit to students who have completed CHI 040S. GE credit: QL, SE, WE. Effective: 2018 Spring Quarter.

CHI 040S—Comparative Health: Leading Causes of Death (4)
Lecture—4 hours. Prerequisite(s): STA 013 or STA 013Y; or Consent of Instructor. Introduction to epidemiology of leading causes of death for ethnic/racial minorities. Assessment of disproportionate rates at which ethnic/racial minorities suffer & die from chronic and infectious diseases & injuries & statistical methods used to calculate these rates. Offered abroad. Not open for credit to students who have completed CHI 040. GE credit: QL, SE, WC, WE. Effective: 2018 Spring Quarter.

CHI 050—Chicana and Chicano Culture (4)
Discussion—1 hour; Lecture—3 hours. Interdisciplinary survey of Chicana/o cultural representation in the 20th century. Examines Chicana/o culture within a national and transnational context. Explores how Chicano cultural forms and practices intersect with social/material forces, intellectual formations and cultural discourses. (Former course 20.) GE credit: ACGH, AH, DD, WC, WE. Effective: 1997 Winter Quarter.

CHI 060—Chicana and Chicano Representation in Cinema (4)
Discussion—1 hour; Film Viewing—2 hours; Lecture—3 hours. Introductory-level study of Chicana and Chicano representation in cinema. Depiction of Chicana and Chicano experience by Chicana/o filmmakers, as well as by non-Chicanos, including independent filmmakers and the commercial industry. GE credit: ACGH, AH, DD, VL, WE. Effective: 2005 Spring Quarter.

CHI 065—New Latin American Cinema (4)
Discussion—1 hour; Film Viewing—3 hours; Lecture/Discussion—2 hours. Historical, critical, and theoretical survey of the cinemas of Latin America and their relationship to the emergence of U.S. Latino cinema. Emphasis on representation and social identity including gender, sexuality, class, race and ethnicity GE credit: AH, VL, WC, WE. Effective: 2005 Spring Quarter.

CHI 070—Survey of Chicana/ o Art (4)
Lecture—4 hours. Survey of contemporary Chicana/o art in context of the social turmoil from which it springs. Includes political use of the poster and the mural, the influence of the Mexican mural and graphic movement, and social responsibility of the artist. GE credit: ACGH, AH, DD, VL, WC, WE. Effective: 1997 Winter Quarter.

CHI 073—Chicana/ o Art Expression Through Silk Screen (4)
Laboratory—4 hours; Studio—8 hours. Introductory level studio course using silk screen and basic printing
techniques to explore and develop images of Chicana/o cultural themes and expressions. Students will experiment with images and symbols from
their immediate environment/culture. Integrated approach to Chicana/o philosophy of art. GE credit: ACGH, AH, DD, OL, VL, WC. Effective: 1997 Winter Quarter.

CHI 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): CHI 010; or Consent of Instructor. Academic guidance combined with internship in community agencies serving Mexican/Latina/Latino/Chicana/Chicano clients. Students will use their bilingual skills and knowledge of history, culture, economics, politics and social issues. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2004 Fall Quarter.

CHI 098—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHI 099—Special Study for Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHI 100—Chicana/ Chicano Theoretical Perspective (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): CHI 010; CHI 050 Critical examination of emerging Chicana/o Studies theoretical perspectives in light of contemporary intellectual frameworks in the social sciences, arts, and humanities. Includes analysis of practices of self-representation, and socio-cultural developments in the Chicana/o community. GE credit: ACGH, DD, SS, WC, WE. Effective: 1997 Winter Quarter.

CHI 110—Sociology of the Chicana/o Experience (4)
Lecture/Discussion—4 hours. Prerequisite(s): CHI 010 or SOC 001 The Chicana/o experience in the American society and economy viewed from theoretical perspectives. Immigration, history of integration of Chicana/o labor into American class structure, education inequality, ethnicity, the family and Chicana/o politics. (Former course Sociology 110.) GE credit: ACGH, DD, OL, SS, WE. Effective: 1997 Winter Quarter.

CHI 111—Chicanas/Mexicanas in Contemporary Society (4)
Lecture/Discussion—4 hours. Prerequisite(s): CHI 010 or CHI 050; (WMS 050 or HIS 169B) Analysis of the role and status of Chicanas/Mexicanas in contemporary society. Special emphasis on their historical role, the political, economic and social institutions that have affected their status, and their contributions to society and their community. (Former course 102.) GE credit: ACGH, DD, SS, WE. Effective: 1997 Winter Quarter.

CHI 112—Globalization, Transnational Migration, and Chicana/o and Latina/o Communities (4)
Lecture—4 hours. Prerequisite(s): CHI 010 Chicana/o and Latina/o migration experiences within a global context. Topics include national and/or transnational migration in Mexico, Central America, and the United States. GE credit: ACGH, DD, OL, SS, WE. Effective: 2005 Winter Quarter.

CHI 113—Latin American Women's Engagement in Social Movements (4)
Lecture/Discussion—3 hours; Term Paper. Examination of how women of different racial/ethnic and class backgrounds in Latin America challenge their marginalization. Exploration of US foreign policy, its effects on Latin American's institutions and on Latin American citizens. Using Chicana feminist perspective. GE credit: ACGH, DD, SS, WC, WE. Effective: 2013 Fall Quarter.

CHI 114—Women of Color Reproductive Health and Reproductive Politics in a Global Perspective (4)
Lecture/Discussion—3 hours; Term Paper. Study contemporary issues in reproductive health and reproductive politics, both globally and in the U.S., for women of color. GE credit: ACGH, DD, SS, WC, WE. Effective: 2013 Fall Quarter.

CHI 114S—Women of Color Reproductive Health and Gender Politics in Cuba and the US (4)
Lecture/Discussion—3 hours; Term Paper. Study of contemporary issues in reproductive health, reproductive politics, and gender politics both in Cuba and in the U.S., for women of color. GE credit: ACGH, DD, SS, WC, WE. Effective: 2015 Spring Quarter.

CHI 120—Chicana/ o Psychology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHI 021; Introductory psychology course recommended. Introduction to the field of Chicana/o psychology. Analysis of socio-cultural context of Chicanas/os and Latinas/os. Special attention to issues of ethnic identity development, bilingualism, and development of self esteem. Impact of minority experience, migration, acculturation are examined. GE credit: ACGH, DD, OL, SS, WE. Effective: 1997 Winter Quarter.

CHI 121—Chicana/ o Community Mental Health (4)
Lecture—3 hours; Term Paper. Prerequisite(s): CHI 010; or CHI 020. Mental health needs, problems, and service utilization patterns of Chicanas/os and Latinas/os will be analyzed. An analysis of social service policy, and the economic context of mental health programs. GE credit: ACGH, DD, OL, SS, WE. Effective: 1997 Winter Quarter.

CHI 122—Psychology Perspectives Chicana/o and Latina/o Family (4)
Lecture—4 hours. Prerequisite(s): CHI 010; and Consent of Instructor. Introductory psychology course highly recommended. Role of migration and acculturation on family structure and functioning. From a psychological and Chicana/o Studies perspective, contemporary gender roles and variations in family structures are examined. Special topics include family violence, addiction, family resilience and coping
strategies. GE credit: SS, WE. Effective: 1997 Winter Quarter.

CHI 122S—Psychology Perspectives Chicana/o and Latina/o Family (4)
Lecture—4 hours. Role of migration and acculturation on family structure and functioning. From a psychological and Chicana/o Studies perspective, contemporary gender roles and variations in family structures are examined. Special topics include family violence, addiction, family resilience and coping strategies. This course is taught abroad. Not open for credit to students who have completed CHI 122. GE credit: OL, SS, WC, WE. Effective: 2006 Spring Quarter.

CHI 123—Psychological perspectives on Chicana/o and Latina/o Children and Adolescents (4)
Lecture—3 hours; Term Paper. Prerequisite(s): CHI 010 or CHI 021 Restricted to upper division standing. Psychological and educational development of Chicano/Latino children and adolescents, with particular attention to the formation of ethnic, gender, class, race, and sexual identities. GE credit: ACGH, DD, OL, SS, WE. Effective: 2005 Spring Quarter.

CHI 125S—Latino Families in the Age of Globalization: Migration and Transculturation (4)
Lecture/Discussion—4 hours. Prerequisite(s): SPA 003 or the equivalent highly recommended. Impact of globalization on Latino families in the American continent. Relationships of political structure, economics and family. Intimate partner violence, child maltreatment and alcohol/drug abuse in contemporary Latino families. Offered in a Spanish speaking country GE credit: OL, SS, WC, WE. Effective: 2007 Spring Quarter.

CHI 130—United States-Mexican Border Relations (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Upper division standing. Theories of U.S.-Mexican border relations, with an overview of the political, economic, and social relationships and an in-depth
analysis of immigration issues, border industrialization, women's organizations, economic crises, and legal issues. GE credit: ACGH, DD, SS, WE. Effective: 1997 Winter Quarter.

CHI 131—Chicanas in Politics and Public Policy (4)
Lecture/Discussion—4 hours. Prerequisite(s): CHI 030 or POL 001 Historical and political analysis of Chicana/Latina political involvement and activities in the general political system, women's movement, Chicano movement, and Chicana movement. Course also examines the public policy process and the relationship of Chicanas/Latinas to public policy formation. GE credit: ACGH, DD, OL, SS, WE. Effective: 1997 Winter Quarter.

CHI 131S—Chicanas in Politics and Public Policy (4)
Lecture/Discussion—4 hours. Historical and political analysis of Chican/Latina political involvement and activities in the general political system, women's movement, Chicano/a movement. Course also examines the public policy process and the relationship of Chicanas/Latinas to public policy formation. Offered Abroad. Not open for credit to students who have completed CHE 131. GE credit: OL, SS, WC, WE. Effective: 2006 Spring Quarter.

CHI 132—Political Economy of Chicana/o Communities (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Upper division standing; lower division Chicana/o Studies course recommended. Historical and contemporary study of political and economic forces which define and influence the development of Chicana/o communities. Includes critiques of traditional and Marxian theories and concepts applicable to Chicana/o communities, case studies of Chicana/o communities,especially in California and Texas. GE credit: ACGH, DD, OL, WE. Effective: 1997 Winter Quarter.

CHI 135S—Transnational Latina/o Political Economy (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 003 or SPA 003V or SPA 003Y; or Consent of Instructor. Or equivalent; ECN 001A and ECN 001B recommended. Intensive reading, discussion and research on selected topics from Latin America and the US with regard to immigrant and native communities. Topics include comparative immigration and macroeconomic policies in the US and Latin America.Offered in a Spanish speaking country. GE credit: OL, WC, WE. Effective: 2018 Spring Quarter.

CHI 140A—Quantitative Methods: Chicano/Latino Health Research (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): Two years of high school algebra or the equivalent in college. Focuses on measuring Latino/Chicano health outcomes using a quantitative approach. Assesses main types of study designs and addresses measurement of disease frequency and health effects. GE credit: ACGH, DD, QL, SE. Effective: 2006 Spring Quarter.

CHI 141—Community-Based Participatory Research and Chicana/o and Latina/o Health (4)
Lecture/Discussion—3 hours; Term Paper. Overview of CBPR, as well as methodological CBPR considerations in building community partnerships, community assessment, issue analysis, research planning, data gathering, and data sharing with Chicana/o and Latina/o communities in particular. GE credit: DD, WE. Effective: 2015 Spring Quarter.

CHI 145S—Bi-National Health (5)
Lecture—5 hours. Prerequisite(s): BIS 001A; BIS 001B; BIS 001C; (SPA 021 or SPA 021V or SPA 021Y or SPA 031); or Consent of Instructor. Upper division standing only. Examination of health status and intervention strategies presented in public health care settings, private clinics and by indigenous healers in Mexico. Analysis of impact of high risk diseases. Offered in a Spanish speaking country under supervision of UC Davis faculty/lecturer GE credit: OL, WC, WE. Effective: 2018 Spring Quarter.

CHI 146S—Public Health in Latin America (5)
Lecture/Discussion—4 hours; Term Paper. Critical examination of emerging Public Health issues in Latin America in light of economic, political and social conditions. Contemporary behavioral frameworks used in public health. Includes analysis of clinical medicine and health care systems. Effective: 2011 Fall Quarter.

CHI 147S—Indigenous Healing and Biodiversity in Latin America (5)
Lecture—4 hours; Term Paper. Contrast between western and traditional healing practices in Latin America and the role of the natural environment in creating sustainable health delivery systems. Questions of health status attributable to public health and environmental risk factors. GE credit: OL, WC, WE. Effective: 2011 Fall Quarter.

CHI 150—The Chicana and Chicano Movement (4)
Lecture—3 hours; Term Paper. Development of the Chicano Movement within the context of the socio-political movements of the 1960's in a national and global perspective. Ideological/political perspectives and the implications for political strategies. GE credit: ACGH, AH, DD, SS, WC, WE. Effective: 2005 Spring Quarter.

CHI 154—The Chicana/o Novel (4)
Lecture—4 hours. Prerequisite(s): Intermediate Spanish or consent of instructor. Introduction to the forms and themes of the Chicana/o novel with special attention to the construction of gender, nationality, sexuality, social class, and the family by contemporary Chicana/o novelists. Bilingual readings, lectures, discussions, and writing in Spanish.(Former course Spanish 126A.) GE credit: ACGH, AH, DD, OL, WC, WE. Effective: 1997 Winter Quarter.

CHI 155—Chicana/o Theater (4)
Lecture—4 hours. Prerequisite(s): Intermediate Spanish or consent of instructor. Examination of the formal and thematic dimensions of Chicana/o theater in the contemporary period with special emphasis on El Teatro Campesino and Chicana Feminist Theater. Bilingual readings, lectures, discussions, and writing in Spanish. (Former course Spanish 126B.) GE credit: ACGH, AH, DD, OL, VL, WC, WE. Effective: 1997 Winter Quarter.

CHI 156—Chicana/o Poetry (4)
Lecture—4 hours. Prerequisite(s): Intermediate Spanish or consent of instructor. Survey of Chicana/o poetry with special emphasis on its thematic and formal dimensions. Bilingual readings, lectures, discussions, and writing in Spanish. (Former course Spanish 126C.) GE credit: ACGH, AH, DD, OL, WC, WE. Effective: 1997 Winter Quarter.

CHI 157—Chicana and Chicano Narrative (4)
Lecture/Discussion—3 hours; Term Paper. Exploration of contemporary forms of the Chicana and Chicano narrative, encompassing visual art, fiction, poetry, film, theater, and creative nonfiction. Exposure to a variety of artists and scholars whose work shapes our evolving understanding of the Chicana/o experience GE credit: ACGH, AH, DD, VL, WC, WE. Effective: 2013 Fall Quarter.

CHI 160—Mexican Film and Greater Mexican Identity (4)
Film Viewing—1 hour; Lecture/Discussion—4 hours. Prerequisite(s): Intermediate Spanish. Survey of the role Mexican cinema plays in consolidation and contestation of post-revoluationary Mexican state and in the formation of a Greater Mexican cultural identity including Chicana/o identity. Showcases genres, perios, auteurs, movements and emphasis on gendered and sexualized narratives. GE credit: AH, VL, WC, WE. Effective: 2001 Winter Quarter.

CHI 161—Queer Latinidad (4)
Lecture/Discussion—3 hours; Term Paper/Discussion. Introduction to queer Latina and Latino studies with a focus on Chicana and Chicano theory and cultural production. GE credit: ACGH, AH, DD, SS, WE. Effective: 2015 Fall Quarter.

CHI 165—Chicanas, Latinas and Mexicanas in Commercial Media (4)
Laboratory—2 hours; Lecture/Discussion—4 hours. Prerequisite(s): CHI 060; Or other film or feminist theory course; conversational fluency in Spanish. The portrayal of Chicanas, Latinas and Mexicanas in commercial media. The relation between the representation of Chicana, Latina, and Mexicana women in commercial television and cinema and the role of women in Mexican and U.S. societies. GE credit: AH, VL, WC, WE. Effective: 1997 Fall Quarter.

CHI 170—Contemporary Issues in Chicano Art (4)
Lecture—4 hours. Issues and conflicts in the dismantling of the Contemporary Chicano Art Movement. Response and challenge to the dominant culture. GE credit: ACGH, AH, DD, VL, WC, WE. Effective: 2007 Winter Quarter.

CHI 171—Mexican and Chicano Mural Workshop (4)
Independent Study—1 hour; Studio—8 hours. Prerequisite(s): CHI 070; and Consent of Instructor. The Mural: a collective art process that empowers students and people through design and execution of mural paintings in the tradition of the Mexican Mural Movement; introduces materials and techniques. May be repeated up to 1 time(s). (ART 171.) GE credit: AH, VL. Effective: 1997 Winter Quarter.

CHI 172—Chicana/o Voice/Poster Silk Screen Workshop (4)
Independent Study—1 hour; Studio—8 hours. Prerequisite(s): CHI 070 or CHI 073; and Consent of Instructor. The poster as a voice art form used by Chicanas/os and other people of color to point to the defects of social and political existence and the possibility for change, from the Chicana/o artists' perspective. May be repeated up to 1 time(s). GE credit: AH, OL, VL, WC. Effective: 1997 Winter Quarter.

CHI 180—Grant Writing in the Chicana/o/Latina/o Community (4)
Lecture—4 hours. Prerequisite(s): CHI 010 or CHI 023; or Consent of Instructor. Upper division standing. Overview of key elements for grant writing. Topics include community needs assessments, development of human subjects protocols, data collection, methods, evaluation designs and community based methodologies for grant development applications in the Latino community. Effective: 2006 Spring Quarter.

CHI 181—Chicanas and Latinas in the U.S.: Historical Perspectives (4)
Lecture/Discussion—4 hours. Prerequisite(s): CHI 010 or WMS 050 Historical issues in the lives of Chicanas and Latinas in the U.S. and their diverse countries of origin. GE credit: ACGH, AH, DD, SS, WE. Effective: 2017 Fall Quarter.

CHI 182—Race and Juvenile Justice (4)
Lecture—4 hours. Prerequisite(s): CHI 010; Or equivalent. Individual and institutinal respnses to "troublesome" youth of color through history and in contemporary siciety. Emphasis on how race, as well as ethnicity, class, and gender have informed the treatment of "delinquent" youth. GE credit: ACGH, DD, OL, SS, WE. Effective: 2007 Winter Quarter.

CHI 184—Latino Youth Gangs in Global Perspective (4)
Lecture—3 hours; Term Paper. Comparative analysis of Latino youth gangs in Europe, Latin America, and the United States. Social, economic, political, and cultural factors leading to youth gangs as well as the responses are considered within a global perspective. Not open for credit to students who have completed CHI 184S. GE credit: ACGH, DD, OL, SS, WC, WE. Effective: 2013 Fall Quarter.

CHI 184S—Latino Youth Gangs in Global Perspective (4)
Lecture/Discussion—12 hours. Comparative analysis of Latino youth gangs in Europe, Latin America, and the United States. Social, economic, political, and cultural factors leading to youth gangs as well as the responses to the youths are considered within a global perspective. Not open for credit to students who have completed CHI 184. GE credit: ACGH, DD, OL, SS, WC, WE. Effective: 2013 Fall Quarter.

CHI 192—Internship in the Chicana/Chicano/Latina/Latino Community (1-12)
Internship—3-36 hours. Prerequisite(s): (CHI 010 or CHI 021 or CHI 050); (SPA 003 or SPA 003V); Or equivalent of SPA 003. Academic guidance combined with internship in community agencies serving Mexican/Latina/Latino/Chicana/Chicano clients. Use of bilingual skills and knowledge of history, culture, economics, politics and social issues. Internship project required. May be repeated up to 12 unit(s). (P/NP grading only.) GE credit: OL. Effective: 2018 Winter Quarter.

CHI 192S—Internship (1-12)
Internship. Prerequisite(s): (CHI 010 or CHI 021 or CHI 050); (SPA 003 or SPA 003V or SPA 003Y); and Consent of Instructor. Or equivalent of SPA 003, SPA 003V, SPA 003Y. Internship May be repeated for credit. (P/NP grading only.) Effective: 2018 Spring Quarter.

CHI 194HA—Senior Honors Research Project (2-5)
Independent Study—6-15 hours. Prerequisite(s): Consent of Instructor. Senior standing in Chicana/o Studies major. Student is required to read, research, and write Honors Thesis on Chicana/o Studies topics. GE credit: OL, WE. Effective: 1997 Winter Quarter.

CHI 194HB—Senior Honors Research Project (2-5)
Independent Study—6-15 hours. Prerequisite(s): Consent of Instructor. Senior standing in Chicana/o Studies major. Student is required to read, research, and write Honors Thesis on Chicana/o Studies topics. GE credit: OL, WE. Effective: 1997 Winter Quarter.

CHI 194HC—Senior Honors Research Project (2-5)
Independent Study—6-15 hours. Prerequisite(s): Consent of Instructor. Senior standing in Chicana/o Studies major. Student is required to read, research, and write Honors Thesis on Chicana/o Studies topics. GE credit: OL, WE. Effective: 1997 Winter Quarter.

CHI 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Upper division standing and consent of Program Chairperson. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHI 198S—Directed Group Study (1-5)
Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2006 Winter Quarter.

CHI 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Upper division standing and consent of Program Chairperson. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHI 199S—Special Study for Advanced Undergraduates (1-5)
Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2006 Winter Quarter.

CHI 230—Chicano/Latino Hispanic Politics (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Two undergraduate courses in Chicana/o Studies or consent of instructor. Examination of Chicano/Latino political experiences. Evaluate theories, ideology, and practice of Chicano politics. Brief history of Chicano/Latino/Hispanic political activity, comparisons among political modes, gendered politics, and understanding relationships among Chicano, Mexican, American and world politics. Effective: 1997 Spring Quarter.

CHI 241—Community Based Health Research (4)
Lecture/Discussion—3 hours; Term Paper. Provides knowledge and skills to plan and implement public health projects that highlight the intersection of social determinants of health within a community empowerment framework. (S/U grading only.) Effective: 2017 Fall Quarter.

CHI 298—Group Study for Graduate Students (1-5)
Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit when topics differs. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

CHI 299—Special Study for Graduate Students (1-12)
Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

CHI 396—Teaching Assistant Training Practicum (1-4)
Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit. (S/U grading only.) Effective: 2004 Spring Quarter.

Child Development (Graduate Group)

Child Development (Graduate Group) | Child Development M.S.

Amanda Guyer, Ph.D., Group Chairperson

Group Office. 1315 Hart Hall; 530-754-4109; http://humandevelopment.ucdavis.edu/

Faculty. http://humanecology.ucdavis.edu/hdfs-faculty

Graduate Study. The Graduate Group in Child Development offers a multidisciplinary program leading to an M.S. degree. The program provides students with an opportunity to pursue a coordinated course of postgraduate study in the field of child development which cuts across departmental boundaries. Students may work with children and families in the community, as well as the University's Center for Child and Family Studies. Recipients of the degree gain sufficient background to engage in professions that directly (e.g., preschool, 4-H) or indirectly (e.g., social policy) involve children and families, obtain positions in teaching or research settings, or pursue further study leading to a doctorate in child development, human development, clinical psychology, or related fields.

Applicants seeking admissions and fellowships consideration must submit all materials by our priority December 15 deadline. The final admissions deadline is March 1. For more details, see http://humandevelopment.ucdavis.edu/.

Graduate Advisor. Contact Group office.

Chinese; East Asian Languages & Cultures

Chinese; East Asian Languages & Cultures | CHN Information

(College of Letters and Science)

Department Office. 211 Sproul Hall; 530-752-4999; http://chinese.ucdavis.edu

Faculty. https://ealc.ucdavis.edu/people

Chinese; East Asian Languages & Cultures | CHN A.B.

(College of Letters and Science)

Department Office. 211 Sproul Hall; 530-752-4999; http://chinese.ucdavis.edu

Faculty. https://ealc.ucdavis.edu/people

The Major Program

The department offers a core language program in Chinese, and courses in literature and culture. The core language program has two tracks: one for students who have no background whatsoever and one for students with prior language background.

The Program. Practical language skills are taught using the most modern methods so that upon entering the upper division a student will have attained substantial fluency in the spoken language (hearing and speaking) and the written language (reading and writing). Upper-division courses balance the need to further language skills with the need to understand and appreciate the cultural richness of Chinese civilization. All students are encouraged to combine their study of language and literature with courses in related fields, and to study abroad through the Education Abroad Program, the UC Davis Study Abroad Program or through internships in China or Taiwan.

Career Opportunities. UC Davis graduates have learned that a major in Chinese is a genuine, earned distinction that facilitates entrance to graduate programs and professional schools. In addition, job opportunities abound in virtually all career paths, especially for those who have completed study abroad.

Honors Program. To be eligible to receive high or highest honors in the Chinese major, students must complete a senior thesis project. A student interested in pursuing a senior thesis project must enroll in CHN 194H and complete a scholarly paper or similar research project under the direction of a senate faculty member. The thesis project will have a minimum duration of two quarters and carry a minimum of 6 units of credit. To qualify to undertake the senior thesis project, a student must have completed at least 135 units with a minimum GPA of 3.500 in courses counted toward the major. Interested students should consult with faculty in their field of interest by the quarter before they hope to commence work on the project (in most cases this will be the Spring Quarter of their junior year). Students who complete the senior thesis project and have an overall GPA that qualifies them for honors may be recommended by the faculty for honors, high honors, or highest honors at graduation.

Education Abroad Program. The university maintains study abroad programs in China, Hong Kong, and Taiwan. They offer excellent opportunities for students to polish their language skills and experience Asian cultures firsthand. Students are encouraged to participate. Appropriate courses taken abroad can be applied toward the major or the minor. For details, see the department's undergraduate advisor, the Education Abroad Program office or the UC Davis Study Abroad Office.

Related Courses. See East Asian Studies course list.

Prerequisite Credit. No student may repeat a course if that course is a prerequisite for a course that has already been completed with a grade of C– or better.

Placement. Chinese 1 is intended for beginning students with no prior knowledge of the Chinese language. Students who do have some knowledge but wish to improve their skills should meet with an advisor to discuss appropriate placement. Students must follow departmental guidelines for placement in all language courses and instructor approval is required for enrollment.

Backtracking. Satisfactory completion of a language course is evidence that a student's language skills are beyond the level of those expected in its prerequisite courses. Accordingly, students who have completed a language course cannot go back and take its prerequisites. If the prerequisite courses are required for the major, students may substitute other courses. Students who are not sure how this requirement applies to them should speak to the undergraduate advisor.

Waived Language Courses. Students with exceptional language ability may waive required language courses. If lower division courses have been waived, students will not have to take courses in their place. If upper division courses have been waived, students can use other

appropriate courses to earn the units they need to complete the major. Consult the undergraduate advisor regarding selection of appropriate courses.

Grading. Students may take up to two and no more than two (regular, letter-graded) courses for the major on a P/NP basis. Courses which are only offered on a P/NP basis do not count toward these limits.

Preparatory Subject Matter **Units:** 0-30

CHN 001	Elementary Chinese	5
CHN 002	Elementary Chinese	5
CHN 003	Elementary Chinese	5
CHN 004	Intermediate Chinese	5
CHN 005	Intermediate Chinese	5
CHN 006	Intermediate Chinese	5
OR		
CHN 001BL	Accelerated Written Chinese I	5
CHN 002BL	Accelerated Written Chinese II	5
CHN 003BL	Accelerated Written Chinese III	5
OR		
CHN 001CN	Mandarin for Cantonese Speakers I	5
CHN 002CN	Mandarin for Cantonese Speakers II	5
CHN 003CN	Mandarin for Cantonese Speakers III	5

OR

Equivalent as determined by a required language placement exam.

Recommended, but NOT required:

CHN 010	Modern Chinese Literature (In English)	4
CHN 011	Great Books of China (in English)	4
CHN 050	Introduction to the Literature of China and Japan	4
COM 014	Introduction to Poetry	3
JPN 010	Masterworks of Japanese Literature (in English)	4
LIN 001	Introduction to Linguistics	4
HIS 009A	History of East Asian Civilization	4

Depth Subject Matter **Units:** 40

CHN 106	Chinese Poetry (in English)	4
CHN 107	Traditional Chinese Fiction (in English)	4
CHN 111	Modern Chinese: Reading and Discussion	4
CHN 112	Modern Chinese: Reading and Discussion	4
CHN 113	Modern Chinese: Reading and Discussion	4
OR		
CHN 111A	Intensive Third-Year Chinese	12

CHN 111A content is equivalent to CHN 111, 112, 113.

CHN 114	Introduction to Classical Chinese	4
CHN 160	The Chinese Language	4

Note: With prior approval of the undergraduate advisor, students already proficient in Chinese at any third-year level (111-112-113) must take other upper-division Chinese courses to replace language course(s.

Choose three; at least 12 units:

One of the three courses must be CHN 101, 102, 103, 104, or 109G.

CHN 100A	Chinese Intellectual Traditions: Daoist Traditions	4
CHN 101	Chinese Film	4
CHN 102	Chinese American Literature (In English)	4
CHN 103	Modern Chinese Drama	4
CHN 104	Modern Chinese Fiction (in English)	4
CHN 105	Western Influences on Twentieth-Century Chinese Literature (in English)	4
CHN 108	Poetry of China and Japan (in English)	4
CHN 109A	Topics in Chinese Literature; Crime and Punishment	4
CHN 109C	Topics in Chinese Literature; Women Writers (in English)	4
CHN 109D	Topics in Chinese Literature; The Knight-Errant (in English)	4
CHN 109E	Topics in Chinese Literature; The City in Fiction (in English)	4
CHN 109G	Topics in Chinese Literature; The Literature of Twentieth-Century Taiwan (in English)	4
CHN 109H	Topics in Chinese Literature; Popular Literature (in English)	4
CHN 109I	Topics in Chinese Literature; Scholar & The Courtesan (in English)	4
CHN 110	Great Writers of China: Texts and Context (in English)	4
CHN 115	Introduction to Classical Chinese II	4
CHN 116	Introduction to Classical Chinese III	4
CHN 120	Advanced Chinese**	4
CHN 130	Readings in Traditional Chinese Fiction**	4
CHN 131	Readings in Traditional Chinese Poetry	4
CHN 132	Readings in Modern Chinese Poetry	4
CHN 133	Readings in Modern Chinese Prose and Drama**	4
CHN 134	Chinese Film in Chinese Language	4
CHN 140	Readings in Classical Chinese**	4
CHN 150	Fifth-Year Chinese: Selected Topics in Chinese Language, Literature, and Culture **	4

OR
Any approved substitutions.

Recommended substitutions:

JPN 101	Japanese Literature in Translation: The Early Period	4
JPN 102	Japanese Literature in Translation: The Middle Period	4
JPN 103	Japanese Literature in Translation: The Modern Period	4
JPN 104	Modern Japanese Literature: War and Revolution	3
JPN 105	Modern Japanese Literature: Hero and Anti-hero	4
JPN 106	Japanese Culture Through Film	4
ANT 148A	Culture and Political Economy in Contemporary China	4
AHI 163A	Early Chinese Art	4
AHI 163B	Chinese Painting	4
EAS 113	Cinema and Society in China	4
ECN 171	Economy of East Asia	4
HIS 191A	Classical China	4
HIS 191B	High Imperial China	4
HIS 191C	Late Imperial China	4
HIS 191D	Nineteenth Century China: The Empire Confronts the West	4
HIS 191E	The Chinese Revolution	4
HIS 191F	History of the People's Republic of China	4
HIS 191G	Special Topics in Chinese History to 1800	4
HIS 191H	Special Topics in Chinese History after 1800	4

POL 148A	Government and Politics of East Asia: China	4
POL 148B	Government and Politics in East Asia: Japan	4
RST 170	Buddhism	4
RST 172	Ch'an (Zen) Buddhism	4

OR

Other advanced literature and culture courses selected in consultation with the undergraduate advisor.

**CHN 120, 130, 133, 140 and 150 can be repeated when content differs.

Total: 40-70

Chinese; East Asian Languages & Cultures | CHN Minor

(College of Letters and Science)

Department Office. 211 Sproul Hall; 530-752-4999; http://chinese.ucdavis.edu

Faculty. https://ealc.ucdavis.edu/people

A minor is offered in Chinese for students wishing to follow a formally recognized program of study in Chinese language and literature. For the minor, students may take one (regular, letter-graded) course on a P/NP basis. Courses which are only offered on a P/NP basis do not count toward these limits.

Chinese **Units:** 20

All upper division courses, including both language courses and literature in translation courses, may be used to meet this requirement. One approved lower division course (CHN 010, 011, 050) may also be used. In addition, students must demonstrate their language proficiency, normally through completion of CHN 003BL or 006. Only four units from 192, 197T, 198, and 199 may be applied to the minor. For details, consult the undergraduate advisor.

Total: 20

Chinese; East Asian Languages & Cultures | CHN Courses

Courses in CHN:

CHN 001—Elementary Chinese (5)
Lecture/Discussion—5 hours. Prerequisite(s): No background in Chinese or placement exam or consent of instructor. Developing elementary level skills of listening, speaking, reading and writing in Mandarin Chinese in everyday communication settings. Introduction of fundamentals of pronunciation, grammar, and Chinese characters will be introduced. GE credit: AH, OL, WC. Effective: 2016 Fall Quarter.

CHN 001A—Accelerated Intensive Elementary Chinese (15)
Lecture/Discussion—15 hours. Prerequisite(s): No background in Chinese or placement exam or consent of instructor. Introduction and practice in contexts of pronunciation, writing system, basic grammar and vocabulary as basis of communicative competency in Mandarin Chinese within a special nine-week intensive course which combines courses 1, 2 and 3. Not open for credit to students who have completed CHN 001, CHN 002, or CHN 003. GE credit: AH, OL, WC. Effective: 2016 Fall Quarter.

CHN 001BL—Accelerated Written Chinese I (5)
Lecture—5 hours. Prerequisite(s): Placement exam or consent of instructor. Trainings on all the communicative skills of listening, speaking, reading, and writing for students who already have elementary level ability to understand or speak Mandarin Chinese. Emphases on standard Mandarin pronunciation, Chinese characters, and discourse level conversations. Not open for credit to students who have completed CHN 008. GE credit: AH, OL, WC. Effective: 2016 Fall Quarter.

CHN 001CN—Mandarin for Cantonese Speakers I (5)
Lecture—5 hours. Prerequisite(s): Placement exam or consent of instructor. Training in spoken Mandarin, particularly in the phonetic transcription system known as pinyin, for students who already read and write Chinese. Not open for credit to students who have completed CHN 007. GE credit: AH, OL, WC. Effective: 2016 Fall Quarter.

CHN 002—Elementary Chinese (5)
Lecture/Discussion—5 hours. Prerequisite(s): CHN 001; Or placement exam or consent of instructor. Continuation of elementary level skill development in listening, speaking, reading and writing Mandarin Chinese in everyday communication settings. Continued introduction of basic vocabulary and characters as well as core grammar, and further train pronunciation. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 002BL—Accelerated Written Chinese II (5)
Lecture—5 hours. Prerequisite(s): CHN 001BL; Or placement exam or consent of instructor. Further trainings on all the communicative skills of listening, speaking, reading, and writing for students that already have elementary level ability to understand or speak Mandarin Chinese. Emphases on standard Mandarin pronunciation, Chinese characters, and discourse level conversations. Not open for credit to students who have completed CHN 018. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 002CN—Mandarin for Cantonese Speakers II (5)
Lecture—5 hours. Prerequisite(s): CHN 001CN; Or placement exam or consent of instructor. Continuation of course 1CN. Training in spoken Mandarin for students who can already read and write Chinese. Not open for credit to students who have completed CHN 017. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 003—Elementary Chinese (5)
Lecture/Discussion—5 hours. Prerequisite(s): CHN 002; Or placement exam or consent of instructor. Continuation of elementary level skill development in listening, speaking, reading and writing Mandarin Chinese in everyday communication settings. Continued introduction of basic vocabulary and characters as well as core grammar, and further train pronunciation. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 003BL—Accelerated Written Chinese III (5)
Lecture—5 hours. Prerequisite(s): CHN 002BL; Or placement exam or consent of instructor. Continuation of course 2BL with further trainings on all the communicative skills of listening, speaking, reading, and writing with emphases on standard Mandarin pronunciation, Chinese characters, and discourse level conversations in more communication settings. Not open for credit to students who have completed CHN 028. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 003CN—Mandarin for Cantonese Speakers III (5)
Lecture—5 hours. Prerequisite(s): CHN 002CN; Or placement exam or consent of instructor. Continuation of course 2CN. Prepares students for entering upper division courses in Chinese. Not open for credit to students who have completed CHN 027. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 004—Intermediate Chinese (5)
Lecture/Discussion—5 hours. Prerequisite(s): CHN 003 or placement exam or consent of instructor. Continuation of intermediate-level communication skills in spoken and written Mandarin, based on language skills developed in course 3. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 004A—Accelerated Intensive Intermediate Chinese (15)
Lecture/Discussion—15 hours. Prerequisite(s): CHN 003 or CHN 001A or placement exam or consent of instructor. Special nine-week accelerated, intensive summer session course that combines the work of courses 4, 5, and 6. Intermediate-level training in spoken and written Chinese in cultural and communicative contexts, based on language skills developed in course 3 or 1A. Not open to students who have completed CHN 004, CHN 005, or CHN 006. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 005—Intermediate Chinese (5)
Lecture/Discussion—5 hours. Prerequisite(s): CHN 004 or placement exam or consent of instructor. Training continues at intermediate-level in spoken and written Chinese in cultural contexts, based on language skills developed in course 4. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 006—Intermediate Chinese (5)
Lecture/Discussion—5 hours. Prerequisite(s): CHN 005; CHN 005 or placement exam or consent of instructor. Intermediate-level training in spoken and written Chinese in cultural contexts, based on language skills developed in course 5. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 007—Chinese Business Culture (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Open to non-heritage students who have no prior knowledge of, or background in, the Chinese language; anyone who has taken Chinese language classes before or after being enrolled at UC Davis, or anyone who is currently enrolled in a Chinese language class, or who speaks any Mandarin or Chinese dialect (e.g., Cantonese), cannot take the course for credit without the instructor's permission. Introduction to business culture of China. Basic conversation and Romanization of Chinese words. GE credit: AH, OL, SS, WC. Effective: 2015 Winter Quarter.

CHN 010—Modern Chinese Literature (In English) (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Introductory course requiring no knowledge of Chinese language or history. Reading and discussion of short stories and novels and viewing of two films. Designed to convey a feeling for what China has experienced in the twentieth century. Not open for credit to students who have already taken, or are taking concurrently, CHN 104. GE credit: AH, WC. Effective: 2008 Spring Quarter.

CHN 011—Great Books of China (in English) (4)
Discussion—1 hour; Lecture—3 hours. Selected readings in English translation are supplemented with background information on periods, authors and the interrelationships of culture, literature and social change. Methods of analysis are introduced and applied in class discussions. GE credit: AH, WC. Effective: 1997 Winter Quarter.

CHN 050—Introduction to the Literature of China and Japan (4)
Lecture/Discussion—4 hours. Methods of literary analysis and their application to major works from the various genres of Chinese and Japanese literature (in translation),
including film. East Asian cultural traditions will also be introduced. (JPN 050.) GE credit: AH, WC. Effective: 2012 Fall Quarter.

CHN 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHN 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHN 100A—Chinese Intellectual Traditions: Daoist Traditions (4)
Lecture/Discussion—4 hours. Prerequisite(s): A course in Chinese history recommended. English-language survey of key Daoist texts and scholarship. Topics include Daoist concepts of the cosmos, the natural world, scripture, the body, and immortality; Daoist divinities; Daoism and the state. (RST 175A.) GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 100B—Confucian Traditions (4)
Lecture/Discussion—4 hours. Key aspects of the Confucian tradition in dynastic China. Major themes addressed include ritual, classical studies, and Confucian influences on the Chinese family and state. GE credit: AH, WC. Effective: 2014 Fall Quarter.

CHN 101—Chinese Film (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. English language survey of Chinese film, from its inception to the end of the twentieth century. Chinese films as important texts for understanding national, transnational, racial, gender, and class politics of modern China. (CTS 147A.) GE credit: AH, VL, WC. Effective: 2016 Spring Quarter.

CHN 102—Chinese American Literature (In English) (4)
Lecture/Discussion—3 hours; Term Paper/Discussion—1 hour. English language survey of Chinese American literature which reflects cultural roots in China before immigration and the diaspora experience in the United States after immigration. Memory, nostalgia, national identities, cross-cultural communication, globalization, and trans-national politics. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 103—Modern Chinese Drama (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. English language survey of modern Chinese spoken drama in the twentieth century and its major playwrights, in the context of Chinese history and the interaction of Chinese culture with other cultures. GE credit: AH, VL, WC. Effective: 2016 Spring Quarter.

CHN 104—Modern Chinese Fiction (in English) (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. English language survey of Chinese fiction as it evolved amidst the great historical, social and cultural changes of the twentieth century. Thorough study of the most influential writers and genres. GE credit: AH, WC. Effective: 2016 Fall Quarter.

CHN 105—Western Influences on Twentieth-Century Chinese Literature (in English) (4)
Discussion—1 hour; Lecture—3 hours. Introduction of Western literary thought into modern China, the experimentation with Western literary forms and techniques, and the development of Marxism in contemporary literary writing. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 106—Chinese Poetry (in English) (4)
Discussion—1 hour; Lecture—3 hours. Organized topically and chronologically, the lyric tradition is explored from the dawn of folk songs down to modern expressions of social protest. Topics include friendship, love, oppression, war, parting, death, ecstasy and beauty. All readings are in English. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 107—Traditional Chinese Fiction (in English) (4)
Discussion—1 hour; Lecture—3 hours. English-language course studying the dawn of Chinese fiction and its development down to modern times. Combines survey history with close reading of representative works such as The Story of the Stone and
famous Ming-Qing short stories. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 108—Poetry of China and Japan (in English) (4)
Discussion—1 hour; Lecture—3 hours. A comparative approach to Chinese and Japanese poetry, examining poetic practice in the two cultures; includes a general outline of the two traditions, plus study of poetic forms, techniques, and distinct treatments of universal themes: love, nature, war, etc. (JPN 108.) GE credit: AH, WC. Effective: 1997 Winter Quarter.

CHN 109A—Topics in Chinese Literature; Crime and Punishment (4)
Discussion—1 hour; Lecture—3 hours. Topics in Chinese literature; crime and punishment. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 109C—Topics in Chinese Literature; Women Writers (in English) (4)
Discussion—1 hour; Lecture—3 hours. Topics in Chinese literature; women writers. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 109D—Topics in Chinese Literature; The Knight-Errant (in English) (4)
Discussion—1 hour; Lecture—3 hours. Topics in Chinese literature; the knight-errant. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 109E—Topics in Chinese Literature; The City in Fiction (in English) (4)
Discussion—1 hour; Lecture—3 hours. Topics in Chinese literature; the city in fiction. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 109G—Topics in Chinese Literature; The Literature of Twentieth-Century Taiwan (in English) (4)
Discussion—1 hour; Lecture—3 hours. Topics in Chinese literature; the literature of twentieth-century Taiwan. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 109H—Topics in Chinese Literature; Popular Literature (in English) (4)
Discussion—1 hour; Lecture—3 hours. Topics in Chinese literature; popular literature. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 109I—Topics in Chinese Literature; Scholar & The Courtesan (in English) (4)
Discussion—1 hour; Lecture—3 hours. Topics in Chinese literature; the scholar and the courtesan. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 110—Great Writers of China: Texts and Context (in English) (4)
Discussion—1 hour; Lecture—3 hours. Examination of major theoretical concepts and interpretive methods in the study of literature by using examples from the Chinese tradition; discussions of classical and modern works with an emphasis on the relations between literature, author, society, and culture. GE credit: AH, WC. Effective: 2017 Spring Quarter.

CHN 111—Modern Chinese: Reading and Discussion (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHN 006 C- or better or CHN 003BL C- or better or CHN 004A C- or better; Or placement exam or consent of instructor. Building on Chinese 6/3BL, further development of communication skills in Modern Standard Mandarin-speaking environments. Reading of dialogues/articles pertaining to contemporary China. GE credit: AH, OL, WC. Effective: 2017 Spring Quarter.

CHN 111A—Intensive Third-Year Chinese (12)
Lecture/Discussion—13.3 hours. Prerequisite(s): CHN 006 or CHN 003BL or CHN 004A; Or placement exam or consent of instructor. Not open to students who have completed course 111, 112, or 113. Nine-week intensive summer course combines courses 111, 112, and 113. Training at intermediate-high and advanced-low level in spoken and written Chinese in cultural and communicative contexts based on language skills developed in course 6. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 112—Modern Chinese: Reading and Discussion (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHN 111; Or placement exam or consent of instructor. Further development of communication skills from course 111 in Modern Standard Mandarin-speaking environments. Reading dialogues/articles pertaining to contemporary China issues and discussing ethical, moral, aesthetic, social, and cultural concerns. GE credit: AH, OL, WC. Effective: 2018 Winter Quarter.

CHN 113—Modern Chinese: Reading and Discussion (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHN 112; Or placement exam or consent of instructor. Continuation of course 112, further developing communication skills in Modern Standard Mandarin-speaking environments. Read dialogues/articles pertaining to contemporary China issues and discuss ethical, moral, aesthetic, social, and cultural concerns. Study strategies for moving between simplified and traditional Chinese characters. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 114—Introduction to Classical Chinese (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHN 112; Consent of Instructor. Or equivalent language proficiency. Introduction to the language in which, until the twentieth century, most official, documentary, scholarly, and belle-lettristic Chinese literature was written. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 115—Introduction to Classical Chinese II (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHN 114; or Consent of Instructor. Continuation of enhancing classical Chinese reading skills with literature ranging from the prose found in Han dynasty historical works, Six Dynasties anecdotal literature, and Tang occasional texts, as well as the poetic shi and fu genres. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 116—Introduction to Classical Chinese III (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHN 115; or Consent of Instructor. Translations of extended readings in the original sources and brief analyses of syntax. These sources will include texts written by well-known figures from the eighth through fifteenth centuries, composing in a wide variety of genres. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 120—Advanced Chinese (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHN 113; Or placement exam or consent of instructor. Evaluation of readings from various genres (literature, newspapers, TV and movies, etc.) develop advanced reading, writing, aural comprehension, and formal/professional speech skills in Mandarin Chinese. Chinese society/cultural studies, especially those sociocultural issues reflected in the language used in learning materials. May be repeated up to 1 time(s) Course material is different for each quarter of an academic year. Students may repeat course one time but repeat class cannot be for the same quarter taken in a previous academic year. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 130—Readings in Traditional Chinese Fiction (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHN 111; Or equivalent language proficiency. Examination of representative works of traditional Chinese fiction popular from the 12th Century until the 17th and 18th centuries. Translations in English of the Chinese texts will be available to students as reference. May be repeated up to 1 time(s). GE credit: AH, VL, WC. Effective: 2016 Spring Quarter.

CHN 131—Readings in Traditional Chinese Poetry (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHN 111; Consent of Instructor. Or equivalent language proficiency. Traditional Chinese poetry from its beginnings to the golden ages of Tang and Song, surveying forms and poets that best reveal the Chinese poetic sensibility and the genius of the language of Chinese poetry. GE credit: AH. Effective: 2016 Spring Quarter.

CHN 132—Readings in Modern Chinese Poetry (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHN 111; Consent of Instructor. Or equivalent language proficiency. Chinese poetry from the Literary Revolution of 1917 to the present, surveying works that embody exciting innovations and reflect the modernity of twentieth-century Chinese society and culture. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 133—Readings in Modern Chinese Prose and Drama (4)
Lecture—4 hours. Prerequisite(s): CHN 111; Or equivalent language proficiency. Literary works and scholarly essays on selected topics of Chinese prose and drama, development of a deep understanding of Chinese culture and society through sophisticated reading materials of these two important genres of the modern period. Conducted in Chinese. May be repeated up to 2 unit(s) when topic differs. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 134—Chinese Film in Chinese Language (4)
Film Viewing—3 hours; Lecture—3 hours. Prerequisite(s): CHN 111; Or equivalent language proficiency. Chinese film and scholarly essays on Chinese cinema and film history. Develop a deep understanding of Chinese culture and society through viewing and studying Chinese films in the Chinese language. GE credit: AH, OL, SS, VL, WC. Effective: 2016 Spring Quarter.

CHN 140—Readings in Classical Chinese (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Study and philological analysis of selected texts from the first millennium of Imperial China. May be repeated up to 2 time(s). GE credit: AH. Effective: 1997 Winter Quarter.

CHN 150—Fifth-Year Chinese: Selected Topics in Chinese Language, Literature, and Culture (4)
Lecture/Discussion—4 hours. Prerequisite(s): CHN 120; Or placement exam or consent of instructor. Examination of literary works and scholarly essays on selected topics of Chinese culture and society. Development of a deep understanding of Chinese culture and society through sophisticated Chinese speaking and writing exercises. May be repeated up to 3 time(s) when topic differs. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

CHN 160—The Chinese Language (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): CHN 006 (can be concurrent) or CHN 003BL (can be concurrent) or CHN 003CN (can be concurrent) or CHN 004A (can be concurrent); Or placement exam or consent of instructor. LIN 001 recommended. Evaluation of the Chinese language viewed in its linguistic context, synchronically and diachronically. Historical phonology, classical and literary language, rise of written vernacular, descriptive grammar of modern standard Chinese, dialectal variation, and sociolinguistic factors. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 160—The Chinese Language (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): CHN 006 (can be concurrent) or CHN 003BL (can be concurrent) or CHN 003CN (can be concurrent) or CHN 004A (can be concurrent); Or placement exam or consent of instructor. LIN 001 recommended. Introduction to structural features of Chinese (Mandarin) sounds, lexicon, grammar, and writing (characters), as well as relevant dialectal and sociolinguistic issues of the language. GE credit: AH, WC. Effective: 2018 Fall Quarter.

CHN 192—Chinese Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing and consent of instructor. Work experience in the Chinese language, with analytical term paper on a topic approved by instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHN 194H—Senior Thesis Honors Project (1-5)
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. Senior standing and qualification for the Chinese honors program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in Chinese literature, civilization, or language studies. May be repeated up to 8 unit(s). (P/NP grading only.) GE credit: AH, WC, WE. Effective: 2017 Fall Quarter.

CHN 197T—Tutoring in Chinese (1-4)
Tutorial—1-4 hours. Prerequisite(s): Consent of Department. Leading of small voluntary discussion groups affiliated with one of the Department's regular courses. May be repeated up to 4 unit(s). (P/NP grading only.) Effective: 2016 Summer Session 1.

CHN 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Summer Session 1.

CHN 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHN 297—Directed Independent Study (4)
Conference—1 hour; Independent Study; Term Paper. Prerequisite(s): Consent of Instructor. Restricted to graduate students. Directed independent study on a topic culminating in a term paper. Independent studies may only be arranged with consent of the instructor and when graduate seminars are unavailable. May be repeated up to 5 time(s). Effective: 2017 Winter Quarter.

CHN 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

CHN 396—Teaching Assistant Training Practicum (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Any course taught by a graduate student under the direction of the Director. May be repeated for credit. (S/U grading only.) Effective: 2016 Spring Quarter.

Cinema & Digital Media

Cinema & Digital Media | Cinema & Digital Media A.B.

(College of Letters and Science)

Michael Neff, Ph.D., Chairperson of the Department

Department Office. 101 Art Building; 530-752-0105; http://arts.ucdavis.edu/cinema-and-digital-media

Faculty. http://arts.ucdavis.edu/cinema-digital-media-program-faculty

The Cinema and Digital Media Major Program

The Cinema and Digital Media (CDM) program combines the study of audio-visual and digital media, theories about such media, and the relevant modes of artistic practice and production. CDM integrates the analysis of audio-visual and digital texts with their theoretical underpinnings and their methods of production. The program also addresses the particular impact that technology has on culture in its many forms and fields.

CDM faculty teach and research on various histories, theories, and practices of media. Current fields for teaching and research in cinema and digital media include the history and analysis of film and video, film and video production, electronic music, digital content creation and design, the digital arts, community media and activism, computer graphics, animation, and gaming—as well as the theories and politics of these various areas.

The Program. Preparatory course work involves a solid introduction to the history, ideas and current trends in cinema and digital media. For depth subject matter, students in the major select a combination of critical studies and creative production courses. Two courses will be selected from the production/programming distribution, two from the theory/history distribution and four will be elected by the student, allowing them to take up to six production courses or six studies/theory classes, should they so choose.

Major Advisor. Information on the current Academic Advisors can be obtained by contacting the Arts Group Advising Center at 530-752-0616 or http://arts.ucdavis.edu/arts-group-undergraduate-advising.

Career Alternatives. Cinema and Digital Media is designed to prepare graduates to be highly adaptable analytical thinkers, collaborative, multi-skilled and current with the latest developments in media and technology. Perhaps most importantly is self-motivation: students do best when fueled by their own passions and plot their own directions, while held to very high standards. We feel this is the best education for living and working in a complex, rapidly changing world. Final research papers and creative production portfolios will provide graduate school admissions committees, employers or clients with tangible evidence of Cinema and Digital Media graduates' track records and talents.

Course Changes. Cinema and Digital Media is working on updating all of the existing FMS, TCS, and CTS courses to the CDM course code. If you have any questions regarding the course code changes and equivalent major requirements please contact the Arts Group Advising Center at 530-752-0616.

Preparatory Subject Matter **Units:** 25

CTS 012	Introduction to Media Computation	4
CTS 020	Filmmaking Foundations	5

Choose two:

FMS 001	Introduction to Film Studies	4
TCS 001	Introduction to Technocultural Studies	4
TCS 005	Media Archaeology	4

Choose two:

CTS 040A	Media History 1, Guttenberg to Oppenheimer	4
CTS 040B	Media History 2 1945-Present	4
CTS 041A	History of Cinema from 1895 to 1945	4
CTS 041B	History of Cinema from 1945 to the present	4

FMS 045	Vampires and Other Horrors in Film and Media	4

Depth Subject Matter **Units:** 37-38

FMS 127	Film Theory	4
OR		
CTS 150	Media Theory	5

Choose two for a total of eight units:

ART 114A	Intermediate Video: Animation	4
ART 114B	Intermediate Video: Experimental Documentary	4
ART 114C	Intermediate Video: Performance Strategies	4
ART 117	Advanced Video and Electronic Arts	4
CTS 116	Design on Screen	4
CTS 124E	Costume Design for Film	4
CTS 174	Acting for Camera	4
TCS 100	Experimental Digital Cinema I	4
TCS 101	Experimental Digital Cinema II	4
TCS 103	Interactivity and Animation	4
TCS 104	Documentary Production	4
TCS 111	Community Media Production	4
TCS 112	New Radio Features and Documentary	4
TCS 113	Community Networks	4
TCS 115	Electronics for Artists	4
TCS 121	Introduction to Electronic Sound	4
TCS 122	Intermediate Sonic Arts	4
TCS 123	Sight and Soundtrack	4
TCS 125	Advanced Sound: Performance and Improvisation	4
TCS 130	Fundamentals of 3D Computer Graphics	4
TCS 131	Character Animation	4
TCS 170A	Advanced Technocultural Workshop	1
TCS 170B	Advanced Technocultural Workshop	1
TCS 170C	Advanced Technocultural Workshop	1
TCS 170D	Advanced Technocultural Workshop	1
TCS 170E	Advanced Technocultural Workshop	1
TCS 175	Small Scale Film Production	4
TCS 192	Internship (Discontinued)	1-4
TCS 198	Directed Group Study (Discontinued)	1-5
TCS 199	Special study for advanced undergraduates (Discontinued)	1-5

Choose two for a total of eight units:

CTS 146A	Modern Iranian Cinema	4
CTS 147A	Chinese Film	4
CTS 150	Media Theory	5
FMS 120	Italian-American Cinema	4
FMS 121	New Italian Cinema	4
FMS 121S	New Italian Cinema	4
FMS 124	Topics in U.S. Film History	4
FMS 125	Topics in Film Genres	4
FMS 127	Film Theory	4
FMS 129	Russian Film	4
FMS 142	New German Cinema	4
FMS 176A	Classic Weimar Cinema	4
FMS 189	Special Topics in Film Studies	4
FMS 194H	Special Study for Honors Students	1-5

FMS 195H	Honors Thesis	1-5
FMS 198	Directed Group Study (Discontinued)	1-5
FMS 199	Special Study for Advanced Undergraduates (Discontinued)	1-5
STS 160	Ghosts of the Machine: How Technology Rewires our Senses	4
TCS 151	Topics in Virtuality	4
TCS 152	New Trends in Technocultural Arts	4
TCS 155	Introduction to Documentary Studies	4
TCS 158	Technology and the Modern American Body	4
TCS 159	Media Subcultures	4

Some courses are identified as fulfilling more than one requirement; a given course can only fulfill one such requirement.

Choose four additional courses, chosen from the lists above, for a total of at least 16 units.

Total: 62-63

Cinema & Digital Media | CDM Courses

Courses in CDM:

CDM 072—Introduction to Games (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Introduction to the history, theory, and practice of play. Survey of both analog and digital games. Overview of gaming cultures, aesthetics, industries, and technologies. (ENL 072.) GE credit: AH, VL. Effective: 2017 Fall Quarter.

CDM 092—Internship (1-12)
Internship—1-12 hours. Prerequisite(s): Consent of Instructor. Supervised internship, on or off campus, in the area of cinema and digital media. May be repeated for credit. (P/NP grading only.) Effective: 2018 Fall Quarter.

CDM 098—Directed Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Directed group study in cinema and digital media. May be repeated for credit when topics differ. (P/NP grading only.) Effective: 2018 Fall Quarter.

CDM 099—Special Study for Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Special study for undergraduates in cinema and digital media. May be repeated for credit. (P/NP grading only.) Effective: 2018 Fall Quarter.

CDM 105—Feminist Media Production (6) ***Review all entries***
Fieldwork—6 hours; Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): CTS 020; or equivalent and one course in Women and Gender Studies, or consent of instructor. Media production as a mode of cultural criticism, furthering feminist and social justice goals. Fundamentals of camera, editing and distribution via a social engagement model. Study and hands-on response to key historic and contemporary feminist and social justice media discourses. (WMS 165) GE credit: ACGH, AH, DD, SS, VL. Effective: 2017 Winter Quarter.

CDM 105—Feminist Media Production (6) ***Review all entries***
Fieldwork—6 hours; Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): (CTS 020 or CDM 020); or two WMS courses Media production as a mode of cultural criticism, furthering feminist and social justice goals. Fundamentals of camera, editing and distribution via a social engagement model. Study and hands-on response to key historic and contemporary feminist and social justice media discourses. (WMS 165.) GE credit: ACGH, AH, DD, SS, VL. Effective: 2018 Fall Quarter.

CDM 163—Art & Cinema: Between the White Cube and the Black Box (4)
Film Viewing—3 hours; Lecture—3 hours. Current debates between cinema studies and contemporary art. Issues covered include, experimental modes of filming, montaging, installing, screening, and displaying images between the White Cube (gallery/museum) and the Black Box (cinema). GE credit: AH, OL, VL, WE. Effective: 2017 Winter Quarter.

CDM 192—Internship (1-12)
Internship—1-12 hours. Prerequisite(s): Consent of Instructor. Upper division standing Supervised internship, on or off campus, in the area of cinema and digital media. May be repeated for credit. (P/NP grading only.) Effective: 2018 Fall Quarter.

CDM 197T—Tutoring in Cinema and Digital Media (1-5)
Tutorial—1-5 hours. Prerequisite(s): Consent of Instructor. Consent of Department Chair. Leading small voluntary discussion groups affiliated with departmental courses under the supervision of the course instructor. May be repeated up to 10 unit(s). (P/NP grading only.) Effective: 2018 Summer Session 1.

CDM 198—Directed Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Directed group study in cinema and digital media. For students with upper division standing. May be repeated for credit when topic differs. (P/NP grading only.) Effective: 2018 Fall Quarter.

CDM 199—Special Study for Advanced Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Special study in cinema and digital media. For advanced undergraduates with upper division standing. May be repeated for credit. (P/NP grading only.) Effective: 2018 Fall Quarter.

CDM 396—Teaching Assistant Training Practicum (1-4)
Variable—3-12 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Teaching assistant training practicum. May be repeated for credit. (S/U grading only.) Effective: 2018 Fall Quarter.

Cinema & Digital Media | CTS Courses

Courses in CTS:

CTS 012—Introduction to Media Computation (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Introduction to key computational ideas necessary to understand and produce digital media. Fundamentals of programming are covered as well as analysis of how media are represented and transmitted in digital form. Aimed primarily at non-computer science students. (ECS 012.) GE credit: AH, SE, VL. Effective: 2013 Fall Quarter.

CTS 020—Filmmaking Foundations (5)
Film Viewing—2 hours; Laboratory—3 hours; Lecture—3 hours; Project (Term Project). Prerequisite(s): CTS 005 or TCS 005 and/or FMS 001 recommended. Introduction to filmmaking concepts, principles, and methods. Hands-on exercises build critical and creative capacities. Emphasis on form, content and the historical dialectic between classical narrative filmmaking conventions and artists' challenges to these conventions. Weekly Lab, Lab Preparation, and Evening Screening. GE credit: AH, VL. Effective: 2013 Fall Quarter.

CTS 040A—Media History 1, Guttenberg to Oppenheimer (4)
Discussion—1 hour; Extensive Writing; Film Viewing—2 hours; Lecture—3 hours. History of Media to 1945, with particular focus on mechanically reproduced mass media technologies including the printing press, the newspaper, photography, cinema, radio and early computing technology. Analysis of inter-related cultural and political topics. (STS 040A.) GE credit: AH, OL, SS, VL, WE. Effective: 2014 Fall Quarter.

CTS 040B—Media History 2 1945-Present (4)
Discussion—1 hour; Extensive Writing; Film Viewing—2 hours; Lecture—3 hours. Prerequisite(s): CTS 040A History of media from 1945 to present, with particular focus on the development of the computer, digital network and internet technologies in the context of other media infrastructures like radio, television and satellite networks. Analysis of inter-related cultural/political topics. (STS 040B.) GE credit: AH, OL, SS, VL, WE. Effective: 2015 Winter Quarter.

CTS 041A—History of Cinema from 1895 to 1945 (4)
Discussion—1 hour; Extensive Writing; Film Viewing—3 hours; Lecture—2 hours. Examination of the cultural context of the emergence of cinema. Discussion of cinema as a product of the age of industrialization and conquest, as well as an element of urban culture, and mass transportation. GE credit: AH, OL, VL, WC, WE. Effective: 2014 Fall Quarter.

CTS 041B—History of Cinema from 1945 to the present (4)
Discussion—1 hour; Extensive Writing; Film Viewing—3 hours; Lecture—2 hours. Examination of cinema in the postwar period. Study of world cinema trends and the economic and socio-political conditions enabling innovative work in the film industry. GE credit: AH, OL, VL, WC, WE. Effective: 2014 Fall Quarter.

CTS 116—Design on Screen (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Analysis of the contribution of outstanding designers for cinema, television and filmed entertainment. Study of diverse aesthetic theories of production design and art direction, costume design, or cinematography. Introductory principles and practice, history. May be repeated up to 2 time(s) when topic differs. (DRA 116.) GE credit: AH, VL. Effective: 2013 Fall Quarter.

CTS 124E—Costume Design for Film (4)
Lecture/Discussion—4 hours. Prerequisite(s): DRA 024; or Consent of Instructor. Pass One restricted to Theatre and Dance majors. Theory and practice of the art and business of film costume design. Script analysis, costume research, developing design concepts, budgeting, and current production practices and methods. Execution of designs for period and contemporary films. Viewing of current films. (DRA 124E.) GE credit: AH, OL, VL. Effective: 2017 Spring Quarter.

CTS 146A—Modern Iranian Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): Upper division standing, or consent of instructor. Iranian cinema of the 20th century in the context of profound cultural and social changes in Iran especially since the Iranian Revolution. Productions by representative directors such as Kiarostami, Makhmalbaf, Bahram Beizaie are included. Knowledge of Persian not required. (MSA 131A.) GE credit: AH, OL, VL, WC, WE. Effective: 2013 Fall Quarter.

CTS 146B—Modern South Asia Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): Upper-division standing or consent of instructor. South Asian cinema of last 100 years in the context of cultural, social, and political changes. South Asian history, Independence, Partition, urban life, class, migration, postcolonial identity, diaspora, gender, sexuality, religion, sport, performance, etc. (MSA 131B and ANT 147.) GE credit: AH, SS, VL, WC, WE. Effective: 2017 Winter Quarter.

CTS 147A—Chinese Film (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): HIS 009A; Or any course on traditional China; upper division standing. English language survey of Chinese film, from its inception to the end of the twentieth century. Chinese films as important texts for understanding national, transnational, racial, gender, and class politics of modern China. (CHN 101.) GE credit: AH, VL, WC. Effective: 2014 Winter Quarter.

CTS 148B—Japanese Literature on Film (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Survey of films based on works of Japanese literature, emphasis on pre-modern and early modern texts. Introduction to major directors of Japan, with a focus on cinematic adaptation. Lectures and readings in English. Films in Japanese with English subtitles. (JPN 156.) GE credit: AH, VL, WC, WE. Effective: 2016 Winter Quarter.

CTS 150—Media Theory (5)
Discussion—1 hour; Extensive Writing; Film Viewing—3 hours; Lecture—2 hours. Critical and theoretical approaches to the emergence of new technologies since the invention of photography. Examine various approaches to media (formalist, semiotic, structuralist, Frankfurt School, cybernetics, visual and gamer theory). (STS 151.) GE credit: AH, OL, SS, VL, WE. Effective: 2014 Fall Quarter.

CTS 162—Surveillance Technologies and Social Media (4)
Film Viewing—3 hours; Lecture—3 hours; Term Paper. Prerequisite(s): TCS 001 or STS 020 Study of the ubiquitous presence of CCTV, face recognition software, global tracking systems, biosensors, and data mining practices that have made surveillance part of our daily life. Study boundaries between security and control, information and spying. (STS 162.) GE credit: ACGH, AH, OL, SS, VL, WE. Effective: 2015 Winter Quarter.

CTS 172—Video Games and Culture (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): TCS 001 or ENL 003 or STS 001; Or equivalent of courses listed above. Critical approaches to the study of video games, focusing on formal, historical, and cultural modes of analysis. History of software and hardware in North American and global contexts. Relations of games to society, politics, economics, literature, media, and the arts. (STS 172 and ENL 172.) GE credit: ACGH, AH, SS, VL. Effective: 2014 Fall Quarter.

CTS 174—Acting for Camera (4)
Lecture/Lab—6 hours. Prerequisite(s): Consent of Instructor. Analysis and practice of acting skills required for camera work and digital media. May be repeated up to 8 unit(s) when instructor differs. (DRA 174.) Effective: 2013 Spring Quarter.

Cinema & Digital Media | FMS Courses

Courses in FMS:

FMS 001—Introduction to Film Studies (4)
Discussion—1 hour; Film Viewing—3 hours; Lecture—2 hours. Analysis of film form and narrative, including cinematography, editing, and sound. Issues in film studies, including authorship, stardom, race, gender, class, and cultural identity. Includes introduction to selected cinematic movements and national film traditions. Not open for credit to students who have taken HUM 010. GE credit: AH, OL, VL, WC, WE. Effective: 2012 Fall Quarter.

FMS 045—Vampires and Other Horrors in Film and Media (4)
Discussion—1 hour; Film Viewing—3 hours; Lecture—2 hours. History of representations of vampires and horror generally from the 19th through 21st centuries. Emphasis on transnational history of the horror genre; psychologies of horror effects; issues of race, gender, and class; intersections with prejudice, medicine, modernity. (GER 045.) GE credit: ACGH, AH, DD, OL, VL, WC, WE. Effective: 2012 Fall Quarter.

FMS 090X—Lower Division Seminar (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Study of a special topic in Film Studies in a small class setting. May be repeated for credit if topics differs. (P/NP grading only.) Effective: 2012 Fall Quarter.

FMS 092—Internship (1-12) ***Review all entries***
Internship—3-36 hours. Supervised internship off and on campus in areas of Film Studies. May be repeated for credit. (P/NP grading only.) Effective: 2012 Fall Quarter.

FMS 092—Internship (1-12) ***Review all entries Discontinued***
Internship—3-36 hours. Supervised internship off and on campus in areas of Film Studies. May be repeated for credit. (P/NP grading only.) Effective: 2018 Fall Quarter.

FMS 098—Directed Group Study (1-5) ***Review all entries***
Variable—3-15 hours. Directed Group Study (P/NP grading only.) Effective: 2012 Fall Quarter.

FMS 098—Directed Group Study (1-5) ***Review all entries Discontinued***
Variable—3-15 hours. Directed Group Study (P/NP grading only.) Effective: 2018 Summer Session 1.

FMS 099—Special Study for Undergraduates (1-5) ***Review all entries***
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Special Study for Undergraduates (P/NP grading only.) Effective: 2012 Fall Quarter.

FMS 099—Special Study for Undergraduates (1-5) ***Review all entries Discontinued***
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Special Study for Undergraduates (P/NP grading only.) Effective: 2018 Summer Session 1.

FMS 120—Italian-American Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): FMS 001 Exploration of representations of Italian-American identity in American (U.S.) cinema. Analysis of both Hollywood and independently produced films, especially as they represent ethnicity, gender, and social class of Italian Americans. Not open for credit to students who have taken HUM 120. GE credit: ACGH, AH, DD, OL, VL, WC, WE. Effective: 2012 Fall Quarter.

FMS 121—New Italian Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): FMS 001; And upper-division standing, or consent of instructor. Italian cinema of the 21st century in the context of profound cultural and social changes in Italy since World War II. Productions by representative directors such as Amelio, Giordana, Moretti, Muccino are included. Knowledge of Italian not required. (ITA 121.) GE credit: AH, OL, VL, WC, WE. Effective: 2012 Fall Quarter.

FMS 121S—New Italian Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): FMS 001; And upper-division standing or consent of instructor. Italian cinema of the 21st century in the context of profound cultural and social changes in Italy since World War II. Productions by representative directors such as Amelio, Giordana, Moretti, Muccino are included. Knowledge of Italian not required. (ITA 121S.) GE credit: AH, OL, VL, WC, WE. Effective: 2012 Fall Quarter.

FMS 124—Topics in U.S. Film History (4)
Film Viewing—3 hours; Lecture—3 hours. Prerequisite(s): FMS 001 Study of an aspect of American film history (such as the silent era; the studio system; U.S. avant-garde cinema), including the influences of technological, economic, regulatory, cultural, and artistic forces. May be repeated up to 2 time(s) when topic differs. Not open for credit to students who have completed HUM 124, unless topic differs. GE credit: ACGH, AH, DD, OL, VL, WE. Effective: 2012 Fall Quarter.

FMS 125—Topics in Film Genres (4)
Film Viewing—3 hours; Lecture—3 hours. Prerequisite(s): FMS 001 A study of one or more of the film genres (such as the documentary, the musical, film noir, screwball comedy, or the western), including genre theory and the relationship of the genre(s) to culture, history, and film industry practices. May be repeated up to 2 time(s) when topic differs. Not open for credit to students who have completed HUM 125, unless topic differs. GE credit: AH, OL, VL, WE. Effective: 2012 Fall Quarter.

FMS 127—Film Theory (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): FMS 001; or Consent of Instructor. Survey of the conceptual frameworks used to study film (including semiotics, psychoanalysis, spectatorship, auteur, genre and narrative theories). Historical survey of major film theorists. GE credit: AH, OL, VL, WC, WE. Effective: 2012 Fall Quarter.

FMS 129—Russian Film (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): Completion of Subject A requirement. History of Russian film; film and social revolution, the cult of Stalin, dissident visions; film and the collapse of the Soviet empire; gender and the nation in Russian film. Course taught in English; films are in Russian with English subtitles. (RUS 129.) GE credit: AH, VL, WC, WE. Effective: 2012 Fall Quarter.

FMS 142—New German Cinema (4)
Extensive Writing; Lecture/Discussion—3 hours. German filmmakers of the 1960s-1980s such as Fassbinder, Herzog, Syberberg, Brückner, Schlöndorf, Kluge, Wenders. Knowledge of German is not required. May be repeated for credit with consent of instructor. (GER 142.) GE credit: AH, OL, VL, WC, WE. Effective: 2012 Fall Quarter.

FMS 176A—Classic Weimar Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): HUM 001 German Weimar (1919-1933) cinema. Fritz Lang, F.W. Murnau, and G.W. Pabst among others. Influence on world-wide (esp. Hollywood) film genres such as film noir, horror, science fiction, and melodrama. Not open for credit to students who have taken HUM 176. (GER 176A.) GE credit: AH, OL, VL, WC, WE. Effective: 2012 Fall Quarter.

FMS 176B—Postwar German Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): FMS 001 Exploration of German cinema from 1945 to 1980, when the Nazi past was a central theme. Includes study of postwar "rubble films," escapist "homeland films," and New German Cinema of the 1970s (including films by Fassbinder, Kluge, Syberberg, and Herzog). Not open for credit to students who have taken HUM 177. GE credit: AH, OL, VL, WC, WE. Effective: 2012 Fall Quarter.

FMS 189—Special Topics in Film Studies (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): FMS 001; or Consent of Instructor. Upper division standing. Group study of a special topic in film, focusing on a national tradition, a major filmmaker, or a specific era. May be repeated up to 3 time(s). GE credit: AH, OL, VL, WE. Effective: 2012 Fall Quarter.

FMS 190X—Upper Division Seminar (4)
Seminar—4 hours. Prerequisite(s): Upper division standing or consent of instructor. Study of a special topic in film studies in a small class setting. May be repeated for credit if topic differs. (P/NP grading only.) Effective: 2012 Fall Quarter.

FMS 192—Internship (1-12) ***Review all entries***
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. Supervised internship off and on campus in areas of film studies. May be repeated for credit. (P/NP grading only.) Effective: 2012 Fall Quarter.

FMS 192—Internship (1-12) ***Review all entries Discontinued***
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. Supervised internship off and on campus in areas of film studies. May be repeated for credit. (P/NP grading only.) Effective: 2018 Fall Quarter.

FMS 194H—Special Study for Honors Students (1-5)
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. Senior standing; GPA of at least 3.500. Guided research on a topic in Film Studies in preparation for the writing of an honors thesis in course 195H or the creation of an honors project in course 196H. May be repeated up to 2 time(s). (P/NP grading only.) Effective: 2012 Fall Quarter.

FMS 195H—Honors Thesis (1-5)
Independent Study—3-15 hours. Prerequisite(s): FMS 194H; and Consent of Instructor. GPA of at least 3.500; senior standing. Writing of an honors thesis on a topic in Film Studies under the direction of a faculty member. May be repeated up to 2 time(s). (P/NP grading only.) GE credit: AH, VL, WE. Effective: 2012 Fall Quarter.

FMS 196H—Honors Project (1-5)
Project (Term Project)—3-15 hours. Prerequisite(s): FMS 194H; and Consent of Instructor. Senior standing, GPA of at least 3.500. Creation of an honors film, video, or mixed-media project under the direction of a faculty member. May be repeated up to 2 time(s). (P/NP grading only.) GE credit: AH, VL, WE. Effective: 2012 Fall Quarter.

FMS 197T—Tutoring in Film Studies (1-5) ***Review all entries***
Tutorial—3-15 hours. Prerequisite(s): Consent of program director. Leading of small voluntary discussion groups affiliated with one of the program's regular courses. May be repeated for credit. (P/NP grading only.) Effective: 2012 Fall Quarter.

FMS 197T—Tutoring in Film Studies (1-5) ***Review all entries Discontinued***
Tutorial—3-15 hours. Prerequisite(s): Consent of program director. Leading of small voluntary discussion groups affiliated with one of the program's regular courses. May be repeated for credit. (P/NP grading only.) Effective: 2018 Summer Session 1.

FMS 198—Directed Group Study (1-5) ***Review all entries***
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Directed Group Study (P/NP grading only.) Effective: 2012 Fall Quarter.

FMS 198—Directed Group Study (1-5) ***Review all entries Discontinued***
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Directed Group Study (P/NP grading only.) Effective: 2018 Fall Quarter.

FMS 199—Special Study for Advanced Undergraduates (1-5) ***Review all entries***
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Special Study for Advanced Undergraduates (P/NP grading only.) Effective: 2012 Fall Quarter.

FMS 199—Special Study for Advanced Undergraduates (1-5) ***Review all entries Discontinued***
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Special Study for Advanced Undergraduates (P/NP grading only.) Effective: 2018 Fall Quarter.

FMS 396—Teaching Assistant Training Practicum (1-4) ***Review all entries***
Variable—3-12 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Teaching Assistant Training Practicum May be repeated for credit. (S/U grading only.) Effective: 2012 Fall Quarter.

FMS 396—Teaching Assistant Training Practicum (1-4) ***Review all entries Discontinued***
Variable—3-12 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Teaching Assistant Training Practicum May be repeated for credit. (S/U grading only.) Effective: 2018 Summer Session 1.

Cinema & Digital Media | TCS Courses

Courses in TCS:

TCS 001—Introduction to Technocultural Studies (4)
Extensive Writing; Lecture—3 hours. Contemporary developments in the fine and performing arts, media arts, digital arts, and literature as they relate to technological and scientific practices. GE credit: AH, VL, WE. Effective: 2012 Fall Quarter.

TCS 005—Media Archaeology (4)
Lecture/Discussion—3 hours; Term Paper. Evolution of media technologies and practices beginning in the 19th Century as they relate to contemporary digital arts practices. Special focus on the reconstruction of the social and artistic possibilities of lost and obsolete media technologies. GE credit: AH, SE, VL, WE. Effective: 2012 Fall Quarter.

TCS 007A—Technocultural Workshop; Digital Imaging (1)
Seminar—1 hour. Workshops in technocultural digital skills; Digital Imaging. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 007B—Technocultural Workshop; Digital Video (1)
Seminar—1 hour. Workshops in technocultural digital skills; Digital Video. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 007C—Technocultural Workshop; Digital Sound (1)
Seminar—1 hour. Workshops in technocultural digital skills; Digital Sound. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 007D—Technocultural Workshop; Web Design (1)
Seminar—1 hour. Workshops in technocultural digital skills; Web Design. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 007E—Technocultural Workshop; Topics in Digital Production (1)
Seminar—1 hour. Workshops in technocultural digital skills; Topics in Digital Production. May be repeated for credit. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 100—Experimental Digital Cinema I (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): CTS 020 or ART 012 or TCS 007B; TCS 170B; or equivalent with consent of instructor. Class size limited to 20 students. Experimental approaches to the making of film and video in the age of digital technologies. Builds upon foundation provided by course 20. Instruction in technical, conceptual, creative, and critical skills for taking a project from idea to fruition. GE credit: AH, OL, VL. Effective: 2017 Spring Quarter.

TCS 101—Experimental Digital Cinema II (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): TCS 100 Continuation of course 100 with further exploration of digital cinema
creation. Additional topics include new modes of distribution, streaming,
installation and exhibition. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 103—Interactivity and Animation (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Fundamentals of creating interactive screen-based work. Theories of interactivity, linear versus non-linear structures and audience involvement and participation. Use of digital production tools to produce class projects. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 104—Documentary Production (4)
Lecture/Discussion—3 hours; Project (Term Project). Prerequisite(s): TCS 007B; TCS 155; Or equivalent proficiency to TCS 007B. Traditional and new forms of documentary, with focus on technocultural issues. Skills and strategies for producing work in various media. Progression through all stages of production, from conception through post-production to critique. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 110—Object-Oriented Programming for Artists (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): TCS 001 Introduction to object-oriented programming for artists. Focus on understanding the metaphors and potential of object-oriented programming for sound, video, performance, and interactive installations. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 111—Community Media Production (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Use of video and new media tools to address social issues among neighborhood and community groups. Students will use basic video, sound, and lighting techniques as they work with local groups in a group video project. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 112—New Radio Features and Documentary (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. New feature and documentary production for radio and other audiophonic media, including audio streaming websites and installation. Emphasis on new and experimental approaches to audio production for broadcast on community radio and in international arts programming. Effective: 2012 Fall Quarter.

TCS 113—Community Networks (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Impact and implications of computer-based networks in community, civic, and social life. Subjects may include community-access computer sites, neighborhood wireless networks, the digital divide, open-source software, and citizen action. Effective: 2012 Fall Quarter.

TCS 115—Electronics for Artists (4)
Laboratory—3 hours; Lecture—3 hours. Creative application of electronic technology relevant to media and fine arts involving both electronic principles and hands-on application. Effective: 2012 Fall Quarter.

TCS 120—History of Sound in the Arts (4)
Lecture—3 hours; Term Paper. Prerequisite(s): TCS 001 A survey of the use of sound, voice, noise, and modes of listening in the modernist, avante-garde, and experimental arts, from the late 19th Century to the present. Focus on audiophonic and audiovisual technologies. Effective: 2012 Fall Quarter.

TCS 121—Introduction to Electronic Sound (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Introduction to the use of electronic sound within the arts. Techniques and aesthetics of experimental contemporary practices. Creation of original sound works. Effective: 2018 Winter Quarter.

TCS 122—Intermediate Sonic Arts (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): TCS 121; TCS 170C Techniques of recording, editing, mixing, and synthesis to combine voice, field recordings, and electronic signals. Incorporating live, recorded, and found sounds to create multidimensional stories. Presentation of live performances, audio recordings, and sound installations. Effective: 2012 Fall Quarter.

TCS 123—Sight and Soundtrack (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): TCS 007C; TCS 170C The use of sound to articulate, lend mood or subconciously underscore visual, environmental or performative situations, combining music, voice, sound effects and other noises to create sound designs that enhance, alter or support action and movement. Effective: 2012 Fall Quarter.

TCS 125—Advanced Sound: Performance and Improvisation (4)
Practice—3 hours; Workshop—3 hours. Prerequisite(s): TCS 121; TCS 122; or Consent of Instructor. Culmination of TCS sound courses. Class will focus on performance and improvisation, culminating in a final public performance. Students will be expected to do extensive reading and rehearsal outside of class time. Effective: 2012 Fall Quarter.

TCS 130—Fundamentals of 3D Computer Graphics (4)
Laboratory—3 hours; Lecture—3 hours. A foundation course that teaches students the theory of three dimensional computer graphics, including modeling, rendering and animation. Development of practical skills through the use of professional software to create computer graphics Effective: 2012 Fall Quarter.

TCS 131—Character Animation (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): TCS 130; or Consent of Instructor. The art of character animation in three dimensional computer animation. Movement theory, principles of animation, animation timing. Development of technical and practical skills. Effective: 2012 Fall Quarter.

TCS 150—Introduction to Theories of the Technoculture (4)
Extensive Writing; Lecture/Discussion—3 hours. Major cultural theories of technology with emphasis on media, communications, and the arts. Changing relationships between technologies, humans, and culture. Focus on the evolution of modern technologies and their reception within popular and applied contexts. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 151—Topics in Virtuality (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): TCS 001 Social, political, economic, and aesthetic factors in virtual reality. Artificial environments, telepresence, and simulated experience. Focus on contemporary artists' work and writing. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 152—New Trends in Technocultural Arts (4)
Lecture/Discussion—3 hours; Term Paper. Current work at the intersection of the arts, culture, science, and technology including biological and medical sciences, computer science and communications, and artificial intelligence and digital media. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 153—Concepts of Innovative Soundtracks (4)
Lecture/Discussion—3 hours; Term Paper. Innovative and unconventional soundtracks in cinema, media arts, and fine arts. Introduction to basic analytical skills for understanding sound-image relationships. Effective: 2012 Fall Quarter.

TCS 154—Outsider Machines (4)
Lecture/Discussion—3 hours; Term Paper. Invention, adaptation and use of technologies outside the mainstream, commonsense, and the possible. Topics include machines as metaphor and embodied thought, eccentric customizing and and fictional technologies. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 155—Introduction to Documentary Studies (4)
Lecture/Discussion—3 hours; Term Paper. Recent evolution of the documentary. The personal essay film; found-footage/appropriation work; non-linear, multi-media forms; spoken word; storytelling; oral history recordings; and other examples of documentary expression. GE credit: ACGH, AH, DD, VL. Effective: 2012 Fall Quarter.

TCS 158—Technology and the Modern American Body (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): TCS 001; (AMS 001A or AMS 005) The history and analysis of the relationships between human bodies and technologies in modern society. Dominant and eccentric examples of how human bodies and technologies influence one another and reveal underlying cultural assumptions. (American Studies 158.) GE credit: ACGH, AH, WE. Effective: 2012 Fall Quarter.

TCS 159—Media Subcultures (4)
Lecture/Discussion—3 hours; Term Paper. Relationships between subcultural groups and media technologies. Media as the cohesive and persuasive force of subcultural activities. List-servs, websites, free radio, fan 'zines, and hip-hop culture. GE credit: ACGH, VL. Effective: 2012 Fall Quarter.

TCS 160—Ghosts of the Machine: How Technology Rewires our Senses (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Historical, aesthetic and critical approaches to how information technologies produced ghost effects or a sense of terror in response to new media like the photograph, gramophone, film, typewriter, computer, Turing Machine. Focus on technological media transforms sense perception. (Science and Technology Studies 160.) GE credit: ACGH, AH, SS, VL, WE. Effective: 2013 Fall Quarter.

TCS 170A—Advanced Technocultural Workshop (1)
Seminar—1 hour. Prerequisite(s): TCS 007A; Or equivalent. Workshop in advanced technocultural digital skills: Digital Imaging. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 170B—Advanced Technocultural Workshop (1)
Seminar—1 hour. Prerequisite(s): TCS 007B; Or equivalent. Workshop in advanced technocultural digital skills: Digital Video. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 170C—Advanced Technocultural Workshop (1)
Seminar—1 hour. Prerequisite(s): TCS 007C Workshop in advanced technocultural digital skills: Digital Sound. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 170D—Advanced Technocultural Workshop (1)
Seminar—1 hour. Prerequisite(s): TCS 007D Workshop in advanced technocultural digital skills: Web Design. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 170E—Advanced Technocultural Workshop (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Workshop in advanced technocultural digital skills: Topics in Digital Production. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 175—Small Scale Film Production (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Lecture and intensive workshop teaching small-scale film production. Appointments as a(n) director, director of photography, actor, writer, lighting designer, sound designer and other critical positions are used to produce and submit a short film to a film festival. May be repeated up to 2 time(s). (Dramatic Art 175.) Effective: 2012 Fall Quarter.

TCS 190—Research Methods in Technocultural Studies (4)
Lecture/Discussion—3 hours; Project (Term Project). Introduction to basic research methods for Technocultural Studies: electronic and archived images, sounds and data, satellite downlinking, radiowave scanning, and oral histories. GE credit: VL, WE. Effective: 2012 Fall Quarter.

TCS 191—Writing Across Media (4)
Extensive Writing; Lecture/Discussion—3 hours. Introduction to experimental approaches to writing for different media and artistic practices. How written texts relate to the images, sounds, and performances in digital and media production. GE credit: WE. Effective: 2012 Fall Quarter.

TCS 192—Internship (1-4) ***Review all entries***
Internship—3-12 hours. Supervised internship on or off campus in area relevant to Technocultural Studies. May be repeated up to 2 time(s). (P/NP grading only.) Effective: 2012 Fall Quarter.

TCS 192—Internship (1-4) ***Review all entries Discontinued***
Internship—3-12 hours. Supervised internship on or off campus in area relevant to Technocultural Studies. May be repeated up to 2 time(s). (P/NP grading only.) Effective: 2018 Fall Quarter.

TCS 197T—Tutoring in Technocultural Studies (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of Instructor. Undergraduates assist the instructor by tutoring students in one of the department's regularly scheduled courses. May be repeated up to 8 unit(s). (P/NP grading only.) Effective: 2012 Fall Quarter.

TCS 198—Directed Group Study (1-5) ***Review all entries***
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2012 Fall Quarter.

TCS 198—Directed Group Study (1-5) ***Review all entries Discontinued***
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2018 Fall Quarter.

TCS 199—Special study for advanced undergraduates (1-5) ***Review all entries***
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Guided study with faculty member in independent scholarly activity. May be repeated up to 8 unit(s). (P/NP grading only.) Effective: 2012 Fall Quarter.

TCS 199—Special study for advanced undergraduates (1-5) ***Review all entries Discontinued***
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Guided study with faculty member in independent scholarly activity. May be repeated up to 8 unit(s). (P/NP grading only.) Effective: 2018 Fall Quarter.

Civil & Environmental Engineering; Engineering

Civil & Environmental Engineering; Engineering | ECI Information

(College of Engineering)

Amit M. Kanvinde, Ph.D., Chairperson of the Department; 530-752-0586

Department Office. 2001 Ghausi Hall; 530-752-0586; http://cee.engr.ucdavis.edu

Faculty. http://cee.engr.ucdavis.edu/people/faculty-directory/

Civil & Environmental Engineering; Engineering | ECI M.S.

(College of Engineering)

Amit M. Kanvinde, Ph.D., Chairperson of the Department; 530-754-9471

Department Office. 2001 Ghausi Hall; 530-752-0586; http://cee.engr.ucdavis.edu

Faculty. http://cee.engr.ucdavis.edu/people/faculty-directory/

M.S.
http://cee.engr.ucdavis.edu/graduate; 530-752-1441

With over forty faculty members, over $20 million in annual research expenditures and over 200 graduate students, the Department of Civil and Environmental Engineering integrates research, education and professional service in areas related to civil infrastructure and the environment. Graduate students benefit from close working relationships with professors who are the leading international experts in their field. Students pursuing their M.S. degrees have the opportunity to follow a more coursework-focused track or research-focused track. Graduate students pursuing their M.S. will specialize in one of five core areas: environmental, geotechnical, structural/structural mechanics, transportation or water resources engineering. Our graduates go on to serve the profession and academia by advancing the leading edge of fundamental knowledge, as well as engineering practice.

Generous financial support is available in the form of research assistantships, teaching assistantships, fellowships and financial aid. Over 70% of the graduate students in our program are either fully or partially supported through one or more of these paths.

Research Area Highlights:

- Alternative fuel transportation infrastructure
- Earthquake engineering
- Environmental engineering
- Environmental planning and management
- Geotechnical engineering
- Hydraulics and fluid mechanics
- Hydrology
- Structural engineering
- Structural health monitoring
- Structural mechanics
- Systems planning and design
- Transportation engineering
- Transportation planning and design
- Water resources engineering

Research Facilities and Partnerships:

- Pavement Research Center & Advanced Transportation Infrastructure Research Center
- Center for Bio-mediated & Bio-inspired Geotechnics
- Center for Geotechnical Modeling
- Center for Watershed Sciences
- Center for Water-Energy Efficiency
- Institute of Transportation Studies
- J. Amorocho Hydraulics Laboratory (JAHL)
- John Muir Institute of the Environment
- Tahoe Environmental Research Center
- Western Cooling Efficiency Center

Complete Information is on our website.

Civil & Environmental Engineering; Engineering | ECI Ph.D.

(College of Engineering)

Amit M. Kanvinde, Ph.D., Chairperson of the Department; 530-754-9471

Department Office. 2001 Ghausi Hall; 530-752-0586; http://cee.engr.ucdavis.edu

Faculty. http://cee.engr.ucdavis.edu/people/faculty-directory/

Ph.D.; Designated Ph.D. emphasis available in Biotechnology
http://cee.engr.ucdavis.edu/graduate; 530-752-1441

With over forty faculty members, over $20 million in annual research expenditures and over 200 graduate students, the Department of Civil and Environmental Engineering integrates research, education and professional service in areas related to civil infrastructure and the environment. Graduate students benefit from close working relationships with professors who are the leading international experts in their field. They are supported in their study and research by robust funding, and they have access to state-of-the-art research facilities within the program and in interdisciplinary CEE faculty-led centers across campus. Our graduates go on to serve the profession and academia by advancing the leading edge of fundamental knowledge, as well as engineering practice.

Generous financial support is available in the form of research assistantships, teaching assistantships, fellowships and financial aid. Over 70% of the graduate students in our program, and nearly all Ph.D. students, are either fully or partially supported through one or more of these paths.

Research Area Highlights:

- Alternative fuel transportation infrastructure
- Earthquake engineering
- Environmental engineering
- Environmental planning and management
- Geotechnical engineering
- Hydraulics and fluid mechanics
- Hydrology
- Structural engineering
- Structural health monitoring
- Structural mechanics
- Systems planning and design
- Transportation engineering
- Transportation planning and design
- Water resources engineering

Research Facilities and Partnerships:

- Pavement Research Center & Advanced Transportation Infrastructure Research Center
- Center for Bio-mediated & Bio-inspired Geotechnics
- Center for Geotechnical Modeling
- Center for Watershed Sciences
- Center for Water-Energy Efficiency
- Institute of Transportation Studies
- J. Amorocho Hydraulics Laboratory (JAHL)
- John Muir Institute of the Environment
- Tahoe Environmental Research Center
- Western Cooling Efficiency Center

Complete Information is on our website.

Civil & Environmental Engineering; Engineering | ECI Courses

Courses in ECI:

ECI 003—Civil Infrastructure and Society (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): MAT 021A (can be concurrent) Pass One restricted to lower division students; Civil Engineering majors. Introduction to civil infrastructure and its relationship with society and the natural environment. Exposure to innovative research on civil engineering and environmental systems. Participation in laboratory experiments illustrative of the solution of representative but simplified engineering problems. Not open for credit to upper division students. GE credit: OL, SE, SS. Effective: 2016 Winter Quarter.

ECI 016—Spatial Data Analysis (2)
Laboratory—3 hours; Lecture—1 hour. Restricted to Civil Engineering and Biological Systems Engineering majors; non-majors accommodated on a space-available basis. Computer-aided design and geographic information systems in civil engineering practice. GE credit: QL, SE. Effective: 2010 Spring Quarter.

ECI 019—C Programming for Civil and Environmental Engineers (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): MAT 021A (can be concurrent) Pass One open to Civil Engineering majors and Optical Science and Engineering majors. Computational problem solving techniques for Civil and Environmental Engineering applications using structured C programming. Algorithm design applied to realistic problems. GE credit: SE. Effective: 2011 Winter Quarter.

ECI 040—Introduction to Environmental Engineering (4)
Lecture—4 hours. Prerequisite(s): CHE 002B Pass One open to students in the College of Engineering. Introduction to topics in environmental engineering; discussion on influence of literary work, art, and media on the evolution of environmental engineering practice, relevant laws, and regulations; presentations of historical case studies. GE credit: AH. Effective: 2017 Winter Quarter.

ECI 090X—Lower Division Seminar (1-4)
Seminar—1-4 hours. Prerequisite(s): Consent of Instructor. Examination of a special topic in a small group setting. May be repeated for credit. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 092—Internship for Engineering (1-5)
Internship. Prerequisite(s): Lower division standing; approval of project prior to period of internship. Supervised work experience in civil engineering. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 100—Introduction to Fluid Mechanics for Civil and Environmental Engineers (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 035 C- or better; MAT 022B C- or better; PHY 009B C- or better Pass One restricted to Civil Engineering, Environmental Engineering and Hydrology majors. Fluid flow in civil & environmental engineering, basis for design, buoyancy, hydrostatics, gravity dams, hydraulic modeling: similarity & scaling, conservation laws, flow in bends, nozzles, pipes, pumps, turbines, complimentary lab experiments. Not open for credit to students who have taken ENG 103. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 114—Probabilistic Systems Analysis for Civil Engineers (4)
Lecture—4 hours. Prerequisite(s): MAT 021C C- or better Probabilistic concepts and models in engineering. Statistical analysis of engineering experimental and field data. Introduction to stochastic processes and models of engineering systems. Not open for credit to students who have completed STA 120. GE credit: QL, SE. Effective: 2013 Fall Quarter.

ECI 115—Computer Methods in Civil & Environmental Engineering (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (ENG 006 or ECS 030); MAT 022B Open to Civil Engineering majors only. Presentation, implementation and application of numerical algorithms and computer models for the solution of practical problems in Civil and Environmental Engineering. GE credit: SE. Effective: 2013 Fall Quarter.

ECI 119—Parallel Processing for Engineering Applications. (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): C programming or consent of instructor. Fundamental skills in parallel computing for engineering applications; emphasis on structured parallel programming for distributed memory parallel clusters. No credit allowed for students who have taken ECI 119B. GE credit: SE. Effective: 2005 Spring Quarter.

ECI 123—Urban Systems and Sustainability (4)
Lecture—4 hours. Prerequisite(s): Upper division standing. Systems-level approach of how to evaluate and then modify sustainability of urban systems based on interaction with natural environments. Topics include: definition/metrics of urban sustainability; system analyses of urban systems; enabling technology, policies, legislation; measures and modification of ecological footprints. GE credit: ACGH, DD, SE, SL, SS, WE. Effective: 2006 Fall Quarter.

ECI 125—Building Energy Performance (4)
Lecture—4 hours. Prerequisite(s): Upper division standing in Engineering. Open to students in the College of Engineering. Mechanisms of energy consumption in buildings including end uses, thermal loads, ventilation, air infiltration, thermal energy distribution, and HVAC systems; energy performance simulation; methods and strategies of energy efficiency. GE credit: SE. Effective: 2011 Winter Quarter.

ECI 130—Structural Analysis (4)
Lecture—4 hours. Prerequisite(s): ENG 104 C- or better; MAT 022A Open to Civil Engineering majors. Elastic structural analysis of determinate and indeterminate trusses, beams and frames. Plastic bending and limit analysis. GE credit: QL, SE. Effective: 2014 Winter Quarter.

ECI 131—Matrix Structural Analysis (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 104 C- or better; ENG 006 Open to Engineering majors only. Matrix formulation and computer analysis of statically indeterminate structures. Stiffness and flexibility formulations for elastic structures. Finite element methods for elasticity and bending problems. GE credit: SE. Effective: 2013 Fall Quarter.

ECI 132—Structural Design: Metallic Elements (4)
Lecture—4 hours. Prerequisite(s): ECI 130 Design of metallic beams, columns, and other members for various types of loading and boundary conditions; design of connections between members; member performance within structural systems. GE credit: SE, VL. Effective: 2013 Fall Quarter.

ECI 135—Structural Design: Concrete Elements (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECI 130 Restricted to Civil Engineering, Civil Engineering/Materials Science and Engineering, and Materials Science and Engineering majors only. Strength design procedures for columns, rectangular beams, T-beams and beams of general cross-section. Building code requirements for bending, shear, axial load, combined stresses and bond. Introduction to prestressed concrete. GE credit: QL, SE. Effective: 2013 Fall Quarter.

ECI 136—Building Design (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (ECI 130 or ECI 131); (ECI 135 or ECI 132) Design of a building structure for a specific need under the multiple constraints of safety, serviceability, cost and aesthetics. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 137—Construction Principles and Project Management (4)
Laboratory—3 hours; Lecture—3 hours. Restricted to upper division standing in Engineering. Project management, with civil engineering construction and design applications, including project scope, schedule, resources, cost, quality, risk, and control. Construction industry overview. Interactions between planning, design, construction, operations. Construction operations analysis. Contract issues. Project management software, field trips, guest lectures. GE credit: ACGH, OL, QL, SE, SS, VL, WE. Effective: 2013 Fall Quarter.

ECI 138—Earthquake Loads on Structures (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECI 130 or ECI 131 Determination of loads on structures due to earthquakes. Methods of estimating equivalent static lateral forces; response spectrum and time history analysis. Concepts of mass, damping and stiffness for typical structures. Design for inelastic behavior. Numerical solutions and Code requirements. GE credit: SE. Effective: 2013 Fall Quarter.

ECI 139—Advanced Structural Mechanics (4)
Lecture—4 hours. Prerequisite(s): ENG 104 C- or better Review of stress, strain, equilibrium, compatibility, and elastic material behavior. Plane stress and plane strain problems in elasticity; energy methods. Theories for unsymmetric bending, straight and curved beams. Beams on elastic foundations; stresses in plates and shells; elastic stability. GE credit: QL, SE. Effective: 2013 Fall Quarter.

ECI 140A—Environmental Analysis of Aqueous Systems (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 002B C- or better Pass One restricted to Environmental Engineering majors. Introduction to "wet chemical" and instrumental techniques commonly used in the examination of water and wastewater and associated data analysis. Not open for credit to students who have taken ECH 140 or CHE 100. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 140B—Chemical Principles for Environmental Engineers (4)
Lecture—4 hours. Prerequisite(s): CHE 002B C- or better Aqueous chemistry; equilibrium relationships; carbonate system; thermodynamics; kinetics & rate laws; precipitation, adsorption, & volatilization phenomenon; oxidation & reduction reactions; pH, pE and predominance diagrams; organic chemicals. Not open for credit to students who have taken ECI 140. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 140C—Biological Principles for Environmental Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 140A C- or better or ECI 140B C- or better Fundamental microbiology concepts for environmental engineers; provides background needed for the application of water and wastewater treatment, bioremediation, air pollution control and biotransformations in environmental engineered systems. Only two units of credit for students who have taken MIC 101 or MIC 102. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 140D—Water and Wastewater Treatment System Design (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (ENG 103 C- or better or ECI 100 C- or better); (ECI 140 C- or better or ECI 140A C- or better or ECI 140B C- or better or ECI 140C C- or better or ECI 148A C- or better) Evaluation and design of water and wastewater treatment systems. Not open for credit to students who have taken ECI 148B. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 141—Engineering Hydraulics (3)
Lecture—3 hours. Prerequisite(s): ENG 103 C- or better or ECI 100 C- or better Nature of flow of a real fluid; flow in pipes; open channel flow; turbomachinery; fluid forces on objects: boundary layers, lift and drag. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 141L—Engineering Hydraulics Laboratory (1)
Laboratory—3 hours. Prerequisite(s): ECI 141 (can be concurrent) Open to Engineering students only. Laboratory experiments and demonstrations on flow measurements, sluice gates, hydraulic jump, flow characteristics, and centrifugal pumps. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 142—Engineering Hydrology (4)
Lecture—4 hours. Prerequisite(s): ECI 141 (can be concurrent) Restricted to students in the College of Engineering. The hydrologic cycle. Evapotranspiration, interception, depression storage and infiltration. Streamflow analysis and modeling. Flood routing through channels and reservoirs. Frequency analysis of hydrologic variables. Precipitation analysis for hydrologic design. Hydrologic design. GE credit: QL, SE. Effective: 2013 Fall Quarter.

ECI 143—Green Engineering Design and Sustainability (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Upper division standing. Restricted to upper division standing; Pass One restricted to Civil Engineering majors. Application of concepts, goals and metrics of sustainability, green engineering and industrial ecology to engineering design. Other course topics include life-cycle assessments, analysis of environmental management systems, and economics of pollution prevention and sustainability. GE credit: QL, SE, SL, SS. Effective: 2017 Winter Quarter.

ECI 144—Groundwater Systems Design (4)
Lecture—4 hours. Prerequisite(s): ECI 141 Groundwater occurrence, distribution, and movement; groundwater flow systems; radial flow to wells and aquifer testing; aquifer management; groundwater contamination; solute transport by groundwater; fate and transport of subsurface contaminants. Groundwater supply and transport modeling. GE credit: SE. Effective: 2005 Spring Quarter.

ECI 144L—Groundwater Systems Design Laboratory (1)
Laboratory—3 hours. Prerequisite(s): ECI 144 (can be concurrent); ECI 144 required concurrently. Computer modeling of groundwater flow under regional gradient, well injection/withdrawal, and natural and engineered boundary conditions. Use of Groundwater Vistas computer program. Effective: 2010 Fall Quarter.

ECI 145—Hydraulic Structure Design (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): ECI 141 C- or better Project-based course on the design of an integrated urban drainage system with focus on consideration of design alternatives, multiple realistic constraints, quantification of uncertainty, codes and standards, technical drawing and cost analysis. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 146—Water Resources Simulation (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 103 C- or better or ECI 100 C- or better Computer simulation techniques in the analysis, design and operation of surface water systems; modeling concepts and practices with application to surface runoff; water quality in rivers and streams and dispersion of contaminants in water bodies. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 148A—Water Quality Management (4)
Lecture—4 hours. Prerequisite(s): CHE 002B C- or better Basic concepts of water quality measurements and regulations. Introduction to physical, biological and chemical processes in natural waters. Fundamentals of mass balances in water and wastewater treatment. GE credit: SE. Effective: 2013 Fall Quarter.

ECI 149—Air Pollution (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021D; MAT 022B; CHE 002B C- or better; (ATM 121A or ENG 103 C- or better or ECI 100 C- or better) Physical and technical aspects of air pollution. Emphasis on geophysical processes and air pollution meteorology as well as physical and chemical properties of pollutants. (ATM 149.) GE credit: QL, SE, SL. Effective: 2018 Winter Quarter.

ECI 150—Air Pollution Control System Design (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECI 149 C- or better or ATM 149 C- or better Design and evaluation of air pollution control devices and systems. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 153—Deterministic Optimization and Design (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): MAT 021C; MAT 022A; Computer programming course. Operations research. Optimization techniques such as linear programming, dynamic programming, and non-linear programming. Applications in civil engineering disciplines, including multiple realistic constraints, through computer-based course projects. GE credit: QL, SE, SL. Effective: 2013 Fall Quarter.

ECI 155—Water Resources Engineering Planning (4)
Lecture—4 hours. Prerequisite(s): (ENG 106 or ECN 001A or ECN 001AV); ECI 114 Basic engineering planning concepts; role of engineering, economic, environmental and social information and analysis; institutional, political and legal aspects. Case studies and computer models illustrate the planning of water resource systems. GE credit: QL, SE, SL, SS, WE. Effective: 2018 Winter Quarter.

ECI 161—Transportation System Operations (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021C C- or better; PHY 009A C- or better Principles of transportation system operations; traffic characteristics and methods of measurement; models of transportation operations and congestion applied to urban streets and freeways. GE credit: QL, SE. Effective: 2016 Fall Quarter.

ECI 163—Energy and Environmental Aspects of Transportation (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): ECN 001A or ECN 001AV or ENG 106 Engineering, economic, and systems planning concepts. Analysis and evaluation of energy, air quality and selected environmental attributes of transportation technologies. Strategies for reducing pollution and petroleum consumption in light of institutional and political constraints. Evaluation of vehicle emission models. (ESP 163.) GE credit: SE, SL, SS, WE. Effective: 2018 Spring Quarter.

ECI 165—Transportation Policy (3)
Lecture—3 hours. Transportation and associated environmental problems confronting urban areas, and prospective technological and institutional solutions. Draws upon concepts and methods from economics, engineering, political science and environmental studies. GE credit: QL, SE, SS. Effective: 2013 Fall Quarter.

ECI 171—Soil Mechanics (4)
Lecture—4 hours. Prerequisite(s): (ENG 103 (can be concurrent) or ECI 100 (can be concurrent)); ENG 104 C- or better; ECI 171L (can be concurrent); ECI 171L required concurrently. Restricted to Civil Engineering and Environmental Engineering majors only. Soil formations, mass-volume relationships, soil classification, effective stress, soil-water-void relationships, compaction, seepage, capillarity, compressibility, consolidation, strength, states of stress and failure, lateral earth pressures, and slope stability. GE credit: SE. Effective: 2018 Spring Quarter.

ECI 171L—Soil Mechanics Laboratory (1)
Laboratory—3 hours. Prerequisite(s): ECI 171 (can be concurrent); ECI 171 required concurrently. Laboratory studies utilizing standard testing methods to determine physical, mechanical and hydraulic properties of soil and demonstration of basic principles of soil behavior. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 173—Foundation Design (4)
Lecture—4 hours. Prerequisite(s): ECI 171 Foundation analysis and design, including site characterization, evaluation of shallow and deep foundation alternatives, evaluation of bearing capacity and settlements, design of retaining structures, and case-based design experiences. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 175—Geotechnical Earthquake Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 171 C- or better Tectonics, faults, site response, and probabilistic ground motion prediction equations. Cyclic loading and liquefaction of soil elements and layers. Empirical procedures and field tests for evaluation of triggering and consequences, of liquefaction. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 179—Pavement Engineering (4)
Discussion/Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 104 C- or better Pavement types (rigid, flexible, unsurfaced, rail), their applications (roads, airfields, ports, rail) and distress mechanisms. Materials, traffic and environment characterization. Empirical and mechanistic-empirical design procedures. Maintenance, rehabilitation and reconstruction; construction quality; asphalt concrete mix design. GE credit: QL, SE, SL, VL. Effective: 2013 Fall Quarter.

ECI 189A—Selected Topics in Civil Engineering; Environmental Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Environmental Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189B—Selected Topics in Civil Engineering; Hydraulics and Hydrologic Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Hydraulics and Hydrologic Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189C—Selected Topics in Civil Engineering; Engineering Planning (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Engineering Planning. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189D—Selected Topics in Civil Engineering; Geotechnical Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Geotechnical Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189E—Selected Topics in Civil Engineering; Structural Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Structural Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189F—Selected Topics in Civil Engineering; Structural Mechanics (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Structural Mechanics. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189G—Selected Topics in Civil Engineering; Transportation Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Transportation Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189H—Selected Topics in Civil Engineering; Transportation Planning (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Transportation Planning. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189I—Selected Topics in Civil Engineering; Water Resources Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Water Resources Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189J—Selected Topics in Civil Engineering; Water Resources Planning (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Water Resources Planning. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 190C—Research Group Conferences in Civil and Environmental Engineering (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing in Civil and Environmental Engineering. Research group conferences. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 192—Internship in Engineering (1-5)
Internship. Prerequisite(s): Upper division standing; approval of project prior to the period of the internship. Supervised work experience in civil engineering. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 193A—Civil and Environmental Engineering Senior Design (4) ***Review all entries***
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): (ECI 140D C- or better) or (ECI 171 C- or better, ECI 171L C- or better) or (ECI 132 C- or better or ECI 135 C- or better) or (ECI 161 C- or better or ECI 163 C- or better) or (ECI 141 C- or better, ECI 141L C- or better); and Consent of Instructor. And one ECI major depth course with a C- or better. Students must be in final year of study. Open to seniors in Civil Engineering and Environmental Engineering only; students must be in their final year of study. Culminating design experience for civil engineering and environmental engineering majors. Student teams work closely with faculty, city officials or consulting clients to propose, implement and validate a unique solution to a real-world problem. GE credit: OL, SE, WE. Effective: 2018 Winter Quarter.

ECI 193A—Civil and Environmental Engineering Senior Design (4) ***Review all entries***
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): (ECI 140D C- or better) or (ECI 171 C- or better, ECI 171L C- or better) or (ECI 132 C- or better or ECI 135 C- or better) or (ECI 161 C- or better or ECI 163 C- or better) or (ECI 141 C- or better, ECI 141L C- or better); and Consent of Instructor. And one other ECI major depth course with a C- or better; students must be in their final year of study. Open to seniors in Civil Engineering and Environmental Engineering only. Culminating design experience for civil engineering and environmental engineering majors. Student teams work closely with faculty, city officials or consulting clients to propose, implement and validate a unique solution to a real-world problem. GE credit: OL, SE, WE. Effective: 2018 Fall Quarter.

ECI 193B—Civil and Environmental Engineering Senior Design (4)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): ECI 193A Open to seniors in Civil Engineering and Environmental Engineering only. Culminating design experience for civil engineering and environmental engineering majors. Student teams work closely with faculty, city officials or consulting clients to propose, implement and validate a unique solution to a real-world problem. GE credit: OL, SE, VL, WE. Effective: 2017 Fall Quarter.

ECI 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 199—Special Study for Advanced Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Special study. (P/NP grading only.) GE credit: SE. Effective: 2016 Fall Quarter.

ECI 201—Introduction to Theory of Elasticity (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 104 Fundamental equations of elasticity in three dimensions; plane stress and plane strain; flexture and torsion of bars of various shapes. Introduction to variational and approximate methods. Effective: 1997 Winter Quarter.

ECI 203—Inelastic Behavior of Solids (3)
Lecture—3 hours. Prerequisite(s): ECI 201 Fundamentals of theories of plasticity, viscoelasticity and viscoplasticity for solids. Macroscopic constitutive modelling for engineering materials, e.g., metals, polymers, soils, etc., and microscopic motivation. Effective: 1997 Winter Quarter.

ECI 205—Continuum Mechanics (3)
Lecture—3 hours. Prerequisite(s): ECI 201 Tensor formulation of the field equations for continuum mechanics, including large deformation effects. Invariance and symmetry requirements. Introduction to nonlinear thermoelasticity and thermodynamics. Solution of three-dimensional problems. Selected topics. Effective: 1998 Winter Quarter.

ECI 206—Fracture Mechanics (4)
Lecture—4 hours. Prerequisite(s): ECI 201; ENG 104 Linear and nonlinear fracture mechanics, stress analysis, energy concepts, brittle fracture criteria, path independent integrals, Dugdale-Barenblatt model, general cohesive zone models, ductile fracture criteria, crack tip fields for stationary and propagating cracks, fatigue. Application of numerical methods for fracture mechanics. Effective: 2006 Winter Quarter.

ECI 211—Advanced Matrix Structural Analysis (4)
Lecture—4 hours. Prerequisite(s): ECI 131 Analysis of complex frameworks by the displacement method; treatment of tapered beams, curved beams, and beams on elastic foundations; partially rigid connections; geometric and material nonlinearities; buckling; flexibility-based formulations; FEM-software for nonlinear analysis of structures. Effective: 2003 Winter Quarter.

ECI 212A—Finite Element Procedures in Applied Mechanics (4)
Lecture—4 hours. Prerequisite(s): EAD 115 or (MAT 128A, MAT 128B (can be concurrent)) Weighted-residual and Rayleigh-Ritz methods. Weak/variational formulation and development of discrete equations using finite element approximations. Application to one- and two-dimensional problems (heat conduction). Effective: 2003 Winter Quarter.

ECI 212B—Finite Elements: Application to Linear and Non-Linear Structural Mechanics Problems (4)
Lecture—4 hours. Prerequisite(s): ECI 212A Application to linear and nonlinear structural mechanics problems. Linear elasticity, weak form, and finite element approximation. Incompressible media problems. Non-linear problems with material nonlinearity. Effective: 2003 Winter Quarter.

ECI 213—Analysis of Structures Subjected to Dynamic Loads (4)
Lecture—4 hours. Prerequisite(s): ECI 211 (can be concurrent) Analysis of structures subjected to earthquake, wind and blast loading; distributed, consistent and lumped mass techniques; computer implementation; nonlinear response spectrum; frequency and time domain analysis; seismic protection of structures; numerical methods in linear and nonlinear structural dynamics. Effective: 2012 Fall Quarter.

ECI 214—Probabilistic Seismic Hazard Analysis and Design Ground Motions (4)
Lecture—4 hours. Probabilistic seismic hazard analysis for use in developing design spectra and for seismic risk analyses, including the development of earthquake ground motion time series for use in dynamic analyses of structures. Effective: 2016 Winter Quarter.

ECI 216—Meshfree Methods and Partition of Unity Finite Elements (4)
Lecture—4 hours. Prerequisite(s): ECI 201; ECI 212A Advanced discretization techniques such as meshfree methods and partition of unity finite elements for the Galerkin solution of boundary-value problems in solid and structural mechanics. Application of meshfree and extended finite element methods in computational fracture. Effective: 2016 Winter Quarter.

ECI 221—Theory of Plates and Introduction to Shells (3)
Lecture—3 hours. Prerequisite(s): ECI 201 (can be concurrent) Development of classical and refined plate theories. Application to isotropic, orthotropic and composite plates. Solutions for rectangular
and circular plates. Membrane theory for axisymmetric shells and bending of circular shells. Effective: 1997 Winter Quarter.

ECI 223—Advanced Dynamics, Signal Processing, and Smart Structures Technology (4)
Lecture—4 hours. Prerequisite(s): ECI 213; Or equivalent. Signal processing and system identification of structures under dynamic excitations; Fourier and Laplace transforms; data acquisition and sensor design fundamentals; sensor technologies/techniques for nondestructive evaluation; structural control; actuators and dampers for smart structures; piezoelectrics and acoustic emissions; micro- and nano-fabrication. Effective: 2011 Winter Quarter.

ECI 232—Advanced Topics in Concrete Structures (4)
Lecture—4 hours. Prerequisite(s): ECI 130; ECI 135; ECI 138; Graduate standing. Ductility of reinforced concrete; strength of two-way slabs; modified compression field theory. Effective: 2001 Fall Quarter.

ECI 233—Advanced Design of Steel Structures (4)
Lecture—4 hours. Prerequisite(s): (ECI 130 or ECI 131); ECI 132 Review of Load and Resistance Factor Design (LRFD); steel-plate girder design; plastic design of indeterminate systems; moment frames and bracing systems; connection design; seismic design of steel structures; vibration of flooring systems; steel-concrete composite design. Effective: 2004 Winter Quarter.

ECI 234—Prestressed Concrete (4)
Lecture—4 hours. Prerequisite(s): ECI 135; (ECI 130 or ECI 131) Survey of methods and applications; prestressing materials and systems; prestress losses; flexural design; design for shear and torsion; deflection computation and control; continuous beams and indeterminate structures; floor systems; partial prestressing; design of compression members; strut-and-tie models. Effective: 2003 Fall Quarter.

ECI 235—Cement Composites (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 104 Applications of cement composites; materials selection and proportioning; component and composite properties; hydration reactions and microstructure development; mechanisms of failure; nondestructive test methods; fiber reinforcement; concrete durability; novel reinforcing materials; ferrocement; repair and retrofit technologies; applications to structural design. Effective: 2002 Fall Quarter.

ECI 236—Design of Fiber Reinforced Polymer Composite Structures (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECI 135 Basics of mechanics and design of polymer matrix composites: composite classification, manufacturing process, micromechanical property determination, classical lamination theory, strength theories, first-ply-failure, test methods, design practice, strengthening and retrofitting of existing reinforced concrete structures. Effective: 2008 Winter Quarter.

ECI 237—Bridge Design (4)
Lecture—4 hours. Prerequisite(s): ECI 130; ECI 135; ECI 234 recommended. Open to Graduate Students only. Bridge types, behavior and construction characteristics; design philosophy, details according to Caltrans and American Association of State Highway and Transportation Officials codes, principles; seismic design and retrofit of concrete bridges; modern bridges using advanced fiber reinforced polymer composites; fieldtrip required. Effective: 2007 Fall Quarter.

ECI 238—Performance-Based Seismic Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 138; ECI 213 Modern seismic design; performance-based seismic design; seismic hazard; seismic demands: linear and nonlinear procedures; performance assessment: deterministic and probabilistic procedure; review of FEMA-350, FEMA-356, ATC-40 and other performance-based guidelines. Effective: 2005 Spring Quarter.

ECI 240—Water Quality (4)
Lecture—4 hours. Prerequisite(s): ECI 141; ECI 142 Quality requirements for beneficial uses of water. Hydrologic cycle of quality. Hydromechanics in relation to quality of surface and groundwaters; transport and fate of waterborne pollutants. Heat
budget for surface waters; predictive methods; introduction to water quality modeling. Effective: 2000 Fall Quarter.

ECI 241—Environmental Reactive Chemical Transport Modeling (4)
Lecture—4 hours. Prerequisite(s): CHE 002A or CHE 002B or ECI 149; Or equivalent. Modeling of reactive chemical transport in air and water including kinetic reactions, equilibrium reactions, and phase partitioning. Emphasis on numerical solution schemes and programming techniques to provide deeper insight into model performance and limitations. Effective: 2014 Fall Quarter.

ECI 242—Air Quality (4)
Lecture—4 hours. Prerequisite(s): ENG 105; ECI 141; ECI 149; Or equivalents. Factors determining air quality. Effects of air pollutants. Physical and chemical fundamentals of atmospheric transport and reaction. Introduction to dispersion modeling. Effective: 2002 Fall Quarter.

ECI 243A—Water and Waste Treatment (4)
Lecture—4 hours. Prerequisite(s): ECI 148A; Or the equivalent. Characteristics of water and airborne wastes; treatment processes and process kinetics; treatment system design. Effective: 1999 Fall Quarter.

ECI 243B—Water and Waste Treatment (4)
Lecture—4 hours. Prerequisite(s): ECI 243A Continuation of course 243A. Aeration, thickening, biological processes, design of biological treatment systems. Effective: 2000 Winter Quarter.

ECI 243L—Pilot Plant Laboratory (4)
Discussion—1 hour; Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): ECI 243A; ECI 243B (can be concurrent); or Consent of Instructor. Graduate standing. Laboratory investigation of physical, chemical, and biological processes for water and wastewater treatment. Effective: 2016 Winter Quarter.

ECI 244—Life Cycle Assessment for Sustainable Engineering (4)
Lecture—4 hours. Prerequisite(s): Graduate standing. Life cycle assessment methodology is taught emphasizing applications to infrastructure and energy systems. Life cycle design, life cycle cost methods, other tools from industrial ecology, and links to policy are covered as well. Effective: 2011 Fall Quarter.

ECI 245A—Applied Environmental Chemistry: Inorganic (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 105; ECI 140; CHE 002B; Or the equivalent of CHE 002B; CHE 002C or CHE 107A recommended. Chemistry of natural and polluted waters. Topics include chemical, kinetic and equilibrium principles, redox reactions, gas solution and solid-solution equilibria, thermodynamics, carbonate systems, coordination chemistry, interfacial phenomena. Effective: 2000 Spring Quarter.

ECI 245B—Applied Environmental Chemistry: Organic (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 128A; CHE 128B; CHE 128C; Or the equivalent; CHE 002C or CHE 107A recommended. Transport and transformation of organic chemicals in the environment.
Topics include application of thermodynamics to predict solubility and activity coefficients; distribution of organic chemicals between the aqueous phase and air, solvent, or solid phases; chemical, photochemical and biological transformation reactions. Effective: 2001 Spring Quarter.

ECI 246N—Understanding Climate Change: Causes and Consequences (4)
Lecture—4 hours. Open to graduate students. Diverse physical processes that govern climate and drive climate change. Observational, experimental and modeling techniques and methods used in the development of our scientific understanding of the Earth system. Effective: 2016 Spring Quarter.

ECI 247—Aerosols (4)
Lecture—4 hours. Prerequisite(s): ENG 103; ENG 105; ECI 141; ECI 149 Behavior of airborne particles including particle formation, modification, and removal processes. Effective: 2002 Fall Quarter.

ECI 247L—Aerosols Laboratory (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): ECI 247 Methods of generation and characterization of aerosols. Detailed topics may include flow rate measurement, aerosol generation, aerosol collection, ions measurement, metals measurement, and carbon measurement. May be repeated up to 1 time(s). Effective: 2002 Fall Quarter.

ECI 248—Biofilm Processes (4)
Lecture—4 hours. Prerequisite(s): SSC 111 or SSC 211 or ECI 243B; or Consent of Instructor. Calculus and basic cell molecular biology are recommended. Natural and engineered biofilms, including biofilm occurrence and development, spatial structure, microbial processes, fundamental and applied research tools, biofilm reactors, beneficial uses, and detrimental effects. Effective: 2004 Spring Quarter.

ECI 249—Probabilistic Design and Optimization (4)
Lecture—4 hours. Prerequisite(s): ECI 114; ECI 153; ENG 106; Or equivalents. Design by optimization for probabilistic systems, decision theory, the value of information, probabilistic linear programming, probabilistic dynamic programming, nonlinear probabilistic optimization. Applications in civil engineering design, project evaluation, and risk management. Effective: 2006 Winter Quarter.

ECI 250—Civil Infrastructure System Optimization and Identification (4)
Lecture—4 hours. Prerequisite(s): MAT 021C; MAT 022A; Programming course; EAD 115 and mathematical modeling course recommended. Restricted to graduate standing. Applied mathematics with a focus on modeling, identifying, and controlling dynamic, stochastic, and underdetermined systems. Applications in transportation networks, water resource planning, and other civil infrastructure systems. Effective: 2005 Spring Quarter.

ECI 251—Transportation Demand Analysis (4)
Lecture—4 hours. Prerequisite(s): ECI 114; Or the equivalent. Procedures used in urban travel demand forecasting. Principles and assumptions of model components (trip generation, trip distribution, model split). New methods of estimating travel demand. Computer exercises using empirical data to calibrate models and forecast travel demand. Effective: 1999 Fall Quarter.

ECI 252—Sustainable Transportation Technology and Policy (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): ECI 165 Role of technical fixes and demand management in creating a sustainable transportation system. Emphasis on technology options, including alternative fuels, electric propulsion, and IVHS. Analysis of market demand and travel behavior, environmental impacts, economics and politics. (ESP 252.) Effective: 2000 Fall Quarter.

ECI 253—Dynamic Programming and Multistage Decision Processes (4)
Lecture—4 hours. Prerequisite(s): MAT 021C; MAT 022A; Programming course; EAD 115 recommended. Operations research. Optimization techniques with a focus on dynamic programming in treating deterministic, stochastic, and adaptive multistage decision processes. Brief review of linear programming and non-linear programming. Applications in transportation networks and other civil infrastructure systems. Effective: 2005 Spring Quarter.

ECI 254—Exploring Data from Built Environment Using R (4)
Laboratory—3 hours; Lecture—3 hours. Introduction to modern data science, specifically data acquisition, exploratory data analysis, visualization, and beginning data analysis using R. Emphasizes computational reasoning and working with tabular and non-standard data. Focus will be on data generated in the built environment. (Geography 279.) Effective: 2017 Fall Quarter.

ECI 256—Urban Traffic Management and Control (4)
Lecture—4 hours. Prerequisite(s): ECI 114 Basic concepts, models, and methods related to the branch of traffic science that deals with the movement of vehicles on a road network, including travel speed, travel time, congestion concepts, car-following and hydrodynamic traffic models. Effective: 2000 Fall Quarter.

ECI 257—Flow in Transportation Networks (4)
Lecture—4 hours. Prerequisite(s): ECI 153; ECI 161 or ECI 256 recommended. Elements of graph theory, a survey of pertinent optimization techniques, extremal principles in network flow problems, deterministic equilibrium assignment, stochastic equilibrium assignment, extensions of equilibrium assignments and dynamic transportation network assignment. Effective: 2000 Winter Quarter.

ECI 259—Asphalt and Asphalt Mixes (4)
Lecture—4 hours. Prerequisite(s): ECI 179; or Consent of Instructor. Asphalts and asphalt mix types and their use in civil engineering structures, with primary emphasis on pavements. Asphalt, aggregate properties and effects on mix properties. Design, construction, recycling. Recent developments and research. Effective: 2006 Winter Quarter.

ECI 260—Sediment Transport (4)
Lecture—4 hours. Prerequisite(s): ECI 141; Or equivalent. Sediment transport in hydrologic systems. Process-oriented course which will emphasize how sediment moves and the physical processes that affect sediment transport. Field trip. Effective: 2006 Winter Quarter.

ECI 264A—Transport, Mixing and Water Quality in River and Lakes (4)
Lecture—4 hours. Prerequisite(s): ECI 141; ECI 240 Principal causes of mixing and transport in rivers, lakes and reservoirs, and their impacts on water quality. Case studies of specific lakes and rivers. Effective: 2000 Fall Quarter.

ECI 264B—Transport, Mixing and Water Quality in Estuaries and Wetlands (4)
Lecture—4 hours. Prerequisite(s): ECI 141; ECI 240 Principal causes of mixing and transport in estuaries and wetlands, and their impacts on water quality. Topics include advection/diffusion; tides; transverse mixing; longitudinal dispersion; sediment transport; nutrient cycling; computer modeling of estuaries. Case studies of specific systems. Effective: 2000 Spring Quarter.

ECI 265—Stochastic Hydrology and Hydraulics (4)
Lecture—4 hours. Prerequisite(s): ECI 266; or Consent of Instructor. Physics-based stochastic methods in modeling hydrologic and hydraulic processes; theory for modeling hydrologic-hydraulic governing equations as stochastic partial differential equations applied to various hydrologic-hydraulic processes under uncertainty, including transport, open channel flow, overland flow, soil water flow, and groundwater. Effective: 2015 Winter Quarter.

ECI 266—Applied Stochastic Methods in Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 114 or MAT 131 or STA 130A or STA 131A or MAT 118A (can be concurrent) Stochastic processes classification; Gaussian random fields; stochastic calculus in mean square; Ito and Stratonovich stochastic differential equations; Fokker-Planck equation; stochastic differential equations
with random coefficients. Effective: 1999 Fall Quarter.

ECI 267—Water Resource Management (3)
Lecture—3 hours. Prerequisite(s): ECI 114; ECI 141; ECI 142; ECI 153 recommended. Engineering, institutional, economic, and social basis for managing local and regional water resources. Examples in the context of California's water development and management. Uses of computer modeling to improve water management. (GEO 212.) Effective: 2013 Fall Quarter.

ECI 268—Infrastructure Economics (3)
Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ENG 106; Or the equivalent. Economics applied to infrastructure engineering planning, operations, maintenance, and management problems; microeconomic and macroeconomic theories; benefit-cost analysis; effect of uncertainty; optimization economics; non-classical economics; public finance. Effective: 2018 Spring Quarter.

ECI 269—Transportation-Air Quality: Theory and Practice (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECI 149; Or the equivalent. Health and regulatory
aspects of airborne pollutants. Principles of modeling
vehicle emissions. Conformity issues and the regulatory
framework. Regional and micro-scale modeling. Effective: 1999 Fall Quarter.

ECI 270—Advanced Water Resources Management (3)
Lecture—3 hours. Prerequisite(s): ECI 153; ECI 267; Or the equivalent. Discussion of technical papers related to planning theory, system maintenance, regionalization, multi-objective methods, risk analysis, institutional issues, pricing model application, economic development, forecasting, operations, and other topics. Effective: 1997 Winter Quarter.

ECI 271—Inverse Problems (4)
Lecture—4 hours. Prerequisite(s): ECI 114; ECI 144; Or equivalents. Inverse calibration of distributed parameter models, using data representing model outputs. Forward and inverse mappings, stability, uniqueness, identifiability. Optimization formulation of inverse problems, maximum likelihood and other objective functions, indirect and direct approaches, solution by UCODE in hands-on project format. Effective: 2010 Fall Quarter.

ECI 272A—Advanced Hydrogeology (4)
Lecture—4 hours. Prerequisite(s): ECI 144; MAT 118A recommended. Flow in confined, unconfined, and leaky aquifers. Geological aspects of aquifers. Regional groundwater flow and hydraulics of pumping and recharging wells. Identification of aquifer parameters. Isotope hydrogeology and recharge estimation. Effective: 2000 Fall Quarter.

ECI 272B—Advanced Hydrogeology (4)
Lecture—4 hours. Prerequisite(s): ECI 212A; ECI 272A Processes of subsurface flows and transport. Numerical methods of subsurface fluid flow and transport systems. Flow in the unsaturated zone. Fresh water-salt water interface in coastal aquifers. Macrodispersion. Identification of regional aquifer parameters. Modeling of aquifer systems. Effective: 2000 Fall Quarter.

ECI 272C—Multiphase Reactive Transport (4)
Lecture—4 hours. Prerequisite(s): ECI 142; ECI 144; ECI 148A Multicomponent reactive transport including multiple phases. Advective/dispersive transport, chemical equilibria, and mass transformation kinetics. Natural chemical/microbiological processes including sorption, complexation, biodegradation, and diffusive mass transfer. Eulerian and Lagrangean averaging methods. Applications to contaminant remediation problems in river and subsurface hydrology. Effective: 2004 Fall Quarter.

ECI 273—Water Resources Systems Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 114; ECI 153; Or the equivalent. Planning and management of water resource systems. Deterministic and stochastic simulation and optimization techniques. Capacity design and operation of reservoir systems for water supply, hydropower, flood control, and environmental objectives. Effective: 2018 Winter Quarter.

ECI 275—Hydrologic Time-Series Analysis (4)
Lecture—4 hours. Prerequisite(s): ECI 114; ECI 142 Application of statistical methods for analysis and modeling of hydrologic series. Statistical simulation and prediction of hydrologic sequences using time series methodology. Effective: 2003 Fall Quarter.

ECI 276—Watershed Hydrology (4)
Lecture—4 hours. Prerequisite(s): ECI 142; Or the equivalent. Analysis and mathematical modeling of hydrologic processes taking place in a watershed. Precipitation analysis and modeling. Theory of overland flow and its kinematic wave approximation.Analysis and modeling of saturated and unsaturated subsurface flow processes taking place on a hill slope. Effective: 1997 Winter Quarter.

ECI 277A—Computational River Mechanics I (4)
Lecture—4 hours. Prerequisite(s): EAD 115 (can be concurrent); ECI 141 (can be concurrent) Unsteady open channel flows, computation of water surface profiles, shallow water equations, St. Venant equations, method of characteristics, finite difference methods, stability and accuracy of explicit and implicit schemes, flood routing in simple and compound channels, advection of plumes. Not open for credit to students who have taken ECI 277. Effective: 2004 Fall Quarter.

ECI 277B—Computational River Mechanics II (4)
Lecture—4 hours. Prerequisite(s): ECI 277A Open channel flows, physical aspects of river mechanics, formulation of depth-averaged equations, boundary conditions, coordinates transformation and grid generation, finite-difference solution techniques, applications to two-dimensional momentum and pollutant transport in rivers. Effective: 2004 Fall Quarter.

ECI 277C—Turbulence and Mixing Processes (4)
Lecture—4 hours. Prerequisite(s): Graduate standing. Nature of turbulent flows, conservation equations, momentum, heat and mass transport in free and wall-bounded flows, body forces and mixing, roughness effects, turbulence modeling and simulation. Effective: 2004 Fall Quarter.

ECI 278—Hydrodynamics (3)
Lecture—3 hours. Prerequisite(s): ECI 141 Perturbation methods. Basic water waves. Governing equations for fluid motion on a rotating earth. Rotation effects, vorticity dynamics, Ekman layer. Stratification effects, internal waves and turbulent mixing. Combined effects. Effective: 1997 Winter Quarter.

ECI 279—Advanced Mechanics of Fluids (4)
Lecture—4 hours. Prerequisite(s): ECI 141 Rotational flows. Navier-Stokes equations and solutions for laminar flow; boundary layer equations and solution techniques. Nature of turbulence. Reynolds equations. Introduction to turbulence modeling. Effective: 1997 Winter Quarter.

ECI 280A—Nonlinear Finite Elements for Elastic-Plastic Problems (4)
Lecture—4 hours. Prerequisite(s): Consent of Instructor. State of the art finite element methods and tools for elasticplastic problems, including computational techniques based on the finite element method and the theory of elastoplasticity. Effective: 2008 Spring Quarter.

ECI 280B—Nonlinear Dynamic Finite Elements (4)
Lecture—4 hours. Prerequisite(s): Consent of Instructor. State of the art computational methods and tools for analyzing linear and nonlinear dynamics problems. Effective: 2009 Spring Quarter.

ECI 281A—Advanced Soil Mechanics (4)
Lecture—4 hours. Prerequisite(s): ECI 171 Consolidation and secondary compression. Preloading and wick drains. Seepage and seepage pressures. Filtration, drainage, and dewatering. Shear strength: friction, cohesion, dilatancy and critical states. Effective: 2004 Fall Quarter.

ECI 281B—Advanced Soil Mechanics (5)
Laboratory—3 hours; Lecture—4 hours. Prerequisite(s): ECI 281A Site investigation and soil characterization within the context of slope stability analysis. Effective: 2014 Spring Quarter.

ECI 282—Pavement Design and Rehabilitation (4)
Lecture—4 hours. Prerequisite(s): ECI 179; or Consent of Instructor. Advanced pavement design and structural/functional condition evaluation for concrete and asphalt pavements. Highways, airfields, port facilities; new facilities, rehabilitation, reconstruction. Mechanistic-empirical procedures, materials, climate and traffic characterization. Use of current design methods; recent developments and research. Effective: 2004 Winter Quarter.

ECI 283—Physico-Chemical Aspects of Soil Behavior (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECI 171 Study of the geotechnical behavior of soils considering formation, transport, mineralogy, soil-fluid-electrolyte systems, surface tension, particle mechanics, shape, fabric, and structure. Laboratories demonstrate effects of fundamental interparticle forces (contact, Van Der Waals, capillarity and chemical). Effective: 2012 Fall Quarter.

ECI 284—Theoretical Geomechanics (4)
Lecture—4 hours. Prerequisite(s): ECI 171 Elasticity, plasticity, micromechanics, coupled behavior and large deformations for geomaterials. Prediction of stress-strain-volume change behavior of geomaterials. Monotonic and cyclic loading, anisotropy, bifurcation of deformation. Effective: 2004 Winter Quarter.

ECI 286—Advanced Foundation Design (4)
Lecture—4 hours. Prerequisite(s): ECI 173 Design and analysis of pile and pier foundations, including seismic effects; deep excavation systems; tie-back, nailing, and anchor systems; coffer dams; loads on buried conduits; ground modification techniques; and other related topics. Effective: 2004 Spring Quarter.

ECI 287—Geotechnical Earthquake Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 138; ECI 281A Characteristics and estimation of earthquake ground motions; wave propagation and local site response; liquefaction potential and remediation; residual strength and stability considerations; ground deformations; dynamic soil-structure interaction. Effective: 2004 Spring Quarter.

ECI 288—Earth and Rockfill Dams (4)
Lecture—4 hours. Prerequisite(s): ECI 281A; ECI 281B (can be concurrent) Site selection; design considerations; layout; seismic effects including considerations of fault movements; construction; environmental considerations, instrumentation; maintenance remediation and retrofit of existing dams. Effective: 2004 Winter Quarter.

ECI 289A—Selected Topics in Civil Engineering; Environmental Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Environmental Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289B—Selected Topics in Civil Engineering; Hydraulics and Hydrologic Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Hydraulics and Hydrologic Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289C—Selected Topics in Civil Engineering; Engineering Planning (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Engineering Planning. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289D—Selected Topics in Civil Engineering; Geotechnical Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Geotechnical Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289E—Selected Topics in Civil Engineering; Structural Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Structural Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289F—Selected Topics in Civil Engineering; Structural Mechanics (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Structural Mechanics. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289G—Selected Topics in Civil Engineering; Transportation Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Transportation Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289H—Selected Topics in Civil Engineering; Transportation Planning (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Transportation Planning. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289I—Selected Topics in Civil Engineering; Water Resources Engineering (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Directed group study in Water Resources Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 290—Seminar (1)
Seminar—1 hour. Discussion of current graduate research, and guest lectures on recent advances. Oral presentation of individual study. Course required of graduate degree candidates. (S/U grading only.) Effective: 1997 Winter Quarter.

ECI 290C—Graduate Research Group Conference (1)
Discussion—1 hour. Research problems, progress, and techniques in civil engineering. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

ECI 296—Topics in Water and Environmental Engineering (1)
Seminar—2 hours. Seminars presented by visiting lecturers, UC Davis faculty and, graduate students. May be repeated for credit. (S/U grading only.) Effective: 2000 Winter Quarter.

ECI 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

ECI 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

ECI 390—The Teaching of Civil Engineering (1)
Discussion—1 hour. Prerequisite(s): Meet qualifications for teaching assistant and/or associate-in in Civil Engineering. Participation as teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated up to 9 unit(s). (S/U grading only.) Effective: 1997 Winter Quarter.

Civil Engineering; Engineering

Civil Engineering; Engineering | Civil Engineering B.S.

(College of Engineering)

Amit M. Kanvinde, Ph.D., Chairperson of the Department; 530-754-9471

Department Office. 2001 Ghausi Hall; 530-752-0586; http://cee.engr.ucdavis.edu

Faculty. http://cee.engr.ucdavis.edu/people/faculty-directory/

The civil engineering profession is responsible for designing, building, operating and maintaining the physical infrastructure and protecting the natural environment that together support human society in an economically and environmentally sustainable manner. The need to predict and mitigate the impact of complex human- and nature-induced stresses on large-scale, geographically-distributed systems has never been more evident than now. These challenges and inevitable societal changes result in a need to develop and adopt new technologies and improved efficiency into the infrastructure.

The Civil Engineering program is accredited by the Engineering Accreditation Commission of ABET; see http://www.abet.org.

Students are encouraged to adhere carefully to all prerequisite requirements. The instructor is authorized to drop students from a course for which stated prerequisites have not been completed. Exclusive of General Education units, the minimum number of units required for the Civil Engineering major is 152 (73 units in lower division and 79-85 units in upper division).

Areas of Specialization

Environmental Engineering. This area focuses on understanding and management of physical, chemical, and biological processes in natural and engineered systems. Areas of emphasis include improvement of air, land, and water quality in the face of increasing population, expanding industrialization, and global climate change. Examples of environmental engineering include innovative analysis and design of air, water, wastewater, and solid waste treatment systems; mathematical modeling of natural and engineered systems; life cycle analysis; sampling, analysis, transport and transformation of natural and anthropogenic pollutants; and modeling of air pollutant emissions.

Suggested Advisors. H.N. Bischel, C.E. Bronner, C. D. Cappa, J.L. Darby, A. Kendall, M.N. Kinyua, M.J. Kleeman, F. J. Loge, J.R. Lund, M.P. Modera, D.A. Niemeier, S.G. Schladow, T.M. Young

Geotechnical Engineering. This area encompasses civil infrastructure and environmental problems that require the characterization and utilization of geologic materials (soils and rocks) to develop engineered solutions. This includes, but is not limited to, foundations for buildings and bridges, earthwork (e.g. dams, tunnels, highways), earthquake hazards (e.g. ground motions, liquefaction, soil-structure interaction), and geo-environmental problems (ground water flow, subsurface contaminant transport and remediation).

Suggested Advisors. R.W. Boulanger, Y.F. Dafalias, J.T. DeJong, J.T. Harvey, B. Jeremic, B.L. Kutter, P.C. Lucia, A. Martinez, K. Ziotopoulou

Structural Engineering and Structural Mechanics. Structural Engineering addresses the conception, design, analysis, construction, and modeling of all types of civil infrastructure, including buildings, bridges, dams, ports, highways, and industrial facilities subject to loadings ranging from gravity and earthquakes, to extreme environmental events, with consideration of optimal and sustainable outcomes over the entire life-cycle. Structural Mechanics encompasses the theory of solid structures, and the associated methods of analysis and computation used in the practice of Structural Engineering. For both disciplines, materials of particular interest include steel, concrete, timber, advanced composites and particulate media.

Suggested Advisors. J.E. Bolander, Y.H. Chai, L. Cheng, Y.F. Dafalias, J.T. Harvey, A.M. Kanvinde, S.K. Kunnath, B.H. Maroney, S.A. Miller, M.M. Rashid, N. Sukumar

Transportation Planning and Engineering. This area deals with the movement of people and goods in a manner consistent with society's environmental and socio-economic goals. Transportation engineering applies engineering, physical and mathematical sciences, economics, and behavioral social science principles to plan, analyze, design, and operate resilient and sustainable transportation systems, such as highways, transit, airfields and ports. Transportation planning involves the formulation and analysis of transportation policy, program, and project alternatives. Societal goals, budgetary constraints, socio-economic (such as safety, equity and mobility) and environmental (such as air and water quality, climate change, and clean energy)

objectives, and technological feasibilities (such as vehicle, infrastructure, and information technologies) are considered.

Suggested Advisors. Y. Fan, J.T. Harvey, M.A. Jaller, A. Kendall, M.P. Modera, D.A. Niemeier, D. Sperling, H.M. Zhang

Water Resources Engineering. This area includes hydrology, hydraulics, fluid mechanics, and water resources systems planning and design. Hydrology deals with quantifying and understanding all aspects of the hydrologic cycle, including the relationships between precipitation, runoff, groundwater, and surface water. Water quality and contaminant transport issues are linked to hydrologic conditions. Hydraulics and fluid mechanics deal with flows in pipes, open-channel water-distribution systems, and natural systems, such as lakes and estuaries. Water resources systems planning and design deals with the comprehensive development of water resources to meet the multiple needs of industry, agriculture, municipalities, recreation, and other activities.

Suggested Advisors. F.A. Bombardelli, J.L. Darby, A.L. Forrest, J.D. Herman M.L. Kavvas, J.R. Lund, V.L. Morales, H.J. Oldroyd, S.G. Schladow, B.A. Younis

Additional information on areas of specialization and potential faculty advisors can be obtained from the departmental website.

Lower Division Required Courses **Units:** 73

MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3
MAT 022B	Differential Equations	3
PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5

Choose one:

PHY 009D	Modern Physics	4
CHE 002C	General Chemistry	5
BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
GEL 050	Physical Geology	3
AND		
GEL 050L	Physical Geology Laboratory	2

CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
OR		
CHE 002AH	Honors General Chemistry	5
CHE 002BH	Honors General Chemistry	5
ECI 003	Civil Infrastructure and Society	4

ECI 003 is designed for lower division students and is not open to upper-division students. Students who do not take this course will substitute four units of additional letter graded upper-division Civil and Environmental Engineering coursework.

ECI 016	Spatial Data Analysis	2
ENG 006	Engineering Problem Solving	4

OR

ECS 032A	Introduction to Programming	4

ENG 035	Statics	4

Choose one; a grade of C- or better is required:

ENL 003	Introduction to Literature	4
UWP 001	Expository Writing	4
UWP 001V	Expository Writing	4
UWP 001Y	Expository Writing	4
COM 001	Major Books of Western Culture: The Ancient World	4
COM 002	Major Books of Western Culture: From the Middle Ages to the Enlightenment	4
COM 003	Major Books of Western Culture: The Modern Crisis	4
COM 004	Major Books of the Contemporary World	4
NAS 005	Introduction to Native American Literature	4

Choose one:

CMN 001	Introduction to Public Speaking	4
CMN 003	Interpersonal Communication Competence	4
	CMN 003Y will not satisfy this requirement.	
ENG 003	Introduction to Engineering Design	4

Upper Division Requirements **Units:** 79-85

ENG 103	Fluid Mechanics	4
OR		
ECI 100	Introduction to Fluid Mechanics for Civil and Environmental Engineers	4
ENG 104	Mechanics of Materials	4
ENG 104L	Mechanics of Materials Laboratory	1
ENG 106	Engineering Economics	3
ENG 102	Dynamics	4
OR		
ENG 105	Thermodynamics	4
ECI 114	Probabilistic Systems Analysis for Civil Engineers	4

Choose one:

ECI 115	Computer Methods in Civil & Environmental Engineering	4
ECI 153	Deterministic Optimization and Design	4
MAT 118A	Partial Differential Equations: Elementary Methods	4
STA 108	Applied Statistical Methods: Regression Analysis	4

Civil & Environmental Engineering Breadth

Choose one course from four of the following group options:

Environment:

ECI 140A	Environmental Analysis of Aqueous Systems	4
OR		
ECI 140B	Chemical Principles for Environmental Engineers	4
OR		
ECI 148A	Water Quality Management	4
OR		
ECI 149	Air Pollution	4

Geotechnical:

ECI 171	Soil Mechanics*	4
ECI 171L	Soil Mechanics Laboratory	1

Structures:

ECI 130	Structural Analysis	4

Transportation:

ECI 161	Transportation System Operations	4
OR		
ECI 163	Energy and Environmental Aspects of Transportation	4
OR		
ECI 165	Transportation Policy	3

Water Resources:

ECI 141	Engineering Hydraulics**	3
ECI 141L	Engineering Hydraulics Laboratory	1

Civil & Environmental Engineering Depth

Choose two courses from two of the following group options selected from Civil and Environmental Engineering Breadth:

Environment:

ECI 140B	Chemical Principles for Environmental Engineers	4
ECI 140C	Biological Principles for Environmental Engineering	4
ECI 140D	Water and Wastewater Treatment System Design	4
ECI 149	Air Pollution	4
ECI 150	Air Pollution Control System Design	4

Geotechnical:

ECI 173	Foundation Design	4
ECI 175	Geotechnical Earthquake Engineering	4
ECI 179	Pavement Engineering	4

Structures:

ECI 131	Matrix Structural Analysis	4
ECI 132	Structural Design: Metallic Elements	4
ECI 135	Structural Design: Concrete Elements	4
ECI 136	Building Design	4

Transportation:

ECI 153	Deterministic Optimization and Design	4
ECI 161	Transportation System Operations	4
ECI 179	Pavement Engineering	4

Water Resources:

ECI 142	Engineering Hydrology	4
ECI 144	Groundwater Systems Design	4
ECI 145	Hydraulic Structure Design	4
ECI 146	Water Resources Simulation	4
ECI 155	Water Resources Engineering Planning	4

Civil & Environmental Engineering Electives

Civil & Environmental Engineering electives may include any upper division, letter-graded Civil & Environmental Engineering courses (i.e. not already used towards the ECI breadth, ECI depth and math analysis requirements) and may include ENG 102 or 105. If both ENG 102 and 105 are completed 4 units will be considered towards the ECI electives. Also can include, but not exceed, a combination of six units from ECI 198 and 199. A maximum of four units of upper-division courses outside of Civil & Environmental Engineering may be considered on a petition basis. Please consult with the undergraduate staff advisor. If ECI 3 was not completed 20 units of electives are required.

ECI 193A	Civil and Environmental Engineering Senior Design	4
ECI 193B	Civil and Environmental Engineering Senior Design	4

Upper Division Composition Requirement

Choose one: a grade of C- or better is required:

UWP 101	Advanced Composition	4
UWP 102E	Writing in the Disciplines: Engineering	4
UWP 102G	Writing in the Disciplines: Environmental Writing	4
UWP 104A	Writing in the Professions: Business Writing	4
UWP 104E	Writing in the Professions: Science	4
UWP 104T	Writing in the Professions: Technical Writing	4

Passing the Upper Division Composition Exam.

*Must also take ECI 171L
**Must also take ECI 141L

Total: 152-158

Civil Engineering; Engineering | ECI Courses

Courses in ECI:

ECI 003—Civil Infrastructure and Society (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): MAT 021A (can be concurrent) Pass One restricted to lower division students; Civil Engineering majors. Introduction to civil infrastructure and its relationship with society and the natural environment. Exposure to innovative research on civil engineering and environmental systems. Participation in laboratory experiments illustrative of the solution of representative but simplified engineering problems. Not open for credit to upper division students. GE credit: OL, SE, SS. Effective: 2016 Winter Quarter.

ECI 016—Spatial Data Analysis (2)
Laboratory—3 hours; Lecture—1 hour. Restricted to Civil Engineering and Biological Systems Engineering majors; non-majors accommodated on a space-available basis. Computer-aided design and geographic information systems in civil engineering practice. GE credit: QL, SE. Effective: 2010 Spring Quarter.

ECI 019—C Programming for Civil and Environmental Engineers (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): MAT 021A (can be concurrent) Pass One open to Civil Engineering majors and Optical Science and Engineering majors. Computational problem solving techniques for Civil and Environmental Engineering applications using structured C programming. Algorithm design applied to realistic problems. GE credit: SE. Effective: 2011 Winter Quarter.

ECI 040—Introduction to Environmental Engineering (4)
Lecture—4 hours. Prerequisite(s): CHE 002B Pass One open to students in the College of Engineering. Introduction to topics in environmental engineering; discussion on influence of literary work, art, and media on the evolution of environmental engineering practice, relevant laws, and regulations; presentations of historical case studies. GE credit: AH. Effective: 2017 Winter Quarter.

ECI 090X—Lower Division Seminar (1-4)
Seminar—1-4 hours. Prerequisite(s): Consent of Instructor. Examination of a special topic in a small group setting. May be repeated for credit. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 092—Internship for Engineering (1-5)
Internship. Prerequisite(s): Lower division standing; approval of project prior to period of internship. Supervised work experience in civil engineering. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 100—Introduction to Fluid Mechanics for Civil and Environmental Engineers (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 035 C- or better; MAT 022B C- or better; PHY 009B C- or better Pass One restricted to Civil Engineering, Environmental Engineering and Hydrology majors. Fluid flow in civil & environmental engineering, basis for design, buoyancy, hydrostatics, gravity dams, hydraulic modeling: similarity & scaling, conservation laws, flow in bends, nozzles, pipes, pumps, turbines, complimentary lab experiments. Not open for credit to students who have taken ENG 103. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 114—Probabilistic Systems Analysis for Civil Engineers (4)
Lecture—4 hours. Prerequisite(s): MAT 021C C- or better Probabilistic concepts and models in engineering. Statistical analysis of engineering experimental and field data. Introduction to stochastic processes and models of engineering systems. Not open for credit to students who have completed STA 120. GE credit: QL, SE. Effective: 2013 Fall Quarter.

ECI 115—Computer Methods in Civil & Environmental Engineering (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (ENG 006 or ECS 030); MAT 022B Open to Civil Engineering majors only. Presentation, implementation and application of numerical algorithms and computer models for the solution of practical problems in Civil and Environmental Engineering. GE credit: SE. Effective: 2013 Fall Quarter.

ECI 119—Parallel Processing for Engineering Applications. (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): C programming or consent of instructor. Fundamental skills in parallel computing for engineering applications; emphasis on structured parallel programming for distributed memory parallel clusters. No credit allowed for students who have taken ECI 119B. GE credit: SE. Effective: 2005 Spring Quarter.

ECI 123—Urban Systems and Sustainability (4)
Lecture—4 hours. Prerequisite(s): Upper division standing. Systems-level approach of how to evaluate and then modify sustainability of urban systems based on interaction with natural environments. Topics include: definition/metrics of urban sustainability; system analyses of urban systems; enabling technology, policies, legislation; measures and modification of ecological footprints. GE credit: ACGH, DD, SE, SL, SS, WE. Effective: 2006 Fall Quarter.

ECI 125—Building Energy Performance (4)
Lecture—4 hours. Prerequisite(s): Upper division standing in Engineering. Open to students in the College of Engineering. Mechanisms of energy consumption in buildings including end uses, thermal loads, ventilation, air infiltration, thermal energy distribution, and HVAC systems; energy performance simulation; methods and strategies of energy efficiency. GE credit: SE. Effective: 2011 Winter Quarter.

ECI 130—Structural Analysis (4)
Lecture—4 hours. Prerequisite(s): ENG 104 C- or better; MAT 022A Open to Civil Engineering majors. Elastic structural analysis of determinate and indeterminate trusses, beams and frames. Plastic bending and limit analysis. GE credit: QL, SE. Effective: 2014 Winter Quarter.

ECI 131—Matrix Structural Analysis (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 104 C- or better; ENG 006 Open to Engineering majors only. Matrix formulation and computer analysis of statically indeterminate structures. Stiffness and flexibility formulations for elastic structures. Finite element methods for elasticity and bending problems. GE credit: SE. Effective: 2013 Fall Quarter.

ECI 132—Structural Design: Metallic Elements (4)
Lecture—4 hours. Prerequisite(s): ECI 130 Design of metallic beams, columns, and other members for various types of loading and boundary conditions; design of connections between members; member performance within structural systems. GE credit: SE, VL. Effective: 2013 Fall Quarter.

ECI 135—Structural Design: Concrete Elements (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECI 130 Restricted to Civil Engineering, Civil Engineering/Materials Science and Engineering, and Materials Science and Engineering majors only. Strength design procedures for columns, rectangular beams, T-beams and beams of general cross-section. Building code requirements for bending, shear, axial load, combined stresses and bond. Introduction to prestressed concrete. GE credit: QL, SE. Effective: 2013 Fall Quarter.

ECI 136—Building Design (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (ECI 130 or ECI 131); (ECI 135 or ECI 132) Design of a building structure for a specific need under the multiple constraints of safety, serviceability, cost and aesthetics. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 137—Construction Principles and Project Management (4)
Laboratory—3 hours; Lecture—3 hours. Restricted to upper division standing in Engineering. Project management, with civil engineering construction and design applications, including project scope, schedule, resources, cost, quality, risk, and control. Construction industry overview. Interactions between planning, design, construction, operations. Construction operations analysis. Contract issues. Project management software, field trips, guest lectures. GE credit: ACGH, OL, QL, SE, SS, VL, WE. Effective: 2013 Fall Quarter.

ECI 138—Earthquake Loads on Structures (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECI 130 or ECI 131 Determination of loads on structures due to earthquakes. Methods of estimating equivalent static lateral forces; response spectrum and time history analysis. Concepts of mass, damping and stiffness for typical structures. Design for inelastic behavior. Numerical solutions and Code requirements. GE credit: SE. Effective: 2013 Fall Quarter.

ECI 139—Advanced Structural Mechanics (4)
Lecture—4 hours. Prerequisite(s): ENG 104 C- or better Review of stress, strain, equilibrium, compatibility, and elastic material behavior. Plane stress and plane strain problems in elasticity; energy methods. Theories for unsymmetric bending, straight and curved beams. Beams on elastic foundations; stresses in plates and shells; elastic stability. GE credit: QL, SE. Effective: 2013 Fall Quarter.

ECI 140A—Environmental Analysis of Aqueous Systems (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 002B C- or better Pass One restricted to Environmental Engineering majors. Introduction to "wet chemical" and instrumental techniques commonly used in the examination of water and wastewater and associated data analysis. Not open for credit to students who have taken ECH 140 or CHE 100. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 140B—Chemical Principles for Environmental Engineers (4)
Lecture—4 hours. Prerequisite(s): CHE 002B C- or better Aqueous chemistry; equilibrium relationships; carbonate system; thermodynamics; kinetics & rate laws; precipitation, adsorption, & volatilization phenomenon; oxidation & reduction reactions; pH, pE and predominance diagrams; organic chemicals. Not open for credit to students who have taken ECI 140. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 140C—Biological Principles for Environmental Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 140A C- or better or ECI 140B C- or better Fundamental microbiology concepts for environmental engineers; provides background needed for the application of water and wastewater treatment, bioremediation, air pollution control and biotransformations in environmental engineered systems. Only two units of credit for students who have taken MIC 101 or MIC 102. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 140D—Water and Wastewater Treatment System Design (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (ENG 103 C- or better or ECI 100 C- or better); (ECI 140 C- or better or ECI 140A C- or better or ECI 140B C- or better or ECI 140C C- or better or ECI 148A C- or better) Evaluation and design of water and wastewater treatment systems. Not open for credit to students who have taken ECI 148B. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 141—Engineering Hydraulics (3)
Lecture—3 hours. Prerequisite(s): ENG 103 C- or better or ECI 100 C- or better Nature of flow of a real fluid; flow in pipes; open channel flow; turbomachinery; fluid forces on objects: boundary layers, lift and drag. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 141L—Engineering Hydraulics Laboratory (1)
Laboratory—3 hours. Prerequisite(s): ECI 141 (can be concurrent) Open to Engineering students only. Laboratory experiments and demonstrations on flow measurements, sluice gates, hydraulic jump, flow characteristics, and centrifugal pumps. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 142—Engineering Hydrology (4)
Lecture—4 hours. Prerequisite(s): ECI 141 (can be concurrent) Restricted to students in the College of Engineering. The hydrologic cycle. Evapotranspiration, interception, depression storage and infiltration. Streamflow analysis and modeling. Flood routing through channels and reservoirs. Frequency analysis of hydrologic variables. Precipitation analysis for hydrologic design. Hydrologic design. GE credit: QL, SE. Effective: 2013 Fall Quarter.

ECI 143—Green Engineering Design and Sustainability (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Upper division standing. Restricted to upper division standing; Pass One restricted to Civil Engineering majors. Application of concepts, goals and metrics of sustainability, green engineering and industrial ecology to engineering design. Other course topics include life-cycle assessments, analysis of environmental management systems, and economics of pollution prevention and sustainability. GE credit: QL, SE, SL, SS. Effective: 2017 Winter Quarter.

ECI 144—Groundwater Systems Design (4)
Lecture—4 hours. Prerequisite(s): ECI 141 Groundwater occurrence, distribution, and movement; groundwater flow systems; radial flow to wells and aquifer testing; aquifer management; groundwater contamination; solute transport by groundwater; fate and transport of subsurface contaminants. Groundwater supply and transport modeling. GE credit: SE. Effective: 2005 Spring Quarter.

ECI 144L—Groundwater Systems Design Laboratory (1)
Laboratory—3 hours. Prerequisite(s): ECI 144 (can be concurrent); ECI 144 required concurrently. Computer modeling of groundwater flow under regional gradient, well injection/withdrawal, and natural and engineered boundary conditions. Use of Groundwater Vistas computer program. Effective: 2010 Fall Quarter.

ECI 145—Hydraulic Structure Design (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): ECI 141 C- or better Project-based course on the design of an integrated urban drainage system with focus on consideration of design alternatives, multiple realistic constraints, quantification of uncertainty, codes and standards, technical drawing and cost analysis. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 146—Water Resources Simulation (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 103 C- or better or ECI 100 C- or better Computer simulation techniques in the analysis, design and operation of surface water systems; modeling concepts and practices with application to surface runoff; water quality in rivers and streams and dispersion of contaminants in water bodies. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 148A—Water Quality Management (4)
Lecture—4 hours. Prerequisite(s): CHE 002B C- or better Basic concepts of water quality measurements and regulations. Introduction to physical, biological and chemical processes in natural waters. Fundamentals of mass balances in water and wastewater treatment. GE credit: SE. Effective: 2013 Fall Quarter.

ECI 149—Air Pollution (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021D; MAT 022B; CHE 002B C- or better; (ATM 121A or ENG 103 C- or better or ECI 100 C- or better) Physical and technical aspects of air pollution. Emphasis on geophysical processes and air pollution meteorology as well as physical and chemical properties of pollutants. (ATM 149.) GE credit: QL, SE, SL. Effective: 2018 Winter Quarter.

ECI 150—Air Pollution Control System Design (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECI 149 C- or better or ATM 149 C- or better Design and evaluation of air pollution control devices and systems. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 153—Deterministic Optimization and Design (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): MAT 021C; MAT 022A; Computer programming course. Operations research. Optimization techniques such as linear programming, dynamic programming, and non-linear programming. Applications in civil engineering disciplines, including multiple realistic constraints, through computer-based course projects. GE credit: QL, SE, SL. Effective: 2013 Fall Quarter.

ECI 155—Water Resources Engineering Planning (4)
Lecture—4 hours. Prerequisite(s): (ENG 106 or ECN 001A or ECN 001AV); ECI 114 Basic engineering planning concepts; role of engineering, economic, environmental and social information and analysis; institutional, political and legal aspects. Case studies and computer models illustrate the planning of water resource systems. GE credit: QL, SE, SL, SS, WE. Effective: 2018 Winter Quarter.

ECI 161—Transportation System Operations (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021C C- or better; PHY 009A C- or better Principles of transportation system operations; traffic characteristics and methods of measurement; models of transportation operations and congestion applied to urban streets and freeways. GE credit: QL, SE. Effective: 2016 Fall Quarter.

ECI 163—Energy and Environmental Aspects of Transportation (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): ECN 001A or ECN 001AV or ENG 106 Engineering, economic, and systems planning concepts. Analysis and evaluation of energy, air quality and selected environmental attributes of transportation technologies. Strategies for reducing pollution and petroleum consumption in light of institutional and political constraints. Evaluation of vehicle emission models. (ESP 163.) GE credit: SE, SL, SS, WE. Effective: 2018 Spring Quarter.

ECI 165—Transportation Policy (3)
Lecture—3 hours. Transportation and associated environmental problems confronting urban areas, and prospective technological and institutional solutions. Draws upon concepts and methods from economics, engineering, political science and environmental studies. GE credit: QL, SE, SS. Effective: 2013 Fall Quarter.

ECI 171—Soil Mechanics (4)
Lecture—4 hours. Prerequisite(s): (ENG 103 (can be concurrent) or ECI 100 (can be concurrent)); ENG 104 C- or better; ECI 171L (can be concurrent); ECI 171L required concurrently. Restricted to Civil Engineering and Environmental Engineering majors only. Soil formations, mass-volume relationships, soil classification, effective stress, soil-water-void relationships, compaction, seepage, capillarity, compressibility, consolidation, strength, states of stress and failure, lateral earth pressures, and slope stability. GE credit: SE. Effective: 2018 Spring Quarter.

ECI 171L—Soil Mechanics Laboratory (1)
Laboratory—3 hours. Prerequisite(s): ECI 171 (can be concurrent); ECI 171 required concurrently. Laboratory studies utilizing standard testing methods to determine physical, mechanical and hydraulic properties of soil and demonstration of basic principles of soil behavior. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 173—Foundation Design (4)
Lecture—4 hours. Prerequisite(s): ECI 171 Foundation analysis and design, including site characterization, evaluation of shallow and deep foundation alternatives, evaluation of bearing capacity and settlements, design of retaining structures, and case-based design experiences. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 175—Geotechnical Earthquake Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 171 C- or better Tectonics, faults, site response, and probabilistic ground motion prediction equations. Cyclic loading and liquefaction of soil elements and layers. Empirical procedures and field tests for evaluation of triggering and consequences, of liquefaction. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 179—Pavement Engineering (4)
Discussion/Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 104 C- or better Pavement types (rigid, flexible, unsurfaced, rail), their applications (roads, airfields, ports, rail) and distress mechanisms. Materials, traffic and environment characterization. Empirical and mechanistic-empirical design procedures. Maintenance, rehabilitation and reconstruction; construction quality; asphalt concrete mix design. GE credit: QL, SE, SL, VL. Effective: 2013 Fall Quarter.

ECI 189A—Selected Topics in Civil Engineering; Environmental Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Environmental Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189B—Selected Topics in Civil Engineering; Hydraulics and Hydrologic Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Hydraulics and Hydrologic Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189C—Selected Topics in Civil Engineering; Engineering Planning (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Engineering Planning. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189D—Selected Topics in Civil Engineering; Geotechnical Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Geotechnical Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189E—Selected Topics in Civil Engineering; Structural Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Structural Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189F—Selected Topics in Civil Engineering; Structural Mechanics (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Structural Mechanics. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189G—Selected Topics in Civil Engineering; Transportation Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Transportation Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189H—Selected Topics in Civil Engineering; Transportation Planning (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Transportation Planning. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189I—Selected Topics in Civil Engineering; Water Resources Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Water Resources Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189J—Selected Topics in Civil Engineering; Water Resources Planning (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Water Resources Planning. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 190C—Research Group Conferences in Civil and Environmental Engineering (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing in Civil and Environmental Engineering. Research group conferences. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 192—Internship in Engineering (1-5)
Internship. Prerequisite(s): Upper division standing; approval of project prior to the period of the internship. Supervised work experience in civil engineering. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 193A—Civil and Environmental Engineering Senior Design (4) ***Review all entries***
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): (ECI 140D C- or better) or (ECI 171 C- or better, ECI 171L C- or better) or (ECI 132 C- or better or ECI 135 C- or better) or (ECI 161 C- or better or ECI 163 C- or better) or (ECI 141 C- or better, ECI 141L C- or better); and Consent of Instructor. And one ECI major depth course with a C- or better. Students must be in final year of study. Open to seniors in Civil Engineering and Environmental Engineering only; students must be in their final year of study. Culminating design experience for civil engineering and environmental engineering majors. Student teams work closely with faculty, city officials or consulting clients to propose, implement and validate a unique solution to a real-world problem. GE credit: OL, SE, WE. Effective: 2018 Winter Quarter.

ECI 193A—Civil and Environmental Engineering Senior Design (4) ***Review all entries***
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): (ECI 140D C- or better) or (ECI 171 C- or better, ECI 171L C- or better) or (ECI 132 C- or better or ECI 135 C- or better) or (ECI 161 C- or better or ECI 163 C- or better) or (ECI 141 C- or better, ECI 141L C- or better); and Consent of Instructor. And one other ECI major depth course with a C- or better; students must be in their final year of study. Open to seniors in Civil Engineering and Environmental Engineering only. Culminating design experience for civil engineering and environmental engineering majors. Student teams work closely with faculty, city officials or consulting clients to propose, implement and validate a unique solution to a real-world problem. GE credit: OL, SE, WE. Effective: 2018 Fall Quarter.

ECI 193B—Civil and Environmental Engineering Senior Design (4)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): ECI 193A Open to seniors in Civil Engineering and Environmental Engineering only. Culminating design experience for civil engineering and environmental engineering majors. Student teams work closely with faculty, city officials or consulting clients to propose, implement and validate a unique solution to a real-world problem. GE credit: OL, SE, VL, WE. Effective: 2017 Fall Quarter.

ECI 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 199—Special Study for Advanced Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Special study. (P/NP grading only.) GE credit: SE. Effective: 2016 Fall Quarter.

ECI 201—Introduction to Theory of Elasticity (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 104 Fundamental equations of elasticity in three dimensions; plane stress and plane strain; flexture and torsion of bars of various shapes. Introduction to variational and approximate methods. Effective: 1997 Winter Quarter.

ECI 203—Inelastic Behavior of Solids (3)
Lecture—3 hours. Prerequisite(s): ECI 201 Fundamentals of theories of plasticity, viscoelasticity and viscoplasticity for solids. Macroscopic constitutive modelling for engineering materials, e.g., metals, polymers, soils, etc., and microscopic motivation. Effective: 1997 Winter Quarter.

ECI 205—Continuum Mechanics (3)
Lecture—3 hours. Prerequisite(s): ECI 201 Tensor formulation of the field equations for continuum mechanics, including large deformation effects. Invariance and symmetry requirements. Introduction to nonlinear thermoelasticity and thermodynamics. Solution of three-dimensional problems. Selected topics. Effective: 1998 Winter Quarter.

ECI 206—Fracture Mechanics (4)
Lecture—4 hours. Prerequisite(s): ECI 201; ENG 104 Linear and nonlinear fracture mechanics, stress analysis, energy concepts, brittle fracture criteria, path independent integrals, Dugdale-Barenblatt model, general cohesive zone models, ductile fracture criteria, crack tip fields for stationary and propagating cracks, fatigue. Application of numerical methods for fracture mechanics. Effective: 2006 Winter Quarter.

ECI 211—Advanced Matrix Structural Analysis (4)
Lecture—4 hours. Prerequisite(s): ECI 131 Analysis of complex frameworks by the displacement method; treatment of tapered beams, curved beams, and beams on elastic foundations; partially rigid connections; geometric and material nonlinearities; buckling; flexibility-based formulations; FEM-software for nonlinear analysis of structures. Effective: 2003 Winter Quarter.

ECI 212A—Finite Element Procedures in Applied Mechanics (4)
Lecture—4 hours. Prerequisite(s): EAD 115 or (MAT 128A, MAT 128B (can be concurrent)) Weighted-residual and Rayleigh-Ritz methods. Weak/variational formulation and development of discrete equations using finite element approximations. Application to one- and two-dimensional problems (heat conduction). Effective: 2003 Winter Quarter.

ECI 212B—Finite Elements: Application to Linear and Non-Linear Structural Mechanics Problems (4)
Lecture—4 hours. Prerequisite(s): ECI 212A Application to linear and nonlinear structural mechanics problems. Linear elasticity, weak form, and finite element approximation. Incompressible media problems. Non-linear problems with material nonlinearity. Effective: 2003 Winter Quarter.

ECI 213—Analysis of Structures Subjected to Dynamic Loads (4)
Lecture—4 hours. Prerequisite(s): ECI 211 (can be concurrent) Analysis of structures subjected to earthquake, wind and blast loading; distributed, consistent and lumped mass techniques; computer implementation; nonlinear response spectrum; frequency and time domain analysis; seismic protection of structures; numerical methods in linear and nonlinear structural dynamics. Effective: 2012 Fall Quarter.

ECI 214—Probabilistic Seismic Hazard Analysis and Design Ground Motions (4)
Lecture—4 hours. Probabilistic seismic hazard analysis for use in developing design spectra and for seismic risk analyses, including the development of earthquake ground motion time series for use in dynamic analyses of structures. Effective: 2016 Winter Quarter.

ECI 216—Meshfree Methods and Partition of Unity Finite Elements (4)
Lecture—4 hours. Prerequisite(s): ECI 201; ECI 212A Advanced discretization techniques such as meshfree methods and partition of unity finite elements for the Galerkin solution of boundary-value problems in solid and structural mechanics. Application of meshfree and extended finite element methods in computational fracture. Effective: 2016 Winter Quarter.

ECI 221—Theory of Plates and Introduction to Shells (3)
Lecture—3 hours. Prerequisite(s): ECI 201 (can be concurrent) Development of classical and refined plate theories. Application to isotropic, orthotropic and composite plates. Solutions for rectangular
and circular plates. Membrane theory for axisymmetric shells and bending of circular shells. Effective: 1997 Winter Quarter.

ECI 223—Advanced Dynamics, Signal Processing, and Smart Structures Technology (4)
Lecture—4 hours. Prerequisite(s): ECI 213; Or equivalent. Signal processing and system identification of structures under dynamic excitations; Fourier and Laplace transforms; data acquisition and sensor design fundamentals; sensor technologies/techniques for nondestructive evaluation; structural control; actuators and dampers for smart structures; piezoelectrics and acoustic emissions; micro- and nano-fabrication. Effective: 2011 Winter Quarter.

ECI 232—Advanced Topics in Concrete Structures (4)
Lecture—4 hours. Prerequisite(s): ECI 130; ECI 135; ECI 138; Graduate standing. Ductility of reinforced concrete; strength of two-way slabs; modified compression field theory. Effective: 2001 Fall Quarter.

ECI 233—Advanced Design of Steel Structures (4)
Lecture—4 hours. Prerequisite(s): (ECI 130 or ECI 131); ECI 132 Review of Load and Resistance Factor Design (LRFD); steel-plate girder design; plastic design of indeterminate systems; moment frames and bracing systems; connection design; seismic design of steel structures; vibration of flooring systems; steel-concrete composite design. Effective: 2004 Winter Quarter.

ECI 234—Prestressed Concrete (4)
Lecture—4 hours. Prerequisite(s): ECI 135; (ECI 130 or ECI 131) Survey of methods and applications; prestressing materials and systems; prestress losses; flexural design; design for shear and torsion; deflection computation and control; continuous beams and indeterminate structures; floor systems; partial prestressing; design of compression members; strut-and-tie models. Effective: 2003 Fall Quarter.

ECI 235—Cement Composites (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 104 Applications of cement composites; materials selection and proportioning; component and composite properties; hydration reactions and microstructure development; mechanisms of failure; nondestructive test methods; fiber reinforcement; concrete durability; novel reinforcing materials; ferrocement; repair and retrofit technologies; applications to structural design. Effective: 2002 Fall Quarter.

ECI 236—Design of Fiber Reinforced Polymer Composite Structures (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECI 135 Basics of mechanics and design of polymer matrix composites: composite classification, manufacturing process, micromechanical property determination, classical lamination theory, strength theories, first-ply-failure, test methods, design practice, strengthening and retrofitting of existing reinforced concrete structures. Effective: 2008 Winter Quarter.

ECI 237—Bridge Design (4)
Lecture—4 hours. Prerequisite(s): ECI 130; ECI 135; ECI 234 recommended. Open to Graduate Students only. Bridge types, behavior and construction characteristics; design philosophy, details according to Caltrans and American Association of State Highway and Transportation Officials codes, principles; seismic design and retrofit of concrete bridges; modern bridges using advanced fiber reinforced polymer composites; fieldtrip required. Effective: 2007 Fall Quarter.

ECI 238—Performance-Based Seismic Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 138; ECI 213 Modern seismic design; performance-based seismic design; seismic hazard; seismic demands: linear and nonlinear procedures; performance assessment: deterministic and probabilistic procedure; review of FEMA-350, FEMA-356, ATC-40 and other performance-based guidelines. Effective: 2005 Spring Quarter.

ECI 240—Water Quality (4)
Lecture—4 hours. Prerequisite(s): ECI 141; ECI 142 Quality requirements for beneficial uses of water. Hydrologic cycle of quality. Hydromechanics in relation to quality of surface and groundwaters; transport and fate of waterborne pollutants. Heat
budget for surface waters; predictive methods; introduction to water quality modeling. Effective: 2000 Fall Quarter.

ECI 241—Environmental Reactive Chemical Transport Modeling (4)
Lecture—4 hours. Prerequisite(s): CHE 002A or CHE 002B or ECI 149; Or equivalent. Modeling of reactive chemical transport in air and water including kinetic reactions, equilibrium reactions, and phase partitioning. Emphasis on numerical solution schemes and programming techniques to provide deeper insight into model performance and limitations. Effective: 2014 Fall Quarter.

ECI 242—Air Quality (4)
Lecture—4 hours. Prerequisite(s): ENG 105; ECI 141; ECI 149; Or equivalents. Factors determining air quality. Effects of air pollutants. Physical and chemical fundamentals of atmospheric transport and reaction. Introduction to dispersion modeling. Effective: 2002 Fall Quarter.

ECI 243A—Water and Waste Treatment (4)
Lecture—4 hours. Prerequisite(s): ECI 148A; Or the equivalent. Characteristics of water and airborne wastes; treatment processes and process kinetics; treatment system design. Effective: 1999 Fall Quarter.

ECI 243B—Water and Waste Treatment (4)
Lecture—4 hours. Prerequisite(s): ECI 243A Continuation of course 243A. Aeration, thickening, biological processes, design of biological treatment systems. Effective: 2000 Winter Quarter.

ECI 243L—Pilot Plant Laboratory (4)
Discussion—1 hour; Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): ECI 243A; ECI 243B (can be concurrent); or Consent of Instructor. Graduate standing. Laboratory investigation of physical, chemical, and biological processes for water and wastewater treatment. Effective: 2016 Winter Quarter.

ECI 244—Life Cycle Assessment for Sustainable Engineering (4)
Lecture—4 hours. Prerequisite(s): Graduate standing. Life cycle assessment methodology is taught emphasizing applications to infrastructure and energy systems. Life cycle design, life cycle cost methods, other tools from industrial ecology, and links to policy are covered as well. Effective: 2011 Fall Quarter.

ECI 245A—Applied Environmental Chemistry: Inorganic (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 105; ECI 140; CHE 002B; Or the equivalent of CHE 002B; CHE 002C or CHE 107A recommended. Chemistry of natural and polluted waters. Topics include chemical, kinetic and equilibrium principles, redox reactions, gas solution and solid-solution equilibria, thermodynamics, carbonate systems, coordination chemistry, interfacial phenomena. Effective: 2000 Spring Quarter.

ECI 245B—Applied Environmental Chemistry: Organic (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 128A; CHE 128B; CHE 128C; Or the equivalent; CHE 002C or CHE 107A recommended. Transport and transformation of organic chemicals in the environment.
Topics include application of thermodynamics to predict solubility and activity coefficients; distribution of organic chemicals between the aqueous phase and air, solvent, or solid phases; chemical, photochemical and biological transformation reactions. Effective: 2001 Spring Quarter.

ECI 246N—Understanding Climate Change: Causes and Consequences (4)
Lecture—4 hours. Open to graduate students. Diverse physical processes that govern climate and drive climate change. Observational, experimental and modeling techniques and methods used in the development of our scientific understanding of the Earth system. Effective: 2016 Spring Quarter.

ECI 247—Aerosols (4)
Lecture—4 hours. Prerequisite(s): ENG 103; ENG 105; ECI 141; ECI 149 Behavior of airborne particles including particle formation, modification, and removal processes. Effective: 2002 Fall Quarter.

ECI 247L—Aerosols Laboratory (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): ECI 247 Methods of generation and characterization of aerosols. Detailed topics may include flow rate measurement, aerosol generation, aerosol collection, ions measurement, metals measurement, and carbon measurement. May be repeated up to 1 time(s). Effective: 2002 Fall Quarter.

ECI 248—Biofilm Processes (4)
Lecture—4 hours. Prerequisite(s): SSC 111 or SSC 211 or ECI 243B; or Consent of Instructor. Calculus and basic cell molecular biology are recommended. Natural and engineered biofilms, including biofilm occurrence and development, spatial structure, microbial processes, fundamental and applied research tools, biofilm reactors, beneficial uses, and detrimental effects. Effective: 2004 Spring Quarter.

ECI 249—Probabilistic Design and Optimization (4)
Lecture—4 hours. Prerequisite(s): ECI 114; ECI 153; ENG 106; Or equivalents. Design by optimization for probabilistic systems, decision theory, the value of information, probabilistic linear programming, probabilistic dynamic programming, nonlinear probabilistic optimization. Applications in civil engineering design, project evaluation, and risk management. Effective: 2006 Winter Quarter.

ECI 250—Civil Infrastructure System Optimization and Identification (4)
Lecture—4 hours. Prerequisite(s): MAT 021C; MAT 022A; Programming course; EAD 115 and mathematical modeling course recommended. Restricted to graduate standing. Applied mathematics with a focus on modeling, identifying, and controlling dynamic, stochastic, and underdetermined systems. Applications in transportation networks, water resource planning, and other civil infrastructure systems. Effective: 2005 Spring Quarter.

ECI 251—Transportation Demand Analysis (4)
Lecture—4 hours. Prerequisite(s): ECI 114; Or the equivalent. Procedures used in urban travel demand forecasting. Principles and assumptions of model components (trip generation, trip distribution, model split). New methods of estimating travel demand. Computer exercises using empirical data to calibrate models and forecast travel demand. Effective: 1999 Fall Quarter.

ECI 252—Sustainable Transportation Technology and Policy (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): ECI 165 Role of technical fixes and demand management in creating a sustainable transportation system. Emphasis on technology options, including alternative fuels, electric propulsion, and IVHS. Analysis of market demand and travel behavior, environmental impacts, economics and politics. (ESP 252.) Effective: 2000 Fall Quarter.

ECI 253—Dynamic Programming and Multistage Decision Processes (4)
Lecture—4 hours. Prerequisite(s): MAT 021C; MAT 022A; Programming course; EAD 115 recommended. Operations research. Optimization techniques with a focus on dynamic programming in treating deterministic, stochastic, and adaptive multistage decision processes. Brief review of linear programming and non-linear programming. Applications in transportation networks and other civil infrastructure systems. Effective: 2005 Spring Quarter.

ECI 254—Exploring Data from Built Environment Using R (4)
Laboratory—3 hours; Lecture—3 hours. Introduction to modern data science, specifically data acquisition, exploratory data analysis, visualization, and beginning data analysis using R. Emphasizes computational reasoning and working with tabular and non-standard data. Focus will be on data generated in the built environment. (Geography 279.) Effective: 2017 Fall Quarter.

ECI 256—Urban Traffic Management and Control (4)
Lecture—4 hours. Prerequisite(s): ECI 114 Basic concepts, models, and methods related to the branch of traffic science that deals with the movement of vehicles on a road network, including travel speed, travel time, congestion concepts, car-following and hydrodynamic traffic models. Effective: 2000 Fall Quarter.

ECI 257—Flow in Transportation Networks (4)
Lecture—4 hours. Prerequisite(s): ECI 153; ECI 161 or ECI 256 recommended. Elements of graph theory, a survey of pertinent optimization techniques, extremal principles in network flow problems, deterministic equilibrium assignment, stochastic equilibrium assignment, extensions of equilibrium assignments and dynamic transportation network assignment. Effective: 2000 Winter Quarter.

ECI 259—Asphalt and Asphalt Mixes (4)
Lecture—4 hours. Prerequisite(s): ECI 179; or Consent of Instructor. Asphalts and asphalt mix types and their use in civil engineering structures, with primary emphasis on pavements. Asphalt, aggregate properties and effects on mix properties. Design, construction, recycling. Recent developments and research. Effective: 2006 Winter Quarter.

ECI 260—Sediment Transport (4)
Lecture—4 hours. Prerequisite(s): ECI 141; Or equivalent. Sediment transport in hydrologic systems. Process-oriented course which will emphasize how sediment moves and the physical processes that affect sediment transport. Field trip. Effective: 2006 Winter Quarter.

ECI 264A—Transport, Mixing and Water Quality in River and Lakes (4)
Lecture—4 hours. Prerequisite(s): ECI 141; ECI 240 Principal causes of mixing and transport in rivers, lakes and reservoirs, and their impacts on water quality. Case studies of specific lakes and rivers. Effective: 2000 Fall Quarter.

ECI 264B—Transport, Mixing and Water Quality in Estuaries and Wetlands (4)
Lecture—4 hours. Prerequisite(s): ECI 141; ECI 240 Principal causes of mixing and transport in estuaries and wetlands, and their impacts on water quality. Topics include advection/diffusion; tides; transverse mixing; longitudinal dispersion; sediment transport; nutrient cycling; computer modeling of estuaries. Case studies of specific systems. Effective: 2000 Spring Quarter.

ECI 265—Stochastic Hydrology and Hydraulics (4)
Lecture—4 hours. Prerequisite(s): ECI 266; or Consent of Instructor. Physics-based stochastic methods in modeling hydrologic and hydraulic processes; theory for modeling hydrologic-hydraulic governing equations as stochastic partial differential equations applied to various hydrologic-hydraulic processes under uncertainty, including transport, open channel flow, overland flow, soil water flow, and groundwater. Effective: 2015 Winter Quarter.

ECI 266—Applied Stochastic Methods in Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 114 or MAT 131 or STA 130A or STA 131A or MAT 118A (can be concurrent) Stochastic processes classification; Gaussian random fields; stochastic calculus in mean square; Ito and Stratonovich stochastic differential equations; Fokker-Planck equation; stochastic differential equations
with random coefficients. Effective: 1999 Fall Quarter.

ECI 267—Water Resource Management (3)
Lecture—3 hours. Prerequisite(s): ECI 114; ECI 141; ECI 142; ECI 153 recommended. Engineering, institutional, economic, and social basis for managing local and regional water resources. Examples in the context of California's water development and management. Uses of computer modeling to improve water management. (GEO 212.) Effective: 2013 Fall Quarter.

ECI 268—Infrastructure Economics (3)
Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ENG 106; Or the equivalent. Economics applied to infrastructure engineering planning, operations, maintenance, and management problems; microeconomic and macroeconomic theories; benefit-cost analysis; effect of uncertainty; optimization economics; non-classical economics; public finance. Effective: 2018 Spring Quarter.

ECI 269—Transportation-Air Quality: Theory and Practice (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECI 149; Or the equivalent. Health and regulatory
aspects of airborne pollutants. Principles of modeling
vehicle emissions. Conformity issues and the regulatory
framework. Regional and micro-scale modeling. Effective: 1999 Fall Quarter.

ECI 270—Advanced Water Resources Management (3)
Lecture—3 hours. Prerequisite(s): ECI 153; ECI 267; Or the equivalent. Discussion of technical papers related to planning theory, system maintenance, regionalization, multi-objective methods, risk analysis, institutional issues, pricing model application, economic development, forecasting, operations, and other topics. Effective: 1997 Winter Quarter.

ECI 271—Inverse Problems (4)
Lecture—4 hours. Prerequisite(s): ECI 114; ECI 144; Or equivalents. Inverse calibration of distributed parameter models, using data representing model outputs. Forward and inverse mappings, stability, uniqueness, identifiability. Optimization formulation of inverse problems, maximum likelihood and other objective functions, indirect and direct approaches, solution by UCODE in hands-on project format. Effective: 2010 Fall Quarter.

ECI 272A—Advanced Hydrogeology (4)
Lecture—4 hours. Prerequisite(s): ECI 144; MAT 118A recommended. Flow in confined, unconfined, and leaky aquifers. Geological aspects of aquifers. Regional groundwater flow and hydraulics of pumping and recharging wells. Identification of aquifer parameters. Isotope hydrogeology and recharge estimation. Effective: 2000 Fall Quarter.

ECI 272B—Advanced Hydrogeology (4)
Lecture—4 hours. Prerequisite(s): ECI 212A; ECI 272A Processes of subsurface flows and transport. Numerical methods of subsurface fluid flow and transport systems. Flow in the unsaturated zone. Fresh water-salt water interface in coastal aquifers. Macrodispersion. Identification of regional aquifer parameters. Modeling of aquifer systems. Effective: 2000 Fall Quarter.

ECI 272C—Multiphase Reactive Transport (4)
Lecture—4 hours. Prerequisite(s): ECI 142; ECI 144; ECI 148A Multicomponent reactive transport including multiple phases. Advective/dispersive transport, chemical equilibria, and mass transformation kinetics. Natural chemical/microbiological processes including sorption, complexation, biodegradation, and diffusive mass transfer. Eulerian and Lagrangean averaging methods. Applications to contaminant remediation problems in river and subsurface hydrology. Effective: 2004 Fall Quarter.

ECI 273—Water Resources Systems Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 114; ECI 153; Or the equivalent. Planning and management of water resource systems. Deterministic and stochastic simulation and optimization techniques. Capacity design and operation of reservoir systems for water supply, hydropower, flood control, and environmental objectives. Effective: 2018 Winter Quarter.

ECI 275—Hydrologic Time-Series Analysis (4)
Lecture—4 hours. Prerequisite(s): ECI 114; ECI 142 Application of statistical methods for analysis and modeling of hydrologic series. Statistical simulation and prediction of hydrologic sequences using time series methodology. Effective: 2003 Fall Quarter.

ECI 276—Watershed Hydrology (4)
Lecture—4 hours. Prerequisite(s): ECI 142; Or the equivalent. Analysis and mathematical modeling of hydrologic processes taking place in a watershed. Precipitation analysis and modeling. Theory of overland flow and its kinematic wave approximation.Analysis and modeling of saturated and unsaturated subsurface flow processes taking place on a hill slope. Effective: 1997 Winter Quarter.

ECI 277A—Computational River Mechanics I (4)
Lecture—4 hours. Prerequisite(s): EAD 115 (can be concurrent); ECI 141 (can be concurrent) Unsteady open channel flows, computation of water surface profiles, shallow water equations, St. Venant equations, method of characteristics, finite difference methods, stability and accuracy of explicit and implicit schemes, flood routing in simple and compound channels, advection of plumes. Not open for credit to students who have taken ECI 277. Effective: 2004 Fall Quarter.

ECI 277B—Computational River Mechanics II (4)
Lecture—4 hours. Prerequisite(s): ECI 277A Open channel flows, physical aspects of river mechanics, formulation of depth-averaged equations, boundary conditions, coordinates transformation and grid generation, finite-difference solution techniques, applications to two-dimensional momentum and pollutant transport in rivers. Effective: 2004 Fall Quarter.

ECI 277C—Turbulence and Mixing Processes (4)
Lecture—4 hours. Prerequisite(s): Graduate standing. Nature of turbulent flows, conservation equations, momentum, heat and mass transport in free and wall-bounded flows, body forces and mixing, roughness effects, turbulence modeling and simulation. Effective: 2004 Fall Quarter.

ECI 278—Hydrodynamics (3)
Lecture—3 hours. Prerequisite(s): ECI 141 Perturbation methods. Basic water waves. Governing equations for fluid motion on a rotating earth. Rotation effects, vorticity dynamics, Ekman layer. Stratification effects, internal waves and turbulent mixing. Combined effects. Effective: 1997 Winter Quarter.

ECI 279—Advanced Mechanics of Fluids (4)
Lecture—4 hours. Prerequisite(s): ECI 141 Rotational flows. Navier-Stokes equations and solutions for laminar flow; boundary layer equations and solution techniques. Nature of turbulence. Reynolds equations. Introduction to turbulence modeling. Effective: 1997 Winter Quarter.

ECI 280A—Nonlinear Finite Elements for Elastic-Plastic Problems (4)
Lecture—4 hours. Prerequisite(s): Consent of Instructor. State of the art finite element methods and tools for elasticplastic problems, including computational techniques based on the finite element method and the theory of elastoplasticity. Effective: 2008 Spring Quarter.

ECI 280B—Nonlinear Dynamic Finite Elements (4)
Lecture—4 hours. Prerequisite(s): Consent of Instructor. State of the art computational methods and tools for analyzing linear and nonlinear dynamics problems. Effective: 2009 Spring Quarter.

ECI 281A—Advanced Soil Mechanics (4)
Lecture—4 hours. Prerequisite(s): ECI 171 Consolidation and secondary compression. Preloading and wick drains. Seepage and seepage pressures. Filtration, drainage, and dewatering. Shear strength: friction, cohesion, dilatancy and critical states. Effective: 2004 Fall Quarter.

ECI 281B—Advanced Soil Mechanics (5)
Laboratory—3 hours; Lecture—4 hours. Prerequisite(s): ECI 281A Site investigation and soil characterization within the context of slope stability analysis. Effective: 2014 Spring Quarter.

ECI 282—Pavement Design and Rehabilitation (4)
Lecture—4 hours. Prerequisite(s): ECI 179; or Consent of Instructor. Advanced pavement design and structural/functional condition evaluation for concrete and asphalt pavements. Highways, airfields, port facilities; new facilities, rehabilitation, reconstruction. Mechanistic-empirical procedures, materials, climate and traffic characterization. Use of current design methods; recent developments and research. Effective: 2004 Winter Quarter.

ECI 283—Physico-Chemical Aspects of Soil Behavior (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECI 171 Study of the geotechnical behavior of soils considering formation, transport, mineralogy, soil-fluid-electrolyte systems, surface tension, particle mechanics, shape, fabric, and structure. Laboratories demonstrate effects of fundamental interparticle forces (contact, Van Der Waals, capillarity and chemical). Effective: 2012 Fall Quarter.

ECI 284—Theoretical Geomechanics (4)
Lecture—4 hours. Prerequisite(s): ECI 171 Elasticity, plasticity, micromechanics, coupled behavior and large deformations for geomaterials. Prediction of stress-strain-volume change behavior of geomaterials. Monotonic and cyclic loading, anisotropy, bifurcation of deformation. Effective: 2004 Winter Quarter.

ECI 286—Advanced Foundation Design (4)
Lecture—4 hours. Prerequisite(s): ECI 173 Design and analysis of pile and pier foundations, including seismic effects; deep excavation systems; tie-back, nailing, and anchor systems; coffer dams; loads on buried conduits; ground modification techniques; and other related topics. Effective: 2004 Spring Quarter.

ECI 287—Geotechnical Earthquake Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 138; ECI 281A Characteristics and estimation of earthquake ground motions; wave propagation and local site response; liquefaction potential and remediation; residual strength and stability considerations; ground deformations; dynamic soil-structure interaction. Effective: 2004 Spring Quarter.

ECI 288—Earth and Rockfill Dams (4)
Lecture—4 hours. Prerequisite(s): ECI 281A; ECI 281B (can be concurrent) Site selection; design considerations; layout; seismic effects including considerations of fault movements; construction; environmental considerations, instrumentation; maintenance remediation and retrofit of existing dams. Effective: 2004 Winter Quarter.

ECI 289A—Selected Topics in Civil Engineering; Environmental Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Environmental Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289B—Selected Topics in Civil Engineering; Hydraulics and Hydrologic Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Hydraulics and Hydrologic Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289C—Selected Topics in Civil Engineering; Engineering Planning (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Engineering Planning. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289D—Selected Topics in Civil Engineering; Geotechnical Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Geotechnical Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289E—Selected Topics in Civil Engineering; Structural Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Structural Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289F—Selected Topics in Civil Engineering; Structural Mechanics (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Structural Mechanics. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289G—Selected Topics in Civil Engineering; Transportation Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Transportation Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289H—Selected Topics in Civil Engineering; Transportation Planning (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Transportation Planning. May be repeated for credit. Effective: 1997 Winter Quarter.

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ECI 289I—Selected Topics in Civil Engineering; Water Resources Engineering (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Directed group study in Water Resources Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 290—Seminar (1)
Seminar—1 hour. Discussion of current graduate research, and guest lectures on recent advances. Oral presentation of individual study. Course required of graduate degree candidates. (S/U grading only.) Effective: 1997 Winter Quarter.

ECI 290C—Graduate Research Group Conference (1)
Discussion—1 hour. Research problems, progress, and techniques in civil engineering. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

ECI 296—Topics in Water and Environmental Engineering (1)
Seminar—2 hours. Seminars presented by visiting lecturers, UC Davis faculty and, graduate students. May be repeated for credit. (S/U grading only.) Effective: 2000 Winter Quarter.

ECI 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

ECI 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

ECI 390—The Teaching of Civil Engineering (1)
Discussion—1 hour. Prerequisite(s): Meet qualifications for teaching assistant and/or associate-in in Civil Engineering. Participation as teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated up to 9 unit(s). (S/U grading only.) Effective: 1997 Winter Quarter.

Classical Civilization; Classics

Classical Civilization; Classics | Classical Civilization Information

(College of Letters and Science)

Carey Seal, Ph.D., Program Director

Department Office. Classics Program; 215 Sproul Hall; 530-752-0835; http://classics.ucdavis.edu

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The Major Program

Classical Civilization is an interdisciplinary major that examines the ancient Mediterranean cultures of Greece, Rome and the Near East, with courses offered on the languages, history, literature, religions, myths, art and archaeology of these societies, their achievements in rhetoric and philosophy, and their political and social institutions. Minor programs in Classical Civilization, Greek, and Latin, and many General Education courses are also offered.

The Program. The major has two tracks: *(1)* Classical and Mediterranean Civilizations, and *(2)* Classical Languages and Literatures. The core of both major tracks consists of two years of Latin or

Greek, the introductory sequence on the ancient Mediterranean world (CLA 001, 002, 003 or 004), the advanced seminar (CLA 190), and a number of electives. The Classical and Mediterranean Civilization track allows students to choose their electives from a broadly balanced program in history, art and archaeology, literature, philosophy and rhetoric. The Classical Languages and Literatures track focuses more intensively on language and literature, requiring the study of two languages and allowing fewer electives. Students planning to go on to graduate work in Classics should take Track 2 and study as much Latin and Greek as possible. They should make a point of talking to an advisor early in their undergraduate program. They are also advised to acquire a reading knowledge of French or German.

Career Opportunities. A degree in Classical Civilization represents a solid liberal arts education that provides an excellent foundation for a wide variety of careers. In the last twenty-five years, many majors have applied to law or medical schools and nearly all have been accepted. Additional career options include library and museum work, teaching, journalism, and graduate study in Classics, art, archaeology, history, literature, philosophy, and religion.

Major Advisors. E. Albu, V. Popescu, C. Seal, A. Uhlig

Honors Program. Candidates for high or highest honors in Classical Civilization must write a senior honors thesis under the direction of a faculty member in Classics. Potential candidates for the honors program must enroll in Classics 194HA and 194HB, normally during the first two quarters of the senior year. Enrollment is limited to upper division students with a minimum of 135 units, and a 3.500 grade point average in courses in the Classical Civilization major. For further information, students should consult with the major advisor or program director. The requirements for the honors program are in addition to the regular requirements for the major in Classical Civilization.

Graduate Study. The Department offers a master's degree in Classics with emphasis on either Greek or Latin; however, admission into the graduate program has been suspended.

Prerequisite credit. Credit will not normally be given for a lower division course in Latin or Greek if it is the prerequisite of a course already successfully completed. Exceptions can be made by the Program Director only.

Classical and Mediterranean Civilizations Track **Units:** 66-67

Preparatory Subject Matter

LAT 001	Elementary Latin	5
LAT 002	Elementary Latin	5
LAT 003	Intermediate Latin	5
GRK 001	Elementary Greek	5
GRK 002	Elementary Greek	5
GRK 003	Intermediate Greek	5

Choose two:

CLA 001	Ancient Near East and Early Greece: 3000-500 B.C.E.	4
CLA 002	Ancient Greece and the Near East: 500 to 146 B.C.E.	4
CLA 003	Rome and the Mediterranean: 800 B.C.E. to 500 C.E.	4
CLA 004	Late Antiquity	4

Choose one additional from:

AHI 001A	Ancient Mediterranean Art	4
CLA 001	Ancient Near East and Early Greece: 3000-500 B.C.E.	4
CLA 002	Ancient Greece and the Near East: 500 to 146 B.C.E.	4

CLA 003	Rome and the Mediterranean: 800 B.C.E. to 500 C.E.	4
CLA 004	Late Antiquity	4
CLA 010	Greek, Roman, and Near Eastern Mythology	3
OR		
CLA 010Y	Greek, Roman, and Near Eastern Mythology - Hybrid	3
CLA 015	Women and Gender in Classical Antiquity	4
CLA 020	Pompeii AD 79	4
CLA 025	The Classical Heritage in America	4
CLA 030	Greek and Latin Elements in English Vocabulary	3
CLA 030F	Greek and Latin Elements in English Vocabulary	3
CLA 031	Greek and Latin Elements in Technical Vocabulary	3
CLA 040	Life and Economy in the Ancient Mediterranean World	4
CLA 050	Ancient Science	4
COM 001	Major Books of Western Culture: The Ancient World	4
PHI 021	Philosophical Classics of the Ancient Era	4
RST 021	The Bible and Its Interpreters	4
RST 040	New Testament	4

Depth Subject Matter

Upper division courses in Latin or Greek

CLA 190	Senior Seminar	4

Six additional upper division courses chosen from the following groups:

Of these 24 units at least 12 must be in Latin, Greek, or Classics.

(a) Upper division courses in Latin or Greek (100 and above), or Classics 101 and above (except 194HA, 194HB, and no more than 4 credits from 197TC).

CLA 101A	Topics in Ancient Mediterranean Civilizations	4
CLA 101B	Topics in Greek Civilization	4
CLA 101C	Topics in Roman Civilization	4
CLA 101D	Topics in Classical Receptions	4
CLA 101E	Topics in Ancient Science	4
CLA 102	Film and the Classical World	4
CLA 103	Love and Beauty in the Ancient World	4
CLA 105	Theory and Practice of Greek and Roman Mythology	4
CLA 110	Origins of Rhetoric	4
CLA 111	Forms of Knowledge in the Ancient World	4
CLA 120	Greek and Roman Historiography	4
CLA 125	Roman Political Thought	4
CLA 140	Homer and Ancient Epic	4
CLA 141	Greek and Roman Comedy	4
CLA 142	Greek and Roman Novel	4
CLA 143	Greek Tragedy	4
CLA 150	Socrates and Classical Athens	4
CLA 170	Cultural Interactions in the Ancient Mediterranean World	4
CLA 171	Mediterranean Bronze Age Archaeology	4
CLA 172A	Early Greek Art and Architecture	4

CLA 172B	Later Greek Art and Architecture	4
CLA 173	Roman Art and Architecture	4
CLA 174	Greek Religion and Society	4
CLA 175	Architecture and Urbanism in Mediterranean Antiquity	4
CLA 176	Roman Religions	4
GRK 100	Readings in Greek Prose	4
GRK 101	Plato	4
GRK 102	Euripides	4
GRK 103A	Homer: Iliad	4
GRK 103B	Homer: Odyssey	4
GRK 104	Menander	4
GRK 105	Attic Orators	4
GRK 106	Greek Hexameter Poetry	4
GRK 110	Readings in the Greek Novel	4
GRK 111	Sophocles	4
GRK 112	Aristophanes	4
GRK 113	Thucydides	4
LAT 100	Readings in Latin Prose	4
LAT 101	Livy	4
LAT 102	Roman Comedy	5
LAT 103	Vergil: Aeneid	4
LAT 104	Sallust	4
LAT 105	Catullus	4
LAT 106	Horace: Odes and Epodes	4
LAT 108	Horace: Satires and Epistles	4
LAT 109	Roman Elegy	4
LAT 110	Ovid	4
LAT 112	Cicero	4
LAT 115	Lucretius	4
LAT 116	Vergil: Eclogues and Georgics	4
LAT 118	Roman Historians	4
LAT 119	Readings in Republican Latin Literature	4
LAT 120	Readings in Imperial Latin Literature	4
LAT 121	Latin Prose Composition	4
LAT 122	Early Christian Writers	4
LAT 125	Medieval Latin	4
LAT 130	Readings in Late Latin	4
LAT 135	Themes in Latin Literature	4

(b) Relevant courses in other departments such as:

HIS 102A	Undergraduate Proseminar in History; Ancient	5
HIS 111A	Ancient History	4
HIS 111B	Ancient History	4
HIS 111C	Ancient History	4
RST 102	Christian Origins	4
RST 125	Dead Sea Scrolls, Apocrypha, and Pseudepigrapha	4
RST 141A	New Testament Literature: Synoptic Gospels	4
RST 141B	New Testament Literature: John	4
RST 141C	New Testament Literature: Paul	4
PHI 143	Hellenistic Philosophy	4
PHI 160	Pre-Socratics	4
PHI 161	Plato	4
PHI 162	Aristotle	4

POL 118A	History of Political Theory: Ancient	4

Classical Languages and Literatures Track **Units:** 70

Preparatory Subject Matter

LAT 001	Elementary Latin	5
LAT 002	Elementary Latin	5
LAT 003	Intermediate Latin	5
AND		
GRK 001	Elementary Greek	5
GRK 002	Elementary Greek	5
GRK 003	Intermediate Greek	5

Choose one:

CLA 001	Ancient Near East and Early Greece: 3000-500 B.C.E.	4
CLA 002	Ancient Greece and the Near East: 500 to 146 B.C.E.	4
CLA 003	Rome and the Mediterranean: 800 B.C.E. to 500 C.E.	4
CLA 004	Late Antiquity	4

Depth Subject Matter

Six upper division courses in the two chosen languages, with at least two courses in each language

CLA 190	Senior Seminar	4

Choose two from either of the following groups:

(a) Additional upper division courses in Latin or Greek (100 and above) or Classics 101 and above (except 194HA, 194HB, and no more than 4 credits from 197TC).

Additional upper division courses in Latin or Greek.

CLA 101A	Topics in Ancient Mediterranean Civilizations	4
CLA 101B	Topics in Greek Civilization	4
CLA 101C	Topics in Roman Civilization	4
CLA 101D	Topics in Classical Receptions	4
CLA 101E	Topics in Ancient Science	4
CLA 102	Film and the Classical World	4
CLA 103	Love and Beauty in the Ancient World	4
CLA 105	Theory and Practice of Greek and Roman Mythology	4
CLA 110	Origins of Rhetoric	4
CLA 111	Forms of Knowledge in the Ancient World	4
CLA 120	Greek and Roman Historiography	4
CLA 125	Roman Political Thought	4
CLA 140	Homer and Ancient Epic	4
CLA 141	Greek and Roman Comedy	4
CLA 142	Greek and Roman Novel	4
CLA 143	Greek Tragedy	4
CLA 150	Socrates and Classical Athens	4
CLA 171	Mediterranean Bronze Age Archaeology	4
CLA 172A	Early Greek Art and Architecture	4
CLA 172B	Later Greek Art and Architecture	4
CLA 173	Roman Art and Architecture	4
CLA 174	Greek Religion and Society	4

CLA 175	Architecture and Urbanism in Mediterranean Antiquity	4
CLA 176	Roman Religions	4

(b) Relevant courses in other departments such as:

HIS 102A	Undergraduate Proseminar in History; Ancient	5
HIS 111A	Ancient History	4
HIS 111B	Ancient History	4
HIS 111C	Ancient History	4
RST 102	Christian Origins	4
RST 125	Dead Sea Scrolls, Apocrypha, and Pseudepigrapha	4
RST 141A	New Testament Literature: Synoptic Gospels	4
RST 141B	New Testament Literature: John	4
RST 141C	New Testament Literature: Paul	4
PHI 143	Hellenistic Philosophy	4
PHI 160	Pre-Socratics	4
PHI 161	Plato	4
PHI 162	Aristotle	4
POL 118A	History of Political Theory: Ancient	4

Total: 70

Classical Civilization; Classics | Classical Civilization Minor

(College of Letters and Science)

Carey Seal, Ph.D., Program Director

Department Office. Classics Program; 215 Sproul Hall; 530-752-0835; http://classics.ucdavis.edu

Faculty. http://classics.ucdavis.edu/people

The Department offers minors in Arabic, Classical Civilization, GreekandLatin for those wishing to follow a shorter but formally recognized program of study in Classics.

Classical Civilization **Units:** 20

Choose one:

CLA 001	Ancient Near East and Early Greece: 3000-500 B.C.E.	4
CLA 002	Ancient Greece and the Near East: 500 to 146 B.C.E.	4
CLA 003	Rome and the Mediterranean: 800 B.C.E. to 500 C.E.	4
CLA 004	Late Antiquity	4

Choose one upper division course in Latin or Greek.
Choose two additional upper division courses in Classics, Latin or Greek.
Choose one additional upper division course selected from either group (a) or (b) in the Classical Civilization major.

Total: 20

Classical Civilization; Classics | CLA Courses

Courses in CLA:

CLA 001—Ancient Near East and Early Greece: 3000-500 B.C.E. (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the literature, art, and social and political institutions of ancient Mesopotamia, Egypt, Palestine, and early Greece from 3000 to 500 B.C.E. GE credit: AH, WC, WE. Effective: 2015 Fall Quarter.

CLA 002—Ancient Greece and the Near East: 500 to 146 B.C.E. (4)
Lecture—3 hours; Term Paper. Introduction to the literature, art and thought and the political and social institutions and values of Greece and its eastern Mediterranean neighbors-the Persians, Egyptians, and Judeans. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

CLA 003—Rome and the Mediterranean: 800 B.C.E. to 500 C.E. (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the history, literature, material culture, political and social institutions and values of Roman Civilization, with an emphasis on the development of the Roman Empire and the interactions of Roman culture with other Mediterranean cultures. GE credit: AH, WC, WE. Effective: 2008 Spring Quarter.

CLA 004—Late Antiquity (4)
Discussion—1 hour; Lecture—3 hours. History and culture of the Roman and Byzantine empires from the third to the eighth century. Transformation of the classical Mediterranean world through political and cultural interactions, rise of Christianity and Islam, beginning of the medieval period in Europe. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

CLA 010—Greek, Roman, and Near Eastern Mythology (3)
Lecture—3 hours. Examination of major myths of Greece, Rome, and the Ancient Near East; their place in the religion, literature and art of the societies that produced them; their subsequent development, influence and interpretation. GE credit: AH, VL, WC. Effective: 1997 Winter Quarter.

CLA 010Y—Greek, Roman, and Near Eastern Mythology - Hybrid (3)
Lecture—2 hours; Web Virtual Lecture—1 hour. Examination of major myths of Greece, Rome, and the Ancient Near East; their place in the religion, literature and art of the societies that produced them; their subsequent development, influence and interpretation. GE credit: AH, VL, WC. Effective: 2016 Winter Quarter.

CLA 015—Women and Gender in Classical Antiquity (4)
Lecture/Discussion—3 hours; Term Paper. Lives and roles of women and men in ancient Greece and Rome. Readings from history, philosophy, medical and legal documents, literature and myth. GE credit: AH, VL, WC, WE. Effective: 2011 Fall Quarter.

CLA 020—Pompeii AD 79 (4)
Lecture—3 hours; Term Paper. Roman life in an urban community at the time of the eruption of Vesuvius. Slide presentations of the archeological evidence will be supplemented by selected readings from Petronius' Satyricon and other ancient authors. GE credit: AH, VL, WC, WE. Effective: 1997 Winter Quarter.

CLA 025—The Classical Heritage in America (4)
Lecture/Discussion—3 hours; Term Paper. Classical heritage in the New World, with emphasis on the United States from its colonial past to the present day. The reception of Greco-Roman thought and values as expressed in art, architecture, education, law, government, literature, and film. GE credit: ACGH, AH, WE. Effective: 2011 Fall Quarter.

CLA 030—Greek and Latin Elements in English Vocabulary (3)
Lecture—3 hours. Knowledge of Latin and Greek not required. Elements of Greek and Latin vocabulary for increased understanding of English word formation and improved ability to understand and retain unfamiliar words. Emphasis on Greek and Latin elements but other languages not neglected. Not open for credit to students who have completed CLA 030F. GE credit: AH. Effective: 2014 Fall Quarter.

CLA 030F—Greek and Latin Elements in English Vocabulary (3)
Lecture—3 hours. Restricted to incoming freshmen. Knowledge of Latin and Greek not required. Elements of Greek and Latin vocabulary for increased understanding of English word formation and improved ability to understand and retain unfamiliar words. Emphasis on Greek and Latin elements but other languages not neglected. Not open for credit to students who have completed CLA 030. GE credit: AH. Effective: 2014 Fall Quarter.

CLA 031—Greek and Latin Elements in Technical Vocabulary (3)
Lecture—3 hours. Knowledge of Greek and Latin not required. Elements of Greek and Latin vocabulary to increase understanding of English word formation in medical, scientific and technical terminology and improve ability to understand and retain unfamiliar terms. GE credit: AH. Effective: 1997 Winter Quarter.

CLA 040—Life and Economy in the Ancient Mediterranean World (4)
Lecture/Discussion—3 hours; Term Paper. Characterization of ancient Mediterranean economies, with emphasis on Greece and Rome. Utilization of archaeological, art historical, and literary evidence. Craft production, labor specialization, trade networks, ancient technology, urban growth, agricultural productivity, coinage systems, and household economies. GE credit: AH, VL, WC, WE. Effective: 2016 Fall Quarter.

CLA 050—Ancient Science (4)
Discussion—1 hour; Lecture—3 hours. Study of science in ancient Greece and Rome; consideration of its social context; concentration on the basic concepts of physics, the world of medicine and biology, the history of mathematics, and the practices of astronomy, astrology and meteorology. (STS 050.) GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

CLA 051—Ancient Medicine (4)
Discussion—1 hour; Lecture—3 hours. Medicine in ancient Greece and Rome; physiological conceptions of the body within scientific and social frameworks; exploration of sanitation technology and health in antiquity; medical treatment of the female body; medicine and the economy. (STS 051.) GE credit: AH, WC, WE. Effective: 2016 Winter Quarter.

CLA 098—Directed Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. May be repeated up to 2 time(s). (P/NP grading only.) Effective: 2007 Fall Quarter.

CLA 101A—Topics in Ancient Mediterranean Civilizations (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Topics may be ordered by time or place (e.g. Hellenistic Egypt) or by theme or genre (e.g. slavery in the ancient world). May be repeated up to 2 time(s) when topic differs. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

CLA 101B—Topics in Greek Civilization (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Topics may be ordered by time or place (e.g. the world of Homer) or by theme or genre (e.g. the Greek art of war). May be repeated up to 2 time(s) when topic differs. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

CLA 101C—Topics in Roman Civilization (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Topics may be ordered by time or place (e.g. Julius Caesar and his age) or by theme or genre (e.g. gladiators: blood in the arena). May be repeated up to 2 time(s) when topic differs. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

CLA 101D—Topics in Classical Receptions (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Topics in classical reception from late antiquity to the present. Topics may be ordered by time or place (e.g. the classical tradition in Washington, D.C.) or by theme or genre (e.g. cinematic representations of the ancient world). May be repeated up to 2 time(s) when topic differs. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

CLA 101E—Topics in Ancient Science (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): CLA 050 or CLA 051; or Consent of Instructor. Topics may be ordered by discipline (e.g. ancient medicine), historical figure (e.g. Galen) or topic (e.g. science and the economy). May be repeated up to 2 time(s) when topic differs. GE credit: AH, WE. Effective: 2016 Spring Quarter.

CLA 102—Film and the Classical World (4)
Film Viewing—2.5 hours; Lecture—3 hours. Prerequisite(s): A lower division Classics course or consent of instructor. Classical World as portrayed in films. Viewings and discussions of modern versions of ancient dramas, modern dramas set in the Ancient Mediterranean world, and films imbued with classical themes and allusions. Supplementary readings in ancient literature and mythology. GE credit: AH, WE. Effective: 2016 Spring Quarter.

CLA 103—Love and Beauty in the Ancient World (4)
Extensive Writing; Lecture/Discussion—3 hours. Philosophical and literary traditions connecting love, beauty, and goodness in ancient thought. Moral and ethical implications, ideologies of sexuality and gender; transmission into the medieval and modern world. GE credit: AH, WC, WE. Effective: 2017 Fall Quarter.

CLA 105—Theory and Practice of Greek and Roman Mythology (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Thematically focused study of mythological narratives. Emphasis on the historical development of myths and the variety of theoretical approaches for the study of myth. GE credit: AH, WE. Effective: 2016 Fall Quarter.

CLA 110—Origins of Rhetoric (4)
Lecture—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Issues in the development of rhetoric from its origins in ancient Greece to A.D.430. Special attention to works of Plato, Aristotle, Cicero, and Quintilian. Role of grammar and rhetoric in schools of Roman Empire. The Christian rhetoric of Saint Augustine. Not open for credit to students who have completed RCM 110 or CMN 110. (Former course RCM 110.). GE credit: AH, WE. Effective: 2016 Spring Quarter.

CLA 111—Forms of Knowledge in the Ancient World (4)
Extensive Writing; Lecture/Discussion—3 hours. History of knowledge preservation and transfer in the ancient Mediterranean. Oral tradition, technology, innovations, forms of writing, libraries, ancient scholarship, cultural exchange and influence. GE credit: AH, VL, WC, WE. Effective: 2017 Fall Quarter.

CLA 120—Greek and Roman Historiography (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Survey of Greek and Roman historical writing in English translation. Authors to be read may include Herodotus, Thucydides, Sallust, Livy, and Tacitus. Focus on the development of historical writing as a literary genre. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

CLA 125—Roman Political Thought (4)
Lecture—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Survey of Roman thinking about politics, as expressed both in formal theorizing and in a variety of other contexts, including oratory, historiography, and epic. Study of Roman political reflection in its historical, cultural, and literary context. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

CLA 140—Homer and Ancient Epic (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Reading of the classical epics of Homer (Iliad, Odyssey) and Virgil (Aeneid) in English. Discussion of techniques of composition, the beliefs and values of their respective societies, and the generic tradition of ancient epic. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

CLA 141—Greek and Roman Comedy (4)
Conference—1 hour; Lecture—3 hours. Prerequisite(s): A lower division Classics course or consent of instructor. Readings in Aristophanes, Menander, Plautus, and Terence; lectures on the development of ancient comedy. GE credit: AH, WE. Effective: 2016 Spring Quarter.

CLA 142—Greek and Roman Novel (4)
Lecture—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Examination of the ancient Greek romances and their development into the grotesque realism of Petronius' Satyricon, and the religious mysticism of Apuleius' The Golden Ass. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

CLA 143—Greek Tragedy (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Reading in English of selected plays of Aeschylus, Sophocles, and Euripides. Discussion of the development and influence of Athenian tragedy. GE credit: AH, WE. Effective: 2016 Fall Quarter.

CLA 150—Socrates and Classical Athens (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Study of the major sources of our knowledge of Socrates, assessment of his role in the politics and culture of ancient Athens, his method of teaching, and his place in Western thought. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

CLA 170—Cultural Interactions in the Ancient Mediterranean World (4)
Lecture/Discussion—3 hours; Term Paper. Exploration of the role of colonial encounters in the spread of ideas throughout the ancient Mediterranean from an archaeological and artistic perspective. Emphasis on material and literary expressions of culture, trade routes, and theories pertaining to culture contact. GE credit: AH, VL, WC, WE. Effective: 2016 Fall Quarter.

CLA 171—Mediterranean Bronze Age Archaeology (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): A lower division Classics course or consent of instructor. Archaeological monuments of the ancient Near East, including Egypt and Mesopotamia, and of Greece and Crete during the Bronze Age. Special emphasis on the problems of state formation and on the co-existence and collapse of Bronze Age societies. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CLA 172A—Early Greek Art and Architecture (4)
Lecture—3 hours; Term Paper. Examination of the origin and development of the major monuments of Greek art and architecture from the eighth century to the mid-fifth century B.C. (AHI 172A.) GE credit: AH, VL, WE. Effective: 2015 Fall Quarter.

CLA 172B—Later Greek Art and Architecture (4)
Lecture—3 hours; Term Paper. Study of the art and architecture of later Classical and Hellenistic Greece, from the mid-fifth century to the first century B.C. (AHI 172B.) GE credit: AH, VL. Effective: 2015 Fall Quarter.

CLA 173—Roman Art and Architecture (4)
Lecture—3 hours; Term Paper. Art and architecture of Rome and the Roman Empire, from the founding of Rome through the fourth century C.E. (AHI 173.) GE credit: AH, VL, WE. Effective: 2014 Fall Quarter.

CLA 174—Greek Religion and Society (4)
Lecture—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Cults, festivals, and rituals of Greek religious practice and their relationship to Greek social and political institutions, and to Greek private life. Includes discussion of major sanctuaries at Olympia, Delphi, Athens, and others. GE credit: AH, WC. Effective: 2017 Winter Quarter.

CLA 175—Architecture and Urbanism in Mediterranean Antiquity (4)
Extensive Writing; Lecture—3 hours. Architecture and urban development in the ancient Near East, Greece, and Rome. Special emphasis on the social structure of the ancient city as expressed in its architecture, and on the interaction between local traditions and the impact of Greco-Roman urbanism. (AHI 175.) GE credit: AH, VL, WC, WE. Effective: 2017 Spring Quarter.

CLA 176—Roman Religions (4)
Extensive Writing; Lecture/Discussion—3 hours. Roman religion from republic to empire. Gods, rituals, and festivals at Rome; sacrifice, sacred places, magic. Gender roles, social status, national identity. Influences from other cultures, especially Egypt and the eastern Mediterranean. GE credit: AH, WC, WE. Effective: 2017 Fall Quarter.

CLA 190—Senior Seminar (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Completion of one upper division course in Latin, Greek or Hebrew or consent of instructor. Advanced interdisciplinary study of a problem in the ancient Mediterranean world using the techniques of history, archaeology, art history and philology. May be repeated for credit. GE credit: AH, WE. Effective: 1997 Winter Quarter.

CLA 194HA—Special Study for Honors Students (3)
Discussion—1 hour; Independent Study; Term Paper. Prerequisite(s): Admission to the Honors Program; consent of faculty member supervising honors thesis. Directed reading, research and writing culminating in the completion of a senior honors thesis under the direction of faculty advisor. (P/NP grading only.) GE credit: AH. Effective: 2003 Fall Quarter.

CLA 194HB—Special Study for Honors Students (3)
Discussion—1 hour; Independent Study; Term Paper. Prerequisite(s): Admission to the Honors Program and consent of faculty member supervising honors thesis. Directed reading, research, and writing culminating in the completion of a senior honors thesis under the direction of faculty advisor. (P/NP grading only.) GE credit: AH. Effective: 2004 Winter Quarter.

CLA 197TC—Community Tutoring in Classical Languages (1-5)
Tutorial—1-5 hours. Prerequisite(s): Consent of Instructor. Supervised instruction of Greek or Latin in nearby schools by qualified students in department. May be repeated up to 5 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

CLA 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1999 Fall Quarter.

CLA 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1999 Fall Quarter.

CLA 200A—Approaches to the Classical Past (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate student status or consent of instructor. Survey of major areas of classical scholarship, with special emphasis on the continuing impact of Mediterranean antiquity on later literature, history, art, and culture. Effective: 2016 Fall Quarter.

CLA 200B—Approaches to the Classics Past (4)
Independent Study—4 hours. Prerequisite(s): CLA 200A; Graduate student status or consent of instructor. Restricted to graduate students. Research project on major area of Classical scholarship, with special emphasis on the continuing impact of Mediterranean antiquity on later literature, history, art, and culture. Effective: 2016 Fall Quarter.

CLA 201—Introduction to Classical Philology (4)
Seminar—3 hours; Term Paper. Survey of major contemporary areas of classical scholarship with special attention devoted to current problems in literary and textual criticism. Effective: 1997 Winter Quarter.

CLA 202—Homer (4)
Seminar—3 hours; Term Paper. Readings in the Iliad and Odyssey: the origins and transmission of the
poems. Effective: 1997 Winter Quarter.

CLA 203—Vergil (4)
Seminar—3 hours; Term Paper. Reading of selected books of the Bucolics, Georgics, and Aeneid. Emphasis will be placed on the study of Vergilean poetic language. Effective: 1997 Winter Quarter.

CLA 204—Greek and Roman Comedy (4)
Seminar—3 hours; Term Paper. Historical and critical problems in Aristophanes or New Comedy. May be repeated for credit. Effective: 1997 Winter Quarter.

CLA 205—Latin Lyric and Elegy (4)
Seminar—3 hours; Term Paper. Critical examination of the works of Catullus, Horace, or Propertius. May be repeated for credit. Effective: 1997 Winter Quarter.

CLA 206—Greek Historiography (4)
Seminar—3 hours; Term Paper. Development of historical writing in Greece. May be repeated for credit. Effective: 1997 Winter Quarter.

CLA 207—Greek Drama (4)
Seminar—3 hours; Term Paper. Literary and philological analysis of the plays of Euripides, Sophocles, or Aeschylus. May be repeated for credit. Effective: 1997 Winter Quarter.

CLA 299—Research (1-12)
Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

CLA 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (S/U grading only.) Effective: 2012 Fall Quarter.

Classics

Classics | CLA Information

(College of Letters and Science)

Carey Seal, Ph.D., Program Director

Department Office. Classics Program; 215 Sproul Hall; 530-752-0835; http://classics.ucdavis.edu

Faculty. http://classics.ucdavis.edu/people

The Classics department offers a Classical Civilization B.S. and minors in Arabic, Classical Civilization, Greek, and Latin.

Classics | ARB Courses

Courses in ARB:

ARB 001—Elementary Arabic 1 (5)
Lecture/Discussion—5 hours. Introduction to basic Arabic. Interactive and integrated presentation of listening, speaking, reading, and writing skills, including the alphabet and basic syntax. Focus on standard Arabic with basic skills in spoken Egyptian and/or one other colloquial dialect. GE credit: AH, WC. Effective: 2014 Fall Quarter.

ARB 001A—Accelerated Intensive Elementary Arabic (15)
Lecture/Discussion—15 hours. Special 12-week accelerated, intensive summer session course that combines the work of courses ARB 1, 2, and 3. Introduction to Modern Standard Arabic through development of all language skills in a cultural context with emphasis on communicative proficiency. Not open for credit to students who have completed ARB 001, ARB 002, or ARB 003. GE credit: AH, WC. Effective: 2014 Summer Special Session.

ARB 002—Elementary Arabic 2 (5)
Lecture/Discussion—5 hours. Prerequisite(s): ARB 001; or Consent of Instructor. Continuation of basic Arabic from course 1. Interactive and integrated presentation of listening, speaking, reading, and writing skills, including syntax. Focus on standard Arabic and limited use of spoken Egyptian and/or one other colloquial dialect. GE credit: AH, WC. Effective: 2016 Spring Quarter.

ARB 003—Elementary Arabic 3 (5)
Lecture/Discussion—5 hours. Prerequisite(s): ARB 002; or Consent of Instructor. Continuation of introduction to basic Arabic from courses 1 and 2. Interactive and integrated presentation of listening, speaking, reading, and writing skills, including syntax. Focus on standard Arabic with limited use of spoken Egyptian and/or one other colloquial dialect. GE credit: AH, WC. Effective: 2016 Spring Quarter.

ARB 021—Intermediate Arabic 21 (4)
Lecture/Discussion—4 hours. Prerequisite(s): ARB 003; or Consent of Instructor. Builds on courses 1, 2, and 3. Interactive and integrated presentation of listening, speaking, reading, and writing skills, including idiomatic expression. Focus on standard Arabic with limited use of Egyptian and/or one other colloquial dialect. GE credit: AH, OL, WC. Effective: 2017 Spring Quarter.

ARB 021A—Accelerated Intensive Intermediate Arabic (15)
Lecture/Discussion—15 hours. Special 12-week accelerated, intensive summer session course that combines the work of courses ARB 21, 22, and 23. Modern Standard Arabic through development of all language skills in a cultural context with emphasis on communicative proficiency. Not open for credit to students who have completed ARB 021, ARB 022, or ARB 023. GE credit: AH, WC. Effective: 2017 Summer Special Session.

ARB 021C—Colloquial Egyptian Arabic (4)
Lecture/Discussion—3 hours; Lecture/Lab—1 hour. Prerequisite(s): ARB 003; or Consent of Instructor. Continuation of the Colloquial Egyptian Arabic covered in the first year of Arabic; courses 1, 2, and 3. May be repeated up to 1 time(s) if instruction material changes. GE credit: AH, OL, WC. Effective: 2017 Spring Quarter.

ARB 021L—Colloquial Levantine Arabic (4)
Lecture/Discussion—4 hours. Prerequisite(s): ARB 003; or Consent of Instructor. Continuation of colloquial Levantine Arabic presented in Arabic 1,2 and 3. Integrated presentation of speaking and listening skills in colloquial Levantine Arabic, with reading and writing in Modern Standard Arabic that is related to Levantine cultural production and social life. GE credit: AH, OL, WC. Effective: 2017 Fall Quarter.

ARB 022—Intermediate Arabic 22 (4)
Lecture/Discussion—4 hours. Prerequisite(s): ARB 021; or Consent of Instructor. Continuation of course 21. Interactive and integrated presentation of listening, speaking, reading, and writing, including idiomatic expression. Focus on standard Arabic with limited use of Egyptian and/or one other colloquial dialect. GE credit: AH, OL, WC. Effective: 2017 Spring Quarter.

ARB 022C—Colloquial Egyptian Arabic (4)
Lecture/Discussion—3 hours; Lecture/Lab—1 hour. Prerequisite(s): ARB 021C; or Consent of Instructor. Continuation of the Colloquial Egyptian Arabic covered in first year of Arabic; courses 1, 2, and 3 and the first quarter of Colloquial Arabic course 21C. May be repeated up to 1 time(s) if instruction material changes. GE credit: AH, OL, WC. Effective: 2017 Spring Quarter.

ARB 022L—Colloquial Levantine Arabic (4)
Lecture/Discussion—4 hours. Prerequisite(s): ARB 021L; or Consent of Instructor. Continuation of colloquial Levantine Arabic presented in Arabic 021L. Integrated presentation of speaking and listening skills in colloquial Levantine Arabic; reading and writing in Modern Standard Arabic related to Levantine social life. GE credit: AH, OL, WC. Effective: 2018 Winter Quarter.

ARB 023—Intermediate Arabic 23 (4)
Lecture/Discussion—4 hours. Prerequisite(s): ARB 022; or Consent of Instructor. Continuation of courses 21 and 22. Interactive and integrated presentation of Arabic listening, speaking, reading, and writing skills, including idiomatic expression. GE credit: AH, OL, WC. Effective: 2017 Fall Quarter.

ARB 023C—Colloquial Egyptian Arabic (4)
Lecture/Discussion—3 hours; Lecture/Lab—1 hour. Prerequisite(s): ARB 022C; or Consent of Instructor. Continuation of Colloquial Egyptian Arabic covered in course 22C. May be repeated up to 1 time(s) if instruction material changes. GE credit: AH, OL, WC. Effective: 2017 Spring Quarter.

ARB 023L—Colloquial Levantine Arabic (4)
Lecture/Discussion—4 hours. Prerequisite(s): ARB 022L; or Consent of Instructor. Continuation of colloquial Levantine Arabic presented in Arabic 022L. Integrated presentation of speaking and listening skills in colloquial Levantine Arabic; reading and writing in Modern Standard Arabic related to Levantine social life. GE credit: AH, OL, WC. Effective: 2017 Fall Quarter.

ARB 098—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Directed group study. May be repeated for credit. (P/NP grading only.) Effective: 2017 Winter Quarter.

ARB 099—Special Study for Undergraduates (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special study. May be repeated for credit. (P/NP grading only.) Effective: 2017 Winter Quarter.

ARB 101A—Readings in Arabic: 600-1850 (4)
Discussion—3 hours; Extensive Writing. Prerequisite(s): ARB 123; or Consent of Instructor. Readings in Arabic. Poetry, prose literature, and selections from texts on religion, history, politics, science, philosophy and mysticism. May be repeated up to 1 time(s) Students can repeat the course if the instructor decides that they would benefit from additional practice working on the different selections from the same texts or if 50% or more of the texts are different. GE credit: AH, OL, SS, WC, WE. Effective: 2016 Fall Quarter.

ARB 121—Advanced Arabic (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ARB 023; or Consent of Instructor. Review, refinement, and development of skills learned in intermediate Arabic through work with texts, video, and audio on cultural and social issues. Integrated approach to reading, writing, listening, speaking primarily standard Arabic, with limited use of one colloquial dialect. May be repeated up to 2 time(s) based on different readings. GE credit: AH, WC. Effective: 2011 Fall Quarter.

ARB 122—Advanced Arabic (4)
Lecture/Discussion—3 hours. Prerequisite(s): ARB 121; or Consent of Instructor. Continuation of course 121. Further development of advanced skills in reading, listening, writing, and speaking standard Arabic through work with texts, video, and audio on cultural and social issues. Limited use of one colloquial dialect. GE credit: AH, WC. Effective: 2009 Winter Quarter.

ARB 123—Advanced Arabic (4)
Lecture/Discussion—3 hours. Prerequisite(s): ARB 122; or Consent of Instructor. Continuation of course 122. Further development of advanced skills in reading, listening, writing, and speaking standard Arabic through work with texts, video, and audio on cultural and social issues. Limited use of one colloquial dialect. GE credit: AH, WC. Effective: 2009 Spring Quarter.

ARB 140—A Story for a Life: The Arabian Nights (4)
Lecture/Discussion—3 hours; Term Paper. In-depth exploration of The Arabian Nights, the best-known work of pre-modern Arabic literature and a major work of world literature. Analysis of the work in its historical context and in comparison to other frame tales in world literature. (COM 172 and MSA 121C.) GE credit: AH, WC, WE. Effective: 2016 Winter Quarter.

ARB 141—Readings in Modern Arabic Literature (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): ARB 123; or Consent of Instructor. Readings of modern Arabic poetry and fiction in original format, assisted by instructor-prepared glossaries and other supplementary material. Readings to be followed by class discussion and short writing assignments in Arabic. Open to students at advanced proficiency in Arabic. May be repeated up to 1 time(s) if reading material changes. GE credit: AH, WC. Effective: 2014 Fall Quarter.

ARB 198—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Development of reading, writing, speaking, and listening skills in advanced Arabic. Materials may include al-Kitaab Part Two or Three, news articles and broadcasts, short stories, poetry, novels, essays, scripture, prophetic traditions, audio recordings, and television and film. May be repeated up to 4 time(s) content differs. Effective: 2008 Fall Quarter.

ARB 297—Directed Independent Study (4)
Discussion—1 hour; Independent Study. Prerequisite(s): Graduate standing or consent of instructor. Restricted to graduate students. Directed Independent Study on a topic culminating in a term paper. Independent Study may only be arranged with consent of the instructor when graduate seminars are unavailable. Topic varies by instructor. May be repeated up to 5 time(s) when no graduate seminars are available and topic differs. Effective: 2015 Fall Quarter.

ARB 299—Individual Study (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. Restricted to graduate students. May be repeated for credit. (S/U grading only.) Effective: 2014 Winter Quarter.

ARB 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. Restricted to graduate students. May be repeated up to 18 time(s). (S/U grading only.) Effective: 2014 Winter Quarter.

Classics | CLA Courses

Courses in CLA:

CLA 001—Ancient Near East and Early Greece: 3000-500 B.C.E. (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the literature, art, and social and political institutions of ancient Mesopotamia, Egypt, Palestine, and early Greece from 3000 to 500 B.C.E. GE credit: AH, WC, WE. Effective: 2015 Fall Quarter.

CLA 002—Ancient Greece and the Near East: 500 to 146 B.C.E. (4)
Lecture—3 hours; Term Paper. Introduction to the literature, art and thought and the political and social institutions and values of Greece and its eastern Mediterranean neighbors-the Persians, Egyptians, and Judeans. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

CLA 003—Rome and the Mediterranean: 800 B.C.E. to 500 C.E. (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the history, literature, material culture, political and social institutions and values of Roman Civilization, with an emphasis on the development of the Roman Empire and the interactions of Roman culture with other Mediterranean cultures. GE credit: AH, WC, WE. Effective: 2008 Spring Quarter.

CLA 004—Late Antiquity (4)
Discussion—1 hour; Lecture—3 hours. History and culture of the Roman and Byzantine empires from the third to the eighth century. Transformation of the classical Mediterranean world through political and cultural interactions, rise of Christianity and Islam, beginning of the medieval period in Europe. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

CLA 010—Greek, Roman, and Near Eastern Mythology (3)
Lecture—3 hours. Examination of major myths of Greece, Rome, and the Ancient Near East; their place in the religion, literature and art of the societies that produced them; their subsequent development, influence and interpretation. GE credit: AH, VL, WC. Effective: 1997 Winter Quarter.

CLA 010Y—Greek, Roman, and Near Eastern Mythology - Hybrid (3)
Lecture—2 hours; Web Virtual Lecture—1 hour. Examination of major myths of Greece, Rome, and the Ancient Near East; their place in the religion, literature and art of the societies that produced them; their subsequent development, influence and interpretation. GE credit: AH, VL, WC. Effective: 2016 Winter Quarter.

CLA 015—Women and Gender in Classical Antiquity (4)
Lecture/Discussion—3 hours; Term Paper. Lives and roles of women and men in ancient Greece and Rome. Readings from history, philosophy, medical and legal documents, literature and myth. GE credit: AH, VL, WC, WE. Effective: 2011 Fall Quarter.

CLA 020—Pompeii AD 79 (4)
Lecture—3 hours; Term Paper. Roman life in an urban community at the time of the eruption of Vesuvius. Slide presentations of the archeological evidence will be supplemented by selected readings from Petronius' Satyricon and other ancient authors. GE credit: AH, VL, WC, WE. Effective: 1997 Winter Quarter.

CLA 025—The Classical Heritage in America (4)
Lecture/Discussion—3 hours; Term Paper. Classical heritage in the New World, with emphasis on the United States from its colonial past to the present day. The reception of Greco-Roman thought and values as expressed in art, architecture, education, law, government, literature, and film. GE credit: ACGH, AH, WE. Effective: 2011 Fall Quarter.

CLA 030—Greek and Latin Elements in English Vocabulary (3)
Lecture—3 hours. Knowledge of Latin and Greek not required. Elements of Greek and Latin vocabulary for increased understanding of English word formation and improved ability to understand and retain unfamiliar words. Emphasis on Greek and Latin elements but other languages not neglected. Not open for credit to students who have completed CLA 030F. GE credit: AH. Effective: 2014 Fall Quarter.

CLA 030F—Greek and Latin Elements in English Vocabulary (3)
Lecture—3 hours. Restricted to incoming freshmen. Knowledge of Latin and Greek not required. Elements of Greek and Latin vocabulary for increased understanding of English word formation and improved ability to understand and retain unfamiliar words. Emphasis on Greek and Latin elements but other languages not neglected. Not open for credit to students who have completed CLA 030. GE credit: AH. Effective: 2014 Fall Quarter.

CLA 031—Greek and Latin Elements in Technical Vocabulary (3)
Lecture—3 hours. Knowledge of Greek and Latin not required. Elements of Greek and Latin vocabulary to increase understanding of English word formation in medical, scientific and technical terminology and improve ability to understand and retain unfamiliar terms. GE credit: AH. Effective: 1997 Winter Quarter.

CLA 040—Life and Economy in the Ancient Mediterranean World (4)
Lecture/Discussion—3 hours; Term Paper. Characterization of ancient Mediterranean economies, with emphasis on Greece and Rome. Utilization of archaeological, art historical, and literary evidence. Craft production, labor specialization, trade networks, ancient technology, urban growth, agricultural productivity, coinage systems, and household economies. GE credit: AH, VL, WC, WE. Effective: 2016 Fall Quarter.

CLA 050—Ancient Science (4)
Discussion—1 hour; Lecture—3 hours. Study of science in ancient Greece and Rome; consideration of its social context; concentration on the basic concepts of physics, the world of medicine and biology, the history of mathematics, and the practices of astronomy, astrology and meteorology. (STS 050.) GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

CLA 051—Ancient Medicine (4)
Discussion—1 hour; Lecture—3 hours. Medicine in ancient Greece and Rome; physiological conceptions of the body within scientific and social frameworks; exploration of sanitation technology and health in antiquity; medical treatment of the female body; medicine and the economy. (STS 051.) GE credit: AH, WC, WE. Effective: 2016 Winter Quarter.

CLA 098—Directed Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. May be repeated up to 2 time(s). (P/NP grading only.) Effective: 2007 Fall Quarter.

CLA 101A—Topics in Ancient Mediterranean Civilizations (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Topics may be ordered by time or place (e.g. Hellenistic Egypt) or by theme or genre (e.g. slavery in the ancient world). May be repeated up to 2 time(s) when topic differs. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

CLA 101B—Topics in Greek Civilization (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Topics may be ordered by time or place (e.g. the world of Homer) or by theme or genre (e.g. the Greek art of war). May be repeated up to 2 time(s) when topic differs. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

CLA 101C—Topics in Roman Civilization (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Topics may be ordered by time or place (e.g. Julius Caesar and his age) or by theme or genre (e.g. gladiators: blood in the arena). May be repeated up to 2 time(s) when topic differs. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

CLA 101D—Topics in Classical Receptions (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Topics in classical reception from late antiquity to the present. Topics may be ordered by time or place (e.g. the classical tradition in Washington, D.C.) or by theme or genre (e.g. cinematic representations of the ancient world). May be repeated up to 2 time(s) when topic differs. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

CLA 101E—Topics in Ancient Science (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): CLA 050 or CLA 051; or Consent of Instructor. Topics may be ordered by discipline (e.g. ancient medicine), historical figure (e.g. Galen) or topic (e.g. science and the economy). May be repeated up to 2 time(s) when topic differs. GE credit: AH, WE. Effective: 2016 Spring Quarter.

CLA 102—Film and the Classical World (4)
Film Viewing—2.5 hours; Lecture—3 hours. Prerequisite(s): A lower division Classics course or consent of instructor. Classical World as portrayed in films. Viewings and discussions of modern versions of ancient dramas, modern dramas set in the Ancient Mediterranean world, and films imbued with classical themes and allusions. Supplementary readings in ancient literature and mythology. GE credit: AH, WE. Effective: 2016 Spring Quarter.

CLA 103—Love and Beauty in the Ancient World (4)
Extensive Writing; Lecture/Discussion—3 hours. Philosophical and literary traditions connecting love, beauty, and goodness in ancient thought. Moral and ethical implications, ideologies of sexuality and gender; transmission into the medieval and modern world. GE credit: AH, WC, WE. Effective: 2017 Fall Quarter.

CLA 105—Theory and Practice of Greek and Roman Mythology (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Thematically focused study of mythological narratives. Emphasis on the historical development of myths and the variety of theoretical approaches for the study of myth. GE credit: AH, WE. Effective: 2016 Fall Quarter.

CLA 110—Origins of Rhetoric (4)
Lecture—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Issues in the development of rhetoric from its origins in ancient Greece to A.D.430. Special attention to works of Plato, Aristotle, Cicero, and Quintilian. Role of grammar and rhetoric in schools of Roman Empire. The Christian rhetoric of Saint Augustine. Not open for credit to students who have completed RCM 110 or CMN 110. (Former course RCM 110.). GE credit: AH, WE. Effective: 2016 Spring Quarter.

CLA 111—Forms of Knowledge in the Ancient World (4)
Extensive Writing; Lecture/Discussion—3 hours. History of knowledge preservation and transfer in the ancient Mediterranean. Oral tradition, technology, innovations, forms of writing, libraries, ancient scholarship, cultural exchange and influence. GE credit: AH, VL, WC, WE. Effective: 2017 Fall Quarter.

CLA 120—Greek and Roman Historiography (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Survey of Greek and Roman historical writing in English translation. Authors to be read may include Herodotus, Thucydides, Sallust, Livy, and Tacitus. Focus on the development of historical writing as a literary genre. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

CLA 125—Roman Political Thought (4)
Lecture—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Survey of Roman thinking about politics, as expressed both in formal theorizing and in a variety of other contexts, including oratory, historiography, and epic. Study of Roman political reflection in its historical, cultural, and literary context. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

CLA 140—Homer and Ancient Epic (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Reading of the classical epics of Homer (Iliad, Odyssey) and Virgil (Aeneid) in English. Discussion of techniques of composition, the beliefs and values of their respective societies, and the generic tradition of ancient epic. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

CLA 141—Greek and Roman Comedy (4)
Conference—1 hour; Lecture—3 hours. Prerequisite(s): A lower division Classics course or consent of instructor. Readings in Aristophanes, Menander, Plautus, and Terence; lectures on the development of ancient comedy. GE credit: AH, WE. Effective: 2016 Spring Quarter.

CLA 142—Greek and Roman Novel (4)
Lecture—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Examination of the ancient Greek romances and their development into the grotesque realism of Petronius' Satyricon, and the religious mysticism of Apuleius' The Golden Ass. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

CLA 143—Greek Tragedy (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Reading in English of selected plays of Aeschylus, Sophocles, and Euripides. Discussion of the development and influence of Athenian tragedy. GE credit: AH, WE. Effective: 2016 Fall Quarter.

CLA 150—Socrates and Classical Athens (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Study of the major sources of our knowledge of Socrates, assessment of his role in the politics and culture of ancient Athens, his method of teaching, and his place in Western thought. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

CLA 170—Cultural Interactions in the Ancient Mediterranean World (4)
Lecture/Discussion—3 hours; Term Paper. Exploration of the role of colonial encounters in the spread of ideas throughout the ancient Mediterranean from an archaeological and artistic perspective. Emphasis on material and literary expressions of culture, trade routes, and theories pertaining to culture contact. GE credit: AH, VL, WC, WE. Effective: 2016 Fall Quarter.

CLA 171—Mediterranean Bronze Age Archaeology (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): A lower division Classics course or consent of instructor. Archaeological monuments of the ancient Near East, including Egypt and Mesopotamia, and of Greece and Crete during the Bronze Age. Special emphasis on the problems of state formation and on the co-existence and collapse of Bronze Age societies. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CLA 172A—Early Greek Art and Architecture (4)
Lecture—3 hours; Term Paper. Examination of the origin and development of the major monuments of Greek art and architecture from the eighth century to the mid-fifth century B.C. (AHI 172A.) GE credit: AH, VL, WE. Effective: 2015 Fall Quarter.

CLA 172B—Later Greek Art and Architecture (4)
Lecture—3 hours; Term Paper. Study of the art and architecture of later Classical and Hellenistic Greece, from the mid-fifth century to the first century B.C. (AHI 172B.) GE credit: AH, VL. Effective: 2015 Fall Quarter.

CLA 173—Roman Art and Architecture (4)
Lecture—3 hours; Term Paper. Art and architecture of Rome and the Roman Empire, from the founding of Rome through the fourth century C.E. (AHI 173.) GE credit: AH, VL, WE. Effective: 2014 Fall Quarter.

CLA 174—Greek Religion and Society (4)
Lecture—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Cults, festivals, and rituals of Greek religious practice and their relationship to Greek social and political institutions, and to Greek private life. Includes discussion of major sanctuaries at Olympia, Delphi, Athens, and others. GE credit: AH, WC. Effective: 2017 Winter Quarter.

CLA 175—Architecture and Urbanism in Mediterranean Antiquity (4)
Extensive Writing; Lecture—3 hours. Architecture and urban development in the ancient Near East, Greece, and Rome. Special emphasis on the social structure of the ancient city as expressed in its architecture, and on the interaction between local traditions and the impact of Greco-Roman urbanism. (AHI 175.) GE credit: AH, VL, WC, WE. Effective: 2017 Spring Quarter.

CLA 176—Roman Religions (4)
Extensive Writing; Lecture/Discussion—3 hours. Roman religion from republic to empire. Gods, rituals, and festivals at Rome; sacrifice, sacred places, magic. Gender roles, social status, national identity. Influences from other cultures, especially Egypt and the eastern Mediterranean. GE credit: AH, WC, WE. Effective: 2017 Fall Quarter.

CLA 190—Senior Seminar (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Completion of one upper division course in Latin, Greek or Hebrew or consent of instructor. Advanced interdisciplinary study of a problem in the ancient Mediterranean world using the techniques of history, archaeology, art history and philology. May be repeated for credit. GE credit: AH, WE. Effective: 1997 Winter Quarter.

CLA 194HA—Special Study for Honors Students (3)
Discussion—1 hour; Independent Study; Term Paper. Prerequisite(s): Admission to the Honors Program; consent of faculty member supervising honors thesis. Directed reading, research and writing culminating in the completion of a senior honors thesis under the direction of faculty advisor. (P/NP grading only.) GE credit: AH. Effective: 2003 Fall Quarter.

CLA 194HB—Special Study for Honors Students (3)
Discussion—1 hour; Independent Study; Term Paper. Prerequisite(s): Admission to the Honors Program and consent of faculty member supervising honors thesis. Directed reading, research, and writing culminating in the completion of a senior honors thesis under the direction of faculty advisor. (P/NP grading only.) GE credit: AH. Effective: 2004 Winter Quarter.

CLA 197TC—Community Tutoring in Classical Languages (1-5)
Tutorial—1-5 hours. Prerequisite(s): Consent of Instructor. Supervised instruction of Greek or Latin in nearby schools by qualified students in department. May be repeated up to 5 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

CLA 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1999 Fall Quarter.

CLA 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1999 Fall Quarter.

CLA 200A—Approaches to the Classical Past (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate student status or consent of instructor. Survey of major areas of classical scholarship, with special emphasis on the continuing impact of Mediterranean antiquity on later literature, history, art, and culture. Effective: 2016 Fall Quarter.

CLA 200B—Approaches to the Classics Past (4)
Independent Study—4 hours. Prerequisite(s): CLA 200A; Graduate student status or consent of instructor. Restricted to graduate students. Research project on major area of Classical scholarship, with special emphasis on the continuing impact of Mediterranean antiquity on later literature, history, art, and culture. Effective: 2016 Fall Quarter.

CLA 201—Introduction to Classical Philology (4)
Seminar—3 hours; Term Paper. Survey of major contemporary areas of classical scholarship with special attention devoted to current problems in literary and textual criticism. Effective: 1997 Winter Quarter.

CLA 202—Homer (4)
Seminar—3 hours; Term Paper. Readings in the Iliad and Odyssey: the origins and transmission of the
poems. Effective: 1997 Winter Quarter.

CLA 203—Vergil (4)
Seminar—3 hours; Term Paper. Reading of selected books of the Bucolics, Georgics, and Aeneid. Emphasis will be placed on the study of Vergilean poetic language. Effective: 1997 Winter Quarter.

CLA 204—Greek and Roman Comedy (4)
Seminar—3 hours; Term Paper. Historical and critical problems in Aristophanes or New Comedy. May be repeated for credit. Effective: 1997 Winter Quarter.

CLA 205—Latin Lyric and Elegy (4)
Seminar—3 hours; Term Paper. Critical examination of the works of Catullus, Horace, or Propertius. May be repeated for credit. Effective: 1997 Winter Quarter.

CLA 206—Greek Historiography (4)
Seminar—3 hours; Term Paper. Development of historical writing in Greece. May be repeated for credit. Effective: 1997 Winter Quarter.

CLA 207—Greek Drama (4)
Seminar—3 hours; Term Paper. Literary and philological analysis of the plays of Euripides, Sophocles, or Aeschylus. May be repeated for credit. Effective: 1997 Winter Quarter.

CLA 299—Research (1-12)
Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

CLA 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (S/U grading only.) Effective: 2012 Fall Quarter.

Classics | GRK Courses

Courses in GRK:

GRK 001—Elementary Greek (5)
Lecture—5 hours. Introduction to the basic grammar and vocabulary of Classical and New Testament Greek. Development of translation skills with emphasis on Greek-English. GE credit: AH. Effective: 1997 Winter Quarter.

GRK 002—Elementary Greek (5)
Lecture—5 hours. Prerequisite(s): GRK 001; Or the equivalent. Continuation of course 1. GE credit: AH. Effective: 2016 Spring Quarter.

GRK 002NT—Elementary New Testament Greek (1)
Lecture—1 hour. Prerequisite(s): GRK 002 (can be concurrent); Concurrent attendance required. Supplementary study of New Testament Greek. GE credit: AH. Effective: 2016 Spring Quarter.

GRK 003—Intermediate Greek (5)
Lecture—5 hours. Prerequisite(s): GRK 002; Or the equivalent. Continuation of course 2. Selected readings from Greek authors. GE credit: AH. Effective: 2016 Spring Quarter.

GRK 003NT—Elementary New Testament Greek (1)
Lecture—1 hour. Prerequisite(s): GRK 003 (can be concurrent); or Consent of Instructor. Concurrent attendance required. Supplementary study of New Testament Greek. GE credit: AH. Effective: 2016 Spring Quarter.

GRK 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

GRK 100—Readings in Greek Prose (4)
Lecture/Discussion—4 hours. Prerequisite(s): GRK 003; Or equivalent. Review of Greek morphology, syntax, and vocabulary. Readings in Greek prose authors, including Xenophon. GE credit: AH. Effective: 2015 Fall Quarter.

GRK 101—Plato (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. GE credit: AH, WE. Effective: 2016 Fall Quarter.

GRK 102—Euripides (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. GE credit: AH, WE. Effective: 2016 Spring Quarter.

GRK 103A—Homer: Iliad (4)
Recitation—3 hours; Term Paper. Prerequisite(s): GRK 003 GE credit: AH, WE. Effective: 1997 Winter Quarter.

GRK 103B—Homer: Odyssey (4)
Recitation—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. GE credit: AH, WE. Effective: 2016 Fall Quarter.

GRK 104—Menander (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. GE credit: AH, WE. Effective: 2016 Spring Quarter.

GRK 105—Attic Orators (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. Selected readings from the orators of 4th and 5th century Athens. May be repeated up to 1 time(s) if topic differs and with consent of instructor. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

GRK 106—Greek Hexameter Poetry (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): GRK 100; or Consent of Instructor. Selected readings from ancient Greek hexameter poetry. Wisdom poetry, hymns, epyllia, idylls, epic, natural history and other texts from the hexameter tradition. May be repeated for credit May be repeated for credit when topic differs. GE credit: AH, WC, WE. Effective: 2017 Fall Quarter.

GRK 110—Readings in the Greek Novel (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. Selected readings from Greek prose fiction of the late classical, Hellenistic and imperial periods. May be repeated up to 2 time(s) with consent of instructor. GE credit: AH, WE. Effective: 2016 Fall Quarter.

GRK 111—Sophocles (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. GE credit: AH, WE. Effective: 2016 Fall Quarter.

GRK 112—Aristophanes (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. GE credit: AH, WE. Effective: 2016 Fall Quarter.

GRK 113—Thucydides (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. GE credit: AH, WE. Effective: 2016 Fall Quarter.

GRK 114—Lyric Poetry (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. GE credit: AH, WE. Effective: 2016 Spring Quarter.

GRK 115—Aeschylus (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. GE credit: AH, WE. Effective: 2016 Spring Quarter.

GRK 116—Herodotus (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. GE credit: AH, WE. Effective: 2016 Spring Quarter.

GRK 121—Greek Prose Composition (4)
Lecture/Discussion—4 hours. Prerequisite(s): GRK 100; or Consent of Instructor. Intensive grammar and vocabulary review through exercises in Greek prose composition. GE credit: AH. Effective: 2016 Fall Quarter.

GRK 130—Readings in Later Greek (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. Translation and discussion of selected readings from Hellenistic to Byzantine Greek literature. GE credit: AH, WE. Effective: 2016 Fall Quarter.

GRK 131—Readings in Ancient Greek Philosophy and Science (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): GRK 100 (can be concurrent); or Consent of Instructor. Selected readings from ancient Greek philosophical and scientific writers. Texts on logical truth and empirical sense data, material and social contexts of ancient Greek philosophy and science. May be repeated for credit May be repeated for credit if topics differ. GE credit: AH, WC, WE. Effective: 2017 Fall Quarter.

GRK 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

GRK 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

Classics | HEB Courses

Courses in HEB:

HEB 001—Elementary Hebrew (5)
Laboratory—1 hour; Lecture/Discussion—4 hours. Speaking, listening, comprehension, reading and writing fundamentals of modern Hebrew. GE credit: AH. Effective: 1998 Fall Quarter.

HEB 001A—Accelerated Intensive Elementary Hebrew (15)
Lecture/Discussion—15 hours. Special 12 week accelerated, intensive summer session course that combines the work of courses 1, 2, and 3. Introduction to Hebrew grammar and development of language skills in a cultural context with emphasis on communication. Not open to students who have completed course HEB 001, HEB 002, or HEB 003. GE credit: AH, WC. Effective: 2008 Spring Quarter.

HEB 002—Elementary Hebrew (5)
Laboratory—1 hour; Lecture/Discussion—4 hours. Prerequisite(s): HEB 001; Or the equivalent. Speaking, listening, comprehension, reading and writing fundamentals of modern Hebrew. GE credit: AH, OL, WC. Effective: 2017 Fall Quarter.

HEB 003—Elementary Hebrew (5)
Laboratory—1 hour; Lecture/Discussion—4 hours. Prerequisite(s): HEB 002; Or the equivalent. Speaking, listening comprehension, reading and writing fundamentals of modern Hebrew. GE credit: AH, OL, WC. Effective: 2017 Fall Quarter.

HEB 010—Introduction to Biblical Hebrew (3)
Lecture/Discussion—3 hours. Introduction to the Hebrew Alphabet and basic grammar rules of the biblical language. Students will learn to read most any biblical text and learn how to find the meaning of words by their roots and morphological structure. GE credit: AH, WC. Effective: 2015 Winter Quarter.

HEB 011—Introduction to Biblical Hebrew (3)
Lecture/Discussion—3 hours. Prerequisite(s): HEB 010 Continuation of course 10. Biblical text reading, simple/literal translation, verb and noun patterns, compounding of prepositions and nouns. GE credit: AH, WC. Effective: 2018 Winter Quarter.

HEB 012—Introduction to Biblical Hebrew (3)
Lecture/Discussion—3 hours. Prerequisite(s): HEB 011 Continuation of course 011. Biblical text reading, simple/literal translation, verb and noun patterns, compounding of prepositions and nouns. GE credit: AH, WC. Effective: 2018 Winter Quarter.

HEB 021—Intermediate Modern Hebrew I (4)
Lecture/Discussion—4 hours. Prerequisite(s): HEB 003; Consent of Instructor. Development and refinement of grammar, composition, and language skills required for reading literary texts and conversing about contemporary topics at an advanced level. History of the Hebrew language. Not open to students who have taken course HEB 100 or HEB 100A. GE credit: AH, OL, WC. Effective: 2017 Fall Quarter.

HEB 022—Intermediate Modern Hebrew II (4)
Lecture/Discussion—4 hours. Prerequisite(s): HEB 021; Consent of Instructor. Continued development and refinement of grammar, composition, and language skills required for reading literary texts and conversing about contemporary topics at an advanced level. History of the Hebrew language. Not open to students who have taken HEB 101 or HEB 100B. GE credit: AH, OL, WC. Effective: 2017 Fall Quarter.

HEB 023—Intermediate Modern Hebrew III (4)
Lecture/Discussion—4 hours. Prerequisite(s): HEB 022; Consent of Instructor. Continued development of grammar, composition, language skills required for reading literary texts and conversing about contemporary topics at an advanced level. History of the Hebrew language. Further development of writing and translating skills. Not open to students who have taken HEB 100C or HEB 102. GE credit: AH, OL, WC. Effective: 2018 Spring Quarter.

HEB 098—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Directed group study. May be repeated for credit. (P/NP grading only.) Effective: 2017 Winter Quarter.

HEB 099—Special Study for Undergraduates (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special study. May be repeated for credit. (P/NP grading only.) Effective: 2017 Winter Quarter.

HEB 100AN—Advanced Modern Hebrew I (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): HEB 023; or Consent of Instructor. Those who took course 100A as second-year Hebrew may take course 100AN. Third year Hebrew. Advanced grammar and composition. Focus on reading of literary texts, oral skills and accuracy in writing. GE credit: AH. Effective: 2006 Fall Quarter.

HEB 100BN—Advanced Modern Hebrew II (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): HEB 100AN; or Consent of Instructor. Those who took course 100B as second-year Hebrew may take course 100BN. Third year Hebrew. Advanced grammar and composition. Focus on reading of literary texts, oral skills and accuracy in writing. GE credit: AH. Effective: 2006 Winter Quarter.

HEB 100CN—Advanced Modern Hebrew III (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): HEB 100BN Third year Hebrew. Advanced grammar and composition. Focus on reading of literary texts, oral skills and accuracy in writing. Students who have taken course 100C as 2nd year Hebrew may take course 100CN. GE credit: AH. Effective: 2006 Spring Quarter.

Classics | HIN Courses

Courses in HIN:

HIN 001—Elementary Hindi/Urdu I (5)
Lecture/Discussion—5 hours. Introduction to Devanagari Script through development of all language skills in a cultural context with emphasis on communicative proficiency. GE credit: AH, WC. Effective: 2014 Fall Quarter.

HIN 001A—Accelerated Intensive Elementary Hindi (15)
Lecture/Discussion—15 hours. Special 12-week accelerated, intensive summer session course that combines the work of courses 1, 2, and 3. Introduction to Devnagari Script through development of all language skills in cultural context with emphasis on communicative proficiency. Not open for credit to students who have completed course HIN 001, HIN 002 or HIN 003. GE credit: AH, WC. Effective: 2014 Summer Special Session.

HIN 002—Elementary Hindi/Urdu II (5)
Lecture/Discussion—5 hours. Prerequisite(s): HIN 001 Continuation of course 1. Devanagari Script through development of all language skills in a cultural context with emphasis on communicative proficiency. GE credit: AH, WC. Effective: 2015 Winter Quarter.

HIN 003—Elementary Hindi/Urdu III (5)
Lecture/Discussion—5 hours. Prerequisite(s): HIN 002 Introduction to Devanagari Script through development of all language skills in a cultural context with emphasis on communicative proficiency. GE credit: AH, WC. Effective: 2015 Spring Quarter.

HIN 021—Intermediate Hindi/Urdu I (4)
Lecture/Discussion—4 hours. Prerequisite(s): HIN 003 Intermediate level course for students who have completed Elementary Hindi/Urdu or the equivalent. Students will continue to practice their skills in listening, speaking, reading and writing in Hindi and Urdu. GE credit: AH, OL, WC. Effective: 2017 Fall Quarter.

HIN 022—Intermediate Hindi/Urdu II (4)
Lecture/Discussion—4 hours. Prerequisite(s): HIN 021 Intermediate level course where students will continue to practice their skills in listening, speaking, reading and writing in Hindi and Urdu. GE credit: AH, OL, WC. Effective: 2017 Fall Quarter.

HIN 023—Intermediate Hindi/Urdu III (4)
Lecture/Discussion—4 hours. Prerequisite(s): HIN 022 Intermediate level course where students will continue to practice their skills in listening, speaking, reading and writing in Hindi and Urdu. GE credit: AH, OL, WC. Effective: 2017 Fall Quarter.

HIN 098—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Directed group study. May be repeated for credit. (P/NP grading only.) Effective: 2017 Winter Quarter.

HIN 099—Special Study for Undergraduates (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special study. May be repeated for credit. (P/NP grading only.) Effective: 2017 Winter Quarter.

HIN 396—Teaching Assistant Training Practicum (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Restricted to graduate students. Teaching practicum. May be repeated up to 18 time(s). (S/U grading only.) Effective: 2017 Winter Quarter.

Classics | LAT Courses

Courses in LAT:

LAT 001—Elementary Latin (5)
Lecture—5 hours. Introduction to basic grammar and vocabulary and development of translation skills with emphasis on Latin to English. Students who have successfully completed LAT 002 or LAT 003 in the 10th grade or higher grade in high school may receive unit credit for this course on a P/NP grading basis only; although a passing grade will be charged to the student's P/NP option, no petition is required; all other students will receive a letter grade unless a P/NP petition is filed. GE credit: AH. Effective: 1997 Winter Quarter.

LAT 002—Elementary Latin (5)
Lecture—5 hours. Prerequisite(s): LAT 001; Or equivalent. Continuation of course 1. GE credit: AH. Effective: 2016 Spring Quarter.

LAT 003—Intermediate Latin (5)
Lecture—5 hours. Prerequisite(s): LAT 002; Or equivalent. Continuation of course 2. Selected readings from Latin authors. GE credit: AH. Effective: 2016 Spring Quarter.

LAT 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

LAT 100—Readings in Latin Prose (4)
Lecture/Discussion—4 hours. Prerequisite(s): LAT 003; Or equivalent. Review of Latin morphology, grammar, and vocabulary. Readings in prose authors, including Julius Caesar. GE credit: AH. Effective: 2016 Fall Quarter.

LAT 101—Livy (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Livy GE credit: AH, WE. Effective: 2016 Spring Quarter.

LAT 102—Roman Comedy (5)
Lecture—4 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Roman comedy. GE credit: AH, WE. Effective: 2016 Spring Quarter.

LAT 103—Vergil: Aeneid (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Vergil: Aeneid. GE credit: AH, WE. Effective: 2016 Spring Quarter.

LAT 104—Sallust (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Sallust. GE credit: AH, WE. Effective: 2016 Spring Quarter.

LAT 105—Catullus (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Catullus. GE credit: AH, WE. Effective: 2016 Spring Quarter.

LAT 106—Horace: Odes and Epodes (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Horace: Odes and Epodes. GE credit: AH, WE. Effective: 2016 Spring Quarter.

LAT 108—Horace: Satires and Epistles (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Horace: Satires and Epistles. GE credit: AH, WE. Effective: 2016 Spring Quarter.

LAT 109—Roman Elegy (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Roman elegy. GE credit: AH, WE. Effective: 2016 Spring Quarter.

LAT 110—Ovid (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): LAT 100; Or equivalent. Translation and discussion of selected readings from the works of Ovid. May be repeated up to 1 time(s) when topic differs and with consent of instructor. GE credit: AH, WC, WE. Effective: 2011 Fall Quarter.

LAT 112—Cicero (4)
Recitation—3 hours; Term Paper. Prerequisite(s): LAT 100; Or equivalent. Translation and discussion of selected readings from the works of Cicero. May be repeated up to 1 time(s) if readings vary and with consent of instructor. GE credit: AH, WE. Effective: 2011 Fall Quarter.

LAT 115—Lucretius (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Lucretius. GE credit: AH, WE. Effective: 2016 Spring Quarter.

LAT 116—Vergil: Eclogues and Georgics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Vergil: Eclogues and Georgics. GE credit: AH, WE. Effective: 2016 Spring Quarter.

LAT 118—Roman Historians (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): LAT 100; Or equivalent. Readings in Latin from one or more of the major Roman historians and biographers. Authors may include Sallust, Nepos, Livy, Tacitus, Suetonius, and Ammianus Marcellinus. GE credit: AH, WC, WE. Effective: 2011 Fall Quarter.

LAT 119—Readings in Republican Latin Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): LAT 100; Or equivalent. Translation and discussion of selected readings from Republican Latin literature. May be repeated for credit when topics vary. GE credit: AH, WC, WE. Effective: 2012 Summer Session 2.

LAT 120—Readings in Imperial Latin Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): LAT 100; Or equivalent. Readings in Imperial Latin literature. May be repeated up to 2 time(s) when topic varies. GE credit: AH, WC, WE. Effective: 2014 Winter Quarter.

LAT 121—Latin Prose Composition (4)
Lecture/Discussion—4 hours. Prerequisite(s): LAT 100; Or equivalent. Intensive grammar and vocabulary review through exercises in Latin prose composition. GE credit: AH. Effective: 2015 Fall Quarter.

LAT 122—Early Christian Writers (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): LAT 100 (can be concurrent); or Consent of Instructor. Latin style of selected early Christian writers. Topics may include: Latin translations of Greek and Hebrew scriptures, Christian Latin, with focus on North Africa, Palestine, or Spain; High literary Christian Latin; Christian Latin oratorical style. GE credit: AH, WC, WE. Effective: 2017 Fall Quarter.

LAT 125—Medieval Latin (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Selected readings from the Vulgate and various medieval authors provide an introduction to the developments in the Latin Language and literature from the fourth to the fifteenth centuries. GE credit: AH, WE. Effective: 2016 Spring Quarter.

LAT 130—Readings in Late Latin (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Translation and discussion of selected readings from late imperial-early medieval Christian and pagan literature. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

LAT 135—Themes in Latin Literature (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): LAT 100 (can be concurrent); or Consent of Instructor. Readings in Latin that trace a theme across times, genres, and authors. May be repeated for credit May be repeated for credit if topics differ. GE credit: AH, WC, WE. Effective: 2017 Fall Quarter.

LAT 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study. (P/NP grading only.) Effective: 2016 Spring Quarter.

LAT 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special study for advanced undergraduates. (P/NP grading only.) Effective: 2016 Fall Quarter.

Climate Science & Policy Minor; Environmental Science & Policy

Climate Science & Policy Minor; Environmental Science & Policy | Climate Science & Policy Minor

(College of Agricultural and Environmental Sciences)

Marcel Holyoak, Ph.D., Chairperson of the Department

Mark N. Lubell, Ph.D., Vice Chairperson

Department Office. 2132 Wickson Hall; 530-752-3026; http://desp.ucdavis.edu/

Faculty. http://desp.ucdavis.edu/faculty

The Climate Science and Policy minor provides students with basic background in climate change science as well as mitigation and adaptation strategies. Students will gain understanding of scientific, social, institutional, and economic dimensions of climate change.

Minor Advisor. M. Springborn (Environmental Science and Policy)

Climate Science and Policy **Units:** 25

ESP 165	Climate Policy	3
ATM 116	Modern Climate Change	3
LDA 003	Sustainable Development: Theory and Practice	4
ATM 005	Global Climate Change	3
OR		
SAS 025	Global Climate Change: Convergence of Biological, Geophysical, & Social Sciences	3

Choose 11 units:

AMS 101G	Special Topics: New Directions in American Culture Studies Special topics can vary; credit for the minor only given for the topic of Environmental Justice.	4
ATM 128	Radiation and Satellite Meteorology	4
CRD 158	Small Community Governance	4
ECI 123	Urban Systems and Sustainability	4
ECI 149	Air Pollution	4
ECI 163	Energy and Environmental Aspects of Transportation	4
OR		
ESP 163	Energy and Environmental Aspects of Transportation	4
ENL 184	Literature and the Environment	4
ESP 171	Urban and Regional Planning	4
PMI 129Y	One Health: Human, Animal & Environment Interfaces	3

Total: 25

Climate Science & Policy Minor; Environmental Science & Policy | ESP Courses

Courses in ESP:

ESP 001—Environmental Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): UWP 001 (can be concurrent) or UWP 001Y (can be concurrent) or UWP 001V (can be concurrent) or ENL 003 (can be concurrent); Or equivalent; sophomore standing; ECN 001A and BIS 002B recommended. Analysis of the physical, biological, and social interactions which constitute environmental problems. Emphasis on analysis of environmental problems, the consequences of proposed solutions, and the interaction of environmental science and public policy in creating solutions. GE credit: SE, SL, SS. Effective: 2018 Spring Quarter.

ESP 010—Current Issues in the Environment (3)
Lecture—3 hours. Prerequisite(s): Elementary biology recommended. The science behind environmental issues, and policies affecting our ability to solve domestic and international environmental problems. Resources, environmental quality, regulation, environmental perception and conservation. Integrative case studies. Not open for credit to students who have completed ESP 1. GE credit: SE, SL, SS, WE. Effective: 2004 Fall Quarter.

ESP 030—World Ecosystems & Geography (3)
Lecture—3 hours. Not open to students who have successfully completed Environmental and Resource Sciences 30. (Formerly Environmental and Resource Sciences 30.) Introduction to the earth's major geographic regions and associated ecosystems, such as deserts, temperate forests, and oceans with an examination of how climate, vegetation regimes, ecological processes, agriculture and other human activities interact in different regions of the world. (ESM 030.) GE credit: SE, SL, WC. Effective: 2011 Fall Quarter.

ESP 092—Internship (1-12)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. Work experience off and on campus in all subject areas offered in the
College of Agricultural and Environmental Sciences. Internship supervised by member of the faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

ESP 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Primarily for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

ESP 100—General Ecology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (BIS 002A, BIS 002B, BIS 002C); ((MAT 016A, MAT 016B) or (MAT 017A, MAT 017B) or (MAT 021A, MAT 021B)); STA 013 recommended. Theoretical and experimental analysis of the distribution, growth and
regulation of species populations; predator-prey and competitive interactions; and the organization of natural communities. Application of evolutionary and ecological principles to selected environmental problems. GE credit: SE, SL. Effective: 2016 Fall Quarter.

ESP 101—Ecology, Nature, and Society (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 001 or ANT 002 or ESP 030 or EVE 100 or BIS 101 recommended. Interdisciplinary study of diversity and change in human societies, using frameworks from anthropology, evolutionary ecology, history, archaeology, psychology, and other fields. Topics include population dynamics, subsistence transitions, family organization, disease, economics, warfare, politics, and resource conservation. (ANT 101.) GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ESP 105—Evolution of Societies and Cultures (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 001 or ANT 002 or ESP 030 or EVE 100 or BIS 101 recommended. Interdisciplinary study of social and cultural evolution in humans. Culture as a system of inheritance,psychology of cultural learning, culture as an adaptive system,evolution of maladaptations, evolution of technology and institutions,evolutionary transitions in human history, coevolution of genetic and cultural variation. Only two units of credit for students who took ESP 101 or ANT 101 prior to fall 2004. (ANT 105.) GE credit: QL, SS, WC, WE. Effective: 2016 Fall Quarter.

ESP 110—Principles of Environmental Science (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (PHY 001A or PHY 007A); (MAT 016B or MAT 017B or MAT 021B); BIS 002A or BIS 010 recommended; upper division standing. Application of physical and chemical principles, ecological concepts, and systems approach to policy analysis of atmospheric environments, freshwater and marine environments, land use, energy supplies and technology, and other resources. GE credit: QL, SE, SL. Effective: 2018 Winter Quarter.

ESP 111—Marine Environmental Issues (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Examination of critical environmental issues occurring in coastal waters including the effects of climate change, overfishing, and other human impacts. Through readings and group discussions, students will develop an integrative understanding of the oceanographic and ecological processes. May be repeated up to 2 time(s) when topics differ. (EVE 111.) GE credit: SE, SL. Effective: 2015 Summer Session 1.

ESP 116N—Oceanography (3)
Fieldwork; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): GEL 001 or GEL 002 or GEL 016 or GEL 050 Advanced oceanographic topics: Chemical, physical, geological, and biological processes; research methods and data analysis; marine resources, anthropogenic impacts, and climate change; integrated earth/ocean/atmosphere systems; weekly lab and one weekend field trip. (GEL 116N.) GE credit: SE, SL. Effective: 2017 Winter Quarter.

ESP 121—Population Ecology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B; BIS 002C; (MAT 016B or MAT 017B or MAT 021B or MAT 021BH) Development of exponential and logistic growth models for plant and animal populations, analysis of age structure and genetic structure, analysis of competition and predator-prey systems. Emphasis is on developing models and using them to make predictions and solve problems. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

ESP 123—Introduction to Field and Laboratory Methods in Ecology (4)
Fieldwork—4 hours; Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): (ESP 100 or EVE 101); STA 100; Or equivalent of EVE 101 and STA 100. Introduces students to methods used for collecting ecological data in field and laboratory situations. Methods used by population ecologists and community ecologists; emphasis on experimental design, scientific writing and data analysis. GE credit: SE, SL. Effective: 2015 Spring Quarter.

ESP 124—Marine and Coastal Field Ecology (3)
Discussion—1 hour; Fieldwork—3 hours; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Upper division standing or consent of instructor. Introductory animal biology (BIS 001B) recommended; residence at or near Bodega Marine Lab required. Enrollment restricted to application at http://www.bml.ucdavis.edu. Ecology of marine populations and communities living in diverse habitats along the California coast. Hands-on learning using scientific process and tools of the biological trade to address ecological questions arising during field trips. Critical thinking through discussing scientific literature. GE credit: SE, SL. Effective: 2006 Summer Session 1.

ESP 127—Plant Conservation Biology (4)
Discussion—1 hour; Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ESP 100 or EVE 101; Or equivalent upper division general ecology. Principles governing the conservation of plant species and plant communities, including the roles of fire, exotic species, grazing, pollination, soils, and population genetics; analytic and practical techniques for plant conservation; and introduction to relevant legal, ethical, and policy issues. GE credit: SE, SL. Effective: 2016 Fall Quarter.

ESP 150A—Physical and Chemical Oceanography (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ESP 116N or GEL 116N); PHY 009B; MAT 021D; CHE 002C; and Consent of Instructor. Physical and chemical properties of seawater, fluid dynamics, air-sea interaction, currents, waves, tides, mixing, major oceanic geochemical cycles. (GEL 150A.) GE credit: QL, SE. Effective: 2017 Winter Quarter.

ESP 150B—Geological Oceanography (3)
Lecture—3 hours. Prerequisite(s): GEL 050 or (GEL 116N or ESP 116N) Introduction to the origin and geologic evolution of ocean basins. Composition and structure of oceanic crust; marine volcanism; and deposition of marine sediments. Interpretation of geologic history of the ocean floor in terms of sea-floor spreading theory. (GEL 150B.) GE credit: SE. Effective: 2017 Winter Quarter.

ESP 150C—Biological Oceanography (4)
Discussion—1 hour; Fieldwork; Lecture—3 hours. Prerequisite(s): BIS 002A; Consent of Instructor. A course in general ecology. Ecology of major marine habitats, including intertidal, shelf benthic, deep-sea and plankton communities. Existing knowledge and contemporary issues in research. Segment devoted to human use. One weekend field trip required. (GEL 150C.) GE credit: SE, SL. Effective: 2017 Winter Quarter.

ESP 151—Limnology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B; (BIS 002C and ESP 100 or EVE 101 recommended.) Biology and productivity of inland waters with emphasis on the physical and chemical environment. GE credit: SE. Effective: 2017 Spring Quarter.

ESP 151L—Limnology Laboratory (3)
Laboratory—6 hours. Prerequisite(s): ESP 151 (can be concurrent); Junior, senior, or graduate standing. Limnological studies of lakes, streams, and reservoirs with interpretation of aquatic ecology. GE credit: SE. Effective: 1997 Winter Quarter.

ESP 152—Coastal Oceanography (3)
Discussion—1 hour; Fieldwork—3 hours; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Upper division standing or consent of the instructor; physics (PHY 009B), calculus (MAT 021B) and exposure to physical and chemical oceanography (GEL 150A and ESP 150A) are recommended; residence at or near Bodega Marine Laboratory required. Enrollment restricted to application at http://www.bml.ucdavis.edu. Oceanography of coastal waters, including bays, river plumes, nearshore and estuaries; focus on transport patterns, how they are forced and implications for ecological and environmental problems. Pertinent for students in oceanography, ecology, environmental engineering, geology and hydrology. GE credit: SE, SL. Effective: 2006 Summer Special Session.

ESP 155—Wetland Ecology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 002A; Or equivalent of BIS 002A; ESP 100 or EVE 101 recommended. Introduction to wetland ecology. The structure and function of major wetland types and principles that are common to wetlands and that distinguish them from terrestrial and aquatic ecosystems. GE credit: SE. Effective: 2016 Fall Quarter.

ESP 155L—Wetland Ecology Laboratory (3)
Fieldwork; Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): ESP 155 (can be concurrent) Modern and classic techniques in wetland field ecology. Emphasis on sampling procedures, vegetation analysis, laboratory analytical procedures, and examples of successful wetland restoration techniques. GE credit: SE, SL. Effective: 1997 Winter Quarter.

ESP 160—The Policy Process (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): POL 001; ECN 001A and STA 013 recommended. Alternative models of public policymaking and application to case studies in the U.S. and California. GE credit: SS. Effective: 2016 Fall Quarter.

ESP 161—Environmental Law (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Upper division standing and one course in environmental science or political science recommended. Introduction for non-Law School students to some of the principal issues in environmental law and the judicial interpretation of some important environmental statutes, e.g., NEPA. GE credit: SS. Effective: 1997 Winter Quarter.

ESP 162—Environmental Policy (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 001A or ECN 001AV Compares economic with socio-cultural approaches to understanding the causes of environmental problems and strategies for addressing them. Includes different approaches to the policy process, policy instruments, and environmental behavior. Applies these principles to several problems. GE credit: SS. Effective: 2018 Winter Quarter.

ESP 163—Energy and Environmental Aspects of Transportation (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): ECN 001A or ECN 001AV or ENG 106 Engineering, economic, and systems planning concepts. Analysis and evaluation of energy, air quality and selected environmental attributes of transportation technologies. Strategies for reducing pollution and petroleum consumption in light of institutional and political constraints. Evaluation of vehicle emission models. (ECI 163.) GE credit: SE, SL, SS, WE. Effective: 2018 Spring Quarter.

ESP 164—Ethical Issues in Environmental Policy (3)
Lecture—3 hours. Prerequisite(s): ESP 160; ESP 168A; Seniors only in Environmental Policy Analysis and Planning or by consent of instructor. Basic modes of ethical reasoning and criteria of distributive justice
applied to selected topics in environmental policymaking. GE credit: SS. Effective: 1997 Winter Quarter.

ESP 165—Climate Policy (3)
Lecture—3 hours. Prerequisite(s): ESP 001 or ECN 001A or ECN 001AV; or Consent of Instructor. Models, data and assumptions behind competing arguments regarding societal response to the prospect of climate change at the state, national and international level from economic, ethical and policy science perspectives. Effective: 2018 Spring Quarter.

ESP 166—Ocean and Coastal Policy (3)
Lecture—3 hours. Prerequisite(s): ESP 001; or Consent of Instructor. Limited enrollment. Overview of U.S. and International ocean and coastal policy, including energy, coastal land-use and water quality, protected areas and species. GE credit: SS. Effective: 2017 Spring Quarter.

ESP 167—Energy Policy (4)
Lecture—4 hours; Term Paper. Prerequisite(s): (ECN 001A or ECN 001AV); (MAT 016B or MAT 017B or MAT 021B); or Consent of Instructor. Survey of primary energy resources (fossil, renewable, nuclear), energy conversion methods, future energy demand scenarios, and environmental impacts of energy. Overview of energy policy in the U.S. Analysis of policy alternatives for addressing energy-related environmental and national security issues. GE credit: SS. Effective: 2018 Spring Quarter.

ESP 168A—Methods of Environmental Policy Evaluation (5) ***Review all entries***
Discussion—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): (ESP 001 or ESP 010); (STA 013 or STA 100); ECN 001A; ECN 100 recommended. Evaluation of alternatives for solution of complex environmental problems; impact analysis, benefitcost analysis, distributional analysis, decision making under uncertainty, and multi-objective evaluation. GE credit: SS. Effective: 2018 Spring Quarter.

ESP 168A—Methods of Environmental Policy Evaluation (5) ***Review all entries***
Discussion—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): (ESP 001 or ESP 010); (STA 013 or STA 013Y or STA 100); (ECN 001A or ECN 001AV); ECN 100 recommended. Evaluation of alternatives for solution of complex environmental problems; impact analysis, benefitcost analysis, distributional analysis, decision making under uncertainty, and multi-objective evaluation. GE credit: SS. Effective: 2018 Summer Quarter.

ESP 168B—Methods of Environmental Policy Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ESP 168A Continuation of course 168A, with emphasis on examination of the literature for applications of research and evaluation techniques to problems of transportation, air and water pollution, land use, and energy policy. GE credit: SS. Effective: 1997 Winter Quarter.

ESP 169—Water Policy and Politics (3)
Lecture—3 hours. Prerequisite(s): ECN 001A or POL 001 recommended. Governance of water, including issues of water pollution/quality and water supply. The politics of water decision-making and effectiveness of water policy. Broad focus on federal water policy, with case examples from nationally significant U.S. watersheds. GE credit: SS. Effective: 2016 Fall Quarter.

ESP 170—Conservation Biology Policy (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): One course in environmental science (e.g., ESP 1), conservation (e.g., WFC 11 or WFC 154), or government (e.g., POL 1) recommended. Analysis of policies designed to conserve species and their habitats. Emphasis on how individual incentives affect the success of conservation policies. Valuation of endangered species and biodiversity. Criteria for deciding conservation priorities. GE credit: SE, SS. Effective: 2016 Fall Quarter.

ESP 171—Urban and Regional Planning (4)
Discussion—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): ESP 001 recommended. How cities plan for growth in ways that minimize environmental harm. Standard city planning tools (general plan, zoning ordinance) and innovative new approaches. Focus on planning requirements and practices in California. Relationships between local, regional, state, and federal policy. GE credit: SS, WE. Effective: 2016 Fall Quarter.

ESP 172—Public Lands Management (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 001A recommended. Investigation of alternative approaches to public lands management by Federal and state agencies. The role each agency's legislation plays in determining the range of resource allocations. GE credit: ACGH, SS. Effective: 2016 Fall Quarter.

ESP 173—Land Use and Growth Controls (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Upper division standing; one course in environmental policy. Exposes students to the economic, political, and legal factors affecting land use and growth controls, and helps students critically evaluate written materials in terms of their arguments and supporting data. GE credit: SS. Effective: 2016 Fall Quarter.

ESP 175—Natural Resource Economics (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100B or ECN 100; Or the equivalent. Pass One open to Managerial Economics (AMGE) and Environmental Policy Analysis and Planning (AEPP) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Economic concepts and policy issues associated with natural resources,
renewable resources (ground water, forests, fisheries, and wildlife populations) and non-renewable resources (minerals and energy resources, soil). (Agricultural and Resource Economics 175.) GE credit: SS. Effective: 2017 Winter Quarter.

ESP 175—Natural Resource Economics (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A C- or better or ECN 100A C- or better or ECN 100 C- or better Pass One open to Managerial Economics (AMGE) and Environmental Policy Analysis and Planning (AEPP) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Economic concepts and policy issues associated with natural resources,
renewable resources (ground water, forests, fisheries, and wildlife populations) and non-renewable resources (minerals and energy resources, soil). (ARE 175.) GE credit: SS. Effective: 2018 Fall Quarter.

ESP 178—Applied Research Methods (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 103 or STA 100 or STA 108 or SOC 106 or ARE 106; Or the equivalent. Research methods for analysis of urban and regional land use, transportation, and environmental problems. Survey research and other data collection techniques; demographic analysis; basic forecasting, air quality, and transportation models. Collection, interpretation, and critical evaluation of data. GE credit: QL, SS. Effective: 2016 Fall Quarter.

ESP 179—Environmental Impact Assessment (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ESP 001; Or the equivalent. Introduction to the information resources and methods typically used in environmental impact analysis. Emphasis on how environmental information is applied to planning, environmental regulation, and public policymaking, with case studies from California land use and natural resource policy. GE credit: SS. Effective: 2016 Fall Quarter.

ESP 179L—Environmental Impact Reporting Using Geographic Information (2)
Discussion/Laboratory—2 hours; Laboratory—4 hours. Prerequisite(s): ESP 179 (can be concurrent); ESP 179 required concurrently. Introduction to Geographic Information Systems (GIS) by using ArcView for assessment and environmental planning. Not open for credit to students who have completed ABT 180, ABT 181, or ASE 132. GE credit: SE. Effective: 2002 Fall Quarter.

ESP 190—Workshops on Environmental Problems (1-8)
Laboratory—2-16 hours. Prerequisite(s): Consent of Instructor. Open to all upper division and graduate students on application. Workshops featuring empirical analyses of contemporary environmental problems by multidisciplinary student teams. Guided by faculty and lay professionals, the teams seek to develop an integrated view of a problem and outline a series of alternative solutions. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ESP 191A—Workshop on Food System Sustainability (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): PLS 015; CRD 020; ARE 121; PLS 150; or Consent of Instructor. Upper division standing. Priority enrollment for seniors in the sustainable agriculture and food systems major; limited to 25 students per section. First in a two-quarter senior capstone course sequence. Identify projects addressing specific problems and opportunities of sustainable agriculture and food systems, form multidisciplinary teams, and identify and consult with key stakeholders to understand their needs and concerns. GE credit: SE. Effective: 2009 Fall Quarter.

ESP 191B—Workshop on Food System Sustainability (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): ESP 191A Priority enrollment for seniors in the sustainable agriculture and food systems major; limited to 25 students per section. Continuation of course 191A. Student teams conduct analyses of a specific issue in sustainable agriculture or food systems, prepare a critical assessment of technological, economic, environmental, and social dimensions of options for action and present their results to stakeholders. GE credit: SE. Effective: 2010 Winter Quarter.

ESP 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Work experience off and on campus in all subject areas offered in the
College of Agricultural and Environmental Sciences. Internships supervised by a member of the faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

ESP 197T—Tutoring in Environmental Science and Policy (1-5)
Tutorial—2-6 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Experience in teaching under guidance of faculty member. (P/NP grading only.) Effective: 2014 Winter Quarter.

ESP 198—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

ESP 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

ESP 212A—Environmental Policy Process (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Course in public policy (e.g., ESP 160); environmental law (e.g., ESP 161); course in statistics (e.g., SOC 106 or ARE 106). Introduction to selected theories of the policy process and applications to the field of environmental policy. Develops critical reading skills, understanding of policy theory, and an ability to apply multiple theories to the same phenomena. (ECL 212A and ENV 200C.) Effective: 2017 Fall Quarter.

ESP 212B—Environmental Policy Evaluation (4)
Discussion—1 hour; Lecture—2 hours; Seminar—2 hours. Prerequisite(s): (STA 108 or ARE 106); ARE 176; Intermediate microeconomics (e.g., ECN 100); policy analysis (e.g., ESP 168A or the equivalent). Method and practice, philosophical basis, and political role of policy analysis. Reviews basic concepts from economic theory; how and why environmental problems emerge in a market economy; and tools necessary for solving environmental problems. (ECL 212B and ENV 200B.) Effective: 2018 Winter Quarter.

ESP 220—Tropical Ecology (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): ESP 100; EVE 101; EVE 117; EVE 138 recommended. Open to graduate and undergraduate students who meet requirement subject to consent of instructor. An overview of present status of knowledge on structure and processes of major tropical ecosystems. Differences and similaritiees among tropical and temperate systems
stressed. Effective: 1997 Winter Quarter.

ESP 228—Advanced Simulation Modeling (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): (STA 108 or ARE 106); (ESP 128 and ESP 128L) Advanced techniques in simulation modeling; optimization and simulation, dynamic parameter estimation, linear models, error propagation, and sensitivity testing. Latter half of course will introduce model evaluation in ecological and social system models. Effective: 1997 Winter Quarter.

ESP 252—Sustainable Transportation Technology and Policy (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): ESP 160; Or the equivalent. Role of technical fixes and demand management in creating a sustainable transportation system. Emphasis on technology options, including alternative fuels, electric propulsion, and IVHS. Analysis of market demand and travel behavior, environmental impacts, economics and politics. (ECI 252.) Effective: 1997 Winter Quarter.

ESP 275—Economic Analysis of Resource and Environmental Policies (4)
Lecture/Discussion—4 hours. Prerequisite(s): ARE 204 or ECN 204 Development of externality theory, market failure concepts, welfare economics, theory of renewable and non-renewable resource use, and political economic models. Applications to policy issues regarding the agricultural/environment interface and managing resources in the public domain. (ARE 275.) Effective: 1999 Spring Quarter.

ESP 278—Research Methods in Environmental Policy (3)
Lecture/Discussion—3 hours. Prerequisite(s): ARE 106; Or the equivalent. Introduction to scientific research in environmental policy.Major issues in the philosophy of the social sciences.How to design research that acknowledges theoretical assumptions and that is likely to produce evidence in an intersubjectively reliable fashion with explicit recognition of its uncertainties. Effective: 1998 Winter Quarter.

ESP 298—Directed Group Study (1-5)
Variable. Effective: 1997 Winter Quarter.

ESP 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

ESP 396—Teaching Assistant Training Practicum (1-4)
Variable—3-12 hours. Prerequisite(s): Consent of Instructor. Open to graduate students only. Teaching assistant training practicum. May be repeated for credit. (S/U grading only.) Effective: 2017 Spring Quarter.

Clinical Nutrition

Clinical Nutrition | Clinical Nutrition B.S.

(College of Agricultural and Environmental Sciences)

Faculty. http://nutrition.ucdavis.edu/people/faculty/index.html

The Major Program

The Clinical Nutrition major provides students with training in normal and therapeutic nutrition, biological and social sciences, food science, communication, business management and food service management. This major fulfills the academic requirements for admission into a dietetics internship or the equivalent, which must be completed before qualifying for registration as a dietitian.

The Program. The Clinical Nutrition major (formerly Dietetics) includes the same basic core of nutrition classes as the Nutrition Science major, but includes additional courses such as food service management, education, sociology, and communication skills to prepare for work with the public. Clinical Nutrition students spend the first two years completing preparatory course work in the basic biological sciences, along with several of the social sciences. In the final two years, students take courses in normal and clinical nutrition, food science, biochemistry, and management techniques.

Entering freshman or transfer students are assumed to have basic computer skills and to demonstrate mathematics competency adequate to pass the Math Placement Exam with a minimum score of 25.

Major Advisor. Francene Steinberg (Nutrition)

Advising Center for the major is located in 3202 Meyer Hall; 530-752-2512.

Career Alternatives. The Clinical Nutrition major qualifies students to apply for a dietetic internship accredited by the Accreditation Council for Education in Nutrition and Dietetics enabling them to become a Registered Dietitian, the professional credential necessary to work in a clinical setting. Once dietitians are registered, they generally seek employment in administrative, therapeutic, teaching, research, or public health/public service positions in clinics, hospitals, schools, or other similar institutions. There is a growing role for dietitians working in settings outside of the traditional hospital (for example, in state and federal nutrition programs, nutrition education, Peace Corps and Cooperative Extension work). Students who complete the undergraduate preparation in clinical nutrition are also qualified to enter graduate programs in dietetics, nutrition science, public health nutrition, and food service management.

Written/Oral Expression		**Units:** 8
ENL 003	Introduction to Literature	4
OR		
UWP 001	Expository Writing	4
CMN 001	Introduction to Public Speaking	4

Preparatory Subject Matter		**Units:** 47-48
BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 002C	General Chemistry	5
CHE 008A	Organic Chemistry: Brief Course	2
CHE 008B	Organic Chemistry: Brief Course	4
ECN 001A	Principles of Microeconomics	4
OR		
ECN 001B	Principles of Macroeconomics	4

PSC 001	General Psychology	4
SOC 001	Introduction to Sociology	5
OR		
SOC 003	Social Problems	4
OR		
ANT 002	Cultural Anthropology	5
STA 013	Elementary Statistics	4

Depth Subject Matter **Units:** 82

ARE 112	Fundamentals of Organization Management	4
ABI 102	Animal Biochemistry and Metabolism	5
ABI 103	Animal Biochemistry and Metabolism	5
BIS 101	Genes and Gene Expression	4
FST 100A	Food Chemistry	4
FST 100B	Food Properties	4
FST 101A	Food Chemistry Laboratory	3
FST 101B	Food Properties Laboratory	2
FSM 120	Principles of Quantity Food Production	4
FSM 120L	Quantity Food Production Laboratory	2
FSM 122	Food Service Systems Management	3
MIC 102	Introductory Microbiology	3
MIC 103L	Introductory Microbiology Laboratory	2
NUT 111AY	Introduction to Nutrition and Metabolism	3
NUT 111B	Recommendations and Standards for Human Nutrition	2
NUT 112	Nutritional Assessment	4
NUT 116A	Clinical Nutrition	3
NUT 116AL	Clinical Nutrition Practicum	3
NUT 116B	Clinical Nutrition	3
NUT 116BL	Clinical Nutrition Practicum	3
NUT 118	Community Nutrition	4
NUT 190	Proseminar in Nutrition	1

NPB 101	Systemic Physiology	5
NPB 101L	Systemic Physiology Laboratory	3

Additional upper division Nutrition electives.

Total: 137-138

Clinical Research (Graduate Group)

Clinical Research (Graduate Group) | Clinical Research M.A.S.

David M. Rocke, Ph.D., Chairperson of the Group

Group Office. CTSC, 2921 Stockton Blvd., Sacramento, CA 95817; 916-703-9110

Faculty.
http://www.ucdmc.ucdavis.edu/ctsc/area/education/ClinicalResearchGraduateGroup/crgg_faculty.html

Graduate Study. Graduate Group in Clinical Research (GGCR) is an interdisciplinary graduate group in clinical research with a Master of Advanced Study degree in Clinical Research. The GGCR provides a solid clinical/translational, patient-oriented research foundation for junior faculty, clinical and pre-clinical fellows, and post-doctoral scholars. The program centers around three core elements: didactic instruction, mentored research, and special experiences.

Mandatory course work includes biostatistics, epidemiology, patient-oriented research, health services research, data management/informatics, scientific communication, research management, research ethics and career development. The instruction includes a 6-8 -week summer curriculum followed by a one- or two-year core curriculum and electives that can be tailored to best meet each scholar's career development needs.

Degree Offered. M.A.S. Plan II

Degree Requirements can be found at
http://www.ucdmc.ucdavis.edu/ctsc/area/education/ClinicalResearchGraduateGroup/crgg_degree_curriculum.h

Coaching Principles & Methods Minor; Physical Education

Coaching Principles & Methods Minor; Physical Education | Coaching Principles & Methods Minor

(College of Letters and Science)

The Coaching Principles and Methods minor is an interdisciplinary minor open to undergraduates in all four colleges. Students must complete a statement of interest to assist in placing them in future internships. This form is available in the Physical Education Program Office, in 264 Hickey Gym, and may be turned in at any time.

Minor Advisor. Lou Bronzan; 530-752-5541 or stbronzan@ucdavis.edu

Advising Center. 289 Hickey Gym

Coaching Principles and Methods **Units:** 20

PHE 001	Physical Activities Must complete a minimum of two Physical Education 1 courses in two different activities or sports.	1
PHE 007	Professional Physical Education Activities: Men and Women	1
PHE 100	Field Experience in Teaching Physical Education	2
PHE 141	Coaching Principles and Methods	3

PHE 143	Coaching Effectiveness	3
PHE 192	Physical Education Internship	2

Required Minor Electives

A minimum of eight units with courses from at least two different departments. One course must be taken from race/class/gender list. Second course can be from race/class/gender list or from sociocultural issues and settings list.

Race/Class/Gender List:

AAS 123	Black Female Experience in Contemporary Society	4
AAS 130	Education in the African-American Community	4
AAS 133	The Black Family In America	4
AMS 154	The Lives of Men in America	4
AMS 156	Race, Culture and Society in the United States	4
ANT 128B	Self, Identity, and Family	4
ANT 139AN	Race, Class, Gender Systems	4
ASA 112	Asian American Women	4
ASA 115	Multiracial Asian Pacific American Issues	4
ASA 116	Asian American Youth	4
ASA 150	Filipino American Experience	4
ASA 150B	Japanese American Experience	4
ASA 150C	Chinese American Experience	4
ASA 150D	Korean American Experience	4
ASA 150E	Southeast Asian American Experience	4
CHI 110	Sociology of the Chicana/o Experience	4
CHI 120	Chicana/ o Psychology	4
CHI 122	Psychology Perspectives Chicana/o and Latina/o Family	4
CHI 123	Psychological perspectives on Chicana/o and Latina/o Children and Adolescents	4
NAS 115	Native Americans in the Contemporary World	4
NAS 134	Race, Culture, and Nation	4
NAS 180	Native American Women	4
SOC 128	Interracial Interpersonal Dynamics	4
SOC 129	Sociology of Black Experience in America	4
SOC 130	Race Relations	4
SOC 132	The Sociology of Gender	4
SOC 134	Sociology of Racial Ethnic Families	4
SOC 172	Ideology of Class, Race and Gender	4
SOC 174	American Jewish Identities and Communities	4
WMS 130	Globalization and Politics of Family Change	4
WMS 158	Masculinities	4
WMS 170	Queer Studies	4

Sociocultural Issues and Settings List:

AMS 130	American Popular Culture	4
AMS 152	The Lives of Children in America	4
ANT 141B	Ethnography of California and the Great Basin	4
EDU 115	Educating Children with Disabilities	2
EDU 122	Children, Learning and Material Culture	4
EDU 153	Diversity in the K-12 Classroom	2
EXB 102	Introduction to Motor Learning and the Psychology of Sport and Exercise	4
EXB 121	Advanced Sport Psychology	3
EXB 122	Psychological Effects of Physical Activity	3

HDE 100B	Middle Childhood and Adolescence	4
HDE 110	Contemporary American Family	4
PHE 120	Sport in American Society	3
PSC 126	Health Psychology	4
PSC 140	Developmental Psychology	4
PSC 151	Social Psychology	4
PSC 157	Stereotyping, Prejudice, and Stigma	4
PSC 158	Sexual Orientation and Prejudice	4
PSC 161	Psychology of the Self	4
PSC 162	Introduction to Personality Psychology	4
PSC 168	Abnormal Psychology	4
SOC 122	Sociology of Adolescence	4
SOC 123	American Society	4
SOC 124	Education and Inequality in the U.S.	4
SOC 131	The Family	4
SOC 153	The Sociology of Childhood	4
WMS 140	Gender and Law	4

PHE 192 has a prerequisite of junior/senior standing. PHE 192 cannot be taken until after a student has completed more than 90 total units. PHE 192 internship must be in a coaching or teaching setting. Setting must be approved IN ADVANCE by the coaching minor advisor before a CRN will be issued.

Total: 20

Cognitive Science

Cognitive Science | CGS Information

(College of Letters and Science)

David Corina, Ph.D., Program Director

Program Office. 101 Young Hall; cogsciadvising@ucdavis.edu; http://cogsci.ucdavis.edu/

Committee in Charge. http://cogsci.ucdavis.edu/faculty.html

Faculty. http://cogsci.ucdavis.edu/faculty.html

Cognitive Science | CGS A.B.

(College of Letters and Science)

David Corina, Ph.D., Program Director

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Faculty. http://cogsci.ucdavis.edu/faculty.html

The Major Programs

The Cognitive Science major is designed to provide a broad interdisciplinary approach to the study of mind that includes courses from different departments and attracts students with a variety of interests. It emphasizes a multi- faceted approach to the study of mind that integrates concepts and techniques from psychology, artificial intelligence, linguistics, neurology, philosophy and other relevant fields.

For students interested in the liberal arts the Cognitive Science major can be pursued as a Bachelor of Arts (A.B.) program. Alternatively, it can be pursued as a Bachelor of Science (B.S.) program for students with a stronger interest in the mathematical, neurological and computational foundations of the discipline. The main objective of both programs is to give the student a broad grounding in

the integrated sciences of the mind and to connect approaches from different fields. Students must complete a number of core courses for the degree, as well as a number of specialty courses on such wide-ranging topics as logic for artificial intelligence, computational linguistics, cognitive neuroscience, animal cognition and the psychology of music.

Career Alternatives. A degree in cognitive science provides broad intellectual foundations useful for careers in a variety of areas, including teaching, business, social work/counseling and the information technology industry. An undergraduate education in cognitive science also prepares the student for graduate study in appropriate subfields of psychology, linguistics, philosophy and informatics. It is also suitable training for pre-medicine, pre-law, and pre-management students.

Major Advisors. Staff advisors are available in 101 Young Hall; 530 752 5104; cogsciadvising@ucdavis.edu; http://cogsci.ucdavis.edu/advising.html.

Preparatory Subject Matter **Units:** 28

LIN 001	Introduction to Linguistics	4
OR		
LIN 001Y	Introduction to Linguistics	4
PHI 010	Introduction to Cognitive Science	4
OR		
CGS 001	Introduction to Cognitive Science	4
PHI 013G	Minds, Brains, and Computers with Discussion	4
PSC 001	General Psychology	4
OR		
PSC 001Y	General Psychology	4
PSC 041	Research Methods in Psychology	4
STA 013	Elementary Statistics	4
PHI 012	Introduction to Symbolic Logic	4

Depth Subject Matter **Units:** 44

All courses from group A

Group A: Core

One 4-unit upper division course in Cognitive Science.

PSC 101	Introduction to Biological Psychology	4
PHI 112	Intermediate Symbolic Logic	4

One course from group B

Group B: Computation

LIN 177	Computational Linguistics	4
PHI 133	Logic, Probability, and Artificial Intelligence	4

Twelve additional units from groups B-G

Sixteen units from two of groups B-F

Group C: Neuroscience

PSC 121	Physiological Psychology	4
PSC 135	Cognitive Neuroscience: The Biological Foundations of the Mind	4

Group D: Linguistics

LIN 103A	Linguistic Analysis I: Phonetics, Phonology, Morphology	4

LIN 103B	Linguistic Analysis II: Morphology, Syntax, Semantics	4
LIN 131	Introduction to Syntactic Theory	4
LIN 141	Semantics	4
LIN 171	Introduction to Psycholinguistics	4
LIN 173	Language Development	4

Group E: Philosophy

PHI 103	Philosophy on Mind	4
PHI 104	The Evolution of Mind	4
PHI 136	Formal Epistemology	4

Group F: Psychology

PSC 100	Introduction to Cognitive Psychology	4
OR		
PSC 100Y	Introduction to Cognitive Psychology	4
PSC 130	Human Learning and Memory	4
PSC 131	Perception	4
PSC 132	Language and Cognition	4
PSC 136	Psychology of Music	4
PSC 137	Neurobiology of Learning & Memory	4
PSC 140	Developmental Psychology	4
PSC 141	Cognitive Development	4

Group G: Other

CMN 101	Communication Theories	4
EDU 110	Educational Psychology: General	4
EDU 173	Language Development	4
HDE 100C	Adulthood and Aging	4
HDE 102	Social and Personality Development	4
HDE 161	Applied Cognition and Aging	4
HDE 163	Cognitive Neuropsychology in Adulthood and Aging	4
LIN 112	Phonetics	4
LIN 121	Morphology	4
LIN 150	Languages of the World	4
LIN 152	Language Universals and Typology	4
LIN 182	Multilingualism	4
NPB 124	Comparative Neuroanatomy	3
PHI 102	Theory of Knowledge	4
PHI 112	Intermediate Symbolic Logic	4
PHI 125	Theory of Action	4
PHI 128	Rationality	4
PHI 137A	Philosophy of Language: Theory of Reference	4
PHI 137B	Philosophy of Language: Truth and Meaning	4
PHI 137C	Philosophy of Language: Semantics and Pragmatics	4
PSC 113	Developmental Psychobiology	4
PSC 124	Comparative Neuroanatomy	3
PSC 142	Social and Personality Development	4
PSC 148	Developmental Disorders	4
PSC 152	Social Cognition	4
STA 106	Applied Statistical Methods: Analysis of Variance	4
STA 108	Applied Statistical Methods: Regression Analysis	4

Total: 72

Cognitive Science | CGS B.S.

(College of Letters and Science)

David Corina, Ph.D., Program Director

Program Office. 101 Young Hall; cogsciadvising@ucdavis.edu; http://cogsci.ucdavis.edu/

Committee in Charge. http://cogsci.ucdavis.edu/faculty.html

Faculty. http://cogsci.ucdavis.edu/faculty.html

The Major Programs

The Cognitive Science major is designed to provide a broad interdisciplinary approach to the study of mind that includes courses from different departments and attracts students with a variety of interests. It emphasizes a multi- faceted approach to the study of mind that integrates concepts and techniques from psychology, artificial intelligence, linguistics, neurology, philosophy and other relevant fields.

For students interested in the liberal arts the Cognitive Science major can be pursued as a Bachelor of Arts (A.B.) program. Alternatively, it can be pursued as a Bachelor of Science (B.S.) program for students with a stronger interest in the mathematical, neurological and computational foundations of the discipline. The main objective of both programs is to give the student a broad grounding in the integrated sciences of the mind and to connect approaches from different fields. Students must complete a number of core courses for the degree, as well as a number of specialty courses on such wide-ranging topics as logic for artificial intelligence, computational linguistics, cognitive neuroscience, animal cognition and the psychology of music.

Career Alternatives. A degree in cognitive science provides broad intellectual foundations useful for careers in a variety of areas, including teaching, business, social work/counseling and the information technology industry. An undergraduate education in cognitive science also prepares the student for graduate study in appropriate subfields of psychology, linguistics, philosophy and informatics. It is also suitable training for pre-medicine, pre-law, and pre-management students.

Bachelor of Science (B.S.) program students select to pursue either the Computational Emphasis (Emphasis 1) ***or*** the Neuroscience Emphasis (Emphasis 2).

Major Advisors. Staff advisors are available in 101 Young Hall; 530 752 5104; cogsciadvising@ucdavis.edu; http://cogsci.ucdavis.edu/advising.html.

Computational Emphasis **Units:** 108

Preparatory Subject Matter **Units:** 60

ECS 020	Discrete Mathematics For Computer Science	4
ECS 032A	Introduction to Programming	4
OR		
ECS 036A	Programming and Problem Solving	4
ECS 034	Software Development in UNIX and C/C++	5
OR		
ECS 036B	Software Development and Object-Oriented Programming in C++	4
ECS 032B	Introduction to Data Structures	4
OR		
ECS 036C	Data Structures, Algorithms, and Programming	4

ECS 050	Computer Organization and Machine-Dependent Programming	4
LIN 001	Introduction to Linguistics	4
OR		
LIN 001Y	Introduction to Linguistics	4
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 022A	Linear Algebra	3
MAT 022AL	Linear Algebra Computer Laboratory	1
PHI 010	Introduction to Cognitive Science	4
OR		
CGS 001	Introduction to Cognitive Science	4
PHI 012	Introduction to Symbolic Logic	4
PHI 013G	Minds, Brains, and Computers with Discussion	4
PSC 001	General Psychology	4
OR		
PSC 001Y	General Psychology	4
PSC 041	Research Methods in Psychology	4
STA 013	Elementary Statistics	4

Depth Subject Matter **Units:** 48

All from group A:

Group A: Core

One four-unit upper division course in Cognitive Science.

ECS 140A	Programming Languages	4
PHI 112	Intermediate Symbolic Logic	4

Choose three from group B:

Group B: Computation

ECS 120	Theory of Computation	4
ECS 170	Introduction to Artificial Intelligence	4
ECS 171	Machine Learning	4
LIN 177	Computational Linguistics	4
PHI 133	Logic, Probability, and Artificial Intelligence	4

Choose one from group C:

Group C: Neuroscience

LIN 175	Biological Basis of Language	4
PSC 101	Introduction to Biological Psychology	4
PSC 135	Cognitive Neuroscience: The Biological Foundations of the Mind	4

Choose one from group D:

Group D: Philosophy/Linguistics

LIN 103A	Linguistic Analysis I: Phonetics, Phonology, Morphology	4

LIN 103B	Linguistic Analysis II: Morphology, Syntax, Semantics	4
LIN 150	Languages of the World	4
LIN 182	Multilingualism	4
PHI 103	Philosophy on Mind	4
PHI 104	The Evolution of Mind	4
PHI 136	Formal Epistemology	4

Choose four courses from group E in addition to any taken to satisfy group C requirements:

Group E: Psychology

PSC 100	Introduction to Cognitive Psychology	4
PSC 101	Introduction to Biological Psychology	4
PSC 103A	Statistical Analysis of Psychological Data	5
PSC 103B	Statistical Analysis of Psychological Data	5
PSC 113	Developmental Psychobiology	4
PSC 121	Physiological Psychology	4
PSC 124	Comparative Neuroanatomy	3
PSC 130	Human Learning and Memory	4
PSC 131	Perception	4
PSC 135	Cognitive Neuroscience: The Biological Foundations of the Mind	4
PSC 137	Neurobiology of Learning & Memory	4

Neuroscience Emphasis **Units:** 107-112

Preparatory Subject Matter **Units:** 62-65

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
BIS 002C	Introduction to Biology: Biodiversity and the Tree of Life	5
LIN 001	Introduction to Linguistics	4
OR		
LIN 001Y	Introduction to Linguistics	4
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
MAT 017C	Calculus for Biology and Medicine	4
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
PHI 010	Introduction to Cognitive Science	4
OR		
CGS 001	Introduction to Cognitive Science	4
PHI 013G	Minds, Brains, and Computers with Discussion	4
PHY 007A	General Physics	4
PHY 007B	General Physics	4
PHY 007C	General Physics	4
OR		
PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5

PHY 009C	Classical Physics	5
PSC 001	General Psychology	4
OR		
PSC 001Y	General Psychology	4
PSC 041	Research Methods in Psychology	4
STA 013	Elementary Statistics	4

Depth Subject Matter **Units:** 45-47

All from group A:

Group A: Core

One four-unit upper division course in Cognitive Science.

NPB 100	Neurobiology	4
PSC 103A	Statistical Analysis of Psychological Data	5

Choose one from group B:

Group B: Computation

LIN 177	Computational Linguistics	4
NPB 167	Computational Neuroscience	5

NPB 167 offered very irregularly.

Choose 12-13 units from group C:

Group C: Neuroscience

NPB 152	Hormones and Behavior	3
OR		
PSC 123	Hormones and Behavior	3
NPB 161	Developmental Neurobiology	3
NPB 162	Neural Mechanisms of Behavior	3
NPB 163	Systems Neuroscience	4
NPB 164	Mammalian Vision	4
NPB 165	Neurobiology of Speech Perception	3
LIN 175	Biological Basis of Language	4
PSC 101	Introduction to Biological Psychology	4
PSC 121	Physiological Psychology	4
PSC 135	Cognitive Neuroscience: The Biological Foundations of the Mind	4

Choose two from group D:

Group D: Philosophy/Linguistics

LIN 103A	Linguistic Analysis I: Phonetics, Phonology, Morphology	4
LIN 103B	Linguistic Analysis II: Morphology, Syntax, Semantics	4
LIN 150	Languages of the World	4
LIN 182	Multilingualism	4
PHI 103	Philosophy on Mind	4
PHI 104	The Evolution of Mind	4

Choose two courses from group E in addition to any taken to satisfy group C requirements:

Group E: Psychology

NPB 122	Developmental Endocrinology	3
NPB 124	Comparative Neuroanatomy	3

PSC 100	Introduction to Cognitive Psychology	4
PSC 101	Introduction to Biological Psychology	4
PSC 113	Developmental Psychobiology	4
PSC 121	Physiological Psychology	4
PSC 122	Advanced Animal Behavior	4
OR		
NPB 150	Advanced Animal Behavior	4
PSC 124	Comparative Neuroanatomy	3
PSC 130	Human Learning and Memory	4
PSC 131	Perception	4
PSC 132	Language and Cognition	4
PSC 135	Cognitive Neuroscience: The Biological Foundations of the Mind	4
PSC 137	Neurobiology of Learning & Memory	4

Total: 108-112

Cognitive Science | CGS Courses

Courses in CGS:

CGS 001—Introduction to Cognitive Science (4)
Lecture/Discussion—4 hours. Pass One open to Cognitive Science majors only. Introduction to the interdisciplinary cognitive scientific approach to the study of mind, drawing concepts and methods from psychology, philosophy, linguistics, artificial intelligence, and other disciplines. (PHI 010.) GE credit: SE, SL. Effective: 2017 Fall Quarter.

CGS 107—Neuroeconomics/Reinforcement Learning and Decision Making (4)
Lecture—3 hours; Term Paper. Prerequisite(s): (PSC 100 or PSC 100Y or PSC 135 or ECN 100A or ARE 100A or NPB 162 or NPB 163); (STA 013 or STA 013Y or STA 100 or PSC 103A); or Consent of Instructor. Theoretical and empirical approaches to neuroeconomics (neuroscience of decision making) from psychology, neuroscience, economics, and computer science. Neuroscience of judgment and decision making, behavioral economics, and reinforcement learning. (ECN 107 and PSC 133.) GE credit: SL, SS. Effective: 2018 Spring Quarter.

CGS 138—Consciousness and Cognition (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; (PSC 100 or PSC 100Y or PSC 135) Current theoretical and empirical evidence in the study of cognition and consciousness. Theories of consciousness, psychological and neural basis of conscious and unconscious processes such as attention, intentionality, and dreams. (PSC 138.) Effective: 2018 Spring Quarter.

CGS 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special study for advanced undergraduates. May be repeated for credit. (P/NP grading only.) Effective: 2017 Winter Quarter.

Communication

Communication | CMN Information

(College of Letters and Science)

Robert A. Bell, Chairperson of the Department

Department Office. 469 Kerr Hall; 530-752-0966; http://communication.ucdavis.edu/

Faculty. http://communication.ucdavis.edu/directory-of-people/

Communication | CMN A.B.

(College of Letters and Science)

Robert A. Bell, Chairperson of the Department

Department Office. 469 Kerr Hall; 530-752-0966; http://communication.ucdavis.edu/

Faculty. http://communication.ucdavis.edu/directory-of-people/

The Major Program

The major in communication focuses upon human symbolic behavior in interpersonal and mediated contexts.

The Program. The program of study in communication examines communication processes at several different levels of analysis. Courses dealing with communication at the individual, interpersonal, organizational and societal levels of analysis are offered. The emphasis in the program reflects the changing focus in the discipline and society toward computer-mediated communication, quantitative behavioral science and cognitive science. Classes addressing such topics as communication and cognition, message systems, interpersonal communication, nonverbal communication, communication and persuasion, organizational communication, mass media effects, computer-mediated communication and public communication campaigns explore communication at these levels of analysis. Related social science courses are also part of the major.

Major Advisors. Faculty; contact department.

Career Alternatives. Communication graduates have found careers in such fields as broadcast and print journalism, administration, sales, management, politics and government, education, social work, and public relations. A communication degree is also excellent preparation for law school or other graduate programs.

Grading recommendation. Although not required, it is recommended that all courses offered in satisfaction of the major, except variable-unit courses, be taken for a letter grade.

Graduate Study. The Department of Communication offers programs of study and research leading to M.A. and Ph.D. degrees in Communication. Detailed information may be obtained from the Graduate Advisor, Department of Communication.

Preparatory Subject Matter **Units:** 29-30

ANT 004	Introduction to Anthropological Linguistics	4
OR		
LIN 001	Introduction to Linguistics	4
CMN 010Y	Introduction to Communication	4
OR		
CMN 010V	Introduction to Communication	4

Choose one:

CMN 001	Introduction to Public Speaking	4
CMN 003	Interpersonal Communication Competence	4
OR		
CMN 003Y	Interpersonal Communication Competence	4
OR		
CMN 003V	Interpersonal Communication Competence	4
CMN 005	Global English and Communication	4
LIN 005	Global English and Communication	4

ECS 015	Introduction to Computers	4
OR		
PHI 012	Introduction to Symbolic Logic	4

PSC 001	General Psychology	4
SOC 001	Introduction to Sociology	5
STA 013	Elementary Statistics	4
OR		
SOC 046B	Introduction to Social Research	5

Depth Subject Matter **Units:** 40

CMN 101	Communication Theories	4
CMN 102	Empirical Methods in Communication	4
CMN 120	Interpersonal Communication	4
CMN 140	Introduction to Mass Communication	4
CMN 170	Digital Technology and Social Change	4
OR		
CMN 170V	Digital Technology and Social Change	4
OR		
CMN 172	Interpersonal Technologies	4

Choose five:

CMN 110	Communication Networks	4
CMN 111	Gender Differences in Communication	4
CMN 112	Theories of Persuasion	4
CMN 114	Communication and Cognition	4
CMN 121	Language Use in Conversation	4
CMN 122	Nonverbal Communication	4
CMN 123	Intercultural Communication	4
CMN 124	Family Communication	4
CMN 130	Group Communication	4
CMN 131	Strategic Communication in Public Relations	4
CMN 132	Social Media for Public Relations	4
CMN 136	Organizational Communication	4
CMN 139	Advanced Organizational Communication	4
CMN 141	Media Effects: Theory and Research	4
CMN 142	Newsmaking	4
CMN 143	Analysis of Media Messages	4
CMN 144	Media Entertainment	4
CMN 145	Political Communication	4
CMN 146	Communication Campaigns	4
CMN 147	Children, Adolescents, and the Media	4
CMN 148	Contemporary Trends In Media	4
CMN 150V	Computational Social Science	4
CMN 151	Simulating Communication Processes	4
CMN 161	Health Communication	4
CMN 165	Media and Health	4
CMN 170	Digital Technology and Social Change	4
OR		
CMN 170V	Digital Technology and Social Change	4
CMN 172	Interpersonal Technologies	4
CMN 174	Social Media	4-6
CMN 176	Video Games Theory and Research	4
CMN 178	Persuasive Technologies	4

CMN 180	Current Topics in Communication	4
CMN 189A	Proseminar in Social Interaction	4
CMN 189B	Proseminar in Mass Communication	4
CMN 189C	Proseminar in Health Communication	4
CMN 189D	Proseminar in Organizational Communication	4
ANT 117	Language and Society	4
ANT 120	Language and Culture	4
ECN 122	Theory of Games and Strategic Behavior	4
LIN 171	Introduction to Psycholinguistics	4
LIN 177	Computational Linguistics	4
LIN 182	Multilingualism	4
POL 165	Mass Media and Politics	4
PSC 100	Introduction to Cognitive Psychology	4
PSC 107	Questionnaire and Survey Research Methods	4
PSC 152	Social Cognition	4
PSC 154	Psychology of Emotion	4
SOC 126	Social Interaction	4
SOC 175	Mass Communication	4
STA 106	Applied Statistical Methods: Analysis of Variance	4
STA 108	Applied Statistical Methods: Regression Analysis	4

Note: Many of the upper division courses offered by other College of Letters & Science departments have their own prerequisites not accounted for by lower division Communication courses. To the degree that students elect to take those courses having "hidden prerequisites," the number of units necessary to complete the major increases above the stated minimum.

Total: 69-70

Communication | CMN M.A.

(College of Letters and Science)

Robert A. Bell, Chairperson of the Department

Department Office. 469 Kerr Hall; 530-752-0966; http://communication.ucdavis.edu/

Faculty. http://communication.ucdavis.edu/directory-of-people/

Graduate Study. The Department of Communication offers programs of study and research leading to M.A. and Ph.D. degrees in Communication. Detailed information may be obtained from the Graduate Advisor, Department of Communication.

Graduate Advisor. B. Feng

Communication | CMN Ph.D.

(College of Letters and Science)

Robert A. Bell, Chairperson of the Department

Department Office. 469 Kerr Hall; 530-752-0966; http://communication.ucdavis.edu/

Faculty. http://communication.ucdavis.edu/directory-of-people/

Graduate Study. The Department of Communication offers programs of study and research leading to M.A. and Ph.D. degrees in Communication. Detailed information may be obtained from the Graduate Advisor, Department of Communication.

Graduate Advisor. B. Feng

Communication | CMN Minor

(College of Letters and Science)

Robert A. Bell, Chairperson of the Department

Department Office. 469 Kerr Hall; 530-752-0966; http://communication.ucdavis.edu/

Faculty. http://communication.ucdavis.edu/directory-of-people/

Career Alternatives. Communication graduates have found careers in such fields as broadcast and print journalism, administration, sales, management, politics and government, education, social work, and public relations. A communication degree is also excellent preparation for law school or other graduate programs.

Communication **Units:** 24

Choose one:

CMN 001	Introduction to Public Speaking	4
CMN 003	Interpersonal Communication Competence	4
OR		
CMN 003Y	Interpersonal Communication Competence	4
OR		
CMN 003V	Interpersonal Communication Competence	4

At least five upper division courses in Communication.

Total: 24

Communication | CMN Courses

Students must have satisfied the Entry Level Writing requirement before taking any course in Communication.

Courses in CMN:

CMN 001—Introduction to Public Speaking (4)
Discussion—2 hours; Lecture—2 hours. Practice in the preparation and delivery of speeches based on principles and strategies of informing and persuading audiences drawn from the social sciences and humanities. GE credit: AH, OL, SS, WE. Effective: 2017 Winter Quarter.

CMN 003—Interpersonal Communication Competence (4)
Discussion—2 hours; Lecture—2 hours. Communication competence in professional settings. Managing face-to-face and virtual teams. Leadership, conflict management and negotiation skills. Communication in diverse organizations. Leveraging communication networks. Effective interviewing. GE credit: SS, WE. Effective: 2018 Spring Quarter.

CMN 003V—Interpersonal Communication Competence (4)
Web Electronic Discussion—2 hours; Web Virtual Lecture—2 hours. Communication competence in professional settings. Managing face-to-face and virtual teams. Leadership, conflict management and negotiation skills. Communication in diverse organizations. Leveraging communication networks. Effective interviewing. GE credit: SS, WE. Effective: 2018 Spring Quarter.

CMN 003Y—Interpersonal Communication Competence (4)
Discussion—2 hours; Web Virtual Lecture—2 hours. Communication competence in professional settings. Managing face-to-face and virtual teams. Leadership, conflict management and negotiation skills. Communication in diverse organizations. Leveraging communication networks. Effective interviewing. GE credit: SS, WE. Effective: 2018 Spring Quarter.

CMN 005—Global English and Communication (4)
Discussion—2 hours; Lecture—2 hours. English as a global language and its uses in intercultural communication. Cultural, historical, and political dimensions of varieties of English spoken around the world. Experiential grounding in strategies for increasing interpretive and verbal communicative competence for a globalized world. (LIN 005.) GE credit: AH, OL, SS, WC. Effective: 2012 Spring Quarter.

CMN 010V—Introduction to Communication (4)
Web Electronic Discussion—1 hour; Web Virtual Lecture—3 hours. Basic principles of communication and communication processes; models of communication; foundations of empirical research in communication; contexts of communication and communication research, including interpersonal, intercultural, news, entertainment, mediated, and others. Not open for credit to students who have taken CMN 010Y. GE credit: SS. Effective: 2016 Fall Quarter.

CMN 010Y—Introduction to Communication (4)
Discussion—1 hour; Web Virtual Lecture—3 hours. Basic principles of communication and communication processes; models of communication; foundations of empirical research in communication; contexts of communication and communication research including interpersonal, intercultural, news, entertainment, mediated, and others. Not open for credit to students who have taken CMN 010V. GE credit: SS. Effective: 2017 Winter Quarter.

CMN 012Y—Data Visualization in the Social Sciences (4)
Laboratory—1.5 hours; Lecture—2 hours; Web Virtual Lecture—1.5 hours. Introduction to quantitative data across the social sciences (Communications, Political Science, Psychology, Sociology, and other disciplines). Transforming data, describing data, producing graphs, visual reasoning, and interpretations. (SOC 012Y, POL 012Y, and PSC 012Y.) GE credit: QL, VL. Effective: 2016 Spring Quarter.

CMN 076—Video Games and Virtual Environments (4)
Discussion—1 hour; Lecture—3 hours. Impact of video games on players and society. Topics include motivations for playing games; cognitive, emotional, and behavioral effects, including violence and addiction; interpersonal and group processes in online games; virtual communities; and video games for education. GE credit: SS, VL. Effective: 2015 Winter Quarter.

CMN 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

CMN 101—Communication Theories (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Forms, functions, development, and testing of communication theory, with emphasis on social scientific approaches. Survey and comparison of significant micro and macro theories and models of face-to-face and mediated communication. Application of theories to real world problems. GE credit: SS. Effective: 2011 Fall Quarter.

CMN 101—Communication Theories (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Forms, functions, development, and testing of communication theory, with emphasis on social scientific approaches. Survey and comparison of significant micro and macro theories and models of face-to-face and mediated communication. Application of theories to real-world problems. Not open for credit to students who have taken CMN 101Y. GE credit: SS. Effective: 2018 Fall Quarter.

CMN 101Y—Communication Theories (4)
Discussion—1 hour; Web Virtual Lecture—3 hours. Forms, functions, development, and testing of communication theory, with emphasis on social scientific approaches. Survey and comparison of significant micro and macro theories and models of face-to-face and mediated communication. Application of theories to real-world problems. Not open for credit to students who have taken CMN 101. GE credit: SS. Effective: 2018 Fall Quarter.

CMN 102—Empirical Methods in Communication (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 013 or STA 013Y; Or equivalent of STA 013. Social scientific research methods employed in Communication. Topics include research design, measurement, sampling, questionnaire construction, survey research, experimental design, content analysis and qualitative field methods. GE credit: SS. Effective: 2018 Winter Quarter.

CMN 110—Communication Networks (4)
Discussion/Laboratory—1 hour; Lecture/Discussion—3 hours. Theoretical approaches to communication networks, practical applications of network studies, and network analysis tools. Friendship, political discussion, social support, organizational, social media, and disease transmission networks are examined. Impact of emerging technologies on network creation, maintenance, and expansion. GE credit: SS. Effective: 2017 Fall Quarter.

CMN 111—Gender Differences in Communication (4)
Lecture—4 hours. Pass One open to Communication majors only. Examination of communication differences between men and women as sources of male/female stereotypes, misunderstandings, dilemmas, and difficulties (real and imagined). Treatment of genders as cultures. Topics include male/female differences in discursive practices and patterns, language attitudes, and relationship dynamics. Not open for credit to students who have taken CMN 103. GE credit: DD, SS. Effective: 2015 Fall Quarter.

CMN 112—Theories of Persuasion (4)
Lecture/Discussion—4 hours. Pass One open to Communication majors only. Theories and models of persuasion that account for the effects of source, channel and audience factors on message recipients. Examination of message strategies for altering attitudes and gaining compliance. Contexts of application include interpersonal relationships, advertising, politics, and health. Not open for credit to students who have taken CMN 152. GE credit: SS. Effective: 2015 Fall Quarter.

CMN 114—Communication and Cognition (4)
Lecture/Discussion—4 hours. Pass One open to Communication majors only. Relationship between communication and cognition in interpersonal and mediated contexts. Discourse comprehension and production, impact of language attitudes on social judgments, the effects of information processing on decision making. Not open for credit to students who have completed CMN 138. GE credit: SS, WE. Effective: 2018 Winter Quarter.

CMN 120—Interpersonal Communication (4)
Lecture—4 hours. Pass One open to Communication majors only. Theories and principles of interpersonal communication related to perception, verbal and nonverbal channels, mutual understanding, and relationship development. Communication processes in face-to-face and technologically-mediated encounters. Consideration of different relationship contexts, including friendships, dating and family relationships, and the workplace. Not open for credit to students who have completed CMN 134. GE credit: SS. Effective: 2016 Winter Quarter.

CMN 121—Language Use in Conversation (4)
Lecture/Discussion—4 hours. Pass One open to Communication majors only. Examination of how people use language in social interaction, how they exchange meaning during conversation, and how their use of language plays a central role in turn-taking, speech acts, attitude formation, figurative speech, politeness, and other aspects of conversation. Not open for credit to students who have taken CMN 105. GE credit: SS. Effective: 2016 Spring Quarter.

CMN 122—Nonverbal Communication (4)
Lecture—4 hours. Pass One open to Communication majors only. Examination of the interaction between nonverbal communication and verbal communication channels in influencing outcomes in interpersonal relationships. Underlying functions served by nonverbal communication are considered. Not open for credit to students who have completed CMN 135. GE credit: SS. Effective: 2015 Fall Quarter.

CMN 123—Intercultural Communication (4)
Seminar—3 hours; Term Paper. Major concepts and theories of intercultural communication. Topics include cultural similarities and differences in verbal and nonverbal communication; dimensions of cultural variations, barriers to intercultural communication, and intercultural communication competence. Not open for credit to students who have taken CMN 137. GE credit: DD, SS. Effective: 2016 Winter Quarter.

CMN 124—Family Communication (4)
Lecture/Discussion—4 hours. Theories and research on family communication. Communication in courtship, marriage, and relational dissolution. Processes and outcomes of parent-child, sibling, family roles, and inter-generational communication. Interaction patterns associated with marital/family satisfaction, maintenance, divorce, and dysfunction. Cultural influences on family communication. GE credit: SS. Effective: 2017 Fall Quarter.

CMN 130—Group Communication (4)
Discussion—1 hour; Lecture—3 hours. Communication processes in the development and maintenance of effective groups and teams in organizations. Examination of both face-to-face and computer-mediated group interaction. Topics include group development, power, norms, cohesion, decision making, problem solving, creativity, conflict management, working remotely, and leadership. GE credit: SS. Effective: 2014 Fall Quarter.

CMN 131—Strategic Communication in Public Relations (4) ***Review all entries***
Lecture/Discussion—4 hours. Pass One open to Communication majors only. Principles, evolution, and professional practice of public relations. Planning and execution of effective, ethical communication strategies and campaigns. Distribution of messages through traditional and new media, including social media. Cultivation of relationships between organizations and their publics. Crisis communication management. GE credit: SS. Effective: 2015 Fall Quarter.

CMN 131—Strategic Communication in Public Relations (4) ***Review all entries***
Lecture/Discussion—4 hours. Principles, evolution, and professional practice of public relations. Planning and execution of effective, ethical communication strategies and campaigns. Distribution of messages through traditional and new media, including social media. Cultivation of relationships between organizations and their publics. Crisis communication management. GE credit: SS, WE. Effective: 2018 Fall Quarter.

CMN 132—Social Media for Public Relations (4)
Lecture/Discussion—4 hours. Prerequisite(s): CMN 131 Uses of social media technologies in contemporary public relations practice. Social and behavioral theories of social media processes and effects. Strategies and tools for authoring content that builds relationships and creates conversations with key publics. GE credit: SS. Effective: 2016 Fall Quarter.

CMN 136—Organizational Communication (4)
Lecture—4 hours. Pass One open to Communication majors only. Organizational communication theory and practice is examined with an emphasis on the use of effective communication strategies for achieving organizational goals. GE credit: SS. Effective: 2016 Spring Quarter.

CMN 139—Advanced Organizational Communication (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): CMN 136 Pass One open to Communication majors only. Communication processes within and among social organizations. Examines formal organizations as information processing systems. Topics include general systems theory, input-output analysis, structural-functionalism, cybernetics, organizational network analysis, organization environments, organizations as cultures, organizational learning, information technologies, and communication diagnostic/auditing strategies. GE credit: SS, WE. Effective: 2011 Fall Quarter.

CMN 140—Introduction to Mass Communication (4)
Discussion—1 hour; Lecture—3 hours. History of mass media and media research traditions. Organization and economics of the media industry. Media policy, law, regulation and ethics. Impact of the media on individuals and society. Traditional, new and emerging communication technologies. GE credit: SS. Effective: 2017 Fall Quarter.

CMN 141—Media Effects: Theory and Research (4)
Lecture/Discussion—4 hours. Pass One open to Communication majors only. Social scientific studies of the effects of mass media messages on audience members' actions, attitudes, beliefs, and emotions. Topics include the cognitive processing of media messages, television violence, political socialization, cultivation of beliefs, agenda-setting, and the impact of new technologies. GE credit: SS. Effective: 2018 Winter Quarter.

CMN 142—Newsmaking (4)
Lecture/Discussion—4 hours. Pass One open to Communication majors only. The making of news. How journalists construct news and how consumers and newsmakers use it. Effects of news, technology's challenges to journalism, and the relationship of news to other institutions. GE credit: ACGH, SS. Effective: 2018 Winter Quarter.

CMN 143—Analysis of Media Messages (4)
Lecture/Discussion—3 hours; Term Paper. Pass One open to Communication majors only. Examination of alternative approaches to the analysis, interpretation, and evaluation of media messages, including those disseminated through broadcasting, print, and new technologies. GE credit: ACGH, SS, WE. Effective: 2018 Winter Quarter.

CMN 144—Media Entertainment (4)
Lecture/Discussion—3 hours; Term Paper. Pass One open to Communication majors only. Effects and appeal of media entertainment, emphasizing emotional reactions. Topics include key concepts of entertainment research such as mood management, and the respective features and emotional/social-psychological effects of genres such as comedy, mystery, thriller, sports, music, horror, and erotica. GE credit: SS, WE. Effective: 2017 Spring Quarter.

CMN 145—Political Communication (4)
Extensive Writing; Lecture/Discussion—3 hours. Pass One open to Communication majors only. Relationships among the mass media, citizens, and politics, production of political news, campaign strategies, and citizens' attitudes and behaviors. Frameworks for mediated politics, the news, and elite discourse and campaign messages. GE credit: ACGH, SS, WE. Effective: 2018 Winter Quarter.

CMN 146—Communication Campaigns (4)
Lecture/Discussion—4 hours; Term Paper. Pass One open to Communication majors only. Strategic uses of media and interpersonal communication channels in health, environmental advocacy, and political campaigns. Emphasis on general principles relevant to most campaign types, including public information, social marketing, and media advocacy campaigns. GE credit: SS. Effective: 2016 Fall Quarter.

CMN 147—Children, Adolescents, and the Media (4)
Lecture/Discussion—4 hours. Open to Communication majors only on Pass 1. Research on the adaptive and maladaptive effects of media (e.g., television, movies, video games, social media) on the social, emotional, cognitive, and physical development of youth, considering the protective role of parents, teachers, ethics, and policy. GE credit: SS. Effective: 2016 Fall Quarter.

CMN 148—Contemporary Trends In Media (4)
Lecture/Discussion—4 hours. Pass One open to Communication majors only. Global trends in media, including media and globalization, impacts of the new media economy, media and security, and effects of ownership on media content and culture. GE credit: OL, SS, WC. Effective: 2017 Spring Quarter.

CMN 150V—Computational Social Science (4)
Web Electronic Discussion—2 hours; Web Virtual Lecture—2 hours. Nontechnical survey of modern computational research methods. Web scraping, artificial intelligence, visualizing social networks, and computer simulations. Hands-on use of diverse software applications. Professors from all ten UC campuses contribute. GE credit: QL, SS. Effective: 2017 Winter Quarter.

CMN 151—Simulating Communication Processes (4)
Lecture/Discussion—3 hours; Term Paper. Simulations of communication and sociality using agent-based models. Focus on strategic behavior, cooperation, coordination, self-organization, information diffusion, and other communication phenomena. No programming skills assumed. GE credit: QL, SS, WE. Effective: 2018 Fall Quarter.

CMN 161—Health Communication (4)
Extensive Writing; Lecture/Discussion—3 hours. Health communication theories and research. Health literacy, social support and coping, doctor-patient interaction, health communication campaigns, media influences on health, and applications of new technologies in health promotion. GE credit: SS, WE. Effective: 2017 Fall Quarter.

CMN 165—Media and Health (4)
Lecture/Discussion—4 hours. Content and effects of health messages in the media. Topics include health news reporting; portrayals of disease, disability, death and health-related behaviors; promotion of drugs and other health products; and tobacco and alcohol advertising. GE credit: SS, WE. Effective: 2018 Winter Quarter.

CMN 170—Digital Technology and Social Change (4)
Lecture/Discussion—4 hours. Conceptual understanding of how digital communication technologies transform our lives through social media, mobile connectivity, globalization, and big data. Contexts of application include education, health, entrepreneurship, democracy, and poverty. Not open for credit to students who have completed CMN 170V. GE credit: SS. Effective: 2016 Spring Quarter.

CMN 170V—Digital Technology and Social Change (4)
Web Electronic Discussion—1 hour; Web Virtual Lecture—3 hours. Conceptual understanding of how digital technologies transform our lives, through social media, mobile connectivity, globalization, big data, and artificial intelligence. Context of course include education, health, entrepreneurship, democracy, among others. Not open for credit to students who have completed CMN 170. GE credit: SS. Effective: 2016 Winter Quarter.

CMN 172—Interpersonal Technologies (4)
Discussion—1 hour; Lecture—3 hours. Pass One open to Communication majors only. Theories and research findings on how people use technologies for interpersonal and relational purposes, including impression formation, self-presentation, deception, anonymity, friendship maintenance, online dating, and emotional expression. GE credit: SS. Effective: 2017 Fall Quarter.

CMN 174—Social Media (4-6)
Lecture/Discussion—4 hours. Application of communication theories to the study and design of social media. Examination of social media in contexts such as political activism and collaboration. Topics include online credibility, participatory culture, viral media and privacy. GE credit: ACGH, SS, WE. Effective: 2018 Spring Quarter.

CMN 176—Video Games Theory and Research (4)
Discussion/Laboratory—2 hours; Lecture/Discussion—2 hours. Communication theory and research on the uses and effects of video games. Research methods available for investigating game use and the impact of games on behavior. Application of those methods in a research project. GE credit: SS. Effective: 2018 Winter Quarter.

CMN 178—Persuasive Technologies (4)
Lecture/Discussion—3 hours; Term Paper. Designing and testing ethical, technology-based communication interventions in the domains of health, marketing, education, and environment. Social media, mobile apps, wearable devices, recommendation systems, serious games, and augmented reality. GE credit: SS, WE. Effective: 2017 Fall Quarter.

CMN 180—Current Topics in Communication (4)
Lecture/Discussion—4 hours. Prerequisite(s): CMN 101; CMN 102; Or a research methods course equivalent to CMN 102. Pass One open to Communication majors only. Group study of a special topic in communication. May be repeated up to 1 time(s) when topic differs. GE credit: SS. Effective: 2011 Fall Quarter.

CMN 189A—Proseminar in Social Interaction (4)
Seminar—3 hours; Term Paper. Prerequisite(s): CMN 101; CMN 102; CMN 136; and Consent of Instructor. Open to Communication majors only. Reading, discussion, research, and writing on a selected topic in the specialty of social interaction. Potential topics include relationship initiation, maintenance, and deterioration; communication failure; nonverbal communication; conversational management; semantics and pragmatics of languages; and family/marital communication. May be repeated for credit when topic differs. GE credit: SS, WE. Effective: 2011 Fall Quarter.

CMN 189B—Proseminar in Mass Communication (4)
Seminar—3 hours; Term Paper. Prerequisite(s): CMN 101; CMN 102; CMN 140; and Consent of Instructor. Open to Communication majors only. Reading, discussion, research, and writing on a selected topic in the specialty of mass communication. Potential topics include, agenda-setting, the cultivation of beliefs, television violence, media portrayals of underprivileged groups, mediated political discourse, interactive technologies, and international/global communications. May be repeated for credit when topic differs. GE credit: SS, WE. Effective: 2011 Fall Quarter.

CMN 189C—Proseminar in Health Communication (4)
Seminar—3 hours; Term Paper. Prerequisite(s): CMN 101; CMN 102; (CMN 161 or CMN 165); and Consent of Instructor. Open to Communication majors only. Reading, discussion, research, and writing on a selected topic in health communication. Potential topics include health communication design and evaluation, media advocacy, physician-patient interaction, uses of communication technologies in health settings, and health-related advertising. May be repeated for credit when topic differs. GE credit: SS, WE. Effective: 2011 Fall Quarter.

CMN 189D—Proseminar in Organizational Communication (4)
Seminar—3 hours; Term Paper. Prerequisite(s): CMN 101; CMN 102; CMN 136; and Consent of Instructor. Open to Communication majors only. Reading, discussion, research, and writing on a selected topic in the specialty of organizational communication. Potential topics include organizational networks, organizational conflict and its resolution, mediation, bargaining and negotiation, superior-subordinate interaction, leadership styles, and inter-organizational communication. May be repeated for credit when topic differs. GE credit: SS, WE. Effective: 2011 Fall Quarter.

CMN 192—Internship in Communication (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Communication majors who have completed 20 units of upper division communication courses. Open to Communication majors only. Supervised work experience requiring the application of communication principles and strategies or the evaluation of communication practices in a professional setting. Relevant experiences include public relations, advertising, sales, human resources, health promotion, political campaigns, journalism, and broadcasting. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2016 Fall Quarter.

CMN 194H—Senior Honors Thesis (4)
Project (Term Project)—3 hours; Seminar—1 hour. Prerequisite(s): Senior standing and approval by Honors Committee. Directed reading, research, and writing culminating in the preparation of honors thesis under direction of faculty advisor. GE credit: SS, WE. Effective: 1997 Winter Quarter.

CMN 197T—Tutoring in Communication (2-4)
Laboratory—1-2 hours; Seminar—1-2 hours. Prerequisite(s): Upper division standing with major in Communication and consent of Department Chairperson. Tutoring in undergraduate Communication courses, including leadership of discussion groups affiliated with departmental courses. May be repeated up to 6 unit(s). (P/NP grading only.) Effective: 1997 Fall Quarter.

CMN 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

CMN 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

CMN 201—Theoretical Perspectives on Communication (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing in Communication. Open to Communication graduate students only. Social scientific study of Communication. Research on interpersonal, organizational, mass, political, and health communication; communication technologies (e.g., video games, social media, persuasive technologies); and communication network analysis. Effective: 2017 Fall Quarter.

CMN 202—Communication Theory Construction (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Alternative meta-theoretical perspectives for theory generation in communication inquiry. Processes of construct explication, operationalization and theory construction. Emphasis on the critique of extant communication theories and the development of theory construction skills. Effective: 2006 Winter Quarter.

CMN 203—Scientific Methods for Communication (4)
Seminar—3 hours; Term Paper. Prerequisite(s): CMN 201; CMN 202; PSC 204A; PSC 204B; Or equivalents. Social scientific research methods commonly employed in Communication. Topics include research design measurement sampling questionnaire construction survey research experimental design evaluation research content analysis and qualitative field methods. Effective: 2014 Winter Quarter.

CMN 204—Biological Foundations of Communication (4)
Lecture/Discussion—3 hours; Term Paper. Communibiological, evolutionary, neuroscience, and neurophysiological perspectives on communication. Methodologies for examining human physiological responses to messages, such as heart rate, skin conductance, electromyography, and cortical activity. Effective: 2017 Fall Quarter.

CMN 210—Experimental Methods and Analysis in Communication (4)
Lecture—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing; one course in inferential statistics. Experimental designs in communication. Topics include: causation; threats to validity; conceptualization, operationalization, and measurement; hypothesis testing; ethics; data analysis software focusing on the analysis of variance and planned contrasts; and the practical and effective implementation and writing of experiments. Effective: 2010 Fall Quarter.

CMN 211—Survey Research Methods in Communication (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing; one course in inferential statistics. Methods for designing personal interview, phone, mail, and web-based surveys in communication. Topics include: sampling strategies, sources of error and bias in survey designs, questionnaire construction, cognitive interviewing, interviewer behavior, and analysis of complex survey data using standard software packages. Effective: 2011 Winter Quarter.

CMN 212—Web Science Research Methods (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Applications of data science to web-based communication research. Design, implementation, analysis, and reporting of studies using online data. Use of Python to scrape, organize, analyze, and visualize web data. Effective: 2018 Spring Quarter.

CMN 213—Theory Development in Communication Inquiry (4) ***Review all entries Discontinued***
Seminar—4 hours. Effective: 2005 Fall Quarter.

CMN 213—Simulation Methods in Communication Research (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Simulation methods for modeling human communication. Single and multiple agent approaches to developing process theories of cooperation, coordination, strategic behavior, information and innovation diffusion, and other aspects of sociality. Effective: 2018 Fall Quarter.

CMN 214—Mass Communication Theory and Research (4) ***Review all entries Discontinued***
Seminar—4 hours. Effective: 2005 Fall Quarter.

CMN 214—Analysis of Communication Networks (4) ***Review all entries***
Lecture/Discussion—3 hours; Term Paper. Theoretical and analytic issues pertaining to network perspectives on communicating and organizing. Consideration of structural and dynamic features of communication networks. Introduction to network analysis software and various analysis techniques. Effective: 2018 Fall Quarter.

CMN 220—Persuasion Theories and Message Design ()
Prerequisite(s): Consent of Instructor. Graduate standing. Major social scientific theories and perspectives on attitude change and persuasion. Application of persuasion theories and principles to persuasive message design in applied contexts. Effective: 2005 Fall Quarter.

CMN 221—Communication and Cognition (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Explores the cognitive structures and processes that enable the production, comprehension and interpretation of messages in face-to-face and mediated communication contexts. Explores the communication outcomes associated with these processes. Effective: 2005 Fall Quarter.

CMN 222—Risk Communication (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Theories and models of individual risk information processing. Media depictions of threats and risk-related information and their potential effects on audiences. Implications for the design and implementation of messages concerning threat and risk. Effective: 2005 Fall Quarter.

CMN 230—Social Interaction Theory and Research (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Survey of theories and research on social interaction and interpersonal communication. Covers communication codes, individual differences in communication, communication and relationship development, family communication, conflict, cognitive and emotional processes underlying social interaction, social influence, intercultural communication, and nonverbal behavior. Effective: 2005 Fall Quarter.

CMN 231—Tactics of Interpersonal Influence (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Achievement of interpersonal goals in social interaction. Topics include message production; tactics, strategies and planning; anticipating potential obstacles; resisting and thwarting goals; plan recognition; and goal detection. Examined goals include compliance gaining, attitude change, ingratiation, information seeking, comforting, and deception. Effective: 2005 Fall Quarter.

CMN 232—Health Communication (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Health communication theories and research traditions. Topics include consumer health information seeking; physician-patient interaction; information, social marketing, "edutainment," and media advocacy campaigns; social networks and coping; media influences on health; and new communication technologies in health promotion and healthcare delivery. (SPH 232.) Effective: 2011 Fall Quarter.

CMN 233—Persuasive Technologies for Health (4)
Lecture/Discussion—3 hours; Term Paper. Theorizing, designing and evaluating ethical technology-based health communication interventions. Uses of social media, mobile communication apps, wearable devices, computer-generated tailored messages, educational games, and computational approaches in health promotion and healthcare delivery. (SPH 233.) Effective: 2017 Fall Quarter.

CMN 234—Intercultural Communication (4)
Seminar—3 hours; Term Paper. Restricted to graduate standing. Theories and research on intercultural communication. Topics include national, racial, and ethnic similarities and differences in communication practices; cultural beliefs and values; identity and conflict; and technological influences on intercultural communication. Methodological issues in intercultural communication research are also examined. Effective: 2016 Spring Quarter.

CMN 235—Health Communication Campaigns (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Restricted to graduate students. Principles of health communication campaign planning, implementation and evaluation. Strategies for changing health behaviors, shaping policy, and improving healthcare organizations' relations with stakeholders. (SPH 235.) Effective: 2017 Fall Quarter.

CMN 243—Media and Health (4)
Seminar—3 hours; Term Paper. Restricted to graduate standing. Survey of research on media and health. Topics include health news coverage; depictions of health, illness and disability in entertainment; health campaigns; advertising of health products and services; and the influence of gaming and other new media on health behaviors. Effective: 2010 Fall Quarter.

CMN 244—Organizational Communication (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Theory and research on communication processes in organizations. Effective: 1997 Winter Quarter.

CMN 250—Mediated Communication Theory and Research (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Survey of major theories on the intended and unintended effects of mediated communication. Topics include media's effects on learning, political behavior, interpersonal violence, sexual socialization, consumer behavior, race relations, gender socialization, and cultural processes. Effective: 2005 Fall Quarter.

CMN 251—Digital Technology and Social Change (4)
Seminar—3 hours; Term Paper. Conceptual, theoretical, and international consideration of how digital communication technologies transform social organization and development. Topics include social media, big data, political revolutions, e-democracy, digital divide, e-education, e-health, entrepreneurship, public policies, poverty reduction, technological innovations, microfinance, and entertainment. Not open to students who have taken CMN 251Y. Effective: 2017 Spring Quarter.

CMN 251Y—Digital Technology and Social Change (4)
Discussion—2 hours; Web Virtual Lecture—2 hours. Discussion and research on how digital technologies transform our lives through social media, mobility, big data, global connectivity, and artificial intelligence; changing business, health, democracy, globalization, families, dating, and education. Not open to students who have taken CMN 251. Effective: 2017 Fall Quarter.

CMN 252—Computer-Mediated Communication (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Effective: 2005 Fall Quarter.

CMN 253—Children, Adolescents, and the Media (4)
Lecture/Discussion—3 hours; Term Paper. Theory and research on the uses and effects of traditional and new media on children and adolescents, emphasizing social, emotional, cognitive, and physical development. Methodological approaches and ethical issues in studies of underage populations. Parent and family mediation of effects. Effective: 2017 Winter Quarter.

CMN 254—Communication Campaigns (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Strategic uses of media and interpersonal channels to promote social change through social marketing, information, and media advocacy campaigns. Focus on theory-based interventions in a variety of applied contexts. Effective: 2005 Fall Quarter.

CMN 255—Social Media (4)
Seminar—3 hours; Term Paper. Theoretical, conceptual and analytic issues pertaining to social media research. Topics include motivation, participation, virality, and social-technical capital. Examination of social media in various contexts. Introduction to online behavioral data collection and analysis methods. Effective: 2014 Fall Quarter.

CMN 256—Communication Perspective on Video Games (4)
Seminar—3 hours; Term Paper. Review of theory and research on the uses and effects of video games and virtual environments developed for entertainment and education. Study of the research methods available for documenting and measuring game use and effects on behavior. Effective: 2014 Fall Quarter.

CMN 259—Cognitive Approaches to Media (4)
Seminar—3 hours; Term Paper. Restricted to graduate standing. Interdisciplinary examination of cognitive approaches to mediated communication. Application of studies on mediated message processing, cognitive and emotional information processing, psychophysiology, and neuroscience to mass communication. Review of media research and methods on attention, memory, motivation, and limited capacity. Effective: 2014 Fall Quarter.

CMN 260—Political Communication (4)
Lecture/Discussion—3 hours; Term Paper. Theories and research on the connections between media, politics, and citizens in the digital age. Critical framework for understanding the nature of mediated politics by assessing inter-relationships between production of news, political elites' campaign strategies, and behaviors of citizens. Effective: 2017 Winter Quarter.

CMN 270—Diffusion of Innovations (4)
Seminar—3 hours; Term Paper. Communication processes by which information and innovations spread through social systems. Models of diffusion, including spatial, network, time dependent, semantic and cognitive frameworks. Impact of communication technologies on diffusion. Practical application of diffusion models in a variety of contexts. Effective: 2015 Spring Quarter.

CMN 271—Communication Networks (4)
Seminar—3 hours; Term Paper. Theoretical, conceptual, and analytic issues pertaining to network perspectives on communicating and organizing. Consideration of both structural and dynamic features of communication networks. Examination of the impact of emerging technologies on communication networks. Introduction to network analysis software. Effective: 2014 Fall Quarter.

CMN 280—Special Topics in Social Interaction (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Reading, discussion, research, and writing on a selected topic in the specialty of social interaction. May be repeated for credit May be repeated when topics differ. Effective: 2005 Fall Quarter.

CMN 281—Special Topics in Mediated Communication (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Reading, discussion, research, and writing on a selected topic in the speciality of mediated communication. May be repeated for credit May be repeated when topics differ. Effective: 2005 Fall Quarter.

CMN 282—Special Topics in Health Communication (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Reading, discussion, research and writing on a focused topic in health communication. May be repeated for credit when topics differ. Effective: 2016 Fall Quarter.

CMN 283—Special Topics in Organizational Communication (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Reading, discussion, research, and writing on a selected topic in the specialty of organizational communication. May be repeated for credit May be repeated when topics differ. Effective: 2005 Fall Quarter.

CMN 298—Group Study (1-5)
Lecture—3 hours. (S/U grading only.) Effective: 1997 Winter Quarter.

CMN 299—Individual Study (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

CMN 299R—Thesis/Dissertation Research and Writing (1-12)
Independent Study—3-36 hours. Prerequisite(s): Consent of Instructor. Graduate standing in Communication. Students in the Department of Communication graduate programs conduct dissertation research and writing under the supervision of a faculty member. May be repeated up to 21 time(s) Across campus, students use the course 299 numbers to reach the 12-unit requirement for full time student status. In saying that students may repeat this "course" 21 times, we assumed that students would complete their doctoral programs within seven years (five is the norm). The value 21 was based on the calculation 3 quarters * 7 years. (S/U grading only.) Effective: 2017 Winter Quarter.

CMN 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Community & Regional Development

Community & Regional Development | CRD B.S.

(College of Agricultural and Environmental Sciences)

(Department of Human Ecology)

Luis E. Guarnizo, Ph.D., Community and Regional Development Program, Vice-Chairperson of the Department

Lisa Miller, Ph.D., Human Development and Family Studies Program, Vice-Chairperson of the Department

Department Advising Office. 1303 Hart Hall; 530-752-2244, 530-752-1805; 530-752-9322; http://hcd.ucdavis.edu

Faculty. http://humanecology.ucdavis.edu/crd-faculty

The Major Program

The Community and Regional Development major aims to provide a broad comparative understanding of theories, methodologies, and issues relevant to the study of communities and the people in them. The program focuses on the ways that economic, political and socio-cultural forces are transforming the world, countries, regions, and local communities, and it considers how knowledge can be used to improve the quality of community life.

The Program. Principal subjects of study within the major are community, regional, and organizational development; social change processes; the role of culture, gender, class, race and ethnicity in shaping social life; community and regional research methodologies; the impacts of innovation and technology on communities, and the effects of social, economic and political systems on regions. The major is organized to allow students to develop fields of concentration that meet their career goals.

Major Advisor. M. Kenney, mfkenney@ucdavis.edu

Internships and Career Alternatives. Community and Regional Development students are required to complete an internship in their field before graduation. Internships have been arranged with local, county, and state planning units, health departments, schools, housing offices, businesses, and education programs, among others. Community and Regional Development graduates are prepared for occupations in community development, social research, program evaluation, organizational and educational consulting, city and regional planning, and for-profit organizations. The major also provides effective preparation for graduate or professional study in the social and behavioral sciences or for professional degrees.

Honors Program. An Honors Program is available to Human and Community Development majors who have demonstrated excellence in their field of study. Entrance into the honors program requires that a student have completed at least 135 units with a minimum grade point average of 3.500 in upper division courses counted toward the major. The program consists of a project whose

specific nature is determined in consultation with the student's Honors Adviser. It may involve completion of a research project, a scholarly paper, a senior thesis, or some comparable assignment. The project will have a minimum duration of two quarters and will be noted on the student's record by a variable unit course number or special honors course designation. Successful completion of the honors program requires that a minimum of eight (8) units of credit be earned in course work for the project. It is expected that a student participating in the Honors Program of the Community and Regional Development major will participate in the Undergraduate Research, Scholarship and Creative Activities Conference. Additionally, students participating in the Honors Program will be required to give a public presentation of their work in a departmental seminar program.

Honors Program Advisor. M. Kenney, mfkenney@ucdavis.edu

Preparatory Subject Matter **Units:** 24-26

CRD 001	The Community	4
CRD 002	Ethnicity and American Communities	4
PLS 021	Application of Computers in Technology	3
OR		
ECS 015	Introduction to Computers	4
ECN 001A	Principles of Microeconomics	4
OR		
ECN 001B	Principles of Macroeconomics	4
ANT 002	Cultural Anthropology	5
OR		
SOC 001	Introduction to Sociology	5

Choose one:

STA 013	Elementary Statistics	4
STA 032	Gateway to Statistical Data Science	4
SOC 046B	Introduction to Social Research	5

Depth Subject Matter **Units:** 40-43

Core Issues in Community Development:

Choose three:

CRD 142	Rural Change in the Industrialized World	4
CRD 152	Community Development	4
CRD 153A	International Community Development: Asia	4
OR		
CRD 153B	International Community Development: Europe	4
OR		
CRD 153C	International Community Development: Africa	4
CRD 164	Theories of Organizations and their Role in Community Change	5
CRD 172	Social Inequality: Issues and Innovations	4
CRD 176	Comparative Ethnicity	4
CRD 180	Transnational Community Development	4

Economics of Community Change:

Choose two:

CRD 118	Technology and Society	4
CRD 140	Dynamics of Regional Development	4
CRD 141	Organization of Economic Space	4
CRD 162	People, Work and Technology	5
IAD 103	Social Change and Agricultural Development	4

Political Processes and Community Change:

Choose two:

CRD 147	Community Youth Development	4
CRD 149	Community Development Perspectives on Environmental Justice	4
CRD 154	Social Theory and Community Change	4
CRD 157	Politics and Community Development	4
CRD 158	Small Community Governance	4
CRD 171	Housing and Social Policy	4

Methods for Community Research:

Choose two; at least one must be CRD 151 or 156:

CRD 151	Community Field Research: Theory and Analysis	4
CRD 156	Community Economic Development	5
CMN 102	Empirical Methods in Communication	4
EDU 114	Quantitative Methods in Educational Research	4
LDA 150	Introduction to Geographic Information Systems	4
SOC 103	Evaluation Research Methods	4
SOC 106	Intermediate Social Statistics	5

Note on substitutions. Supplementary list of pre-approved substitutions available in Advising Office.

Internship:

CRD 192	Internship	1-12

Areas of Specialization **Units:** 40

Choose 20 units from each of two options, including at least one Community and Regional Development course from each option, or 40 units from one option, including at least two Community and Regional Development courses. These courses cannot overlap with the depth subject. Up to four units of variable-unit course work may be counted toward this requirement; e.g., Community and Regional Development 192.

Global Communities Option

Students must consult with a faculty advisor to identify an emphasis within the option and to select suitable courses.

Development Policy:

ANT 122B	Anthropology and Political Economy	4
ANT 126A	Anthropology of Development	4
ARE 115A	Economic Development	4
ARE 115B	Economic Development	4
ARE 142	Personal Finance	3
CRD 140	Dynamics of Regional Development	4
CRD 152	Community Development	4
CRD 153A	International Community Development: Asia	4
CRD 153B	International Community Development: Europe	4
CRD 153C	International Community Development: Africa	4

CRD 164	Theories of Organizations and their Role in Community Change	5
CRD 180	Transnational Community Development	4
ECN 115A	Economic Development	4
ECN 115B	Economic Development	4
ECN 160A	International Microeconomics	4
ECN 160B	International Macroeconomics	4
ECN 162	International Economic Relations	4
IAD 170	Program Development for International Agriculture	4
SOC 138	Economic Sociology	4
SOC 139	Corporations and Society	4
SOC 141	Industrialization and Social Change	4
SOC 145A	Sociology of Third World Development	4
SOC 159	Work, Employment, and Careers in the 21st Century	4

Gender and Development:

SOC 132	The Sociology of Gender	4
SOC 145A	Sociology of Third World Development	4
SOC 145B	Gender and Rural Development in the Third World	4
ANT 126B	Women and Development	4
WMS 102	Gender and Post Colonialism	4
WMS 182	Globalization, Gender and Culture	4

Globalization and Politics:

POL 124	The Politics of Global Inequality	4
POL 130	Recent U.S. Foreign Policy	4
POL 131	Analysis of U.S. Foreign Policy	4
POL 175	Science, Technology, and Policy	4

Experiential Learning, Area Studies, and Language:

Total number of units of credit in Experiential learning, Area Studies, and Language courses cannot exceed 32.
Up to 12 credits transferred from any accredited foreign program or foreign internship, including UCD EAP and Summer Abroad programs.
Up to 12 credits in regional area studies classes; e.g., Middle East, China, Latin America.
Up to 12 credits for foreign language.

Organization and Management Option

Students must consult with a faculty advisor to identify an emphasis within the option and to select suitable courses.

Administration:

CRD 157	Politics and Community Development	4
CRD 158	Small Community Governance	4
CRD 194HA	Special Study for Honors Students	4
CRD 194HB	Special Study for Honors Student	4
ARE 100A	Intermediate Microeconomics: Theory of Production and Consumption	4
ARE 171A	Financial Management of the Firm (Discontinued)	4
ECN 115A	Economic Development	4
POL 100	Local Government and Politics	4
POL 105	The Legislative Process	4

POL 142A	Comparative Development: Political Development in Modernizing Societies	4
POL 142B	Comparative Development: Politics and Inequality	4
POL 142C	Comparative Political Development: Democracy and Democratization	4
POL 155	Judicial Process and Behavior	4
POL 183	Administrative Behavior	4

Communication:

CMN 136	Organizational Communication	4
CMN 140	Introduction to Mass Communication	4
CRD 147	Community Youth Development	4
CRD 176	Comparative Ethnicity	4
EDU 120	Philosophical and Social Foundations of Education	4

Human Resources:

CRD 151	Community Field Research: Theory and Analysis	4
CRD 172	Social Inequality: Issues and Innovations	4
CRD 176	Comparative Ethnicity	4
CMN 102	Empirical Methods in Communication	4
ECN 151B	Economics of Human Resources	4
SOC 120	Deviance	4
SOC 128	Interracial Interpersonal Dynamics	4
SOC 129	Sociology of Black Experience in America	4

Management:

CRD 118	Technology and Society	4
CRD 140	Dynamics of Regional Development	4
CRD 141	Organization of Economic Space	4
CRD 154	Social Theory and Community Change	4
CRD 162	People, Work and Technology	5
CRD 164	Theories of Organizations and their Role in Community Change	5
ARE 112	Fundamentals of Organization Management	4
ARE 113	Fundamentals of Marketing Management	4
HIS 174A	The Gilded Age and Progressive Era: United States, 1876-1917	4
HIS 174AD	Emergence of Modern America: Discussion	1
SOC 138	Economic Sociology	4
SOC 139	Corporations and Society	4
SOC 158	Women's Social Movements in Latin America	4
SOC 159	Work, Employment, and Careers in the 21st Century	4
SOC 180A	Complex Organizations	4
SOC 180B	Complex Organizations	4

Policy, Planning, and Social Services Option

Students must consult with a faculty advisor to identify an emphasis within the option and to select suitable courses.

General:

CRD 118	Technology and Society	4
CRD 142	Rural Change in the Industrialized World	4
CRD 151	Community Field Research: Theory and Analysis	4
CRD 153A	International Community Development: Asia	4
CRD 153B	International Community Development: Europe	4

CRD 153C	International Community Development: Africa	4
CRD 154	Social Theory and Community Change	4
CRD 156	Community Economic Development	5
CRD 162	People, Work and Technology	5
CRD 176	Comparative Ethnicity	4
CRD 180	Transnational Community Development	4
CRD 194HA	Special Study for Honors Students	4
CRD 194HB	Special Study for Honors Student	4
POL 100	Local Government and Politics	4
POL 105	The Legislative Process	4
POL 108	Policy Making in the Public Sector	4
POL 109	Public Policy and the Governmental Process	4
POL 142A	Comparative Development: Political Development in Modernizing Societies	4
POL 142B	Comparative Development: Politics and Inequality	4
POL 142C	Comparative Political Development: Democracy and Democratization	4
POL 154	Legal Philosophy	4
POL 155	Judicial Process and Behavior	4
POL 183	Administrative Behavior	4
SOC 120	Deviance	4
SOC 140	Social Stratification	4
SOC 154	Health and Illness	4
SOC 155	Sociology of Law	4
SOC 185	Social Policy	4

Community Health and Counseling:

CMN 120	Interpersonal Communication	4
CMN 122	Nonverbal Communication	4
CMN 165	Media and Health	4
CRD 164	Theories of Organizations and their Role in Community Change	5
EDU 160A	Introduction to Peer Counseling	2
EDU 160B	Issues in Peer Counseling	2
SPH 101	Introduction to Public Health	3
HDE 120	Research Methods in Human Development	4
HDE 130	Developmental Psychopathology	4
PSC 123	Hormones and Behavior	3
PSC 126	Health Psychology	4
PSC 151	Social Psychology	4
PSC 154	Psychology of Emotion	4
PSC 162	Introduction to Personality Psychology	4
PSC 168	Abnormal Psychology	4
SOC 154	Health and Illness	4

Education and Community:

AED 100	Concepts in Agricultural and Environmental Education	3
AED 160	Vocational Education	3
CMN 101	Communication Theories	4
CMN 146	Communication Campaigns	4
EDU 100	Introduction to Schools	4
EDU 110	Educational Psychology: General	4
EDU 120	Philosophical and Social Foundations of Education	4

EDU 150	Cultural Diversity and Education in a Sociopolitical Context	4
EDU 151	Language Development in the Chicano Child	3
EDU 152	Academic Spanish for Bilingual Teachers	3
EDU 153	Diversity in the K-12 Classroom	2
PSC 100	Introduction to Cognitive Psychology	4
PSC 132	Language and Cognition	4
SOC 124	Education and Inequality in the U.S.	4

Environmental Policy and Regional Planning:

CRD 140	Dynamics of Regional Development	4
CRD 141	Organization of Economic Space	4
CRD 149	Community Development Perspectives on Environmental Justice	4
CRD 152	Community Development	4
CRD 158	Small Community Governance	4
CRD 171	Housing and Social Policy	4
ECN 115A	Economic Development	4
ESM 121	Water Science and Management	3
ESP 110	Principles of Environmental Science	4
ESP 160	The Policy Process	4
ESP 161	Environmental Law	4
ESP 164	Ethical Issues in Environmental Policy	3
ESP 168A	Methods of Environmental Policy Evaluation	5
ESP 168B	Methods of Environmental Policy Analysis	4
ESP 171	Urban and Regional Planning	4
ESP 172	Public Lands Management	4
ESP 173	Land Use and Growth Controls	4
ESP 179	Environmental Impact Assessment	4
POL 102	Urban Public Policy	4
POL 107	Environmental Politics and Administration	4
POL 175	Science, Technology, and Policy	4
SOC 102	Society and Culture of California	4
SOC 118	Political Sociology	4
SOC 138	Economic Sociology	4
SOC 141	Industrialization and Social Change	4
SOC 143A	Urban Society	4
SOC 143B	Sociology of City Life	4
SOC 170	Population	4

Family and Community:

AMS 152	The Lives of Children in America	4
CRD 147	Community Youth Development	4
HDE 100A	Infancy and Early Childhood	4
HDE 100B	Middle Childhood and Adolescence	4
HDE 100C	Adulthood and Aging	4
HDE 101	Cognitive Development	4
HDE 102	Social and Personality Development	4
HDE 103	Cross-Cultural Study of Children	4
HDE 110	Contemporary American Family	4
HDE 130	Developmental Psychopathology	4
HDE 140	Communication and Interaction with Young Children	2
HDE 140L	Laboratory in Early Childhood	3-5
HDE 141	Field Study With Children and Adolescents	4-6
HDE 143	Field Studies of the Elderly	4-6

HDE 160	Social Aspects of Aging	4
HDE 161	Applied Cognition and Aging	4
HDE 163	Cognitive Neuropsychology in Adulthood and Aging	4
PSC 140	Developmental Psychology	4
SOC 122	Sociology of Adolescence	4
SOC 131	The Family	4
SOC 134	Sociology of Racial Ethnic Families	4
SOC 135	Social Relationships	4
SOC 152	Juvenile Delinquency	4

Choose three in English Composition:

ENL 003	Introduction to Literature	4
UWP 001	Expository Writing	4
UWP 018	Style in the Essay (Discontinued)	4
UWP 019	Writing Research Papers (Discontinued)	4
UWP 101	Advanced Composition	4
UWP 102A	Writing in the Disciplines: Special Topics	4
UWP 102B	Writing in the Disciplines: Biology	4
UWP 102C	Writing in the Disciplines: History	4
UWP 102D	Writing in the Disciplines: International Relations	4
UWP 102E	Writing in the Disciplines: Engineering	4
UWP 102F	Writing in the Disciplines: Food Science and Technology	4
UWP 102G	Writing in the Disciplines: Environmental Writing	4
UWP 102H	Writing in the Disciplines: Human Development and Psychology	4
UWP 102J	Writing in the Disciplines: Fine Arts	4
UWP 102K	Writing in the Disciplines: Sociology	4
UWP 102L	Writing in the Disciplines: Film Studies	4
UWP 104A	Writing in the Professions: Business Writing	4
UWP 104B	Writing in the Professions: Law	4
UWP 104C	Writing in the Professions: Journalism	4
UWP 104D	Writing in the Professions: Elementary and Secondary Education	4
UWP 104E	Writing in the Professions: Science	4
UWP 104F	Writing in the Professions: Health	4
UWP 104I	Writing in the Professions: Internships	4
CMN 001	Introduction to Public Speaking	4
COM 001	Major Books of Western Culture: The Ancient World	4
COM 002	Major Books of Western Culture: From the Middle Ages to the Enlightenment	4
COM 003	Major Books of Western Culture: The Modern Crisis	4
COM 004	Major Books of the Contemporary World	4
OR		
NAS 005	Introduction to Native American Literature	4

Choose at least one:

UWP 101	Advanced Composition	4
UWP102 Series		
UWP104 Series		

The Upper Division Composition Exam does not satisfy the requirement.

Advanced Placement English score of 4 or 5 which satisfies English 3 and/or University Writing Program 1 will satisfy one of the three required courses.

Total: 108-113

Community & Regional Development | CRD Courses

Courses in CRD:

CRD 001—The Community (4)
Discussion—1 hour; Lecture—3 hours. Basic concepts of community analysis and planned social change. The dynamics of community change through case studies of communities including peasant, urban ghetto, suburban mainline, and California
farm workers. GE credit: ACGH, DD, OL, SS, VL, WE. Effective: 2012 Fall Quarter.

CRD 002—Ethnicity and American Communities (4)
Discussion—1 hour; Lecture—3 hours. Historical and cultural survey of the role of various ethnic groups in
the development of American communities. Examines ethnicity as a cultural factor, ethnicity as power and issues related to selected American ethnic groups. GE credit: ACGH, DD, SS, WE. Effective: 2012 Fall Quarter.

CRD 020—Food Systems (4)
Laboratory—3 hours; Lecture—3 hours. Social aspects of agri-food systems. Social science perspectives applied to food and agricultural sustainability in relation to ecology, knowledge, technology, power, governance, labor, social difference, and social movements. Social and environmental effects of commodity chains in comparative global context. GE credit: OL, SS, VL, WE. Effective: 2012 Fall Quarter.

CRD 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Supervised internship, off and on campus, in community and institutional settings. (P/NP grading only.) Effective: 2012 Fall Quarter.

CRD 098—Directed Group Study for Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2012 Fall Quarter.

CRD 099—Special Study for Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 2012 Fall Quarter.

CRD 118—Technology and Society (4)
Discussion—1 hour; Extensive Writing; Lecture—3 hours; Term Paper. Prerequisite(s): CRD 001 or CRD 002 or SOC 001 or ANT 002 Impact of technology on labor relations, employment, industrial development and international relations. Internal relations of technology development and deployment. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

CRD 140—Dynamics of Regional Development (4)
Extensive Writing; Lecture—4 hours; Project (Term Project); Term Paper. Prerequisite(s): CRD 001 or CRD 002 or SOC 001 or ANT 002 Industrial cluster formation and institutions. Technology, labor relations and interfirm linkages in global value chains. California and other regions are used as case studies. GE credit: SS, WE. Effective: 2016 Fall Quarter.

CRD 141—Organization of Economic Space (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CRD 001 or CRD 002 or SOC 001 or ANT 002 Globalization and technological restructuring of economic activity focusing on new spatial patterns of production and circulation and their implications for workers, communities and societies, both in the U.S. and around the globe. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

CRD 142—Rural Change in the Industrialized World (4)
Discussion—1 hour; Extensive Writing; Lecture—3 hours; Term Paper. Prerequisite(s): CRD 001 or CRD 002 or SOC 001 or ANT 002 Geography of rural environment with emphasis on rural restructuring. Demographics, community, economy, governance, agriculture, and environmental conservation in rural areas of industrialized world. Case studies from and comparisons drawn between North America, Europe, Australia, New Zealand, and Japan. GE credit: SS, WE. Effective: 2016 Fall Quarter.

CRD 147—Community Youth Development (4)
Extensive Writing/Discussion; Lecture/Discussion—4 hours; Project (Term Project); Term Paper. Community influences on youth well-being, youth as agents of community change, and policies to support healthy communities for young people. Special emphasis on disparities in youth well-being related to race, class, immigration status, gender, sexual-orientation. GE credit: DD, OL, SS, VL, WE. Effective: 2016 Fall Quarter.

CRD 149—Community Development Perspectives on Environmental Justice (4)
Extensive Writing/Discussion; Lecture/Discussion—4 hours; Project (Term Project); Term Paper. Environmental justice social movements; inequitable distribution of pollution on low-income communities of color; histories, policies, and innovations associated environmental justice movements in the United States and around the world. GE credit: DD, OL, SS, VL, WE. Effective: 2016 Fall Quarter.

CRD 151—Community Field Research: Theory and Analysis (4)
Extensive Writing; Lecture—4 hours; Project (Term Project). Prerequisite(s): CRD 001; STA 013 or STA 013Y or SOC 046B; Any upper division Community and Regional Development course is recommended. Emphasis on the design and analysis of community research considering the relationship between theory and practice. Study of community research methods, including structural analysis, elite interviewing, and ethnographic approaches. Course requires design and completion of field research project. GE credit: ACGH, DD, OL, SS, VL, WE. Effective: 2017 Fall Quarter.

CRD 152—Community Development (4)
Extensive Writing; Lecture—4 hours; Project (Term Project); Term Paper. Prerequisite(s): CRD 001 or CRD 151 or SOC 002 or ANT 002 or ASA 100 or CHI 132 or AAS 101 Introduction to principles and strategies of community organizing and development. Examination of non-profit organizations, citizen participation, poverty reduction, community needs assessment, and regional development strategies. Comparison of community development approaches of the U.S.A./California with other western and non-western societies. GE credit: ACGH, DD, SS, WC, WE. Effective: 2016 Fall Quarter.

CRD 153A—International Community Development: Asia (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): CRD 001 or ANT 002 or IAD 010 or SOC 001 or SOC 002 or POL 001 Examination and analysis of community development efforts in Japan and the impact of global forces in different settings. Alternative strategies with emphasis on self-reliance and locally controlled development. Course is based in Kyoto, Japan, and includes field trips. GE credit: OL, SS, VL, WC, WE. Effective: 2016 Fall Quarter.

CRD 153A—International Community Development: Asia (4) ***Review all entries***
Lecture/Discussion—3 hours; Project (Term Project)—3 hours. Prerequisite(s): Consent of Instructor. 2.000 GPA; good academic standing. For summer and quarter abroad versions, limited to 30 students; for the Seminar Abroad version, limited to 15 students; this allows for the small group learning methodology as well as the active collaboration with in-country university students; available for undergraduate and graduate students; applications through UC Davis Study Aboard accepted on a first-come, first-reserved basis for qualified applicants. Examination and analysis of community development efforts in a range of Asian countries and the impact of global forces in different settings. Includes classroom lectures, workshops, field trips, and collaborative action research projects. GE credit: OL, SS, WC, WE. Effective: 2018 Fall Quarter.

CRD 153B—International Community Development: Europe (4)
Lecture—4 hours. Prerequisite(s): ANT 002 or IAD 010 or CRD 001 or CRD 002 or SOC 001 or SOC 002 or POL 001 Examination and analysis of community development efforts in Europe and the impact of global forces in different settings. Alternative strategies with emphasis on self-reliance and locally controlled development. Based in Freiburg, Germany, including field trips to France and Switzerland. GE credit: SS, WC. Effective: 2016 Fall Quarter.

CRD 153C—International Community Development: Africa (4)
Fieldwork—2 hours; Lecture—2 hours. Prerequisite(s): CRD 001 or CRD 002 or ANT 002 or IAD 010 or SOC 001 or SOC 002 or POL 001 Examination and analysis of community development efforts in Africa and the impact of global forces in urban and rural settings. Focus on strategies that promote self-reliance and locally controlled development. Course based in South Africa, includes field trips. GE credit: SS, WC. Effective: 2016 Fall Quarter.

CRD 154—Social Theory and Community Change (4)
Extensive Writing; Lecture/Discussion—4 hours; Project (Term Project); Term Paper. Prerequisite(s): CRD 001 or SOC 001 or ANT 002 Comparative overview of the dominant social science paradigms for the study of community development and change. Among the paradigms discussed are functionalism, conflict theory/Marxism, structuralism, methodological individualism, reflexive modernity. GE credit: ACGH, DD, OL, SS, VL, WC, WE. Effective: 2016 Fall Quarter.

CRD 156—Community Economic Development (5)
Laboratory—2 hours; Lecture—4 hours. Prerequisite(s): CRD 152 or PLS 021 or ECS 015; and Consent of Instructor. How government and community organizations help firms grow and create jobs through local economic development corporations, small business centers, revolving loan funds, incubators, and other programs. Techniques to analyze community economic potential and identification of appropriate intervention tools. Group project. GE credit: QL, SS, WE. Effective: 2016 Fall Quarter.

CRD 157—Politics and Community Development (4)
Lecture—4 hours. Analyzes political, economic and sociocultural forces shaping the form and function of local communities in the U.S. Considers theories of the state, the community and social change and case studies of actual community development in comparative historical perspective. GE credit: ACGH, DD, SS, WE. Effective: 2016 Fall Quarter.

CRD 158—Small Community Governance (4)
Fieldwork—30 hours; Lecture/Discussion—3 hours. Prerequisite(s): CRD 001 or SOC 001 or POL 001 Governing institutions and political processes in rural and small urban places. Local government organization, community autonomy, leadership, political change, policy development, and select policy issues including public finance. Field research on political processes or policy issues in select communities. Effective: 2016 Fall Quarter.

CRD 162—People, Work and Technology (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): CRD 001 or SOC 001 or ANT 001; Upper division standing recommended. Restricted to upper division standing. Analysis of the relationship between work, technology, and human experience. Theories of the causes and consequences of labor process change; impacts of race/ethnicity, class, gender, and citizenship status on work; responses of workers, communities, and policy-makers to workplace changes. Effective: 2016 Fall Quarter.

CRD 162—People, Work and Technology (5) ***Review all entries***
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): CRD 001 or SOC 001 or ANT 001; Upper division standing recommended. Analysis of the relationship between work, technology, and the human experience. Theories of the causes and consequences of labor process, changes under capitalism and globalization, impacts of race/ethnicity, class, gender, and citizenship status on work in the United States and globally; responses of workers, communities, and policy-makers to workplace changes. GE credit: ACGH, DD, SS, WE. Effective: 2018 Fall Quarter.

CRD 164—Theories of Organizations and their Role in Community Change (5)
Laboratory—2 hours; Lecture—4 hours. Prerequisite(s): (STA 013 or STA 013Y or SOC 046B); (CRD 001 or CRD 002 or SOC 001 or ANT 002) Planned change within and through community organizations. Private voluntary organizations, local community associations, and local government. Relationship between community organizations and social capital. Collaborative original data gathering and professional report writing. GE credit: ACGH, DD, OL, SS, VL, WE. Effective: 2018 Spring Quarter.

CRD 171—Housing and Social Policy (4)
Lecture—4 hours; Term Paper. Social impact, economics, and politics of housing in the United States. Special attention given to federal, state, and local policy and program strategies to produce and preserve affordable housing and inclusive neighborhoods. Effective: 2016 Fall Quarter.

CRD 172—Social Inequality: Issues and Innovations (4)
Extensive Writing; Lecture/Discussion—4 hours; Project (Term Project); Term Paper. Prerequisite(s): CRD 001 or CRD 002 or SOC 001 or ANT 002; Upper division standing recommended. Focus on the dimensions, causes, and means of alleviating social inequality in the U.S. Examination and analysis of major theories and forms (class, race/ethnicity, gender, and citizenship status) of inequality. Policy-based and grassroots approaches to change. Effective: 2016 Fall Quarter.

CRD 176—Comparative Ethnicity (4)
Lecture—4 hours; Term Paper. Prerequisite(s): CRD 001 or CRD 002 or SOC 001 or ANT 002; Upper division standing recommended. Role of ethnicity in shaping social systems and interaction. Analytical approaches to and issues arising from the study of ethnicity, through utilization of data from a range of different societies. GE credit: ACGH, DD, SS, WC, WE. Effective: 2016 Fall Quarter.

CRD 180—Transnational Community Development (4)
Extensive Writing; Lecture/Discussion—4 hours; Project (Term Project); Term Paper. Prerequisite(s): CRD 001 or ANT 002 or SOC 001 The effects of grassroots, non-state, non-corporate actors from abroad on local, national and international development. Socioeconomic, political, and cultural implications of transnational actions undertaken by international non-governmental organizations, individual migrants, and migrant grassroots civic organizations. GE credit: SS, WC, WE. Effective: 2012 Fall Quarter.

CRD 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Supervised internship, off and on campus, in community and institutional
settings. (P/NP grading only.) Effective: 2012 Fall Quarter.

CRD 194HA—Special Study for Honors Students (4)
Independent Study—3 hours; Project (Term Project); Seminar—1 hour; Term Paper. Prerequisite(s): Consent of Instructor. Completion of 135 units at the time of enrollment; GPA 3.500 in the major; GPA 3.300 in overall standing; completion of at least four upper division courses; agreement of a faculty member to serve as thesis advisor. Community and Regional Development Honors is a program of direct reading, research and writing culminating in the preparation of a Senior Honors Thesis under the direction of a faculty advisor. Effective: 2012 Fall Quarter.

CRD 194HB—Special Study for Honors Student (4)
Independent Study—3 hours; Project (Term Project); Seminar—1 hour; Term Paper. Prerequisite(s): Consent of Instructor. Completion of 135 units at the time of enrollment; GPA 3.500 in the major; GPA 3.300 in overall standing; completion of at least four upper division courses; agreement of a faculty member to serve as thesis advisor. Community and Regional Development Honors is a program of direct reading, research and writing culminating in the preparation of a Senior Honors Thesis under the direction of a faculty advisor. Effective: 2012 Fall Quarter.

CRD 197T—Tutoring in Community and Regional Development (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing; completion of course to be tutored. Assisting instructor in one of the Community and Regional Development's regular courses by tutoring individual students or small groups of students in a laboratory, in voluntary discussion groups, or other voluntary activities. May be repeated up to 10 unit(s). (P/NP grading only.) Effective: 2013 Fall Quarter.

CRD 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2012 Fall Quarter.

CRD 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 2012 Fall Quarter.

CRD 240—Community Development Theory (4)
Lecture/Discussion—4 hours. Introduction to theories of community development and different concepts of community, poverty, and development. Emphasis on building theory, linking applied development techniques to theory, evaluating development policy, and examining case studies of community development organizations and projects. (GEO 240.) Effective: 2014 Winter Quarter.

CRD 241—The Economics of Community Development (4)
Seminar—4 hours. Prerequisite(s): Graduate standing. Economic theories and methods of planning for communities. Human resources, community services and infrastructure, industrialization and technological change, and regional growth. The community's role in the greater economy. (GEO 241.) Effective: 2015 Spring Quarter.

CRD 242—Community Development Organizations (4)
Seminar—4 hours. Prerequisite(s): CRD 240; and Consent of Instructor. Class size limited to 15 students. Theory and praxis of organizations with social change agendas at the community level. Emphasis on non-profit organizations and philanthropic foundations. Effective: 2012 Fall Quarter.

CRD 242S—Community Development Organizations (International) (4)
Fieldwork—10 hours; Lecture—5 hours; Workshop—5 hours. Prerequisite(s): CRD 240 Class size limited to 10 students. Theory and praxis of organizations with social change agendas at the community level. Emphasis on local governance, non-profit organizations and philanthropic foundations at an international level. Effective: 2012 Fall Quarter.

CRD 243—Critical Environmental Justice Studies (4)
Extensive Writing; Seminar—4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students only. Application of social science theories of race, ethnicity, class, gender, and power to understand the production and contestation of environmental inequities. Effective: 2017 Fall Quarter.

CRD 244—Political Ecology of Community Development (4)
Lecture—4 hours. Prerequisite(s): Graduate standing. Community development from the perspective of geographical political ecology. Social and environmental outcomes of the dynamic relationship between communities and land-based resources, and between social groups. Cases of community conservation and development in developing and industrialized countries. (GEO 254.) Effective: 2014 Winter Quarter.

CRD 245—The Political Economy of Urban and Regional Development (4)
Lecture—4 hours. Prerequisite(s): CRD 157; CRD 244; Or equivalent. How global, political and economic restructuring and national and state policies are mediated by community politics; social production of urban form; role of the state in uneven development; dynamics of urban growth and decline; regional development in California. (GEO 245.) Effective: 2014 Spring Quarter.

CRD 246—The Political Economy of Transnational Migration (4)
Lecture—4 hours. Prerequisite(s): Graduate standing. Theoretical perspectives and empirical research on social, cultural, political, and economic processes of transnational migration to the U.S. Discussion of conventional theories will precede contemporary comparative perspectives on class, race, ethnicity, citizenship, and the ethnic economy. (GEO 246.) Effective: 2014 Winter Quarter.

CRD 247—Transformation of Work (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing in history or social science degree program or consent of instructor. Exploration of the ways that the experience, organization, and systems of work are being reconfigured in the late twentieth century. The impacts of economic restructuring on local communities and workers. Effective: 2012 Fall Quarter.

CRD 248—Social Policy, Welfare Theories and Communities (4)
Seminar—4 hours. Prerequisite(s): Graduate standing. Theories and comparative histories of modern welfare states and social policy in relation to legal/normative, organizational, and administrative aspects. Analysis of specific social issues within the U.S./California context. Not open for credit to students having completed CRD 248A and CRD 248B. (GEO 248.) Effective: 2013 Fall Quarter.

CRD 248A—Social Policy, Welfare Theories and Communities I (2)
Seminar—2 hours. Prerequisite(s): Graduate standing. Theories and comparative histories of modern welfare states. Theories of welfare and social policy in relation to normative, organizational, and administrative aspects of welfare and social policy. Effective: 2017 Winter Quarter.

CRD 248B—Social Policy, Welfare Theories and Communities II (2)
Seminar—2 hours. Prerequisite(s): Graduate standing. Concurrent enrollment in course 248A. Analysis of a specific set of social issues within the US/California context. Issues may include poverty, hunger, housing, health, family, disability, economic opportunity, affirmative action orientations, gender, old age, or special social groups. Effective: 2017 Winter Quarter.

CRD 249—Media Innovation and Community Development (4)
Seminar—4 hours. Open to graduate students. Role of innovative media in communities and social change. Studies historical, practical and theoretical issues involving media in community organizing, social justice movements, democracy initiatives, and economic justice. Effective: 2014 Spring Quarter.

CRD 250—Professional Skills for Community Development (4)
Extensive Writing/Discussion; Fieldwork; Lecture/Discussion—2 hours; Project (Term Project)—2 hours. Prerequisite(s): CRD 240 Priority enrollment for Masters and Ph.D. students in Community and Regional Development. Help students develop the practical skills needed to work professionally in organizations that are involved in community development. Provides an overview of community development planning, project management, and consultation skills. Effective: 2016 Fall Quarter.

CRD 290—Seminar (1)
Seminar—1 hour. Analysis of research in applied behavioral sciences. (S/U grading only.) Effective: 2016 Fall Quarter.

CRD 292—Graduate Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Individually designed supervised internship, off campus, in community or institutional setting. Developed with advice of faculty mentor. May be repeated for credit Student may register in more than one internship section per term. (S/U grading only.) Effective: 2012 Fall Quarter.

CRD 293—Community Development Graduate Proseminar (1)
Lecture/Discussion—1 hour. Prerequisite(s): Enrollment in Community Development graduate group. Restricted to first year Community Development graduate students only. Introduction to graduate training in Community Development. Seminar designed to introduce students entering graduate work in the Community Development Graduate Group to its ongoing activities. (S/U grading only.) Effective: 2012 Fall Quarter.

CRD 298—Group Study (1-5)
Variable. Effective: 2012 Fall Quarter.

CRD 299—Research (1-12)
Variable. (S/U grading only.) Effective: 2012 Fall Quarter.

CRD 396—Teaching Assistant Training Practicum (1-4) ***Review all entries***
Variable—3-12 hours. Prerequisite(s): Graduate Standing. May be repeated for credit. (S/U grading only.) Effective: 2012 Fall Quarter.

CRD 396—Teaching Assistant Training Practicum (1-4) ***Review all entries Discontinued***
Variable—3-12 hours. Prerequisite(s): Graduate Standing. May be repeated for credit. (S/U grading only.) Effective: 2018 Fall Quarter.

Community Development (Graduate Group)

Community Development (Graduate Group) | Community Development M.S.

Jonathan K. London, Ph.D., Chairperson of the Group; jklondon@ucdavis.edu

Group Office. Carrie Armstrong-Ruport, Student Affairs Officer; 133 Hunt (Community Development Graduate Group); 530-752-4119; caruport@ucdavis.edu; http://communitydevelopment.ucdavis.edu

Faculty. http://communitydevelopment.ucdavis.edu/people/faculty.php

Graduate Study. The Graduate Group in Community Development offers an inter-disciplinary program of study which leads to the M.S. degree. The program emphasizes interdisciplinary, collaborative, and project-based learning, as well as community-engaged scholarship. The CDGG challenges students to integrate theory and practice, to develop constructive solutions to contemporary problems, and to lead in building a healthy, sustainable, and equitable society. Graduate study in the CDGG prepares individuals to work within government, for-profit and non-profit community development organizations in the realm of social and economic change, or to prepare them for further doctoral studies in related programs. Particular strengths of the program include: community economic development; community organizing and organizations in under-served communities; environmental justice and planning; education; ethnic studies; local impacts of globalization and trans-nationalism; rural and urban political development and change; sustainable agriculture and food systems; and women and gender studies.

Preparation. Applicants to this program can prepare themselves by enrolling for upper division courses in the social or behavioral sciences, e.g., anthropology, economics, sociology, psychology, geography, urban studies or political science, and courses in community studies.

Graduate Advisors. Natalia Deeb Sossa (ndeebsossa@ucdavis.edu); Michael Rios (mxrios@ucdavis.edu); Sheryl-Ann Simpson (ssimpson@ucdavis.edu); Stephen Wheeler (smwheeler@ucdavis.edu).

Community Development Minor; Human Ecology

Community Development Minor; Human Ecology | Community Development Minor Information

(College of Agricultural and Environmental Sciences)

(Department of Human Ecology)

Luis E. Guarnizo, Ph.D., Community and Regional Development Program, Vice-Chairperson of the Department

Lisa Miller, Ph.D., Human Development and Family Studies Program, Vice-Chairperson of the Department

Department of Human Ecology. 1303 Hart Hall; 530-752-2244, 530-752-1805; http://hcd.ucdavis.edu

Faculty. http://humanecology.ucdavis.edu/crd-faculty

The Community and Regional Development Program (Department of Human Ecology) offers the following minor.

Minor Advisor. M. Kenney, mfkenney@ucdavis.edu

Community Development **Units:** 24

CRD 001	The Community	4
Choose five:		
CRD 118	Technology and Society	4
CRD 140	Dynamics of Regional Development	4
CRD 141	Organization of Economic Space	4
CRD 142	Rural Change in the Industrialized World	4
CRD 147	Community Youth Development	4
CRD 149	Community Development Perspectives on Environmental Justice	4
CRD 151	Community Field Research: Theory and Analysis	4
CRD 152	Community Development	4
CRD 153A	International Community Development: Asia	4
CRD 153B	International Community Development: Europe	4
CRD 153C	International Community Development: Africa	4
CRD 154	Social Theory and Community Change	4
CRD 156	Community Economic Development	5
CRD 157	Politics and Community Development	4
CRD 158	Small Community Governance	4
CRD 162	People, Work and Technology	5
CRD 164	Theories of Organizations and their Role in Community Change	5
CRD 171	Housing and Social Policy	4
CRD 172	Social Inequality: Issues and Innovations	4
CRD 176	Comparative Ethnicity	4
CRD 180	Transnational Community Development	4

Total: 24

Community Development Minor; Human Ecology | CRD Courses

Courses in CRD:

CRD 001—The Community (4)
Discussion—1 hour; Lecture—3 hours. Basic concepts of community analysis and planned social change. The dynamics of community change through case studies of communities including peasant, urban ghetto, suburban mainline, and California
farm workers. GE credit: ACGH, DD, OL, SS, VL, WE. Effective: 2012 Fall Quarter.

CRD 002—Ethnicity and American Communities (4)
Discussion—1 hour; Lecture—3 hours. Historical and cultural survey of the role of various ethnic groups in
the development of American communities. Examines ethnicity as a cultural factor, ethnicity as power and issues related to selected American ethnic groups. GE credit: ACGH, DD, SS, WE. Effective: 2012 Fall Quarter.

CRD 020—Food Systems (4)
Laboratory—3 hours; Lecture—3 hours. Social aspects of agri-food systems. Social science perspectives applied to food and agricultural sustainability in relation to ecology, knowledge, technology, power, governance, labor, social difference, and social movements. Social and environmental effects of commodity chains in comparative global context. GE credit: OL, SS, VL, WE. Effective: 2012 Fall Quarter.

CRD 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Supervised internship, off and on campus, in community and institutional settings. (P/NP grading only.) Effective: 2012 Fall Quarter.

CRD 098—Directed Group Study for Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2012 Fall Quarter.

CRD 099—Special Study for Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 2012 Fall Quarter.

CRD 118—Technology and Society (4)
Discussion—1 hour; Extensive Writing; Lecture—3 hours; Term Paper. Prerequisite(s): CRD 001 or CRD 002 or SOC 001 or ANT 002 Impact of technology on labor relations, employment, industrial development and international relations. Internal relations of technology development and deployment. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

CRD 140—Dynamics of Regional Development (4)
Extensive Writing; Lecture—4 hours; Project (Term Project); Term Paper. Prerequisite(s): CRD 001 or CRD 002 or SOC 001 or ANT 002 Industrial cluster formation and institutions. Technology, labor relations and interfirm linkages in global value chains. California and other regions are used as case studies. GE credit: SS, WE. Effective: 2016 Fall Quarter.

CRD 141—Organization of Economic Space (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CRD 001 or CRD 002 or SOC 001 or ANT 002 Globalization and technological restructuring of economic activity focusing on new spatial patterns of production and circulation and their implications for workers, communities and societies, both in the U.S. and around the globe. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

CRD 142—Rural Change in the Industrialized World (4)
Discussion—1 hour; Extensive Writing; Lecture—3 hours; Term Paper. Prerequisite(s): CRD 001 or CRD 002 or SOC 001 or ANT 002 Geography of rural environment with emphasis on rural restructuring. Demographics, community, economy, governance, agriculture, and environmental conservation in rural areas of industrialized world. Case studies from and comparisons drawn between North America, Europe, Australia, New Zealand, and Japan. GE credit: SS, WE. Effective: 2016 Fall Quarter.

CRD 147—Community Youth Development (4)
Extensive Writing/Discussion; Lecture/Discussion—4 hours; Project (Term Project); Term Paper. Community influences on youth well-being, youth as agents of community change, and policies to support healthy communities for young people. Special emphasis on disparities in youth well-being related to race, class, immigration status, gender, sexual-orientation. GE credit: DD, OL, SS, VL, WE. Effective: 2016 Fall Quarter.

CRD 149—Community Development Perspectives on Environmental Justice (4)
Extensive Writing/Discussion; Lecture/Discussion—4 hours; Project (Term Project); Term Paper. Environmental justice social movements; inequitable distribution of pollution on low-income communities of color; histories, policies, and innovations associated environmental justice movements in the United States and around the world. GE credit: DD, OL, SS, VL, WE. Effective: 2016 Fall Quarter.

CRD 151—Community Field Research: Theory and Analysis (4)
Extensive Writing; Lecture—4 hours; Project (Term Project). Prerequisite(s): CRD 001; STA 013 or STA 013Y or SOC 046B; Any upper division Community and Regional Development course is recommended. Emphasis on the design and analysis of community research considering the relationship between theory and practice. Study of community research methods, including structural analysis, elite interviewing, and ethnographic approaches. Course requires design and completion of field research project. GE credit: ACGH, DD, OL, SS, VL, WE. Effective: 2017 Fall Quarter.

CRD 152—Community Development (4)
Extensive Writing; Lecture—4 hours; Project (Term Project); Term Paper. Prerequisite(s): CRD 001 or CRD 151 or SOC 002 or ANT 002 or ASA 100 or CHI 132 or AAS 101 Introduction to principles and strategies of community organizing and development. Examination of non-profit organizations, citizen participation, poverty reduction, community needs assessment, and regional development strategies. Comparison of community development approaches of the U.S.A./California with other western and non-western societies. GE credit: ACGH, DD, SS, WC, WE. Effective: 2016 Fall Quarter.

CRD 153A—International Community Development: Asia (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): CRD 001 or ANT 002 or IAD 010 or SOC 001 or SOC 002 or POL 001 Examination and analysis of community development efforts in Japan and the impact of global forces in different settings. Alternative strategies with emphasis on self-reliance and locally controlled development. Course is based in Kyoto, Japan, and includes field trips. GE credit: OL, SS, VL, WC, WE. Effective: 2016 Fall Quarter.

CRD 153A—International Community Development: Asia (4) ***Review all entries***
Lecture/Discussion—3 hours; Project (Term Project)—3 hours. Prerequisite(s): Consent of Instructor. 2.000 GPA; good academic standing. For summer and quarter abroad versions, limited to 30 students; for the Seminar Abroad version, limited to 15 students; this allows for the small group learning methodology as well as the active collaboration with in-country university students; available for undergraduate and graduate students; applications through UC Davis Study Aboard accepted on a first-come, first-reserved basis for qualified applicants. Examination and analysis of community development efforts in a range of Asian countries and the impact of global forces in different settings. Includes classroom lectures, workshops, field trips, and collaborative action research projects. GE credit: OL, SS, WC, WE. Effective: 2018 Fall Quarter.

CRD 153B—International Community Development: Europe (4)
Lecture—4 hours. Prerequisite(s): ANT 002 or IAD 010 or CRD 001 or CRD 002 or SOC 001 or SOC 002 or POL 001 Examination and analysis of community development efforts in Europe and the impact of global forces in different settings. Alternative strategies with emphasis on self-reliance and locally controlled development. Based in Freiburg, Germany, including field trips to France and Switzerland. GE credit: SS, WC. Effective: 2016 Fall Quarter.

CRD 153C—International Community Development: Africa (4)
Fieldwork—2 hours; Lecture—2 hours. Prerequisite(s): CRD 001 or CRD 002 or ANT 002 or IAD 010 or SOC 001 or SOC 002 or POL 001 Examination and analysis of community development efforts in Africa and the impact of global forces in urban and rural settings. Focus on strategies that promote self-reliance and locally controlled development. Course based in South Africa, includes field trips. GE credit: SS, WC. Effective: 2016 Fall Quarter.

CRD 154—Social Theory and Community Change (4)
Extensive Writing; Lecture/Discussion—4 hours; Project (Term Project); Term Paper. Prerequisite(s): CRD 001 or SOC 001 or ANT 002 Comparative overview of the dominant social science paradigms for the study of community development and change. Among the paradigms discussed are functionalism, conflict theory/Marxism, structuralism, methodological individualism, reflexive modernity. GE credit: ACGH, DD, OL, SS, VL, WC, WE. Effective: 2016 Fall Quarter.

CRD 156—Community Economic Development (5)
Laboratory—2 hours; Lecture—4 hours. Prerequisite(s): CRD 152 or PLS 021 or ECS 015; and Consent of Instructor. How government and community organizations help firms grow and create jobs through local economic development corporations, small business centers, revolving loan funds, incubators, and other programs. Techniques to analyze community economic potential and identification of appropriate intervention tools. Group project. GE credit: QL, SS, WE. Effective: 2016 Fall Quarter.

CRD 157—Politics and Community Development (4)
Lecture—4 hours. Analyzes political, economic and sociocultural forces shaping the form and function of local communities in the U.S. Considers theories of the state, the community and social change and case studies of actual community development in comparative historical perspective. GE credit: ACGH, DD, SS, WE. Effective: 2016 Fall Quarter.

CRD 158—Small Community Governance (4)
Fieldwork—30 hours; Lecture/Discussion—3 hours. Prerequisite(s): CRD 001 or SOC 001 or POL 001 Governing institutions and political processes in rural and small urban places. Local government organization, community autonomy, leadership, political change, policy development, and select policy issues including public finance. Field research on political processes or policy issues in select communities. Effective: 2016 Fall Quarter.

CRD 162—People, Work and Technology (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): CRD 001 or SOC 001 or ANT 001; Upper division standing recommended. Restricted to upper division standing. Analysis of the relationship between work, technology, and human experience. Theories of the causes and consequences of labor process change; impacts of race/ethnicity, class, gender, and citizenship status on work; responses of workers, communities, and policy-makers to workplace changes. Effective: 2016 Fall Quarter.

CRD 162—People, Work and Technology (5) ***Review all entries***
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): CRD 001 or SOC 001 or ANT 001; Upper division standing recommended. Analysis of the relationship between work, technology, and the human experience. Theories of the causes and consequences of labor process, changes under capitalism and globalization, impacts of race/ethnicity, class, gender, and citizenship status on work in the United States and globally; responses of workers, communities, and policy-makers to workplace changes. GE credit: ACGH, DD, SS, WE. Effective: 2018 Fall Quarter.

CRD 164—Theories of Organizations and their Role in Community Change (5)
Laboratory—2 hours; Lecture—4 hours. Prerequisite(s): (STA 013 or STA 013Y or SOC 046B); (CRD 001 or CRD 002 or SOC 001 or ANT 002) Planned change within and through community organizations. Private voluntary organizations, local community associations, and local government. Relationship between community organizations and social capital. Collaborative original data gathering and professional report writing. GE credit: ACGH, DD, OL, SS, VL, WE. Effective: 2018 Spring Quarter.

CRD 171—Housing and Social Policy (4)
Lecture—4 hours; Term Paper. Social impact, economics, and politics of housing in the United States. Special attention given to federal, state, and local policy and program strategies to produce and preserve affordable housing and inclusive neighborhoods. Effective: 2016 Fall Quarter.

CRD 172—Social Inequality: Issues and Innovations (4)
Extensive Writing; Lecture/Discussion—4 hours; Project (Term Project); Term Paper. Prerequisite(s): CRD 001 or CRD 002 or SOC 001 or ANT 002; Upper division standing recommended. Focus on the dimensions, causes, and means of alleviating social inequality in the U.S. Examination and analysis of major theories and forms (class, race/ethnicity, gender, and citizenship status) of inequality. Policy-based and grassroots approaches to change. Effective: 2016 Fall Quarter.

CRD 176—Comparative Ethnicity (4)
Lecture—4 hours; Term Paper. Prerequisite(s): CRD 001 or CRD 002 or SOC 001 or ANT 002; Upper division standing recommended. Role of ethnicity in shaping social systems and interaction. Analytical approaches to and issues arising from the study of ethnicity, through utilization of data from a range of different societies. GE credit: ACGH, DD, SS, WC, WE. Effective: 2016 Fall Quarter.

CRD 180—Transnational Community Development (4)
Extensive Writing; Lecture/Discussion—4 hours; Project (Term Project); Term Paper. Prerequisite(s): CRD 001 or ANT 002 or SOC 001 The effects of grassroots, non-state, non-corporate actors from abroad on local, national and international development. Socioeconomic, political, and cultural implications of transnational actions undertaken by international non-governmental organizations, individual migrants, and migrant grassroots civic organizations. GE credit: SS, WC, WE. Effective: 2012 Fall Quarter.

CRD 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Supervised internship, off and on campus, in community and institutional
settings. (P/NP grading only.) Effective: 2012 Fall Quarter.

CRD 194HA—Special Study for Honors Students (4)
Independent Study—3 hours; Project (Term Project); Seminar—1 hour; Term Paper. Prerequisite(s): Consent of Instructor. Completion of 135 units at the time of enrollment; GPA 3.500 in the major; GPA 3.300 in overall standing; completion of at least four upper division courses; agreement of a faculty member to serve as thesis advisor. Community and Regional Development Honors is a program of direct reading, research and writing culminating in the preparation of a Senior Honors Thesis under the direction of a faculty advisor. Effective: 2012 Fall Quarter.

CRD 194HB—Special Study for Honors Student (4)
Independent Study—3 hours; Project (Term Project); Seminar—1 hour; Term Paper. Prerequisite(s): Consent of Instructor. Completion of 135 units at the time of enrollment; GPA 3.500 in the major; GPA 3.300 in overall standing; completion of at least four upper division courses; agreement of a faculty member to serve as thesis advisor. Community and Regional Development Honors is a program of direct reading, research and writing culminating in the preparation of a Senior Honors Thesis under the direction of a faculty advisor. Effective: 2012 Fall Quarter.

CRD 197T—Tutoring in Community and Regional Development (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing; completion of course to be tutored. Assisting instructor in one of the Community and Regional Development's regular courses by tutoring individual students or small groups of students in a laboratory, in voluntary discussion groups, or other voluntary activities. May be repeated up to 10 unit(s). (P/NP grading only.) Effective: 2013 Fall Quarter.

CRD 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2012 Fall Quarter.

CRD 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 2012 Fall Quarter.

CRD 240—Community Development Theory (4)
Lecture/Discussion—4 hours. Introduction to theories of community development and different concepts of community, poverty, and development. Emphasis on building theory, linking applied development techniques to theory, evaluating development policy, and examining case studies of community development organizations and projects. (GEO 240.) Effective: 2014 Winter Quarter.

CRD 241—The Economics of Community Development (4)
Seminar—4 hours. Prerequisite(s): Graduate standing. Economic theories and methods of planning for communities. Human resources, community services and infrastructure, industrialization and technological change, and regional growth. The community's role in the greater economy. (GEO 241.) Effective: 2015 Spring Quarter.

CRD 242—Community Development Organizations (4)
Seminar—4 hours. Prerequisite(s): CRD 240; and Consent of Instructor. Class size limited to 15 students. Theory and praxis of organizations with social change agendas at the community level. Emphasis on non-profit organizations and philanthropic foundations. Effective: 2012 Fall Quarter.

CRD 242S—Community Development Organizations (International) (4)
Fieldwork—10 hours; Lecture—5 hours; Workshop—5 hours. Prerequisite(s): CRD 240 Class size limited to 10 students. Theory and praxis of organizations with social change agendas at the community level. Emphasis on local governance, non-profit organizations and philanthropic foundations at an international level. Effective: 2012 Fall Quarter.

CRD 243—Critical Environmental Justice Studies (4)
Extensive Writing; Seminar—4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students only. Application of social science theories of race, ethnicity, class, gender, and power to understand the production and contestation of environmental inequities. Effective: 2017 Fall Quarter.

CRD 244—Political Ecology of Community Development (4)
Lecture—4 hours. Prerequisite(s): Graduate standing. Community development from the perspective of geographical political ecology. Social and environmental outcomes of the dynamic relationship between communities and land-based resources, and between social groups. Cases of community conservation and development in developing and industrialized countries. (GEO 254.) Effective: 2014 Winter Quarter.

CRD 245—The Political Economy of Urban and Regional Development (4)
Lecture—4 hours. Prerequisite(s): CRD 157; CRD 244; Or equivalent. How global, political and economic restructuring and national and state policies are mediated by community politics; social production of urban form; role of the state in uneven development; dynamics of urban growth and decline; regional development in California. (GEO 245.) Effective: 2014 Spring Quarter.

CRD 246—The Political Economy of Transnational Migration (4)
Lecture—4 hours. Prerequisite(s): Graduate standing. Theoretical perspectives and empirical research on social, cultural, political, and economic processes of transnational migration to the U.S. Discussion of conventional theories will precede contemporary comparative perspectives on class, race, ethnicity, citizenship, and the ethnic economy. (GEO 246.) Effective: 2014 Winter Quarter.

CRD 247—Transformation of Work (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing in history or social science degree program or consent of instructor. Exploration of the ways that the experience, organization, and systems of work are being reconfigured in the late twentieth century. The impacts of economic restructuring on local communities and workers. Effective: 2012 Fall Quarter.

CRD 248—Social Policy, Welfare Theories and Communities (4)
Seminar—4 hours. Prerequisite(s): Graduate standing. Theories and comparative histories of modern welfare states and social policy in relation to legal/normative, organizational, and administrative aspects. Analysis of specific social issues within the U.S./California context. Not open for credit to students having completed CRD 248A and CRD 248B. (GEO 248.) Effective: 2013 Fall Quarter.

CRD 248A—Social Policy, Welfare Theories and Communities I (2)
Seminar—2 hours. Prerequisite(s): Graduate standing. Theories and comparative histories of modern welfare states. Theories of welfare and social policy in relation to normative, organizational, and administrative aspects of welfare and social policy. Effective: 2017 Winter Quarter.

CRD 248B—Social Policy, Welfare Theories and Communities II (2)
Seminar—2 hours. Prerequisite(s): Graduate standing. Concurrent enrollment in course 248A. Analysis of a specific set of social issues within the US/California context. Issues may include poverty, hunger, housing, health, family, disability, economic opportunity, affirmative action orientations, gender, old age, or special social groups. Effective: 2017 Winter Quarter.

CRD 249—Media Innovation and Community Development (4)
Seminar—4 hours. Open to graduate students. Role of innovative media in communities and social change. Studies historical, practical and theoretical issues involving media in community organizing, social justice movements, democracy initiatives, and economic justice. Effective: 2014 Spring Quarter.

CRD 250—Professional Skills for Community Development (4)
Extensive Writing/Discussion; Fieldwork; Lecture/Discussion—2 hours; Project (Term Project)—2 hours. Prerequisite(s): CRD 240 Priority enrollment for Masters and Ph.D. students in Community and Regional Development. Help students develop the practical skills needed to work professionally in organizations that are involved in community development. Provides an overview of community development planning, project management, and consultation skills. Effective: 2016 Fall Quarter.

CRD 290—Seminar (1)
Seminar—1 hour. Analysis of research in applied behavioral sciences. (S/U grading only.) Effective: 2016 Fall Quarter.

CRD 292—Graduate Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Individually designed supervised internship, off campus, in community or institutional setting. Developed with advice of faculty mentor. May be repeated for credit Student may register in more than one internship section per term. (S/U grading only.) Effective: 2012 Fall Quarter.

CRD 293—Community Development Graduate Proseminar (1)
Lecture/Discussion—1 hour. Prerequisite(s): Enrollment in Community Development graduate group. Restricted to first year Community Development graduate students only. Introduction to graduate training in Community Development. Seminar designed to introduce students entering graduate work in the Community Development Graduate Group to its ongoing activities. (S/U grading only.) Effective: 2012 Fall Quarter.

CRD 298—Group Study (1-5)
Variable. Effective: 2012 Fall Quarter.

CRD 299—Research (1-12)
Variable. (S/U grading only.) Effective: 2012 Fall Quarter.

CRD 396—Teaching Assistant Training Practicum (1-4) ***Review all entries***
Variable—3-12 hours. Prerequisite(s): Graduate Standing. May be repeated for credit. (S/U grading only.) Effective: 2012 Fall Quarter.

CRD 396—Teaching Assistant Training Practicum (1-4) ***Review all entries Discontinued***
Variable—3-12 hours. Prerequisite(s): Graduate Standing. May be repeated for credit. (S/U grading only.) Effective: 2018 Fall Quarter.

Community Nutrition Minor; Nutrition

Community Nutrition Minor; Nutrition | Community Nutrition Minor

(College of Agricultural and Environmental Sciences)

Francene M. Steinberg, Ph.D., RD., Chair of the Department

Sheri Zidenberg-Cherr, Ph.D., Vice Chairperson of the Department

Department Office. 3135 Meyer Hall; 530-752-4630; http://nutrition.ucdavis.edu

Faculty. http://nutrition.ucdavis.edu/people/faculty/index.html

The Department of Nutrition offers four minor programs open to students majoring in other disciplines who wish to complement their study programs with a concentration in the area of food and nutrition.

Minor Advisor. 3202 Meyer Hall; 530-752-2512

Note: If the student's major program requires the same course in biochemistry and physiology, only one of the courses may duplicate credit toward the minor. Each program below lists replacement courses to fulfill the minimum unit requirement.

Community Nutrition **Units:** 20

Preparation.
Plan in advance to include the required course prerequisites.

NUT 111AY	Introduction to Nutrition and Metabolism	3
NUT 111B	Recommendations and Standards for Human Nutrition	2
NUT 118	Community Nutrition	4
NUT 192	Internship	2
NUT 120AN	Nutritional Anthropology	4
OR		
NUT 120BN	Nutritional Geography	4
NPB 101	Systemic Physiology	5

Replacement courses; see note above:

NUT 114	Developmental Nutrition	4
NUT 116A	Clinical Nutrition	3
NUT 116B	Clinical Nutrition	3
NUT 116AL	Clinical Nutrition Practicum	3
NUT 116BL	Clinical Nutrition Practicum	3

Total: 20

Community Nutrition Minor; Nutrition | NUT Courses

Courses in NUT:

NUT 010—Discoveries and Concepts in Nutrition (3)
Lecture—3 hours; Project (Term Project). Nutrition as a science; historical development of nutrition concepts; properties of nutrients and foods. Not open for credit to students who have taken an upper division course in nutrition. No credit will be granted to students who have completed NUT 010Y or NUT 010V or an upper-division nutrition course. GE credit: SE, SL. Effective: 2018 Winter Quarter.

NUT 010V—Discoveries and Concepts in Nutrition (3)
Project (Term Project); Web Virtual Lecture—3 hours. Nutrition as a science; historical development of nutrition concepts; properties of nutrients and foods. Not open for credit to students who have taken an upper division course in nutrition. No credit will be granted to students who have completed NUT 010 or NUT 010Y or an upper-division nutrition course. GE credit: SE, SL. Effective: 2018 Winter Quarter.

NUT 010Y—Discoveries and Concepts in Nutrition (3)
Project (Term Project); Web Virtual Lecture—3 hours. Nutrition as a science; historical development of nutrition concepts; properties of nutrients and foods. Not open for credit to students who have taken an upper division course in nutrition. No credit will be granted to students who have completed NUT 010 or NUT 010V or an upper-division nutrition course. GE credit: SE, SL. Effective: 2018 Winter Quarter.

NUT 011—Current Topics and Controversies in Nutrition (2)
Discussion—1.5 hours; Term Paper. Exploration of current applications and controversies in nutrition. Students read scientific journal articles and write summaries, as well as give brief oral presentations. Topics change to reflect current interests and issues. GE credit: OL, SE, WE. Effective: 2010 Winter Quarter.

NUT 099—Individual Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

NUT 104—Environmental & Nutritional Factors in Cellular Regulation and Nutritional Toxicants (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 101; (BIS 103 or ABI 103) Cellular regulation from nutritional/toxicological perspective. Emphasis: role of biofactors on modulation of signal transduction pathways, role of specific organelles in organization/regulation of metabolic transformations, major cofactor functions, principles of pharmacology/toxicology important to understanding nutrient/toxicant metabolism. (Environmental Toxicology 104.) GE credit: OL, SE, SL. Effective: 2008 Fall Quarter.

NUT 105—Nutrition and Aging (3)
Lecture—3 hours. Prerequisite(s): (NUT 111AV or NUT 111AY); ABI 103; Or the equivalent course to ABI 103. Role of nutrition in the aging process from both an organismal/cell perspective, including demographics, theories of aging, nutrition and evolution, nutritional manipulation and life-span extension, and nutrition's impact on the diseases of aging. GE credit: SE. Effective: 2017 Spring Quarter.

NUT 111AY—Introduction to Nutrition and Metabolism (3)
Lecture/Discussion—1 hour; Web Virtual Lecture—2 hours. Prerequisite(s): CHE 008B; NPB 101; Or the equivalent of NPB 101. Restricted to upper division or graduate level students only. Introduction to metabolism of protein, fat and carbohydrate: the biological role of vitamins and minerals; nutrient requirements during the life cycle; assessment of dietary intake and nutritional status. Not open for credit to students who have completed NUT 101 or NUT 111AV. GE credit: SE. Effective: 2016 Fall Quarter.

NUT 111B—Recommendations and Standards for Human Nutrition (2)
Lecture—2 hours. Prerequisite(s): CHE 008B; NPB 101; (NUT 111AV or NUT 111AY); Or the equivalent of NPB 101. Critical analysis of the development of nutritional recommendations for humans. Topics include: history of modern recommendations, development of the Recommended Dietary Allowance (RDA) and other food guides; the Dietary Reference Intakes (DRI); administrative structure of regulatory agencies pertinent to nutrition recommendations; introduction to scientific methods used to determine the recommendations; food labeling laws; nutrition recommendations in other countries and cultures. Not open for credit to students who have completed NUT 111. Effective: 2017 Spring Quarter.

NUT 112—Nutritional Assessment (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ((ABI 102, ABI 103) or (BIS 102, BIS 103)); NUT 111AY; (STA 013 or STA 013Y or PLS 120) Restricted to upper division or graduate level Nutrition students only. Methods of human nutritional assessment, including dietary, anthropometric, biochemical methods. Principles of precision, accuracy, and interpretation of results for individuals and populations. GE credit: QL, SE. Effective: 2018 Spring Quarter.

NUT 113—Principles of Epidemiology in Nutrition (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): PLS 120; Or equivalent. Introduction to epidemiology as it relates to the field of nutrition, including study design, principles of epidemiologic inference, criteria for causality, and interpreting measures of disease risk. GE credit: QL, SE. Effective: 2014 Fall Quarter.

NUT 113—Principles of Epidemiology in Nutrition (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): STA 013 or STA 013Y or PLS 120 or STA 100 Introduction to epidemiology as it relates to the field of nutrition, including study design, principles of epidemiologic inference, criteria for causality, and interpreting measures of disease risk. GE credit: QL, SE. Effective: 2018 Fall Quarter.

NUT 114—Developmental Nutrition (4)
Lecture—4 hours. Prerequisite(s): ABI 102; ABI 103; (NUT 111AV or NUT 111AY); NUT 111B Role of nutritional factors in embryonic and postnatal development. GE credit: SE. Effective: 2017 Winter Quarter.

NUT 115—Animal Nutrition (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 008B or CHE 118B; or Consent of Instructor. Comparative differences among animals in digestion and metabolism of nutrients. Nutrient composition of feeds, digestive systems, digestion, absorption, feeding strategies. GE credit: OL, QL, SE, SL, VL, WE. Effective: 2017 Winter Quarter.

NUT 116A—Clinical Nutrition (3)
Lecture—3 hours. Prerequisite(s): (NUT 111AV or NUT 111AY); NUT 111B; NUT 112; NPB 101; Or the equivalent to NPB 101. Biochemical and physiological bases for therapeutic diets. Problems in planning diets for normal and pathological conditions. GE credit: SE. Effective: 2016 Fall Quarter.

NUT 116AL—Clinical Nutrition Practicum (3)
Discussion—1 hour; Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): NUT 116A (can be concurrent) Fundamental principles of planning and evaluating therapeutic diets and patient education for pathological conditions covered in 116A. GE credit: SE. Effective: 1997 Fall Quarter.

NUT 116B—Clinical Nutrition (3)
Lecture—3 hours. Prerequisite(s): (NUT 111AV or NUT 111AY); NUT 111B; NUT 112; NPB 101; Or the equivalent to NPB 101. Biochemical and physiological bases for therapeutic diets. Problems in planning diets for normal and pathological conditions. GE credit: SE. Effective: 2017 Winter Quarter.

NUT 116BL—Clinical Nutrition Practicum (3)
Discussion—1 hour; Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): NUT 116AL; NUT 116B (can be concurrent) Fundamental principles of planning and evaluating therapeutic diets and patient education for pathological conditions covered in 116B. Continuation of course 116AL. GE credit: SE. Effective: 2017 Winter Quarter.

NUT 117—Experimental Nutrition (6)
Extensive Writing; Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): (NUT 111AV or NUT 111AY); NUT 111B; NUT 112; BIS 102; BIS 103; MCB 120L or other laboratory course in biochemistry is recommended. Methods of assessing nutritional status. Application of chemical, microbiological, chromatographic and enzymatic techniques to current problems in nutrition. GE credit: SE, WE. Effective: 2016 Fall Quarter.

NUT 118—Community Nutrition (4)
Lecture—4 hours. Prerequisite(s): NUT 116A; (NUT 111AV or NUT 111AY); NUT 111B Nutrition problems in contemporary communities and of selected target groups in the United States and in developing countries. Nutrition programs and policy, principles of nutrition education. GE credit: SE, SL. Effective: 2017 Winter Quarter.

NUT 119A—International, community-based nutritional assessment. (1)
Lecture/Discussion—1 hour. Prerequisite(s): NUT 112 (can be concurrent); and Consent of Instructor. Issues and problems related to community-based nutritional assessment in a low-income country, major nutritional problems in low-income countries; ethical issues in human investigation; survey design, data collection techniques, and data analysis; preparation for international travel; cross-cultural communication, health, and safety while living abroad. Effective: 2002 Spring Quarter.

NUT 119B—International, Community-Based Nutritional Assessment (6)
Fieldwork—12 hours; Lecture—2 hours. Prerequisite(s): NUT 119A; and Consent of Instructor. Restricted to upper division students in Clinical Nutrition, Community Nutrition, Dietetics, and Nutrition Science. A six-week summer course in Peru. Implementation of a community-based nutritional assessment survey, including development of the survey instrument, selection. Effective: 2002 Summer Special Session.

NUT 120AN—Nutritional Anthropology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): NUT 010 and ANT 002 recommended. Nutritional anthropology from historical and contemporary perspectives; the anthropological approach to food and diet; field work methods; case histories that explore food patterns and their nutritional implications. GE credit: SE, SS. Effective: 2017 Spring Quarter.

NUT 120BN—Nutritional Geography (4)
Discussion—1 hour; Lecture—3 hours. Nutritional geography from historical and contemporary perspectives; the geographical approach to food and diet; cultural and environmental factors that influence dietary practices; food-related landscapes and patterns. GE credit: SE, SS. Effective: 2016 Fall Quarter.

NUT 122—Ruminant Nutrition and Digestive Physiology (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (ABI 103 or BIS 103); BIS 002A; BIS 002B; BIS 002C; (ANS 100 or NPB 101); or Consent of Instructor. MAT 016B recommended. Study of nutrient utilization as influenced by the unique aspects of digestion and fermentation in ruminants, both domestic and wild. Laboratories include comparative anatomy, feed evaluation, digestion kinetics using fistulated cows, computer modeling, and microbial exercises. GE credit: QL, SE. Effective: 2017 Spring Quarter.

NUT 123—Comparative Animal Nutrition (3)
Lecture—3 hours. Prerequisite(s): ABI 103 or BIS 103 Restricted to upper division and graduate level students. Comparative nutrition of animals; including laboratory, companion, zoo, and wild, animals. Digestion and metabolic adaptations required for animal species to consume diverse diets. Relation of nutrition to metabolic adaptations and physiological states, including growth, reproduction, and diseases. GE credit: SE. Effective: 2017 Spring Quarter.

NUT 123L—Comparative Animal Nutrition Laboratory (1)
Laboratory—3 hours. Prerequisite(s): ABI 103 or BIS 103 Laboratory exercises leading to written reports on establishment of nutritional requirements and formulation of complete diets for laboratory, companion, zoo and wild animals. Effective: 2017 Spring Quarter.

NUT 124—Nutrition and Feeding of Finfishes (3)
Lecture—3 hours. Prerequisite(s): BIS 103 or ABI 103 Principles of nutrition and feeding of fishes under commercial situations; implication of fish nutrition to the environment and conservation of endangered species. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

NUT 127—Environmental Stress and Development in Marine Organisms (10)
Discussion—2 hours; Laboratory—12 hours; Lecture—4 hours. Prerequisite(s): ETX 101 or BIS 102 or BIS 104; or equivalent course. ETX 114A or NUT 114 recommended. Course taught at Bodega Marine Laboratory. Effects of environmental and nutritional stress, including pollutants, on development and function in embryos and larvae of marine organisms. Emphasis on advanced experimental methods. (Environmental Toxicology 127.) GE credit: OL, QL, SE, SL, VL, WE. Effective: 2002 Summer Session 1.

NUT 129—Journalistic Practicum in Nutrition (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): (NUT 111AV or NUT 111AY); NUT 111B; or Consent of Instructor. A course in written or oral expression. Critical analysis and discussion of current, controversial issues in nutrition; use of journalistic techniques to interpret scientific findings for the lay public. Students required to write several articles for campus media. May be repeated up to 1 time(s). GE credit: OL, SE, SL, WE. Effective: 2017 Spring Quarter.

NUT 130—Experiments in Nutrition: Design and Execution (2)
Laboratory—6 hours. Prerequisite(s): Consent of Instructor. NUT 111AV, NUT 111AY, NUT 111B or NUT 114 recommended. Experiments in current nutritional problems. Experimental design:students choose project and, independently or in groups of two-three, design a protocol, complete the project, and report findings. May be repeated for credit up to six times(three times per instructor)with consent of instructor. May be repeated up to 6 time(s) three times per instructor with consent of instructor. GE credit: SE. Effective: 2016 Fall Quarter.

NUT 190—Proseminar in Nutrition (1)
Seminar—1 hour. Prerequisite(s): (NUT 111AV or NUT 111AY); NUT 111B Restricted to senior standing. Discussion of human nutrition problems. Each term will involve a different emphasis among experimental, clinical, and dietetic problems of community, national and international scope. May be repeated twice for credit with consent of instructor. May be repeated up to 2 time(s). GE credit: OL, SE, VL. Effective: 2016 Fall Quarter.

NUT 190C—Nutrition Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing in Nutrition or related biological science. Introduction to research findings and methods in nutrition. Presentation and discussion of research by faculty and students. May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

NUT 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. One upper division course in nutrition. Work experience on or off campus in practical application of nutrition, supervised by a faculty member. (P/NP grading only.) Effective: 1997 Winter Quarter.

NUT 197T—Tutoring in Nutrition (1-2)
Discussion/Laboratory—3-6 hours. Prerequisite(s): Consent of Instructor. Nutrition Science, Clinical Nutrition or related major. Tutoring of students in nutrition courses, assistance with discussion groups or laboratory sections, weekly conference with instructor in charge of course: written evaluations. May be repeated if tutoring a different course. May be repeated for credit. (P/NP grading only.) Effective: 2016 Fall Quarter.

NUT 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

NUT 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

NUT 219A—International Nutrition (3)
Lecture—3 hours. Prerequisite(s): NUT 111AV; NUT 111AY; Graduate Standing; undergraduates only admitted with consent of instructor. Epidemiology, etiology, and consequences of undernutrition, with particular focus on the nutritional problems of children and women in low income populations. Effective: 2018 Spring Quarter.

NUT 219B—International Nutrition (3)
Lecture—3 hours. Prerequisite(s): NUT 219A Intervention programs to prevent or ameliorate nutritional problems in low-income populations. Planning, implementing, and evaluating nutrition intervention programs. Effective: 2004 Fall Quarter.

NUT 230—Experiments in Nutrition: Design and Execution (2)
Laboratory—6 hours. Prerequisite(s): Consent of Instructor. NUT 201, NUT 202, NUT 203, NUT 204, or the equivalent recommended. Student selected projects to enhance laboratory skills. Independently, or in groups of two-three students, design a protocol, carry out the project, analyze the results and report the findings. May be repeated up to 6 time(s) with consent of instructor (limit of three times per instructor). Effective: 1999 Fall Quarter.

NUT 250—Metabolic Homeostasis (3)
Discussion—1.5 hours; Lecture—2 hours. Prerequisite(s): Passing the Nutrition Graduate Group Preliminary Examination or consent of instructor. Preference given to students in advanced standing in the Nutrition Graduate Group. Regulatory mechanisms of carbohydrate, lipid, and protein homeostasis; mechanisms of metabolic enzyme regulation and of the metabolic hormones; homeostatic mechanisms and interactions; fuel-fuel interactions; nutrition-energy balance. Effective: 2001 Spring Quarter.

NUT 251—Nutrition and Immunity (2)
Lecture/Discussion—2 hours. Prerequisite(s): PMI 126; ABI 102; MMI 107; Or the equivalent to MMI 107. Cellular and molecular mechanisms underlying interactions of nutrition and immune function, including modulation of immunocompetence by diet and effects of immune responses on nutritional needs. Lectures and discussion explore implications for resistance to infection, autoimmunity and cancer. Effective: 2000 Winter Quarter.

NUT 252—Nutrition and Development (3)
Lecture—3 hours. Prerequisite(s): NUB 210A, NUB 210B, and NUB 210C recommended. Relationship of nutrition to prenatal and early postnatal development. Effective: 2018 Spring Quarter.

NUT 253—Control of Energy Balance and Body Weight (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Comprehensive study of the biochemical, nutritional and physiological mechanisms controlling food intake, body composition and energy expenditure. Subject matter will be approached through lectures and discussions where students and staff will critically evaluate the literature. Effective: 2016 Spring Quarter.

NUT 254—Applications of Systems Analysis in Nutrition (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): NUT 202; Or the equivalent. Quantitative aspects of digestion and metabolism; principles of systems analysis. Evolution of models of energy metabolism as applied in current
feeding systems. Critical evaluations of mechanistic models used analytically in support of nutritional research. Effective: 1997 Winter Quarter.

NUT 258—Field Research Methods in International Nutrition (3)
Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Issues and problems related to implementation of nutrition field research in less-developed countries, including ethics; relationships with local governments, communities, and scientists; data collection techniques and quality assurance; field logistics; research budgets; and other administrative and personal issues. Effective: 1997 Winter Quarter.

NUT 259—Nutrition and Aging (2)
Lecture—2 hours. Prerequisite(s): NUT 201; NUT 202; NUT 203; NUT 204; Three courses. Interaction between nutrition and aging. Topics include physiological/biochemical basis of aging, age-related changes affecting
nutritional requirements, nutrition and mortality rate, assessment of nutritional status in the elderly, and relationship between developmental nutrition and the rate of aging. Effective: 1997 Fall Quarter.

NUT 270—Scientific Ethics in Biomedical Studies: Emphasis on Nutrition (3)
Discussion—1 hour; Lecture—1 hour; Term Paper. Restricted to graduate standing or consent of instructor. Scientific ethics in biomedical studies, especially nutrition. Discussion and case study presentations on scientific integrity, fraud, misconduct, conflict of interest, human and animal research protections. Not open for credit to students who have completed NUT 492B. Effective: 2003 Spring Quarter.

NUT 290—Beginning Nutrition Seminar (2)
Lecture/Discussion—1 hour; Seminar—1 hour. Prerequisite(s): First-year graduate standing. Discussion and critical evaluation of topics in nutrition with emphasis on literature review and evaluation in this field. Students give oral presentations on relevant topics. Effective: 1997 Fall Quarter.

NUT 290C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Major professors lead research discussions with their graduate students.
Research papers are reviewed and project proposals presented and evaluated. Format will combine seminar and discussion style. (S/U grading only.) Effective: 1997 Winter Quarter.

NUT 291—Advanced Nutrition Seminar (1)
Seminar—1 hour. Prerequisite(s): Second-year graduate standing. Advanced topics in nutrition research. Multiple sections may be taken concurrently for credit. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

NUT 293A—Current Topics in Obesity, Food Intake and Energy Balance (3)
Discussion—1 hour; Lecture—1 hour; Seminar—1 hour. Prerequisite(s): NUT 129; Or graduate standing; Undergraduates with upper division standing with at least one writing course may enroll with consent of instructor. Current research and its evaluation. Principles of experimental design and scientific background for given article. Articles summarized for
posting on Internet for use by healthcare professionals. May be repeated for credit with consent of instructor. May be repeated for credit. Effective: 1997 Fall Quarter.

NUT 293B—Current Topics in Obesity, Food Intake, and Energy Balance with Special Topics (3)
Discussion—1 hour; Lecture—1 hour; Seminar—1 hour. Prerequisite(s): NUT 129; Graduate standing. Undergraduates with upper division standing with at least one writing course may enroll with consent of instructor. A continuation of course 293A, with additional special topics. May be repeated for credit up to 3 times with consent of instructor. May be repeated up to 3 time(s). Effective: 1997 Fall Quarter.

NUT 294A—Current Topics in Developmental Nutrition (2)
Seminar—2 hours. Prerequisite(s): NUT 114 or NUT 252; or Consent of Instructor. Restricted to graduate standing or consent of instructor. Effects of nutrition on embryology, morphogenesis, and developmental mechanisms. May be repeated for credit when topic differs. Effective: 2004 Winter Quarter.

NUT 297T—Supervised Teaching in Nutrition (1-3)
Variable. Prerequisite(s): Graduate standing in nutrition or consent of instructor. Practical experience in teaching nutrition at the university level; curriculum design and evaluation; preparation and presentation of material. Assistance in laboratories, discussion sections, and evaluation of student work. (S/U grading only.) Effective: 1997 Winter Quarter.

NUT 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Effective: 1997 Winter Quarter.

NUT 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

NUT 492A—Professionalism: An Academic Perspective (2)
Lecture/Discussion—2 hours. Prerequisite(s): Graduate standing. For graduate students in their initial quarter of residence. Professionalism topics are presented and examples drawn from both the biological and social sciences. Effective: 1997 Fall Quarter.

NUT 492C—Grant Writing (3)
Discussion—1.5 hours; Lecture—1.5 hours. Prerequisite(s): Graduate standing in Nutrition or consent of instructor. Preparation of grants for governmental agencies (particularly NIH and USDA) and private foundations. Students will write a research grant or
fellowship application. May be repeated once for credit with consent of instructor. May be repeated up to 1 time(s). Effective: 1997 Fall Quarter.

Comparative Literature

Comparative Literature | COM Information

(College of Letters and Science)

Sheldon Lu, Chairperson of the Department

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Faculty. http://complit.ucdavis.edu/people/faculty

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The Major Program

Comparative Literature is a dynamic major whose own self-definition is constantly shifting. Once mostly limited to the study of western European literature and its Greco-Roman classical past, today Comparative Literature has become a global interdisciplinary study of literature in original languages and other media (including cinema, television, fine arts, and opera, for example). Thus, we can define Comparative Literature as the study of literature and culture across national boundaries and throughout historical time.

The Program. Both the major and the minor programs in Comparative Literature allow students to combine courses in one or more national literature departments with courses in Comparative Literature. The introductory course sequence (COM 001 - 004) provides both an overview of ancient to contemporary literature and film and offers intensive practice in analytical thought. In addition, any one of the courses in the sequence satisfies the university composition requirement. All readings in undergraduate Comparative Literature courses are in English, but majors take upper division courses in at least one foreign literature in the original language.

Students majoring in Comparative Literature choose a first and second literature of concentration, one of which may be English. After the introductory sequence, each student's major course work is divided between courses in the two literatures of concentration and Comparative Literature courses. These Comparative Literature courses encourage students to take a broad view of a historical period, a theme, a genre, or a literary movement. The wide variety of options in the program permits great flexibility and encourages interdisciplinary connections among literature and philosophy, psychology, history, and the arts. Each student's plan of study must be approved by the major adviser at the beginning and end of each calendar year.

Advising. All Comparative Literature majors and minors must consult with their advisor, individually, at least once at the beginning and once at the end of each academic year.

Major Advisor. Consult the Department office.

Career Alternatives. A Comparative Literature major offers an excellent enhancement to pre-professional training, preparing students for graduate study in medicine, dentistry, veterinary medicine, and other science fields as well as law and business, besides of course journalism and publishing, teaching, or graduate study in literature.

Honors and Honors Program. Students, who meet the grade point requirement for graduation with honors and complete the requirements established by the College of Letters and Science, may be recommended by the department for graduation with high honors or highest honors on the basis of an evaluation of their academic achievements in the major and in the honors project in particular. Entrance into the honors program requires that a student have completed at least 135 units with a minimum grade point average of 3.500 in courses counted toward the major.

Candidates must write a senior thesis under the direction of a faculty member approved by the major adviser. For this purpose, in addition to fulfilling all other major requirements, honors candidates must enroll in 6 units of COM 194H during the first two quarters of the senior year.

Teaching Credential Subject Representative. See the Teaching Credential/M.A. Program.

Education Abroad Options. The department of Comparative Literature encourages students to study abroad, in the Summer Abroad program, the Quarter Abroad Program, or the Education Abroad Program. With the approval of a major adviser, applicable courses taken abroad may be accepted in the major or minor programs.

Graduate Study. The Comparative Literature Program offers the Ph.D. degree with a strong emphasis on individual research under the supervision of a faculty member. Candidates for the Ph.D., in addition to research of a comparative nature, study three literatures (one of which may be English and/or American) in the original languages, acquiring an extensive knowledge of the overall development of one. Students may choose to focus on a special topic instead of on a third literary tradition.

Within this framework, each student's program will be tailored to individual interests, and may center on a major historical period, such as the Renaissance or the modern age; a genre, such as lyric poetry, epic, drama, or the novel; or any other special emphasis approved by the Graduate Advisor.

Preparation. For admission to the Ph.D. Program candidates should have an undergraduate major in literature and reading ability in three foreign languages. The Group requires three letters of recommendation and a sample of recent written work, and it is recommended that students submit their GRE scores.

Preparatory Subject Matter **Units:** 16-46

COM 001	Major Books of Western Culture: The Ancient World	4
OR		
COM 002	Major Books of Western Culture: From the Middle Ages to the Enlightenment	4
COM 003	Major Books of Western Culture: The Modern Crisis	4
OR		
COM 004	Major Books of the Contemporary World	4

Two other lower division courses in Comparative Literature (selected from 1-53C excluding the 10 series. Cannot include the two required courses in the 1-4 series).

COM 005	Fairy Tales, Fables, and Parables	4
COM 006	Myths and Legends	4
COM 007	Literature of Fantasy and the Supernatural	4
COM 008	Utopias and their Transformations	4
COM 009	The Short Story and Novella	4
COM 011	Travel and the Modern World	4
COM 012	Introduction to Women Writers	4
COM 013	Dramatic Literature	3
COM 014	Introduction to Poetry	3
COM 020	Humans and the Natural World	4
COM 024	Animals in Literature	4
COM 025	Ethnic Minority Writers in World Literature	4
COM 053A	Literature of East Asia	4
COM 053B	Literature of South Asia	4
COM 053C	Literatures of the Islamic World	4

It is recommended that students who do not use a European language toward the major take one of the remaining required lower division courses in the 53 series, preferably the 53 course that relates to the region of the language the student is using to satisfy the upper division language requirement in the major.

Foreign language:
Sufficient preparation to ensure satisfactory performance at the upper division level.

Depth Subject Matter **Units:** 40

Choose five upper division Comparative Literature courses including at least one course in a major period (such as 164A-164B-164C-164D), movement (such as 168A-168B, 169) or genre (such as 160A-160B, 161A-161B, 163, 166A-166B) and including the following required courses:

COM 141	Introduction to Critical Theoretical Approaches to Literature and Culture	4
COM141 recommended for the junior year.		
COM 195	Senior Seminar in Comparative Literature	4
COM195 to be taken in the spring quarter before graduation.		

Three upper division literature courses in a language other than English.

Two additional upper division literature courses in Comparative Literature or in any other program including English or literature in translation.

Total: 56-86

Comparative Literature | COM M.A.

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Graduate Study. The Comparative Literature Program offers the Ph.D. degree with a strong emphasis on individual research under the supervision of a faculty member. Candidates for the Ph.D., in addition to research of a comparative nature, study three literatures (one of which may be English and/or American) in the original languages, acquiring an extensive knowledge of the overall development of one. Students may choose to focus on a special topic instead of on a third literary tradition.

Within this framework, each student's program will be tailored to individual interests, and may center on a major historical period, such as the Renaissance or the modern age; a genre, such as lyric poetry, epic, drama, or the novel; or any other special emphasis approved by the Graduate Advisor.

Preparation. For admission to the Ph.D. Program candidates should have an undergraduate major in literature and reading ability in three foreign languages. The Group requires three letters of recommendation and a sample of recent written work, and it is recommended that students submit their GRE scores.

Graduate Advisor. Consult the graduate advising office.

Comparative Literature | COM Ph.D.

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Graduate Study. The Comparative Literature Program offers the Ph.D. degree with a strong emphasis on individual research under the supervision of a faculty member. Candidates for the Ph.D., in addition to research of a comparative nature, study three literatures (one of which may be English and/or American) in the original languages, acquiring an extensive knowledge of the overall development of one. Students may choose to focus on a special topic instead of on a third literary tradition.

Within this framework, each student's program will be tailored to individual interests, and may center on a major historical period, such as the Renaissance or the modern age; a genre, such as lyric poetry, epic, drama, or the novel; or any other special emphasis approved by the Graduate Advisor.

Preparation. For admission to the Ph.D. Program candidates should have an undergraduate major in literature and reading ability in three foreign languages. The Group requires three letters of recommendation and a sample of recent written work, and it is recommended that students submit their GRE scores.

Graduate Advisor. Consult the graduate advising office.

Comparative Literature | COM Minor

(College of Letters and Science)

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The minor in Comparative Literature allows students to combine courses in Comparative Literature with courses in a national literature, including English or foreign literature in translation. There is no foreign language requirement for the minor.

Minor Advisor. Consult the Department office.

Advising. All Comparative Literature majors and minors must consult with their advisor, individually, at least once at the beginning and once at the end of each academic year.

Comparative Literature **Units:** 24

Choose one:

COM 001	Major Books of Western Culture: The Ancient World	4
COM 002	Major Books of Western Culture: From the Middle Ages to the Enlightenment	4
COM 003	Major Books of Western Culture: The Modern Crisis	4
COM 004	Major Books of the Contemporary World	4

Choose at least five upper division literature courses, at least four of which are in Comparative Literature; COM 141 and COM 195 recommended.

Courses should be chosen in consultation with, and with the approval of, the advisor.

Total: 24

Comparative Literature | COM Courses

Note. Many courses in Comparative Literature require that students have met the Entry Level Writing Requirement (ELWR) for the University of California.

Courses in COM:

COM 001—Major Books of Western Culture: The Ancient World (4)
Lecture/Discussion—4 hours. Prerequisite(s): Completion of Entry Level Writing Requirement. Introduction, through class discussion and frequent written assignments, to some of the major books of western civilization such as The Odyssey, Aeneid, Bible, and Augustine's Confessions. GE credit: AH, WC, WE. Effective: 2010 Spring Quarter.

COM 002—Major Books of Western Culture: From the Middle Ages to the Enlightenment (4)
Lecture/Discussion—4 hours. Prerequisite(s): Completion of Entry Level Writing Requirement. Introduction to the methods of inquiry applied to critical reading and the practice of writing. Focus on texts from the European Middle Ages to the eighteenth century; critical analysis of the historical-cultural developments in this period. GE credit: AH, WC, WE. Effective: 2010 Spring Quarter.

COM 003—Major Books of Western Culture: The Modern Crisis (4)
Lecture/Discussion—4 hours. Prerequisite(s): Completion of Entry Level Writing Requirement. Introduction, through class discussion and frequent written assignments, to the major literature and thought of the late eighteenth to the mid-twentieth century. GE credit: AH, WC, WE. Effective: 2010 Spring Quarter.

COM 004—Major Books of the Contemporary World (4)
Lecture/Discussion—4 hours. Prerequisite(s): Completion of entry level writing requirement. Comparative study of selected major Western and non-Western texts composed in the period from 1945 to the present. Intensive focus on writing about these texts, with frequent papers written about these works. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

COM 005—Fairy Tales, Fables, and Parables (4)
Discussion—1 hour; Lecture—3 hours. An introduction to fairy tales, fables, and parables as recurrent forms in literature, with such readings as tales from Aesop and Grimm, Chaucer and Shakespeare, Kafka and Borges, Buddhist and Taoist parables, the
Arabian Nights, and African American folklore. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 006—Myths and Legends (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the comparative study of myths and legends, excluding
those of Greece and Rome, with readings from Near Eastern, Teutonic, Celtic, Indian, Japanese, Chinese, African and Central American literary
sources. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 007—Literature of Fantasy and the Supernatural (4)
Discussion—1 hour; Lecture—3 hours. The role of fantasy and the supernatural in literature: tales of magic, hallucination, ghosts, and metamorphosis, including diverse authors such as Shakespeare, P'u Sung-Ling, Kafka, Kawabata, Fuentes, and Morrison. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 008—Utopias and their Transformations (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. A consideration, in literary works from different ages, of visionary and rational perceptions of a lost paradise, Golden Age, or Atlantis-and of the inhuman nightmares that can result from perversions of the utopian dream of perfection. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

COM 009—The Short Story and Novella (4)
Lecture/Discussion—3 hours; Term Paper. An introduction to shorter forms of prose fiction by major authors of different countries, with special emphasis on the modern period. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 010A—Master Authors in World Literature; Gilgamesh, Ramayana, Beowulf, Nibelungenlied (2)
Lecture/Discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Gilgamesh, Ramayana, Beowulf, Nibelungenlied. May be repeated for credit in different subject area. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 010B—Master Authors in World Literature; Metamorphoses, Decameron, Arabian Nights, Canterbury Tales (2)
Lecture/Discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Metamorphoses, Decameron, Arabian Nights, Canterbury Tales. May be repeated for credit in different subject area. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 010C—Master Authors in World Literature; Chanson de Roland, El Cid, Igor's Campaign, Morte D'Arthur (2)
Lecture/Discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Chanson de Roland, El Cid, Igor's Campaign, Morte D'Arthur. May be repeated for credit in different subject area. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 010D—Master Authors in World Literature; Sakuntala, Tristan and Isolde, Aucassin and Nicolette, Gawain and the Green Knight (2)
Lecture/Discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Sakuntala, Tristan and Isolde, Aucassin and Nicolette, Gawain and the Green Knight. May be repeated for credit in different subject area. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 010E—Master Authors in World Literature; Swift, Rabelais, La Celestina, Simplicissimus (2)
Lecture/Discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Swift, Rabelais, La Celestina, Simplicissimus. May be repeated for credit in different subject area. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 010F—Master Authors in World Literature; Cervantes, Saikaku, Fielding, Voltaire (2)
Lecture/Discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Cervantes, Saikaku, Fielding, Voltaire. May be repeated for credit in different subject area. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 010G—Master Authors in World Literature; Machiavelli, Shakespeare, Lope de Vega/Calderón, Molière/Racine, Lessing/Schiller (2) (2)
Lecture/Discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Machiavelli, Shakespeare, Lope de Vega/Calderón, Molière/Racine, Lessing/Schiller. May be repeated for credit in different subject area. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 010H—Master Authors in World Literature; Goethe, Byron, Stendhal, Pushkin, Lermontov (2)
Lecture/Discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Goethe, Byron, Stendhal, Pushkin, Lermontov. May be repeated for credit in different subject area. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 010I—Master Authors in World Literature; Hoffmann, Gogol, Poe, Hawthorne, Maupassant, Chekhov, Melville (2)
Lecture/Discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Hoffmann, Gogol, Poe, Hawthorne, Maupassant, Chekhov, Melville. May be repeated for credit in different subject area. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 010J—Master Authors in World Literature; Flaubert, Twain, Turgenev, Galdós, Ibsen (2)
Lecture/Discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Flaubert, Twain, Turgenev, Galdós, Ibsen. May be repeated for credit in different subject area. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 010K—Master Authors in World Literature; Balzac, Dostoevski/Tolstoi, Hardy, Shaw, Strindberg (2)
Lecture/Discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Balzac, Dostoevski/Tolstoi, Hardy, Shaw, Strindberg. May be repeated for credit in different subject area. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 010L—Master Authors in World Literature; Unamuno, Svevo, Conrad, Gide, Kafka, Faulkner (2)
Lecture/Discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Unamuno, Svevo, Conrad, Gide, Kafka, Faulkner. May be repeated for credit in different subject area. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 010M—Master Authors in World Literature; Rilke/Yeats, Joyce/Woolf, Mann/Céline, Bulgakov/Tanizaki, O'Neill/Brecht, Lorca/Pirandello (2)
Lecture/Discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Rilke/Yeats, Joyce/Woolf, Mann/Céline, Bulgakov/Tanizaki, O'Neill/Brecht, Lorca/Pirandello. May be repeated for credit in different subject area. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 010N—Master Authors in World Literature; Camus/Sartre, García Márquez/Grass, Borges/Sarraute, Bellow/Nabokov, Beckett/Pinter, Genet/Dürrenmatt (2)
Lecture/Discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Camus/Sartre, García Márquez/Grass, Borges/Sarraute, Bellow/Nabokov, Beckett/Pinter, Genet/Dürrenmatt. May be repeated for credit in different subject area. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 011—Travel and the Modern World (4)
Extensive Writing; Lecture/Discussion—3 hours. Examination of travel as a quintessential human activity and experience of global modernity and cross-cultural encounters from the 18th to the 21st century with an emphasis on German-speaking culture. Travelogues, literature, art, memoirs, and films in English translation. (GER 011.) GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

COM 012—Introduction to Women Writers (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Completion of entry level writing requirement. Survey of fiction, drama, and poetry by women writers from all continents. Concerns of women compared in light of their varied social and cultural traditions. Literary analysis of voice, imagery, narrative strategies and diction. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

COM 013—Dramatic Literature (3)
Lecture—3 hours. Prerequisite(s): Completion of entry level writing requirement. Introduction, through careful reading of selected plays, to some of the major forms of Western drama, from the earliest tragedies of ancient Greece to the contemporary American theater. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

COM 014—Introduction to Poetry (3)
Lecture/Discussion—3 hours. Prerequisite(s): Completion of entry level writing requirement. Comparative study of poetry in a variety of lyric and other poetic forms from different historical periods and different linguistic, national, and cultural traditions. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

COM 020—Humans and the Natural World (4)
Lecture/Discussion—3 hours; Term Paper. Changing relationship between humans and the natural environment in ancient and modern authors as Virgil, Li Po, Basho, Darwin, and Thoreau. GE credit: AH, WC, WE. Effective: 2007 Fall Quarter.

COM 022—Literature of the Abnormal Psyche (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of Entry Level Writing Requirement. Representations of the human psyche in literature and other media (film, visual arts, music) spanning cultures and historical contexts. Depictions of abnormal psychological states, including madness, obsession, and self-fragmentation. Textual interpretation informed by psychological theories. Rhetorical persuasion and nuanced argumentation. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

COM 024—Animals in Literature (4)
Lecture—3 hours; Term Paper/Discussion. Prerequisite(s): Completion of Entry Level Writing Requirement. Study of literary texts from various periods and cultures whose theme is the representation of animals. GE credit: AH, WC, WE. Effective: 2012 Fall Quarter.

COM 025—Ethnic Minority Writers in World Literature (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ELWR (Entry Level Writing Requirement). Consideration of a broad range of writers who speak from an ethnic perspective different from the nominally or politically dominant culture of their respective countries and who explore the challenges faced by characters significantly affected by their ethnic minority status. GE credit: AH, WC, WE. Effective: 2011 Winter Quarter.

COM 053A—Literature of East Asia (4)
Lecture—3 hours; Term Paper. Introduction to representative masterpieces of East Asia with readings
from such works as The Story of the Stone, The Peach Blossom Fan, T'ang and Sung poetry, classical Japanese poetry, drama, and travel diaries, and The Tale of Genji. GE credit: AH, OL, WC, WE. Effective: 2015 Spring Quarter.

COM 053B—Literature of South Asia (4)
Lecture—3 hours; Term Paper. Introduction to representative masterpieces of South Asia with readings
from such works as the Mahabharata and Ramayana, The Cloud Messenger, Shakuntala, The Little Clay Cart, and the stories and poems of both
ancient and modern India and Southeast Asia. GE credit: AH, OL, WC, WE. Effective: 2015 Spring Quarter.

COM 053C—Literatures of the Islamic World (4)
Lecture—3 hours; Term Paper. Introduction to classical Islamic culture through translations of literature primarily from Arabic and Persian, as well as other languages. Topics include the concept of the self, society and power, spirituality, the natural world, the cosmos, and the supernatural. GE credit: AH, OL, WC, WE. Effective: 2015 Fall Quarter.

COM 090X—Lower Division Seminar (1-2)
Seminar—1-4 hours. Prerequisite(s): Consent of Instructor. Examination of a special topic in a small group setting. Effective: 1997 Winter Quarter.

COM 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Restricted to lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 100—World Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): Completion of entry level writing requirement, upper division standing, or consent of instructor. Comparative, cross-cultural study of a topic, theme, or movement in world cinema beyond the boundary of a single national tradition. Topics may include "postsocialist cinemas in East Europe and Asia," "cinema and globalization," and "popular Asian cinemas" May be repeated up to 3 time(s) the topic differs. GE credit: AH, VL, WC, WE. Effective: 2017 Spring Quarter.

COM 110—Hong Kong Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): Completion of entry level writing requirement, upper division standing, or consent of instructor. Hong Kong cinema, its history, industry, styles, genres, directors, and stars. Special attention to its polyglot, multicultural, transnational, colonial, and postcolonial environment. GE credit: AH, VL, WC, WE. Effective: 2017 Spring Quarter.

COM 112—Japanese Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Upper-division standing Introduction to Japanese cinema from early silent films to the present. Explores important directors, genres, stars, themes and techniques in relation to specific historical and cultural contexts. Lectures and readings in English. Films in Japanese with English subtitles. GE credit: AH, VL, WC, WE. Effective: 2018 Spring Quarter.

COM 120—Writing Nature: 1750 to the Present (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. Study of representations, descriptions, and discussions of humankind's problematical relationship with the non-human world in texts written in a variety of European and American traditions between 1750 and the present. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

COM 135—Women Writers (4)
Lecture/Discussion—3 hours; Term Paper. An exploration of women's differing views of self and society as revealed in major works by female authors of various times and cultures. Readings, principally of fiction, will include such writers as Lady Murasaki, Mme de Lafayette, and Charlotte Bronte. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 138—Gender and Interpretation in the Renaissance (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. Critical analysis of Renaissance texts with primary focus on issues such as human dignity, education and gender politics; "high" and "low" culture and its relation to literary practices. (ITA 141.) GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

COM 139—Shakespeare and the Classical World (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. Shakespeare's representations of the classical world in the light of selected ancient texts and Renaissance conceptions of Antiquity, with special attention to the depiction of politics and history. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

COM 140—Thematic and Structural Study of Literature (4)
Lecture/Discussion—3 hours; Term Paper. Interpretation of selected works illustrating the historical evolution
of themes, as well as of formal and structural elements. May be repeated for credit. GE credit: AH, WE. Effective: 1997 Winter Quarter.

COM 141—Introduction to Critical Theoretical Approaches to Literature and Culture (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. Introduction to critical theory and its use for interpreting literary texts, film, and media forms in global culture. (CRI 101.) GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

COM 142—Critical Reading and Analysis (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Close reading of selected texts; scrutiny of very limited amount of material, with attention to the problems of texts in translation. GE credit: AH, WE. Effective: 1997 Winter Quarter.

COM 144—The Grotesque (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. Study of the "grotesque" in selected texts from the Renaissance to the 20th century, with attention to the "grotesque" as a means of social, cultural, and political commentary, as well as of aesthetic innovation. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

COM 145—Representations of the City (4)
Discussion—1 hour; Extensive Writing; Lecture—2 hours. Exploration of the representation of the city in major translated literary texts from a variety of literary traditions and periods. Emphasis on the diversity of urban experience in literature. Topics include public and private space, memory, and gender. GE credit: AH, WC, WE. Effective: 2004 Spring Quarter.

COM 146—Myth in Literature (4)
Lecture—3 hours; Term Paper. Prerequisite(s): COM 006 recommended. Comparative study of different versions of one or more central myths, with attention to their cultural settings, artistic and literary forms of representation, as well as to their psychological dimensions. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 147—Modern Jewish Writers (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. Problems of the modern Jewish experience from the perspective of the writer's construction of the self in relation to the future and to the non-Jew. Draws upon Russian, German, Yiddish, and American traditions. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

COM 148—Mystical Literatures of South Asia and the Middle East (4)
Lecture/Discussion—3 hours; Term Paper. Exploration of the comparative mystical literatures of major religious traditions, with a focus on those produced in South Asia and the Middle East, although including other traditions. GE credit: AH, WC, WE. Effective: 2010 Fall Quarter.

COM 151—Colonial and Postcolonial Experience in Literature (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. A literary introduction to the cultural issues of colonialism and postcolonialism through reading, discussing and writing on narratives which articulate diverse points of view. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

COM 152—Literature of the Americas (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. Study of the various stylistic, historical, social and cultural factors that contribute to a hemispheric vision of American literature, encompassing works by Canadian, United States, Caribbean, Brazilian, and Spanish-American writers. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

COM 152S—Literature of the Americas (Taught in Latin America) (4)
Fieldwork—6 hours; Lecture/Discussion—6 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. Various stylistic, historical, social, and cultural factors that contribute to a hemispheric vision of American literature, encompassing works by Canadian, United States, Caribbean, Brazilian, and Spanish-American writers. Course taught abroad. May be repeated up to 1 time(s). GE credit: AH, VL, WC, WE. Effective: 2016 Fall Quarter.

COM 153—The Forms of Asian Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. Introduction to distinctive Asian literary forms, such as haiku, noh, the Chinese novel and tale, through reading of major works. Comparison with Western genres and study of native and Western critical traditions. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

COM 154—African Literature (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Completion of Entry Level Writing Requirement (ELWR). Colonial and post-colonial sub-Saharan African literature and the African oral traditions from which it emerged. Genres and themes of African literature from the nineteenth century to the present. (AAS 153.) GE credit: AH, WC, WE. Effective: 2012 Spring Quarter.

COM 155—Classical Literatures of the Islamic World 600-1900 (4)
Lecture—3 hours; Term Paper. Major texts from Arabic, Persian, Ottoman Turkish and Urdu literature with attention to historical and cross-cultural context. Includes epic, romance, various genres of lyric poetry, fairy tales, historical and religious stories, mystical and philosophical narratives, and essays. GE credit: AH, OL, WC, WE. Effective: 2014 Fall Quarter.

COM 156—The Ramayana (4)
Lecture—3 hours; Term Paper. Exploration of the Indian epic, Ramayana, through the lens of literature, performance, and visual art. Emphasis on the text's diversity and its contemporary global relevance. Topics include Ramayanas in Southeast Asia, and in various South Asian diaspora communities. (RST 158.) GE credit: AH, WC, WE. Effective: 2015 Spring Quarter.

COM 157—War and Peace in Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): COM 001 or COM 002 or COM 003; or Consent of Instructor. Through study of a few major works from Western and non-Western literature the course seeks to illuminate the way in which literature from antiquity to the present has dealt with the antinomy peace/war through the ages. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 158—The Detective Story as Literature (4)
Lecture—3 hours; Term Paper. Study of the origins, literary and social background, development and
implications of the literature of detection in a comparative context. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 159—Women in Literature (4)
Lecture—3 hours; Term Paper. Prerequisite(s): COM 001, COM 002, COM 003, or COM 004 or the equivalent recommended. Portrayals of women in literature, comparing selected heroines who represent a particular theme, period, or genre. Texts range around the globe and from ancient to modern works, such as Lysistrata, Emma, Hedda Gabler, The Makioka Sisters, and Top Girls. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 160A—The Modern Novel (4)
Lecture/Discussion—3 hours; Term Paper. The changing image of man and his world as seen in novels by such writers as Joyce, Proust, and Mann. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 160B—The Modern Drama (4)
Lecture/Discussion—3 hours; Term Paper. Readings in representative authors such as Ibsen, Strindberg, Chekhov, Pirandello and Brecht. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 161A—Tragedy (4)
Lecture/Discussion—3 hours; Term Paper. Persistent and changing aspects of the tragic vision in literature from ancient times to the present. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 161B—Comedy (4)
Lecture/Discussion—3 hours; Term Paper. Comic attitudes towards life in literary works of different ages. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 162—Writing Love and War in South Asia (4)
Lecture—3 hours; Term Paper. Comparative study of the themes and motifs of love and war in the literature of South Asia. Includes a discussion of Sanskrit epics, classical erotic court poetry, medieval heroic poetry, mystical compositions and colonial and post-colonial fiction. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

COM 163—Biography and Autobiography (4)
Lecture/Discussion—3 hours; Term Paper. Portrayals of a human life in biographies and/or autobiographies of different countries and ages. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 164A—The European Middle Ages (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. Medieval literary genres as the foundation for modern literary forms. Topics and themes as love, God, vision, nature, history and politics, and sign theory. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

COM 164B—The Renaissance (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. Literature, new science, gender, politics, and exploration in European Renaissance. Readings in Petrarch, Machiavelli, Montaigne, Tasso, Ariosto, Stampa, Shakespeare, Labé and Aphra Behn. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

COM 164C—Baroque and Neoclassicism (4)
Lecture/Discussion—3 hours; Term Paper. Readings in major authors such as Calderón, Corneille, Pascal, Racine, Milton, and Grimmelshausen, with consideration of the tension between the expansive energies of the "baroque" and the restraints of dogma and reason. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 164D—The Enlightenment (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. Enlightenment writers such as Swift, Voltaire, Sterne, Rousseau, Wollstonecraft, and Kant. Emphasis on the revolutionary impact of eighteenth-century philosophical ideas and literary forms on modern political, social, and aesthetic culture. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

COM 165—Caribbean Literatures (4)
Lecture/Discussion—4 hours. Prerequisite(s): Completion of entry level writing requirement. Comparative approach to the multi-lingual, multi-cultural literatures of the Caribbean. Works from English, French, and Spanish speaking regions with special attention to problems of identity, diaspora and resistance, class, gender, race. Not open to students who have completed COM 165S. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

COM 165S—Caribbean Literatures (4)
Lecture/Discussion—4 hours. Restricted to upper division standing in the student's discipline of origin. Comparative approach to the multi-lingual, multi-cultural literatures of the Caribbean. Works from English, French, and Spanish speaking regions with special attention to problems of identity, diaspora and resistance, class, gender, race. Taught at the University of Havana, Cuba. Not open to students who have completed COM 165. GE credit: AH, WC, WE. Effective: 2004 Fall Quarter.

COM 166—Literatures of the Modern Middle East (4)
Lecture/Discussion—3 hours; Term Paper. Major translated works in modern Middle Eastern and North African Literature, including Arabic, Hebrew, Persian, and Turkish. Social and historical formation, with topics such as conflict and coexistence, journeys, and displaced people, gender and family. GE credit: AH, WC, WE. Effective: 2007 Fall Quarter.

COM 166A—The Epic (4)
Lecture/Discussion—3 hours; Term Paper. Study of various forms of epic poetry in both the oral and literary
traditions. May be repeated for credit in different subject area. May be repeated for credit. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 166B—The Novel (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. The novel as global genre: picaresque, epistolary, Bildungsroman, historical novel, contemporary forms. May be repeated up to 1 time(s). GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

COM 167—Comparative Study of Major Authors (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Pivotal works of artists in the Western mainstream, such as Dante, Shakespeare, Cervantes, Goethe, Tolstoi, Proust, and Joyce. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 168A—Romanticism (4)
Discussion—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. Introduction to the Romantic movement with emphasis upon Romantic concepts of the self, irony, love, the imagination and artistic creativity, and the relationship of the individual to nature and society. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

COM 168B—Realism and Naturalism (4)
Discussion—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Novels and plays by Dickens, Zola, Flaubert, Dreiser, Ibsen, and Strindberg investigate marriage and adultery, the city and its perils, the hardships of industrialization, the war between the sexes, the New Woman, and other 19th-century themes. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 169—The Avant-Garde (4)
Lecture/Discussion—3 hours; Term Paper. Studies in movements such as surrealism, expressionism and the absurd. GE credit: AH, WE. Effective: 1997 Winter Quarter.

COM 170—The Contemporary Novel (4)
Lecture—3 hours; Term Paper. Study of important novels from different parts of the world, including
Asia, Africa, Latin America, Europe, and the United States, in the period from the Second World War to the present. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 172—A Story for a Life: The Arabian Nights (4)
Lecture/Discussion—3 hours; Term Paper. In-depth exploration of The Arabian Nights, the best-known work of pre-modern Arabic literature and a major work of world literature. Analysis of the work in its historical context and in comparison to other frame tales in world literature. (ARB 140 and MSA 121C.) GE credit: AH, WC, WE. Effective: 2016 Winter Quarter.

COM 175—Shahnameh: The Persian Book of Kings (4)
Lecture/Discussion—3 hours; Term Paper. In-depth analysis of the Persian Book of Kings (Shahnameh) by Abu al-Qasim Ferdowsi (d. 1020 CE) in its historical context with a comparative perspective on the role of this work in Persian and world literature. (MSA 121A.) GE credit: AH, WC, WE. Effective: 2015 Winter Quarter.

COM 180—Selected Topics in Comparative Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of Subject A requirement and at least one course in literature. Study of a selected topic or topics appropriate to student and faculty
interests and areas of specialization of the instructor. May be repeated up to 1 time(s). GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 180S—Selected Topics in Comparative Literature (Taught Abroad) (4)
Extensive Writing; Fieldwork—6 hours; Lecture/Discussion—6 hours. Prerequisite(s): Subject A, and at least one course in literature, or consent of instructor. Study of selected topics appropriate to student and faculty interests and areas of specialization of the instructor. May be repeated once for credit when topic differs. May be repeated up to 1 time(s). GE credit: AH, WC, WE. Effective: 2007 Fall Quarter.

COM 192—Internship in Comparative Literature (1-12)
Internship—1-12 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Restricted to Comparative Literature majors. Internships in fields where students can practice their skills. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2013 Fall Quarter.

COM 194H—Special Study for Honors Students (1-5)
Independent Study—1-5 hours. Prerequisite(s): Consent of Instructor. Open only to majors of senior standing who qualify for Honors Program. Guided research, under the direction of a faculty member approved by the Program Director, leading to a senior honors thesis on a comparative topic. May be repeated for credit. (P/NP grading only.) GE credit: AH, WE. Effective: 1997 Winter Quarter.

COM 195—Senior Seminar in Comparative Literature (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Senior standing as a Comparative Literature major or minor or consent of instructor. Open only to Comparative Literature majors or minors in or consent of instructor. Advanced study of selected topics and texts in Comparative Literature, with explicit emphasis on the theoretical and interpretive approaches that define Comparative Literature as a discipline and distinguish it from other literary disciplines. Required for the major. GE credit: AH, WE. Effective: 2012 Fall Quarter.

COM 197T—Tutoring in Comparative Literature (1-5)
Discussion—2-4 hours. Prerequisite(s): Consent of Instructor. Upper division standing with declared major in Comparative Literature. Tutoring in undergraduate courses including leadership in small voluntary discussion groups affiliated with current courses offered by Comparative Literature. May be repeated up to 6 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 198—Directed Group Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 210—Topics and Themes in Comparative Literature (4)
Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing in Comparative Literature, English, or a foreign-language literature, or consent of instructor. Comparative, interpretive study of the treatment of specific topics and themes in literary works from various periods, societies, and cultures, in light of these works' historical and sociocultural contexts. May be repeated for credit. Effective: 1997 Winter Quarter.

COM 214—Approaches to Lyric Poetry (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Analysis and interpretation of poetic texts in different historical
periods and national literatures, with consideration of major theoretical developments in the understanding of poetic discourse. Effective: 1998 Fall Quarter.

COM 215—Forms of the Spiritual Quest (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor; knowledge of at least one foreign language. An exploration, culminating in a research paper, of changing forms of the quest for transcendence in different cultures, mainly in major works of Western literature, but also in other traditions and from the perspectives of other disciplines. Effective: 1997 Winter Quarter.

COM 220—Literary Genres (4)
Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing in Comparative Literature, English, or a foreign-language literature or consent of instructor. Comparative literature of major works in a particular genre from various linguistic, national, and cultural traditions, with particular attention to historical developments within the genre and to genre theory. May be repeated for credit. Effective: 1997 Winter Quarter.

COM 238—Gender and Interpretation (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Study of how literary texts from different periods, societies, and
cultures represent gender roles and gender hierarchy, building on recent work on gender in anthropology, literature, psychology, and women's studies. Effective: 1998 Fall Quarter.

COM 250A—Research in Primary Literature (4)
Project (Term Project). Individually guided research in the primary literature of concentration, under the supervision of a faculty member culminating in a conference paper. Required of M.A. and Ph.D. candidates. Effective: 2011 Fall Quarter.

COM 250B—Research in Second Literature (4)
Project (Term Project). Individually guided research in the secondary literature of concentration, under the supervision of a faculty member, culminating in a paper. Required of Ph.D. candidates. Effective: 2011 Fall Quarter.

COM 250C—Research in Third Literature or Special Topic (4)
Conference—1 hour; Independent Study—8 hours; Term Paper. Individually guided research, under the supervision of a faculty member, in the third literature of concentration or on a special topic culminating in a paper. Required of Ph.D. candidates. Effective: 2016 Winter Quarter.

COM 250D—Dissertation Prospectus (4)
Independent Study. Individually guided writing of the dissertation prospectus under supervision of a faculty member. Must be taken prior to completion of the qualifying exam. Required of Ph.D. candidates. (S/U grading only.) Effective: 2006 Spring Quarter.

COM 255—Proseminar: Comparative Literature: Past, Present, Future (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing. Restricted to graduate students. History, theory, and methodology of comparative literature. Issues of national literature, world literature, and comparative literature. Relation of comparative literature to other disciplines and diverse expressions. Discussion of current problems in teaching and research in comparative literature. Required for MA/PhD. Effective: 2016 Winter Quarter.

COM 260—Contexts of the 19th-Century Novel (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Development in 19th-century history, culture, and society in relation
to major trends in the 19th-century novel. Effective: 1998 Fall Quarter.

COM 297—Directed Independent Study in Primary, Secondary, or Third Literature (4)
Conference—1 hour; Independent Study—8 hours; Term Paper. Prerequisite(s): Consent of Instructor. Restricted to graduate students. Directed Independent Study in Primary, Secondary, or Third Literature culminating in term paper. Only for languages with no graduate course offerings. May be repeated for credit when no seminars are available and topic differs. Effective: 2016 Spring Quarter.

COM 298—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

COM 299—Individual Study (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

COM 299D—Special Study for the Doctoral Dissertation (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

COM 390—Teaching Comparative Literature in College (4)
Discussion—2 hours; Lecture—2 hours. Prerequisite(s): Appointment as a Comparative Literature Associate Instructor or consent of instructor. Restricted to graduate students. Discussion of the theory and practice of teaching composition at the college level in a department of comparative literature in relation to the major cultural and social developments and with specific application to the introductory courses 1, 2, 3, 4. (S/U grading only.) Effective: 2016 Winter Quarter.

COM 392—Teaching Internship in Comparative Literature (2)
Discussion—2 hours. Restricted to graduate students. Regular consultations between the student instructor teaching Comparative Literature courses and a supervisor. Specifically designed for first-time TAs in COM 5, 6, 7, and 10. Instruction in the teaching of writing in a literature course, grading of papers, leading discussions. (S/U grading only.) Effective: 2016 Winter Quarter.

COM 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Computational Biology Minor; Computer Science Engineering

Computational Biology Minor; Computer Science Engineering | Computational Biology Minor

(College of Engineering)

Matthew Farrens, Ph.D., Chairperson of the Department

Department Office. 2063 Kemper Hall 530-752-7004; http://www.cs.ucdavis.edu

The minor in Computational Biology will provide to students with engineering, physical science or biological science majors the foundations necessary to build efficient computational models and algorithms, use state-of-the-art techniques for scientific analysis and create scalable infrastructure environments for biological and biotechnological applications.

Students must take a total of 19-24 upper division units, with two required courses and 11-12 units of upper division electives, as specified below. A minimum GPA of 2.000 is required for coursework in the minor. Students should note that most of the courses listed below have lower division prerequisites. In particular, required course ECS 122A has a prerequisite chain of ECS 020, 036A, 036B, and 036C. No more than one course of Upper Division work will be permitted for overlap between any major and the minor.

Minor Advisors. T. Pham, V. Filkov, D. Gusfield, P. Koehl, J. Sison, I. Tagkopoulos

Computer Science **Units:** 20

Required Courses

ECS 122A	Algorithm Design and Analysis	4
ECS 124	Theory and Practice of Bioinformatics	4

Electives

Choose at least one biology course:

MCB 121	Advanced Molecular Biology	3
MCB 124	Macromolecular Structure and Function	4
MCB 182	Principles of Genomics	3
EVE 100	Introduction to Evolution	4
EVE 101	Introduction to Ecology	4
EVE 102	Population and Quantitative Genetics	4
EVE 103	Phylogeny, Speciation and Macroevolution	4
EVE 131	Human Genetic Variation and Evolution	3
BIS 101	Genes and Gene Expression	4
BIS 104	Cell Biology	3
BIS 122	Population Biology and Ecology	3

Choose at least one computational or statistics course:

ECS 130	Scientific Computation	4
ECS 132	Probability and Statistical Modeling for Computer Science	4
ECS 140 (Discontinued 1993)		
ECS 145	Scripting Languages and Their Applications	4
ECS 158	Programming on Parallel Architectures	4
ECS 160	Software Engineering	4
ECS 165A	Database Systems	4
ECS 170	Introduction to Artificial Intelligence	4
ECS 177	Scientific Visualization	4
STA 130A	Mathematical Statistics: Brief Course	4
STA 141	Statistical Computing (Discontinued)	4
BIT 150	Applied Bioinformatics	4
BIS 132	Introduction to Dynamic Models in Modern Biology	4

Choose at least one computational biology and bioinformatics course:

ECS 129	Computational Structural Bioinformatics	4
BIS 132	Introduction to Dynamic Models in Modern Biology	4
BIM 117	Modeling Strategies for Biomedical Engineering	4
BIT 150	Applied Bioinformatics	4

Total: 20

Computer Engineering; Electrical & Computer Engineering

Computer Engineering; Electrical & Computer Engineering | Computer Engineering B.S.

(College of Engineering)

Saif Islam, Ph.D., Chairperson of the Department

Josh Hihath, Ph.D., Vice Chairperson for Undergraduate Studies

Khaled Abdel-Ghaffar, Ph.D., Vice Chairperson for Graduate Studies

Department Office. 2064 Kemper Hall 530-752-0583; http://www.ece.ucdavis.edu

Faculty. http://www.ece.ucdavis.edu/people/faculty/

The Electrical and Computer Engineering Undergraduate Programs

The department administers two undergraduate curricula in the College of Engineering: (1) the Electrical Engineering curriculum and (2) the Computer Engineering curriculum.

Integrated Degree Program (IDP). The IDP leads to both the Bachelor of Science and the Master of Science degrees. The program provides a student the opportunity to obtain superior breadth and depth of technical material. The IDP program in the Department of Electrical and Computer Engineering is available only to UC Davis undergraduates with strong academic records enrolled in the Electrical Engineering, Computer Engineering or Applied Physics curricula. Applicants in their junior year must apply for the IDP by March 31. For more information on IDP, see http://www.ece.ucdavis.edu.

Mission. Under its land grant status, the University of California has a mission to provide the state with the trained workforce it needs and to advance knowledge and research in directions that contribute to the general welfare of the state and the nation. The Department of Electrical and Computer Engineering contributes to the mission of the University in three ways. First, its undergraduate and graduate education programs seek to provide students with an understanding of the fundamental principles of electrical and computer engineering, the skills needed to solve the complex technological problems of modern society and the ability to continue to learn and develop throughout their careers. Second, through its research programs, the department contributes to the development and progress of electronics, communications, and computer technology. Finally, the department helps to transfer research results to industry through publication, public service and professional activities.

Objectives. *Teaching*—To provide undergraduate students with sufficient breadth to allow them to participate in teams, continue their own education after graduation and select a focus area intelligently; to provide undergraduate students with sufficient depth in a narrower discipline to allow them to develop the ability to solve complex engineering problems; to educate the students in the graduate program to be leaders in industry or to do meaningful research in industry, government or academia. *Research*—To develop and maintain research programs that produce useful technological advances while simultaneously training the next generation of researchers and leaders; to update and/or shift the foci of these programs frequently in response to the needs of our constituency and the nation; to provide a stimulating environment that encourages our graduate students to develop their abilities as far as possible.

Computer Engineering Undergraduate Program

The Computer Engineering program is accredited by the Engineering Accreditation Commission of ABET; see http://www.abet.org.

Exclusive of General Education units, the minimum number of units required for the Computer Engineering undergraduate major is 148.

Students are encouraged to adhere carefully to all prerequisite requirements. The instructor is authorized to drop students from a course for which stated prerequisites have not been completed.

Lower Division Required Courses **Units:** 85

MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3
MAT 022AL	Linear Algebra Computer Laboratory	1
MAT 022B	Differential Equations	3
PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5
PHY 009D	Modern Physics	4

CHE 002A	General Chemistry	5
ECS 020	Discrete Mathematics For Computer Science	4
ECS 030	Programming and Problem Solving (Discontinued)	4
OR		
ECS 036A	Programming and Problem Solving	4
ECS 036B	Software Development and Object-Oriented Programming in C++	4
OR		
ECS 040	Software Development and Object-Oriented Programming (Discontinued)	4
ECS 036C	Data Structures, Algorithms, and Programming	4
OR		
ECS 060	Data Structures and Programming (Discontinued)	4
EEC 001	Introduction to Electrical and Computer Engineering	1
EEC 010	Introduction to Digital and Analog Systems	4

Electrical and Computer Engineering 10 is designed for sophomore students and is not recommended for upper-division students. Transfer and change of major students who do not take Electrical and Computer Engineering 10 will substitute four additional units of upper-division electives.

ENG 017	Circuits I	4
EEC 018	Digital Systems I	5

Choose one; a grade of C- or better is required:

ENL 003	Introduction to Literature	4
UWP 001	Expository Writing	4
UWP 001Y	Expository Writing	4
UWP 001V	Expository Writing	4
COM 001	Major Books of Western Culture: The Ancient World	4
COM 002	Major Books of Western Culture: From the Middle Ages to the Enlightenment	4
COM 003	Major Books of Western Culture: The Modern Crisis	4
COM 004	Major Books of the Contemporary World	4
NAS 005	Introduction to Native American Literature	4

Choose one:

CMN 001	Introduction to Public Speaking	4
CMN 003	Interpersonal Communication Competence	4
ENG 003	Introduction to Engineering Design	4

Upper Division Required Courses **Units:** 67-70

EEC 100	Circuits II	5
EEC 110A	Electronic Circuits I	4
EEC 140A	Principles of Device Physics I	4
EEC 161	Probabilistic Analysis of Electrical & Computer Systems	4
EEC 170	Introduction to Computer Architecture	4

ECS 154B may be substituted for the EEC 170 requirement.

EEC 172	Embedded Systems	4

EEC 173A	Computer Networks	4
EEC 180	Digital Systems II	5
EEC 196	Issues in Engineering Design	1
ECS 122A	Algorithm Design and Analysis	4
ECS 150	Operating Systems and System Programming	4

Choose one:

ENG 160	Environmental Physics and Society	3
ENG 190	Professional Responsibilities of Engineers	3
ECS 188	Ethics in an Age of Technology	4

Upper-Division Electives

Choose one design project course:

EEC 119A	Integrated Circuit Design Project	3
EEC 119B	Integrated Circuit Design Project	3
EEC 134A	RF/Microwave Systems Design	3
EEC 134B	RF/Microwave Systems Design	3
EEC 136A	Electronic Design Project	3
EEC 136B	Electronic Design Project	3
EEC 181A	Digital Systems Design Project	3
EEC 181B	Digital Systems Design Project	3
EEC 193A	Senior Design Project	3
EEC 193B	Senior Design Project	3
EEC 195A	Autonomous Vehicle Design Project	3
EEC 195B	Autonomous Vehicle Design Project	3

Choose one upper division EEC or ECS course; excluding ECS 132, 155, 157, 188, 154A, 154B.

Technical Electives

CHE 002B, 002C, and any upper-division course; except CHE 195, 197.
ENG 035, 045, and any upper-division engineering course not used in satisfaction of core degree requirements; excluding ENG 100, 160, 190 (each restricted to one unit of technical elective), 198, ECS 132, 155, 157, 188, 154A, 154B. A maximum of six units for any combination of engineering courses numbered 190C, 192, 198, and 199 may be used.
Mathematics: any upper-division course; except MAT 135A, 197TC.
Physics: any upper-division course; except 116, 137, 160 (restricted to one unit of technical elective), 195, 197T.
Statistics: any upper-division course; except STA 100, 102, 103, 104, 106, 108, 120, 130A.

BIS 101	Genes and Gene Expression	4
BIS 101D	Genes and Gene Expression Discussion	1
BIS 102	Structure and Function of Biomolecules	3
BIS 103	Bioenergetics and Metabolism	3
BIS 104	Cell Biology	3
BIS 122	Population Biology and Ecology	3
BIS 122P	Population Biology and Ecology/Advanced Laboratory Topics	5
BIS 132	Introduction to Dynamic Models in Modern Biology	4
ECN 100	Intermediate Micro Theory	4

ECN 101	Intermediate Macro Theory	4
ECN 102	Analysis of Economic Data	4
ECN 103	Economics of Uncertainty and Information	4
ECN 122	Theory of Games and Strategic Behavior	4
ECN 140	Econometrics	4
MGT 011A	Elementary Accounting	4
MGT 011B	Elementary Accounting	4
MGT 100	Introduction to Financial Accounting	3
MGT 120	Managing and Using Information Technology	4
MGT 140	Marketing for the Technology-Based Enterprise	4
MGT 150	Technology Management	4
MGT 160	Financing New Business Ventures	4
MGT 170	Managing Costs and Quality	4
MGT 180	Supply Chain Planning and Management	4

Upper Division Composition Requirement

Choose one; a grade of C- or better is required:

UWP 101	Advanced Composition	4
UWP 102A	Writing in the Disciplines: Special Topics	4
UWP 102B	Writing in the Disciplines: Biology	4
UWP 102C	Writing in the Disciplines: History	4
UWP 102D	Writing in the Disciplines: International Relations	4
UWP 102E	Writing in the Disciplines: Engineering	4
UWP 102F	Writing in the Disciplines: Food Science and Technology	4
UWP 102G	Writing in the Disciplines: Environmental Writing	4
UWP 102H	Writing in the Disciplines: Human Development and Psychology	4
UWP 102I	Writing in the Disciplines: Ethnic Studies	4
UWP 102J	Writing in the Disciplines: Fine Arts	4
UWP 102K	Writing in the Disciplines: Sociology	4
UWP 102L	Writing in the Disciplines: Film Studies	4
UWP 104A	Writing in the Professions: Business Writing	4
UWP 104B	Writing in the Professions: Law	4
UWP 104C	Writing in the Professions: Journalism	4
UWP 104D	Writing in the Professions: Elementary and Secondary Education	4
UWP 104E	Writing in the Professions: Science	4
UWP 104F	Writing in the Professions: Health	4
UWP 104I	Writing in the Professions: Internships	4
UWP 104J	Writing in the Professions: Writing for Social Justice	4
UWP 104T	Writing in the Professions: Technical Writing	4

Passing the Upper Division Composition Exam.

Total: 146

Computer Engineering; Electrical & Computer Engineering | EEC Courses

Courses in EEC:

EEC 001—Introduction to Electrical and Computer Engineering (1)
Lecture—1 hour. Electrical and Computer Engineering as a professional activity. What Electrical and Computer Engineers know and how they use their knowledge. (P/NP grading only.) GE credit: SE. Effective: 2012 Fall Quarter.

EEC 010—Introduction to Digital and Analog Systems (4) ***Review all entries***
Laboratory—3 hours; Lecture—2 hours; Project (Term Project). Prerequisite(s): ECS 030; (PHY 009C (can be concurrent) or PHY 009HD (can be concurrent)); and Consent of Instructor. Open to Electrical and Computer Engineering sophomores. Interactive and practical introduction to fundamental concepts of electrical and computer engineering by implementing electronic systems, which can be digitally controlled and interrogated, with a programmable microcontroller with the ability to program the electrical connections between analog and digital components. GE credit: SE. Effective: 2017 Winter Quarter.

EEC 010—Introduction to Digital and Analog Systems (4) ***Review all entries***
Laboratory—3 hours; Lecture—2 hours; Project (Term Project). Prerequisite(s): (PHY 009C (can be concurrent) or PHY 009HD (can be concurrent)); (ECS 030 or ECS 036B or EEC 007); ENG 017; Consent of Instructor. Open to Electrical and Computer Engineering sophomores. Interactive and practical introduction to fundamental concepts of electrical and computer engineering by implementing electronic systems, which can be digitally controlled and interrogated, with a programmable microcontroller with the ability to program the electrical connections between analog and digital components. GE credit: SE. Effective: 2019 Winter Quarter.

EEC 089A—Special Topics in Electromagnetics (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Electromagnetics. May be repeated for credit if topic differs. GE credit: SE. Effective: 2011 Winter Quarter.

EEC 089B—Special Topics in Physical Electronics (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special topics in Physical Electronics. May be repeated for credit if topic differs. GE credit: SE. Effective: 2011 Winter Quarter.

EEC 089C—Special Topics in Active and Passive Circuits (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special topics in Active and Passive Circuits. May be repeated for credit if topic differs. GE credit: SE. Effective: 2011 Winter Quarter.

EEC 089D—Special Topics in Signals and Systems (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special topics in Signals and Systems. May be repeated for credit if topic differs. GE credit: SE. Effective: 2011 Winter Quarter.

EEC 089E—Special Topics in Computer Systems and Software (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special topics in Computer Systems and Software. May be repeated for credit if topic differs. GE credit: SE. Effective: 2011 Winter Quarter.

EEC 089F—Special Topics in Digital System Design (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special topics in Digital System Design. May be repeated for credit if topic differs. GE credit: SE. Effective: 2011 Winter Quarter.

EEC 090C—Research Group Conference in Electrical and Computer Engineering (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Lower division standing. Research group conferences. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

EEC 090X—Lower Division Seminar (1-4)
Seminar—1-4 hours. Prerequisite(s): Consent of Instructor. Examination of a special topic in a small group setting. May be repeated for credit. Effective: 1997 Winter Quarter.

EEC 092—Internship in Electrical and Computer Engineering (1-5)
Internship—3-15 hours. Prerequisite(s): Lower division standing; project approval prior to period of internship. Supervised work experience in Electrical and Computer Engineering. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

EEC 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

EEC 099—Special Study for Lower Division Students (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

EEC 100—Circuits II (5) ***Review all entries***
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 017 C- or better Restricted to the following majors: Electrical Engineering, Computer Engineering, Computer Science & Engineering, Electronic Materials Engineering, Electrical Engineering/Materials Science, Optical Science & Engineering, Biomedical Engineering, Applied Physics, Electrical & Computer Engineering graduate students. Theory, application, and design of analog circuits. Methods of analysis including frequency response, SPICE simulation, and Laplace transform. Operational amplifiers and design of active filters. Students who have completed Engineering 100 may receive 3.5 units of credit. GE credit: QL, SE, VL. Effective: 2014 Fall Quarter.

EEC 100—Circuits II (5) ***Review all entries***
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 017 C- or better; MAT 022B Restricted to the following majors: Electrical Engineering, Computer Engineering, Computer Science & Engineering, Electronic Materials Engineering, Electrical Engineering/Materials Science, Optical Science & Engineering, Biomedical Engineering, Applied Physics, Electrical & Computer Engineering graduate students. Theory, application, and design of analog circuits. Methods of analysis including frequency response, SPICE simulation, and Laplace transform. Operational amplifiers and design of active filters. Students who have completed ENG 100 may receive 3.5 units of credit. GE credit: QL, SE, VL. Effective: 2018 Fall Quarter.

EEC 110A—Electronic Circuits I (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 100; EEC 140A (can be concurrent) Use and modeling of nonlinear solid-state electronic devices in basic analog and digital circuits. Introduction to the design of transistor amplifiers and logic gates. GE credit: SE, VL. Effective: 2018 Winter Quarter.

EEC 110B—Electronic Circuits II (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 110A Analysis and design of integrated circuits. Single-stage amplifiers, cascaded amplifier stages, differential amplifiers, current sources, frequency response, and return-ratio analysis of feedback amplifiers. GE credit: SE, VL. Effective: 2009 Fall Quarter.

EEC 112—Communication Electronics (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 110A; EEC 150A; EEC 110B recommended. Electronic circuits for analog and digital communication, including oscillators, mixers, tuned amplifiers, modulators, demodulators, and phase-locked loops. Circuits for amplitude modulation (AM) and frequency modulation (FM) are emphasized. GE credit: SE. Effective: 2014 Spring Quarter.

EEC 116—VLSI Design (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 110A; EEC 180A recommended. CMOS devices, layout, circuits, and functional units; VLSI fabrication and design methodologies. GE credit: SE. Effective: 2014 Spring Quarter.

EEC 118—Digital Integrated Circuits (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 110A; EEC 180A Analysis and design of digital integrated circuits. Emphasis on MOS logic circuit families. Logic gate construction, voltage transfer characteristics, propagation delay, and power consumption. Regenerative circuits, sequential elements, interconnect, RAMs, ROMs, and PLAs. GE credit: SE. Effective: 2011 Spring Quarter.

EEC 119A—Integrated Circuit Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): EEC 116 or EEC 118 Design course involving architecture, circuit design, physical design, and validation through extensive simulation of a digital or mixed-signal integrated circuit of substantial complexity under given design constraints. Team project that includes a final report. GE credit: SE. Effective: 2014 Fall Quarter.

EEC 119B—Integrated Circuit Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): EEC 119A Design course involving architecture, circuit design, physical design, and validation through extensive simulation of a digital or mixed-signal integrated circuit of substantial complexity under given design constraints. Team project that includes a final report. GE credit: SE. Effective: 2014 Fall Quarter.

EEC 130A—Electromagnetics I (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021D; (PHY 009C or PHY 009HD); ENG 017 Basics of static electric and magnetic fields and fields in materials. Work and scalar potential. Maxwell's equations in integral and differential form. Plan waves in lossless media. Lossless transmission lines. GE credit: SE. Effective: 2016 Fall Quarter.

EEC 130B—Introductory Electromagnetics II (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 130A Plane wave propagation in lossy media, reflections, guided waves, simple modulated waves and dispersion, and basic antennas. GE credit: SE. Effective: 1997 Winter Quarter.

EEC 132A—RF and Microwaves in Wireless Communication (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 110A; EEC 130B Study of Radio Frequency and Microwave theory and practice for design of wireless electronic systems. Transmission lines, microwave integrated circuits, circuit analyis of electromagnetic energy transfer systems, the scattering parameters. GE credit: SE. Effective: 2015 Winter Quarter.

EEC 132B—RF and Microwaves in Wireless Communication (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 132A Passive RF and microwave device analysis, design, fabrication, and testing for wireless applications. RF and microwave filter and coupler design. Introductory analysis and design of RF and microwave transistor amplifiers. GE credit: SE. Effective: 2007 Winter Quarter.

EEC 132C—RF and Microwaves in Wireless Communications (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 132B RF and microwave amplifier theory and design, including transistor circuit models, stability considerations, noise models and low noise design. Theory and design of microwave transistor oscillators and mixers. Wireless system design and analysis. GE credit: SE. Effective: 2009 Spring Quarter.

EEC 133—Electromagnetic Radiation and Antenna Analysis (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 130B Properties of electromagnetic radiation; analysis and design of antennas: ideal cylindrical, small loop, aperture, and arrays; antenna field measurements. GE credit: SE. Effective: 1999 Fall Quarter.

EEC 133—Electromagnetic Radiation and Antenna Analysis (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 130B Properties of electromagnetic radiation; analysis and design of antennas: ideal cylindrical, small loop, aperture, and arrays; antenna field measurements. GE credit: SE. Effective: 2018 Fall Quarter.

EEC 134A—RF/Microwave Systems Design (3)
Laboratory—6 hours; Workshop—3 hours. Prerequisite(s): EEC 130B or EEC 110B or EEC 150A Class size limited to 24 students. Board-level RF design, fabrication, and characterization of an RF/microwave system, including the antenna, RF front-end, baseband, mix-signal circuits, and digital signal processing models. GE credit: SE. Effective: 2014 Fall Quarter.

EEC 134B—RF/Microwave Systems Design (3)
Laboratory—6 hours; Workshop—3 hours. Prerequisite(s): EEC 134A Class size limited to 24 students. Board-level RF design, fabrication, and characterization of an RF/microwave system, including the antenna, RF front-end, baseband, mix-signal circuits, and digital signal processing models. GE credit: SE. Effective: 2015 Winter Quarter.

EEC 135—Optical Communications I: Fibers (4)
Lecture—4 hours. Prerequisite(s): EEC 130B Principles of optical communication systems. Planar dielectric waveguides. Optical fibers: single-mode, multi-mode, step and graded index. Attenuation and dispersion in optical fibers. Optical sources (LEDs and lasers) and receivers. Design of digital optical transmission systems. GE credit: SE. Effective: 2012 Winter Quarter.

EEC 136A—Electronic Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): ECS 030; EEC 100; EEC 180A; (EEC 110B or EEC 157A (can be concurrent) or EEC 180B) Pass One restricted to major. Optical, electronic and communication-engineering design of an opto-electronic system operating under performance and economic constraints. Measurement techniques will be designed and implemented, and the system will be characterized. GE credit: SE. Effective: 2015 Fall Quarter.

EEC 136B—Electronic Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): EEC 136A Optical, electronic and communication-engineering design of an opto-electronic system operating under performance and economic constraints. Measurement techniques will be designed and implemented, and the system will be characterized. GE credit: SE. Effective: 2014 Fall Quarter.

EEC 140A—Principles of Device Physics I (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 017; (PHY 009D or PHY 009HE) Semiconductor device fundamentals, equilibrium and non-equilibrium statistical mechanics, conductivity, diffusion, electrons and holes, p-n and Schottky junctions, first-order metal-oxide-semiconductor (MOS) field effect transistors, bipolar junction transistor fundamentals. GE credit: SE, SL. Effective: 2016 Fall Quarter.

EEC 140A—Principles of Device Physics I (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 017 (can be concurrent); (PHY 009D or PHY 009HE) Semiconductor device fundamentals, equilibrium and non-equilibrium statistical mechanics, conductivity, diffusion, electrons and holes, p-n and Schottky junctions, first-order metal-oxide-semiconductor (MOS) field effect transistors, bipolar junction transistor fundamentals. GE credit: SE, SL. Effective: 2018 Fall Quarter.

EEC 140B—Principles of Device Physics II (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 140A Electrical properties, designs, models and advanced concepts for MOS, Bipolar, and Junction Field-Effect Transistors, including scaling, minority-carrier distributions, non-ideal effects, and device fabrication methods. MESFET and heterojunction bipolar transistors (HBTs). Fundamentals of solar cells, photodetectors, LEDs and semiconductor lasers. GE credit: SE. Effective: 2010 Spring Quarter.

EEC 145—Electronic Materials (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 140A Electronic and physical properties of materials used in electronics, ICs, optoelectronics and MEMS. Semiconductors, dielectrics, metals, optical materials, organic semiconductive, optical and nonlinear properties, as well as their synthesis and deposition methods. GE credit: SE. Effective: 2015 Fall Quarter.

EEC 146A—Integrated Circuits Fabrication (4)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): EEC 140A Theoretical and experimental study of basic fabrication processes for metal oxide semiconductor integrated circuits, including oxidation, photolithography, impurity diffusion, metallization, wet chemical etching, and characterization. GE credit: SE. Effective: 2018 Winter Quarter.

EEC 146B—Advanced Integrated Circuits Fabrication (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): EEC 146A Restricted to Electrical, Computer, and Electrical/Materials Science majors and Electrical Engineering graduate students; non-majors accommodated when space available. Fabrication processes for CMOS VLSI. Laboratory projects examine deposition of thin films, ion implantation, process simulation, anisotropic plasma etching, sputter metallization, and C-V analysis. Topics include isolation, projection alignment, epilayer growth, thin gate oxidation, and rapid thermal annealing. GE credit: SE. Effective: 1997 Winter Quarter.

EEC 150A—Introduction to Signals and Systems I (4)
Lecture—4 hours. Prerequisite(s): EEC 100; (ENG 006 (can be concurrent) or MAT 022AL (can be concurrent)) Characterization and analysis of continuous-time linear systems. Fourier series and transforms with applications. Introduction to communication systems. Transfer functions and block diagrams. Elements of feedback systems. Stability of linear systems. GE credit: QL, SE. Effective: 2013 Fall Quarter.

EEC 150B—Introduction to Signals and Systems II (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 150A Characterization and analysis of discrete time systems. Difference equation models. Ztransform analysis methods. Discrete and fast Fourier
transforms. Introduction to digital filter design. GE credit: QL, SE. Effective: 2012 Fall Quarter.

EEC 152—Digital Signal Processing (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): EEC 150B; (EEC 070 or ECS 050) Theory and practice of real-time digital signal processing. Fundamentals of real-time systems. Programmable architectures including I/O, memory, peripherals, interrupts, DMA. Interfacing issues with A/D and D/A converters to a programmable DSP. Specification driven design and implementation of simple DSP applications. GE credit: SE. Effective: 2014 Fall Quarter.

EEC 157A—Control Systems (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 100 Analysis and design of feedback control systems. Examples are drawn from electrical and mechanical systems as well as other engineering fields. Mathematical modeling of systems, stability criteria, root-locus and frequency domain design methods. GE credit: SE. Effective: 2013 Fall Quarter.

EEC 157B—Control Systems (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 157A Control system design; transfer-function and state-space methods; sampled-data implementation, digital control. Laboratory includes feedback system experiments and simulation studies. GE credit: SE. Effective: 1997 Winter Quarter.

EEC 160—Signal Analysis and Communications (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 150A Signal analysis based on Fourier methods. Fourier series and transforms; time-sampling, convolution, and filtering; spectral density; modulation: carrier-amplitude, carrier-frequency, and pulse-amplitude. GE credit: SE. Effective: 1997 Winter Quarter.

EEC 161—Probabilistic Analysis of Electrical & Computer Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 100; (ENG 006 or MAT 022AL) Probabilistic and statistical analysis of electrical and computer systems. Discrete and continuous random variables, expectation and moments. Transformation of random variables. Joint and conditional densities. Limit theorems and statistics. Noise models, system reliability and testing. GE credit: SE. Effective: 2016 Spring Quarter.

EEC 165—Statistical and Digital Communication (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 160; EEC 161 Introduction to random process models of modulated signals and noise, and analysis of receiver performance. Analog and digitally modulated signals. Signal-to-noise ratio, probability of error, matched filters. Intersymbol interference, pulse shaping and equalization. Carrier and clock synchronization. GE credit: SE. Effective: 2017 Winter Quarter.

EEC 170—Introduction to Computer Architecture (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 180A; ECS 030 Introduces basic aspects of computer architecture, including computer performance measurement, instruction set design, computer arithmetic, pipelined/non-pipelined implementation, and memory hierarchies (cache and virtual memory). Presents a simplified Reduced Instruction Set Computer using logic design methods from the prerequisite course. GE credit: SE. Effective: 2015 Winter Quarter.

EEC 171—Parallel Computer Architecture (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 170 or ECS 154B Organization and design of parallel processors including shared-memory multiprocessors, cache coherence, memory consistency, snooping protocols, synchronization, scalable multiprocessors, message passing protocols, distributed shared memory and interconnection networks. GE credit: SE. Effective: 2014 Fall Quarter.

EEC 172—Embedded Systems (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): (EEC 170 or ECS 154A); EEC 100 Introduction to embedded-system hardware and software. Topics include: embedded processor and memory architecture; input/output hardware and software, including interrupts and direct memory access; interfacing with sensors and actuators; wired and wireless embedded networking. GE credit: SE. Effective: 2016 Winter Quarter.

EEC 173A—Computer Networks (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 060; (ECS 132 or EEC 161 or MAT 135A or STA 131A or STA 120 or STA 032) Pass One open to Computer Science, Computer Science Engineering and Computer Engineering Majors only. Overview of computer networks, TCP/IP protocol suite, computer-networking applications and protocols, transport-layer protocols, network architectures, Internet Protocol (IP), routing, link-layer protocols, local area and wireless networks, medium access control, physical aspects of data transmission, and network-performance analysis. Only 2 units of credit for students who have taken ECS 157. (ECS 152A.) GE credit: SE. Effective: 2016 Fall Quarter.

EEC 173B—Design Projects in Communication Networks (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 173A or ECS 152A Advanced topics and design projects in communication networks. Example topics include wireless networks, multimedia networking, network design and management, traffic analysis and modeling, network simulations and performance analysis. Offered in alternate years. (ECS 152C.) GE credit: SE. Effective: 2005 Spring Quarter.

EEC 180A—Digital Systems I (5)
Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): PHY 009C or PHY 009HD Introduction to digital system design including combinational logic design, sequential and asynchronous circuits, computer arithmetic, memory systems and algorithmic state machine design; computer aided design (CAD) methodologies and tools. GE credit: SE. Effective: 2014 Spring Quarter.

EEC 180B—Digital Systems II (5)
Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): EEC 180A Computer-aided design of digital systems with emphasis on hardware description languages (VHDL), logic synthesis, and field-programmable gate arrays (FPGA). May cover advanced topics in digital system design such as static timing analysis, pipelining, memory system design, testing digital circuits. GE credit: SE. Effective: 2013 Fall Quarter.

EEC 181A—Digital Systems Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): EEC 180B; EEC 170 Digital-system and computer-engineering design course involving architecture, design, implementation and testing of a prototype application-specific processor under given design constraints. This is a team project that includes a final presentation and report. GE credit: SE. Effective: 2018 Winter Quarter.

EEC 181B—Digital Systems Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): EEC 181A Digital-system and computer-engineering design course involving architecture, design, implementation and testing of a prototype application-specific processor under given design constraints. This is a team project that includes a final presentation and report. GE credit: SE. Effective: 2015 Winter Quarter.

EEC 183—Testing and Verification of Digital Systems (5)
Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): EEC 170; EEC 180B Computer aided-testing and design verification techniques for digital systems; physical fault testing; simulation-based design verification; formal verification; timing analysis. GE credit: SE. Effective: 2012 Spring Quarter.

EEC 189A—Special Topics in Electrical Engineering and Computer Science; Computer Science (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Computer Science. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189B—Special Topics in Electrical Engineering and Computer Science; Programming Systems (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Programming Systems. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189C—Special Topics in Electrical Engineering and Computer Science; Digital Systems (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Digital Systems. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189D—Special Topics in Electrical Engineering and Computer Science; Communications (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Communications. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189E—Special Topics in Electrical Engineering and Computer Science; Signal Transmission (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Signal Transmission. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189F—Special Topics in Electrical Engineering and Computer Science; Digital Communication (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Digital Communication. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189G—Special Topics in Electrical Engineering and Computer Science; Control Systems (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Control Systems. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189H—Special Topics in Electrical Engineering and Computer Science; Robotics (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Robotics. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189I—Special Topics in Electrical Engineering and Computer Science; Signal Processing (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Signal Processing. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189J—Special Topics in Electrical Engineering and Computer Science; Image Processing (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Image Processing. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189K—Special Topics in Electrical Engineering and Computer Science; High-Frequency Phenomena and Devices (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in High-Frequency Phenomena and Devices. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189L—Special Topics in Electrical Engineering and Computer Science; Solid-State Devices and Physical Electronics (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Solid-State Devices and Physical Electronics. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189M—Special Topics in Electrical Engineering and Computer Science; Systems Theory (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Systems Theory. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189N—Special Topics in Electrical Engineering and Computer Science; Active and Passive Circuits (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Active and Passive Circuits. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189O—Special Topics in Electrical Engineering and Computer Science; Integrated Circuits (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Integrated Circuits. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189P—Special Topics in Electrical Engineering and Computer Science; Computer Software (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Computer Software. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189Q—Special Topics in Electrical Engineering and Computer Science; Computer Engineering (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Computer Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189R—Special Topics in Electrical Engineering and Computer Science; Microprocessing (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Microprocessing. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189S—Special Topics in Electrical Engineering and Computer Science; Electronics (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Electronics. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189T—Special Topics in Electrical Engineering and Computer Science; Electromagnetics (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Electromagnetics. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189U—Special Topics in Electrical Engineering and Computer Science; Opto-Electronics (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Opto-Electronics. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189W—Special Topics in Electrical and Computer Engineering; Computer Networks (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special topics in Computer Networks. May be repeated for credit when topic differs. GE credit: SE. Effective: 2018 Winter Quarter.

EEC 190C—Research Group Conferences in Electrical and Computer Engineering (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing in Electrical and Computer Engineering. Research group conferences. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 2013 Spring Quarter.

EEC 192—Internship in Electrical and Computer Engineering (1-5) ***Review all entries***
Internship—3-15 hours. Prerequisite(s): Consent of Instructor. Completion of a minimum of 84 units; project approval before period of internship. Supervised work experience in electrical and computer engineering. May be repeated for credit project is different. (P/NP grading only.) GE credit: SE. Effective: 2012 Fall Quarter.

EEC 192—Internship in Electrical and Computer Engineering (1-6) ***Review all entries***
Internship—3-18 hours. Prerequisite(s): Consent of Instructor. Completion of a minimum of 84 units; project approval before period of internship. Supervised work experience in electrical and computer engineering. May be repeated for credit if project differs. (P/NP grading only.) GE credit: SE. Effective: 2018 Fall Quarter.

EEC 193A—Senior Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): EEC 196 (can be concurrent); and Consent of Instructor. Restricted to senior standing in Electrical or Computer Engineering. Team design project for seniors in Electrical or Computer Engineering. Project involves analysis, design, implementation and evaluation of an Electrical Engineering or Computer Engineering system. Project is supervised by a faculty member. GE credit: SE. Effective: 2014 Fall Quarter.

EEC 193B—Senior Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): EEC 193A Team design project for seniors in Electrical Engineering or Computer Engineering. Project involves analysis, design, implementation and evaluation of an Electrical Engineering or Computer Engineering system. Project supervised by a faculty member. GE credit: SE. Effective: 2015 Winter Quarter.

EEC 195A—Autonomous Vehicle Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): ECS 030; EEC 180A; (EEC 110B or EEC 157A (can be concurrent) or EEC 180B or ECS 060) Pass One restricted to major. Design and construct an autonomous race car. Work in groups to design, build and test speed control circuits, track sensing circuits, and a steering control loop. GE credit: SE. Effective: 2015 Fall Quarter.

EEC 195B—Autonomous Vehicle Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): EEC 195A Design and construct an autonomous race car. Students work in groups to design, build and test speed control circuits, track sensing circuits, and a steering control loop. GE credit: SE. Effective: 2015 Winter Quarter.

EEC 196—Issues in Engineering Design (1)
Seminar—1 hour. Prerequisite(s): Senior standing in Electrical or Computer Engineering. The course covers various electrical and computer engineering standards and realistic design constraints including economic, manufacturability, sustainability, ethical, health and safety, environmental, social, and political. GE credit: SE. Effective: 2008 Fall Quarter.

EEC 197T—Tutoring in Electrical and Computer Engineering (1-3)
Discussion—1 hour; Discussion/Laboratory—2-8 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Tutoring in Electrical and Computer Engineering courses, especially introductory circuits. For upper-division undergraduate students who will provide tutorial assistance. (P/NP grading only.) Effective: 2007 Fall Quarter.

EEC 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. May be repeated up to 3 time(s). (P/NP grading only.) GE credit: SE. Effective: 2007 Fall Quarter.

EEC 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2007 Fall Quarter.

EEC 201—Digital Signal Processing (4)
Lecture—4 hours. Prerequisite(s): EEC 150B; STA 120 or MAT 131 or MAT 167 recommended. Theory and design of digital filters. Classification of digital filters, linear phase systems, all-pass functions, FIR and IIR filter design methods and optimality measures, numerically robust structures for digital filters. Effective: 2006 Winter Quarter.

EEC 202—Advanced Digital Signal Processing (4)
Lecture—4 hours. Prerequisite(s): EEC 201, EEC 260 and EEC 265, and MAT 167 are recommended. Multirate DSP theory and wavelets, optimal transform and subband coders in data compressions, advanced sampling theory and oversampled A/D converters, transmultiplexers and precoders in digital communication systems, genomic signal processing. Effective: 2006 Spring Quarter.

EEC 205—Computational Methods in Biomedical Imaging (4)
Lecture—4 hours. Prerequisite(s): (BIM 105 or STA 120); (BIM 108 or EEC 150A) Analytic tomographic reconstruction from projections in 2D and 3D; model-based image reconstruction methods; maximum likelihood and Bayesian methods; applications to CT, PET, and SPECT. (BIM 252.) Effective: 2011 Fall Quarter.

EEC 206—Digital Image Processing (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 150B Two-dimensional systems theory, image perception, sampling and quantization, transform theory and applications, enhancement, filtering
and restoration, image analysis, and image processing systems. Effective: 1997 Winter Quarter.

EEC 210—MOS Analog Circuit Design (3)
Lecture—3 hours. Prerequisite(s): EEC 110B; EEC 140A Analysis and design of MOS amplifiers, bias circuits, voltage references and other analog circuits. Stability and compensation of feedback amplifiers. Introduction to noise analysis in MOS circuits. Effective: 2016 Winter Quarter.

EEC 211—Advanced Analog Circuit Design (3)
Lecture—3 hours. Prerequisite(s): EEC 210; STA 131A and EEC 112 recommended. Noise and distortion in electronic circuits and systems. Application to communication circuits. Specific applications include mixers, low-noise amplifiers, power amplifiers, phase-locked loops, oscillators and receiver architectures. Effective: 2002 Winter Quarter.

EEC 212—Analog MOS IC Design for Signal Processing (3)
Lecture—3 hours. Prerequisite(s): EEC 210 Analysis and design of analog MOS integrated circuits. Passive components, single-ended and fully differential op amps, sampled-data and continuous-time filters. Effective: 1998 Spring Quarter.

EEC 213—Data-Conversion Techniques and Circuits (3)
Lecture—3 hours. Prerequisite(s): EEC 210 Digital-to-analog and analog-to-digital conversion; component characteristics and matching; sample-and-hold, comparator, amplifier, and reference circuits. Effective: 1997 Winter Quarter.

EEC 214—Computer-Aided Circuit Analysis and Design (3)
Lecture—3 hours. Prerequisite(s): EEC 110A; EEC 110B; And knowledge of FORTRAN or C. Network equation formulations. Nonlinear DC, linear AC, timedomain (both linear and nonlinear), steady-state (nonlinear) and harmonic analysis. DC, AC, and time-domain sensitivities of linear and nonlinear circuits. Gradient-based design optimization. Behavioral simulations. Extensive CAD project. Effective: 2000 Winter Quarter.

EEC 215—Circuits for Digital Communications (3)
Lecture—3 hours. Prerequisite(s): EEC 150B; EEC 210 (can be concurrent); EEC 165, EEC 166, or EEC 265 recommended. Analog, digital, and mixed-signal CMOS implementations of communication-circuit blocks: gain control, adaptive equalizers, sampling detectors, clock recovery. Effective: 2000 Fall Quarter.

EEC 216—Low Power Digital Integrated Circuit Design (3)
Lecture—3 hours. Prerequisite(s): EEC 118 IC design for low power and energy consumption. Low power architectures, logic styles and circuit design. Variable supply and threshold voltages. Leakage management. Power estimation. Energy sources, power electronics, and energy recovery. Applications in portable electronics and sensors. Thermodynamic limits. Effective: 2006 Winter Quarter.

EEC 217—Biomedical Electronics (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): EEC 210; or Consent of Instructor. Special consideration and accommodation will be made for biomedical or signal processing majors who have not taken EEC 210. Circuit design for medical applications including weak inversion amplifiers; integrated ULF filters; chopper stabilization; electrochemical interfaces; neurostimulation pulse generation; wireless powering of and communication with implantable devices. Electrophysiological signaling and aspects of signal processing for biomedical systems. Effective: 2013 Spring Quarter.

EEC 219—Advanced Digital Circuit Design (3)
Lecture—3 hours. Prerequisite(s): EEC 118 or EEC 218A Analysis and design of digital circuits. Both bipolar and MOS circuits are covered. Dynamic and static RAM cells and sense amplifiers. Advanced MOS families. Multi-valued logic. Effective: 1997 Winter Quarter.

EEC 221—Analog Filter Design (3)
Lecture—3 hours. Prerequisite(s): EEC 100; EEC 150A Design of active and passive filters including filter specification and approximation theory. Passive LC filter design will cover doubly-terminated reactance two-port synthesis. Active filter design will include sensitivity, op-amp building blocks, cascade, multi-loop, ladder and active-R filter design. Effective: 1997 Fall Quarter.

EEC 222—RF IC Design (3)
Lecture—3 hours. Prerequisite(s): EEC 132C; EEC 210 Radio frequency (RF) solid-state devices, RF device modeling and design rules; non-linear RF circuit design techniques; use of non-linear computer-aided (CAD) tools; RF power amplifier design. Effective: 2004 Winter Quarter.

EEC 224—Terahertz and mm-Wave Integrated Circuit Design (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): EEC 132A; EEC 112; or Consent of Instructor. Fundamental theory of RF transmitter and receiver, including noise analysis, transceiver architectures, and antenna arrays. Fundamental limitations, theory and design of amplifiers, oscillators and signal sources at THz and mm-wave frequencies Effective: 2018 Winter Quarter.

EEC 228—Advanced Microwave Circuit and Device Design Techniques (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 132B Theory, design, fabrication, analysis of advanced microwave circuits and devices. Wideband transformers, stripline/microstripline broadband couplers. Lumped and distributed filter synthesis. Broadband matching theory applied to microwave devices. Wideband and low noise FET/HEMT amplifiers. Advanced microwave oscillator theory. Phase noise analysis. Effective: 2007 Spring Quarter.

EEC 229—RF-MEMS and Adaptive Wireless Frontends (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 130A Focuses on the modeling, design, fabrication, and characterization of RF-MEMS while providing a thorough introduction to the technology with an emphasis on how it will benefit the design of adaptive RF/microwave wireless systems. Effective: 2015 Fall Quarter.

EEC 230—Electromagnetics (3)
Lecture—3 hours. Prerequisite(s): EEC 130B Maxwell's equations, plane waves, reflection and refraction, complex waves, waveguides, resonant cavities, and basic antennas. Effective: 2001 Fall Quarter.

EEC 231A—Plasma Physics and Controlled Fusion (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Equilibrium plasma properties; single particle motion; fluid equations; waves and instabilities in a fluid plasma; plasma kinetic theory and transport coefficients; linear and nonlinear Vlasov theory; fluctuations, correlations and radiation; inertial and magnetic confinement systems in controlled fusion. Effective: 2015 Spring Quarter.

EEC 231B—Plasma Physics and Controlled Fusion (3)
Lecture—3 hours. Prerequisite(s): EEC 231A; and Consent of Instructor. Equilibrium plasma properties; single particle motion; fluid equations; waves and instabilities in a fluid plasma; plasma kinetic theory and transport coefficients; linear and nonlinear Vlasov theory; fluctuations, correlations and radiation; inertial and magnetic confinement systems in controlled fusion. Effective: 2015 Spring Quarter.

EEC 231C—Plasma Physics and Controlled Fusion (3)
Lecture—3 hours. Prerequisite(s): EEC 231B; and Consent of Instructor. Equilibrium plasma properties; single particle motion; fluid equations; waves and instabilities in a fluid plasma; plasma kinetic theory and transport coefficients; linear and nonlinear Vlasov theory; fluctuations, correlations and radiation; inertial and magnetic confinement systems in controlled fusion. Effective: 2015 Spring Quarter.

EEC 232A—Advanced Applied Electromagnetics I (3)
Lecture—3 hours. Prerequisite(s): EEC 132B The exact formulation of applied electromagnetic problems using Green's functions. Applications of these techniques to transmission circuits. Effective: 2000 Fall Quarter.

EEC 232B—Advanced Applied Electromagnetics II (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 132B An advanced treatment of electromagnetics with applications to passive microwave devices and antennas. Effective: 2000 Fall Quarter.

EEC 233—High Speed Signal Integrity (3)
Lecture—3 hours. Prerequisite(s): EEC 130B Design and analysis of interconnects in high-speed circuits and sub-systems; understanding of high-speed signal propagation and signal integrity concepts; electromagnetic modeling tools and experimental techniques. Effective: 2008 Fall Quarter.

EEC 234A—Physics and Technology of Microwave Vacuum Electron Beam Devices I (4)
Lecture—4 hours. Prerequisite(s): B.S. degree in physics or electrical engineering or the equivalent background. Physics and technology of electron beam emissions, flow and transport, electron gun design, space charge waves and klystrons. Effective: 2015 Fall Quarter.

EEC 234B—Physics and Technology of Microwave Vacuum Electron Beam Devices II (4)
Lecture—4 hours. Prerequisite(s): EEC 234A Theory and experimental design of traveling wave tubes, backward wave oscillators, and extended interaction oscillators. Effective: 2016 Spring Quarter.

EEC 234C—Physics and Technology of Microwave Vacuum Electron Beam Devices III (4)
Lecture—4 hours. Prerequisite(s): EEC 234B Physics and technology of gyrotrons, gyro-amplifiers, free electron lasers, magnetrons, crossfield amplifiers and relativistic devices. Effective: 2015 Fall Quarter.

EEC 235—Photonics (4)
Lecture—3 hours; Project (Term Project)—1 hour. Prerequisite(s): EEC 230 (can be concurrent) Optical propagation of electromagnetic waves and beams in photonic components and the design of such devices using numerical techniques. Effective: 2004 Fall Quarter.

EEC 236—Nonlinear Optical Applications (3)
Lecture—3 hours. Prerequisite(s): EEC 130B; EEC 230 (can be concurrent) Nonlinear optical interactions in optical communication, optical information processing and integrated optics. Basic concepts underlying optical nonlinear interactions in materials and guided media. Not open for credit to students who have completed EEC 233. Effective: 2000 Fall Quarter.

EEC 237A—Lasers (3)
Lecture—3 hours. Prerequisite(s): EEC 235; EEC 130B; Or the equivalent of EEC 130B. Not open for credit to students who have completed course 226A. Theoretical and practical description of lasers. Theory of population inversion, amplification and oscillation using semiclassical oscillator model and rate equations. Description and design of real laser system (Not open for credit to students who have completed course 226A.) Effective: 1998 Winter Quarter.

EEC 237B—Laser Physics II (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): EEC 237A or EAD 265A Oscillation threshold. Coupled cavity/atomic rate equations, Linear pulse propagation; dispersion, broadening, compression. Nonlinear pulse propagation. Energy extraction. Optical beams, resonators, eigenmodes, axial/transverse modes. Paraxial ray optics, resonator stability, ABCD matrices. Laser dynamics; transients, spiking, Q-switching, active and passive modelocking. Not open for credit to students who have completed EEC 226B. Effective: 2014 Fall Quarter.

EEC 238—Semiconductor Diode Lasers (3)
Lecture—3 hours. Prerequisite(s): EEC 245A Understanding of fundamental optical transitions in semiconductor and quantum-confined systems are applied to diode lasers and selected photonic devices. The importance of radiative and non-radiative
recombination, simulated emission, excitons in quantum wells, and strained quantum layers are considered. Effective: 1998 Spring Quarter.

EEC 239A—Optical Fiber Communications Technologies (4)
Lecture—4 hours. Prerequisite(s): EEC 130B Physical layer issues for component and system technologies in optical fiber networks. Sources of physical layer impairments and limitations in network scalability. Enabling technologies for wavelength-division-multiplexing and time-division-multiplexing networks. Optical amplifiers and their impact in optical networks (signal-to-noise ratio, gain-equalization, and cascadability). Effective: 2002 Fall Quarter.

EEC 239B—Optical Fiber Communications Systems and Networking (4)
Lecture—4 hours. Prerequisite(s): EEC 239A Physical layer optical communications systems in network architectures and protocols. Optical systems design and integration using optical component technologies. Comparison of wavelength routed WDM, TDM, and NGI systems and networks. Case studies of next generation technologies. Effective: 2003 Winter Quarter.

EEC 240—Semiconductor Device Physics (3)
Lecture—3 hours. Prerequisite(s): EEC 140B Physical principles, characteristics and models of fundamental semiconductor device types, including P-N and Schottky diodes, MOSFETs and MESFETs Bipolar Junction Transistors, and light emitters/detectors. Effective: 1998 Fall Quarter.

EEC 241—Introduction to Molecular Electronics (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Examines molecules for electronic devices and sensors. Course covers: electronic states of molecules, charge transport in nanoscale systems, and fabrication and measurement of molecular-scale devices. Specific Topics: Hartree-Fock and Density Functional Theory, Landauer formalism, coulomb blockade, tunneling and hopping transport. Effective: 2016 Spring Quarter.

EEC 242—Advanced Nanostructured Devices (3)
Lecture—3 hours. Prerequisite(s): EEC 130A; EEC 140A Physics of nano-structured materials and device operation. Overview of new devices enabled by nanotechnology; fabrication and characterization methods; applications of nano-structures and devices. Effective: 2005 Fall Quarter.

EEC 244A—Design of Microelectromechanical Systems (MEMS) (3)
Lecture—3 hours. Prerequisite(s): EEC 140A; EEC 140B; or Consent of Instructor. Theory and practice of MEMS design. Micromechanical fundamentals, CAD tools, and case studies. A MEMS design project is required. The designs will be fabricated in a commercial foundry and tested in course 244B. Effective: 1997 Fall Quarter.

EEC 244B—Microsciences (4)
Lecture/Discussion—4 hours. Introduction to the theory of physical and chemical principles at the microscale. Scale effects, surface tension, microfluidic mechanics, micromechanical properties, intermolecular interactions and micro tribology. (BIM 218.) Effective: 2011 Fall Quarter.

EEC 245—Micro- and Nano-Technology in Life Sciences (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Survey of biomedical device design from the engineering and biological perspectives; micro-/nano-fabrication and characterization techniques; surface chemistry and mass transfer; essential biological processes and models; proposal development skills to merge aforementioned themes in a multidisciplinary project. (ECH 245 and EMS 245.) Effective: 2016 Winter Quarter.

EEC 246—Advanced Projects in IC Fabrication (3)
Discussion—1 hour; Laboratory—6 hours. Prerequisite(s): EEC 146B Individualized projects in the fabrication of analog or digital integrated circuits. Effective: 1997 Winter Quarter.

EEC 247—Advanced Semiconductor Devices (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): Graduate standing in Engineering. Semiconductor devices, including MOSFETs, heterojunction transistors, light-emitting diodes, lasers, sensors, detectors, power and high-voltage transistors, MEMS resonators, organic semiconductors and photovoltaics. All material is from recent literature, encouraging students to utilize search methods and critically assess the latest research. Effective: 2011 Fall Quarter.

EEC 248—Photovoltaics and Solar Cells (3)
Lecture—3 hours. Prerequisite(s): EEC 140B; or Consent of Instructor. Or equivalent. Physics and application of photovoltaics and solar cells, including design, fabrication technology, and grid incorporation. Mono and microcrystalline silicon devices; thin-film technologies, heterojunction and organic-semiconductor technologies. Collectors, electrical inverters and infrastructure issues. Challenges and concerns. (EMS 246.) Effective: 2014 Fall Quarter.

EEC 249—Nanofabrication (3)
Lecture—3 hours. Prerequisite(s): Graduate standing in Engineering. Theory and practices of nanofabrication used for producing ICs, electronic devices, optoelectronics, sensors, and microstructures. Major topics include electron-, photon-, and ion-beams and their interactions with solids, chemical vapor depositions, plasma processing and micromachining. Effective: 2014 Winter Quarter.

EEC 250—Linear Systems and Signals (4)
Lecture—4 hours. Prerequisite(s): EEC 150A Mathematical description of systems. Selected topics in linear algebra. Solution of the state equations and an analysis of stability, controllability, observability, realizations, state feedback and state estimation. Discrete-time signals and systems, and the Z-transform. Effective: 2002 Fall Quarter.

EEC 251—Nonlinear Systems (3)
Lecture—3 hours. Prerequisite(s): EEC 250 Nonlinear differential equations, second-order systems, approximation methods, Lyapunov stability, absolute stability, Popov criterion, circle criterion, feedback linearization techniques. Effective: 1997 Winter Quarter.

EEC 252—Multivariable Control System Design (3)
Lecture—3 hours. Prerequisite(s): EEC 250 Modern control system design, theory, and techniques. Topics will include single-loop feedback design; stability, performance and robustness of multivariable control systems; LQG design; H-infinity design; frequency response methods; and optimization-based design. Effective: 2005 Fall Quarter.

EEC 254—Optimization (3)
Lecture—3 hours. Prerequisite(s): MAT 022A; Knowledge of FORTRAN or C. Modeling optimization problems in engineering design and other applications; optimality conditions; unconstrained optimization (gradient, Newton, conjugate gradient and quasi-Newton methods); duality and Lagrangian relaxation constrained optimization. (Primal method and an introduction to penalty and augmented Lagrangian methods.) Effective: 1997 Winter Quarter.

EEC 255—Robotic Systems (3)
Lecture—3 hours. Introduction to robotic systems. Mechanical manipulators, kinematics, manipulator positioning and path planning. Dynamics of manipulators. Robot motion programming and control algorithm design. Effective: 2006 Winter Quarter.

EEC 256—Stochastic Optimization in Dynamic Systems (4)
Lecture—4 hours. Prerequisite(s): EEC 260; Or the equivalent. Markov Decision Processes (MDP), dynamic programming, multi-armed bandit, Partially observable MDP, optimal stopping, stochastic scheduling, sequential detection and quickest change detection, competitive MDP and game theory, applications in dynamic systems such as queueing networks, communication systems, and multi-agent systems. Effective: 2012 Spring Quarter.

EEC 260—Random Signals and Noise (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 120; EEC 150A; EEC 250 recommended. Random processes as probabilistic models for signals and noise. Review of probability, random variables, and expectation. Study of correlation function and spectral density, ergodicity and duality between time averages and expected values, filters and dynamical systems. Applications. Effective: 1997 Winter Quarter.

EEC 261—Signal Processing for Communications (4)
Lecture—4 hours. Prerequisite(s): EEC 165; EEC 260; or Consent of Instructor. Signal processing in wireless and wireline communication systems. Characterization and distortion of wireless and wireline channels. Channel equalization and maximum likelihood sequence estimation. Channel precoding and pre-equalization. OFDM and transmit diversity. Array processing. Effective: 2003 Spring Quarter.

EEC 262—Multi-access Communications Theory (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): (EEC 173A or ECS 152A); STA 120; Or equivalent of STA 120. Maximum stable throughput of Poisson collision channels. Classic collision resolution algorithms. Carrier sensing multiple access and its performance analysis. System stability analysis. Joint design of the physical/medium access control layers. Capacity region of multi-access channels. Multi-access with correlated sources. Effective: 2006 Spring Quarter.

EEC 263—Optimal and Adaptive Filtering (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 260 Geometric formulation of least-squares estimation problems. Theory and applications of optimum Wiener and Kalman filtering. MAP and maximum likelihood estimation of hidden Markov models, Viterbi algorithm. Adaptive filtering algorithms, properties and applications. Effective: 2002 Spring Quarter.

EEC 264—Estimation and Detection of Signals in Noise (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 260 Introduction to parameter estimation and detections of signals in noise. Bayes and Neyman-Pearson likelihood-ratio tests for signal detection. Maximum-likelihood parameter estimation. Detection of known and Gaussian signals in white or colored noise. Applications to communications, radar, signal processing. Effective: 2007 Fall Quarter.

EEC 265—Principles of Digital Communications (4)
Lecture—4 hours. Prerequisite(s): EEC 165; EEC 260; or Consent of Instructor. Introduction to digital communications. Coding for analog sources. Characterization of signals and systems. Modulation and demodulation for the additive Gaussian channel. Digital signaling over bandwidth-constrained linear filter channels and over fading multipath channels. Spread spectrum signals. Effective: 1997 Winter Quarter.

EEC 266—Information Theory and Coding (3)
Lecture—3 hours. Prerequisite(s): STA 120 Information theory and coding. Measure of information. Redundancy reduction encoding of an information source. Capacity of a communication channel, errorfree communications. Effective: 1997 Winter Quarter.

EEC 267—Mobile Communications (4)
Lecture/Lab—3 hours. Prerequisite(s): EEC 260; EEC 265 (can be concurrent) Time-varying multi-path fading channel models and receiver performance in fading channels; multiple access techniques and multiple access receivers design and performance; optimum design and the capacity of wireless channels. Effective: 2013 Spring Quarter.

EEC 269A—Error Correcting Codes I (3)
Lecture—3 hours. Prerequisite(s): MAT 022A; EEC 160 Introduction to the theory and practice of block codes,
linear block codes, cyclic codes, decoding algorithms, coding techniques. Effective: 2001 Fall Quarter.

EEC 269B—Error Correcting Codes II (3)
Lecture—3 hours. Prerequisite(s): EEC 165; EEC 269A Introduction to convolutional codes, turbo codes, trellis and block coded modulation codes,soft-decision decoding algorithms, the Viterbi algorithm,reliability-based decoding, trellis-based decoding, multistage decoding. Effective: 2002 Spring Quarter.

EEC 270—Computer Architecture (3)
Lecture—3 hours. Prerequisite(s): EEC 170 or ECS 154B Introduction to modern techniques for high-performance single and
multiple processor systems. Topics include advanced pipeline design, advanced memory hierarchy design, optimizing pipeline and memory use, and memory sharing among multiprocessors. Case studies of recent single and multiple processor systems. Effective: 1999 Winter Quarter.

EEC 272—High-Performance Computer Architecture (4)
Lecture—4 hours. Prerequisite(s): EEC 270 or ECS 201A Designing and analysis of high performance computer architecture with emphasis on vector processing, on-chip interconnect networks, chip-level multiprocessors, memory and storage subsystem design and impact of technological advances on computer architecture. Effective: 2015 Spring Quarter.

EEC 273—Networking Architecture and Resource Management (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): ECS 152A or EEC 173A Pass One and Pass Two open to Graduate Students in Computer Science and Electrical and Computer Engineering only. Concepts and design principles of computer networks. Network architectures, protocol mechanisms and implementation principles (transport/network/data-link layers), network algorithms, router mechanisms, design requirements of applications, network simulation, modeling and performance analysis. (ECS 258.) Effective: 2016 Fall Quarter.

EEC 274—Internet Measurements, Modeling and Analysis (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): ECS 252 or EEC 273 Advanced topics in the theoretical foundations of network measurements, modeling, and statistical inferencing. Applications to Internet engineering, routing optimization, load balancing, traffic engineering, fault tolerance, anomaly detection, and network security. Individual project requirement. Effective: 2007 Winter Quarter.

EEC 276—Fault-Tolerant Computer Systems: Design and Analysis (3)
Lecture—3 hours. Prerequisite(s): EEC 170; EEC 180A Introduces fault-tolerant digital system theory and practice. Covers recent and classic fault-tolerant techniques based on hardware redundancy, time redundancy, information redundancy, and software
redundancy. Examines hardware and software reliability analysis, and example fault-tolerant designs. Not open for credit to students who have completed EEC 276A. Effective: 1997 Fall Quarter.

EEC 277—Graphics Architecture (3)
Lecture—3 hours. Prerequisite(s): (ECS 154B or EEC 170); ECS 175 Design and analysis of the architecture of computer graphics systems. Topics include the graphics pipeline with a concentration on hardware technqiues and algorithms, exploiting parallelism in graphics, and case studies of noteworthy and modern graphics arhitectures. Effective: 2004 Winter Quarter.

EEC 278—Computer Arithmetic for Digital Implementation (3)
Lecture—3 hours. Prerequisite(s): EEC 170; EEC 180A The design and implementation of computer arithmetic logic units are studied with particular emphasis on high-speed performance requirements. Addition (subtraction), multiplication and division operations are covered, and fixed and floating-point representations are examined. Effective: 1997 Winter Quarter.

EEC 281—VLSI Digital Signal Processing (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): EEC 150B; EEC 170; EEC 180B; or Consent of Instructor. Digital signal processors, building blocks, and algorithms. Design and implementation of processor algorithms, architectures, control, functional units, and circuit topologies for increased performance and reduced circuit size and power dissipation. Effective: 2011 Spring Quarter.

EEC 282—Hardware Software Codesign (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): EEC 170; EEC 180B Specification and design of embedded systems; modeling and performance estimation; hardware/software partitioning; co-simulation; design re-use; platform-based design; reconfigurable computing. Effective: 2003 Spring Quarter.

EEC 283—Advanced Design Verification of Digital Systems (4)
Lecture—3 hours; Project (Term Project)—1 hour. Prerequisite(s): EEC 170; EEC 180A Design verification techniques for digital systems; simulation-based design verification techniques; formal verification techniques, including equivalence checking, model checking, and theorem proving; timing analysis and verification; application of design cerification techniques to microprocessors. Effective: 2000 Winter Quarter.

EEC 284—Design and Optimization of Embedded Computing Systems (4)
Lecture—4 hours. Prerequisite(s): EEC 170; EEC 180B; or Consent of Instructor. ECS 122A recommended. Introduction to design and optimization of digital computing systems for embedded applications. Topics include combinatorial optimization techniques, performance and energy optimization in embedded systems, compilation and architecture-specific mapping, programmable and reconfigurable platforms; design automation and algorithmic improvements to design process. Effective: 2007 Winter Quarter.

EEC 286—Introduction to Digital System Testing (3)
Lecture—3 hours. Prerequisite(s): EEC 180A; (STA 120 or STA 131A) A review of several current techniques used to diagnose faults in both combinational and sequential circuits. Topics include path sensitization procedures, Boolean difference, D-algorithm random test generation, TC testing and an analysis of the effects of intermittent faults. Not open for credit to students who have completed EEC 276A. Effective: 1998 Winter Quarter.

EEC 289A—Special Topics in Electrical and Computer Engineering; Computer Science (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Computer Science. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289B—Special Topics in Electrical and Computer Engineering; Programming Systems (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Programming Systems. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289C—Special Topics in Electrical and Computer Engineering; Digital Systems (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Digital Systems. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289D—Special Topics in Electrical and Computer Engineering; Digital Systems (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Digital Systems. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289E—Special Topics in Electrical and Computer Engineering; Signal Transmission (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Signal Transmission. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289F—Special Topics in Electrical and Computer Engineering; Digital Communication (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Digital Communication. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289G—Special Topics in Electrical and Computer Engineering; Control Systems (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Control Systems. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289H—Special Topics in Electrical and Computer Engineering; Robotics (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Robotics. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289I—Special Topics in Electrical and Computer Engineering; Signal Processing (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Signal Processing. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289J—Special Topics in Electrical and Computer Engineering; Image Processing (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Image Processing. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289K—Special Topics in Electrical and Computer Engineering; High Frequency Phenomena and Devices (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in High Frequency Phenomena and Devices. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289L—Special Topics in Electrical and Computer Engineering; Solid-State Devices and Physical Electronics (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Solid-State Devices and Physical Electronics. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289M—Special Topics in Electrical and Computer Engineering; Systems Theory (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Systems Theory. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289N—Special Topics in Electrical and Computer Engineering; Active and Passive Circuits (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Active and Passive Circuits. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289O—Special Topics in Electrical and Computer Engineering; Integrated Circuits (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Integrated Circuits. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289P—Special Topics in Electrical and Computer Engineering; Computer Software (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Computer Software. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289Q—Special Topics in Electrical and Computer Engineering; Computer Engineering (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Computer Engineering. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289R—Special Topics in Electrical and Computer Engineering; Microprocessing (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Microprocessing. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289S—Special Topics in Electrical and Computer Engineering; Electronics (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Electronics. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289T—Special Topics in Electrical and Computer Engineering; Electromagnetics (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Electromagnetics. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289U—Special Topics in Electrical and Computer Engineering; Optoelectronics (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Optoelectronics. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289W—Special Topics in Electrical and Computer Engineering; Computer Networks (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Computer Networks. May be repeated for credit when topic differs. Effective: 2018 Winter Quarter.

EEC 290—Seminar in Electrical and Computer Engineering (1)
Seminar—1 hour. Discussion and presentation of current research and development in Electrical and Computer Engineering. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

EEC 290C—Graduate Research Group Conference in Electrical and Computer Engineering (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Research problems, progress, and techniques in electrical and computer engineering. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

EEC 291—Solid-State Circuit Research Laboratory Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Lectures on solid-state circuit and system design by various visiting experts in the field. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

EEC 292—Seminar in Solid-State Technology (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Lectures on solid-state technology by various visiting experts in the field. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

EEC 293—Computer Engineering Research Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Lectures, tutorials and seminars on topics in computer engineering. May be repeated up to 4 time(s). (S/U grading only.) Effective: 2000 Winter Quarter.

EEC 294—Communications, Signal and Image Processing Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Communications, signal and image processing, video engineering and computer vision. May be repeated for credit. (S/U grading only.) Effective: 2003 Winter Quarter.

EEC 295—Systems, Control and Robotics Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Seminars on current research in systems and control by faculty and visiting experts. Technical presentations and lectures on current topics in robotics research and robotics technology. May be repeated for credit. (S/U grading only.) Effective: 1998 Winter Quarter.

EEC 296—Photonics Research Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Lectures on photonics and related areas by faculty and visiting experts. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1998 Winter Quarter.

EEC 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

EEC 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

EEC 390—The Teaching of Electrical Engineering (1)
Discussion—1 hour. Prerequisite(s): Meet qualifications for teaching assistant and/or associate-in in Electrical Engineering. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

EEC 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Computer Science (Graduate Group)

Computer Science (Graduate Group) | Computer Science (Graduate Group) Information

Kwan-Liu Ma, Ph.D., Chairperson of the Group

Group Office. 2063 Engineering II (Department of Computer Science) 530-752-7004; gradinfocs@ucdavis.edu; http://www.cs.ucdavis.edu

Computer Science (Graduate Group) | Computer Science M.S.

Kwan-Liu Ma, Ph.D., Chairperson of the Group

Group Office. 2063 Engineering II (Department of Computer Science); 530-752-7004; gradinfocs@ucdavis.edu; http://www.cs.ucdavis.edu

Graduate Study. The Graduate Group in Computer Science offers programs of study leading to the M.S. and Ph.D. degrees in Computer Science. The varied nature of the faculty brings a wide variety of research interests to the program. Research strengths lie in algorithms, computational biology, computer architecture, computer graphics and visualization, database systems, computer security and cryptography, computer networks, program specifications and verification, programming languages and compilers, parallel and distributed systems, scientific computation, and software engineering. Interdisciplinary research in computer science is encouraged.

Preparation. Normal preparation for the program is a bachelor's degree in either computer science or in a closely related field (such as electrical engineering or mathematics, with substantial course work in computer science). Applications are also considered from students with outstanding records in other disciplines. M.S. students may either complete a thesis, project or pass a comprehensive examination.

Graduate Advisors. D. Ghosal (Chair), M. Farrens, P. Koehl

Computer Science (Graduate Group) | Computer Science Ph.D.

Kwan-Liu Ma, Ph.D., Chairperson of the Group

Group Office. 2063 Engineering II (Department of Computer Science); 530-752-7004; gradinfocs@ucdavis.edu; http://www.cs.ucdavis.edu

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Graduate Advisors. D. Ghosal (Chair), M. Farrens, P. Koehl

Computer Science; Letters & Science

Computer Science; Letters & Science | Computer Science Information

(College of Letters and Science)

Matthew Farrens, Ph.D., Chairperson of the Department

Department Office. 2063 Kemper Hall; 530-752-7004; http://www.cs.ucdavis.edu

Faculty. http://www.cs.ucdavis.edu/people/faculty/

Computer Science; Letters & Science | Computer Science B.S.

(College of Letters and Science)

Matthew Farrens, Ph.D., Chairperson of the Department

Department Office. 2063 Kemper Hall; 530-752-7004; http://www.cs.ucdavis.edu

Faculty. http://www.cs.ucdavis.edu/people/faculty/

The Major Program

The Department of Computer Science administers two majors: Computer Science and Engineering (CSE), in the College of Engineering, and Computer Science (CS), in the College of Letters and Science. It also administers two minors: Computer Science, in the College of Letters and Science, and Computational Biology, in the College of Engineering. For information on the Computer Science and Engineering curriculum and the minor in Computational Biology, see Engineering: Computer Science.

The primary differences between the CSE and CS majors are the extent of hardware coverage and curricular flexibility. The CSE major develops a solid understanding of the entire machine, including hands-on experience with its hardware components. The CS major teaches some hardware, at the digital-design level, on simulators. The CSE major has fewer free electives. The CS major's more generous electives make it easier to complete a minor or double major.

Students in the CS major receive a solid grounding in the fundamentals of computer languages, operating systems, computer architecture, and the mathematical abstractions underpinning computer science. Students are prepared for both industry and postgraduate study.

Major Advisors. M. Farrens, V. Filkov, D. Ghosal, P. Koehl, N. Matloff, M. Neff, P. Koehl, P. Rogaway

Graduate Study. See Graduate Studies.

Preparatory Requirements **Units:** 17-20

Before declaring a major in Computer Science, students must complete the following courses with an overall UC Davis grade point average of at least 3.000; a grade of C- or better required in all courses:

MAT 021A	Calculus	4
MAT 021B	Calculus	4
ECS 020	Discrete Mathematics For Computer Science	4

Choose one option:

(a)

ECS 030	Programming and Problem Solving (Discontinued)	4

OR

ECS 036A	Programming and Problem Solving	4
ECS 040	Software Development and Object-Oriented Programming (Discontinued)	4
OR		
ECS 036B	Software Development and Object-Oriented Programming in C++	4

(b)

ECS 034	Software Development in UNIX and C/C++	5

Preparatory Subject Matter **Units:** 50-51

MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 022A	Linear Algebra	3
OR		
MAT 067	Modern Linear Algebra	4
ECS 020	Discrete Mathematics For Computer Science	4
ECS 030	Programming and Problem Solving (Discontinued)	4
OR		
ECS 036A	Programming and Problem Solving	4
ECS 040	Software Development and Object-Oriented Programming (Discontinued)	4
OR		
ECS 036B	Software Development and Object-Oriented Programming in C++	4
ECS 060	Data Structures and Programming (Discontinued)	4
OR		
ECS 036C	Data Structures, Algorithms, and Programming	4
ECS 050	Computer Organization and Machine-Dependent Programming	4
OR		
EEC 070	Computer Structure and Assembly Language (Discontinued)	4

Choose three from the following:

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
BIS 002C	Introduction to Biology: Biodiversity and the Tree of Life	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 002C	General Chemistry	5
CHE 002AH	Honors General Chemistry	5
CHE 002BH	Honors General Chemistry	5
CHE 002CH	Honors General Chemistry	5
PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5

Depth Subject Matter **Units:** 50-55

ECS 122A	Algorithm Design and Analysis	4
ECS 120	Theory of Computation	4
OR		
ECS 122B	Algorithm Design and Analysis	4
ECS 140A	Programming Languages	4
ECS 150	Operating Systems and System Programming	4
ECS 154A	Computer Architecture	4
ECS 132	Probability and Statistical Modeling for Computer Science	4
OR		
MAT 135A	Probability	4
OR		
STA 131A	Introduction to Probability Theory	4

Computer Science electives:

Choose a minimum of seven courses, including at least one mathematics or statistics course:

ECS 120-189 inclusive; ECS 193AB (counts as one); one approved 3–5 units course from ECS 192 or 199; ECN 122; EEC 100, 171, 172, 180A, 180B; LIN 127, 177; MAT 100-189, excluding MAT 111; STA 131A, 131B, 141B, 141C; PSC 120. **No course can count as both a required course and a Computer Science elective.**

Total: 100-106

Computer Science; Letters & Science | Computer Science Minor

(College of Letters and Science)

Matthew Farrens, Ph.D., Chairperson of the Department

Department Office. 2063 Kemper Hall; 530-752-7004; http://www.cs.ucdavis.edu

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The primary differences between the CSE and CS majors are the extent of hardware coverage and curricular flexibility. The CSE major develops a solid understanding of the entire machine, including hands-on experience with its hardware components. The CS major teaches some hardware, at the digital-design level, on simulators. The CSE major has fewer free electives. The CS major's more generous electives make it easier to complete a minor or double major.

Students in the CS major receive a solid grounding in the fundamentals of computer languages, operating systems, computer architecture, and the mathematical abstractions underpinning computer science. Students are prepared for both industry and postgraduate study.

Computer Science **Units:** 19-22

Choose any three upper-division Computer Science Engineering courses; a single approved course of three to five units from ECS 192 or 199 is allowed.

Choose any two upper division courses including any upper division Computer Science and Engineering courses or any upper division course in MAT (excluding MAT 111), EEC 100, 171, 172, 180A, 180B; ECN 122; STA 131A, 131B, 141B, 141C; PSC 120 or LIN 127, 177.

Total: 19-22

Computer Science; Letters & Science | ECS Courses

Courses in ECS:

ECS 010—Introduction to Programming (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Two years of high school algebra. Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, Electrical Engineering Majors only. Hands-on introduction to computation, through programming and problem solving. Two units of credit for students who have taken course 12 or Engineering 6. Not open to students who have completed course 30. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

ECS 010—Introduction to Programming (4) ***Review all entries Discontinued***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Two years of high school algebra. Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, Electrical Engineering Majors only. Hands-on introduction to computation, through programming and problem solving. Two units of credit for students who have taken course 12 or Engineering 6. Not open to students who have completed course 30. GE credit: QL, SE, SL. Effective: 2018 Fall Quarter.

ECS 012—Introduction to Media Computation (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Introduction to key computational ideas necessary to understand and produce digital media. Fundamentals of programming are covered as well as analysis of how media are represented and transmitted in digital form. Aimed primarily at non-computer science students. Two units of credit for students that have taken ECS 010 or ECS 030 or ENG 006. (CTS 012.) GE credit: AH, SE, VL. Effective: 2015 Spring Quarter.

ECS 015—Introduction to Computers (4)
Laboratory—3 hours; Lecture—3 hours. Computer uses in modern society. Emphasis on uses in non-scientific disciplines. Includes word processing, spreadsheets, web-page creation, elementary programming, basic computer organization, the Internet, the uses of computers and their influence on society. Course not intended for CS or CSE majors. Only two units of credit allowed to students who have completed PLS 021; not open for credit to students who have completed ECS 030. GE credit: QL, SE, WE. Effective: 2013 Fall Quarter.

ECS 020—Discrete Mathematics For Computer Science (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016A C- or better or MAT 017A C- or better or MAT 021A C- or better Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, and Cognitive Science Majors only. Discrete mathematics of particular utility to computer science. Proofs by induction. Propositional and first-order logic. Sets, functions, and relations. Big-O and related notations. Recursion and solutions of recurrence relations. Combinatorics. Probability on finite probability spaces. Graph theory. GE credit: QL, SE. Effective: 2017 Winter Quarter.

ECS 030—Programming and Problem Solving (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016A (can be concurrent) or MAT 017A (can be concurrent) or MAT 021A (can be concurrent); Prior experience with basic programming concepts (variable, loops, conditional statements) recommended. Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, Electrical Engineering, and Cognitive Science Majors only. Introduction to computers and computer programming, algorithm design, and debugging. Elements of good programming style. Programming in the C language. Use of basic UNIX tools. GE credit: QL, SE. Effective: 2017 Spring Quarter.

ECS 030—Programming and Problem Solving (4) ***Review all entries Discontinued***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016A (can be concurrent) or MAT 017A (can be concurrent) or MAT 021A (can be concurrent); Prior experience with basic programming concepts (variable, loops, conditional statements) recommended. Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, Electrical Engineering, and Cognitive Science Majors only. Introduction to computers and computer programming, algorithm design, and debugging. Elements of good programming style. Programming in the C language. Use of basic UNIX tools. GE credit: QL, SE. Effective: 2018 Fall Quarter.

ECS 032A—Introduction to Programming (4)
Discussion—1 hour; Lecture—3 hours. Not open to students who have completed ECS 036A. Introduction to programming and problem solving in Python. Aimed primarily at non-major students. No credit to students who completed previous ECS 010, ECS 030 or higher. GE credit: SE. Effective: 2018 Fall Quarter.

ECS 032B—Introduction to Data Structures (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 010 C- or better or ECS 030 C- or better or ECS 032A C- or better or ECS 036A C- or better Design and analysis of data structures using Python; trees, heaps, searching, sorting, and graphs. No credit to students who completed ECS 036C or ECS 060 or higher. GE credit: SE. Effective: 2018 Fall Quarter.

ECS 034—Software Development in UNIX and C/C++ (5)
Discussion—1 hour; Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): ECS 032B C- or better; or Consent of Instructor. UNIX Operating system tools and programming environment. Methods for debugging and verification. Principles of C and object-oriented programming in C++. Extensive programming. Only three units of credit for students who have previously taken ECS 036B. GE credit: SE. Effective: 2018 Fall Quarter.

ECS 036A—Programming and Problem Solving (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Prior experience with basic programming concepts (variable, loops, conditional statements) required; must satisfy computer science placement exam, or C- or better in ECS 32A. Pass One restricted to Computer Science, Computer Science and Engineering, Computer Engineering, Electrical Engineering, and Cognitive Science majors only. Computers and computer programming for students with some prior experience, algorithm design, and debugging. Good programming style. Use of basic UNIX tools. Two units if completed ECS 032A; no credit for students who have completed ECS 032B or previous course ECS 030. GE credit: SE. Effective: 2018 Fall Quarter.

ECS 036B—Software Development and Object-Oriented Programming in C++ (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 030 C- or better or ECS 036A C- or better Pass One restricted to Computer Science, Computer Science and Engineering, Computer Engineering, Electrical Engineering, and Cognitive Science majors only. Object-oriented programming in C++. Basic data structures and their use. Writing good programs of increased complexity and efficiency. Methods for debugging and verification. Not open for credit to students who have taken ECS 034, previous course ECS 040 or ECS 060. GE credit: SE. Effective: 2018 Fall Quarter.

ECS 036C—Data Structures, Algorithms, and Programming (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 040 C- or better or ECS 036B C- or better Pass One restricted to Computer Science, Computer Science and Engineering, Computer Engineering, Electrical Engineering, and Cognitive Science majors only. Design and analysis of data structures for a variety of applications; trees, heaps, searching, sorting, hashing, and graphs. Extensive programming. Not open for credit to students who have taken ECS 032B or previous ECS 060. GE credit: SE. Effective: 2018 Fall Quarter.

ECS 040— Software Development and Object-Oriented Programming (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 030 C- or better; Or equivalent. Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, Electrical Engineering, and Cognitive Science Majors only. Elements of program design, style, documentation, efficiency. Methods for debugging and verification. Operating system tools. Principles and use of object-oriented programming in C++. Basic data structures and their use. GE credit: SE. Effective: 2018 Winter Quarter.

ECS 040— Software Development and Object-Oriented Programming (4) ***Review all entries Discontinued***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 030 C- or better; Or equivalent. Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, Electrical Engineering, and Cognitive Science Majors only. Elements of program design, style, documentation, efficiency. Methods for debugging and verification. Operating system tools. Principles and use of object-oriented programming in C++. Basic data structures and their use. GE credit: SE. Effective: 2018 Fall Quarter.

ECS 050—Computer Organization and Machine-Dependent Programming (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 040 C- or better Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, and Cognitive Science Majors only. Comparative study of different hardware architectures via programming in the assembly languages of various machines. Role of system software in producing an abstract machine. Introduction to I/O devices and programming. Only one unit of credit allowed for students who have taken EEC 070. GE credit: SE. Effective: 2017 Winter Quarter.

ECS 060—Data Structures and Programming (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 040 C- or better Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, and Cognitive Science Majors only. Design and analysis of data structures for a variety of applications. Trees, heaps, searching, sorting, hashing, graphs. Extensive programming. GE credit: QL, SE. Effective: 2017 Spring Quarter.

ECS 060—Data Structures and Programming (4) ***Review all entries Discontinued***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 040 C- or better Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, and Cognitive Science Majors only. Design and analysis of data structures for a variety of applications. Trees, heaps, searching, sorting, hashing, graphs. Extensive programming. GE credit: QL, SE. Effective: 2018 Fall Quarter.

ECS 089A—Special Topics in Computer Science; Computer Science Theory (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Computer Science Theory. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 089B—Special Topics in Computer Science; Architecture (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Architecture. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 089C—Special Topics in Computer Science; Programming Languages and Compilers (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Programming Languages and Compilers. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 089D—Special Topics in Computer Science; Operating Systems (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Operating Systems. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 089E—Special Topics in Computer Science; Software Engineering (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Software Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 089F—Special Topics in Computer Science; Databases (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Databases. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 089G—Special Topics in Computer Science; Artificial Intelligence (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Artificial Intelligence. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 089H—Special Topics in Computer Science; Computer Graphics (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Computer Graphics. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 089I—Special Topics in Computer Science; Networks (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Networks. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 089J—Special Topics in Computer Science; Computer-Aided Design (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Computer-Aided Design. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 089K—Special Topics in Computer Science; Scientific Computing (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Scientific Computing. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 089L—Special Topics in Computer Science; Computer Science (1-5)
Laboratory; Lecture. Prerequisite(s): Consent of Instructor. Special topics in Computer Science. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 092—Internship in Computer Science (1-5)
Internship. Prerequisite(s): Lower division standing; project approval prior to period of internship. Supervised work experience in computer science. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

ECS 098—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

ECS 098F—Student Facilitated Course (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Student facilitated course intended primarily for lower division students. (P/NP grading only.) Effective: 2016 Winter Quarter.

ECS 099—Special Study for Lower Division Students (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

ECS 113—Computer Security for Non-Majors (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Programming skill at the level of ECS 015. Principles, mechanisms, implementation, and sound practices of computer security and data protection. Cryptography, authentication and access control. Internet security. Malicious software. Common vulnerabilities. Practical security in everyday life. Course not intended for CS or CSE majors. No credit allowed to students who have completed ECS 153 or ECS 155. GE credit: SE. Effective: 2018 Winter Quarter.

ECS 120—Theory of Computation (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 020 or MAT 108 Pass One open to Computer Science, Computer Science Engineering, and Computer Engineering Majors only. Fundamental ideas in the theory of computation, including formal languages, computability and complexity. Reducibility among computational problems. GE credit: QL, SE. Effective: 2016 Fall Quarter.

ECS 122A—Algorithm Design and Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 020; ECS 060 Pass One open to Computer Science, Computer Science Engineering, and Computer Engineering Majors only. Complexity of algorithms, bounds on complexity, analysis methods. Searching, sorting, pattern matching, graph algorithms. Algorithm design techniques: divide-conquer, greedy, dynamic programming. Approximation methods. NP-complete problems. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 122B—Algorithm Design and Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 122A Pass One open to Computer Science, Computer Science Engineering, and Computer Engineering Majors only. Theory and practice of hard problems, and problems with complex algorithm solutions. NP-completeness, approximation algorithms, randomized algorithms, dynamic programming and branch and bound. Theoretical analysis, implementation and practical evaluations. Examples from parallel, string, graph, and geometric algorithms. GE credit: QL, SE. Effective: 2016 Fall Quarter.

ECS 124—Theory and Practice of Bioinformatics (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): (ECS 010 or ECS 030 or ENG 006); (STA 012 or STA 013 or STA 013Y or STA 032 or STA 100 or STA 131A or MAT 135A or BIM 105); (BIS 002A or MCB 010) Pass One open to Computer Science, Computer Science Engineering, and Biotechnology majors only. Fundamental biological, mathematical and algorithmic models underlying bioinformatics and systems biology; sequence analysis, database search, genome annotation, clustering and classification, functional gene networks, regulatory network inference, phylogenetic trees, applications of common bioinformatics tools in molecular biology and genetics. GE credit: SE. Effective: 2018 Spring Quarter.

ECS 127—Cryptography (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 020 or MAT 108 Pass One open to Computer Science and Computer Science Engineering Majors only. Introduction to the theory and practice of cryptographic techniques used in computer security. Encryption (secret-key and public-key), message authentication, digital signatures, entity authentication, key distribution, and other cryptographic protocols. The social context of cryptography. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

ECS 129—Computational Structural Bioinformatics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 002A or MCB 010; College level programming course. Pass One open to Computer Science, Computer Science Engineering, and Biotechnology majors only. Fundamental biological, chemical and algorithmic models underlying computational structural biology; protein structure and nucleic acids structure; comparison of protein structures; protein structure prediction; molecular simulations; databases and online services in computational structural biology. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 130—Scientific Computation (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECS 030 or ENG 006); (MAT 022A or MAT 067) Pass One open to Computer Science and Computer Science Engineering Majors only. Matrix-vector approach using MATLAB for floating-point arithmetic, error analysis, data interpolation, least squares data fitting, quadrature, zeros, optimization and matrix eigenvalues and singular values. Parallel computing for matrix operations and essential matrix factorizations. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 132—Probability and Statistical Modeling for Computer Science (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 040; (ECS 050 or EEC 070); MAT 021C; (MAT 022A or MAT 067) Pass One open to Computer Science and Computer Science Engineering Majors only. Univariate and multivariate distributions. Estimation and model building. Markov/Hidden Markov models. Applications to data mining, networks, security, software engineering and bioinformatics. GE credit: QL, SE. Effective: 2016 Fall Quarter.

ECS 140A—Programming Languages (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 050 or EEC 070; ECS 060 Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, and Cognitive Science Majors only. Syntactic definition of programming languages. Introduction to programming language features including variables, data types, data abstraction, object-orientedness, scoping, parameter disciplines, exception handling. Non-imperative programming languages. Comparative study of several high-level programming languages. GE credit: SE. Effective: 2017 Winter Quarter.

ECS 140B—Programming Languages (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 140A Pass One open to Computer Science and Computer Science Engineering Majors only. Continuation of programming language principles. Further study of programming language paradigms such as functional and logic; additional programming language paradigms such as concurrent (parallel); key implementation issues for those paradigms; and programming language semantics. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 142—Compilers (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 020; ECS 140A; ECS 120 recommended. Pass One open to Computer Science and Computer Science Engineering Majors only. Principles and techniques of lexical analysis, parsing, semantic analysis, code generation, and code optimization. Implementation of compilers. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 145—Scripting Languages and Their Applications (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Programming skill at the level of ECS 060. Pass One open to Computer Science and Computer Science Engineering Majors only. Goals and philosophy of scripting languages, with Python and R as prime examples. Applications include networking, data analysis and display, and graphical user interfaces (GUIs). GE credit: SE. Effective: 2016 Fall Quarter.

ECS 150—Operating Systems and System Programming (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 040; (ECS 050 or EEC 070 or EEC 170) Pass One open to Computer Science, Computer Science Engineering, and Computer Engineering Majors only. Basic concepts of operating systems and system programming. Processes and interprocess communication/synchronization; virtual memory, program loading and linking; file and I/O subsystems; utility programs. Study of a real operating system. GE credit: SE. Effective: 2017 Fall Quarter.

ECS 152A—Computer Networks (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 060; (ECS 132 or EEC 161 or MAT 135A or STA 131A or STA 120 or STA 032) Pass One open to Computer Science and Computer Science Engineering Majors only. Overview of computer networks, TCP/IP protocol suite, computer-networking applications and protocols, transport-layer protocols, network architectures, Internet Protocol (IP), routing, link-layer protocols, local area and wireless networks, medium access control, physical aspects of data transmission, and network-performance analysis. Only 2 units of credit for students who have taken ECS 157. (EEC 173A.) GE credit: SE. Effective: 2016 Fall Quarter.

ECS 152B—Computer Networks (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 152A or EEC 173A Pass One open to Computer Science and Computer Science Engineering Majors only. TCP/IP protocol suite, computer networking applications, client-server and peer-to-peer architectures, application-layer protocols, transport-layer protocols, transport-layer interfaces, sockets, network programming, remote procedure calls, and network management. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 152C—Advanced Topics in Computer Networks

(4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 173A or ECS 152A Advanced topics in computer networks, wireless networks, multimedia networking, traffic analysis and modeling, network design and management, network simulation and performance analysis, and design projects in communication networks. (EEC 173B.) GE credit: SE. Effective: 2014 Fall Quarter.

ECS 153—Computer Security (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 150; ECS 152A Pass One open to Computer Science and Computer Science Engineering Majors only. Principles, mechanisms, and implementation of computer security and data protection. Policy, encryption and authentication, access control, and integrity models and mechanisms; network security; secure systems; programming and vulnerabilities analysis. Study of an existing operating system. Not open for credit to students who have completed course 155. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 153—Computer Security (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 150; (ECS 152A or EEC 173A) Pass One open to Computer Science and Computer Science Engineering Majors only. Principles, mechanisms, and implementation of computer security and data protection. Policy, encryption and authentication, access control, and integrity models and mechanisms; network security; secure systems; programming and vulnerabilities analysis. Study of an existing operating system. Not open for credit to students who have completed ECS 155. GE credit: SE. Effective: 2018 Fall Quarter.

ECS 154A—Computer Architecture (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 050 or EEC 070 Pass One open to Computer Science and Computer Science Engineering Majors only. Introduction to digital design. Interfacing of devices for I/O, memory and memory management. Input/output programming, via wait loops, hardware interrupts and calls to operating system services. Hardware support for operating systems software. Only one unit of credit allowed for students who have taken EEC 170. GE credit: SE. Effective: 2017 Winter Quarter.

ECS 154B—Computer Architecture (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 154A or (EEC 170, EEC 180A) Pass One open to Computer Science and Computer Science Engineering Majors only. Hardwired and microprogrammed CPU design. Memory hierarchies. Uniprocessor performance analysis under varying program mixes. Introduction to pipelining and multiprocessors. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 158—Programming on Parallel Architectures (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 150; ECS 154B recommended. Pass One open to Computer Science and Computer Science Engineering Majors only. Techniques for software development using the shared-memory and message-passing paradigms, on parallel architectures and networks of workstations. Locks, barriers, and other techniques for synchronization. Introduction to parallel algorithms. GE credit: SE. Effective: 2018 Winter Quarter.

ECS 160— Software Engineering (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 140A Pass One open to Computer Science and Computer Science Engineering Majors only. Requirements, specification, design, implementation, testing, and verification of large software systems. Study and use of software engineering methodologies. Team programming. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 161—Modern Programming Tools (4)
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): ECS 040; or equivalent. Pass One open to Computer Science and Computer Science Engineering Majors only. Concepts and practice of collaborative software development using modern software tools. GE credit: SE. Effective: 2017 Fall Quarter.

ECS 162—Web Programming (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): ECS 030; Or equivalent programming experience in C and the Unix environment. Pass One open to Computer Science and Computer Science Engineering Majors only. Technical aspects of building websites, including both server-side and client-side software development. GE credit: SE, VL. Effective: 2017 Fall Quarter.

ECS 163—Information Interfaces (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 060 Pass One open to Computer Science and Computer Science Engineering Majors only. Art and science of information visualization and interfaces for information systems. Design principles of human-computer interaction. Visual display and navigation of nonspatial and higher dimensional data. Implementations, performance issues, tradeoffs, and evaluation of interactive information systems. GE credit: SE, VL. Effective: 2016 Fall Quarter.

ECS 165A—Database Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 060 Pass One open to Computer Science and Computer Science Engineering Majors only. Database modeling and design (E/R model, relational model), relational algebra, query languages (SQL), file and index structures, query processing, transaction management. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 165B—Database Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 165A Pass One open to Computer Science and Computer Science Engineering Majors only. Data modeling (object-relational, graph-based, spatiotemporal models). Querying semistructured data (XML). Database theory (normalization, integration, provenance). Database programming (stored procedures, embedded SQL, web programming). Advanced topics (data warehousing, parallel data processing). GE credit: SE. Effective: 2016 Fall Quarter.

ECS 170—Introduction to Artificial Intelligence (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 060 Pass One open to Computer Science and Computer Science Engineering Majors only. Design and implementation of intelligent computer systems. Knowledge representation and organization. Memory and inference. Problem solving. Natural language processing. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 171—Machine Learning (4)
Discussion—1 hour; Lecture—3 hours. Pass One open to Computer Science and Computer Science Engineering Majors only. Introduction to machine learning. Supervised and unsupervised learning, including classification, dimensionality reduction, regression and clustering using modern machine learning methods. Applications of machine learning to other fields. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 173—Image Processing and Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (MAT 067 or MAT 022A C- or better); ECS 060 Pass One open to Computer Science and Computer Science Engineering Majors only. Techniques for automated extraction of high-level information from images generated by cameras, three-dimensional surface sensors, and medical devices. Typical applications include detection of objects in various types of images and describing populations of biological specimens appearing in medical imagery. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 174—Computer Vision (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 060; (STA 032 or STA 131A or MAT 135A or EEC 161 or ECS 132) recommended; (MAT 022A or MAT 067) recommended. Pass One open to Computer Science and Computer Science and Engineering Majors only. Computer vision is the study of enabling machines to "see" the visual world (e.g., understand images and videos). Explores several fundamental topics in the area, including feature detection, grouping and segmentation, and recognition. GE credit: SE. Effective: 2018 Spring Quarter.

ECS 175—Computer Graphics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 060; (MAT 022A or MAT 067) Pass One open to Computer Science and Computer Science Engineering Majors only. Principles of computer graphics, with a focus on interactive systems. Current graphics hardware, elementary operations in two-and three-dimensional space, geometric transformations, camera models and interaction, graphics system design, standard graphics APIs, individual projects. GE credit: SE, VL. Effective: 2016 Fall Quarter.

ECS 177—Scientific Visualization

(4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 175 Pass One open to Computer Science and Computer Science Engineering Majors only. Computer graphics techniques for generating images of various types of measured or computer-simulated data. Typical applications for these graphics techniques include study of air flows around car bodies, medical data, and molecular structures. GE credit: SE, VL. Effective: 2016 Fall Quarter.

ECS 178—Geometric Modeling (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 175 Pass One open to Computer Science and Computer Science Engineering Majors only. Interactive graphics techniques for defining and manipulating geometrical shapes used in computer animation, car body design, aircraft design, and architectural design. GE credit: SE, VL. Effective: 2016 Fall Quarter.

ECS 188—Ethics in an Age of Technology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Upper division standing. Pass One open to Computer Science and Computer Science Engineering Majors only. Foundations of ethics. Views of technology. Technology and human values. Costs and benefits of technology. Character of technological change. Social context of work in computer science and engineering. GE credit: SL, SS, WE. Effective: 2018 Winter Quarter.

ECS 189A—Special Topics in Computer Science; Computer Science Theory (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Computer Science Theory. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189B—Special Topics in Computer Science; Architecture (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Architecture. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189C—Special Topics in Computer Science; Programming Languages and Compilers (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Programming Languages and Compilers. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189D—Special Topics in Computer Science; Operating Systems (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Operating Systems. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189E—Special Topics in Computer Science; Software Engineering (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Software Engineering May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189F—Special Topics in Computer Science; Databases (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic Databases. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189G—Special Topics in Computer Science; Artificial Intelligence (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Artificial Intelligence. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189H—Special Topics in Computer Science; Computer Graphics (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Computer Graphics. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189I—Special Topics in Computer Science; Networks (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Networks. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189J—Special Topics in Computer Science; Computer-Aided Design (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Computer-Aided Design. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189K—Special Topics in Computer Science; Scientific Computing (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Scientific Computing. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189L—Special Topics in Computer Science; Computer Science (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Computer Science. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189M—Special Topics in Computer Security; Computer Security (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Computer Security. May be repeated for credit when topic differs. Effective: 2009 Spring Quarter.

ECS 189N—Special Topics in Bioinformatics and Computational Biology (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Bioinformatics and Computational Biology. May be repeated for credit when topic differs. Effective: 2009 Spring Quarter.

ECS 190C—Research Group Conferences in Computer Science (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing in Computer Science and Engineering. Research group conferences. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

ECS 190X—Senior Seminar (2)
Seminar—2 hours. Prerequisite(s): Senior standing. Examination of a special topic in a small group setting. Effective: 1997 Winter Quarter.

ECS 192—Internship in Computer Science (1-5)
Internship. Prerequisite(s): Completion of a minimum of 84 units; project approval prior to period of internship. Supervised work experience in computer science. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

ECS 193A—Senior Design Project (3)
Lecture/Discussion—3 hours. Prerequisite(s): ECS 160 (can be concurrent); Senior standing in Computer Science or Computer Science and Engineering or consent of instructor. Pass One open to Computer Science Engineering Majors only; Pass Two open to Computer Science and Computer Science Engineering Majors only. Responding to real-life client design challenges, student teams plan, implement, and evaluate large-scale projects involving computer and computational systems. The project is supervised by a faculty member. Students must take course 193A and 193B to receive credit. GE credit: SE. Effective: 2017 Winter Quarter.

ECS 193B—Senior Design Project (3)
Lecture/Discussion—3 hours. Prerequisite(s): ECS 193A IP or better Pass One open to Computer Science Engineering Majors only; Pass Two open to Computer Science and Computer Science Engineering Majors only. Responding to real-life client design challenges, student teams plan, implement, and evaluate large-scale projects involving computer and computational systems. The project is supervised by a faculty member. Students must take course 193A and 193B to receive credit. GE credit: SE. Effective: 2017 Spring Quarter.

ECS 197T—Tutoring in Computer Science (1-3)
Discussion—1 hour; Discussion/Laboratory—3-6 hours. Prerequisite(s): Consent of Instructor. Restricted to upper-division standing. Tutoring in computer science courses, especially introductory courses. (P/NP grading only.) Effective: 2014 Fall Quarter.

ECS 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

ECS 198F—Student Facilitated Course (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Student facilitated course intended primarily for upper division students. (P/NP grading only.) Effective: 2016 Winter Quarter.

ECS 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

ECS 199FA—Student Facilitated Course Development (1-4)
Variable—1-4 hours. Under the supervision of a faculty member, an undergraduate student plans and develops the course they will offer under 98F/198F. (P/NP grading only.) Effective: 2016 Winter Quarter.

ECS 199FB—Student Facilitated Teaching (1-4)
Variable—1-4 hours. Prerequisite(s): ECS 199FA; Consent of Instructor. STU FAC. Under the supervision of a faculty member, an undergraduate student teaches a course under 98F/198F. (P/NP grading only.) Effective: 2016 Winter Quarter.

ECS 201A—Advanced Computer Architecture (4)
Lecture—3 hours; Term Paper. Prerequisite(s): (ECS 154B or EEC 170); ECS 150 Pass 1 and Pass 2 open to Graduate Students in Computer Science only. Modern research topics and methods in computer architecture. Design implications of memory latency and bandwidth limitations. Performance enhancement via within-processor and between-processor parallelism. Term project involving student-proposed extensions/modifications of work in the research literature. Not open for credit to students who have completed ECS 250A. Effective: 2016 Spring Quarter.

ECS 201B—High-Performance Uniprocessing (4)
Lecture—3 hours; Term Paper. Prerequisite(s): ECS 201A Pass 1 and Pass 2 open to Graduate Students in Computer Science only. Maximizing uniprocessor performance. Barriers to high performance; solutions to the problems; historical and current processor designs. Not open for credit to students who have completed ECS 250B. Effective: 2016 Spring Quarter.

ECS 201C—Parallel Architectures (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): ECS 201A Evolution of parallel architectures from special-purpose machines to commodity servers. Emphasis on recent machines and applications that drive them. Not open for credit to students who have completed ECS 250C. Effective: 2003 Spring Quarter.

ECS 203—Novel Computing Technologies (4)
Lecture—3 hours; Project (Term Project)—1 hour. Prerequisite(s): ECS 201A Pass One and Pass Two open to Graduate Students in Computer Science only. Novel computing technologies that could revolutionize computer architecture. Quantum computing technologies, including algorithms, devices, and fault tolerance. A survey of other unconventional technologies including nanoscale electronics, MEMS devices, biological devices, and nanotechnology. Effective: 2016 Spring Quarter.

ECS 220—Theory of Computation (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 120; ECS 122A Pass 1 and Pass 2 open to Graduate Students in Computer Science only. Time and space complexity classes. Reductions, completeness, and the role of randomness. Logic and undecidability. Effective: 2016 Spring Quarter.

ECS 221—Computational Methods in Systems and Synthetic Biology (4)
Discussion—1 hour; Lecture—3 hours. Pass 1 and Pass 2 open to Graduate Students in Computer Science only. Computational methods related to systems and synthetic biology. An overview of machine learning techniques related to the analysis of biological data, biological networks. Predictive modeling and simulation of biological systems. Topics on biological circuit construction. Effective: 2016 Spring Quarter.

ECS 222A—Design and Analysis of Algorithms (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 122A; STA 031A recommended. Pass One and Pass Two open to Graduate Students in Computer Science only. Techniques for designing efficient algorithms, analyzing their complexity and applying these algorithms to a broad range of applications. Methods for recognizing and dealing with difficult problems. Effective: 2016 Spring Quarter.

ECS 222B—Advanced Design and Analysis of Algorithms (4)
Lecture—3 hours; Project (Term Project)—1 hour. Prerequisite(s): ECS 222A Pass One and Pass Two open to Graduate Students in Computer Science only. Advanced topics in complexity theory. Problem classification. The classes P, NP, P-space, co-NP. Matching and network flow algorithms. Matrix multiplication. Approximation algorithms. Effective: 2016 Spring Quarter.

ECS 223—Parallel Algorithms (4)
Discussion/Laboratory—3 hours; Project (Term Project)—1 hour. Prerequisite(s): ECS 222A Pass One and Pass Two open to Graduate Students in Computer Science only. Models of parallel computer systems including PRAMs, loosely coupled systems and interconnection networks. Parallel algorithms for classical problems and general techniques for their design and analysis. Proving lower bounds on parallel computation in several settings. Effective: 2016 Spring Quarter.

ECS 224—String Algorithms and Applications in Computational Biology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 122A Pass One and Pass Two open to Graduate Students in Computer Science only. Algorithms that operate on strings. Pattern matching, sets of patterns, regular expression pattern matching, suffix trees and applications, inexact similarity, parametric sequence alignment, applications to DNA sequencing and protein database searching. Effective: 2016 Spring Quarter.

ECS 225—Graph Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Graduate standing in electrical engineering or computer science or consent of instructor. Open to Graduate Students in Computer Science only. Fundamental concepts. Planar graphs: Kuratowski's theorem. Packings and coverings. Menger's theorem, representation of cuts, Hamilton graphs, rigid graphs, chordal graphs, graph coloring, graph isomorphism, applications and some algorithms. Effective: 2018 Winter Quarter.

ECS 226—Computational Geometry (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 175; ECS 222A Pass One and Pass Two open to Graduate Students in Computer Science only. Mathematics of unstructured data. Algorithms for data structures such as Voronoi diagrams, oct-trees, and arrangements. Applications in computer graphics, concentrating on problems in three-dimensions. Effective: 2016 Spring Quarter.

ECS 227—Modern Cryptography (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 220 or ECS 222A Pass One and Pass Two open to Graduate Students in Computer Science only. Modern cryptography as a discipline emphasizing formal definitions and proofs of security. One-way functions, pseudo-randomness, encryption, digital signatures, zero-knowledge, secure protocols. Effective: 2016 Spring Quarter.

ECS 228—Cryptograpy for E-Commerce (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 222A Pass One and Pass Two open to Graduate Students in Computer Science only. Cryptographic primitives and protocols of importance to e-commerce, present and future, including content distribution mechanisms, payment mechanisms, pricing mechanisms, anonymity and privacy mechanisms, fair exchange mechanisms. Effective: 2016 Spring Quarter.

ECS 229—Advanced Computational Structural Bioinformatics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Graduate standing. Pass One and Pass Two open to Graduate Students in Computer Science only. Algorithmic problems in structural biology; protein structure classification; protein structure prediction (including comparative modeling and ab initio protein structure prediction); molecular simulations (molecular dynamics and Monte Carlo simulations). Effective: 2016 Spring Quarter.

ECS 230—Applied Numerical Linear Algebra (4)
Discussion—1 hour; Discussion/Laboratory—3 hours. Prerequisite(s): ECS 130 or EAD 209 or MAT 167 Pass One and Pass Two open to Graduate Students in Computer Science only. Numerical linear algebra (NLA) with emphasis on applications in engineered systems; matrix factorizations; perturbation and rounding error analyses of fundamental NLA algorithms. Effective: 2016 Spring Quarter.

ECS 231—Large-Scale Scientific Computation (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 130 Pass One and Pass Two open to Graduate Students in Computer Science only. Algorithms and techniques for large-scale scientific computation, including basics for high performance computing, iterative methods, discrete approximation, fast Fourier transform, Poisson solvers, particle methods, spectral graph partition and its applications. Effective: 2016 Spring Quarter.

ECS 234—Computational Functional Genomics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 124; Graduate standing in Computer Science or Life Sciences. Pass One and Pass Two open to Graduate Students in Computer Science only. Bioinformatics methods for analysis and inference of functional relationships among genes using large-scale genomic data, including methods for integration of gene expression, promoter sequence, TF-DNA binding and other data, and approaches in modeling of biological networks. Effective: 2016 Spring Quarter.

ECS 235A—Computer and Information Security (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): ECS 150; ECS 152A recommended. Pass One and Pass Two open to Graduate Students in Computer Science only. Modern topics in computer security, including: protection, access control, operating systems security, network security, applied cryptography, cryptographic protocols, secure programming practices, safe languages, mobile code, malware, privacy and anonymity, and case studies from real-world systems. Not open for credit to students who have taken ECS 235. Effective: 2016 Fall Quarter.

ECS 235B—Foundations of Computer and Information Security (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): ECS 235A; (ECS 120 and ECS 150 recommended.) Pass One and Pass Two open to Graduate Students in Computer Science only. Theoretical foundations of methods used to protect data in computer and communication systems. Access control matrix and undecidability of security; policies; Bell-LaPadula, Biba, Chinese Wall models; non-interference and non-deducibility; information flow and the confinement problem. Not open for credit to students who have taken ECS 235. Effective: 2016 Fall Quarter.

ECS 236—Computer Security: Intrusion Detection Based Approach (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 150; ECS 153 recommended. Pass One and Pass Two open to Graduate Students in Computer Science only. Concepts of intrusion detection, anomaly detection based on machine learning, signature-based detection using pattern matching, automated response to attacks using artificial intelligence planning, tracing intruders based on principal component analysis, security policy languages. Effective: 2016 Spring Quarter.

ECS 240—Programming Languages (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 140A; ECS 142 Pass One and Pass Two open to Graduate Students in Computer Science only. Advanced topics in programming languages, including formal syntax and semantics, the relation between formal semantics and verification, an introduction to the lambda calculus. Additional topics will include language design principles, alternative programming languages, in-depth semantic theory and models of language implementation. Effective: 2016 Spring Quarter.

ECS 242—Translation of Programming Languages (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECS 240 Pass One and Pass Two open to Graduate Students in Computer Science only. Lexical analysis, parsing, storage management, symbol table design, semantic analysis and code generation. LR, LALR grammars. Compilercompilers. Effective: 2016 Spring Quarter.

ECS 243—Code Generation and Optimization (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 201A or EEC 270 Pass One and Pass Two open to Graduate Students in Computer Science only. Compiler optimizations for performance, code size and power reduction. Topics include control- and data-flow analysis, redundancy elimination, loop and cache optimizations, register allocation, local and global instruction scheduling, and modulo scheduling. Effective: 2016 Fall Quarter.

ECS 244—Principles of Concurrent Programming (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECS 020; ECS 150 Pass One and Pass Two open to Graduate Students in Computer Science only. Fundamental concepts and applications of concurrent programs; concurrent program verification and derivation; synchronization mechanisms in programming languages; distributed programming techniques; case studies of languages. Effective: 2016 Spring Quarter.

ECS 247—Concurrent Programming Languages (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECS 140A; ECS 150 Pass One and Pass Two open to Graduate Students in Computer Science only. Language design parameters. Models of parallel machines. Load balancing. Scalability. Portability. Efficiency measures. Design and implementation techniques for several classes of concurrent programming languages (such as object-oriented, functional, logic, and constraint programming languages). Effective: 2016 Fall Quarter.

ECS 251—Operating Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 150 Pass One and Pass Two open to Graduate Students in Computer Science only. Models, design, implementation, performance evaluation in operating systems. Algorithms, internal architectures for single processor OS and distributed systems. Concurrency control, recovery, security. OS kernel-level programming. Special topics embedded systems, real-time system, device driver, NPU (Network Processor Unit). Effective: 2016 Spring Quarter.

ECS 252—Computer Networks (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECS 152B Pass 1 and Pass 2 open to Graduate Students in Computer Science only. Internet protocol based computer networks applications, transport, network layer protocols. High speed LAN technologies: Ethernet, Asynchronous Transfer Mode (ATM). Delay models in data networks: analysis of multiaccess techniques in polling, ring, random access networks. Multimedia applications requirements and design. Effective: 2016 Spring Quarter.

ECS 253—Network Theory and Applications (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): MAT 022A; MAT 022B; (STA 013 or STA 013Y or STA 120); Experience with computer software, or consent of instructor. Pass One and Pass Two open to Graduate Students in Mechanical and Aerospace Engineering and Computer Science only. Develops the mathematical theory underlying growth, structure and function of networks with applications to physical, social, biological and engineered systems. Topics include network growth, resilience, epidemiology, phase transitions, software and algorithms, routing and search control, cascading failures. (Mechanical & Aeronautical Engineering 253.) Effective: 2018 Spring Quarter.

ECS 253—Network Theory and Applications (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): MAT 022A; MAT 022B; (STA 013 or STA 013Y or STA 120); Experience with computer software, or consent of instructor. Develops the mathematical theory underlying growth, structure and function of networks with applications to physical, social, biological and engineered systems. Topics include network growth, resilience, epidemiology, phase transitions, software and algorithms, routing and search control, cascading failures. (MAE 253.) Effective: 2018 Fall Quarter.

ECS 255—Resource Management in Wireless Communication Networks (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 252A Advanced research issues in wireless communication networks, including multi-user diversity and cross-layer optimization, basic network information theory, MIMO systems and the impact on networks, and dynamics spectrum management. Effective: 2009 Winter Quarter.

ECS 256—Performance Evaluation (4)
Lecture—3 hours; Project (Term Project)—1 hour. Prerequisite(s): ECS 020; ECS 152A; STA 131A; (EEC 170 or (ECS 154A, ECS 154B)); ECS 150 recommended. Pass One and Pass Two open to Graduate Students in Computer Science only. Use of simulation and queueing theory in computer and communication system design. Applications to processor scheduling, memory hierarchies; I/O systems; packet and circuit switched networks; fault-tolerance; computer networks applications. Not open for credit to students who have completed ECS 256A. Effective: 2016 Fall Quarter.

ECS 257—Mobile and Wireless Networks (4)
Independent Study—1 hour; Lecture—3 hours. Prerequisite(s): ECS 252 Pass One and Pass Two open to Graduate Students in Computer Science only. Fundamental techniques in design of second generation wireless networks: cellular network and protocols, medium access techniques, handoff control, signaling and mobility management, wireless data works, Internet mobility and Personal Communication Services (PCS). Third generation wideband systems, novel technologies, adhoc networks. Effective: 2016 Fall Quarter.

ECS 258—Networking Architecture and Resource Management (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): ECS 152A or EEC 173A Pass One and Pass Two open to Graduate Students in Computer Science and Electrical and Computer Engineering only. Concepts and design principles of computer networks. Network architectures, protocol mechanisms and implementation principles (transport/network/data-link layers), network algorithms, router mechanisms, design requirements of applications, network simulation, modeling and performance analysis. (EEC 273.) Effective: 2016 Fall Quarter.

ECS 259—Optical Networks (4)
Independent Study—1 hour; Lecture—3 hours. Prerequisite(s): ECS 252 Pass One and Pass Two open to Graduate Students in Computer Science only. Optical networks. Enabling technologies. Multiplexing techniques. WDM. Broadcast networks. Wavelength-routed networks. Network architectures. Protocols. Network algorithms. Device-network interface. Optimization problems. Effective: 2016 Fall Quarter.

ECS 260—Software Engineering (4)
Lecture—3 hours; Project (Term Project)—3 hours. Prerequisite(s): ECS 142; ECS 160 recommended. Pass One and Pass Two open to Graduate Students in Computer Science only. Advanced techniques for domain-specific software reuse. Effective: 2016 Fall Quarter.

ECS 261—Program Verification (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PHI 112; or MAT 125 or familiarity with first-order logic; knowledge of an integrative and functional programming language. Methods of proving correctness of programs with respect to formal
specifications, with attention to those suited for employing automated deduction.Logic background, symbolic execution, techniques suited to iterative programming, methods from denotational semantics, termination, dynamic logic and proofs of concurrent programs. Effective: 1997 Fall Quarter.

ECS 262—Formal Specification (3)
Lecture—3 hours. Prerequisite(s): ECS 261 Pass One and Pass Two open to Graduate Students in Computer Science only. Formal specification of modules, and its relationship to topdown programming development and verification. Abstract data types, together with methods for specifying them. Implementations and proofs of implementation. Using specifications to reason about programs. Parameterized types. Constructing good formal specifications. Effective: 2016 Fall Quarter.

ECS 265—Distributed Database Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 165A Pass One and Pass Two open to Graduate Students in Computer Science only. Concepts of distributed database systems and architectures, distributed database design, distributed query processing and optimization, transaction management and concurrency control, heterogeneous and multidatabase systems. Effective: 2016 Fall Quarter.

ECS 266—Spatial Databases (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 165A Concepts, models, and architectures for spatial databases, spatial access methods, query processing, spatio-temporal data management, moving objects, spatial data mining. <p> Effective: 2008 Winter Quarter.

ECS 267—Wide-Area Distributed Information Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 152B or ECS 165A Pass One and Pass Two open to Graduate Students in Computer Science only. Wide-area distributed information systems, data broadcast, multicast, publish/subscribe, service differentiation, information retrieval, Web caching. Effective: 2016 Fall Quarter.

ECS 268—Scientific Data And Workflow Management <p> (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 165A Scientific data integration, metadata, knowledge representation, ontologies, scientific workflow design and management. <p> Effective: 2008 Winter Quarter.

ECS 270—Artificial Intelligence (3)
Lecture—3 hours. Prerequisite(s): ECS 140A; ECS 172 Pass One and Pass Two open to Graduate Students in Computer Science only. Concepts and techniques underlying the design and implementation of models of human performance on intelligent tasks. Representation of high-level knowledge structures. Models of memory and inference. Natural language and story understanding. Common sense planning and problem solving. Effective: 2016 Fall Quarter.

ECS 271—Machine Learning and Discovery (4)
Lecture—3 hours; Project (Term Project)—1 hour. Prerequisite(s): ECS 170 Pass One and Pass Two open to Graduate Students in Computer Science only. Artificial intelligence techniques for knowledge acquisition by computers. Fundamental problems in machine learning and discovery. Systems that learn from examples, analogies, and solved problems. Systems that discover numerical laws and qualitative relationships. Projects centering on implementation and evaluation. Effective: 2016 Fall Quarter.

ECS 272—Information Visualization (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECS 163 or ECS 175 recommended. Pass One and Pass Two open to Graduate Students in Computer Science only. Advanced topics in information visualization: perceptually effective display methods, color design and selection, interaction models and techniques, focus-context techniques, distortion methods, large graph visualization techniques, visual data mining methods, and evaluation methods. Effective: 2016 Fall Quarter.

ECS 273—Applied Visual Computing (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Graduate standing. Visual computing paradigms, current visualization technologies, principles of 3-d graphics, user interface designs, and exploratory visualization. Effective: 2002 Winter Quarter.

ECS 274—Automated Deduction (4)
Lecture—3 hours. Prerequisite(s): PHI 112; or MAT 125 or familiarity with first order logic. Techniques of mechanical theorem proving. Methods based on resolution and termrewriting. Decision procedures. Induction. Applications to program verification, question/answering and plan generation. Study existing mechanical theorem provers. Effective: 1997 Fall Quarter.

ECS 275A—Advanced Computer Graphics (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECS 175 or ECS 177 or ECS 178 Pass One and Pass Two open to Graduate Students in Computer Science only. Advanced topics in computer graphics. Hidden surface models, rendering of various surface types, subdivision methods, shading techniques, anti-aliasing, modeling techniques. Effective: 2016 Fall Quarter.

ECS 275B—Advanced Computer Graphics (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECS 175 or ECS 177 or ECS 178 Pass 1 and Pass 2 open to Graduate Students in Computer Science only. Advanced topics in computer graphics and geometric modeling. Topics taken from advanced research papers in computer graphics, image synthesis, visualization and geometric modeling. Discussion of current research in the field. Effective: 2016 Spring Quarter.

ECS 276—Advanced Volume Visualization (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 177 Pass One and Pass Two open to Graduate Students in Computer Science only. Applications, available tools and techniques, the challenges confronting the field of volume visualization, and some of the advanced topics in the field. Primary emphasis on advanced software and hardware techniques to achieve interactive visualization. Effective: 2016 Fall Quarter.

ECS 277—Advanced Visualization (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 177 Visualization of 3D data, including scalar fields, vector fields, and medical data. Effective: 2000 Fall Quarter.

ECS 278—Computer-Aided Geometric Design (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECS 175 Pass One and Pass Two open to Graduate Students in Computer Science only. Mathematical techniques for the definition and manipulation of curves and surfaces. Bezier curves and surfaces, B-spline curves and surfaces, subdivision surfaces, wavelets. Integration into various computer graphics rendering models, visualization systems and computer-aided design systems. Effective: 2016 Fall Quarter.

ECS 279—Computer Animation (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 175; or ECS 275. Pass One and Pass Two open to Graduate Students in Computer Science only. Course surveys current research and fundamental techniques that lie behind character animation tools. Emphasis on improving expressive aspects of movement and how physics, motion capture data, the arts and psychology literature, and interactive techniques can be used towards this goal. Effective: 2016 Fall Quarter.

ECS 280—Virtual Reality Technology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 175 Pass One and Pass Two open to Graduate Students in Computer Science only. Fundamentals and principles of Virtual Reality (VR) technology. Potential and limits for its useful application. Developing a complete virtual reality application. Effective: 2016 Spring Quarter.

ECS 289A—Special Topics in Computer Science; Computer Science Theory (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Computer Science Theory. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289B—Special Topics in Computer Science; Architecture (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Architecture. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289C—Special Topics in Computer Science; Programming Languages and Compilers (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Programming Languages and Compilers. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289D—Special Topics in Computer Science; Operating Systems (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Operating Systems. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289E—Special Topics in Computer Science; Software Engineering (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Software Engineering. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289F—Special Topics in Computer Science; Databases (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Databases. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289G—Special Topics in Computer Science (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Artificial Intelligence. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289H—Special Topics in Computer Science; Computer Graphics (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Computer Graphics. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289I—Special Topics in Computer Science (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Networks. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289J—Special Topics in Computer Science; Computer-Aided Design (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Computer-Aided Design. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289K—Special Topics in Computer Science; Scientific Computing (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Scientific Computing. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289L—Special Topics in Computer Science; Computer Science (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Computer Science. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289M—Special Topics in Computer Science; Security (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Security. May be repeated for credit when topic differs. Effective: 2001 Winter Quarter.

ECS 289N—Special Topics in Bioinformatics and Computational Biology (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Bioinformatics and Computational Biology. May be repeated for credit when topic differs. Effective: 2009 Spring Quarter.

ECS 290—Seminar in Computer Science (1)
Seminar—1 hour. Participating seminar; discussion and presentation of current research and development in computer science. (S/U grading only.) Effective: 1997 Winter Quarter.

ECS 290C—Graduate Research Group Conference (1)
Discussion—1 hour. Research problems, progress and techniques in computer science. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

ECS 293A—Research in Computer Science (1)
Lecture—1 hour. Prerequisite(s): Graduate standing in computer science. Pass One and Pass Two open to Graduate Students in Computer Science only. Study of research topics in computer science, PhD level research methodologies (experimental, applied and theoretical). Study skills necessary to successfully find/solve significant research problems. Finding and successful interacting with a research advisor. Ethical issues in research/collaborative work. (S/U grading only.) Effective: 2016 Fall Quarter.

ECS 293B—Research in Computer Science (1)
Lecture—1 hour. Prerequisite(s): Graduate standing in computer science; ECS 293A recommended. Pass One and Pass Two open to Graduate Students in Computer Science only. Study of PhD level research methodologies (experimental, applied and theoretical), presenting research results for the computer science community. Study skills necessary to successfully find/solve significant research problems. (S/U grading only.) Effective: 2016 Fall Quarter.

ECS 298—Group Study (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

ECS 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

ECS 390—The Teaching of Computer Science (1)
Discussion—1 hour. Prerequisite(s): Meet qualifications for teaching assistant and/or associate-in in Computer Science. Pass One and Pass Two open to Graduate Students in Computer Science only. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit. (S/U grading only.) Effective: 2016 Spring Quarter.

ECS 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Computer Science & Engineering; Engineering

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(College of Engineering)

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Faculty. http://www.cs.ucdavis.edu/people/faculty/

The Computer Science and Engineering Program

The Department of Computer Science administers two curricula: Computer Science and Engineering in the College of Engineering, and Computer Science in the College of Letters and Science. It also administers two minors: Computer Science in the College of Letters and Science, and Computational Biology in the College of Engineering. For information on the Computer Science curriculum and minor; see Computer Science.

The Computer Science Engineering major (below) prepares students to do further work in hardware, software, theory, or electronics, either in industry or in postgraduate study.

The primary differences between the Computer Science Engineering and the Computer Science majors are the extent of course work covering hardware and the flexibility of the curriculum. The Computer Science Engineering major develops a solid understanding of the entire machine, including hands-on experience with its hardware components. The Computer Science major has some course work on hardware, at the digital-design level, on simulators. The Computer Science Engineering major has fewer free electives. The CS major's more generous electives make it easier to complete a minor or double major.

A key theme of the Computer Science Engineering curriculum is the hardware/software interaction, a theme reflected in the courses required and the orientation of the courses themselves.

The Computer Science and Engineering major provides students with a solid background in mathematics, physics, chemistry, and electronic circuits and systems, all supporting the computer hardware and computer software courses that constitute the focus of the curriculum.

Mission. The University of California, Davis, is, first and foremost, an institution of learning and teaching, committed to serving the needs of society. The Department of Computer Science contributes to the mission in three ways. First, its undergraduate and graduate education programs seek to educate students in the fundamental principles of computer science and the skills needed to solve the complex technological problems of modern society. The breadth of coursework provides a framework for life-long learning and an appreciation for multidisciplinary activities. Second, through its research programs, the department contributes to the development and progress of computer science, and software and information technology, to provide innovative, creative solutions for societal needs. Finally, the department disseminates its research-to enhance collaborations with the public sector, further interdisciplinary interests that benefit society, and educate the public through publications, public service, and professional activities.

Department Objectives. *Teaching*—We seek to provide undergraduate students with a thorough understanding of the key principles and practices of computing, which include a strong theoretical background in mathematics, basic sciences, and engineering fundamentals and an ability to apply this knowledge to practical problems. We endeavor to provide students with sufficient breadth to work creatively and productively in multidisciplinary work teams; this breadth, in its broadest context, will form the basis for an appreciation and interest in life-long learning. We provide students with the opportunities to design and conduct experiments, and to collect and analyze data in core, as well as more specialized, areas of computer science. We provide students with breadth in the humanities and social sciences so they learn to communicate effectively, understand professional and ethical issues in society, and appreciate the interrelatedness between computing and society. We educate graduate students to be our next generation of teachers or leaders in industry, or to pursue meaningful, creative research in industry, government, or academia. *Re search*—We develop and maintain research programs that produce fundamental scientific advances, as well as useful technological innovations, while simultaneously training the next generation of researchers and leaders in the field of computer science.

Objectives. We train graduates to practice computer science and engineering in a broad range of industries; we prepare interested graduates for graduate education or other professional degrees; we give students an understanding of computer software and hardware systems, and both theoretical and experimental approaches to problem solving; we ready graduates for lifelong learning; and we encourage graduates to contribute to their profession and society.

Computer Science and Engineering Undergraduate Program

The Computer Science and Engineering program is accredited by the Engineering Accreditation Commission and the Computing Accreditation Commission of ABET; see http://www.abet.org.

Exclusive of General Education units, the minimum number of units for the Computer Science and Engineering major is 144.

Students are encouraged to adhere carefully to all prerequisite requirements. The instructor is authorized to drop students from a course for which stated prerequisites have not been completed.

Lower Division Required Courses **Units:** 78-79

MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3
OR		
MAT 067	Modern Linear Algebra	4
MAT 022B	Differential Equations	3
PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5
PHY 009D	Modern Physics	4
CHE 002A	General Chemistry	5
ECS 020	Discrete Mathematics For Computer Science	4
ECS 030	Programming and Problem Solving (Discontinued)	4
OR		
ECS 036A	Programming and Problem Solving	4
ECS 040	Software Development and Object-Oriented Programming (Discontinued)	4
OR		
ECS 036B	Software Development and Object-Oriented Programming in C++	4
ECS 060	Data Structures and Programming (Discontinued)	4
OR		
ECS 036C	Data Structures, Algorithms, and Programming	4
ECS 050	Computer Organization and Machine-Dependent Programming	4
OR		
EEC 070	Computer Structure and Assembly Language (Discontinued)	4
ENG 017	Circuits I	4

Choose one; a grade of C- or better is required:

ENL 003	Introduction to Literature	4
UWP 001	Expository Writing	4
UWP 001V	Expository Writing	4

UWP 001Y	Expository Writing	4
COM 001	Major Books of Western Culture: The Ancient World	4
COM 002	Major Books of Western Culture: From the Middle Ages to the Enlightenment	4
COM 003	Major Books of Western Culture: The Modern Crisis	4
COM 004	Major Books of the Contemporary World	4
NAS 005	Introduction to Native American Literature	4

CMN 001	Introduction to Public Speaking	4

Upper Division Required Courses **Units:** 62-66

ECS 132	Probability and Statistical Modeling for Computer Science	4
ECS 140A	Programming Languages	4
ECS 150	Operating Systems and System Programming	4
ECS 152A	Computer Networks	4
ECS 154A	Computer Architecture	4
ECS 154B	Computer Architecture	4
ECS 160	Software Engineering	4
ECS 188	Ethics in an Age of Technology	4
ECS 193A	Senior Design Project	3
ECS 193B	Senior Design Project	3
ECS 120	Theory of Computation	4
OR		
ECS 122A	Algorithm Design and Analysis	4
EEC 100	Circuits II	5
EEC 172	Embedded Systems	4

Computer Science Electives:

Choose a minimum of four courses and a minimum of 15 units chosen from ECS courses numbered 120 to 189 inclusive; one approved course of three-five units from ECS 192 or 199; EEC 171, 180A, 180B; one course may be taken from the following restricted elective list: ECN 122; LIN 127, 177; MAT 135A, 135B; PSC 120; STA 131A, 131B. No course can count as both a required course and a computer science and engineering elective.

Upper Division Composition Requirement

Choose one:

UWP 101 Advanced Composition 4

A grade of C- or better is required.

Passing the Upper-Division Composition Exam administered by the College of Letters Science.

Total: 144

Computer Science & Engineering; Engineering | ECS Courses

Courses in ECS:

ECS 010—Introduction to Programming (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Two years of high school algebra. Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, Electrical Engineering Majors only. Hands-on introduction to computation, through programming and problem solving. Two units of credit for students who have taken course 12 or Engineering 6. Not open to students who have completed course 30. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

ECS 010—Introduction to Programming (4) ***Review all entries Discontinued***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Two years of high school algebra. Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, Electrical Engineering Majors only. Hands-on introduction to computation, through programming and problem solving. Two units of credit for students who have taken course 12 or Engineering 6. Not open to students who have completed course 30. GE credit: QL, SE, SL. Effective: 2018 Fall Quarter.

ECS 012—Introduction to Media Computation (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Introduction to key computational ideas necessary to understand and produce digital media. Fundamentals of programming are covered as well as analysis of how media are represented and transmitted in digital form. Aimed primarily at non-computer science students. Two units of credit for students that have taken ECS 010 or ECS 030 or ENG 006. (CTS 012.) GE credit: AH, SE, VL. Effective: 2015 Spring Quarter.

ECS 015—Introduction to Computers (4)
Laboratory—3 hours; Lecture—3 hours. Computer uses in modern society. Emphasis on uses in non-scientific disciplines. Includes word processing, spreadsheets, web-page creation, elementary programming, basic computer organization, the Internet, the uses of computers and their influence on society. Course not intended for CS or CSE majors. Only two units of credit allowed to students who have completed PLS 021; not open for credit to students who have completed ECS 030. GE credit: QL, SE, WE. Effective: 2013 Fall Quarter.

ECS 020—Discrete Mathematics For Computer Science (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016A C- or better or MAT 017A C- or better or MAT 021A C- or better Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, and Cognitive Science Majors only. Discrete mathematics of particular utility to computer science. Proofs by induction. Propositional and first-order logic. Sets, functions, and relations. Big-O and related notations. Recursion and solutions of recurrence relations. Combinatorics. Probability on finite probability spaces. Graph theory. GE credit: QL, SE. Effective: 2017 Winter Quarter.

ECS 030—Programming and Problem Solving (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016A (can be concurrent) or MAT 017A (can be concurrent) or MAT 021A (can be concurrent); Prior experience with basic programming concepts (variable, loops, conditional statements) recommended. Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, Electrical Engineering, and Cognitive Science Majors only. Introduction to computers and computer programming, algorithm design, and debugging. Elements of good programming style. Programming in the C language. Use of basic UNIX tools. GE credit: QL, SE. Effective: 2017 Spring Quarter.

ECS 030—Programming and Problem Solving (4) ***Review all entries Discontinued***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016A (can be concurrent) or MAT 017A (can be concurrent) or MAT 021A (can be concurrent); Prior experience with basic programming concepts (variable, loops, conditional statements) recommended. Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, Electrical Engineering, and Cognitive Science Majors only. Introduction to computers and computer programming, algorithm design, and debugging. Elements of good programming style. Programming in the C language. Use of basic UNIX tools. GE credit: QL, SE. Effective: 2018 Fall Quarter.

ECS 032A—Introduction to Programming (4)
Discussion—1 hour; Lecture—3 hours. Not open to students who have completed ECS 036A. Introduction to programming and problem solving in Python. Aimed primarily at non-major students. No credit to students who completed previous ECS 010, ECS 030 or higher. GE credit: SE. Effective: 2018 Fall Quarter.

ECS 032B—Introduction to Data Structures (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 010 C- or better or ECS 030 C- or better or ECS 032A C- or better or ECS 036A C- or better Design and analysis of data structures using Python; trees, heaps, searching, sorting, and graphs. No credit to students who completed ECS 036C or ECS 060 or higher. GE credit: SE. Effective: 2018 Fall Quarter.

ECS 034—Software Development in UNIX and C/C++ (5)
Discussion—1 hour; Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): ECS 032B C- or better; or Consent of Instructor. UNIX Operating system tools and programming environment. Methods for debugging and verification. Principles of C and object-oriented programming in C++. Extensive programming. Only three units of credit for students who have previously taken ECS 036B. GE credit: SE. Effective: 2018 Fall Quarter.

ECS 036A—Programming and Problem Solving (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Prior experience with basic programming concepts (variable, loops, conditional statements) required; must satisfy computer science placement exam, or C- or better in ECS 32A. Pass One restricted to Computer Science, Computer Science and Engineering, Computer Engineering, Electrical Engineering, and Cognitive Science majors only. Computers and computer programming for students with some prior experience, algorithm design, and debugging. Good programming style. Use of basic UNIX tools. Two units if completed ECS 032A; no credit for students who have completed ECS 032B or previous course ECS 030. GE credit: SE. Effective: 2018 Fall Quarter.

ECS 036B—Software Development and Object-Oriented Programming in C++ (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 030 C- or better or ECS 036A C- or better Pass One restricted to Computer Science, Computer Science and Engineering, Computer Engineering, Electrical Engineering, and Cognitive Science majors only. Object-oriented programming in C++. Basic data structures and their use. Writing good programs of increased complexity and efficiency. Methods for debugging and verification. Not open for credit to students who have taken ECS 034, previous course ECS 040 or ECS 060. GE credit: SE. Effective: 2018 Fall Quarter.

ECS 036C—Data Structures, Algorithms, and Programming (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 040 C- or better or ECS 036B C- or better Pass One restricted to Computer Science, Computer Science and Engineering, Computer Engineering, Electrical Engineering, and Cognitive Science majors only. Design and analysis of data structures for a variety of applications; trees, heaps, searching, sorting, hashing, and graphs. Extensive programming. Not open for credit to students who have taken ECS 032B or previous ECS 060. GE credit: SE. Effective: 2018 Fall Quarter.

ECS 040— Software Development and Object-Oriented Programming (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 030 C- or better; Or equivalent. Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, Electrical Engineering, and Cognitive Science Majors only. Elements of program design, style, documentation, efficiency. Methods for debugging and verification. Operating system tools. Principles and use of object-oriented programming in C++. Basic data structures and their use. GE credit: SE. Effective: 2018 Winter Quarter.

ECS 040— Software Development and Object-Oriented Programming (4) ***Review all entries Discontinued***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 030 C- or better; Or equivalent. Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, Electrical Engineering, and Cognitive Science Majors only. Elements of program design, style, documentation, efficiency. Methods for debugging and verification. Operating system tools. Principles and use of object-oriented programming in C++. Basic data structures and their use. GE credit: SE. Effective: 2018 Fall Quarter.

ECS 050—Computer Organization and Machine-Dependent Programming (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 040 C- or better Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, and Cognitive Science Majors only. Comparative study of different hardware architectures via programming in the assembly languages of various machines. Role of system software in producing an abstract machine. Introduction to I/O devices and programming. Only one unit of credit allowed for students who have taken EEC 070. GE credit: SE. Effective: 2017 Winter Quarter.

ECS 060—Data Structures and Programming (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 040 C- or better Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, and Cognitive Science Majors only. Design and analysis of data structures for a variety of applications. Trees, heaps, searching, sorting, hashing, graphs. Extensive programming. GE credit: QL, SE. Effective: 2017 Spring Quarter.

ECS 060—Data Structures and Programming (4) ***Review all entries Discontinued***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 040 C- or better Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, and Cognitive Science Majors only. Design and analysis of data structures for a variety of applications. Trees, heaps, searching, sorting, hashing, graphs. Extensive programming. GE credit: QL, SE. Effective: 2018 Fall Quarter.

ECS 089A—Special Topics in Computer Science; Computer Science Theory (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Computer Science Theory. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 089B—Special Topics in Computer Science; Architecture (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Architecture. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 089C—Special Topics in Computer Science; Programming Languages and Compilers (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Programming Languages and Compilers. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 089D—Special Topics in Computer Science; Operating Systems (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Operating Systems. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 089E—Special Topics in Computer Science; Software Engineering (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Software Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 089F—Special Topics in Computer Science; Databases (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Databases. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 089G—Special Topics in Computer Science; Artificial Intelligence (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Artificial Intelligence. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 089H—Special Topics in Computer Science; Computer Graphics (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Computer Graphics. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 089I—Special Topics in Computer Science; Networks (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Networks. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 089J—Special Topics in Computer Science; Computer-Aided Design (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Computer-Aided Design. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 089K—Special Topics in Computer Science; Scientific Computing (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Scientific Computing. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 089L—Special Topics in Computer Science; Computer Science (1-5)
Laboratory; Lecture. Prerequisite(s): Consent of Instructor. Special topics in Computer Science. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 092—Internship in Computer Science (1-5)
Internship. Prerequisite(s): Lower division standing; project approval prior to period of internship. Supervised work experience in computer science. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

ECS 098—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

ECS 098F—Student Facilitated Course (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Student facilitated course intended primarily for lower division students. (P/NP grading only.) Effective: 2016 Winter Quarter.

ECS 099—Special Study for Lower Division Students (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

ECS 113—Computer Security for Non-Majors (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Programming skill at the level of ECS 015. Principles, mechanisms, implementation, and sound practices of computer security and data protection. Cryptography, authentication and access control. Internet security. Malicious software. Common vulnerabilities. Practical security in everyday life. Course not intended for CS or CSE majors. No credit allowed to students who have completed ECS 153 or ECS 155. GE credit: SE. Effective: 2018 Winter Quarter.

ECS 120—Theory of Computation (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 020 or MAT 108 Pass One open to Computer Science, Computer Science Engineering, and Computer Engineering Majors only. Fundamental ideas in the theory of computation, including formal languages, computability and complexity. Reducibility among computational problems. GE credit: QL, SE. Effective: 2016 Fall Quarter.

ECS 122A—Algorithm Design and Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 020; ECS 060 Pass One open to Computer Science, Computer Science Engineering, and Computer Engineering Majors only. Complexity of algorithms, bounds on complexity, analysis methods. Searching, sorting, pattern matching, graph algorithms. Algorithm design techniques: divide-conquer, greedy, dynamic programming. Approximation methods. NP-complete problems. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 122B—Algorithm Design and Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 122A Pass One open to Computer Science, Computer Science Engineering, and Computer Engineering Majors only. Theory and practice of hard problems, and problems with complex algorithm solutions. NP-completeness, approximation algorithms, randomized algorithms, dynamic programming and branch and bound. Theoretical analysis, implementation and practical evaluations. Examples from parallel, string, graph, and geometric algorithms. GE credit: QL, SE. Effective: 2016 Fall Quarter.

ECS 124—Theory and Practice of Bioinformatics (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): (ECS 010 or ECS 030 or ENG 006); (STA 012 or STA 013 or STA 013Y or STA 032 or STA 100 or STA 131A or MAT 135A or BIM 105); (BIS 002A or MCB 010) Pass One open to Computer Science, Computer Science Engineering, and Biotechnology majors only. Fundamental biological, mathematical and algorithmic models underlying bioinformatics and systems biology; sequence analysis, database search, genome annotation, clustering and classification, functional gene networks, regulatory network inference, phylogenetic trees, applications of common bioinformatics tools in molecular biology and genetics. GE credit: SE. Effective: 2018 Spring Quarter.

ECS 127—Cryptography (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 020 or MAT 108 Pass One open to Computer Science and Computer Science Engineering Majors only. Introduction to the theory and practice of cryptographic techniques used in computer security. Encryption (secret-key and public-key), message authentication, digital signatures, entity authentication, key distribution, and other cryptographic protocols. The social context of cryptography. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

ECS 129—Computational Structural Bioinformatics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 002A or MCB 010; College level programming course. Pass One open to Computer Science, Computer Science Engineering, and Biotechnology majors only. Fundamental biological, chemical and algorithmic models underlying computational structural biology; protein structure and nucleic acids structure; comparison of protein structures; protein structure prediction; molecular simulations; databases and online services in computational structural biology. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 130—Scientific Computation (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECS 030 or ENG 006); (MAT 022A or MAT 067) Pass One open to Computer Science and Computer Science Engineering Majors only. Matrix-vector approach using MATLAB for floating-point arithmetic, error analysis, data interpolation, least squares data fitting, quadrature, zeros, optimization and matrix eigenvalues and singular values. Parallel computing for matrix operations and essential matrix factorizations. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 132—Probability and Statistical Modeling for Computer Science (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 040; (ECS 050 or EEC 070); MAT 021C; (MAT 022A or MAT 067) Pass One open to Computer Science and Computer Science Engineering Majors only. Univariate and multivariate distributions. Estimation and model building. Markov/Hidden Markov models. Applications to data mining, networks, security, software engineering and bioinformatics. GE credit: QL, SE. Effective: 2016 Fall Quarter.

ECS 140A—Programming Languages (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 050 or EEC 070; ECS 060 Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, and Cognitive Science Majors only. Syntactic definition of programming languages. Introduction to programming language features including variables, data types, data abstraction, object-orientedness, scoping, parameter disciplines, exception handling. Non-imperative programming languages. Comparative study of several high-level programming languages. GE credit: SE. Effective: 2017 Winter Quarter.

ECS 140B—Programming Languages (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 140A Pass One open to Computer Science and Computer Science Engineering Majors only. Continuation of programming language principles. Further study of programming language paradigms such as functional and logic; additional programming language paradigms such as concurrent (parallel); key implementation issues for those paradigms; and programming language semantics. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 142—Compilers (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 020; ECS 140A; ECS 120 recommended. Pass One open to Computer Science and Computer Science Engineering Majors only. Principles and techniques of lexical analysis, parsing, semantic analysis, code generation, and code optimization. Implementation of compilers. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 145—Scripting Languages and Their Applications (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Programming skill at the level of ECS 060. Pass One open to Computer Science and Computer Science Engineering Majors only. Goals and philosophy of scripting languages, with Python and R as prime examples. Applications include networking, data analysis and display, and graphical user interfaces (GUIs). GE credit: SE. Effective: 2016 Fall Quarter.

ECS 150—Operating Systems and System Programming (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 040; (ECS 050 or EEC 070 or EEC 170) Pass One open to Computer Science, Computer Science Engineering, and Computer Engineering Majors only. Basic concepts of operating systems and system programming. Processes and interprocess communication/synchronization; virtual memory, program loading and linking; file and I/O subsystems; utility programs. Study of a real operating system. GE credit: SE. Effective: 2017 Fall Quarter.

ECS 152A—Computer Networks (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 060; (ECS 132 or EEC 161 or MAT 135A or STA 131A or STA 120 or STA 032) Pass One open to Computer Science and Computer Science Engineering Majors only. Overview of computer networks, TCP/IP protocol suite, computer-networking applications and protocols, transport-layer protocols, network architectures, Internet Protocol (IP), routing, link-layer protocols, local area and wireless networks, medium access control, physical aspects of data transmission, and network-performance analysis. Only 2 units of credit for students who have taken ECS 157. (EEC 173A.) GE credit: SE. Effective: 2016 Fall Quarter.

ECS 152B—Computer Networks (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 152A or EEC 173A Pass One open to Computer Science and Computer Science Engineering Majors only. TCP/IP protocol suite, computer networking applications, client-server and peer-to-peer architectures, application-layer protocols, transport-layer protocols, transport-layer interfaces, sockets, network programming, remote procedure calls, and network management. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 152C—Advanced Topics in Computer Networks

(4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 173A or ECS 152A Advanced topics in computer networks, wireless networks, multimedia networking, traffic analysis and modeling, network design and management, network simulation and performance analysis, and design projects in communication networks. (EEC 173B.) GE credit: SE. Effective: 2014 Fall Quarter.

ECS 153—Computer Security (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 150; ECS 152A Pass One open to Computer Science and Computer Science Engineering Majors only. Principles, mechanisms, and implementation of computer security and data protection. Policy, encryption and authentication, access control, and integrity models and mechanisms; network security; secure systems; programming and vulnerabilities analysis. Study of an existing operating system. Not open for credit to students who have completed course 155. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 153—Computer Security (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 150; (ECS 152A or EEC 173A) Pass One open to Computer Science and Computer Science Engineering Majors only. Principles, mechanisms, and implementation of computer security and data protection. Policy, encryption and authentication, access control, and integrity models and mechanisms; network security; secure systems; programming and vulnerabilities analysis. Study of an existing operating system. Not open for credit to students who have completed ECS 155. GE credit: SE. Effective: 2018 Fall Quarter.

ECS 154A—Computer Architecture (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 050 or EEC 070 Pass One open to Computer Science and Computer Science Engineering Majors only. Introduction to digital design. Interfacing of devices for I/O, memory and memory management. Input/output programming, via wait loops, hardware interrupts and calls to operating system services. Hardware support for operating systems software. Only one unit of credit allowed for students who have taken EEC 170. GE credit: SE. Effective: 2017 Winter Quarter.

ECS 154B—Computer Architecture (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 154A or (EEC 170, EEC 180A) Pass One open to Computer Science and Computer Science Engineering Majors only. Hardwired and microprogrammed CPU design. Memory hierarchies. Uniprocessor performance analysis under varying program mixes. Introduction to pipelining and multiprocessors. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 158—Programming on Parallel Architectures (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 150; ECS 154B recommended. Pass One open to Computer Science and Computer Science Engineering Majors only. Techniques for software development using the shared-memory and message-passing paradigms, on parallel architectures and networks of workstations. Locks, barriers, and other techniques for synchronization. Introduction to parallel algorithms. GE credit: SE. Effective: 2018 Winter Quarter.

ECS 160— Software Engineering (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 140A Pass One open to Computer Science and Computer Science Engineering Majors only. Requirements, specification, design, implementation, testing, and verification of large software systems. Study and use of software engineering methodologies. Team programming. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 161—Modern Programming Tools (4)
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): ECS 040; or equivalent. Pass One open to Computer Science and Computer Science Engineering Majors only. Concepts and practice of collaborative software development using modern software tools. GE credit: SE. Effective: 2017 Fall Quarter.

ECS 162—Web Programming (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): ECS 030; Or equivalent programming experience in C and the Unix environment. Pass One open to Computer Science and Computer Science Engineering Majors only. Technical aspects of building websites, including both server-side and client-side software development. GE credit: SE, VL. Effective: 2017 Fall Quarter.

ECS 163—Information Interfaces (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 060 Pass One open to Computer Science and Computer Science Engineering Majors only. Art and science of information visualization and interfaces for information systems. Design principles of human-computer interaction. Visual display and navigation of nonspatial and higher dimensional data. Implementations, performance issues, tradeoffs, and evaluation of interactive information systems. GE credit: SE, VL. Effective: 2016 Fall Quarter.

ECS 165A—Database Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 060 Pass One open to Computer Science and Computer Science Engineering Majors only. Database modeling and design (E/R model, relational model), relational algebra, query languages (SQL), file and index structures, query processing, transaction management. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 165B—Database Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 165A Pass One open to Computer Science and Computer Science Engineering Majors only. Data modeling (object-relational, graph-based, spatiotemporal models). Querying semistructured data (XML). Database theory (normalization, integration, provenance). Database programming (stored procedures, embedded SQL, web programming). Advanced topics (data warehousing, parallel data processing). GE credit: SE. Effective: 2016 Fall Quarter.

ECS 170—Introduction to Artificial Intelligence (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 060 Pass One open to Computer Science and Computer Science Engineering Majors only. Design and implementation of intelligent computer systems. Knowledge representation and organization. Memory and inference. Problem solving. Natural language processing. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 171—Machine Learning (4)
Discussion—1 hour; Lecture—3 hours. Pass One open to Computer Science and Computer Science Engineering Majors only. Introduction to machine learning. Supervised and unsupervised learning, including classification, dimensionality reduction, regression and clustering using modern machine learning methods. Applications of machine learning to other fields. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 173—Image Processing and Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (MAT 067 or MAT 022A C- or better); ECS 060 Pass One open to Computer Science and Computer Science Engineering Majors only. Techniques for automated extraction of high-level information from images generated by cameras, three-dimensional surface sensors, and medical devices. Typical applications include detection of objects in various types of images and describing populations of biological specimens appearing in medical imagery. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 174—Computer Vision (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 060; (STA 032 or STA 131A or MAT 135A or EEC 161 or ECS 132) recommended; (MAT 022A or MAT 067) recommended. Pass One open to Computer Science and Computer Science and Engineering Majors only. Computer vision is the study of enabling machines to "see" the visual world (e.g., understand images and videos). Explores several fundamental topics in the area, including feature detection, grouping and segmentation, and recognition. GE credit: SE. Effective: 2018 Spring Quarter.

ECS 175—Computer Graphics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 060; (MAT 022A or MAT 067) Pass One open to Computer Science and Computer Science Engineering Majors only. Principles of computer graphics, with a focus on interactive systems. Current graphics hardware, elementary operations in two-and three-dimensional space, geometric transformations, camera models and interaction, graphics system design, standard graphics APIs, individual projects. GE credit: SE, VL. Effective: 2016 Fall Quarter.

ECS 177—Scientific Visualization

(4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 175 Pass One open to Computer Science and Computer Science Engineering Majors only. Computer graphics techniques for generating images of various types of measured or computer-simulated data. Typical applications for these graphics techniques include study of air flows around car bodies, medical data, and molecular structures. GE credit: SE, VL. Effective: 2016 Fall Quarter.

ECS 178—Geometric Modeling (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 175 Pass One open to Computer Science and Computer Science Engineering Majors only. Interactive graphics techniques for defining and manipulating geometrical shapes used in computer animation, car body design, aircraft design, and architectural design. GE credit: SE, VL. Effective: 2016 Fall Quarter.

ECS 188—Ethics in an Age of Technology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Upper division standing. Pass One open to Computer Science and Computer Science Engineering Majors only. Foundations of ethics. Views of technology. Technology and human values. Costs and benefits of technology. Character of technological change. Social context of work in computer science and engineering. GE credit: SL, SS, WE. Effective: 2018 Winter Quarter.

ECS 189A—Special Topics in Computer Science; Computer Science Theory (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Computer Science Theory. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189B—Special Topics in Computer Science; Architecture (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Architecture. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189C—Special Topics in Computer Science; Programming Languages and Compilers (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Programming Languages and Compilers. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189D—Special Topics in Computer Science; Operating Systems (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Operating Systems. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189E—Special Topics in Computer Science; Software Engineering (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Software Engineering May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189F—Special Topics in Computer Science; Databases (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic Databases. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189G—Special Topics in Computer Science; Artificial Intelligence (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Artificial Intelligence. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189H—Special Topics in Computer Science; Computer Graphics (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Computer Graphics. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189I—Special Topics in Computer Science; Networks (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Networks. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189J—Special Topics in Computer Science; Computer-Aided Design (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Computer-Aided Design. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189K—Special Topics in Computer Science; Scientific Computing (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Scientific Computing. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189L—Special Topics in Computer Science; Computer Science (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Computer Science. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189M—Special Topics in Computer Security; Computer Security (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Computer Security. May be repeated for credit when topic differs. Effective: 2009 Spring Quarter.

ECS 189N—Special Topics in Bioinformatics and Computational Biology (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Bioinformatics and Computational Biology. May be repeated for credit when topic differs. Effective: 2009 Spring Quarter.

ECS 190C—Research Group Conferences in Computer Science (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing in Computer Science and Engineering. Research group conferences. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

ECS 190X—Senior Seminar (2)
Seminar—2 hours. Prerequisite(s): Senior standing. Examination of a special topic in a small group setting. Effective: 1997 Winter Quarter.

ECS 192—Internship in Computer Science (1-5)
Internship. Prerequisite(s): Completion of a minimum of 84 units; project approval prior to period of internship. Supervised work experience in computer science. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

ECS 193A—Senior Design Project (3)
Lecture/Discussion—3 hours. Prerequisite(s): ECS 160 (can be concurrent); Senior standing in Computer Science or Computer Science and Engineering or consent of instructor. Pass One open to Computer Science Engineering Majors only; Pass Two open to Computer Science and Computer Science Engineering Majors only. Responding to real-life client design challenges, student teams plan, implement, and evaluate large-scale projects involving computer and computational systems. The project is supervised by a faculty member. Students must take course 193A and 193B to receive credit. GE credit: SE. Effective: 2017 Winter Quarter.

ECS 193B—Senior Design Project (3)
Lecture/Discussion—3 hours. Prerequisite(s): ECS 193A IP or better Pass One open to Computer Science Engineering Majors only; Pass Two open to Computer Science and Computer Science Engineering Majors only. Responding to real-life client design challenges, student teams plan, implement, and evaluate large-scale projects involving computer and computational systems. The project is supervised by a faculty member. Students must take course 193A and 193B to receive credit. GE credit: SE. Effective: 2017 Spring Quarter.

ECS 197T—Tutoring in Computer Science (1-3)
Discussion—1 hour; Discussion/Laboratory—3-6 hours. Prerequisite(s): Consent of Instructor. Restricted to upper-division standing. Tutoring in computer science courses, especially introductory courses. (P/NP grading only.) Effective: 2014 Fall Quarter.

ECS 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

ECS 198F—Student Facilitated Course (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Student facilitated course intended primarily for upper division students. (P/NP grading only.) Effective: 2016 Winter Quarter.

ECS 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

ECS 199FA—Student Facilitated Course Development (1-4)
Variable—1-4 hours. Under the supervision of a faculty member, an undergraduate student plans and develops the course they will offer under 98F/198F. (P/NP grading only.) Effective: 2016 Winter Quarter.

ECS 199FB—Student Facilitated Teaching (1-4)
Variable—1-4 hours. Prerequisite(s): ECS 199FA; Consent of Instructor. STU FAC. Under the supervision of a faculty member, an undergraduate student teaches a course under 98F/198F. (P/NP grading only.) Effective: 2016 Winter Quarter.

ECS 201A—Advanced Computer Architecture (4)
Lecture—3 hours; Term Paper. Prerequisite(s): (ECS 154B or EEC 170); ECS 150 Pass 1 and Pass 2 open to Graduate Students in Computer Science only. Modern research topics and methods in computer architecture. Design implications of memory latency and bandwidth limitations. Performance enhancement via within-processor and between-processor parallelism. Term project involving student-proposed extensions/modifications of work in the research literature. Not open for credit to students who have completed ECS 250A. Effective: 2016 Spring Quarter.

ECS 201B—High-Performance Uniprocessing (4)
Lecture—3 hours; Term Paper. Prerequisite(s): ECS 201A Pass 1 and Pass 2 open to Graduate Students in Computer Science only. Maximizing uniprocessor performance. Barriers to high performance; solutions to the problems; historical and current processor designs. Not open for credit to students who have completed ECS 250B. Effective: 2016 Spring Quarter.

ECS 201C—Parallel Architectures (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): ECS 201A Evolution of parallel architectures from special-purpose machines to commodity servers. Emphasis on recent machines and applications that drive them. Not open for credit to students who have completed ECS 250C. Effective: 2003 Spring Quarter.

ECS 203—Novel Computing Technologies (4)
Lecture—3 hours; Project (Term Project)—1 hour. Prerequisite(s): ECS 201A Pass One and Pass Two open to Graduate Students in Computer Science only. Novel computing technologies that could revolutionize computer architecture. Quantum computing technologies, including algorithms, devices, and fault tolerance. A survey of other unconventional technologies including nanoscale electronics, MEMS devices, biological devices, and nanotechnology. Effective: 2016 Spring Quarter.

ECS 220—Theory of Computation (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 120; ECS 122A Pass 1 and Pass 2 open to Graduate Students in Computer Science only. Time and space complexity classes. Reductions, completeness, and the role of randomness. Logic and undecidability. Effective: 2016 Spring Quarter.

ECS 221—Computational Methods in Systems and Synthetic Biology (4)
Discussion—1 hour; Lecture—3 hours. Pass 1 and Pass 2 open to Graduate Students in Computer Science only. Computational methods related to systems and synthetic biology. An overview of machine learning techniques related to the analysis of biological data, biological networks. Predictive modeling and simulation of biological systems. Topics on biological circuit construction. Effective: 2016 Spring Quarter.

ECS 222A—Design and Analysis of Algorithms (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 122A; STA 031A recommended. Pass One and Pass Two open to Graduate Students in Computer Science only. Techniques for designing efficient algorithms, analyzing their complexity and applying these algorithms to a broad range of applications. Methods for recognizing and dealing with difficult problems. Effective: 2016 Spring Quarter.

ECS 222B—Advanced Design and Analysis of Algorithms (4)
Lecture—3 hours; Project (Term Project)—1 hour. Prerequisite(s): ECS 222A Pass One and Pass Two open to Graduate Students in Computer Science only. Advanced topics in complexity theory. Problem classification. The classes P, NP, P-space, co-NP. Matching and network flow algorithms. Matrix multiplication. Approximation algorithms. Effective: 2016 Spring Quarter.

ECS 223—Parallel Algorithms (4)
Discussion/Laboratory—3 hours; Project (Term Project)—1 hour. Prerequisite(s): ECS 222A Pass One and Pass Two open to Graduate Students in Computer Science only. Models of parallel computer systems including PRAMs, loosely coupled systems and interconnection networks. Parallel algorithms for classical problems and general techniques for their design and analysis. Proving lower bounds on parallel computation in several settings. Effective: 2016 Spring Quarter.

ECS 224—String Algorithms and Applications in Computational Biology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 122A Pass One and Pass Two open to Graduate Students in Computer Science only. Algorithms that operate on strings. Pattern matching, sets of patterns, regular expression pattern matching, suffix trees and applications, inexact similarity, parametric sequence alignment, applications to DNA sequencing and protein database searching. Effective: 2016 Spring Quarter.

ECS 225—Graph Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Graduate standing in electrical engineering or computer science or consent of instructor. Open to Graduate Students in Computer Science only. Fundamental concepts. Planar graphs: Kuratowski's theorem. Packings and coverings. Menger's theorem, representation of cuts, Hamilton graphs, rigid graphs, chordal graphs, graph coloring, graph isomorphism, applications and some algorithms. Effective: 2018 Winter Quarter.

ECS 226—Computational Geometry (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 175; ECS 222A Pass One and Pass Two open to Graduate Students in Computer Science only. Mathematics of unstructured data. Algorithms for data structures such as Voronoi diagrams, oct-trees, and arrangements. Applications in computer graphics, concentrating on problems in three-dimensions. Effective: 2016 Spring Quarter.

ECS 227—Modern Cryptography (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 220 or ECS 222A Pass One and Pass Two open to Graduate Students in Computer Science only. Modern cryptography as a discipline emphasizing formal definitions and proofs of security. One-way functions, pseudo-randomness, encryption, digital signatures, zero-knowledge, secure protocols. Effective: 2016 Spring Quarter.

ECS 228—Cryptograpy for E-Commerce (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 222A Pass One and Pass Two open to Graduate Students in Computer Science only. Cryptographic primitives and protocols of importance to e-commerce, present and future, including content distribution mechanisms, payment mechanisms, pricing mechanisms, anonymity and privacy mechanisms, fair exchange mechanisms. Effective: 2016 Spring Quarter.

ECS 229—Advanced Computational Structural Bioinformatics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Graduate standing. Pass One and Pass Two open to Graduate Students in Computer Science only. Algorithmic problems in structural biology; protein structure classification; protein structure prediction (including comparative modeling and ab initio protein structure prediction); molecular simulations (molecular dynamics and Monte Carlo simulations). Effective: 2016 Spring Quarter.

ECS 230—Applied Numerical Linear Algebra (4)
Discussion—1 hour; Discussion/Laboratory—3 hours. Prerequisite(s): ECS 130 or EAD 209 or MAT 167 Pass One and Pass Two open to Graduate Students in Computer Science only. Numerical linear algebra (NLA) with emphasis on applications in engineered systems; matrix factorizations; perturbation and rounding error analyses of fundamental NLA algorithms. Effective: 2016 Spring Quarter.

ECS 231—Large-Scale Scientific Computation (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 130 Pass One and Pass Two open to Graduate Students in Computer Science only. Algorithms and techniques for large-scale scientific computation, including basics for high performance computing, iterative methods, discrete approximation, fast Fourier transform, Poisson solvers, particle methods, spectral graph partition and its applications. Effective: 2016 Spring Quarter.

ECS 234—Computational Functional Genomics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 124; Graduate standing in Computer Science or Life Sciences. Pass One and Pass Two open to Graduate Students in Computer Science only. Bioinformatics methods for analysis and inference of functional relationships among genes using large-scale genomic data, including methods for integration of gene expression, promoter sequence, TF-DNA binding and other data, and approaches in modeling of biological networks. Effective: 2016 Spring Quarter.

ECS 235A—Computer and Information Security (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): ECS 150; ECS 152A recommended. Pass One and Pass Two open to Graduate Students in Computer Science only. Modern topics in computer security, including: protection, access control, operating systems security, network security, applied cryptography, cryptographic protocols, secure programming practices, safe languages, mobile code, malware, privacy and anonymity, and case studies from real-world systems. Not open for credit to students who have taken ECS 235. Effective: 2016 Fall Quarter.

ECS 235B—Foundations of Computer and Information Security (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): ECS 235A; (ECS 120 and ECS 150 recommended.) Pass One and Pass Two open to Graduate Students in Computer Science only. Theoretical foundations of methods used to protect data in computer and communication systems. Access control matrix and undecidability of security; policies; Bell-LaPadula, Biba, Chinese Wall models; non-interference and non-deducibility; information flow and the confinement problem. Not open for credit to students who have taken ECS 235. Effective: 2016 Fall Quarter.

ECS 236—Computer Security: Intrusion Detection Based Approach (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 150; ECS 153 recommended. Pass One and Pass Two open to Graduate Students in Computer Science only. Concepts of intrusion detection, anomaly detection based on machine learning, signature-based detection using pattern matching, automated response to attacks using artificial intelligence planning, tracing intruders based on principal component analysis, security policy languages. Effective: 2016 Spring Quarter.

ECS 240—Programming Languages (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 140A; ECS 142 Pass One and Pass Two open to Graduate Students in Computer Science only. Advanced topics in programming languages, including formal syntax and semantics, the relation between formal semantics and verification, an introduction to the lambda calculus. Additional topics will include language design principles, alternative programming languages, in-depth semantic theory and models of language implementation. Effective: 2016 Spring Quarter.

ECS 242—Translation of Programming Languages (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECS 240 Pass One and Pass Two open to Graduate Students in Computer Science only. Lexical analysis, parsing, storage management, symbol table design, semantic analysis and code generation. LR, LALR grammars. Compilercompilers. Effective: 2016 Spring Quarter.

ECS 243—Code Generation and Optimization (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 201A or EEC 270 Pass One and Pass Two open to Graduate Students in Computer Science only. Compiler optimizations for performance, code size and power reduction. Topics include control- and data-flow analysis, redundancy elimination, loop and cache optimizations, register allocation, local and global instruction scheduling, and modulo scheduling. Effective: 2016 Fall Quarter.

ECS 244—Principles of Concurrent Programming (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECS 020; ECS 150 Pass One and Pass Two open to Graduate Students in Computer Science only. Fundamental concepts and applications of concurrent programs; concurrent program verification and derivation; synchronization mechanisms in programming languages; distributed programming techniques; case studies of languages. Effective: 2016 Spring Quarter.

ECS 247—Concurrent Programming Languages (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECS 140A; ECS 150 Pass One and Pass Two open to Graduate Students in Computer Science only. Language design parameters. Models of parallel machines. Load balancing. Scalability. Portability. Efficiency measures. Design and implementation techniques for several classes of concurrent programming languages (such as object-oriented, functional, logic, and constraint programming languages). Effective: 2016 Fall Quarter.

ECS 251—Operating Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 150 Pass One and Pass Two open to Graduate Students in Computer Science only. Models, design, implementation, performance evaluation in operating systems. Algorithms, internal architectures for single processor OS and distributed systems. Concurrency control, recovery, security. OS kernel-level programming. Special topics embedded systems, real-time system, device driver, NPU (Network Processor Unit). Effective: 2016 Spring Quarter.

ECS 252—Computer Networks (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECS 152B Pass 1 and Pass 2 open to Graduate Students in Computer Science only. Internet protocol based computer networks applications, transport, network layer protocols. High speed LAN technologies: Ethernet, Asynchronous Transfer Mode (ATM). Delay models in data networks: analysis of multiaccess techniques in polling, ring, random access networks. Multimedia applications requirements and design. Effective: 2016 Spring Quarter.

ECS 253—Network Theory and Applications (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): MAT 022A; MAT 022B; (STA 013 or STA 013Y or STA 120); Experience with computer software, or consent of instructor. Pass One and Pass Two open to Graduate Students in Mechanical and Aerospace Engineering and Computer Science only. Develops the mathematical theory underlying growth, structure and function of networks with applications to physical, social, biological and engineered systems. Topics include network growth, resilience, epidemiology, phase transitions, software and algorithms, routing and search control, cascading failures. (Mechanical & Aeronautical Engineering 253.) Effective: 2018 Spring Quarter.

ECS 253—Network Theory and Applications (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): MAT 022A; MAT 022B; (STA 013 or STA 013Y or STA 120); Experience with computer software, or consent of instructor. Develops the mathematical theory underlying growth, structure and function of networks with applications to physical, social, biological and engineered systems. Topics include network growth, resilience, epidemiology, phase transitions, software and algorithms, routing and search control, cascading failures. (MAE 253.) Effective: 2018 Fall Quarter.

ECS 255—Resource Management in Wireless Communication Networks (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 252A Advanced research issues in wireless communication networks, including multi-user diversity and cross-layer optimization, basic network information theory, MIMO systems and the impact on networks, and dynamics spectrum management. Effective: 2009 Winter Quarter.

ECS 256—Performance Evaluation (4)
Lecture—3 hours; Project (Term Project)—1 hour. Prerequisite(s): ECS 020; ECS 152A; STA 131A; (EEC 170 or (ECS 154A, ECS 154B)); ECS 150 recommended. Pass One and Pass Two open to Graduate Students in Computer Science only. Use of simulation and queueing theory in computer and communication system design. Applications to processor scheduling, memory hierarchies; I/O systems; packet and circuit switched networks; fault-tolerance; computer networks applications. Not open for credit to students who have completed ECS 256A. Effective: 2016 Fall Quarter.

ECS 257—Mobile and Wireless Networks (4)
Independent Study—1 hour; Lecture—3 hours. Prerequisite(s): ECS 252 Pass One and Pass Two open to Graduate Students in Computer Science only. Fundamental techniques in design of second generation wireless networks: cellular network and protocols, medium access techniques, handoff control, signaling and mobility management, wireless data works, Internet mobility and Personal Communication Services (PCS). Third generation wideband systems, novel technologies, adhoc networks. Effective: 2016 Fall Quarter.

ECS 258—Networking Architecture and Resource Management (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): ECS 152A or EEC 173A Pass One and Pass Two open to Graduate Students in Computer Science and Electrical and Computer Engineering only. Concepts and design principles of computer networks. Network architectures, protocol mechanisms and implementation principles (transport/network/data-link layers), network algorithms, router mechanisms, design requirements of applications, network simulation, modeling and performance analysis. (EEC 273.) Effective: 2016 Fall Quarter.

ECS 259—Optical Networks (4)
Independent Study—1 hour; Lecture—3 hours. Prerequisite(s): ECS 252 Pass One and Pass Two open to Graduate Students in Computer Science only. Optical networks. Enabling technologies. Multiplexing techniques. WDM. Broadcast networks. Wavelength-routed networks. Network architectures. Protocols. Network algorithms. Device-network interface. Optimization problems. Effective: 2016 Fall Quarter.

ECS 260—Software Engineering (4)
Lecture—3 hours; Project (Term Project)—3 hours. Prerequisite(s): ECS 142; ECS 160 recommended. Pass One and Pass Two open to Graduate Students in Computer Science only. Advanced techniques for domain-specific software reuse. Effective: 2016 Fall Quarter.

ECS 261—Program Verification (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PHI 112; or MAT 125 or familiarity with first-order logic; knowledge of an integrative and functional programming language. Methods of proving correctness of programs with respect to formal
specifications, with attention to those suited for employing automated deduction.Logic background, symbolic execution, techniques suited to iterative programming, methods from denotational semantics, termination, dynamic logic and proofs of concurrent programs. Effective: 1997 Fall Quarter.

ECS 262—Formal Specification (3)
Lecture—3 hours. Prerequisite(s): ECS 261 Pass One and Pass Two open to Graduate Students in Computer Science only. Formal specification of modules, and its relationship to topdown programming development and verification. Abstract data types, together with methods for specifying them. Implementations and proofs of implementation. Using specifications to reason about programs. Parameterized types. Constructing good formal specifications. Effective: 2016 Fall Quarter.

ECS 265—Distributed Database Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 165A Pass One and Pass Two open to Graduate Students in Computer Science only. Concepts of distributed database systems and architectures, distributed database design, distributed query processing and optimization, transaction management and concurrency control, heterogeneous and multidatabase systems. Effective: 2016 Fall Quarter.

ECS 266—Spatial Databases (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 165A Concepts, models, and architectures for spatial databases, spatial access methods, query processing, spatio-temporal data management, moving objects, spatial data mining. <p> Effective: 2008 Winter Quarter.

ECS 267—Wide-Area Distributed Information Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 152B or ECS 165A Pass One and Pass Two open to Graduate Students in Computer Science only. Wide-area distributed information systems, data broadcast, multicast, publish/subscribe, service differentiation, information retrieval, Web caching. Effective: 2016 Fall Quarter.

ECS 268—Scientific Data And Workflow Management <p> (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 165A Scientific data integration, metadata, knowledge representation, ontologies, scientific workflow design and management. <p> Effective: 2008 Winter Quarter.

ECS 270—Artificial Intelligence (3)
Lecture—3 hours. Prerequisite(s): ECS 140A; ECS 172 Pass One and Pass Two open to Graduate Students in Computer Science only. Concepts and techniques underlying the design and implementation of models of human performance on intelligent tasks. Representation of high-level knowledge structures. Models of memory and inference. Natural language and story understanding. Common sense planning and problem solving. Effective: 2016 Fall Quarter.

ECS 271—Machine Learning and Discovery (4)
Lecture—3 hours; Project (Term Project)—1 hour. Prerequisite(s): ECS 170 Pass One and Pass Two open to Graduate Students in Computer Science only. Artificial intelligence techniques for knowledge acquisition by computers. Fundamental problems in machine learning and discovery. Systems that learn from examples, analogies, and solved problems. Systems that discover numerical laws and qualitative relationships. Projects centering on implementation and evaluation. Effective: 2016 Fall Quarter.

ECS 272—Information Visualization (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECS 163 or ECS 175 recommended. Pass One and Pass Two open to Graduate Students in Computer Science only. Advanced topics in information visualization: perceptually effective display methods, color design and selection, interaction models and techniques, focus-context techniques, distortion methods, large graph visualization techniques, visual data mining methods, and evaluation methods. Effective: 2016 Fall Quarter.

ECS 273—Applied Visual Computing (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Graduate standing. Visual computing paradigms, current visualization technologies, principles of 3-d graphics, user interface designs, and exploratory visualization. Effective: 2002 Winter Quarter.

ECS 274—Automated Deduction (4)
Lecture—3 hours. Prerequisite(s): PHI 112; or MAT 125 or familiarity with first order logic. Techniques of mechanical theorem proving. Methods based on resolution and termrewriting. Decision procedures. Induction. Applications to program verification, question/answering and plan generation. Study existing mechanical theorem provers. Effective: 1997 Fall Quarter.

ECS 275A—Advanced Computer Graphics (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECS 175 or ECS 177 or ECS 178 Pass One and Pass Two open to Graduate Students in Computer Science only. Advanced topics in computer graphics. Hidden surface models, rendering of various surface types, subdivision methods, shading techniques, anti-aliasing, modeling techniques. Effective: 2016 Fall Quarter.

ECS 275B—Advanced Computer Graphics (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECS 175 or ECS 177 or ECS 178 Pass 1 and Pass 2 open to Graduate Students in Computer Science only. Advanced topics in computer graphics and geometric modeling. Topics taken from advanced research papers in computer graphics, image synthesis, visualization and geometric modeling. Discussion of current research in the field. Effective: 2016 Spring Quarter.

ECS 276—Advanced Volume Visualization (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 177 Pass One and Pass Two open to Graduate Students in Computer Science only. Applications, available tools and techniques, the challenges confronting the field of volume visualization, and some of the advanced topics in the field. Primary emphasis on advanced software and hardware techniques to achieve interactive visualization. Effective: 2016 Fall Quarter.

ECS 277—Advanced Visualization (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 177 Visualization of 3D data, including scalar fields, vector fields, and medical data. Effective: 2000 Fall Quarter.

ECS 278—Computer-Aided Geometric Design (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECS 175 Pass One and Pass Two open to Graduate Students in Computer Science only. Mathematical techniques for the definition and manipulation of curves and surfaces. Bezier curves and surfaces, B-spline curves and surfaces, subdivision surfaces, wavelets. Integration into various computer graphics rendering models, visualization systems and computer-aided design systems. Effective: 2016 Fall Quarter.

ECS 279—Computer Animation (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 175; or ECS 275. Pass One and Pass Two open to Graduate Students in Computer Science only. Course surveys current research and fundamental techniques that lie behind character animation tools. Emphasis on improving expressive aspects of movement and how physics, motion capture data, the arts and psychology literature, and interactive techniques can be used towards this goal. Effective: 2016 Fall Quarter.

ECS 280—Virtual Reality Technology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 175 Pass One and Pass Two open to Graduate Students in Computer Science only. Fundamentals and principles of Virtual Reality (VR) technology. Potential and limits for its useful application. Developing a complete virtual reality application. Effective: 2016 Spring Quarter.

ECS 289A—Special Topics in Computer Science; Computer Science Theory (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Computer Science Theory. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289B—Special Topics in Computer Science; Architecture (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Architecture. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289C—Special Topics in Computer Science; Programming Languages and Compilers (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Programming Languages and Compilers. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289D—Special Topics in Computer Science; Operating Systems (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Operating Systems. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289E—Special Topics in Computer Science; Software Engineering (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Software Engineering. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289F—Special Topics in Computer Science; Databases (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Databases. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289G—Special Topics in Computer Science (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Artificial Intelligence. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289H—Special Topics in Computer Science; Computer Graphics (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Computer Graphics. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289I—Special Topics in Computer Science (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Networks. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289J—Special Topics in Computer Science; Computer-Aided Design (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Computer-Aided Design. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289K—Special Topics in Computer Science; Scientific Computing (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Scientific Computing. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289L—Special Topics in Computer Science; Computer Science (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Computer Science. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289M—Special Topics in Computer Science; Security (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Security. May be repeated for credit when topic differs. Effective: 2001 Winter Quarter.

ECS 289N—Special Topics in Bioinformatics and Computational Biology (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Bioinformatics and Computational Biology. May be repeated for credit when topic differs. Effective: 2009 Spring Quarter.

ECS 290—Seminar in Computer Science (1)
Seminar—1 hour. Participating seminar; discussion and presentation of current research and development in computer science. (S/U grading only.) Effective: 1997 Winter Quarter.

ECS 290C—Graduate Research Group Conference (1)
Discussion—1 hour. Research problems, progress and techniques in computer science. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

ECS 293A—Research in Computer Science (1)
Lecture—1 hour. Prerequisite(s): Graduate standing in computer science. Pass One and Pass Two open to Graduate Students in Computer Science only. Study of research topics in computer science, PhD level research methodologies (experimental, applied and theoretical). Study skills necessary to successfully find/solve significant research problems. Finding and successful interacting with a research advisor. Ethical issues in research/collaborative work. (S/U grading only.) Effective: 2016 Fall Quarter.

ECS 293B—Research in Computer Science (1)
Lecture—1 hour. Prerequisite(s): Graduate standing in computer science; ECS 293A recommended. Pass One and Pass Two open to Graduate Students in Computer Science only. Study of PhD level research methodologies (experimental, applied and theoretical), presenting research results for the computer science community. Study skills necessary to successfully find/solve significant research problems. (S/U grading only.) Effective: 2016 Fall Quarter.

ECS 298—Group Study (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

ECS 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

ECS 390—The Teaching of Computer Science (1)
Discussion—1 hour. Prerequisite(s): Meet qualifications for teaching assistant and/or associate-in in Computer Science. Pass One and Pass Two open to Graduate Students in Computer Science only. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit. (S/U grading only.) Effective: 2016 Spring Quarter.

ECS 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Construction Engineering & Management Minor; Civil & Environmental Engineering

Construction Engineering & Management Minor; Civil & Environmental Engineering | Construction Engineering & Management Minor

(College of Engineering)

Amit M. Kanvinde, Ph.D., Chairperson of the Department; 530-754-9471

Department Office. 2001 Ghausi Hall; 530-752-0586; http://cee.engr.ucdavis.edu

Faculty. http://cee.engr.ucdavis.edu/people/faculty-directory/

California's construction industry continues to experience high growth as it continues to accommodate increasing population and as it faces renewal of much of the infrastructure built by previous generations. At the same time, the construction industry faces challenges of scarce materials, a need for decreased environmental impact in terms of the construction process itself and operation of the completed project, and a more complex operational, regulatory and social context in which it must do its work.
The purpose of this minor is to better prepare professional civil and environmental engineers to thrive in this challenging industry, and to improve the efficiency of delivery and sustainability of the civil infrastructure in the state through their future efforts.

It is expected that engineering students will enroll in this minor program, including Civil, Mechanical, Chemical, and Materials Science majors. Students from other colleges can also complete this minor, but it is recommended that they review the requirements with one of the

advisors before enrolling. Students who are interested in construction of infrastructure in their discipline can make use of the skills that will be learned through completion of this minor.

All courses must be taken for a letter grade. A grade of C- or better is required for all courses used to satisfy minor requirements, with an overall GPA of 2.000 or better. All prerequisites for courses must have been taken for a letter grade; no grade lower than a C- will be accepted in any prerequisite course. Students must complete ENG 106 with a C- or better.

The online Minor Declaration form is available via the Online Advising Student Information System (OASIS) at https://students.ucdavis.edu/.

Transcript notation must be requested no later than the quarter preceding graduation, and will appear as a minor in Construction Engineering and Management.

Minor advisors. J.L. Darby, J.T. Harvey, J.R. Lund

Construction Engineering & Management **Units:** 24

ECI 137	Construction Principles and Project Management	4
ECI 123	Urban Systems and Sustainability	4
ECI 153	Deterministic Optimization and Design	4

Choose twelve units:

ECI 179	Pavement Engineering	4
ARE 112	Fundamentals of Organization Management	4
ARE 155	Operations Research and Management Science	4
ARE 157	Analysis for Operations and Production Management	4
ARE 171A	Financial Management of the Firm (Discontinued)	4
ARE 171B	Financial Management of the Firm (Discontinued)	4
ECN 134	Financial Economics	4
ECN 162	International Economic Relations	4
ESP 161	Environmental Law	4

May include one from:

ARE 018	Business Law	4
MGT 011A	Elementary Accounting	4

Total: 24

Construction Engineering & Management Minor; Civil & Environmental Engineering | ECI Courses

Courses in ECI:

ECI 003—Civil Infrastructure and Society (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): MAT 021A (can be concurrent) Pass One restricted to lower division students; Civil Engineering majors. Introduction to civil infrastructure and its relationship with society and the natural environment. Exposure to innovative research on civil engineering and environmental systems. Participation in laboratory experiments illustrative of the solution of representative but simplified engineering problems. Not open for credit to upper division students. GE credit: OL, SE, SS. Effective: 2016 Winter Quarter.

ECI 016—Spatial Data Analysis (2)
Laboratory—3 hours; Lecture—1 hour. Restricted to Civil Engineering and Biological Systems Engineering majors; non-majors accommodated on a space-available basis. Computer-aided design and geographic information systems in civil engineering practice. GE credit: QL, SE. Effective: 2010 Spring Quarter.

ECI 019—C Programming for Civil and Environmental Engineers (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): MAT 021A (can be concurrent) Pass One open to Civil Engineering majors and Optical Science and Engineering majors. Computational problem solving techniques for Civil and Environmental Engineering applications using structured C programming. Algorithm design applied to realistic problems. GE credit: SE. Effective: 2011 Winter Quarter.

ECI 040—Introduction to Environmental Engineering (4)
Lecture—4 hours. Prerequisite(s): CHE 002B Pass One open to students in the College of Engineering. Introduction to topics in environmental engineering; discussion on influence of literary work, art, and media on the evolution of environmental engineering practice, relevant laws, and regulations; presentations of historical case studies. GE credit: AH. Effective: 2017 Winter Quarter.

ECI 090X—Lower Division Seminar (1-4)
Seminar—1-4 hours. Prerequisite(s): Consent of Instructor. Examination of a special topic in a small group setting. May be repeated for credit. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 092—Internship for Engineering (1-5)
Internship. Prerequisite(s): Lower division standing; approval of project prior to period of internship. Supervised work experience in civil engineering. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 100—Introduction to Fluid Mechanics for Civil and Environmental Engineers (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 035 C- or better; MAT 022B C- or better; PHY 009B C- or better Pass One restricted to Civil Engineering, Environmental Engineering and Hydrology majors. Fluid flow in civil & environmental engineering, basis for design, buoyancy, hydrostatics, gravity dams, hydraulic modeling: similarity & scaling, conservation laws, flow in bends, nozzles, pipes, pumps, turbines, complimentary lab experiments. Not open for credit to students who have taken ENG 103. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 114—Probabilistic Systems Analysis for Civil Engineers (4)
Lecture—4 hours. Prerequisite(s): MAT 021C C- or better Probabilistic concepts and models in engineering. Statistical analysis of engineering experimental and field data. Introduction to stochastic processes and models of engineering systems. Not open for credit to students who have completed STA 120. GE credit: QL, SE. Effective: 2013 Fall Quarter.

ECI 115—Computer Methods in Civil & Environmental Engineering (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (ENG 006 or ECS 030); MAT 022B Open to Civil Engineering majors only. Presentation, implementation and application of numerical algorithms and computer models for the solution of practical problems in Civil and Environmental Engineering. GE credit: SE. Effective: 2013 Fall Quarter.

ECI 119—Parallel Processing for Engineering Applications. (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): C programming or consent of instructor. Fundamental skills in parallel computing for engineering applications; emphasis on structured parallel programming for distributed memory parallel clusters. No credit allowed for students who have taken ECI 119B. GE credit: SE. Effective: 2005 Spring Quarter.

ECI 123—Urban Systems and Sustainability (4)
Lecture—4 hours. Prerequisite(s): Upper division standing. Systems-level approach of how to evaluate and then modify sustainability of urban systems based on interaction with natural environments. Topics include: definition/metrics of urban sustainability; system analyses of urban systems; enabling technology, policies, legislation; measures and modification of ecological footprints. GE credit: ACGH, DD, SE, SL, SS, WE. Effective: 2006 Fall Quarter.

ECI 125—Building Energy Performance (4)
Lecture—4 hours. Prerequisite(s): Upper division standing in Engineering. Open to students in the College of Engineering. Mechanisms of energy consumption in buildings including end uses, thermal loads, ventilation, air infiltration, thermal energy distribution, and HVAC systems; energy performance simulation; methods and strategies of energy efficiency. GE credit: SE. Effective: 2011 Winter Quarter.

ECI 130—Structural Analysis (4)
Lecture—4 hours. Prerequisite(s): ENG 104 C- or better; MAT 022A Open to Civil Engineering majors. Elastic structural analysis of determinate and indeterminate trusses, beams and frames. Plastic bending and limit analysis. GE credit: QL, SE. Effective: 2014 Winter Quarter.

ECI 131—Matrix Structural Analysis (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 104 C- or better; ENG 006 Open to Engineering majors only. Matrix formulation and computer analysis of statically indeterminate structures. Stiffness and flexibility formulations for elastic structures. Finite element methods for elasticity and bending problems. GE credit: SE. Effective: 2013 Fall Quarter.

ECI 132—Structural Design: Metallic Elements (4)
Lecture—4 hours. Prerequisite(s): ECI 130 Design of metallic beams, columns, and other members for various types of loading and boundary conditions; design of connections between members; member performance within structural systems. GE credit: SE, VL. Effective: 2013 Fall Quarter.

ECI 135—Structural Design: Concrete Elements (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECI 130 Restricted to Civil Engineering, Civil Engineering/Materials Science and Engineering, and Materials Science and Engineering majors only. Strength design procedures for columns, rectangular beams, T-beams and beams of general cross-section. Building code requirements for bending, shear, axial load, combined stresses and bond. Introduction to prestressed concrete. GE credit: QL, SE. Effective: 2013 Fall Quarter.

ECI 136—Building Design (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (ECI 130 or ECI 131); (ECI 135 or ECI 132) Design of a building structure for a specific need under the multiple constraints of safety, serviceability, cost and aesthetics. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 137—Construction Principles and Project Management (4)
Laboratory—3 hours; Lecture—3 hours. Restricted to upper division standing in Engineering. Project management, with civil engineering construction and design applications, including project scope, schedule, resources, cost, quality, risk, and control. Construction industry overview. Interactions between planning, design, construction, operations. Construction operations analysis. Contract issues. Project management software, field trips, guest lectures. GE credit: ACGH, OL, QL, SE, SS, VL, WE. Effective: 2013 Fall Quarter.

ECI 138—Earthquake Loads on Structures (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECI 130 or ECI 131 Determination of loads on structures due to earthquakes. Methods of estimating equivalent static lateral forces; response spectrum and time history analysis. Concepts of mass, damping and stiffness for typical structures. Design for inelastic behavior. Numerical solutions and Code requirements. GE credit: SE. Effective: 2013 Fall Quarter.

ECI 139—Advanced Structural Mechanics (4)
Lecture—4 hours. Prerequisite(s): ENG 104 C- or better Review of stress, strain, equilibrium, compatibility, and elastic material behavior. Plane stress and plane strain problems in elasticity; energy methods. Theories for unsymmetric bending, straight and curved beams. Beams on elastic foundations; stresses in plates and shells; elastic stability. GE credit: QL, SE. Effective: 2013 Fall Quarter.

ECI 140A—Environmental Analysis of Aqueous Systems (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 002B C- or better Pass One restricted to Environmental Engineering majors. Introduction to "wet chemical" and instrumental techniques commonly used in the examination of water and wastewater and associated data analysis. Not open for credit to students who have taken ECH 140 or CHE 100. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 140B—Chemical Principles for Environmental Engineers (4)
Lecture—4 hours. Prerequisite(s): CHE 002B C- or better Aqueous chemistry; equilibrium relationships; carbonate system; thermodynamics; kinetics & rate laws; precipitation, adsorption, & volatilization phenomenon; oxidation & reduction reactions; pH, pE and predominance diagrams; organic chemicals. Not open for credit to students who have taken ECI 140. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 140C—Biological Principles for Environmental Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 140A C- or better or ECI 140B C- or better Fundamental microbiology concepts for environmental engineers; provides background needed for the application of water and wastewater treatment, bioremediation, air pollution control and biotransformations in environmental engineered systems. Only two units of credit for students who have taken MIC 101 or MIC 102. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 140D—Water and Wastewater Treatment System Design (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (ENG 103 C- or better or ECI 100 C- or better); (ECI 140 C- or better or ECI 140A C- or better or ECI 140B C- or better or ECI 140C C- or better or ECI 148A C- or better) Evaluation and design of water and wastewater treatment systems. Not open for credit to students who have taken ECI 148B. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 141—Engineering Hydraulics (3)
Lecture—3 hours. Prerequisite(s): ENG 103 C- or better or ECI 100 C- or better Nature of flow of a real fluid; flow in pipes; open channel flow; turbomachinery; fluid forces on objects: boundary layers, lift and drag. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 141L—Engineering Hydraulics Laboratory (1)
Laboratory—3 hours. Prerequisite(s): ECI 141 (can be concurrent) Open to Engineering students only. Laboratory experiments and demonstrations on flow measurements, sluice gates, hydraulic jump, flow characteristics, and centrifugal pumps. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 142—Engineering Hydrology (4)
Lecture—4 hours. Prerequisite(s): ECI 141 (can be concurrent) Restricted to students in the College of Engineering. The hydrologic cycle. Evapotranspiration, interception, depression storage and infiltration. Streamflow analysis and modeling. Flood routing through channels and reservoirs. Frequency analysis of hydrologic variables. Precipitation analysis for hydrologic design. Hydrologic design. GE credit: QL, SE. Effective: 2013 Fall Quarter.

ECI 143—Green Engineering Design and Sustainability (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Upper division standing. Restricted to upper division standing; Pass One restricted to Civil Engineering majors. Application of concepts, goals and metrics of sustainability, green engineering and industrial ecology to engineering design. Other course topics include life-cycle assessments, analysis of environmental management systems, and economics of pollution prevention and sustainability. GE credit: QL, SE, SL, SS. Effective: 2017 Winter Quarter.

ECI 144—Groundwater Systems Design (4)
Lecture—4 hours. Prerequisite(s): ECI 141 Groundwater occurrence, distribution, and movement; groundwater flow systems; radial flow to wells and aquifer testing; aquifer management; groundwater contamination; solute transport by groundwater; fate and transport of subsurface contaminants. Groundwater supply and transport modeling. GE credit: SE. Effective: 2005 Spring Quarter.

ECI 144L—Groundwater Systems Design Laboratory (1)
Laboratory—3 hours. Prerequisite(s): ECI 144 (can be concurrent); ECI 144 required concurrently. Computer modeling of groundwater flow under regional gradient, well injection/withdrawal, and natural and engineered boundary conditions. Use of Groundwater Vistas computer program. Effective: 2010 Fall Quarter.

ECI 145—Hydraulic Structure Design (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): ECI 141 C- or better Project-based course on the design of an integrated urban drainage system with focus on consideration of design alternatives, multiple realistic constraints, quantification of uncertainty, codes and standards, technical drawing and cost analysis. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 146—Water Resources Simulation (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 103 C- or better or ECI 100 C- or better Computer simulation techniques in the analysis, design and operation of surface water systems; modeling concepts and practices with application to surface runoff; water quality in rivers and streams and dispersion of contaminants in water bodies. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 148A—Water Quality Management (4)
Lecture—4 hours. Prerequisite(s): CHE 002B C- or better Basic concepts of water quality measurements and regulations. Introduction to physical, biological and chemical processes in natural waters. Fundamentals of mass balances in water and wastewater treatment. GE credit: SE. Effective: 2013 Fall Quarter.

ECI 149—Air Pollution (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021D; MAT 022B; CHE 002B C- or better; (ATM 121A or ENG 103 C- or better or ECI 100 C- or better) Physical and technical aspects of air pollution. Emphasis on geophysical processes and air pollution meteorology as well as physical and chemical properties of pollutants. (ATM 149.) GE credit: QL, SE, SL. Effective: 2018 Winter Quarter.

ECI 150—Air Pollution Control System Design (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECI 149 C- or better or ATM 149 C- or better Design and evaluation of air pollution control devices and systems. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 153—Deterministic Optimization and Design (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): MAT 021C; MAT 022A; Computer programming course. Operations research. Optimization techniques such as linear programming, dynamic programming, and non-linear programming. Applications in civil engineering disciplines, including multiple realistic constraints, through computer-based course projects. GE credit: QL, SE, SL. Effective: 2013 Fall Quarter.

ECI 155—Water Resources Engineering Planning (4)
Lecture—4 hours. Prerequisite(s): (ENG 106 or ECN 001A or ECN 001AV); ECI 114 Basic engineering planning concepts; role of engineering, economic, environmental and social information and analysis; institutional, political and legal aspects. Case studies and computer models illustrate the planning of water resource systems. GE credit: QL, SE, SL, SS, WE. Effective: 2018 Winter Quarter.

ECI 161—Transportation System Operations (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021C C- or better; PHY 009A C- or better Principles of transportation system operations; traffic characteristics and methods of measurement; models of transportation operations and congestion applied to urban streets and freeways. GE credit: QL, SE. Effective: 2016 Fall Quarter.

ECI 163—Energy and Environmental Aspects of Transportation (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): ECN 001A or ECN 001AV or ENG 106 Engineering, economic, and systems planning concepts. Analysis and evaluation of energy, air quality and selected environmental attributes of transportation technologies. Strategies for reducing pollution and petroleum consumption in light of institutional and political constraints. Evaluation of vehicle emission models. (ESP 163.) GE credit: SE, SL, SS, WE. Effective: 2018 Spring Quarter.

ECI 165—Transportation Policy (3)
Lecture—3 hours. Transportation and associated environmental problems confronting urban areas, and prospective technological and institutional solutions. Draws upon concepts and methods from economics, engineering, political science and environmental studies. GE credit: QL, SE, SS. Effective: 2013 Fall Quarter.

ECI 171—Soil Mechanics (4)
Lecture—4 hours. Prerequisite(s): (ENG 103 (can be concurrent) or ECI 100 (can be concurrent)); ENG 104 C- or better; ECI 171L (can be concurrent); ECI 171L required concurrently. Restricted to Civil Engineering and Environmental Engineering majors only. Soil formations, mass-volume relationships, soil classification, effective stress, soil-water-void relationships, compaction, seepage, capillarity, compressibility, consolidation, strength, states of stress and failure, lateral earth pressures, and slope stability. GE credit: SE. Effective: 2018 Spring Quarter.

ECI 171L—Soil Mechanics Laboratory (1)
Laboratory—3 hours. Prerequisite(s): ECI 171 (can be concurrent); ECI 171 required concurrently. Laboratory studies utilizing standard testing methods to determine physical, mechanical and hydraulic properties of soil and demonstration of basic principles of soil behavior. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 173—Foundation Design (4)
Lecture—4 hours. Prerequisite(s): ECI 171 Foundation analysis and design, including site characterization, evaluation of shallow and deep foundation alternatives, evaluation of bearing capacity and settlements, design of retaining structures, and case-based design experiences. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 175—Geotechnical Earthquake Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 171 C- or better Tectonics, faults, site response, and probabilistic ground motion prediction equations. Cyclic loading and liquefaction of soil elements and layers. Empirical procedures and field tests for evaluation of triggering and consequences, of liquefaction. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 179—Pavement Engineering (4)
Discussion/Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 104 C- or better Pavement types (rigid, flexible, unsurfaced, rail), their applications (roads, airfields, ports, rail) and distress mechanisms. Materials, traffic and environment characterization. Empirical and mechanistic-empirical design procedures. Maintenance, rehabilitation and reconstruction; construction quality; asphalt concrete mix design. GE credit: QL, SE, SL, VL. Effective: 2013 Fall Quarter.

ECI 189A—Selected Topics in Civil Engineering; Environmental Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Environmental Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189B—Selected Topics in Civil Engineering; Hydraulics and Hydrologic Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Hydraulics and Hydrologic Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189C—Selected Topics in Civil Engineering; Engineering Planning (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Engineering Planning. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189D—Selected Topics in Civil Engineering; Geotechnical Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Geotechnical Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189E—Selected Topics in Civil Engineering; Structural Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Structural Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189F—Selected Topics in Civil Engineering; Structural Mechanics (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Structural Mechanics. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189G—Selected Topics in Civil Engineering; Transportation Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Transportation Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189H—Selected Topics in Civil Engineering; Transportation Planning (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Transportation Planning. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189I—Selected Topics in Civil Engineering; Water Resources Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Water Resources Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189J—Selected Topics in Civil Engineering; Water Resources Planning (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Water Resources Planning. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 190C—Research Group Conferences in Civil and Environmental Engineering (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing in Civil and Environmental Engineering. Research group conferences. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 192—Internship in Engineering (1-5)
Internship. Prerequisite(s): Upper division standing; approval of project prior to the period of the internship. Supervised work experience in civil engineering. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 193A—Civil and Environmental Engineering Senior Design (4) ***Review all entries***
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): (ECI 140D C- or better) or (ECI 171 C- or better, ECI 171L C- or better) or (ECI 132 C- or better or ECI 135 C- or better) or (ECI 161 C- or better or ECI 163 C- or better) or (ECI 141 C- or better, ECI 141L C- or better); and Consent of Instructor. And one ECI major depth course with a C- or better. Students must be in final year of study. Open to seniors in Civil Engineering and Environmental Engineering only; students must be in their final year of study. Culminating design experience for civil engineering and environmental engineering majors. Student teams work closely with faculty, city officials or consulting clients to propose, implement and validate a unique solution to a real-world problem. GE credit: OL, SE, WE. Effective: 2018 Winter Quarter.

ECI 193A—Civil and Environmental Engineering Senior Design (4) ***Review all entries***
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): (ECI 140D C- or better) or (ECI 171 C- or better, ECI 171L C- or better) or (ECI 132 C- or better or ECI 135 C- or better) or (ECI 161 C- or better or ECI 163 C- or better) or (ECI 141 C- or better, ECI 141L C- or better); and Consent of Instructor. And one other ECI major depth course with a C- or better; students must be in their final year of study. Open to seniors in Civil Engineering and Environmental Engineering only. Culminating design experience for civil engineering and environmental engineering majors. Student teams work closely with faculty, city officials or consulting clients to propose, implement and validate a unique solution to a real-world problem. GE credit: OL, SE, WE. Effective: 2018 Fall Quarter.

ECI 193B—Civil and Environmental Engineering Senior Design (4)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): ECI 193A Open to seniors in Civil Engineering and Environmental Engineering only. Culminating design experience for civil engineering and environmental engineering majors. Student teams work closely with faculty, city officials or consulting clients to propose, implement and validate a unique solution to a real-world problem. GE credit: OL, SE, VL, WE. Effective: 2017 Fall Quarter.

ECI 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 199—Special Study for Advanced Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Special study. (P/NP grading only.) GE credit: SE. Effective: 2016 Fall Quarter.

ECI 201—Introduction to Theory of Elasticity (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 104 Fundamental equations of elasticity in three dimensions; plane stress and plane strain; flexture and torsion of bars of various shapes. Introduction to variational and approximate methods. Effective: 1997 Winter Quarter.

ECI 203—Inelastic Behavior of Solids (3)
Lecture—3 hours. Prerequisite(s): ECI 201 Fundamentals of theories of plasticity, viscoelasticity and viscoplasticity for solids. Macroscopic constitutive modelling for engineering materials, e.g., metals, polymers, soils, etc., and microscopic motivation. Effective: 1997 Winter Quarter.

ECI 205—Continuum Mechanics (3)
Lecture—3 hours. Prerequisite(s): ECI 201 Tensor formulation of the field equations for continuum mechanics, including large deformation effects. Invariance and symmetry requirements. Introduction to nonlinear thermoelasticity and thermodynamics. Solution of three-dimensional problems. Selected topics. Effective: 1998 Winter Quarter.

ECI 206—Fracture Mechanics (4)
Lecture—4 hours. Prerequisite(s): ECI 201; ENG 104 Linear and nonlinear fracture mechanics, stress analysis, energy concepts, brittle fracture criteria, path independent integrals, Dugdale-Barenblatt model, general cohesive zone models, ductile fracture criteria, crack tip fields for stationary and propagating cracks, fatigue. Application of numerical methods for fracture mechanics. Effective: 2006 Winter Quarter.

ECI 211—Advanced Matrix Structural Analysis (4)
Lecture—4 hours. Prerequisite(s): ECI 131 Analysis of complex frameworks by the displacement method; treatment of tapered beams, curved beams, and beams on elastic foundations; partially rigid connections; geometric and material nonlinearities; buckling; flexibility-based formulations; FEM-software for nonlinear analysis of structures. Effective: 2003 Winter Quarter.

ECI 212A—Finite Element Procedures in Applied Mechanics (4)
Lecture—4 hours. Prerequisite(s): EAD 115 or (MAT 128A, MAT 128B (can be concurrent)) Weighted-residual and Rayleigh-Ritz methods. Weak/variational formulation and development of discrete equations using finite element approximations. Application to one- and two-dimensional problems (heat conduction). Effective: 2003 Winter Quarter.

ECI 212B—Finite Elements: Application to Linear and Non-Linear Structural Mechanics Problems (4)
Lecture—4 hours. Prerequisite(s): ECI 212A Application to linear and nonlinear structural mechanics problems. Linear elasticity, weak form, and finite element approximation. Incompressible media problems. Non-linear problems with material nonlinearity. Effective: 2003 Winter Quarter.

ECI 213—Analysis of Structures Subjected to Dynamic Loads (4)
Lecture—4 hours. Prerequisite(s): ECI 211 (can be concurrent) Analysis of structures subjected to earthquake, wind and blast loading; distributed, consistent and lumped mass techniques; computer implementation; nonlinear response spectrum; frequency and time domain analysis; seismic protection of structures; numerical methods in linear and nonlinear structural dynamics. Effective: 2012 Fall Quarter.

ECI 214—Probabilistic Seismic Hazard Analysis and Design Ground Motions (4)
Lecture—4 hours. Probabilistic seismic hazard analysis for use in developing design spectra and for seismic risk analyses, including the development of earthquake ground motion time series for use in dynamic analyses of structures. Effective: 2016 Winter Quarter.

ECI 216—Meshfree Methods and Partition of Unity Finite Elements (4)
Lecture—4 hours. Prerequisite(s): ECI 201; ECI 212A Advanced discretization techniques such as meshfree methods and partition of unity finite elements for the Galerkin solution of boundary-value problems in solid and structural mechanics. Application of meshfree and extended finite element methods in computational fracture. Effective: 2016 Winter Quarter.

ECI 221—Theory of Plates and Introduction to Shells (3)
Lecture—3 hours. Prerequisite(s): ECI 201 (can be concurrent) Development of classical and refined plate theories. Application to isotropic, orthotropic and composite plates. Solutions for rectangular
and circular plates. Membrane theory for axisymmetric shells and bending of circular shells. Effective: 1997 Winter Quarter.

ECI 223—Advanced Dynamics, Signal Processing, and Smart Structures Technology (4)
Lecture—4 hours. Prerequisite(s): ECI 213; Or equivalent. Signal processing and system identification of structures under dynamic excitations; Fourier and Laplace transforms; data acquisition and sensor design fundamentals; sensor technologies/techniques for nondestructive evaluation; structural control; actuators and dampers for smart structures; piezoelectrics and acoustic emissions; micro- and nano-fabrication. Effective: 2011 Winter Quarter.

ECI 232—Advanced Topics in Concrete Structures (4)
Lecture—4 hours. Prerequisite(s): ECI 130; ECI 135; ECI 138; Graduate standing. Ductility of reinforced concrete; strength of two-way slabs; modified compression field theory. Effective: 2001 Fall Quarter.

ECI 233—Advanced Design of Steel Structures (4)
Lecture—4 hours. Prerequisite(s): (ECI 130 or ECI 131); ECI 132 Review of Load and Resistance Factor Design (LRFD); steel-plate girder design; plastic design of indeterminate systems; moment frames and bracing systems; connection design; seismic design of steel structures; vibration of flooring systems; steel-concrete composite design. Effective: 2004 Winter Quarter.

ECI 234—Prestressed Concrete (4)
Lecture—4 hours. Prerequisite(s): ECI 135; (ECI 130 or ECI 131) Survey of methods and applications; prestressing materials and systems; prestress losses; flexural design; design for shear and torsion; deflection computation and control; continuous beams and indeterminate structures; floor systems; partial prestressing; design of compression members; strut-and-tie models. Effective: 2003 Fall Quarter.

ECI 235—Cement Composites (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 104 Applications of cement composites; materials selection and proportioning; component and composite properties; hydration reactions and microstructure development; mechanisms of failure; nondestructive test methods; fiber reinforcement; concrete durability; novel reinforcing materials; ferrocement; repair and retrofit technologies; applications to structural design. Effective: 2002 Fall Quarter.

ECI 236—Design of Fiber Reinforced Polymer Composite Structures (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECI 135 Basics of mechanics and design of polymer matrix composites: composite classification, manufacturing process, micromechanical property determination, classical lamination theory, strength theories, first-ply-failure, test methods, design practice, strengthening and retrofitting of existing reinforced concrete structures. Effective: 2008 Winter Quarter.

ECI 237—Bridge Design (4)
Lecture—4 hours. Prerequisite(s): ECI 130; ECI 135; ECI 234 recommended. Open to Graduate Students only. Bridge types, behavior and construction characteristics; design philosophy, details according to Caltrans and American Association of State Highway and Transportation Officials codes, principles; seismic design and retrofit of concrete bridges; modern bridges using advanced fiber reinforced polymer composites; fieldtrip required. Effective: 2007 Fall Quarter.

ECI 238—Performance-Based Seismic Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 138; ECI 213 Modern seismic design; performance-based seismic design; seismic hazard; seismic demands: linear and nonlinear procedures; performance assessment: deterministic and probabilistic procedure; review of FEMA-350, FEMA-356, ATC-40 and other performance-based guidelines. Effective: 2005 Spring Quarter.

ECI 240—Water Quality (4)
Lecture—4 hours. Prerequisite(s): ECI 141; ECI 142 Quality requirements for beneficial uses of water. Hydrologic cycle of quality. Hydromechanics in relation to quality of surface and groundwaters; transport and fate of waterborne pollutants. Heat
budget for surface waters; predictive methods; introduction to water quality modeling. Effective: 2000 Fall Quarter.

ECI 241—Environmental Reactive Chemical Transport Modeling (4)
Lecture—4 hours. Prerequisite(s): CHE 002A or CHE 002B or ECI 149; Or equivalent. Modeling of reactive chemical transport in air and water including kinetic reactions, equilibrium reactions, and phase partitioning. Emphasis on numerical solution schemes and programming techniques to provide deeper insight into model performance and limitations. Effective: 2014 Fall Quarter.

ECI 242—Air Quality (4)
Lecture—4 hours. Prerequisite(s): ENG 105; ECI 141; ECI 149; Or equivalents. Factors determining air quality. Effects of air pollutants. Physical and chemical fundamentals of atmospheric transport and reaction. Introduction to dispersion modeling. Effective: 2002 Fall Quarter.

ECI 243A—Water and Waste Treatment (4)
Lecture—4 hours. Prerequisite(s): ECI 148A; Or the equivalent. Characteristics of water and airborne wastes; treatment processes and process kinetics; treatment system design. Effective: 1999 Fall Quarter.

ECI 243B—Water and Waste Treatment (4)
Lecture—4 hours. Prerequisite(s): ECI 243A Continuation of course 243A. Aeration, thickening, biological processes, design of biological treatment systems. Effective: 2000 Winter Quarter.

ECI 243L—Pilot Plant Laboratory (4)
Discussion—1 hour; Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): ECI 243A; ECI 243B (can be concurrent); or Consent of Instructor. Graduate standing. Laboratory investigation of physical, chemical, and biological processes for water and wastewater treatment. Effective: 2016 Winter Quarter.

ECI 244—Life Cycle Assessment for Sustainable Engineering (4)
Lecture—4 hours. Prerequisite(s): Graduate standing. Life cycle assessment methodology is taught emphasizing applications to infrastructure and energy systems. Life cycle design, life cycle cost methods, other tools from industrial ecology, and links to policy are covered as well. Effective: 2011 Fall Quarter.

ECI 245A—Applied Environmental Chemistry: Inorganic (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 105; ECI 140; CHE 002B; Or the equivalent of CHE 002B; CHE 002C or CHE 107A recommended. Chemistry of natural and polluted waters. Topics include chemical, kinetic and equilibrium principles, redox reactions, gas solution and solid-solution equilibria, thermodynamics, carbonate systems, coordination chemistry, interfacial phenomena. Effective: 2000 Spring Quarter.

ECI 245B—Applied Environmental Chemistry: Organic (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 128A; CHE 128B; CHE 128C; Or the equivalent; CHE 002C or CHE 107A recommended. Transport and transformation of organic chemicals in the environment.
Topics include application of thermodynamics to predict solubility and activity coefficients; distribution of organic chemicals between the aqueous phase and air, solvent, or solid phases; chemical, photochemical and biological transformation reactions. Effective: 2001 Spring Quarter.

ECI 246N—Understanding Climate Change: Causes and Consequences (4)
Lecture—4 hours. Open to graduate students. Diverse physical processes that govern climate and drive climate change. Observational, experimental and modeling techniques and methods used in the development of our scientific understanding of the Earth system. Effective: 2016 Spring Quarter.

ECI 247—Aerosols (4)
Lecture—4 hours. Prerequisite(s): ENG 103; ENG 105; ECI 141; ECI 149 Behavior of airborne particles including particle formation, modification, and removal processes. Effective: 2002 Fall Quarter.

ECI 247L—Aerosols Laboratory (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): ECI 247 Methods of generation and characterization of aerosols. Detailed topics may include flow rate measurement, aerosol generation, aerosol collection, ions measurement, metals measurement, and carbon measurement. May be repeated up to 1 time(s). Effective: 2002 Fall Quarter.

ECI 248—Biofilm Processes (4)
Lecture—4 hours. Prerequisite(s): SSC 111 or SSC 211 or ECI 243B; or Consent of Instructor. Calculus and basic cell molecular biology are recommended. Natural and engineered biofilms, including biofilm occurrence and development, spatial structure, microbial processes, fundamental and applied research tools, biofilm reactors, beneficial uses, and detrimental effects. Effective: 2004 Spring Quarter.

ECI 249—Probabilistic Design and Optimization (4)
Lecture—4 hours. Prerequisite(s): ECI 114; ECI 153; ENG 106; Or equivalents. Design by optimization for probabilistic systems, decision theory, the value of information, probabilistic linear programming, probabilistic dynamic programming, nonlinear probabilistic optimization. Applications in civil engineering design, project evaluation, and risk management. Effective: 2006 Winter Quarter.

ECI 250—Civil Infrastructure System Optimization and Identification (4)
Lecture—4 hours. Prerequisite(s): MAT 021C; MAT 022A; Programming course; EAD 115 and mathematical modeling course recommended. Restricted to graduate standing. Applied mathematics with a focus on modeling, identifying, and controlling dynamic, stochastic, and underdetermined systems. Applications in transportation networks, water resource planning, and other civil infrastructure systems. Effective: 2005 Spring Quarter.

ECI 251—Transportation Demand Analysis (4)
Lecture—4 hours. Prerequisite(s): ECI 114; Or the equivalent. Procedures used in urban travel demand forecasting. Principles and assumptions of model components (trip generation, trip distribution, model split). New methods of estimating travel demand. Computer exercises using empirical data to calibrate models and forecast travel demand. Effective: 1999 Fall Quarter.

ECI 252—Sustainable Transportation Technology and Policy (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): ECI 165 Role of technical fixes and demand management in creating a sustainable transportation system. Emphasis on technology options, including alternative fuels, electric propulsion, and IVHS. Analysis of market demand and travel behavior, environmental impacts, economics and politics. (ESP 252.) Effective: 2000 Fall Quarter.

ECI 253—Dynamic Programming and Multistage Decision Processes (4)
Lecture—4 hours. Prerequisite(s): MAT 021C; MAT 022A; Programming course; EAD 115 recommended. Operations research. Optimization techniques with a focus on dynamic programming in treating deterministic, stochastic, and adaptive multistage decision processes. Brief review of linear programming and non-linear programming. Applications in transportation networks and other civil infrastructure systems. Effective: 2005 Spring Quarter.

ECI 254—Exploring Data from Built Environment Using R (4)
Laboratory—3 hours; Lecture—3 hours. Introduction to modern data science, specifically data acquisition, exploratory data analysis, visualization, and beginning data analysis using R. Emphasizes computational reasoning and working with tabular and non-standard data. Focus will be on data generated in the built environment. (Geography 279.) Effective: 2017 Fall Quarter.

ECI 256—Urban Traffic Management and Control (4)
Lecture—4 hours. Prerequisite(s): ECI 114 Basic concepts, models, and methods related to the branch of traffic science that deals with the movement of vehicles on a road network, including travel speed, travel time, congestion concepts, car-following and hydrodynamic traffic models. Effective: 2000 Fall Quarter.

ECI 257—Flow in Transportation Networks (4)
Lecture—4 hours. Prerequisite(s): ECI 153; ECI 161 or ECI 256 recommended. Elements of graph theory, a survey of pertinent optimization techniques, extremal principles in network flow problems, deterministic equilibrium assignment, stochastic equilibrium assignment, extensions of equilibrium assignments and dynamic transportation network assignment. Effective: 2000 Winter Quarter.

ECI 259—Asphalt and Asphalt Mixes (4)
Lecture—4 hours. Prerequisite(s): ECI 179; or Consent of Instructor. Asphalts and asphalt mix types and their use in civil engineering structures, with primary emphasis on pavements. Asphalt, aggregate properties and effects on mix properties. Design, construction, recycling. Recent developments and research. Effective: 2006 Winter Quarter.

ECI 260—Sediment Transport (4)
Lecture—4 hours. Prerequisite(s): ECI 141; Or equivalent. Sediment transport in hydrologic systems. Process-oriented course which will emphasize how sediment moves and the physical processes that affect sediment transport. Field trip. Effective: 2006 Winter Quarter.

ECI 264A—Transport, Mixing and Water Quality in River and Lakes (4)
Lecture—4 hours. Prerequisite(s): ECI 141; ECI 240 Principal causes of mixing and transport in rivers, lakes and reservoirs, and their impacts on water quality. Case studies of specific lakes and rivers. Effective: 2000 Fall Quarter.

ECI 264B—Transport, Mixing and Water Quality in Estuaries and Wetlands (4)
Lecture—4 hours. Prerequisite(s): ECI 141; ECI 240 Principal causes of mixing and transport in estuaries and wetlands, and their impacts on water quality. Topics include advection/diffusion; tides; transverse mixing; longitudinal dispersion; sediment transport; nutrient cycling; computer modeling of estuaries. Case studies of specific systems. Effective: 2000 Spring Quarter.

ECI 265—Stochastic Hydrology and Hydraulics (4)
Lecture—4 hours. Prerequisite(s): ECI 266; or Consent of Instructor. Physics-based stochastic methods in modeling hydrologic and hydraulic processes; theory for modeling hydrologic-hydraulic governing equations as stochastic partial differential equations applied to various hydrologic-hydraulic processes under uncertainty, including transport, open channel flow, overland flow, soil water flow, and groundwater. Effective: 2015 Winter Quarter.

ECI 266—Applied Stochastic Methods in Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 114 or MAT 131 or STA 130A or STA 131A or MAT 118A (can be concurrent) Stochastic processes classification; Gaussian random fields; stochastic calculus in mean square; Ito and Stratonovich stochastic differential equations; Fokker-Planck equation; stochastic differential equations
with random coefficients. Effective: 1999 Fall Quarter.

ECI 267—Water Resource Management (3)
Lecture—3 hours. Prerequisite(s): ECI 114; ECI 141; ECI 142; ECI 153 recommended. Engineering, institutional, economic, and social basis for managing local and regional water resources. Examples in the context of California's water development and management. Uses of computer modeling to improve water management. (GEO 212.) Effective: 2013 Fall Quarter.

ECI 268—Infrastructure Economics (3)
Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ENG 106; Or the equivalent. Economics applied to infrastructure engineering planning, operations, maintenance, and management problems; microeconomic and macroeconomic theories; benefit-cost analysis; effect of uncertainty; optimization economics; non-classical economics; public finance. Effective: 2018 Spring Quarter.

ECI 269—Transportation-Air Quality: Theory and Practice (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECI 149; Or the equivalent. Health and regulatory
aspects of airborne pollutants. Principles of modeling
vehicle emissions. Conformity issues and the regulatory
framework. Regional and micro-scale modeling. Effective: 1999 Fall Quarter.

ECI 270—Advanced Water Resources Management (3)
Lecture—3 hours. Prerequisite(s): ECI 153; ECI 267; Or the equivalent. Discussion of technical papers related to planning theory, system maintenance, regionalization, multi-objective methods, risk analysis, institutional issues, pricing model application, economic development, forecasting, operations, and other topics. Effective: 1997 Winter Quarter.

ECI 271—Inverse Problems (4)
Lecture—4 hours. Prerequisite(s): ECI 114; ECI 144; Or equivalents. Inverse calibration of distributed parameter models, using data representing model outputs. Forward and inverse mappings, stability, uniqueness, identifiability. Optimization formulation of inverse problems, maximum likelihood and other objective functions, indirect and direct approaches, solution by UCODE in hands-on project format. Effective: 2010 Fall Quarter.

ECI 272A—Advanced Hydrogeology (4)
Lecture—4 hours. Prerequisite(s): ECI 144; MAT 118A recommended. Flow in confined, unconfined, and leaky aquifers. Geological aspects of aquifers. Regional groundwater flow and hydraulics of pumping and recharging wells. Identification of aquifer parameters. Isotope hydrogeology and recharge estimation. Effective: 2000 Fall Quarter.

ECI 272B—Advanced Hydrogeology (4)
Lecture—4 hours. Prerequisite(s): ECI 212A; ECI 272A Processes of subsurface flows and transport. Numerical methods of subsurface fluid flow and transport systems. Flow in the unsaturated zone. Fresh water-salt water interface in coastal aquifers. Macrodispersion. Identification of regional aquifer parameters. Modeling of aquifer systems. Effective: 2000 Fall Quarter.

ECI 272C—Multiphase Reactive Transport (4)
Lecture—4 hours. Prerequisite(s): ECI 142; ECI 144; ECI 148A Multicomponent reactive transport including multiple phases. Advective/dispersive transport, chemical equilibria, and mass transformation kinetics. Natural chemical/microbiological processes including sorption, complexation, biodegradation, and diffusive mass transfer. Eulerian and Lagrangean averaging methods. Applications to contaminant remediation problems in river and subsurface hydrology. Effective: 2004 Fall Quarter.

ECI 273—Water Resources Systems Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 114; ECI 153; Or the equivalent. Planning and management of water resource systems. Deterministic and stochastic simulation and optimization techniques. Capacity design and operation of reservoir systems for water supply, hydropower, flood control, and environmental objectives. Effective: 2018 Winter Quarter.

ECI 275—Hydrologic Time-Series Analysis (4)
Lecture—4 hours. Prerequisite(s): ECI 114; ECI 142 Application of statistical methods for analysis and modeling of hydrologic series. Statistical simulation and prediction of hydrologic sequences using time series methodology. Effective: 2003 Fall Quarter.

ECI 276—Watershed Hydrology (4)
Lecture—4 hours. Prerequisite(s): ECI 142; Or the equivalent. Analysis and mathematical modeling of hydrologic processes taking place in a watershed. Precipitation analysis and modeling. Theory of overland flow and its kinematic wave approximation.Analysis and modeling of saturated and unsaturated subsurface flow processes taking place on a hill slope. Effective: 1997 Winter Quarter.

ECI 277A—Computational River Mechanics I (4)
Lecture—4 hours. Prerequisite(s): EAD 115 (can be concurrent); ECI 141 (can be concurrent) Unsteady open channel flows, computation of water surface profiles, shallow water equations, St. Venant equations, method of characteristics, finite difference methods, stability and accuracy of explicit and implicit schemes, flood routing in simple and compound channels, advection of plumes. Not open for credit to students who have taken ECI 277. Effective: 2004 Fall Quarter.

ECI 277B—Computational River Mechanics II (4)
Lecture—4 hours. Prerequisite(s): ECI 277A Open channel flows, physical aspects of river mechanics, formulation of depth-averaged equations, boundary conditions, coordinates transformation and grid generation, finite-difference solution techniques, applications to two-dimensional momentum and pollutant transport in rivers. Effective: 2004 Fall Quarter.

ECI 277C—Turbulence and Mixing Processes (4)
Lecture—4 hours. Prerequisite(s): Graduate standing. Nature of turbulent flows, conservation equations, momentum, heat and mass transport in free and wall-bounded flows, body forces and mixing, roughness effects, turbulence modeling and simulation. Effective: 2004 Fall Quarter.

ECI 278—Hydrodynamics (3)
Lecture—3 hours. Prerequisite(s): ECI 141 Perturbation methods. Basic water waves. Governing equations for fluid motion on a rotating earth. Rotation effects, vorticity dynamics, Ekman layer. Stratification effects, internal waves and turbulent mixing. Combined effects. Effective: 1997 Winter Quarter.

ECI 279—Advanced Mechanics of Fluids (4)
Lecture—4 hours. Prerequisite(s): ECI 141 Rotational flows. Navier-Stokes equations and solutions for laminar flow; boundary layer equations and solution techniques. Nature of turbulence. Reynolds equations. Introduction to turbulence modeling. Effective: 1997 Winter Quarter.

ECI 280A—Nonlinear Finite Elements for Elastic-Plastic Problems (4)
Lecture—4 hours. Prerequisite(s): Consent of Instructor. State of the art finite element methods and tools for elasticplastic problems, including computational techniques based on the finite element method and the theory of elastoplasticity. Effective: 2008 Spring Quarter.

ECI 280B—Nonlinear Dynamic Finite Elements (4)
Lecture—4 hours. Prerequisite(s): Consent of Instructor. State of the art computational methods and tools for analyzing linear and nonlinear dynamics problems. Effective: 2009 Spring Quarter.

ECI 281A—Advanced Soil Mechanics (4)
Lecture—4 hours. Prerequisite(s): ECI 171 Consolidation and secondary compression. Preloading and wick drains. Seepage and seepage pressures. Filtration, drainage, and dewatering. Shear strength: friction, cohesion, dilatancy and critical states. Effective: 2004 Fall Quarter.

ECI 281B—Advanced Soil Mechanics (5)
Laboratory—3 hours; Lecture—4 hours. Prerequisite(s): ECI 281A Site investigation and soil characterization within the context of slope stability analysis. Effective: 2014 Spring Quarter.

ECI 282—Pavement Design and Rehabilitation (4)
Lecture—4 hours. Prerequisite(s): ECI 179; or Consent of Instructor. Advanced pavement design and structural/functional condition evaluation for concrete and asphalt pavements. Highways, airfields, port facilities; new facilities, rehabilitation, reconstruction. Mechanistic-empirical procedures, materials, climate and traffic characterization. Use of current design methods; recent developments and research. Effective: 2004 Winter Quarter.

ECI 283—Physico-Chemical Aspects of Soil Behavior (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECI 171 Study of the geotechnical behavior of soils considering formation, transport, mineralogy, soil-fluid-electrolyte systems, surface tension, particle mechanics, shape, fabric, and structure. Laboratories demonstrate effects of fundamental interparticle forces (contact, Van Der Waals, capillarity and chemical). Effective: 2012 Fall Quarter.

ECI 284—Theoretical Geomechanics (4)
Lecture—4 hours. Prerequisite(s): ECI 171 Elasticity, plasticity, micromechanics, coupled behavior and large deformations for geomaterials. Prediction of stress-strain-volume change behavior of geomaterials. Monotonic and cyclic loading, anisotropy, bifurcation of deformation. Effective: 2004 Winter Quarter.

ECI 286—Advanced Foundation Design (4)
Lecture—4 hours. Prerequisite(s): ECI 173 Design and analysis of pile and pier foundations, including seismic effects; deep excavation systems; tie-back, nailing, and anchor systems; coffer dams; loads on buried conduits; ground modification techniques; and other related topics. Effective: 2004 Spring Quarter.

ECI 287—Geotechnical Earthquake Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 138; ECI 281A Characteristics and estimation of earthquake ground motions; wave propagation and local site response; liquefaction potential and remediation; residual strength and stability considerations; ground deformations; dynamic soil-structure interaction. Effective: 2004 Spring Quarter.

ECI 288—Earth and Rockfill Dams (4)
Lecture—4 hours. Prerequisite(s): ECI 281A; ECI 281B (can be concurrent) Site selection; design considerations; layout; seismic effects including considerations of fault movements; construction; environmental considerations, instrumentation; maintenance remediation and retrofit of existing dams. Effective: 2004 Winter Quarter.

ECI 289A—Selected Topics in Civil Engineering; Environmental Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Environmental Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289B—Selected Topics in Civil Engineering; Hydraulics and Hydrologic Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Hydraulics and Hydrologic Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289C—Selected Topics in Civil Engineering; Engineering Planning (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Engineering Planning. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289D—Selected Topics in Civil Engineering; Geotechnical Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Geotechnical Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289E—Selected Topics in Civil Engineering; Structural Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Structural Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289F—Selected Topics in Civil Engineering; Structural Mechanics (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Structural Mechanics. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289G—Selected Topics in Civil Engineering; Transportation Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Transportation Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289H—Selected Topics in Civil Engineering; Transportation Planning (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Transportation Planning. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289I—Selected Topics in Civil Engineering; Water Resources Engineering (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Directed group study in Water Resources Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 290—Seminar (1)
Seminar—1 hour. Discussion of current graduate research, and guest lectures on recent advances. Oral presentation of individual study. Course required of graduate degree candidates. (S/U grading only.) Effective: 1997 Winter Quarter.

ECI 290C—Graduate Research Group Conference (1)
Discussion—1 hour. Research problems, progress, and techniques in civil engineering. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

ECI 296—Topics in Water and Environmental Engineering (1)
Seminar—2 hours. Seminars presented by visiting lecturers, UC Davis faculty and, graduate students. May be repeated for credit. (S/U grading only.) Effective: 2000 Winter Quarter.

ECI 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

ECI 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

ECI 390—The Teaching of Civil Engineering (1)
Discussion—1 hour. Prerequisite(s): Meet qualifications for teaching assistant and/or associate-in in Civil Engineering. Participation as teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated up to 9 unit(s). (S/U grading only.) Effective: 1997 Winter Quarter.

Consumer Science

Consumer Science | Consumer Science Information

(College of Agricultural and Environmental Sciences)

Faculty. http://foodscience.ucdavis.edu/people/faculty/

Graduate Study. See Graduate Studies.

Consumer Science | CNS Courses

Questions pertaining to the following courses should be directed to the Food Science Advising office in 1204 RMI South.

Courses in CNS:

CNS 092—Internship in Consumer Science (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Internship on and off campus in a consumer science related area. (P/NP grading only.) Effective: 1997 Winter Quarter.

CNS 100—Consumer Behavior (3)
Lecture—3 hours. Prerequisite(s): Preparation in areas of psychology or sociology and economics recommended. Provides a set of behavioral concepts and theories useful in understanding consumer behavior on the part of the individual, business, and social organizations. Conceptual models to help guide and understand consumer research will be presented. GE credit: SS, WE. Effective: 1997 Winter Quarter.

CNS 192—Internship in Consumer Science (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of a minimum of 84 units. Internship on and off campus in a consumer science related area (P/NP grading only.) Effective: 1997 Winter Quarter.

CNS 198—Directed Group Study (1-5)
(P/NP grading only.) Effective: 1997 Winter Quarter.

CNS 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

CNS 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

CNS 396—Teaching Assistant Training Practicum (1-4)
Variable. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Contemporary Leadership Minor; Science & Society

Contemporary Leadership Minor; Science & Society | Contemporary Leadership Minor

(College of Agricultural and Environmental Sciences)

Science and Society Program. https://sas.ucdavis.edu/

Program Office. 160 Hutchison Hall; 530-754-7277

The Science and Society Program offers a minor in Contemporary Leadership, open to all undergraduate students regardless of major. The minor provides a broad overview of leadership theory and practice, and engages students in critical thinking, self-reflection, problem solving and multicultural education. Students should contact the minor advisor for course selection and plan approval.

Consult advisors often to insure timely enrollment in SAS 192 and 190X only offered in spring quarter once a year.

Minor Advisor. The list of appropriate courses may change over time. To request an advising appointment, consult Elvira Galvan Hack in Science and Society (Plant Pathology) at eghack@ucdavis.edu.

Contemporary Leadership **Units:** 24

Core Leadership Courses

SAS 130	Contemporary Leadership	4
SAS 192	Internship in Science and Society	1-12
SAS 192 must be taken concurrently with an approved internship.		
SAS 190X	Science & Society Seminar	1-4

Preparatory Subject Matter

Students are required to complete four units from each of the following four categories. All courses are four units except where noted:

Ethics and Values:

Ethics and Values

ANS 170	Ethics of Animal Use	4
ECS 188	Ethics in an Age of Technology	4
ENL 107	Freedom of Expression	4
ESP 164	Ethical Issues in Environmental Policy	3
ESP 164 is a three-unit course.		
PHI 115	Problems in Normative Ethics	4

PHI 116	Ethical Theories	4
PHI 117	Foundations of Ethics	4
PSC 175	Genius, Creativity, and Leadership	4

Communication, Interpersonal Relationships and Human Dynamics:

ANT 139AN	Race, Class, Gender Systems	4
CMN 136	Organizational Communication	4
CRD 172	Social Inequality: Issues and Innovations	4
LIN 163	Language, Gender, and Society	4
PSC 151	Social Psychology	4
SOC 126	Social Interaction	4
SOC 132	The Sociology of Gender	4
UWP 104A	Writing in the Professions: Business Writing	4
UWP 104B	Writing in the Professions: Law	4
UWP 104C	Writing in the Professions: Journalism	4
UWP 104D	Writing in the Professions: Elementary and Secondary Education	4
UWP 104E	Writing in the Professions: Science	4
UWP 104F	Writing in the Professions: Health	4

Organization Structure and Cultures:

AMS 125	Corporate Cultures	4
ANT 105	Evolution of Societies and Cultures	4
CRD 152	Community Development	4
CRD 154	Social Theory and Community Change	4
CRD 158	Small Community Governance	4
CRD 164	Theories of Organizations and their Role in Community Change	5
SOC 030A	Intercultural Relations in Multicultural Societies	3

SOC 030A is a three-unit course.

SOC 156	Social Movements	4
SOC 180A	Complex Organizations	4
SOC 180B	Complex Organizations	4
SOC 183	Comparative Organizations	4
WMS 140	Gender and Law	4

Multiculturalism, the Global Community and Social Change:

AMS 153	The Individual and Community in America	4
AMS 156	Race, Culture and Society in the United States	4
CRD 176	Comparative Ethnicity	4
ENL 179	Multi-Ethnic Literature of the United States	4
HIS 173	Becoming an American: Immigration and American Culture	4
HIS 178B	Race In America, 1865-Present (Discontinued)	4
NAS 134	Race, Culture, and Nation	4
POL 124	The Politics of Global Inequality	4
POL 125	Political Economy of Foreign Aid	4
POL 130	Recent U.S. Foreign Policy	4
TXC 174	Introduction to World Trade in Textiles and Clothing	4

Total: 24

Critical Theory

Critical Theory | Critical Theory Information

Jeff Fort, Ph.D., Chairperson of the Program

Program Office. 207 Sproul Hall; 530-752-2115; http://crittheory.ucdavis.edu

Committee in Charge. http://crittheory.ucdavis.edu/people/executive-committee

Faculty. http://crittheory.ucdavis.edu/people

Graduate Study. The program in Critical Theory offers study and research leading to the Ph.D. with a designated emphasis in Critical Theory. The program provides theoretical emphasis and interdisciplinary perspective to students already preparing for the Ph.D. in one of 14 participating graduate programs (Anthropology, Comparative Literature, Cultural Studies, Education, English, French, German, History, Music, Psychology, Sociology, Spanish, Study of Religion, and Performance Studies). Students complete all requirements for the Ph.D., including the dissertation, in one of the participating departments. Minimum coursework for the Critical Theory Designated Emphasis consists of four courses. The first three of these, CRI 200A, 200B, and 200C are taught by affiliated faculty, with 200A normally being taken first. For the fourth course, students have the option of taking another section of CRI 200B or an approved course from any affiliated department.

Graduate Advisor. Consult Critical Theory Program office.

Critical Theory | CRI Courses

Courses in CRI:

CRI 101—Introduction to Critical Theoretical Approaches to Literature and Culture (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. Introduction to critical theory and its use for interpreting literary texts, film, and media forms in our present global culture. (COM 141.) GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

CRI 200A—Approaches to Critical Theory (4)
Seminar—3 hours; Term Paper. Restricted to Graduate students. Critical overview of modern theoretical texts (e.g., semiotics, hermeneutics, deconstruction, social and cultural critique, feminist theory, psychoanalysis). Effective: 2016 Spring Quarter.

CRI 200B—Problems in Critical Theory (4)
Seminar—3 hours; Term Paper. Restricted to Graduate students. Focused study of a particular critical theoretical approach, school or perspective. Topics may include but are not limited to: critical approaches to the study of literature, culture, film, historiography, visual culture, the body, and aesthetics. May be repeated for credit when topic differs and with consent of instructor. Effective: 2016 Spring Quarter.

CRI 200C—History of Critical Theory (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate student standing. Restricted to Graduate students. Critical analysis and discussion of pre-twentieth century theories of literary and cultural criticism. Topics may include but are not limited to: ancient and early modern philosophy; nature and culture in the Renaissance; theories of Mimesis from antiquity to the Renaissance. May be repeated for credit when topic differs and with consent of instructor. Effective: 2016 Spring Quarter.

CRI 201—Critical Theory Special Topics (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate student standing. Application of theoretical principles to one specific research topic. May be repeated for credit with consent of instructor when topic differs. Effective: 2016 Spring Quarter.

CRI 202—Visual Culture (4)
Lecture/Discussion—4 hours. Restricted to Graduate student standing. Analysis of image production in the contemporary world (photography, film, television, advertising, etc.) and their effects on individual subjectivities and collective social identities. Effective: 2016 Spring Quarter.

CRI 298—Directed Group Study (1-5)
Seminar—3 hours. Prerequisite(s): Consent of Instructor. Restricted to Graduate student standing. Effective: 2016 Spring Quarter.

CRI 299—Individual Study (1-12)
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. Graduate student standing. (S/U grading only.) Effective: 2016 Spring Quarter.

Cultural Studies (Graduate Group)

Cultural Studies (Graduate Group) | CST Information

Wendy Ho, Ph.D., Graduate Group Chair

Group Office. 3129 Hart Hall; 530-754-9765; https://culturalstudies.ucdavis.edu/

Faculty. http://culturalstudiesgg.ucdsitefarm.acsitefactory.com/people?first=&last=&title=&unit=

Cultural Studies (Graduate Group) | CST M.A.

Wendy Ho, Ph.D., Graduate Group Chair

Group Office. 3129 Hart Hall; 530-754-9765; https://culturalstudies.ucdavis.edu/

Faculty. http://culturalstudiesgg.ucdsitefarm.acsitefactory.com/people?first=&last=&title=&unit=

Graduate Study. The Graduate Group in Cultural Studies at UC Davis offers an interdisciplinary approach to the study of culture and society that highlights how sexuality, race, ability, citizenship, gender, nationality, class and language organize embodied identities, social relations and cultural objects. With the close guidance and supervision of a faculty committee, students in the program pursue interdisciplinary research in areas including studies of comparative and critical race, ecocriticism, fashion, queer theory, media and popular cultural representation, science and technology, Marxist theory, travel and tourism, food, physical and cognitive abilities, cultural geography, transnational culture and politics, globalization, religion, rhetoric, performance, and critical theory. Although both the Ph.D. and M.A. are offered, applications are only accepted for the Ph.D. program, and the M.A. is available as a terminal degree en route to the Ph.D.

Preparation. Normal preparation for the program is a bachelor's degree in a related field. Terminal M.A. students must pass an examination. Ph.D. students must pass a qualifying examination, a comprehensive examination, and complete a dissertation demonstrating original research in an area approved by the Graduate Group. In addition to the standard UC Davis graduate application (which requires a statement of purpose), we also require three letters of recommendation, transcripts, GRE scores, writing sample (ten-page minimum, not exceeding twenty pages), and a fellowship application.

The Master of Art degree is offered as a terminal degree in route to the Ph.D.. Applicants may only apply for the Ph.D. program.

Graduate Advisors. Omnia El Shakry (History), Elizabeth Freeman (English), Cristiana Giordano (Anthropology), Wendy Ho (Asian American Studies & Gender, Sexuality, and Women’s Studies), Caren Kaplan (American Studies), Sudipta Sen (History), Robyn Rodriguez (Asian American Studies)

Cultural Studies (Graduate Group) | CST Ph.D.

Wendy Ho, Ph.D., Graduate Group Chair

Group Office. 3129 Hart Hall; 530-754-9765; https://culturalstudies.ucdavis.edu/

Faculty. http://culturalstudiesgg.ucdsitefarm.acsitefactory.com/people?first=&last=&title=&unit=

Graduate Study. The Graduate Group in Cultural Studies at UC Davis offers an interdisciplinary approach to the study of culture and society that highlights how sexuality, race, ability, citizenship,

gender, nationality, class and language organize embodied identities, social relations and cultural objects. With the close guidance and supervision of a faculty committee, students in the program pursue interdisciplinary research in areas including studies of comparative and critical race, ecocriticism, fashion, queer theory, media and popular cultural representation, science and technology, Marxist theory, travel and tourism, food, physical and cognitive abilities, cultural geography, transnational culture and politics, globalization, religion, rhetoric, performance, and critical theory. Although both the Ph.D. and M.A. are offered, applications are only accepted for the Ph.D. program, and the M.A. is available as a terminal degree in route to the Ph.D.

Preparation. Normal preparation for the program is a bachelor's degree in a related field. Terminal M.A. students must pass an examination. Ph.D. students must pass a qualifying examination, a comprehensive examination, and complete a dissertation demonstrating original research in an area approved by the Graduate Group. In addition to the standard UC Davis graduate application (which requires a statement of purpose), we also require three letters of recommendation, transcripts, GRE scores, writing sample (ten-page minimum, not exceeding twenty pages), and a fellowship application.

Graduate Advisors. Omnia El Shakry (History), Elizabeth Freeman (English), Cristiana Giordano (Anthropology), Wendy Ho (Asian American Studies & Gender, Sexuality, and Women's Studies), Caren Kaplan (American Studies), Sudipta Sen (History), Robyn Rodriguez (Asian American Studies)

Cultural Studies (Graduate Group) | CST Courses

Courses in CST:

CST 200A—Histories of Cultural Studies (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing or consent of instructor required. Undergraduate coursework in the humanities or social sciences recommended. Histories and traditions of cultural studies internationally; multiple legacies of cultural studies as a field of inquiry in various geographical contexts; foregrounds important critical perspectives resulting from social and intellectual movements world-wide. Effective: 2000 Fall Quarter.

CST 200B—Theories of Cultural Studies (4)
Lecture/Discussion—4 hours. Prerequisite(s): CST 200A; or Consent of Instructor. Definitions of "critical" scholarship and examination of various contexts in which cultural studies theory has emerged worldwide. Both mainstream and alternative theoretical traditions, such as those developed by people of color and by other minoritized groups. Effective: 2000 Fall Quarter.

CST 200C—Practices of Cultural Studies (4)
Lecture/Discussion—4 hours. Prerequisite(s): CST 200A; CST 200B; or Consent of Instructor. Methodological and practical applications of cultural studies research. Critical analyses of ethnography, textual analysis, social change, community development, and identity formation. Emphasis given to students' unique versions of cultural studies practices. Effective: 2000 Fall Quarter.

CST 204—History and Theory of Sexualities (4)
Lecture/Discussion—4 hours. Prerequisite(s): CST 200A (can be concurrent); or Consent of Instructor. Studies of sexuality in feminist, literary, historical, and cultural studies research, specifically examining the emergence of "sexuality" as a field of research and the relationship of sexuality studies to cultural forms, subjectivity, and social relations generally. May be repeated up to 2 time(s). Effective: 2014 Spring Quarter.

CST 206—Studies in Race Theory (4)
Lecture/Discussion—4 hours. Prerequisite(s): CST 200A (can be concurrent); or Consent of Instructor. Theoretical framework for the critical study of race, drawing on contemporary cultural studies and postcolonial scholarship in order to understand the social production of "race" as a category for organizing social groups and determining group processes. Effective: 2000 Fall Quarter.

CST 208—Studies in Nationalism, Transnationalism, and Late Capitalism (4)
Lecture/Discussion—4 hours. Prerequisite(s): CST 200A (can be concurrent); or Consent of Instructor. Contemporary theories of nation, nationalism, postcolonialism, and transnationalism. Specific attention to the relationship between cultural production and the formation of ideas about nation and nationalism, including examination of both "legitimizing" and resistant discourses. Effective: 2000 Fall Quarter.

CST 210—Memory, Culture, and Human Rights (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Restricted to graduate students. Explores the multiple convergences among memory, culture, and human rights. Discusses diverse approaches to how societal actors in different historical, cultural, and national settings, construct meanings of past political violence, inter-group conflicts, and human rights struggles. (HMR 200B.) Effective: 2013 Fall Quarter.

CST 212—Studies in the Rhetorics of Culture (4)
Lecture/Discussion—4 hours. Prerequisite(s): CST 200A (can be concurrent); or Consent of Instructor. Survey of critical and analytical approaches to the study of texts. Examination of multi-mediated objects to understand their cultural import by focusing on discursive production, dispersal, and reception processes, and related shifts in power relations. Effective: 2000 Fall Quarter.

CST 214—Studies in Political and Cultural Representations (4)
Lecture/Discussion—4 hours. Prerequisite(s): CST 200A (can be concurrent); Consent of graduate advisor required. Framework for the analysis of political and popular cultural representations. Emphasis on concepts, theories, and methodologies illuminating dominant and vernacular cultural representation, appropriation, and innovation in transnational contexts. May be repeated up to 4 time(s) when topic differs. Effective: 2003 Fall Quarter.

CST 250—Research Seminar (4)
Seminar—4 hours. Prerequisite(s): CST 200A; CST 200B; CST 200C; or Consent of Instructor. Designed to facilitate student interaction and promote student research by guiding students through the production of a publishable essay. Essays submitted, distributed, and discussed by seminar participants. May be repeated up to 12 unit(s). Effective: 2000 Fall Quarter.

CST 270A—Individually Guided Research in Cultural Studies (4)
Discussion—1 hour; Extensive Writing; Independent Study—2 hours. Prerequisite(s): CST 200C; CST 250; and Consent of Instructor. Individually guided research, under the supervision of a faculty member, on a Cultural Studies topic related to the student's proposed dissertation project to produce a dissertation prospectus. Effective: 2003 Fall Quarter.

CST 270B—Individually Guided Research in Cultural Studies (4)
Discussion—1 hour; Extensive Writing; Independent Study—2 hours. Prerequisite(s): CST 200C; CST 250; and Consent of Instructor. Individually guided research, under the supervision of a faculty member, on a Cultural Studies topic related to the student's proposed dissertation project to produce a dissertation prospectus. Effective: 2003 Fall Quarter.

CST 270C—Individually Guided Research in Cultural Studies (4)
Discussion—1 hour; Extensive Writing; Independent Study—2 hours. Prerequisite(s): CST 200C; CST 250; and Consent of Instructor. Individually guided research, under the supervision of a faculty member, on a Cultural Studies topic related to the student's proposed dissertation project to produce a dissertation prospectus. Effective: 2003 Fall Quarter.

CST 290—Colloquium (1)
Lecture—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Designed to provide cohort identity and faculty student exchange. Opportunity to present papers, hear guest lecturers, and see faculty presentations, gather for organizational and administrative news, exchange information, and make announcements. May be repeated up to 12 unit(s). (S/U grading only.) Effective: 2000 Fall Quarter.

CST 295—Special Topics (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Special topics courses offered according to faculty and student interests and demands. May be repeated for credit with consent of advisor. Effective: 2000 Fall Quarter.

CST 298—Group Research (1-5)
May be repeated for credit. (S/U grading only.) Effective: 2002 Spring Quarter.

CST 299—Directed Research (1-5)
May be repeated for credit. (S/U grading only.) Effective: 2002 Spring Quarter.

CST 299D—Dissertation Research (1-12)
Independent Study—3-36 hours. Prerequisite(s): Advancement to doctoral candidacy. May be repeated for credit. (S/U grading only.) Effective: 2004 Winter Quarter.

CST 396—Teaching Assistant Training Practicum (1-4)
Variable—3-12 hours. Prerequisite(s): Graduate standing. May be repeated for credit. (S/U grading only.) Effective: 2004 Winter Quarter.

Design

Design | DES Information

(College of Letters and Science)

Christina Cogdell, Ph.D., Chairperson of the Department

Department Office. 101 Art Building; 530-752-0890; http://design.ucdavis.edu

Faculty. http://arts.ucdavis.edu/design-people-0

Design | DES A.B.

(College of Letters and Science)

Christina Cogdell, Ph.D., Chairperson of the Department

Department Office. 101 Art Building; 530-752-0890; http://design.ucdavis.edu

Faculty. http://arts.ucdavis.edu/design-people-0

The Major Program

The Department of Design offers a creative, challenging, and flexible approach to the study of design with emphasis on socially responsible, human centered, and sustainable practice.

The Program. Foundation courses: Design and Visual Culture; Design Drawing, Form and Color, and Graphic Design and Computer Technology; are required of all design majors. One additional course in the student's area of interest is required for Preparatory Subject Matter. Depth Subject Matter courses provide: (1) further exploration of design principles and conceptual, formal and technical issues; (2) conceptual and critical development through a series of history and theory classes; (3) in-depth studio experience with projects that demonstrate a research-based, iterative design process. Optional capstone class. A more detailed explanation is available through the Design Advising office in 101 Art Building; 530-752-0890.

Portfolios. Portfolios are not required for admission to the major. However, it is highly recommended that design students maintain an updated portfolio of visual work for faculty and professional evaluation and consideration for enrollment in specialized courses, including independent study, group study and internship.

Internships, Careers, and Study Abroad. Design students are encouraged to supplement their coursework with internships in design firms, museums, and design related businesses. Design

graduates go directly from this program into further graduate study, or professional work including exhibition, fashion, information, interior architecture and product (lighting and furniture), textiles, visual communications (digital, environmental and print) and sustainable design. In addition, students have become entrepreneurs through freelance and commissioned work in many related areas. The Department of Design encourages students to experience design education abroad through a variety of sponsored programs.

Preparatory Subject Matter **Units:** 28

DES 001	Introduction to Design	4
DES 014	Design Drawing	4
OR		
DES 021	Drafting and Perspective	4
DES 015	Form and Color	4
DES 016	Graphic Design and Computer Technology	4

Choose one:

UWP 011	Popular Science and Technology Writing	4
UWP 012	Writing and Visual Rhetoric	4

Preferred.

UWP 018	Style in the Essay (Discontinued)	4
OR		
UWP 048	Style in the Essay	4
UWP 019	Writing Research Papers (Discontinued)	4
OR		
UWP 049	Writing Research Papers	4

Choose one:

DES 040A	Energy, Materials, and Design Over Time	4
DES 040B	Ideologies of Design	4
DES 040C	Design for Aesthetics and Experience	4

Choose two:

DES 040A	Energy, Materials, and Design Over Time**	4
DES 040B	Ideologies of Design**	4
DES 040C	Design for Aesthetics and Experience **	4
DES 050	Introduction to Three-Dimensional Design	4
DES 070	Introduction to Textile Design Structures	4
DES 077	Introduction to Structural Design for Fashion	4
ART 012	Beginning Video	4

**DES 040A, 040B, 040C can only be used for this requirement if not counted above.

Depth Subject Matter **Units:** 44

Choose three, at least two must be Design courses from list A:

List A:

AHI 168	Great Cities	4
AHI 184	Twentieth Century Architecture	4
AHI 187	Contemporary Architecture	4
AHI 188A	The American Home	4
AHI 188B	Architecture of the United States	4

AHI 189	Photography in History	4
DES 127A	Sustainable Design	4
DES 138	Materials and Methods in Interior Design	4
DES 142A	World Textiles: Eastern Hemisphere	4
DES 142B	World Textiles: Western Hemisphere	4
DES 143	History of Fashion	4
DES 144	History of Interior Architecture	4
DES 145	History of Visual Communication	4
DES 149	Information Design: Principles and Practice	4
DRA 114	Theatre on Film	4
DRA 150	American Theatre and Drama	4
DRA 155	Representing Race in Performance	4
TCS 150	Introduction to Theories of the Technoculture	4
TCS 152	New Trends in Technocultural Arts	4
TCS 153	Concepts of Innovative Soundtracks	4
TCS 155	Introduction to Documentary Studies	4
TCS 159	Media Subcultures	4

Choose five from lists B and C; one may be a non-Design course:

List B:

DES 107	Advanced Structural Design for Fashion	4
DES 113	Photography and Digital Imaging	4
DES 115	Letterforms and Typography	4
DES 116	Visual Communication: Graphic Design Studio	4
DES 117	Interactive Media I	4
DES 127B	Studio Practice in Sustainable Design	4
DES 131	Global Fashion and Product Design	4
DES 132A	Textile Design: Woven Structures	4
DES 132B	Loom-Constructed Textile Design	4
DES 134A	Introduction to Interior Design - Residential	4
DES 134B	Introduction to Interior Design - Commercial and Technical Spaces	4
DES 135A	Furniture Design and Detailing	4
DES 135B	Furniture Design and Prototyping	4
DES 136A	Lighting Technology and Design	4
DES 136B	Designing with Light - Industrial Design	4
DES 137A	Daylighting and Interior Design	4
DES 137B	Daylighting Design Studio	4
DES 150B	Computer-Assisted Presentations for Interior Architecture	4
DES 151	Type in Motion	4
DES 155A	Pattern, Form and Surface	4
DES 156	Graphitecture: Architecture in the Age of New Media	4
DES 160	Textile Surface Design: Patterns and Resists	4
DES 161	Textile Surface Design: Screen and Digital Printing	4
DES 170	Experimental Fashion & Textile Design	4
DES 171	Fashion Drawing: Technical and Illustration	4
DES 177	Computer-Assisted Fashion Design	4
DES 180A	Advanced Interior Design: Institutional Spaces	4
DES 185	Exhibition Design	4
DES 186	Environmental Graphic Design	4

One from the following approved list may count:

AHI 110A (Nonexistent)

ART 113	Interdisciplinary Art	4
ART 114A	Intermediate Video: Animation	4
CHI 172	Chicana/o Voice/Poster Silk Screen Workshop	4
DRA 124A	Principles of Theatrical Design: Scenery	4
DRA 124B	Principles of Theatrical Design: Scenery	4
DRA 124C	Principles of Theatrical Design: Lighting	4
DRA 124D	Principles of Theatrical Design: Costume	4
DRA 124E	Costume Design for Film	4
DRA 128	Principles of Theatre Sound	3
DRA 130	Approaches to Theatrical Design: Practice and Theory	4
DRA 170	Media Theatre	4
TCS 100	Experimental Digital Cinema I	4
TCS 104	Documentary Production	4
TCS 130	Fundamentals of 3D Computer Graphics	4
TCS 131	Character Animation	4
TXC 163	Textile Coloration and Finishing	3
TXC 163L	Textile Coloration and Finishing Laboratory	1
LDA 141	Community Participation and Design	4

List C:

Capstone Course Option; these courses are the most advanced in the major and prerequisites are strictly enforced:

DES 154	Visual Communication: Message Campaign Design	4
DES 157	Interactive Media II	4
DES 159	Design for Understanding	4
DES 179	Fashion Design: Signature Collection	4
DES 180B	Advanced Interior Architecture	4
DES 187	Narrative Environments	4

Choose two from list A, B, or C that have not been previously counted.

Note: Substitutions for the listed courses may be allowed under certain circumstances with prior departmental approval.

Total: 72

Design | DES M.F.A.

(College of Letters and Science)

Christina Cogdell, Ph.D., Chairperson of the Department

Department Office. 101 Art Building; 530-752-0890; http://design.ucdavis.edu

Faculty. http://arts.ucdavis.edu/design-people-0

Graduate Study. The graduate program in Design leading to the Master of Fine Arts.

The UC Davis Master of Fine Arts (MFA) in Design unites theory and practice. This two-year program encourages an interdisciplinary approach with emphases on socially responsible, human-centered, and sustainable design practice. Students collaborate with outstanding faculty within the department, and the greater University, whose work covers a broad array of disciplines and interests. Design faculty expertise includes design theory, exhibition, fashion, history, information, interaction, interior architecture, immersion, lighting, product, textiles, time-base, visual communication and wearables, among others. Students blend individual focused research and

creative practice with an understanding of key design issues in history, theory and research methodology. The MFA degree culminates in a project-based thesis and exhibition. For more information, see http://arts.ucdavis.edu/design-graduate-program.

Graduate Advisor. Please contact the Program at 530-752-8710.

Design | DES Courses

Questions pertaining to the following courses should be directed to the instructor or to the Design Advising office in 107 Art; 530-752-6244. Scheduling of classes is subject to change; please contact the Advising office to confirm when a course is offered.

Courses in DES:

DES 001—Introduction to Design (4)
Discussion—1 hour; Lecture—3 hours. Priority given to Design majors. Introduction to design discipline through readings, writing, visual problem solving, and critical analysis. Topics: design principles and elements, vocabulary, color theory, Gestalt principles, conceptualization strategies. Role of designer and products in contemporary culture including social responsibility and sustainability. GE credit: AH, VL. Effective: 2013 Spring Quarter.

DES 014—Design Drawing (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001 (can be concurrent); Students with a background in drawing or Advanced Placement Art Studio units are encouraged to submit a portfolio for review to waive this course. Priority given to Design majors. Drawing as a tool for design. Basic skills in objective observation and representation, including line, shape, tone, and space. Drawing as a tool for formulating and working through design problems. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 015—Form and Color (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001 (can be concurrent); or Consent of Instructor. Priority given to Design majors. Understanding color, form and composition as ways of communicating design concepts and content. Color theory, color mixing, interaction of color. Design principles and elements. Gestalt theory. Explores a variety of materials, media and presentation techniques. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 016—Graphic Design and Computer Technology (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001 (can be concurrent); or Consent of Instructor. Priority given to Design majors. Introduction to digital tools with emphasis on graphic design including theory, practice and technology. Includes principles of color, resolution, pixels, vectors, image enhancement, layout, visual organization, visual hierarchy, typography. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 021—Drafting and Perspective (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001 (can be concurrent); or Consent of Instructor. Priority given to Design majors. Introduction to mechanical drafting, including scaled drawing, orthogonal projection, isometric, axonometric and perspective. Includes basic rendering techniques. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 040A—Energy, Materials, and Design Over Time (4)
Discussion—1 hour; Lecture—3 hours. Global history of design across time, viewed through the lens of the effects of the creation and discovery of new energy sources, processes, and materials on design. (SAS 043.) GE credit: AH, WC. Effective: 2018 Spring Quarter.

DES 040B—Ideologies of Design (4)
Discussion—1 hour; Lecture—3 hours. Priority to Design majors. Introduction to the history and theory of design in particular relation to political, philosophical, cultural, economic, and environmental debates and objectives. GE credit: AH, WE. Effective: 2014 Spring Quarter.

DES 040C—Design for Aesthetics and Experience (4)
Discussion—1 hour; Lecture—3 hours. Priority to Design majors. Global historical survey of design's engagement with changing notions of aesthetics and experience. Relates transformations in the theory, production, and reception of all aspects of design (objects, landscapes, architectures, etc.) to larger cultural, social, and political contexts. Not open for credit to students who have taken DES 40 or DES 140. GE credit: AH, DD, WE. Effective: 2014 Spring Quarter.

DES 050—Introduction to Three-Dimensional Design (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; or Consent of Instructor. Priority given to Design majors. Design concept development and detailing as it relates to the making of objects, structures and models using form, scale and materials. Product design and rapid prototyping methods using a range of techniques for advancing the design process. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 070—Introduction to Textile Design Structures (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001 (can be concurrent); or Consent of Instructor. Priority to Design majors. Introduction to diverse methods for creating textile structures. Exploration of the creative potential of hand-constructed textiles, manipulation of fabric to create dimensional surfaces, and the basics of building and joining fabric structures. Only two units of credit to students who have completed DES 023 or DES 24; not open for credit for students who have completed both DES 023 and DES 024. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 077—Introduction to Structural Design for Fashion (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001 (can be concurrent); or Consent of Instructor. Priority given to Design majors. Study and practice of designing clothing for the human body. Emphasis on flat pattern development, structural joining sequences and the development of three-dimensional garments from two-dimensional drawings. Not open for credit to students who have completed DES 077A. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

DES 107—Advanced Structural Design for Fashion (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; DES 077; or Consent of Instructor. Priority given to Design majors. Advanced study and practice of designing clothing for the human body through pattern development and structural joining. Emphasis on draping techniques and advanced conceptualization for fashion design. GE credit: AH, VL. Effective: 2017 Spring Quarter.

DES 111—Coding for Designers (4)
Studio—6 hours. Prerequisite(s): DES 001; DES 015; DES 016; or Consent of Instructor. Pass One restricted to Design majors. Programming concepts/skills for design. Algorithm-based design and development flowcharts. Pseudo-code entry level programming. Principles of coding logic syntax structure. Analysis of history. Development iteration presentation of design projects. Not open for credit to students who completed DES 037. GE credit: SE, VL. Effective: 2018 Spring Quarter.

DES 113—Photography and Digital Imaging (4)
Studio—6 hours. Prerequisite(s): DES 001; DES 015; DES 016 Pass One restricted to Design majors. Digital imaging techniques using black/white and color. Critical analysis of photographs and the role of photography in society. Explore use and meaning of single, sequence and single composite images. Not open for credit to students who have taken DES 031. GE credit: AH, VL. Effective: 2017 Fall Quarter.

DES 115—Letterforms and Typography (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. Priority given to Design majors. Fundamentals of letterforms and typography. Characteristics of typefaces; formatting and composition of type. Principles of legibility, visual hierarchy, grid systems, and the integration of type and image. Not available for credit to students who have completed DES 022. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 116—Visual Communication: Graphic Design Studio (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; DES 115; or Consent of Instructor. Priority given to Design majors. Multiple, conceptually-linked assignments focusing on the fundamental choices designers make in translating concepts into effective graphic form. Problem finding and analysis of audience needs. Design process from research and initial concepts to project prototypes. Not open for credit to students who have completed DES 152 or DES 152A. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 117—Interactive Media I (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. Priority to Design majors. Practice of creating interactive visual media for network-based applications and principles of human computer interaction. Responsive design. User-centered research, information architecture, interface and interaction. Analysis of usability. Development and presentation of design production materials and completed interactive projects. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 126—Design Ethnography (4)
Lecture/Lab—6 hours. Prerequisite(s): DES 001; or Consent of Instructor. Pass One restricted to Design majors. Practical introduction to design ethnography through project-based work. Tools and methods, observation, interviews, fieldnotes, and synthesis of qualitative data. Exploration of participatory design. Examination of the ethical questions. GE credit: AH. Effective: 2017 Spring Quarter.

DES 127A—Sustainable Design (4)
Lecture/Discussion—4 hours. Prerequisite(s): DES 001 Priority to Design majors. Principles, practice and materials of contemporary sustainable design in the context of environmental crisis. History of sustainable design in relation to the fields of textiles, visual communication, interior architecture, exhibition design and lighting. GE credit: AH, VL. Effective: 2015 Winter Quarter.

DES 127B—Studio Practice in Sustainable Design (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 127A; DES 001; or Consent of Instructor. Priority to Design majors. Analysis and practice of sustainable design within studio context. Design project that incorporate the reuse of post consumer waste; standard materials vs. sustainable materials; Cradle to Cradle philosophy and practice. Field trips required. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 128—BioDesign Theory and Practice (4)
Lecture/Discussion—3 hours; Term Paper. Pass One restricted to Design and Art History majors. Recent biological theories and their influence upon design theory and practice; includes bio-based materials in contemporary design. GE credit: VL. Effective: 2017 Winter Quarter.

DES 131—Global Fashion and Product Design (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. Priority given to Design majors. Exploration of materials, embellishments, and structural techniques derived from historic and contemporary world cultures. Emphasis on unique qualities of individual expression applied to hand made textiles, fashion and textile products. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 132A—Textile Design: Woven Structures (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. Priority given to Design majors. Foundation course in handwoven textile structure and design, emphasizing yarn identification, basic drafting, basic weaves and their derivatives explored in context of original color effects and yarn combinations. May be repeated up to 1 time(s) with consent of instructor. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 132B—Loom-Constructed Textile Design (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; DES 132A; or Consent of Instructor. Priority to Design majors. Intermediate level study of complex fabric structure with emphasis on pattern in relation to surface, dimension, and material. May be repeated up to 1 time(s) with consent of instructor. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 134A—Introduction to Interior Design - Residential (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 021 or DES 150A); or Consent of Instructor. Priority to Design majors. Introduction to the theory and practice of interior design with focus on residential spaces. Basic methods of design conceptualization, development, and presentation. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 134B—Introduction to Interior Design - Commercial and Technical Spaces (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 021 or DES 150A); or Consent of Instructor. Pass One priority given to Design majors. Introduction to the theory and practice of interior design with focus on small commercial and technical spaces. Archetypal spaces, non-residential building systems, ADA accessibility, design programming and research methods. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 135A—Furniture Design and Detailing (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. Priority given to Design majors. Development of designs for contemporary furniture. Consideration of behavioral and physical requirements, cultural and historic expression, and structural and aesthetic qualities. Process includes research, drawings, and construction of scale models. Required field trip. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 135B—Furniture Design and Prototyping (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. Priority given to Design majors. Design and construction of full size prototype furniture based on preliminary work completed in course 135A. Material technology, construction methods, and finishes discussed. Development of shop drawings and furniture construction. Required field trip. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 136A—Lighting Technology and Design (4)
Laboratory—4 hours; Lecture/Discussion—2 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. Priority to Design majors. Introduction to lighting design and technology. Understanding the role of lighting and vision in the development of functional and aesthetically pleasing environments. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 136B—Designing with Light - Industrial Design (4)
Laboratory—4 hours; Lecture/Discussion—2 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; DES 136A; or Consent of Instructor. Priority to Design majors. Design and manipulation of light sources, luminaires, and lighting controls to enhance the functional and aesthetic impact of interior and exterior spaces. Industrial design projects explore lighting effects, light distribution characteristics, and luminaire design. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 137A—Daylighting and Interior Design (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. Priority to Design majors. Emphasis on understanding the effect of daylight on the perception of interior designs as well as on vision, luminous and thermal comfort, health and energy efficiency. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 137B—Daylighting Design Studio (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. Priority to Design majors. Introduction to daylighting through observation of its effects on interior designs using scale models of interior designs of choice and photographing them outdoors and in CLTC's Heliodon to understand year-round performance. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 138—Materials and Methods in Interior Design (4)
Lecture/Discussion—3 hours; Project (Term Project)—1 hour. Prerequisite(s): DES 001; or Consent of Instructor. Priority to Design majors. Introduction to the finish materials used for interior design with special emphasis on sustainable and recycled products. Performance factors, relative costs and energy impacts, installation conditions and construction details, and design potential for a full range of interior materials. GE credit: AH, VL, WE. Effective: 2016 Fall Quarter.

DES 142A—World Textiles: Eastern Hemisphere (4)
Lecture—4 hours. Social contexts, meanings, aesthetics, stylistic developments, and methods significant in eastern hemisphere textiles. Emphasis on Japan, China, Indonesia, Oceania, Southern and Central Asia, Africa. GE credit: AH. Effective: 2016 Fall Quarter.

DES 142B—World Textiles: Western Hemisphere (4)
Lecture—4 hours. Social context, aesthetics, stylistic developments and methods significant in western hemisphere textiles. Emphasis on the Middle East, Europe, and the Americas up to contemporary times. Two required field trips. GE credit: AH. Effective: 2016 Fall Quarter.

DES 143—History of Fashion (4)
Discussion—1 hour; Lecture—3 hours. Priority to Design majors. History of fashion design from the earliest times to the present focusing on the ancient Middle East and Common Era North America and Europe. Emphasis on aesthetic, functional, social, economic, political and cultural aspects of clothing and personal adornment. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 144—History of Interior Architecture (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Pass One priority to Design majors. Thematic survey of interior architecture. Emphasis on dwellings in their cultural settings and development of modern interior design theories. Interiors considered in relation to buildings' exteriors, sites, and uses. GE credit: AH, WE. Effective: 2017 Fall Quarter.

DES 145—History of Visual Communication (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): DES 001; or Consent of Instructor. Priority to Design majors. Historical developments of visual communication, concentrating on the technological and aesthetic development of graphic design; origins and manifestations of current issues in visual communication; provide framework for analysis of current and future trends in visual communication. GE credit: AH, VL, WE. Effective: 2016 Fall Quarter.

DES 149—Information Design: Principles and Practice (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Upper division standing or consent of instructor. Restricted to students with upper division standing. Design principles and visual strategies for effective information display; analysis of contemporary and historical examples of visual representations and visual narratives in science, humanities, and the arts; emergence of digital methods for interactive data presentation. GE credit: AH, VL. Effective: 2014 Winter Quarter.

DES 150A—Computer-Assisted Drawing for Designers (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. DES 021 preferred. Priority given to Design majors. Computer assisted drawing and modeling using a mid-level, multi-use CAD program. Basic architectural drawing and modeling technique in both two-dimensional and three-dimensional CAD environments. Not open for credit to students who have taken DES 150. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 150B—Computer-Assisted Presentations for Interior Architecture (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; DES 150A; or Consent of Instructor. DES 021 recommended. Priority given to Design majors. Computer-assisted architectural presentation including the development of complex 3D models, techniques of photo-realistic rendering and computer simulation of movement through architectural and interior space. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 151—Type in Motion (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. DES 115 recommended. Priority given to Design majors. Fundamentals of creating motion-based, screen-based typography. Consideration of narrative structures, movement assemblage, and other visual languages, synthesized within a nuanced understanding of typography within digital space. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 154—Visual Communication: Message Campaign Design (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 115; DES 116; DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. Priority given to Design majors. Principles and application of visual design strategies for projects that address a broad public audience. Emphasis on design for social awareness/interaction/benefit. Creation of public visual-media campaign. Not open for credit to students who have completed DES 152B. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 155A—Pattern, Form and Surface (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; DES 115; (DES 014 or DES 021); DES 015; DES 016; (DES 031 or DES 113); or Consent of Instructor. Priority given to Design majors. Experimental approaches to form-making through an examination of pattern, form, and surface in historical and contemporary contexts. Explorations of alternative design processes, methods, and materials that open up new possibilities for content creation and invention in design practice. GE credit: VL. Effective: 2017 Fall Quarter.

DES 156—Graphitecture: Architecture in the Age of New Media (4)
Studio—6 hours. Prerequisite(s): DES 001; DES 014; DES 015; DES 016 Priority to Design majors. New media and its impact on environmental design; analysis of contemporary projects at the intersection of architecture and new media; time-based strategies of representation; digital narrative. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 157—Interactive Media II (4) ***Review all entries***
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; (DES 037 or DES 111); DES 117; or Consent of Instructor. Priority to Design majors. Technical and conceptual aspects of creating web sites that address current trends, such as CSS for type and position and interactivity with ActionScript. Attention to conceptual framework, visual design and user interaction design. Research and written pre-production materials required. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 157—Interactive Media II (4) ***Review all entries***
Studio—6 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; (DES 037 or DES 111); DES 117; or Consent of Instructor. Priority to Design majors. Conceptual approaches, technical practice for interactive media using the front-end stack (html, css, js). Conceptual framework, user experience, visual interface and interaction design. Research and written pre-production materials required. GE credit: AH, VL. Effective: 2018 Fall Quarter.

DES 159—Design for Understanding (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; DES 115; DES 116; or Consent of Instructor. DES 117 recommended. Pass One open to Design majors. Principles of effective information display including aspects of language, structure, legibility, sequencing, and context. Analysis of historical examples of typographic, diagrammatic, and cartographic excellence. User-centered research. Development and presentation of iterative design prototypes. Design that informs, connects, and inspires. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 160—Textile Surface Design: Patterns and Resists (4)
Studio—6 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; or Consent of Instructor. Pass one restricted to Design majors. Use of traditional and contemporary processes to create images and patterns on fabric using a variety of dyes, including direct applications, bound and mechanical resists, and surface additives. GE credit: AH, VL. Effective: 2017 Fall Quarter.

DES 161—Textile Surface Design: Screen and Digital Printing (4)
Studio—6 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016 Pass One restricted to Design majors. Design of textiles and screen printing on fabrics; soft-product development; integration of hand-produced and digitally generated imagery on cloth. GE credit: AH, VL. Effective: 2017 Spring Quarter.

DES 165—Studio Practices in Industrial Design (4) ***Review all entries***
Studio—6 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; (DES 051 or DES 150A); or Consent of Instructor. Pass One restricted to Design majors. 3D studio methods for design, including: historic and contemporary developments in industrial design; innovation in material and fabrication technology; design based projects for everyday objects including soft goods, electronics, transportation. GE credit: SE, VL. Effective: 2018 Winter Quarter.

DES 165—Studio Practices in Industrial Design (4) ***Review all entries***
Studio—6 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 050; or Consent of Instructor. Pass One restricted to Design majors. 3D studio methods for design, including: historic and contemporary developments in industrial design; innovation in material and fabrication technology; design based projects for everyday objects including soft goods, electronics, transportation. GE credit: SE, VL. Effective: 2018 Fall Quarter.

DES 166—Human Centered Design (4)
Studio—6 hours. Prerequisite(s): DES 001; DES 014; DES 015 Pass One restricted to Design majors. Human-centered approach to problem solving, ethnography, ideation, project framing, rapid prototypes, visual communication, and experiential learning. Creative approaches to graphic design, industrial design, fashion, business, and entrepreneurship. GE credit: AH, VL. Effective: 2017 Fall Quarter.

DES 167—Prototyping: From Objects to Systems (4) ***Review all entries***
Studio—6 hours. Prerequisite(s): DES 001; DES 014; DES 015; DES 050; or Consent of Instructor. Pass One restricted to Design majors. Exploration of rapid prototyping techniques for objects, interactive experiences, services and organizations. Understanding of additive manufacturing, foam models, digital interfaces and business models. GE credit: SE, VL. Effective: 2017 Fall Quarter.

DES 167—Prototyping: From Objects to Systems (4) ***Review all entries***
Studio—6 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; or Consent of Instructor. Pass One restricted to Design majors. Exploration of rapid prototyping techniques for objects, interactive experiences, services and organizations. Understanding of additive manufacturing, foam models, digital interfaces and business models. GE credit: SE, VL. Effective: 2018 Fall Quarter.

DES 169—Advanced Explorations in Textile Design (4)
Studio—6 hours. Prerequisite(s): DES 001; DES 014 or DES 021; DES 015; DES 016; DES 160 or DES 161; or Consent of Instructor. DES 070 recommended. Pass One restricted to Design majors. Advanced exploration of textile design aimed at developing unique textiles for a specific end product such as a fashion collection, functional interior design, art textile or surface design competition. May be repeated up to 1 time(s) with consent of instructor; topics and themes change yearly; criteria is 1) space with first priority to students not previously taken the course and 2) course content must be sufficiently different from the previous time the student took the course. GE credit: AH. Effective: 2017 Spring Quarter.

DES 170—Experimental Fashion & Textile Design (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. Priority to Design majors. Experimental approaches to fashion and textile design. Emphasis on developing conceptual ideas and translating them into one-of-a-kind garments and soft products. Exploration of a variety of current topics including sustainability, pattern design, new technologies, and social activism. May be repeated up to 1 time(s) with consent of instructor. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 171—Fashion Drawing: Technical and Illustration (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. Priority to Design majors. Exploration of fashion design processes for industry within the social and physical context. Emphasis on two-dimensional conceptualization of ideas, garment construction, and ideation processes utilizing commercial textiles. Field trip required. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 177—Computer-Assisted Fashion Design (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 077; DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. Priority to Design majors. Advanced exploration of apparel design processes for industry and personal expression with emphasis on computer-assisted design applications. Field trip required. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 178—Design and Wearable Technology (4)
Studio—6 hours. Prerequisite(s): DES 001; DES 014; DES 015; DES 016; or Consent of Instructor. Pass One restricted to Design majors. Introduction to wearable technology and related technologies. Emphasis on designing, and fabricating prototypes of wearable technology for value-added designs and to improve quality of life. GE credit: AH, VL. Effective: 2017 Spring Quarter.

DES 179—Fashion Design: Signature Collection (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 077; (DES 107 or DES 177); DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. Priority to Design majors. Advanced exploration of fashion design with an emphasis on professional portfolio development and presentation. Emphasis on conceptualizing, designing, and fabricating a cohesive line of wearable garments suitable for presenting in a public fashion show. May be repeated up to 1 time(s). Not open for credit to students who have taken more than 8 units of DES 191A. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 180A—Advanced Interior Design: Institutional Spaces (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 021 or DES 150A); or Consent of Instructor. Priority to Design majors. Advanced interior design problems focused on complex institutional spaces. Introduction to building codes related to interior design. Integration of building systems with interior design solutions. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 180B—Advanced Interior Architecture (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): (DES 180A or DES 134B); DES 134A; or Consent of Instructor. Priority to Design majors. Advanced problems in interior architectural design emphasizing space planning for corporate and institutional environments. Field trips required. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 185—Exhibition Design (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. DES 150A recommended. Priority to Design majors. Design of cultural and commercial exhibition environments, including exhibition development and object selection, spatial planning and architectural finishes, object placement and staging, interpretive strategies, exhibition and promotional graphics. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 186—Environmental Graphic Design (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. DES 115 recommended. Priority to Design majors. Design of informational and directional graphics for the built environment. Application and integration of typography, imagery and symbols into the architectural landscape. Development of universal wayfinding and graphic navigational systems to help people find their way. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 187—Narrative Environments (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): (DES 185 or DES 186); (DES 014 or DES 021); DES 001; DES 015; DES 016; or Consent of Instructor. Priority to Design majors. Design of storytelling environments and multi-sensory experiences for cultural, commercial, entertainment and public spaces. Interpretive planning and design for specific exhibit audiences. Manipulation of objects and the communication of complex ideas in the exhibition environment. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 190—Proseminar (1)
Seminar—1 hour. Prerequisite(s): Design major or consent of instructor. Philosophies of design explored through discussion and presentation of research results. May be repeated up to 3 time(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

DES 191A—Workshops in Design (4-12)
Seminar—1 hour; Studio—3 hours. Prerequisite(s): DES 014; DES 015; and Consent of Instructor. Upper division standing. Faculty initiated workshops featuring advanced studies and applications of original work in Design: Costume. Letter grading by contract. Field trips included. Credit limited to 12 units in one section or a combination of sections. Effective: 1997 Winter Quarter.

DES 191B—Workshops in Design (4-12)
Seminar—1 hour; Studio—3 hours. Prerequisite(s): DES 014; DES 015; and Consent of Instructor. Upper division standing. Faculty initiated workshops featuring advanced studies and applications of original work in Design: Environment. Letter grading by contract. Field trips included. Credit limited to 12 units in one section or a combination of sections. Effective: 1997 Winter Quarter.

DES 191C—Workshops in Design (4-12)
Seminar—1 hour; Studio—3 hours. Prerequisite(s): DES 014; DES 015; and Consent of Instructor. Upper division standing. Faculty initiated workshops featuring advanced studies and applications of original work in Design: Graphics. Letter grading by contract. Field trips included. Credit limited to 12 units in one section or a combination of sections. Effective: 1997 Winter Quarter.

DES 191D—Workshops in Design (4-12)
Seminar—1 hour; Studio—3 hours. Prerequisite(s): DES 014; DES 015; and Consent of Instructor. Upper division standing. Faculty initiated workshops featuring advanced studies and applications of original work in Design: Textiles. Letter grading by contract. Field trips included. Credit limited to 12 units in one section or a combination of sections. Effective: 1997 Winter Quarter.

DES 192—Internship (1-6)
Internship—3-18 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Enrollment limited to 3 units per quarter or 6 units per IV session. Supervised internship, off and on campus, in areas of design including
environmental, costume, textile, museum, display and interior design. (P/NP grading only.) Effective: 1997 Winter Quarter.

DES 194HA—Special Study for Honors Students (3)
Independent Study—9 hours. Prerequisite(s): Consent of Instructor. Qualification for Letters and Science Honors Program; senior standing; approval of Design Honors Program proposal by the Curriculum Committee and major advisor. Limited enrollment. Preparation and presentation of a culminating project. Supervision of an instructor in one of the creative or scholarly areas of Design. Effective: 2013 Spring Quarter.

DES 194HB—Special Study for Honors Students (3)
Independent Study—9 hours. Prerequisite(s): DES 194HA; and Consent of Instructor. Qualification for Letters and Science Honors Program; senior standing. Limited enrollment. Preparation and presentation of a culminating project. Supervision of an instructor in one of the creative or scholarly areas of Design. Effective: 2013 Spring Quarter.

DES 197T—Tutoring in Design (1-5)
Discussion—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Leading of small discussion groups or studio meetings affiliated with
one of the department's regular courses. (P/NP grading only.) Effective: 1997 Winter Quarter.

DES 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

DES 198F—Student-Taught Course (1-4)
Variable—1-4 hours. Student-facilitated (taught) course intended for upper division students (P/NP grading only.) Effective: 2016 Fall Quarter.

DES 199—Special Study of Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

DES 199FA—Student Facilitated Course Development (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Planning and development for student led course 198F under the supervision of a faculty member. (P/NP grading only.) Effective: 2017 Fall Quarter.

DES 199FB—Student Facilitated Teaching (1-4)
Variable—1-4 hours. Prerequisite(s): DES 199FA; and Consent of Instructor. Student-facilitated course under the supervision of a faculty member, an undergraduate student teaching a course under 98F/198F. (P/NP grading only.) Effective: 2018 Spring Quarter.

DES 221—Theory and Issues in Design (4)
Independent Study; Seminar—3 hours. Prerequisite(s): Graduate standing in Design or consent of instructor. Perspectives on theoretical and aesthetic issues related to the design professions such as methodology in historical and contemporary contexts, implications of technology on design theory and practice, and design relationships to environmental sustainability, recycling, and other social issues. Effective: 2011 Spring Quarter.

DES 222—Research Methods and Critical Writing for Design (4)
Independent Study; Seminar—3 hours. Prerequisite(s): DES 221; Graduate standing in Design or consent of instructor. Focused on research methods and critical writing related to design topics including case studies, original and secondary sources, critical reviews. Expectation of a paper meeting professional standards suitable for publication from each student at end of course. May be repeated up to 1 time(s). Effective: 2006 Fall Quarter.

DES 223—Profesional Practice and Ethics in Design (4)
Independent Study; Seminar—3 hours. Prerequisite(s): DES 221; DES 222; Graduate standing in Design or consent of instructor. Introduce students to issues of professional design practice: business ethics, contracts and business practices, social responsibility through case studies, guest lectures and field trips, and readings. Short written assignments and presentations will be required. Effective: 2006 Fall Quarter.

DES 224—Seminar in Design Research and Teaching (4)
Discussion—2 hours; Extensive Writing—4 hours; Independent Study—6 hours. Prerequisite(s): DES 221; DES 222; DES 223; and Consent of Instructor. Concurrent academic appointment (TA) in DES 142A, DES 142B, DES 143, DES 144, DES 145; graduate standing in Design. Student will work closely with instructor on a research and writing project related to subject matter of undergraduate history courses noted above with the goal of introducing student to advanced historical research processes and development of writing skills. May be repeated up to 2 time(s). Effective: 2007 Fall Quarter.

DES 225—Studio Practice in Design (4)
Studio—6 hours. Prerequisite(s): DES 221 Restricted to graduate standing in Design or consent of instructor. Students work together on a collective project to experience the multiple phases of design through an iterative process. Design projects will be geared towards relevance in contemporary social, cultural and political contexts. May be repeated up to 2 time(s). Effective: 2017 Fall Quarter.

DES 290—Seminar in Design (4)
Seminar—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Selected topics in design methodology, research, communication, and education. May be repeated for credit. Effective: 1997 Winter Quarter.

DES 292—Practicum in Design (1-12)
Variable—3-36 hours. Prerequisite(s): Graduate standing in Design or consent of instructor. Interaction with a working professional in the student's field of interest to apply theories and concepts to working practice. (S/U grading only.) Effective: 2014 Fall Quarter.

DES 298—Directed Group Study for Graduate Students (1-5)
Studio. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

DES 299—Individual Focused Study (1-12)
Variable—3-36 hours. Prerequisite(s): Graduate standing in Design or consent of instructor. Advanced study in studio practice on independent projects with faculty consultation. May be repeated for credit. (S/U grading only.) Effective: 2017 Winter Quarter.

DES 299D—Project Concentration (1-12)
Variable—3-36 hours. Prerequisite(s): Graduate standing in Design or consent of instructor; minimum of 22 units must be taken in Project Concentration and Individual Focused Study. Student creates a body of original work at a professional level, with
written and visual documentation of process and concepts underlying the project, culminating in public presentation. (S/U grading only.) Effective: 2014 Fall Quarter.

DES 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Dramatic Art

Dramatic Art | Dramatic Art M.F.A.

(College of Letters and Science)

Department of Theatre and Dance. 216A Art Building; 530-752-8710; http://arts.ucdavis.edu/mfa-dramatic-art

Faculty. http://arts.ucdavis.edu/theatre-dance-faculty

Graduate Study. The Department of Theatre and Dance offers programs of study and research leading to the M.F.A. in Theatre and Dance (the interdisciplinary weaving of acting, directing, design, choreography and practice and research) and contributing to the Graduate Group Ph.D. in Performance Studies. Detailed information may be obtained by contacting the Graduate Program Administrators: for the M.F.A. in Theatre and Dance, 530-752-8710; Graduate Group in Performance Studies, 530-754-6973.

See department website at http://arts.ucdavis.edu/general-information/mfa-program-dramatic-art.

Dramatic Art | DRA Courses

Courses in DRA:

DRA 001—Theatre, Performance and Culture (4)
Discussion—1 hour; Lecture—3 hours. Not open to students who have completed DRA 001S. Introductory investigation of the nature of performance, moving from performance theory to consideration of various manifestations of performance including theatre, film and media, performance art, dance, sports, rituals, political and religious events, and other "occasions." GE credit: AH, DD, VL, WE. Effective: 2013 Fall Quarter.

DRA 001S—Theatre, Performance and Culture (4)
Discussion—1 hour; Lecture—3 hours. Not open to students who have completed DRA 001. Introductory investigation of the nature of performance, moving from performance theory to consideration of various manifestations of performance including theatre, film and media, performance art, dance, sports, rituals, political and religious events, and other "occasions." For Short Term Programs Abroad. Effective: 2005 Spring Quarter.

DRA 002—Acting: The Basics: History and Practice (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the historical evolution of the actor – from ancient Greece & Asia to the Hollywood icon & postdramatic performer – and the practical foundations of acting for stage and screen. Onstage opportunities within lecture course structure. GE credit: AH, OL, VL. Effective: 2015 Winter Quarter.

DRA 005—Understanding Performance: Appreciation of Modern Theatre, Dance, Film and Performance Art for the Humanities and Sciences (4)
Discussion/Laboratory—1 hour; Lecture/Discussion—3 hours. Relevance of theatre and performance to modern culture, science and society. Approaches to theatre/dance/media/performance art, integrated into Mondavi Centre for the Arts and Theatre and Dance Department programs. (SAS 041.) GE credit: AH, DD, OL, VL, WC, WE. Effective: 2015 Winter Quarter.

DRA 010—Introduction to Acting (4)
Discussion/Laboratory—4 hours. Fundamentals of movement, speech, theatre games, and improvisation. Selected reading and viewing of theatre productions. Intended for students not specializing in Dramatic Art. GE credit: OL, VL. Effective: 2015 Spring Quarter.

DRA 011—Introduction to Presentation Skills (2)
Lecture/Lab—4 hours. Class size limited to 20 students. Development of clear oral and physical communication skills that build confidence, presentational style and clarity for students whose command of English is at a basic level. Effective: 2013 Spring Quarter.

DRA 014—Introduction to Contemporary Dance (4)
Laboratory—3 hours; Lecture—3 hours. Introduction to basic issues and methods in contemporary dance. Focus on preparing the student for dancing and dance-making through basic techniques of improvisation and composition. Consideration of dance as
a cultural practice. GE credit: VL. Effective: 2012 Fall Quarter.

DRA 020—Introduction to Dramatic Art (4)
Discussion—1 hour; Lecture—3 hours. Understanding and appreciation of both the distinctive and collaborative contributions of playwright, actor, director, and designer to the total work of dramatic art. Study of plays from the major periods of dramatic art in their cultural contexts. GE credit: AH, VL, WC, WE. Effective: 2013 Fall Quarter.

DRA 021A—Fundamentals of Acting (4)
Laboratory—4 hours; Lecture—2 hours. Open to students planning to major in Theatre and Dance. Physical and psychological resources of the actor. Experience in individual and group contact and communication, theatre games, advanced improvisation, sound and movement dynamics. Viewing of theatre productions. GE credit: OL, VL. Effective: 2016 Fall Quarter.

DRA 024—Visual Aspects of Dramatic Art (4)
Lecture/Discussion—4 hours. Understanding and appreciation of the visual aspects of dramatic art: theatre architecture, scenery, lighting, costume, and makeup. GE credit: AH, VL. Effective: 2013 Fall Quarter.

DRA 025—Technical Aspects of Dramatic Production (3)
Lecture—3 hours. Technical principles of dramatic production emphasizing the three areas of scenic, costume and lighting studios. Subjects covered include basic tools, materials and equipment, production practices; and the interdisciplinary and collaborative nature of dramatic production. Effective: 1997 Winter Quarter.

DRA 026—Performing Arts Production Management (3)
Lecture—3 hours. Theoretical study of performing arts administration and backstage operations from audition through performance. Techniques of scheduling,
production management, stage management, technical direction, audience control, box office, promotion, safety, accommodations for persons with
disabilities and emergency procedures. Effective: 1997 Winter Quarter.

DRA 028—Entertainment Engineering and Management: Stagecraft to Stage Management (4)
Lecture/Discussion—4 hours. Introduction to technical production and management in theatre and dance. Topics include stage management, theatrical mechanics, backstage protocols, scenic construction, properties, lighting, basic shop tools, costume shop use and construction, basic make-up, sound equipment, graphics and robotics for theatre. GE credit: AH. Effective: 2015 Spring Quarter.

DRA 030—Theatre Laboratory (1-5)
Project (Term Project)—2 hours. Prerequisite(s): Consent of Instructor. Projects in acting, production, scene design, costuming, lighting, directing, and playwriting. Participation in departmental productions. May be repeated up to 11 unit(s). Effective: 2016 Spring Quarter.

DRA 040A—Beginning Modern Dance (2)
Discussion/Laboratory—4 hours. Fundamentals of modern dance focusing primarily on the development of techniques and creative problem solving. Basic anatomy, dance terminology, and a general overview of modern dance history. May be repeated up to 2 time(s) Non-dance majors can only repeat the course once; dance majors may apply to the dance faculty advisor for permission to repeat more times; dance is a repetitive practice that involves constant reiteration and demands this for improvement and better understanding of the somatic and proprioceptive skills. GE credit: AH, VL. Effective: 2017 Spring Quarter.

DRA 040B—Intermediate Modern Dance (2)
Discussion/Laboratory—4 hours. Prerequisite(s): DRA 040A; or Consent of Instructor. Modern dance techniques. Basic anatomy, dance terminology and a general overview of modern dance history. May be repeated up to 1 time(s) For Dance majors, further repeats negotiated with faculty advisor in dance. GE credit: AH, VL. Effective: 2016 Spring Quarter.

DRA 041A—Beginning Jazz Dance (2)
Discussion/Laboratory—4 hours. Fundamentals of jazz dance; includes warm-ups, dance techniques and combinations. Basic anatomy, dance terminology and general overview of jazz dance history. May be repeated up to 1 time(s). Effective: 2017 Spring Quarter.

DRA 041B—Intermediate Jazz Dance (2)
Discussion/Laboratory—4 hours. Prerequisite(s): DRA 041A; or Consent of Instructor. Warm-ups, dance techniques and combinations at the intermediate level. Basic anatomy, dance terminology and a general overview of jazz styles of historically significant jazz choreographers and leading contemporary jazz choreographers. May be repeated up to 1 time(s) with consent of instructor. Effective: 2016 Spring Quarter.

DRA 042A—Beginning Ballet (2)
Discussion/Laboratory—4 hours. Fundamentals of ballet, focusing on the development of technique through proper alignment, quality, and rhythm. Basic anatomy, ballet terminology, and dance history. May be repeated for credit with consent of instructor. GE credit: AH, VL. Effective: 2016 Spring Quarter.

DRA 042B—Intermediate Ballet (2)
Discussion/Laboratory—4 hours. Prerequisite(s): DRA 042A; or Consent of Instructor. Barre and center work at the intermediate level. Development and
refinement of technique through proper alignment, rhythmic, and qualitative understanding. Anatomy, ballet terminology, and dance history. May be repeated for credit with consent of instructor. GE credit: AH, VL. Effective: 2016 Spring Quarter.

DRA 043A—Contact Improvisation Dance (2)
Lecture/Lab—4 hours. Fundamentals of contact improvisation and its applications to all forms of dance, performance, sports, physical safety and health. Solo improvisation, safety, communication, alignment, basic lifting and weight-sharing, intuition, developing relaxed readiness and personal expression. May be repeated up to 2 time(s). GE credit: AH, VL. Effective: 2014 Fall Quarter.

DRA 043B—Intermediate Contact Improvisation (2)
Lecture/Lab—4 hours. Prerequisite(s): DRA 043A; or Consent of Instructor. Building on the fundamentals. Reviewing basics, extended improvising, skillfully working with partners of different sizes and abilities, advanced lifting, advanced safety practices, embracing risk and disorientation, subtle nuances of communication. May be repeated up to 2 time(s). GE credit: AH, VL. Effective: 2016 Spring Quarter.

DRA 044A—Beginning Hip Hop Dance (2)
Discussion/Laboratory—4 hours. Fundamentals of Hip Hop dance focusing on developing a fluid movement vocabulary, facility in body isolations, intricate rhythmic patterning, quick shifts of weight and mastering dance combinations. Discussions on Hip Hop dance history, styles and terminology. May be repeated up to 1 time(s). Effective: 2002 Fall Quarter.

DRA 044B—Intermediate Hip Hop Dance (2)
Discussion/Laboratory—4 hours. Prerequisite(s): DRA 044A; or Consent of Instructor. Expansion of Hip Hop dance vocabulary by focusing on mastering body isolations and intricate rhythmic techniques, complex dance combinations, advanced across the floor sequences. May be repeated up to 1 time(s). Effective: 2002 Fall Quarter.

DRA 055—Contemporary Local, National and Global Theatre, Dance and Performance (4)
Lecture/Discussion—4 hours. Introduction a range of contemporary theatre, dance and performance in local, national and international settings. Training in critical approaches to and aesthetic appreciation of these forms. Emphasis varies based on instructor. GE credit: AH, DD, VL, WC. Effective: 2015 Fall Quarter.

DRA 056A—History of Theatre and Dance I: Myth, Magic and Madness (4)
Lecture/Discussion—4 hours. Exploration of aesthetic movements in various disciplines of theatre and dance from the origins to 1550. Examination of Greek, Roman, Sanskrit, Kathakali, Chinese, Japanese, Mesoamerican, Medieval European, and Indigenous theatre and dance including oral, ritual and shamanic performance. Offered once a year. GE credit: AH, VL, WC. Effective: 2014 Fall Quarter.

DRA 056B—History of Theatre and Dance II: Romance, Revenge and Rebellion (4)
Lecture/Discussion—4 hours. Exploration of aesthetic movements in various disciplines of theatre and dance from 1550 to 1850. Examination of genres related to romance, revenge and rebellion using European, North and South American, and Asian examples. Offered once a year. GE credit: AH, VL, WC. Effective: 2015 Winter Quarter.

DRA 056C—History of Theatre and Dance III: Sex, Society and the State (4)
Lecture/Discussion—4 hours. Exploration of aesthetic movements in various disciplines of theatre and dance from 1850-1968. Examination of melodrama, popular theatre, naturalism, psychological realism, and the avant-garde using European, North and South American, Asian, and African examples. Offered once a year. GE credit: AH, VL, WC. Effective: 2015 Spring Quarter.

DRA 092—Internship in Dramatic Art (1-12)
Variable—1-12 hours. Prerequisite(s): Consent of instructor and department chairperson. Restricted to lower division students with less than 84 units completed. Internship outside the Department of Theatre and Dance enabling students to practice their skills. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2006 Fall Quarter.

DRA 098—Directed Group Study (1-5)
Primarily for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

DRA 099—Special Study for Undergraduates (1-5)
(P/NP grading only.) Effective: 1997 Winter Quarter.

DRA 111—Advanced Presentation Skills (2)
Lecture/Lab—4 hours. Class size limited 20 students. Development of clear oral and physical communication skills that build confidence, presentational style and clarity for students whose command of English is at a competent to fluent level. GE credit: OL. Effective: 2013 Spring Quarter.

DRA 111S—Representation and Identity in Culture and Cinema (4)
Film Viewing—4 hours; Lecture/Discussion—2 hours. Issues of personal and collective identity via study of film narratives from different cultures. Reflection of dominant cultural identities in film. Taught in Australia. Effective: 2006 Spring Quarter.

DRA 114—Theatre on Film (4)
Film Viewing—2 hours; Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Study of six/eight plays on film, using mixed casts and raising issues of diversity. Focus: sociohistorical context for production and reception, interpretation and analysis of topics (gender, ethnicity, age, politics, philosophy), and filming, screenwriting, design, and acting/directing for film. GE credit: AH, SS, VL. Effective: 2016 Fall Quarter.

DRA 115—Advanced Study of Major Film Makers (4)
Film Viewing—2 hours; Lecture/Discussion—3 hours. Analysis of the contribution of some outstanding film creators. Study of diverse aesthetic theories of the cinema and their application to selected films. May be repeated for credit when different film creator studied, or studied with a different methodological approach. GE credit: VL. Effective: 2016 Spring Quarter.

DRA 116—Design on Screen (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Analysis of the contribution of outstanding designers for cinema, television and filmed entertainment. Study of diverse aesthetic theories of production design and art direction, costume design, or cinematography. Introductory principles and practice, history. May be repeated up to 2 time(s) when topic differs. (CTS 116.) GE credit: AH, VL. Effective: 2013 Fall Quarter.

DRA 120—Intermediate Acting/Gateway: The Actor's Toolkit (4)
Lecture/Lab—6 hours. Prerequisite(s): DRA 021A; or Consent of Instructor. Limited enrollment. Implementation of acting tools drawn predominantly from Stanislavsky’s ‘system’. Gateway into the Advanced Acting courses. GE credit: OL, VL. Effective: 2013 Spring Quarter.

DRA 121A—Advanced Acting: Scene Study and Script Analysis (4)
Lecture/Lab—6 hours. Prerequisite(s): DRA 120; and Consent of Instructor. Limited enrollment. In-depth study, analysis and performance of texts from different eras, genres and styles. Implementation of tools to undertake independent preparation of character creation. May be repeated up to 8 unit(s) Since acting requires repetition to habituate the body and imagination to new practices, this course may be taken twice. New scripts and scenes must be undertaken in the repetition. GE credit: OL, VL. Effective: 2013 Spring Quarter.

DRA 121B—Advanced Acting: Rehearsal Processes and Practices (4)
Lecture/Lab—6 hours. Prerequisite(s): DRA 120; and Consent of Instructor. Limited enrollment. Development of rehearsal practice and etiquette, using a variety of scenes from different eras and genres. May be repeated up to 8 unit(s) The course has been established to enable visiting artists in residence to undertake the instruction, as well as faculty. Therefore, this course may be taken twice, as students will be exposed to different professional practitioners' working processes. New etudes, scripts and scenes must be undertaken in the repetition. GE credit: OL, VL. Effective: 2013 Spring Quarter.

DRA 121C—Advanced Acting: Character and Style (4)
Lecture/Lab—6 hours. Prerequisite(s): DRA 120; and Consent of Instructor. Limited enrollment. Study of psycho-physical techniques to create characters with an emphasis on non-realistic styles. May be repeated up to 8 unit(s) Since acting requires repetition to habituate the body and imagination to new practices, this course may be taken twice. New scripts and scenes must be undertaken in the repetition. GE credit: OL, VL. Effective: 2012 Fall Quarter.

DRA 122A—Advanced Acting: Devising and Collaboration (4)
Lecture/Lab—6 hours. Prerequisite(s): DRA 120; and Consent of Instructor. Limited enrollment. Study and practice of various devising techniques, to collaborate on and produce a series of short etudes and dramatic scenes/short plays. May be repeated up to 8 unit(s) Since acting requires repetition to habituate the body and imagination to new practices, this course may be taken twice. New scripts and scenes must be undertaken in the repetition. GE credit: OL, VL. Effective: 2016 Spring Quarter.

DRA 122B—Advanced Acting: Shakespeare and His Contemporaries (4)
Lecture/Lab—6 hours. Prerequisite(s): DRA 120; and Consent of Instructor. Limited enrollment. Study and performance of classical texts (monologues and dialogues), with a focus on Shakespeare and the Elizabethan world view. May be repeated up to 8 unit(s) Since acting requires repetition to habituate the body and imagination to new practices, this course may be taken twice. New monologues and scenes must be undertaken in the repetition. GE credit: OL, VL. Effective: 2013 Spring Quarter.

DRA 122C—Advanced Acting: Special Topics in Acting (4)
Lecture/Lab—6 hours. Prerequisite(s): DRA 120; and Consent of Instructor. Restricted to Theatre and Dance majors; limited enrollment. Intensive study and practical exploration of a specialized area; for example, World Theatre, Social Theatre, Physical Theatre, Musical Theatre, the Ancient Greeks, etc. May be repeated up to 8 unit(s). GE credit: AH, OL, VL. Effective: 2016 Fall Quarter.

DRA 124A—Principles of Theatrical Design: Scenery (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Pass One restricted to Theatre and Dance majors. Scene design processes, working drawings, sketching techniques, scale models, methods and materials of scenery construction. GE credit: AH, VL. Effective: 2018 Winter Quarter.

DRA 124B—Principles of Theatrical Design: Scenery (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Pass One restricted to Theatre and Dance majors. Analysis of plays in terms of scene design, elements of design, execution of designs for modern and period plays. GE credit: AH, VL. Effective: 2018 Winter Quarter.

DRA 124C—Principles of Theatrical Design: Lighting (4)
Lecture/Lab—4 hours. Prerequisite(s): Consent of Instructor. Pass One restricted to Theatre and Dance majors. Theories of lighting the stage, equipment and control systems, execution of lighting plots. GE credit: AH, VL. Effective: 2018 Winter Quarter.

DRA 124D—Principles of Theatrical Design: Costume (4)
Lecture/Discussion—4 hours. Prerequisite(s): DRA 024; Consent of Instructor. Pass one restricted to Theatre and Dance majors. Source materials for theatrical costuming, selecting fabrics, elements of design, analysis of plays in terms of costume design, execution of designs for modern and period plays. GE credit: AH, OL, VL. Effective: 2018 Winter Quarter.

DRA 124E—Costume Design for Film (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Pass One restricted to Theatre and Dance majors. Theory and practice of the art and business of film costume design. Script analysis, costume research, developing design concepts, budgeting, and current production practices and methods. Execution of designs for period and contemporary films. Viewing of current films. (CTS 124E.) GE credit: AH, OL, VL. Effective: 2018 Winter Quarter.

DRA 125—Scenic Painting: Studio (4)
Laboratory—3 hours; Lecture—2 hours; Studio—1 hour. Prerequisite(s): DRA 024 or DRA 028; or Consent of Instructor. upper division standing in Theatre and Dance, Art Studio, or Design. Scene painting techniques, practices and materials including color mixing and matching, wood graining, faux painting techniques, glazing, creating foliage, stone and brick. May be repeated up to 1 time(s) with consent of instructor. GE credit: AH, VL. Effective: 2016 Spring Quarter.

DRA 126—Principles of Performing Arts Stage Management (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Stage management principles for theatre, dance, musical theatre, music, and concerts. The dynamical role of the stage manager in the performing arts, upper-management team. Effective: 2014 Fall Quarter.

DRA 127A—Principles of Directing (4)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Director's creative approach to the play and to its staging. GE credit: VL. Effective: 2016 Spring Quarter.

DRA 127B—Principles of Directing (4)
Laboratory—4 hours; Lecture—2 hours; Rehearsal. Prerequisite(s): DRA 127A; or Consent of Instructor. Director's creative approach to the actor. GE credit: VL. Effective: 2016 Spring Quarter.

DRA 128—Principles of Theatre Sound (3)
Laboratory—3 hours; Lecture/Discussion—2 hours. Fundamentals of sound, sound equipment, and sound design as used in modern theatre and other performance venues. Assembly, set-up, and operation of basic theatre sound reinforcement system, recording system, and theatrical playback system. Effective: 2004 Winter Quarter.

DRA 130—Approaches to Theatrical Design: Practice and Theory (4)
Seminar—2 hours; Studio—4 hours. Prerequisite(s): DRA 124A or DRA 124B or DRA 124C or DRA 124D or DRA 124E; Upper division standing in Theatre and Dance, Art Studio or Design; or consent of instructor. Advanced design study in specific areas including but not limited to: research, design styles and concepts, new materials and techniques, scenery, lighting, costume, makeup, photography, projections, computer technology, spectacle and special effects, and alternative theatre forms and genres. May be repeated up to 3 time(s) when topic differs; when instructor differs. GE credit: AH, VL. Effective: 2016 Spring Quarter.

DRA 135—Voice in Performance (2)
Performance Instruction—4 hours. Prerequisite(s): DRA 021B; or Consent of Instructor. Progression of exercises to free, develop and strengthen the voice, as a human and then as an actor's instrument with emphasis on how the voice works, to freeing the channel for sound, to interpersonal communication. May be repeated up to 2 time(s). Effective: 2009 Fall Quarter.

DRA 140A—Dance Composition (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): DRA 040A or DRA 041A or DRA 042A; or Consent of Instructor. Introduction to the craft of choreography. Compose phrases and present movement studies based on the elements of choreography: motivation, space, time, force/energy. GE credit: VL. Effective: 2016 Spring Quarter.

DRA 140B—Dance Composition (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): DRA 140A Continuation of the study of choreography, focusing on the development of group choreography: duets, trios, quartets and group work, form, and accompaniment. Effective: 1999 Spring Quarter.

DRA 140C—Dance Composition (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): DRA 140A; DRA 140B Continuation of study of choreography focusing on sequencing movements for groups. The relation between dance and allied mediums of music, sets, costumes and lighting. Students conceptualize a choreographic issue and explore it through creation of short dance studies. Effective: 1999 Spring Quarter.

DRA 141—Introduction to the Fundamentals of Movement (4)
Lecture/Discussion—4 hours. Introduction to fundamentals of movement that combines intellectual and kinesthetic understanding of the body's skeletal and muscular systems. Explorations based on theories of various body mind specialists including Laban, Feldenkrais, Bartenieff and Sweigard as well as the eastern discipline of Yoga. GE credit: VL. Effective: 2014 Fall Quarter.

DRA 142—History of Modern Dance (4)
Lecture/Discussion—4 hours. Modern Dance tradition, focusing on its theorizations of individual and social identity. Students will write and choreograph analyses of principle dances in this tradition. GE credit: AH, VL, WE. Effective: 2015 Winter Quarter.

DRA 143—Dance and Movement Studio (1-4)
Discussion/Laboratory—2-8 hours. Prerequisite(s): Consent of Instructor. Special studies in dance and movement such as African, Balinese,
Baroque, Chinese, European, and stage combat. Offered as needed for stage productions. May be repeated up to 8 unit(s). GE credit: AH, VL. Effective: 2016 Spring Quarter.

DRA 144—Introduction to Traditional Chinese Physical Culture (4)
Lecture/Discussion—4 hours. Traditional Chinese Wushu practices, explored through practical work in dance laboratory conditions. Integration of practice with conceptual analysis; contemporary social, educational and artistic applications. GE credit: AH, SS. Effective: 2011 Fall Quarter.

DRA 144A—Introduction to Traditional Chinese Embodied Culture (4)
Lecture/Discussion—4 hours. Traditional Chinese Wushu practices, explored through practical work in dance laboratory conditions. Integration of practice with conceptual analysis; contemporary social, educational and artistic applications. GE credit: AH, DD, SS, VL, WC. Effective: 2014 Winter Quarter.

DRA 144B—Traditional Chinese Physical Culture (4)
Lecture/Discussion—4 hours. Prerequisite(s): DRA 144A Traditional Chinese Wushu practices, explored through practical work in dance laboratory conditions. Integration of practice with conceptual analysis; contemporary social, educational and artistic applications. May be repeated up to 2 time(s) when content and instructor varies and if student progression is required. GE credit: AH, DD, SS, VL, WC. Effective: 2014 Winter Quarter.

DRA 144C—Daoist Philosophy in Traditional Chinese Movement Culture (4)
Lecture/Discussion—4 hours. Prerequisite(s): DRA 144B Daoist practices of movement and their relation to daoist philosophy, explored through work in dance laboratory conditions. Integration of practice with conceptual analysis, and critical philosophy around values and ethical action. May be repeated up to 2 time(s) when content or instructor varies and if student progression is required. GE credit: AH, DD, VL, WC. Effective: 2014 Winter Quarter.

DRA 145—Directed Choreography Projects (4)
Lecture/Lab—6 hours. Prerequisite(s): DRA 140A; DRA 140B; DRA 140C; or Consent of Instructor. Conceptualization, creation, casting, rehearsing, and concert presentation of complete dances, with students integrating elements of stagecraft and directing the on-stage rehearsals. Effective: 1999 Winter Quarter.

DRA 146A—Professional Track Modern Dance I (4)
Lecture/Lab—6 hours. Prerequisite(s): Consent of Instructor. Professionally oriented performance training. Rigorous, consistent training regimen based on traditional modern dance technique. Breath and voice, skeletal and muscular placement, moving from the spine, contraction technique, movement intention. May be repeated up to 2 time(s). GE credit: VL. Effective: 2016 Spring Quarter.

DRA 146B—Professional Track Modern Dance II (4)
Lecture/Lab—6 hours. Prerequisite(s): DRA 146A; and Consent of Instructor. Body and space relationships in solos, duets and group work; stylistic variations of Graham technique; works of Paul Taylor. May be repeated up to 1 time(s). GE credit: VL. Effective: 2016 Spring Quarter.

DRA 146C—Professional Track Modern Dance III (4)
Lecture/Lab—6 hours. Prerequisite(s): DRA 146A; DRA 146B; and Consent of Instructor. Continuation of course 146B. Time as a theatrical device, sustaining movement and non-movement, phrasing, musicality. May be repeated up to 1 time(s). GE credit: VL. Effective: 2017 Winter Quarter.

DRA 150—American Theatre and Drama (4)
Lecture—4 hours. The history of the theatre from Colonial times to the present. Readings of selected plays. GE credit: ACGH, AH, DD, VL, WE. Effective: 2014 Winter Quarter.

DRA 151S—Australian Performance and Culture (4)
Lecture/Discussion—2 hours; Seminar—2 hours. Australian performance and theatre practices as a product of its culture of origin. Relationships between art and society. Taught in Australia. Effective: 2006 Spring Quarter.

DRA 154—Asian Theatre and Drama: Contexts and Forms (4)
Lecture/Discussion—4 hours. Selected Asian plays and performance forms in their cultural and artistic contexts; myth, ritual and the theatre; performance training, visual presentation of the text; political theatre; intercultural performance-the fusion of Asian and Western traditions. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

DRA 155—Representing Race in Performance (4)
Lecture—4 hours. Representation and performance of "race" in American culture featuring different sub-headings such as "African American Theatre" or "Asian-Americans on Stage." May be repeated up to 1 time(s) when topic differs. GE credit: AH, DD, WE. Effective: 2012 Spring Quarter.

DRA 155A—African American Dance and Culture in the United States, Brazil and the Caribbean (4)
Lecture/Discussion—4 hours. Comparative study of the African American dance forms in the U.S.A.,

Brazil, Haiti, Cuba, Jamaica, Barbados, and Trinidad. Examination of ritual, folk, and popular dance forms and the socio/historical factors that have influenced these forms. (AAS 155A.) GE credit: AH, VL, WC. Effective: 2012 Fall Quarter.

DRA 155B—Ancient and Contemporary Greek Theatre and Dance (6)
Discussion/Laboratory—10 hours; Performance Instruction—10 hours; Seminar—13 hours. Origins of early theatres and the first actors, playwrights and dancers and their powerful influence on western performance and thought up to present day. Offered in Greece. GE credit: AH. Effective: 2011 Fall Quarter.

DRA 156AN—Performance Analysis (4)
Discussion—1 hour; Lecture—3 hours. Performance on the stage, in the street, in everyday life, ritual, and in politics. Satire, irony, creative protest and performance. Social movements, the state, and performance as tactical intervention. GE credit: AH, DD, WE. Effective: 2016 Spring Quarter.

DRA 156B—Theatre in History and Place: Local, National and Global Conditions for Production (4)
Discussion—1 hour; Lecture—3 hours. Exploration of local, national and global issues in theatre production, with special attention to historical changes in social and political contexts for performance. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

DRA 156C—Modern Aesthetic Movements in Performance (4)
Discussion—1 hour; Discussion/Laboratory—3 hours. Important movements in performance, especially theatre and dance, from realism to the present. Primary emphasis on Western traditions though others may be studied. GE credit: AH, WE. Effective: 2017 Spring Quarter.

DRA 156D—Theatre History Through Shakespeare (4)
Extensive Writing; Lecture—4 hours. Shakespeare's plays, theatre history, and theatre today. European contexts from 1590-2004 and international theatre from 20th century. Stagecraft, different media (print, stage, film), social/political environments, design, and cultural change (gender, sexuality and ethnicity). May be repeated up to 1 time(s). GE credit: AH, OL, WC, WE. Effective: 2014 Spring Quarter.

DRA 158—Performance Studies Undergraduate Seminar (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. DRA 156AN recommended. Focused inquiry into a particular genre, period, movement, artist, or theme in performance. Philosophical and aesthetic issues as well as historical and cultural performance contexts. In-depth research projects in relationship to the subject of inquiry. May be repeated for credit. GE credit: WE. Effective: 2016 Spring Quarter.

DRA 159—Contemporary Experimental Performance, Theatre and Drama (4)
Extensive Writing; Lecture/Discussion—3 hours. Evaluation and examination of the "New Theatre;" its experimental and innovative nature since the 1960s. Dance, film, stage, performance art and public acts of a performative nature. May be repeated up to 3 time(s) if content differs. GE credit: AH, DD, VL, WC, WE. Effective: 2014 Spring Quarter.

DRA 159S—Contemporary Experimental Performance, Theatre and Drama (4)
Lecture/Discussion—4 hours. Evaluation and examination of the "New Theatre;" its experimental and innovative nature since the 1960s. Dance, film, stage, performance art and public acts of a performative nature. May be repeated up to 12 unit(s) if instructor or content varies. GE credit: AH, WE. Effective: 2015 Winter Quarter.

DRA 160A—Principles of Playwriting (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Analysis of dramatic structure; preparation of scenarios; the composition of plays. GE credit: WE. Effective: 2018 Winter Quarter.

DRA 160B—Principles of Playwriting (4)
Lecture—4 hours. Prerequisite(s): DRA 160A; and Consent of Instructor. Analysis of dramatic structure; preparation of scenarios; the composition of plays. GE credit: WE. Effective: 2016 Spring Quarter.

DRA 170—Media Theatre (4)
Lecture—1 hour; Performance Instruction—1 hour; Rehearsal—2 hours. New media and application of in theatre devising and performance. Emphasis on collaborative process in relationship to integration of emerging technologies and formation of new theatrical works. Development of collaborative performance through lecture, demonstration, improvisation and experimentation. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2017 Spring Quarter.

DRA 174—Acting for Camera (4)
Lecture/Lab—6 hours. Prerequisite(s): Consent of Instructor. Analysis and practice of acting skills required for camera work and digital media. May be repeated up to 8 unit(s) when instructor differs. (CTS 174.) Effective: 2013 Spring Quarter.

DRA 175—Small Scale Film Production (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Lecture and intensive workshop teaching small-scale film production. Appointments as a(n) director, director of photography, actor, writer, lighting designer, sound designer and other critical positions are used to produce and submit a short film to a film festival. May be repeated up to 2 time(s). (TCS 175.) Effective: 2011 Fall Quarter.

DRA 180—Theatre Laboratory (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Projects in acting, production, scene design, costuming, lighting, directing, and playwriting. Participation in departmental productions. May be repeated for credit. Effective: 2016 Spring Quarter.

DRA 180A—Theatre Laboratory: Performance (1-5)
Rehearsal—12 hours. Prerequisite(s): Consent of Instructor. Limited enrollment. Rehearsal and performance of a production directed or choreographed by visiting Granada Artists-in-Residence and/or faculty, and/or the UG Edge Festival. May be repeated for credit Since each production involves different scripts, directions, challenges of rehearsal practices and performance processes, it is possible for students to appear in a variety of productions in the course of their education. Admission by audition. Effective: 2013 Spring Quarter.

DRA 180B—Theatre Laboratory: Design (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Design-related participation in theatre and dance productions involves research, creation and implementation of design concept in collaboration with the director and other members of the production team. May be repeated for credit Because each theatrical piece is conceived and produced afresh with new source material, scripts, and production style the challenges and assignments for the designers will be new each and every time they design a show. GE credit: AH, VL. Effective: 2016 Spring Quarter.

DRA 180C—Theatre Laboratory: Management, Directing, other Production Team (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Participation in theatre and dance production in management, direction, choreography, dramaturgy, writing or other production related role; research, creation and implementation of production concept in collaboration with members of the production team and cast. May be repeated up to 5 unit(s) May repeat multiple times but only for a total of five units. Permission to repeat is required from the Dramatic Art department. Effective: 2014 Fall Quarter.

DRA 180D—Theatre Laboratory: Crew (2-4)
Laboratory—6-12 hours. Prerequisite(s): Consent of Instructor. Participation in theatre and dance productions as backstage running crew which will involve skill development, rehearsal and execution of performance. May be repeated for credit. Effective: 2013 Spring Quarter.

DRA 180E—Theatre Laboratory: Scenic (1-4)
Laboratory—3-12 hours. Prerequisite(s): Consent of Instructor. Practical experience working on scenery and properties for theatre and dance department productions. Study and execution of basic scenery and prop engineering, construction, painting, rigging. Study of techniques, materials, tools, and equipment use. Skill development, professional etiquette. Safety training requirement. May be repeated for credit. Effective: 2013 Spring Quarter.

DRA 180F—Theatre Laboratory: Costume (1-4)
Laboratory—3-12 hours. Prerequisite(s): Consent of Instructor. Practical experience working on costumes for theatre and dance department productions. Study and execution of basic costume construction techniques and materials, tools, and equipment use. Skills development, professional etiquette. Safety training requirement. May be repeated for credit. Effective: 2013 Spring Quarter.

DRA 180G—Theatre Laboratory: Lighting/Sound/Projection (1-4)
Laboratory—3-12 hours. Prerequisite(s): Consent of Instructor. Practical experience working on lighting, sound or projections for theatre and dance department productions. Study and execution of basic techniques, materials, tools, and equipment use. Skill development, professional etiquette. Safety training requirement. May be repeated for credit. Effective: 2013 Spring Quarter.

DRA 192—Internships in Theatre and Dance (1-12)
Internship—3-36 hours. Theatre production experience in creative, technical or management areas. Experience in galleries, performance sites, or theatre/dance/physical theatre companies. May be repeated up to 12 unit(s). Not open to students who have completed DRA 192S. (P/NP grading only.) Effective: 2004 Fall Quarter.

DRA 192S—Internships in Theatre and Dance (1-12)
Internship—3-36 hours. Theatre production experience in creative, technical or management areas. Experience in galleries, performance sites, or theatre/dance/physical theatre companies. This course is offered in Sydney, Australia. May be repeated up to 12 unit(s). Not open to students who have completed DRA 192. (P/NP grading only.) Effective: 2005 Spring Quarter.

DRA 194HA—Special Study for Honors Students (3)
Independent Study—9 hours. Prerequisite(s): Qualification for Letters and Science Honors Program and admission to Theatre and Dance Senior Honors Program. Preparation and presentation of a culminating project, under the supervision of an instructor, in one of the creative or scholarly areas of Theatre and Dance. (P/NP grading only.) Effective: 2016 Spring Quarter.

DRA 194HB—Special Study for Honors Students (3)
Independent Study—9 hours. Prerequisite(s): Qualification for Letters and Science Honors Program and admission to Theatre and Dance Senior Honors Program. Preparation and presentation of a culminating project, under the supervision of an instructor, in one of the creative or scholarly areas of Theatre and Dance. Effective: 2016 Spring Quarter.

DRA 195—Senior Capstone Experience (2)
Lecture/Discussion—1 hour; Project (Term Project). Open to Theatre and Dance Majors who have completed 135 or more units. Capstone experience for majors. Examination, reflection and synthesis on development. Discussion of professional development and translatable skills. Individual project and development of portfolio. (P/NP grading only.) GE credit: AH, WE. Effective: 2016 Fall Quarter.

DRA 197T—Tutoring in Dramatic Art (1-5)
Tutorial—1-5 hours. Prerequisite(s): Consent of Instructor. Upper division or graduate standing with major in Theatre and Dance; consent of department chairperson. Leading of small voluntary groups affiliated with one of the department's regular courses. May be repeated for credit. (P/NP grading only.) Effective: 2016 Spring Quarter.

DRA 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

DRA 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

DRA 200—Methods and Materials in Theatre Research (4)
Seminar—3 hours; Term Paper. Essential research tools in theatre and related fields; bibliographies,
primary sources; methods of evaluating and presenting evidence; delineating research areas in the field. Effective: 1997 Winter Quarter.

DRA 211—Advanced Voice and Speech (3)
Laboratory—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open only to Dramatic Arts Students and Ph.D. students with an emphasis in Performance and Theatre. Review a progression of exercises to free, develop and strengthen the voice, first as a human instrument, and then as an actor's instrument using various texts such as Shakespeare, Ibsen and contemporary plays. Required for the M.F.A. degree in Acting. May be repeated up to 2 time(s). Effective: 2016 Spring Quarter.

DRA 212—Advanced Stage Movement (3)
Laboratory—6 hours. Prerequisite(s): Consent of Instructor. Graduate standing in the MFA Program. Open to advanced undergraduates by consent of instructor. Application of modes of exploration, breath placement, and the use of imagery as well as Laban's effort/shape system as a method of analysis in classic and modern plays. May be repeated for credit. Effective: 2016 Spring Quarter.

DRA 221—Special Problems in Advanced Acting (4)
Laboratory—4 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Advanced acting problems arising from differences in the type and style of plays selected from Greece to the present. May be repeated for credit. Effective: 1997 Winter Quarter.

DRA 224A—Seminar in Theatrical Design: Ancient Worlds--Early 17th Century (4)
Project (Term Project)—2 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Group study while focusing primarily on one discipline: scenic, costume or lighting design. Periods covered: Greek, Medieval, Renaissance, Shakespearean, Jacobean, early 17th century. Design projects include script analysis, research of period style, fashion, character development, developing design concepts, presentation skills. Effective: 2016 Spring Quarter.

DRA 224B—Seminar in Theatrical Design: Mid 17th Century to 1900 (4)
Project (Term Project)—2 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Group study focusing primarily on one discipline: scenic, costume or lighting design. Periods covered: Cavalier, Restoration 18th century opera and ballet, 19th century drama. Design projects include script analysis, research of period style, fashion, character development, developing design concepts,presentation skills. Effective: 2016 Spring Quarter.

DRA 224C—Seminar in Theatrical Design: the 20th Century (4)
Project (Term Project)—2 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Group study focusing primarily on one discipline-scenic, costume or lighting design. 20th century genres covered: Realism, Brecht, Musicals, Contemporary Dance, short narrative film. Design projects include script analysis, research of period style, fashion, character development, developing design concepts, presentation skills. Effective: 2016 Spring Quarter.

DRA 224D—Seminar in Theatrical Design: Contemporary Concepts (4)
Project (Term Project)—2 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Group study focusing primarily on one discipline: scenic, costume or lighting design. Emphasis on contemporary design concepts for new works and classics: Shakespeare, modern dance, concept plays and musicals. Script and character analysis for design in performance, research, design projects. Effective: 2016 Spring Quarter.

DRA 224E—Seminar in Theatrical Design: Advanced Concepts (4)
Project (Term Project)—2 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Group study focusing primarily on one discipline: scenic, costume or lighting design. Emphasis on special issues in contemporary design concepts for new works and classics. Script and character analysis for design in performance, research, design projects. Effective: 2016 Spring Quarter.

DRA 225—Performance Design Studio: Techniques and Media (2)
Studio—2 hours. Prerequisite(s): DRA 224A (can be concurrent) or DRA 224B (can be concurrent) or DRA 224C (can be concurrent) or DRA 224D (can be concurrent) or DRA 224E (can be concurrent); Consent of Instructor. Exploration and development of techniques and skills in the performance design process. Drafting, model building, drawing, painting and rendering, costume drawing, color theory, lighting techniques, design portfolio preparation and presentation. May be repeated up to 5 time(s). Effective: 2016 Spring Quarter.

DRA 228—Seminar in Directing Theory: Non-Realism (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Modern directing theory as it applies to non-realistic theatre; development of directorial concepts for production of selected non-realistic plays-Greek to the present; emphasis on textual analysis. Effective: 2016 Spring Quarter.

DRA 229—Special Problems in Directing (4)
Laboratory—2 hours; Rehearsal—4 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Projects in directing scenes selected from plays from ancient Greece to the present. May be repeated up to 2 time(s). Effective: 2014 Spring Quarter.

DRA 230—Advanced Problems in Choreography and Performance (2)
Discussion/Laboratory—2 hours. Prerequisite(s): Consent of Instructor. Explores contemporary issues of choreography and performance in depth and how those issues pertain to performance work. Focus will include contemporary thought on representation, legibility, new forms, and cultural attitudes. May be repeated up to 6 time(s). Effective: 2012 Winter Quarter.

DRA 244—Critical Approaches to Traditional Systems of Body Movement (4)
Discussion/Laboratory—6 hours; Project (Term Project); Term Paper. Prerequisite(s): Consent of Instructor. Introduction to traditional systems for body movement, development of critical approaches to them, and experiments in how they inform training and practice in theatre, dance, and performance. May be repeated up to 5 time(s). Effective: 2016 Fall Quarter.

DRA 250—Modern Theatre (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Theatre of Europe and America, 1860-1940, with emphasis on the relationship of the dramas of the period to the physical circumstances under which they were produced. Effective: 2016 Spring Quarter.

DRA 251—Scoring and Scripting in Performance (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Process of weaving together various performance elements brought into play by the artists in their respective disciplines. The "script" is the thread from which the artists' "scores" will layer and transform the "script" into performance for specific time, place, spectators. Effective: 2016 Spring Quarter.

DRA 252—Performance: Concepts of Space, Place, and Time (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Innovative theories of creating performance spaces, establishing a sense of place, and communicating the concept of time explored through collaborative interaction. Research includes traditional principles, site-specific spaces and consideration of various tempi from music and movement. Effective: 2016 Spring Quarter.

DRA 253—Approaches to Collaboration (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Exploration of different approaches to collaboration among artists in different media and their influence on the creative process. Effective: 2016 Spring Quarter.

DRA 254—Performing Identities/Personae (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Historical and contemporary theories of constructing stage identities. Discussion and project collaborations based on theories. Questions of identity related to ethnicity, gender or sexual orientation. Effective: 2016 Spring Quarter.

DRA 255—Composition in the Arts (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Examine manner in which specific elements utilized by actors, dancers, directors, choreographers, and designers are combined or related to form a whole in space and time, as well as methods of sequencing used by each discipline to produce artistic products. May be repeated up to 1 time(s). Effective: 2016 Spring Quarter.

DRA 256—Visual Language for Performance (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Restricted to graduate students. Exploration of different approaches and methods to the visual elements of performance. Focus on design and style for different media and genres, storytelling through visual elements of performance. Effective: 2017 Winter Quarter.

DRA 257—Interdisciplinary Seminar in Theatre, Dance and Performance (1)
Project (Term Project)—1.5 hours; Seminar—1.5 hours. Prerequisite(s): Consent of Instructor. Restricted to students enrolled in the MFA in Dramatic Art; students taking the PhD in Performance Studies or the DE in Studies in Performance and Practice may apply to enroll. Interdisciplinary seminar for first and second year MFA students in Theatre and Dance. Topics range from current practice in dance, theatre, film and performance, to leading edge developments by outstanding practitioners in the field. May be repeated up to 2 time(s). Effective: 2017 Spring Quarter.

DRA 259—Topics in Contemporary Theatre and Performance (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Special topics designed to study in depth aspects of contemporary
performance including performance analysis, cultural and historical context, modes of production, theoretical and political entailments, and issues of spectatorship (e.g., "Brecht and After," "British Theater," "Race and Gender in Performance." May be repeated up to 5 time(s). Effective: 2016 Spring Quarter.

DRA 260—Approaches and Methodologies to Studies in Performance and Practice (4)
Project (Term Project); Seminar—3 hours; Term Paper. Prerequisite(s): Admission to any graduate program in the University and consent of instructor. Preference to students enrolled in the Designated Emphasis in Studies in Performance and Practice. Instruction is offered a variety of disciplinary approaches and methodologies in Performance and Practice, with a focus is on cross-disciplinary learning and research. Usually offered each quarter. May be repeated for credit when content differs. Effective: 2016 Fall Quarter.

DRA 265A—Performance Studies: Modes of Production (4)
Project (Term Project); Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Introduces students to the literature of performance production in a
variety of media: theatre, dance, film, video, computer-based, looking at cultural, aesthetic, rhetorical and political theory. Usually offered in alternate years. Maybe repeated for credit with different topical matter/instructor. May be repeated up to 3 time(s) topic differs. Effective: 2016 Fall Quarter.

DRA 265B—Peformance Studies: Signification and the Body (4)
Project (Term Project); Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Introduces students to analysis of the body in performance, drawing on theoretical models from several fields. May be repeated up to 3 time(s) when topic differs. Effective: 2016 Fall Quarter.

DRA 265C—Performance Studies: Performance and Society (4)
Project (Term Project); Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Introduces students to the role of performance (broadly defined), in everyday life, sociopolitical negotiation, identity, social movements, the media, and the state. May be repeated up to 3 time(s) when topic differs. Effective: 2016 Fall Quarter.

DRA 265D— Performance studies: Theory, History, Criticism (4)
Project (Term Project); Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Introduction to the theory, history and criticism, informing performance studies. May be repeated up to 3 time(s) when topic differs. Effective: 2016 Fall Quarter.

DRA 280—Theatre Laboratory (1-12)
Variable. Prerequisite(s): Consent of Instructor. Advanced practice in acting, designing, directing, playwriting, and technical theatre. May be repeated for credit. Effective: 2016 Fall Quarter.

DRA 298—Group Study (1-5)
Prerequisite(s): Consent of Instructor. Effective: 1997 Winter Quarter.

DRA 299—Individual Study (1-12)
Variable. Prerequisite(s): Consent of Instructor. Individual study. (S/U grading only.) Effective: 2016 Fall Quarter.

DRA 299D—Dissertation Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Dissertation research. (S/U grading only.) Effective: 2016 Fall Quarter.

DRA 396—Teaching Assitant Training Practicum (1-4)
Variable. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2016 Spring Quarter.

DRA 413—Stage Make-up (1)
Lecture/Lab—2 hours. Prerequisite(s): Consent of Instructor. Approved for graduate degree credit. Lectures, demonstrations, and practical work in aspects of theatrical make-up. Effective: 1997 Winter Quarter.

Earth & Planetary Sciences

Earth & Planetary Sciences | Earth & Planetary Sciences Information

Michael E. Oskin, Ph.D., Chairperson of the Department

David A. Osleger, Ph.D., Vice-Chairperson, Undergraduate Program

Sujoy Mukhopadhyay, Ph.D., Vice-Chairperson, Graduate Program

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Faculty. http://geology.ucdavis.edu/people/faculty/index.php

Major Programs. See Geology, Marine and Coastal Science, and Natural Sciences.

Courses. See courses listed under Geology.

Earth & Planetary Sciences | GEL Courses

Courses in GEL:

GEL 001—The Earth (4)
Discussion—1 hour; Lecture—3 hours. Intoduction to the study of the Earth. Earth's physical and chemical structure;
internal and surface processes that mold the Earth; geological hazards and resources. Not open for credit to students who have taken GEL 050; only 2 credits for students who have taken GEL 002. GE credit: SE, SL, WE. Effective: 2013 Fall Quarter.

GEL 002—Earth System Science (3)
Lecture—3 hours. Solid and fluid earth and its place in the solar system. How the solid earth interacts with the atmosphere, hydrosphere, biosphere, and extraterrestrial environment. Only 2 units credit for students who have taken GEL 050; only 2 units credit for students who have taken GEL 001. GE credit: SE, SL. Effective: 2017 Winter Quarter.

GEL 002G—The Blue Planet: Introduction to Earth Science - Discussion (1) ***Review all entries***
Discussion—1 hour. Prerequisite(s): GEL 002 (can be concurrent); GEL 002 required concurrently. Small group discussion and preparation of short papers for course 2. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 002G—Earth System Science Discussion (1) ***Review all entries***
Discussion—1 hour. Prerequisite(s): GEL 002 (can be concurrent); GEL 002 required concurrently. Small group discussion and preparation of short papers for GEL 002. GE credit: SE. Effective: 2018 Fall Quarter.

GEL 003—History of Life (3)
Lecture—3 hours. Prerequisite(s): GEL 001 recommended. The history of life during the three and onehalf billion years from its origin to the present day. Origin of life and processes of evolution; how to visualize and understand living organisms from their fossil remains. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 003G—History of Life: Discussion (1)
Discussion—1 hour. Prerequisite(s): GEL 003 (can be concurrent); GEL 003 required concurrently. Small group discussion and preparation of short papers for course 3. GE credit with concurrent enrollment in course 3: Wrt. GE credit: SE, WE. Effective: 2013 Fall Quarter.

GEL 003L—History of Life Laboratory (1)
Laboratory—3 hours. Prerequisite(s): GEL 003 (can be concurrent); GEL 003 required concurrently. Exercises in understanding fossils as the clues to interpreting ancient life, including their functional morphology, paleoecology, and evolution. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 004—Evolution: Science and World View (3)
Discussion—1 hour; Lecture—2 hours. Introduction to biological evolution. Emphasis on historical development, major lines of evidence and causes of evolution; relationships between evolution and Earth history; the impact of evolutionary thought on other disciplines. GE credit: SE, SL, WE. Effective: 2013 Fall Quarter.

GEL 009—Geology Field Experience (1)
Fieldwork—1 session. Prerequisite(s): Consent of Instructor. At least one previous GEL class, or concurrent enrollment. Pass One open to non-Geology Majors only. Exposure to geologic features and earth processes in the field. Experiential instruction in earth-science concepts, spatial visualization, landscape evolution, deep time, critical thinking skills, and integrative scientific themes. One 4-5 day field trip. May be repeated up to 1 time(s) when field trip destination differs. (P/NP grading only.) GE credit: SE. Effective: 2018 Fall Quarter.

GEL 010—Modern and Ancient Global Environmental Change (3)
Lecture—3 hours. Fundamental scientific concepts underlying issues such as global warming, pollution, and the future of nonsustainable resources presented
in the context of anthropogenic processes as well as natural forcing of paleoenvironmental change throughout Earth's history. GE credit: SE, SL, VL. Effective: 2013 Fall Quarter.

GEL 012—Evolution and Paleobiology of Dinosaurs (2)
Lecture—2 hours. Introduction to evolutionary biology, paleobiology, ecology and paleoecology, using dinosaurs as case studies. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 016—The Oceans (3)
Lecture—3 hours. Introductory survey of the marine environment. Oceanic physical phenomena, chemical constituents and chemistry of water, geological history, the seas biota and human utilization of marine resources Not open for credit to students who have taken GEL 116. GE credit: SE, SL. Effective: 2013 Fall Quarter.

GEL 016G—The Oceans: Discussion (2)
Discussion/Laboratory—2 hours; Term Paper/Discussion—4 hours. Prerequisite(s): GEL 016 (can be concurrent) Scientific method applied to discovery of the processes, biota and history of the oceans. Group discussion and preparation of term paper. Not open for credit to students who have taken GEL 116G. GE credit: SE, WE. Effective: 2016 Fall Quarter.

GEL 017—Earthquakes and Other Earth Hazards (2)
Lecture—2 hours. Impact of earthquakes, tsunami, volcanoes, landslides, and floods on humans, structures, and the environment. Discussion of the causes and effects of disasters and catastrophes, and on prediction, preparation, and mitigation of natural hazards. GE credit: SE, SL. Effective: 2013 Fall Quarter.

GEL 018—Energy and the Environment (3)
Lecture—3 hours. Conventional and alternative energy resources and their environmental impacts. Basic principles, historical development, current advantages and disadvantages, future prospects. Oil, natural gas, coal, nuclear, wind, geothermal, water, tidal, solar, hydrogen, and other sources of energy for the 21st century. GE credit: SE, SL, WE. Effective: 2013 Fall Quarter.

GEL 018V—Energy and the Environment (3)
Web Electronic Discussion—1.5 hours; Web Virtual Lecture—1.5 hours. Conventional and alternative energy resources and their environmental impacts. Basic principles, historical development, current advantages and disadvantages, future prospects. Oil, natural gas, coal, nuclear, wind, geothermal, water, tidal, solar, hydrogen, and other sources of energy for the 21st century. GE credit: SE, SL, WE. Effective: 2015 Winter Quarter.

GEL 020—Geology of California (2)
Lecture—2 hours. The geologic history of California, the origin of rocks and the environments in which they were formed, the structure of the rocks and the interpretation of their structural history, mineral resources, and appreciation of the California landscape. Offered in alternate years. GE credit: SE, SL, VL. Effective: 2013 Fall Quarter.

GEL 025—Geology of National Parks (3)
Lecture—3 hours. Appreciation of the geologic framework underlying the inherent beauty of U.S. National Parks. Relationship of individual parks to geologic processes such as mountain building, volcanism, stream erosion, glacial action and landscape evolution. GE credit: SE, SL, VL. Effective: 2014 Winter Quarter.

GEL 025V—Geology of National Parks (3)
Web Electronic Discussion—2 hours; Web Virtual Lecture—1 hour. Appreciation of the geologic framework underlying the inherent beauty of U.S. National Parks. Relationship of individual parks to geologic processes such as mountain building, volcanism, stream erosion, glacial action and landscape evolution. No credit for students who have completed GEL 025. GE credit: SE. Effective: 2015 Spring Quarter.

GEL 028—Astrobiology (3)
Lecture—3 hours. Origin, evolution and distribution of life in our solar system and the Universe. Detecting habitable worlds, Drake equations, necessities and raw materials for life, philosophical implications of the search for life elsewhere. GE credit: SE, SL. Effective: 2013 Fall Quarter.

GEL 030—Fractals, Chaos and Complexity (3)
Lecture/Discussion—3 hours. Prerequisite(s): MAT 016A or MAT 021A Modern ideas about the unifying ideas of fractal geometry, chaos and complexity. Basic theory and applications with examples from physics, earth sciences, mathematics, population dynamics, ecology, history, economics, biology, computer science, art and architecture. Offered in alternate years. (PHY 030.) GE credit: QL, SE. Effective: 2013 Fall Quarter.

GEL 032—Volcanoes (3)
Lecture—3 hours. Role of eruptions, and eruptive products of volcanoes in shaping the planet's surface, influencing its environment, and providing essential human resources. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 035—Rivers (3)
Lecture—3 hours. Introduction to geomorphology, climate and geology of rivers and watersheds, with case examples from California. Assessment of impacts of logging, agriculture, mining, urbanization and water supply on river processes. Optional river field trips. GE credit: SE, SL. Effective: 2013 Fall Quarter.

GEL 036—The Solar System (4)
Discussion—1 hour; Lecture—3 hours. Nature of the sun, moon, and planets as determined by recent manned and unmanned exploration of the solar system.Comparison of terrestrial, lunar, and planetary geological processes. Search for life on other planets. Origin and evolution of the solar system. (Former course 113-113G.) GE credit: SE, VL, WE. Effective: 2013 Fall Quarter.

GEL 050—Physical Geology (3)
Lecture—3 hours. Prerequisite(s): High school physics and chemistry. The Earth, its materials, its internal and external processes, its development through time by sea-floor spreading and global plate tectonics. Students with credit for GEL 001 or the equivalent may receive only 2 units for GEL 050. GE credit: SE, SL. Effective: 2013 Fall Quarter.

GEL 050L—Physical Geology Laboratory (2)
Laboratory—6 hours. Prerequisite(s): GEL 050 (can be concurrent) Introduction to classification and recognition of minerals and rocks and to interpretation of topographic and geologic maps and aerial photographs. Students with credit for GEL 001L or the equivalent may receive only 1 unit for GEL 050L. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 060—Earth Materials: Introduction (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 002A; (MAT 016A or MAT 017A or MAT 021A); (GEL 001 or GEL 050, GEL 050L) Physical and chemical properties of rocks, minerals and other earth materials; structure and composition of rock-forming minerals; formation of minerals by precipitation from silicate liquids and aqueous fluids and by solid state transformations. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 062—Optical Mineralogy (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): GEL 060 (can be concurrent) Optical properties of inorganic crystals; techniques of mineral identification using the polarizing microscope; strategies for studying rocks in thin section. GE credit: SE, VL. Effective: 2016 Fall Quarter.

GEL 081—Learning in Science and Mathematics (2)
Fieldwork—2 hours; Lecture/Discussion—2 hours. Limited to 26 students per section. Exploration of how students learn and develop understanding in science and mathematics classrooms. Introduction to case studies and interview techniques and their use in K-6 classrooms to illuminate factors that affect student learning. (EDU 081.) (P/NP grading only.) GE credit: SS, VL, WE. Effective: 2013 Fall Quarter.

GEL 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Work-learn experience on and off campus in all subject areas offered by the department. Internships supervised by a member of the faculty. May be repeated up to 12 unit(s). (P/NP grading only.) GE credit: SE. Effective: 2013 Fall Quarter.

GEL 098—Directed Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Directed group study. May be repeated up to 3 time(s) content changes. (P/NP grading only.) GE credit: SE. Effective: 2013 Fall Quarter.

GEL 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. Special study for undergraduates. (P/NP grading only.) GE credit: SE. Effective: 2013 Fall Quarter.

GEL 101—Structural Geology (3)
Lecture—3 hours. Prerequisite(s): GEL 050; GEL 050L; (PHY 007A or PHY 009A); (MAT 016A or MAT 017A or MAT 021A); Consent of Instructor. Class size limited to 35 students. Study of processes and products of rock deformation. Introduction to structural geology through a survey of the features and geometries of faults and folds, techniques of strain analysis, and continuum mechanics of rock deformation. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 101L—Structural Geology Lab (2)
Fieldwork—2 hours; Laboratory—6 hours. Prerequisite(s): GEL 050; GEL 050L; (PHY 007A or PHY 009A); GEL 101 (can be concurrent); Consent of Instructor. Class size limited to 15 students per session. Laboratory study of the processes and products of rock deformation. Introduction to the practice of structural geology through observations and analysis of rock deformation, including field measurement techniques and geologic mapping. GE credit: SE, VL. Effective: 2016 Fall Quarter.

GEL 103—Field Geology (3)
Fieldwork; Laboratory. Prerequisite(s): GEL 101L; GEL 101; Consent of Instructor. Field mapping projects and writing geological reports. Weekly classroom meetings devoted to preparation of maps, cross sections, stratigraphic sections, rock descriptions, and reports. Seven-eight days on weekends during quarter. GE credit: SE, VL, WE. Effective: 2016 Fall Quarter.

GEL 105—Earth Materials: Igneous Rocks (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): GEL 060; GEL 062; (MAT 016A or MAT 017A or MAT 021A); CHE 002B (can be concurrent) Origin and occurrence of igneous rocks. Laboratory exercises emphasize the study of these rocks in hand specimen and thin section. GE credit: SE, WE. Effective: 2016 Fall Quarter.

GEL 106—Earth Materials: Metamorphic Rocks (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): GEL 105 Physical and chemical properties of metamorphic rocks; interpretation of metamorphic environments. Laboratory exercises emphasize the study of these rocks in hand specimen and thin section. GE credit: SE, WE. Effective: 2016 Fall Quarter.

GEL 107—Earth History: Paleobiology (3)
Lecture—3 hours. Prerequisite(s): GEL 003 or BIS 002A or BIS 010 Evolution and ecological structure of the biosphere from the origin of life to the present. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 107L—Earth History: Paleobiology Laboratory (2)
Laboratory—6 hours. Prerequisite(s): (GEL 003, GEL 003L) or BIS 002B; GEL 107 (can be concurrent) Exercises in determining the ecological functions and evolution of individuals, populations, and communities of fossil organisms in field and laboratory. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 108—Earth History: Paleoclimates (3)
Lecture—3 hours. Prerequisite(s): (GEL 001 or GEL 050 or GEL 116N or ESP 116N); CHE 002A; Consent of Instructor. Geological and environmental factors controlling climate change, the greenhouse effect with a detailed analysis of the history of Earth's climate fluctuations over the last 600 million years. Past and present climate records are used to examine potential future climatic scenarios. GE credit: SE, SL, WE. Effective: 2016 Fall Quarter.

GEL 109—Earth History: Sediments and Strata (2)
Lecture—2 hours. Prerequisite(s): GEL 050; GEL 050L Principles of stratigraphic and sedimentologic analysis. Evaluation of historical and modern global changes in sedimentation within terrestrial and marine environments. Examination of the plate tectonic, climatic and oceanographic factors controlling the distribution and exploitation of economic fluids within sedimentary rocks. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 109L—Earth History: Sediments and Strata Laboratory (2)
Laboratory—6 hours. Prerequisite(s): GEL 109 (can be concurrent) Methods of stratigraphic and sedimentologic analysis of modern and ancient sediments. Identification of major sediment and sedimentary rock types. Outcrop and subsurface analysis of sedimentary basins. GE credit with concurrent enrollment in course 109. Includes four one-day field trips. GE credit: SE, WE. Effective: 2016 Fall Quarter.

GEL 110—Summer Field Geology (8)
Fieldwork. Prerequisite(s): GEL 060; GEL 103; GEL 109; GEL 105 recommended. Advanced application of geologic and geophysical field methods to the study of rocks. Includes development and interpretation of geologic maps and cross sections; gravity, magnetic, electrical resistivity and seismic surveys; and field analysis of plutonic and volcanic rock suites. Eight hours/day, six days/week for six weeks. GE credit: SE, VL, WE. Effective: 2017 Spring Quarter.

GEL 115—Earth Science, History, and People (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): GEL 001 or GEL 050 Study of interplay between the Earth and its human inhabitants through history, including consideration of acute events such as earthquakes and eruptions as well as the geology of resources, topography, and water. GE credit: OL, SE, WE. Effective: 2017 Winter Quarter.

GEL 116N—Oceanography (3)
Fieldwork; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): GEL 001 or GEL 002 or GEL 016 or GEL 050 Advanced oceanographic topics: Chemical, physical, geological, and biological processes; research methods and data analysis; marine resources, anthropogenic impacts, and climate change; integrated earth/ocean/atmosphere systems; weekly lab and one weekend field trip. (ESP 116N.) GE credit: SE, SL. Effective: 2017 Winter Quarter.

GEL 120—Origins: From the Big Bang to Today (3)
Lecture—3 hours. Limited enrollment. Long-term and large-scale perspectives on the origins of the universe, stars and planets, life, human evolution, the rise of civilization and the modern world. Multi-disciplinary approach to 'Big History' involving cosmology, astronomy, geology, climatology, biology, anthropology, archeology and traditional history. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 130—Non-Renewable Natural Resources (3)
Lecture—3 hours. Prerequisite(s): GEL 001 or GEL 050 Origin, occurrence, and distribution of non-renewable resources, including metallic, nonmetallic, and energy-producing materials. Problems of discovery, production, and management. Estimations and limitations of reserves, and their sociological, political, and economic effects. GE credit: SE, SL. Effective: 2016 Fall Quarter.

GEL 131—Risk: Natural Hazards and Related Phenomena (3)
Lecture—3 hours. Risk, prediction, prevention and response for earthquakes, volcanic eruptions, landslides, floods, storms, fires, impacts, global warming. GE credit: SE, SL. Effective: 2016 Fall Quarter.

GEL 132—Introductory Inorganic Geochemistry (3)
Lecture—3 hours. Prerequisite(s): GEL 060 (can be concurrent); CHE 002B Nucleosynthesis of chemical elements, physical and chemical properties of elements, ionic substitution, elemental partition, distribution and transport among planetary materials, basic thermodynamics and phase diagrams, isotopic geochronometers, stable isotope fractionation, mixing and dilution, advection and diffusion, geochemical cycles. Effective: 2016 Fall Quarter.

GEL 134—Environmental Geology and Land Use Planning (3)
Lecture—3 hours. Prerequisite(s): GEL 001 or GEL 050; Consent of Instructor. One course in Geology. Geologic aspects of land use and development planning. Geologic problems concerning volcanic and earthquake hazards, land stability, floods, erosion, coastal hazards, non-renewable resource extraction, waste disposal, water resources. GE credit: SE, WE. Effective: 2016 Fall Quarter.

GEL 136—Ecogeomorphology of Rivers and Streams (5)
Discussion/Laboratory—2 hours; Fieldwork; Lecture—1 hour; Term Paper. Prerequisite(s): Consent of Instructor. Upper division or graduate standing in any physical science, biological science, or engineering. Restricted to advanced students in the physical sciences, biological sciences, or engineering. Integrative multidisciplinary field analysis of streams. Class project examines hydrology, geomorphology, water quality and aquatic and riparian ecology of degraded and pristine stream systems. Includes cooperative two-week field survey in remote wilderness settings with students from diverse scientific backgrounds. GE credit: SE, WE. Effective: 2013 Fall Quarter.

GEL 138—Introductory Volcanology (4)
Fieldwork—6 hours; Lecture—2 hours. Prerequisite(s): GEL 060; GEL 109; Consent of Instructor. Principles of physical and chemical volcanology. Taught in a volcanically active setting (e.g., Hawaii) with a strong field component. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 139—Rivers: Form, Function and Management (4)
Fieldwork—3 hours; Lecture—3 hours. Prerequisite(s): GEL 050 or GEL 050L; MAT 016B or 021B recommended. Analysis of river form and processes, emphasis on fluvial geomorphology, and river and stream restoration; case studies to illustrate concepts and applications. Two weekend field trips required. Offered irregularly. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 140—Introduction to Process Geomorphology (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (GEL 001 or GEL 050); (MAT 016B or MAT 021B) Quantitative description and interpretation of landscapes with emphasis on the relationships between physical processes, mass conservation, and landform evolution. Topics covered include physical and chemical weathering, hillslopes, debris flows, fluvial systems, alluvial fans, pedogenesis, eolian transport, glaciation and Quaternary geochronology. Effective: 2016 Fall Quarter.

GEL 141—Evolutionary History of Vertebrates (3)
Lecture—3 hours. Prerequisite(s): GEL 003 or BIS 002A Evolutionary history of vertebrates; fossil record and phylogeny; timing of major evolutionary events; appearance of major vertebrate groups; physical constraints in vertebrate evolution; paleobiogeography of vertebrates; effect of continental movement on vertebrate evolution; dinosaurs and other strange vertebrates. Offered in alternate years. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 141L—Evolutionary History of Vertebrates Laboratory (1)
Laboratory—3 hours. Prerequisite(s): GEL 141 (can be concurrent) Augments lecture course 141 through handling of specimens enabling in-person examination of three dimensional features observed in vertebrate skeletons, both fossil and living. Offered in alternate years. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 142—Basin Analysis (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): GEL 050; GEL 050L; GEL 109 Analysis of sedimentary basins from initiation to maturity, including controls on sedimentary fill, subsidence analysis, sequence stratigraphy, core logs, and applications to petroleum exploration and hydrology. One two-day field trip. Offered irregularly. GE credit: SE, VL. Effective: 2013 Fall Quarter.

GEL 143—Advanced Igneous Petrology (5)
Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): GEL 105; (MAT 016C or MAT 021C); CHE 002C Physical and chemical properties of magmatic environments and processes of igneous rock formation. Laboratory study of representative igneous rocks. Offered irregularly. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 144—Historical Ecology (3)
Lecture—3 hours. Prerequisite(s): Upper division course in environmental science or ecology, or an introductory course in paleobiology. Ancient ecosystems and the factors that caused them to change. Species, expansion, evolution of new modes of life, geologically induced variations in resource supply, and extinction provide historical perspective on the biosphere of future. GE credit: SE, WE. Effective: 2013 Fall Quarter.

GEL 145—Advanced Metamorphic Petrology (5)
Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): GEL 106; (HYD 134 or CHE 002C); (MAT 016C or MAT 021C) Metamorphic processes and the origin of metamorphic rocks. Laboratory study of representative rock suites. Offered irregularly. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 146—Radiogenic Isotope Geochemistry and Cosmochemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 002C; PHY 007C; MAT 016C Basic principles of nuclear chemistry and physics applied to geology to determine the ages of terrestrial rocks, meteorites, archeological objects, age of the Earth, to trace geological/environmental processes, and explain formation of the chemical elements in the Universe. Offered irregularly. GE credit: QL, SE. Effective: 2013 Fall Quarter.

GEL 147—Geology of Ore Deposits (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (CHE 002C or HYD 134); GEL 060; GEL 062; GEL 105 Tectonic, lithologic and geochemical setting of major metallic ore deposit types emphasizing ore deposit genesis, water/rock interaction and the environmental effects of mining. Offered irregularly. GE credit: QL, SE. Effective: 2013 Fall Quarter.

GEL 148—Stable Isotopes and Geochemical Tracers (3)
Lecture—3 hours. Prerequisite(s): (CHE 002C or HYD 134); GEL 050; GEL 050L; GEL 060 Use of oxygen and hydrogen isotopes in defining hydrologic processes; carbon, nitrogen, and sulfur isotopes as indicators of exchange between the lithosphere, hydrosphere, atmosphere and biosphere. Radiogenic, cosmogenic, and noble gas isotope tracers. Offered irregularly. GE credit: QL, SE. Effective: 2013 Fall Quarter.

GEL 149—Geothermal Systems (3)
Fieldwork; Lecture—3 hours. Prerequisite(s): GEL 050; GEL 050L; CHE 002B Geology, geochemistry, and geophysics of geothermal systems, including electrical power generation and direct use applications. Includes one day field trip on a weekend during the quarter. Offered irregularly. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 150A—Physical and Chemical Oceanography (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ESP 116N or GEL 116N); PHY 009B; MAT 021D; CHE 002C; and Consent of Instructor. Physical and chemical properties of seawater, fluid dynamics, air-sea interaction, currents, waves, tides, mixing, major oceanic geochemical cycles. (ESO 150A.) GE credit: QL, SE. Effective: 2017 Winter Quarter.

GEL 150B—Geological Oceanography (3)
Lecture—3 hours. Prerequisite(s): GEL 050 or (GEL 116N or ESP 116N) Introduction to the origin and geologic evolution of ocean basins. Composition and structure of oceanic crust; marine volcanism; and deposition of marine sediments. Interpretation of geologic history of the ocean floor in terms of sea-floor spreading theory. (ESP 150B.) GE credit: SE. Effective: 2017 Winter Quarter.

GEL 150C—Biological Oceanography (4)
Discussion—1 hour; Fieldwork; Lecture—3 hours. Prerequisite(s): BIS 002A; Consent of Instructor. A course in general ecology. Ecology of major marine habitats, including intertidal, shelf benthic, deep-sea and plankton communities. Existing knowledge and contemporary issues in research. Segment devoted to human use. One weekend field trip required. (ESP 150C.) GE credit: SE, SL. Effective: 2017 Winter Quarter.

GEL 152—Paleobiology of Protista (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): GEL 107 or BIS 002A; Consent of Instructor. Morphology, systematics, evolution, and ecology of single-celled organisms that are preserved in the fossil record. Offered irregularly. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 156—Hydrogeology and Contaminant Transport (5)
Laboratory—3 hours; Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): HYD 145; ECI 144; Or equivalent of ECI 144. Physical and chemical processes affecting groundwater flow and contaminant transport, with emphasis on realistic hydrogeologic systems. Groundwater geology and chemistry. Fundamentals of groundwater flow and transport analysis. Laboratory includes field pumping test and work with physical and computer models. (HYD 146.) GE credit: SE. Effective: 2013 Fall Quarter.

GEL 160—Geological Data Analysis (3)
Lecture/Discussion—3 hours. Prerequisite(s): MAT 021A Introduction to quantitative methods in analyzing geological data including basic principles of statistics and probability, error analysis, hypothesis testing, inverse theory, time series analysis and directional data analyses. Use of computer in lectures and homework. GE credit: QL, SE. Effective: 2016 Fall Quarter.

GEL 161—Geophysical Field Methods (3)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): MAT 021C; (GEL 001 or GEL 050); (PHY 007C or PHY 009C) Geophysical methods applied to determining subsurface structure in tectonics, hydrogeology, geotechnical engineering, hydrocarbon and mineral exploration. Theory, survey design and interpretation of gravity, electrical resistivity, electromagnetic, reflection and refraction seismology, and ground-penetrating radar measurements. GE credit: QL, SE. Effective: 2016 Fall Quarter.

GEL 162—Geophysics of the Solid Earth (3)
Lecture—3 hours. Prerequisite(s): MAT 021C; (PHY 007C or PHY 009C); Consent of Instructor. Theory and use of physics in the study of the solid earth. Gravity, magnetism, paleomagnetism, and heat flow. Application to the interpretation of the regional and large-scale structure of the earth and to plate tectonics. Offered irregularly. GE credit: QL, SE. Effective: 2016 Fall Quarter.

GEL 163—Planetary Geology and Geophysics (3)
Lecture—3 hours. Prerequisite(s): MAT 021C; (PHY 007C or PHY 009C); (GEL 050 or GEL 036 or AST 010G or AST 010L or AST 010S); Consent of Instructor. Principles of planetary science. Planetary dynamics, including orbital mechanics, tidal interactions and ring dynamics. Theory of planetary interiors, gravitational fields, rotational dynamics. Physics of planetary atmospheres. Geological processes, landforms and theirmodification. Methods of analysis from Earth-based observations and spacecraft. GE credit: QL, SE. Effective: 2016 Fall Quarter.

GEL 175— Advanced Field Geology (3)
Discussion—3 hours; Fieldwork—6 hours. Prerequisite(s): Consent of Instructor. Advanced field studies of selected geologic terrains, interpretation and discussion of field observations. Offered irregularly. May be repeated up to 2 time(s) when instructors varies. (P/NP grading only.) GE credit: SE. Effective: 2013 Fall Quarter.

GEL 181—Teaching in Science and Mathematics (2)
Fieldwork—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Major in mathematics, science, or engineering; or completion of a one-year sequence of science or calculus. Class size limited to 40 students per section. Exploration of effective teaching practices based on examination of how middle school students learn math and science. Selected readings, discussion and field experience in middle school classrooms. (EDU 181.) (P/NP grading only.) GE credit: SS, WE. Effective: 2013 Fall Quarter.

GEL 182—Field Studies in Marine Geochemistry (2-8)
Fieldwork—6-40 hours; Laboratory—1-3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Marine geochemistry with the opportunity of going to sea or into the field on land. Techniques of sea-floor mapping using bottom photography, marine geochemical sampling, and method of data reduction and sample analysis. Analysis of data/samples collected. Offered irregularly. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 183—Teaching High School Mathematics and Science (3) ***Review all entries***
Fieldwork; Lecture/Discussion—2 hours. Prerequisite(s): Major in mathematics, science, or engineering; or consent of instructor with completion of a one-year sequence of science or calculus. Limited to 40 students per section. Exploration and creation of effective teaching practices based on examination of how high school students learn mathematics and science. Field experience in high school classrooms. (Education 183.) GE credit: OL, SS, WE. Effective: 2017 Fall Quarter.

GEL 183—Teaching High School Mathematics and Science (3) ***Review all entries***
Fieldwork; Lecture/Discussion—2 hours. Prerequisite(s): Major in mathematics, science, or engineering; or completion of a one-year sequence of science or calculus and consent of the instructor. Limited to 40 students per section. Exploration and creation of effective teaching practices based on examination of how high school students learn mathematics and science. Field experience in high school classrooms. (EDU 183.) GE credit: OL, SS, WE. Effective: 2018 Fall Quarter.

GEL 185A—Conceptual Integrated Science for Non-Science Majors: The Physical World (2)
Discussion/Laboratory—3 hours; Lecture—1 hour. Conceptual, inquiry-based integrated science course. Topics in the Next Generation Science Standards. Elementary school level teaching practice. Physics, chemistry, and science inquiry. GE credit: SE, SL. Effective: 2017 Winter Quarter.

GEL 185B—Conceptual Integrated Science for Non-Science Majors: Earth System Science (2)
Discussion/Laboratory—3 hours; Lecture—1 hour. Conceptual, inquiry-based integrated science course. Topics in the Next Generation Science Standards. Elementary school level teaching practice. Earth, space and environmental science, and science inquiry. GE credit: SE, SL. Effective: 2016 Fall Quarter.

GEL 186—Facilitating Learning in STEM Classrooms (1)
Lecture/Discussion—1 hour. STEM Learning Assistant Seminar. Theoretical and practical issues of effective teaching in discussion/labs: student-centered, active, cooperative learning environments, responsive teaching, and differentiated classroom instruction. GE credit: SS. Effective: 2016 Fall Quarter.

GEL 190—Seminar in Geology (1)
Discussion—1 hour; Seminar—1 hour. Presentation and discussion of current topics in geology by visiting lecturers, staff, and students. Written abstracts. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 2016 Fall Quarter.

GEL 192—Internship in Geology (1-12)
Internship. Prerequisite(s): Upper division standing; project approval prior to internship. Supervised work experience in geology. May be repeated for credit for a total of 10 units. May be repeated up to 10 unit(s). (P/NP grading only.) GE credit: SE. Effective: 2013 Fall Quarter.

GEL 194A—Senior Thesis (3)
Variable. Prerequisite(s): Open to Geology majors who have completed 135 units and who do not qualify for the Honors Program. Guided independent study of a selected topic, leading to the writing of a senior thesis. GE credit: SE, WE. Effective: 2013 Fall Quarter.

GEL 194B—Senior Thesis (3)
Variable. Prerequisite(s): Open to Geology majors who have completed 135 units and who do not qualify for the Honors Program. Guided independent study of a selected topic, leading to the writing of a senior thesis. GE credit: SE, WE. Effective: 2013 Fall Quarter.

GEL 194HA—Senior Honors Project (3)
Independent Study—9 hours. Prerequisite(s): Open to Geology majors who have completed 135 units and who qualify for the Honors Program. Guided independent study of a selected topic, leading to the writing of an honors thesis. GE credit: SE, WE. Effective: 2013 Fall Quarter.

GEL 194HB—Senior Honors Project (3)
Independent Study—9 hours. Prerequisite(s): Open to Geology majors who have completed 135 units and who qualify for the Honors Program. Guided independent study of a selected topic, leading to the writing of an honors thesis. GE credit: SE, WE. Effective: 2013 Fall Quarter.

GEL 198—Directed Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Senior standing in Geology or consent of instructor. Group study focused on topics in Geology. (P/NP grading only.) GE credit: SE. Effective: 2016 Spring Quarter.

GEL 199—Special Study for Advanced Undergraduates (1-5)
Variable. Special study for advanced undergraduates. (P/NP grading only.) GE credit: SE. Effective: 2013 Fall Quarter.

GEL 205—Advanced Field Stratigraphy (3)
Fieldwork—2 hours; Lecture—1 hour. Prerequisite(s): GEL 109; GEL 110; or Consent of Instructor. GEL 206 recommended. Fieldwork over spring break. Application of stratigraphic techniques to research problems. Collection, compilation, and interpretation of field data. Integration of data with models for deposition and interpretations of Earth history. Topics will vary. Offered irregularly. May be repeated for credit. Effective: 2013 Fall Quarter.

GEL 206—Stratigraphic Analysis (3)
Lecture—3 hours. Prerequisite(s): GEL 109; GEL 109L; or Consent of Instructor. GEL 144 recommended. Topics in advanced methods of stratigraphic analysis, regional stratigraphy and sedimentation, and sedimentary basin analysis. Emphasis on techniques used to interpret stratigraphic record and on current issues in stratigraphy and sedimentation. Offered irregularly. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

GEL 214—Active Tectonics (3)
Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Active deformation associated with faults, landslides, and volcanoes. Geodetic measurement techniques such as triangulation, trilateration, leveling, Global Positioning System (GPS), and radar interferometry. GPS data acquisition and analysis. Inversion of geodetic data and mechanical models of crustal deformation. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 216—Tectonics (3)
Lecture/Discussion—3 hours. Prerequisite(s): GEL 101; or Consent of Instructor. Nature and evolution of tectonic features of the Earth. Causes, consequences, and evolution of plate motion, with selected examples from the Earth's deformed belts. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 217—Topics in Geophysics (3)
Lecture—1 hour; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Discussion and evaluation of current research in a given area of geophysics. Topic will change from year to year. Offered in alternate years. May be repeated for credit. Effective: 2013 Fall Quarter.

GEL 218—Analysis of Structures in Deformed Rocks (3)
Seminar—3 hours. Prerequisite(s): GEL 100; GEL 100L; GEL 101; GEL 101L; GEL 170; or Consent of Instructor. Recent advances in the understanding and analysis of structures in brittlely and ductilely deformed rocks. Detailed investigation of the characteristics of the structures, models for their formation, and applications to inferring the kinematics of larger scale tectonics. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 219—Fracture and Flow of Rocks (3)
Lecture—3 hours. Prerequisite(s): GEL 100; GEL 101; or Consent of Instructor. Origins of those structures in rocks associated with brittle and ductile deformation. Theoretical analysis, using continuum mechanics, and experimental evidence for the origin of the structures with emphasis on deformational processes in the earth. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 220—Mechanics of Geologic Structures (3)
Lecture—3 hours. Prerequisite(s): MAT 021C; (PHY 009A; or PHY 005A); GEL 170; or Consent of Instructor; MAT 021D and MAT 022A recommended. Development in tensor notation of the balance laws of continuum mechanics, and constitutive theories of elasticity, viscosity, and plasticity and their application to understanding development of geologic structures such as fractures, faults, dikes, folds, foliations,
and boudinage. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 226—Advanced Sedimentary Petrology (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): GEL 144; or Consent of Instructor. Advanced petrography and geochemistry of sediments and sedimentary rocks. Geochemical, textural and mineralogical evolution of sedimentary rocks reflecting depositional or burial processes. Laboratory work emphasizes thin section study of rocks. Offered irregularly. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

GEL 227—Stable Isotopes Biogeochemistry (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Discussion and application of stable isotope techniques for scientific research problems. Course emphasizes carbon, oxygen, nitrogen, hydrogen and sulfur isotopes. Laboratory will develop basic skills of cryogenic gas extraction and specific techniques for individual research using stable isotopes. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 228—Topics in Paleoceanography (3)
Lecture—3 hours. Prerequisite(s): GEL 108; GEL 150A; or Consent of Instructor. Critical discussion and review of selected topics in paleoceanography and paleoclimatology relating to the history of the processes controlling and affecting climate change and ocean circulation throughout the geologic record. Topics vary. Offered irregularly. May be repeated for credit. Effective: 2013 Fall Quarter.

GEL 230—Geomorphology and River Management (3)
Seminar—3 hours. Prerequisite(s): GEL 139; Or equivalent; graduate standing. Impacts of management and land use activities on the geomorphology of rivers and streams. Evaluation and use of analytical tools for river assessment. Assessment of river and stream restoration strategies and emerging issues in river management. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

GEL 232—The Oceans and Climate Change (3)
Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Modern climate change and linkages between the ocean-atmosphere-cryosphere-terrestrial climate system. Importance of the ocean in forcing climate change, and the impacts of anthropogenic processes on the ocean. Topics vary. Offered irregularly. May be repeated up to 3 time(s). Effective: 2013 Fall Quarter.

GEL 235—Surface Processes (3)
Seminar—3 hours. Prerequisite(s): GEL 050; GEL 050L; GEL 139; MAT 021B or MAT 016B recommended. Recent advances in the analysis of landforms and their evolution. Detailed investigation of the tools used to document surface processes. Evaluation of concepts and processes that govern landscape evolution. Offered irregularly. May be repeated for credit. Effective: 2013 Fall Quarter.

GEL 236—Inverse Theory in Geology and Geophysics (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Inversion of data for model parameters. Evaluation of parameter uncertainties. Linear and nonlinear problems for discrete and continuous models. Bakus-Gilbert inversion. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 238—Theoretical Seismology (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Elastodynamic wave equation. Greens functions and source representations. Ray theory. Plane and spherical waves and boundary conditions. Elastic wave propagation in stratified media. (P/F grading only.) Effective: 2013 Fall Quarter.

GEL 240—Geophysics of the Earth (3)
Lecture—3 hours. Prerequisite(s): PHY 009B; MAT 022B Physics of the earth's crust, mantle, and core. Laplace's equation and spherical harmonic expression of gravity and magnetic fields. Elastic wave equation in geologic media. Body and surface seismic waves. Equations of state, thermal structure of the earth. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 241—Geomagnetism (3)
Lecture—3 hours. Prerequisite(s): Graduate standing. Nature and origin of the Earth's magnetic field. Present field and recent secular variation. Spherical harmonic analysis. Paleosecular variation. Polarity transitions and geomagnetic excursions. Statistics of polarity intervals. Dynamo theory. Planetary magnetism. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 242—Paleomagnetism (3)
Lecture—3 hours. Prerequisite(s): Graduate standing. Principles and applications of paleomagnetism. Physical basis of rock and mineral magnetism. Field and laboratory techniques. Instrumentation. Analysis of paleomagnetic data. Statistical methods. Rock magnetic properties. Geological and geophysical applications. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 246—Physical Chemistry of Metamorphic Processes (3)
Lecture—3 hours. Prerequisite(s): GEL 145; CHE 110A; or Consent of Instructor. Physiochemical principles of metamorphic mineral assemblages and methods of interpreting the paragenesis of metamorphic rocks. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 247—Metamorphic Petrology Seminar (3)
Seminar—3 hours. Prerequisite(s): GEL 145; or Consent of Instructor. GEL 246 recommended. Selected topics in metamorphic petrology (e.g., mass transport processes, tectonic settings, geothermometry, thermal structure of metamorphic belts, regional studies). Offered irregularly. May be repeated for credit. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 250—Advanced Geochemistry Seminar (3)
Seminar—3 hours. Prerequisite(s): GEL 146; or Consent of Instructor. Critical review of selected topics in geochemistry including: ore genesis, hydrothermal and geothermal fluids, recent and ancient sediments, isotope geology, origin and chemistry of the oceans. Subject varies yearly depending on student interest. May be repeated for credit. May be repeated for credit. Effective: 2013 Fall Quarter.

GEL 251—Advanced Topics in Isotope Geochemistry and Cosmochemistry (3)
Lecture/Discussion—2 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Astrophysical context on origin of Solar System, synthesis of chemical elements, condensation sequence, star and planet formation, cosmochronology, building blocks of planets, development on planets' layered structure, atmosphere and hydrosphere and the role of comets/asteroids for volatile delivery. Offered irregularly. May be repeated up to 3 time(s) when topics differs. Effective: 2013 Fall Quarter.

GEL 253—Current Topics in Igneous Petrology (3)
Seminar—3 hours. Prerequisite(s): GEL 143; or Consent of Instructor. Graduate standing in Geology. Topical seminar designed to help graduate students develop and maintain familiarity with current and past literature related to igneous rock petrogenesis. May be repeated for credit when topic differs. May be repeated for credit when topic differs. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 254—Physical Chemistry of Igneous Processes (3)
Lecture—3 hours. Prerequisite(s): CHE 110A; GEL 143; and Consent of Instructor. GEL 143 or consent of instructor; CHE 110B and CHE 110C recommended. Introduction of modern concepts in chemical thermodynamics and kinetics, and fluid dynamics of magmatic systems for graduate students in petrology. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 255—Experimental Petrology (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): GEL 143; or Consent of Instructor. Introduction to techniques and methods of design and executing experiments on Earth-forming minerals and rocks. Problems and examples from igneous and metamorphic petrology will be utilized. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 260—Paleontology (3)
Seminar—3 hours. Prerequisite(s): Graduate standing in geology or a biological science. Selected problems in paleontology. Subject to be studied will be decided at an organizational meeting. Offered irregularly. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

GEL 261—Paleobiology Graduate Seminar 1: Evolutionary aspects (3)
Lecture—1 hour; Seminar—2 hours. Prerequisite(s): Graduate standing in Geology or a biological science; qualified undergraduates will be accepted on an exception-only basis. This course will treat one or more of several topics in paleobiology from a phylogenetic perspective, including major patterns in evolution, building the tree of life, extinction and phylogeny, phylogeny of major phyla, and the relation between taxonomy and phylogeny. May be repeated for credit when topic varies. Effective: 2013 Fall Quarter.

GEL 262—Paleobiology Graduate Seminar: Methodological aspects (3)
Lecture—1 hour; Seminar—2 hours. One or more major methods used in the study of fossils: Morphometrics and three-dimensional reconstruction of fossils, phylogenetic methodology, the application of geochemical techniques, and electron microscopy. May be repeated up to 4 time(s) topic varies. Effective: 2013 Fall Quarter.

GEL 281N—Instrumental Techniques for Earth Scientists (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): MAT 021A; MAT 021B; MAT 021C; ((PHY 007A, PHY 007B, PHY 007C) or (PHY 009A, PHY 009B, PHY 009C)); or Consent of Instructor. Laboratory research techniques for new graduate students in Geology. Demonstration of and exposure to appropriate techniques in research. Effective: 2013 Fall Quarter.

GEL 285—Field Studies in Marine Geochemistry (2-8)
Fieldwork—6-40 hours; Laboratory—1-3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Marine geochemistry with the opportunity of going to sea or into the field on land. Techniques of seafloor mapping using bottom photography, marine geochemical sampling, and method of data reduction and sample analysis. Analysis of data/samples collected. Effective: 2013 Fall Quarter.

GEL 290—Seminar in Geology (1)
Discussion—1 hour; Seminar—1 hour. Presentation and discussion of current topics in geology by visiting lecturers, staff, and students. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 291—Geology of the Sierra Nevada (1)
Seminar. Prerequisite(s): Consent of Instructor. Short oral presentations by students and faculty concerning results of their past work and plans for future work in the Sierra. A written abstract is required following the format required at professional meetings. Offered irregularly. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 292—River Forum (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Review and discussion of latest research and fundamental issues surrounding riverine systems, with emphasis on physical processes. Topics vary. Offered irregularly. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 293—Geologic Event of the Week (1)
Discussion—0.5 hours; Seminar—0.5 hours. Prerequisite(s): Graduate standing. Seminar/discussion group to review and discuss recent earthquakes, volcanic eruptions, and other significant geologic events. The focus is on understanding the available observations, the physical processes behind each event, the geological setting, and societal consequences. Offered irregularly. May be repeated up to 3 time(s) for up to 3 units. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 294—Structure/Tectonics Forum (1)
Seminar—1 hour. Prerequisite(s): Graduate student in geology or consent of instructor. Seminar/discussion group to review and discuss latest research in structural geology and tectonics, and on-going research of participants. Topics will vary each quarter depending on the interests of the group. Occasional field trips to areas of current interest. May be repeated for credit when topic differs. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 295—Geophysics Forum (1)
Discussion—0.5 hours; Seminar—0.5 hours. Prerequisite(s): GEL 100; GEL 101; or Consent of Instructor. Seminar/discussion group to review and discuss latest research in geophysics, and on-going research of participants. Topics will change each quarter depending on the interests of the group. Offered irregularly. May be repeated for credit when topic differs. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 296—Advanced Problems in Tectonics (3)
Seminar—3 hours. Prerequisite(s): GEL 101; and Consent of Instructor. Seminar dealing with current problems in tectonics of selected regions. Topics will change from year to year. Emphasis on study of recent literature. Offered irregularly. May be repeated for credit. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 297—Geophysics Forum (1)
Discussion—0.5 hours; Seminar—0.5 hours. Prerequisite(s): Graduate student status in the Geology Department, or consent of instructor. Seminar/discussion group to review and discuss latest research in geophysics, and on-going research of participants. Topics will change each quarter depending on the interests of the group. Offered irregularly. May be repeated up to 3 time(s). (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 298—Group Study (1-5)
Variable. Group study. Effective: 2013 Fall Quarter.

GEL 299—Research (1-12)
Variable. Research. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 390—Methods of Teaching Geology (2)
Extensive Writing/Discussion—2 hours. Prerequisite(s): Graduate student standing in Geology. Introduction to graduate-level writing and undergraduate-level teaching skills in geology. Persuasive (proposal) writing workshop; discussions on campus teaching resources, presenting information, managing classroom dynamics, evaluating student performance. Participation in teaching program required for Ph.D. in Geology. (S/U grading only.) Effective: 2014 Spring Quarter.

GEL 391—Ethical Issues in Earth Science (1)
Seminar—1 hour. Prerequisite(s): Graduate standing in Geology or consent of instructor. Reading and discussion of ethical issues arising in the earth sciences. Topics include scientific misconduct, gender equity in science, authorship of scientific papers, establishing priorities in research, and related issues. Offered irregularly. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 396—Teaching Assistant Training Practicum (1-4)
Variable. Teaching assistant training. May be repeated for credit. (P/NP grading only.) Effective: 2013 Fall Quarter.

Earth & Planetary Sciences Teaching Credential

Earth & Planetary Sciences Teaching Credential | Earth & Planetary Sciences Teaching Credential

See Science Teaching Credential.

East Asian Languages & Cultures

East Asian Languages & Cultures | East Asian Languages & Cultures Information

(College of Letters and Science)

Department Office. 211 Sproul Hall; 530-752-4999; http://chinese.ucdavis.edu; http://japanese.ucdavis.edu

Faculty. https://ealc.ucdavis.edu/people

The Major Program

The department offers a core language program in both Chinese and Japanese, and courses in literature and culture. The core language program in Chinese has two tracks: one for students who have no background whatsoever and one for students with prior language background.

East Asian Languages & Cultures | CHN Courses

Courses in CHN:

CHN 001—Elementary Chinese (5)
Lecture/Discussion—5 hours. Prerequisite(s): No background in Chinese or placement exam or consent of instructor. Developing elementary level skills of listening, speaking, reading and writing in Mandarin Chinese in everyday communication settings. Introduction of fundamentals of pronunciation, grammar, and Chinese characters will be introduced. GE credit: AH, OL, WC. Effective: 2016 Fall Quarter.

CHN 001A—Accelerated Intensive Elementary Chinese (15)
Lecture/Discussion—15 hours. Prerequisite(s): No background in Chinese or placement exam or consent of instructor. Introduction and practice in contexts of pronunciation, writing system, basic grammar and vocabulary as basis of communicative competency in Mandarin Chinese within a special nine-week intensive course which combines courses 1, 2 and 3. Not open for credit to students who have completed CHN 001, CHN 002, or CHN 003. GE credit: AH, OL, WC. Effective: 2016 Fall Quarter.

CHN 001BL—Accelerated Written Chinese I (5)
Lecture—5 hours. Prerequisite(s): Placement exam or consent of instructor. Trainings on all the communicative skills of listening, speaking, reading, and writing for students who already have elementary level ability to understand or speak Mandarin Chinese. Emphases on standard Mandarin pronunciation, Chinese characters, and discourse level conversations. Not open for credit to students who have completed CHN 008. GE credit: AH, OL, WC. Effective: 2016 Fall Quarter.

CHN 001CN—Mandarin for Cantonese Speakers I (5)
Lecture—5 hours. Prerequisite(s): Placement exam or consent of instructor. Training in spoken Mandarin, particularly in the phonetic transcription system known as pinyin, for students who already read and write Chinese. Not open for credit to students who have completed CHN 007. GE credit: AH, OL, WC. Effective: 2016 Fall Quarter.

CHN 002—Elementary Chinese (5)
Lecture/Discussion—5 hours. Prerequisite(s): CHN 001; Or placement exam or consent of instructor. Continuation of elementary level skill development in listening, speaking, reading and writing Mandarin Chinese in everyday communication settings. Continued introduction of basic vocabulary and characters as well as core grammar, and further train pronunciation. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 002BL—Accelerated Written Chinese II (5)
Lecture—5 hours. Prerequisite(s): CHN 001BL; Or placement exam or consent of instructor. Further trainings on all the communicative skills of listening, speaking, reading, and writing for students that already have elementary level ability to understand or speak Mandarin Chinese. Emphases on standard Mandarin pronunciation, Chinese characters, and discourse level conversations. Not open for credit to students who have completed CHN 018. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 002CN—Mandarin for Cantonese Speakers II (5)
Lecture—5 hours. Prerequisite(s): CHN 001CN; Or placement exam or consent of instructor. Continuation of course 1CN. Training in spoken Mandarin for students who can already read and write Chinese. Not open for credit to students who have completed CHN 017. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 003—Elementary Chinese (5)
Lecture/Discussion—5 hours. Prerequisite(s): CHN 002; Or placement exam or consent of instructor. Continuation of elementary level skill development in listening, speaking, reading and writing Mandarin Chinese in everyday communication settings. Continued introduction of basic vocabulary and characters as well as core grammar, and further train pronunciation. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 003BL—Accelerated Written Chinese III (5)
Lecture—5 hours. Prerequisite(s): CHN 002BL; Or placement exam or consent of instructor. Continuation of course 2BL with further trainings on all the communicative skills of listening, speaking, reading, and writing with emphases on standard Mandarin pronunciation, Chinese characters, and discourse level conversations in more communication settings. Not open for credit to students who have completed CHN 028. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 003CN—Mandarin for Cantonese Speakers III (5)
Lecture—5 hours. Prerequisite(s): CHN 002CN; Or placement exam or consent of instructor. Continuation of course 2CN. Prepares students for entering upper division courses in Chinese. Not open for credit to students who have completed CHN 027. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 004—Intermediate Chinese (5)
Lecture/Discussion—5 hours. Prerequisite(s): CHN 003 or placement exam or consent of instructor. Continuation of intermediate-level communication skills in spoken and written Mandarin, based on language skills developed in course 3. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 004A—Accelerated Intensive Intermediate Chinese (15)
Lecture/Discussion—15 hours. Prerequisite(s): CHN 003 or CHN 001A or placement exam or consent of instructor. Special nine-week accelerated, intensive summer session course that combines the work of courses 4, 5, and 6. Intermediate-level training in spoken and written Chinese in cultural and communicative contexts, based on language skills developed in course 3 or 1A. Not open to students who have completed CHN 004, CHN 005, or CHN 006. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 005—Intermediate Chinese (5)
Lecture/Discussion—5 hours. Prerequisite(s): CHN 004 or placement exam or consent of instructor. Training continues at intermediate-level in spoken and written Chinese in cultural contexts, based on language skills developed in course 4. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 006—Intermediate Chinese (5)
Lecture/Discussion—5 hours. Prerequisite(s): CHN 005; CHN 005 or placement exam or consent of instructor. Intermediate-level training in spoken and written Chinese in cultural contexts, based on language skills developed in course 5. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 007—Chinese Business Culture (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Open to non-heritage students who have no prior knowledge of, or background in, the Chinese language; anyone who has taken Chinese language classes before or after being enrolled at UC Davis, or anyone who is currently enrolled in a Chinese language class, or who speaks any Mandarin or Chinese dialect (e.g., Cantonese), cannot take the course for credit without the instructor's permission. Introduction to business culture of China. Basic conversation and Romanization of Chinese words. GE credit: AH, OL, SS, WC. Effective: 2015 Winter Quarter.

CHN 010—Modern Chinese Literature (In English) (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Introductory course requiring no knowledge of Chinese language or history. Reading and discussion of short stories and novels and viewing of two films. Designed to convey a feeling for what China has experienced in the twentieth century. Not open for credit to students who have already taken, or are taking concurrently, CHN 104. GE credit: AH, WC. Effective: 2008 Spring Quarter.

CHN 011—Great Books of China (in English) (4)
Discussion—1 hour; Lecture—3 hours. Selected readings in English translation are supplemented with background information on periods, authors and the interrelationships of culture, literature and social change. Methods of analysis are introduced and applied in class discussions. GE credit: AH, WC. Effective: 1997 Winter Quarter.

CHN 050—Introduction to the Literature of China and Japan (4)
Lecture/Discussion—4 hours. Methods of literary analysis and their application to major works from the various genres of Chinese and Japanese literature (in translation),
including film. East Asian cultural traditions will also be introduced. (JPN 050.) GE credit: AH, WC. Effective: 2012 Fall Quarter.

CHN 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHN 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHN 100A—Chinese Intellectual Traditions: Daoist Traditions (4)
Lecture/Discussion—4 hours. Prerequisite(s): A course in Chinese history recommended. English-language survey of key Daoist texts and scholarship. Topics include Daoist concepts of the cosmos, the natural world, scripture, the body, and immortality; Daoist divinities; Daoism and the state. (RST 175A.) GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 100B—Confucian Traditions (4)
Lecture/Discussion—4 hours. Key aspects of the Confucian tradition in dynastic China. Major themes addressed include ritual, classical studies, and Confucian influences on the Chinese family and state. GE credit: AH, WC. Effective: 2014 Fall Quarter.

CHN 101—Chinese Film (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. English language survey of Chinese film, from its inception to the end of the twentieth century. Chinese films as important texts for understanding national, transnational, racial, gender, and class politics of modern China. (CTS 147A.) GE credit: AH, VL, WC. Effective: 2016 Spring Quarter.

CHN 102—Chinese American Literature (In English) (4)
Lecture/Discussion—3 hours; Term Paper/Discussion—1 hour. English language survey of Chinese American literature which reflects cultural roots in China before immigration and the diaspora experience in the United States after immigration. Memory, nostalgia, national identities, cross-cultural communication, globalization, and trans-national politics. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 103—Modern Chinese Drama (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. English language survey of modern Chinese spoken drama in the twentieth century and its major playwrights, in the context of Chinese history and the interaction of Chinese culture with other cultures. GE credit: AH, VL, WC. Effective: 2016 Spring Quarter.

CHN 104—Modern Chinese Fiction (in English) (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. English language survey of Chinese fiction as it evolved amidst the great historical, social and cultural changes of the twentieth century. Thorough study of the most influential writers and genres. GE credit: AH, WC. Effective: 2016 Fall Quarter.

CHN 105—Western Influences on Twentieth-Century Chinese Literature (in English) (4)
Discussion—1 hour; Lecture—3 hours. Introduction of Western literary thought into modern China, the experimentation with Western literary forms and techniques, and the development of Marxism in contemporary literary writing. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 106—Chinese Poetry (in English) (4)
Discussion—1 hour; Lecture—3 hours. Organized topically and chronologically, the lyric tradition is explored from the dawn of folk songs down to modern expressions of social protest. Topics include friendship, love, oppression, war, parting, death, ecstasy and beauty. All readings are in English. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 107—Traditional Chinese Fiction (in English) (4)
Discussion—1 hour; Lecture—3 hours. English-language course studying the dawn of Chinese fiction and its development down to modern times. Combines survey history with close reading of representative works such as The Story of the Stone and
famous Ming-Qing short stories. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 108—Poetry of China and Japan (in English) (4)
Discussion—1 hour; Lecture—3 hours. A comparative approach to Chinese and Japanese poetry, examining poetic practice in the two cultures; includes a general outline of the two traditions, plus study of poetic forms, techniques, and distinct treatments of universal themes: love, nature, war, etc. (JPN 108.) GE credit: AH, WC. Effective: 1997 Winter Quarter.

CHN 109A—Topics in Chinese Literature; Crime and Punishment (4)
Discussion—1 hour; Lecture—3 hours. Topics in Chinese literature; crime and punishment. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 109C—Topics in Chinese Literature; Women Writers (in English) (4)
Discussion—1 hour; Lecture—3 hours. Topics in Chinese literature; women writers. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 109D—Topics in Chinese Literature; The Knight-Errant (in English) (4)
Discussion—1 hour; Lecture—3 hours. Topics in Chinese literature; the knight-errant. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 109E—Topics in Chinese Literature; The City in Fiction (in English) (4)
Discussion—1 hour; Lecture—3 hours. Topics in Chinese literature; the city in fiction. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 109G—Topics in Chinese Literature; The Literature of Twentieth-Century Taiwan (in English) (4)
Discussion—1 hour; Lecture—3 hours. Topics in Chinese literature; the literature of twentieth-century Taiwan. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 109H—Topics in Chinese Literature; Popular Literature (in English) (4)
Discussion—1 hour; Lecture—3 hours. Topics in Chinese literature; popular literature. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 109I—Topics in Chinese Literature; Scholar & The Courtesan (in English) (4)
Discussion—1 hour; Lecture—3 hours. Topics in Chinese literature; the scholar and the courtesan. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 110—Great Writers of China: Texts and Context (in English) (4)
Discussion—1 hour; Lecture—3 hours. Examination of major theoretical concepts and interpretive methods in the study of literature by using examples from the Chinese tradition; discussions of classical and modern works with an emphasis on the relations between literature, author, society, and culture. GE credit: AH, WC. Effective: 2017 Spring Quarter.

CHN 111—Modern Chinese: Reading and Discussion (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHN 006 C- or better or CHN 003BL C- or better or CHN 004A C- or better; Or placement exam or consent of instructor. Building on Chinese 6/3BL, further development of communication skills in Modern Standard Mandarin-speaking environments. Reading of dialogues/articles pertaining to contemporary China. GE credit: AH, OL, WC. Effective: 2017 Spring Quarter.

CHN 111A—Intensive Third-Year Chinese (12)
Lecture/Discussion—13.3 hours. Prerequisite(s): CHN 006 or CHN 003BL or CHN 004A; Or placement exam or consent of instructor. Not open to students who have completed course 111, 112, or 113. Nine-week intensive summer course combines courses 111, 112, and 113. Training at intermediate-high and advanced-low level in spoken and written Chinese in cultural and communicative contexts based on language skills developed in course 6. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 112—Modern Chinese: Reading and Discussion (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHN 111; Or placement exam or consent of instructor. Further development of communication skills from course 111 in Modern Standard Mandarin-speaking environments. Reading dialogues/articles pertaining to contemporary China issues and discussing ethical, moral, aesthetic, social, and cultural concerns. GE credit: AH, OL, WC. Effective: 2018 Winter Quarter.

CHN 113—Modern Chinese: Reading and Discussion (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHN 112; Or placement exam or consent of instructor. Continuation of course 112, further developing communication skills in Modern Standard Mandarin-speaking environments. Read dialogues/articles pertaining to contemporary China issues and discuss ethical, moral, aesthetic, social, and cultural concerns. Study strategies for moving between simplified and traditional Chinese characters. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 114—Introduction to Classical Chinese (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHN 112; Consent of Instructor. Or equivalent language proficiency. Introduction to the language in which, until the twentieth century, most official, documentary, scholarly, and belle-lettristic Chinese literature was written. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 115—Introduction to Classical Chinese II (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHN 114; or Consent of Instructor. Continuation of enhancing classical Chinese reading skills with literature ranging from the prose found in Han dynasty historical works, Six Dynasties anecdotal literature, and Tang occasional texts, as well as the poetic shi and fu genres. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 116—Introduction to Classical Chinese III (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHN 115; or Consent of Instructor. Translations of extended readings in the original sources and brief analyses of syntax. These sources will include texts written by well-known figures from the eighth through fifteenth centuries, composing in a wide variety of genres. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 120—Advanced Chinese (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHN 113; Or placement exam or consent of instructor. Evaluation of readings from various genres (literature, newspapers, TV and movies, etc.) develop advanced reading, writing, aural comprehension, and formal/professional speech skills in Mandarin Chinese. Chinese society/cultural studies, especially those sociocultural issues reflected in the language used in learning materials. May be repeated up to 1 time(s) Course material is different for each quarter of an academic year. Students may repeat course one time but repeat class cannot be for the same quarter taken in a previous academic year. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 130—Readings in Traditional Chinese Fiction (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHN 111; Or equivalent language proficiency. Examination of representative works of traditional Chinese fiction popular from the 12th Century until the 17th and 18th centuries. Translations in English of the Chinese texts will be available to students as reference. May be repeated up to 1 time(s). GE credit: AH, VL, WC. Effective: 2016 Spring Quarter.

CHN 131—Readings in Traditional Chinese Poetry (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHN 111; Consent of Instructor. Or equivalent language proficiency. Traditional Chinese poetry from its beginnings to the golden ages of Tang and Song, surveying forms and poets that best reveal the Chinese poetic sensibility and the genius of the language of Chinese poetry. GE credit: AH. Effective: 2016 Spring Quarter.

CHN 132—Readings in Modern Chinese Poetry (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHN 111; Consent of Instructor. Or equivalent language proficiency. Chinese poetry from the Literary Revolution of 1917 to the present, surveying works that embody exciting innovations and reflect the modernity of twentieth-century Chinese society and culture. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 133—Readings in Modern Chinese Prose and Drama (4)
Lecture—4 hours. Prerequisite(s): CHN 111; Or equivalent language proficiency. Literary works and scholarly essays on selected topics of Chinese prose and drama, development of a deep understanding of Chinese culture and society through sophisticated reading materials of these two important genres of the modern period. Conducted in Chinese. May be repeated up to 2 unit(s) when topic differs. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 134—Chinese Film in Chinese Language (4)
Film Viewing—3 hours; Lecture—3 hours. Prerequisite(s): CHN 111; Or equivalent language proficiency. Chinese film and scholarly essays on Chinese cinema and film history. Develop a deep understanding of Chinese culture and society through viewing and studying Chinese films in the Chinese language. GE credit: AH, OL, SS, VL, WC. Effective: 2016 Spring Quarter.

CHN 140—Readings in Classical Chinese (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Study and philological analysis of selected texts from the first millennium of Imperial China. May be repeated up to 2 time(s). GE credit: AH. Effective: 1997 Winter Quarter.

CHN 150—Fifth-Year Chinese: Selected Topics in Chinese Language, Literature, and Culture (4)
Lecture/Discussion—4 hours. Prerequisite(s): CHN 120; Or placement exam or consent of instructor. Examination of literary works and scholarly essays on selected topics of Chinese culture and society. Development of a deep understanding of Chinese culture and society through sophisticated Chinese speaking and writing exercises. May be repeated up to 3 time(s) when topic differs. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

CHN 160—The Chinese Language (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): CHN 006 (can be concurrent) or CHN 003BL (can be concurrent) or CHN 003CN (can be concurrent) or CHN 004A (can be concurrent); Or placement exam or consent of instructor. LIN 001 recommended. Evaluation of the Chinese language viewed in its linguistic context, synchronically and diachronically. Historical phonology, classical and literary language, rise of written vernacular, descriptive grammar of modern standard Chinese, dialectal variation, and sociolinguistic factors. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 160—The Chinese Language (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): CHN 006 (can be concurrent) or CHN 003BL (can be concurrent) or CHN 003CN (can be concurrent) or CHN 004A (can be concurrent); Or placement exam or consent of instructor. LIN 001 recommended. Introduction to structural features of Chinese (Mandarin) sounds, lexicon, grammar, and writing (characters), as well as relevant dialectal and sociolinguistic issues of the language. GE credit: AH, WC. Effective: 2018 Fall Quarter.

CHN 192—Chinese Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing and consent of instructor. Work experience in the Chinese language, with analytical term paper on a topic approved by instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHN 194H—Senior Thesis Honors Project (1-5)
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. Senior standing and qualification for the Chinese honors program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in Chinese literature, civilization, or language studies. May be repeated up to 8 unit(s). (P/NP grading only.) GE credit: AH, WC, WE. Effective: 2017 Fall Quarter.

CHN 197T—Tutoring in Chinese (1-4)
Tutorial—1-4 hours. Prerequisite(s): Consent of Department. Leading of small voluntary discussion groups affiliated with one of the Department's regular courses. May be repeated up to 4 unit(s). (P/NP grading only.) Effective: 2016 Summer Session 1.

CHN 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Summer Session 1.

CHN 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHN 297—Directed Independent Study (4)
Conference—1 hour; Independent Study; Term Paper. Prerequisite(s): Consent of Instructor. Restricted to graduate students. Directed independent study on a topic culminating in a term paper. Independent studies may only be arranged with consent of the instructor and when graduate seminars are unavailable. May be repeated up to 5 time(s). Effective: 2017 Winter Quarter.

CHN 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

CHN 396—Teaching Assistant Training Practicum (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Any course taught by a graduate student under the direction of the Director. May be repeated for credit. (S/U grading only.) Effective: 2016 Spring Quarter.

East Asian Languages & Cultures | JPN Courses

Courses in JPN:

JPN 001—Elementary Japanese (5)
Lecture/Discussion—5 hours. Introduction to spoken and written Japanese in cultural contexts, with emphasis on communication. GE credit: AH, OL, WC. Effective: 2014 Fall Quarter.

JPN 001A—Accelerated Intensive Elementary Japanese (15)
Lecture/Discussion—15 hours. Special 12 week accelerated, intensive summer session course that combines the work of courses 1, 2 and 3. Introduction to Japanese grammar and development of all language skills in a cultural context with emphasis on communication. not open for credit to students who have completed JPN 001, JPN 002, or JPN 003. GE credit: AH, OL, WC. Effective: 2014 Summer Special Session.

JPN 001AS—Intensive Elementary Japanese (15)
Lecture/Discussion—15 hours. Intensive course taught combining the work of courses 1, 2 and 3. Introduction to Japanese grammar and development of all language skills in a cultural context with emphasis on communication. Offered in Japan. not open for credit to students who have taken JPN 001, JPN 002, or JPN 003. GE credit: AH, OL, WC. Effective: 2014 Fall Quarter.

JPN 002—Elementary Japanese (5)
Lecture/Discussion—5 hours. Prerequisite(s): JPN 001 C- or better; Or the equivalent language proficiency. Continuation of training in basic Japanese spoken and written skills. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

JPN 003—Elementary Japanese (5)
Lecture/Discussion—5 hours. Prerequisite(s): JPN 002 C- or better; Or the equivalent language proficiency. Continuation of training in basic spoken and written skills in Japanese language. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

JPN 004—Intermediate Japanese (5)
Lecture/Discussion—5 hours. Prerequisite(s): JPN 003 C- or better; Or the equivalent language proficiency. Intermediate-level training in spoken and written Japanese in cultural context, based on language skills developed in course 3. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

JPN 005—Intermediate Japanese (5)
Lecture/Discussion—5 hours. Prerequisite(s): JPN 004 C- or better; Or the equivalent language proficiency. Intermediate-level training in spoken and written Japanese in cultural context, based on language skills developed in course 4. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

JPN 006—Intermediate Japanese (5)
Lecture/Discussion—5 hours. Prerequisite(s): JPN 005 C- or better; Or the equivalent language proficiency. Intermediate-level training in spoken and written Japanese in cultural context, based on language skills developed in course 5. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

JPN 007S—Intensive Intermediate Japanese (20)
Lecture/Discussion—20 hours. Prerequisite(s): JPN 002 C- or better; or the equivalent language proficiency. Consent of Instructor. Special intensive course that combines the work of courses 3, 4, 5, and 6. Introduction to Japanese grammar and development of all language skills in a cultural context with emphasis on communication. Taught in Japan. GE credit: AH, OL, WC. Effective: 2017 Winter Quarter.

JPN 010—Masterworks of Japanese Literature (in English) (4)
Discussion—1 hour; Lecture—3 hours. Introduction to Japanese literature: readings and discussion in English of important works from earliest times to the present. GE credit: AH, WC, WE. Effective: 2011 Fall Quarter.

JPN 015S—Introduction to Japanese Culture (2)
Fieldwork; Lecture/Discussion—2 hours. Restricted to students enrolled in units for the Kyoto Quarter Abroad program. Aspects of Japanese culture: literature, history, religion, art, language, and society. Conducted in English; taught in Japan. (P/NP grading only.) GE credit: AH, WC. Effective: 2014 Fall Quarter.

JPN 025—Japanese Language and Culture (in English) (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 001 or LIN 001 or ANT 004 recommended. Classification and communication of experience in Japanese culture; principles of language use in Japanese society. Speech levels and honorific language, language and gender, minority languages, literacy. Role of Japanese in artificial intelligence and computer science. GE credit: AH, SS, WC, WE. Effective: 2014 Fall Quarter.

JPN 031—Basic Kanji (4)
Lecture—3 hours; Practice—1 hour. Prerequisite(s): JPN 001 C- or better; or Consent of Instructor. Or equivalent proficiency of basic writing system (Hiragana and Katakana). Restricted to students who have never been exposed to any form of Kanji or Chinese characters before; students who have completed schooling up to the 6th grade in the Japanese education system or equivalent or whose native languages have Chinese character orthography are not allowed to register this course. Introduction and mastery of 300 basic Kanji or Chinese characters to establish a solid foundation in the novel and complex Kanji encountered while learning Japanese. GE credit: AH, WC. Effective: 2016 Spring Quarter.

JPN 050—Introduction to the Literature of China and Japan (4)
Lecture/Discussion—4 hours. Methods of literary analysis and their application to major works from the various genres of Chinese and Japanese literature (in translation),
including film. East Asian cultural traditions will also be introduced. (Chinese 50.) GE credit: AH, WC. Effective: 2012 Fall Quarter.

JPN 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study. (P/NP grading only.) GE credit: AH. Effective: 2016 Fall Quarter.

JPN 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

JPN 101—Japanese Literature in Translation: The Early Period (4)
Discussion—1 hour; Lecture—3 hours. Study of early Japanese literature from the Nara to the end of the Heian period through a broad survey of the major literary genres such as lyric poetry, court diaries, prose narratives, poem-tales, and classical Chinese writings. GE credit: AH, WC, WE. Effective: 2012 Winter Quarter.

JPN 102—Japanese Literature in Translation: The Middle Period (4)
Discussion—1 hour; Lecture—3 hours. Study of the major literary genres from the twelfth century to the second half of the nineteenth century including poetry, linked-verse, military chronicles, no drama, Buddhist literature, haiku, haibun, kabuki, bunraku, plays and Edo prose narratives. GE credit: AH, WC, WE. Effective: 2012 Winter Quarter.

JPN 103—Japanese Literature in Translation: The Modern Period (4)
Discussion—1 hour; Lecture—3 hours. Modern Japanese literature from the 1870s to the 1970s. Surveys representative literary works and ideas against the social and intellectual background of the Meiji, Taisho, and Showa periods. GE credit: AH, WC. Effective: 1997 Winter Quarter.

JPN 104—Modern Japanese Literature: War and Revolution (3)
Lecture/Discussion—3 hours. Perspectives and sensibilities with which major modern Japanese writers have interpreted the traumatic and often poignant experiences of war and socio-political upheavals from the late nineteenth century to the 1970s. Lectures, discussions, and readings in English. GE credit: AH, WC. Effective: 1997 Winter Quarter.

JPN 105—Modern Japanese Literature: Hero and Anti-hero (4)
Lecture/Discussion—4 hours. The ways in which representative hero and anti-hero protagonists in modern Japanese literature perceive, confront, challenge, and resolve a wide array of social, political, and moral problems of their times. Course taught in English. GE credit: AH, WC. Effective: 2002 Spring Quarter.

JPN 106—Japanese Culture Through Film (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Aspects of Japanese culture such as love, sexuality, war, the military, the family, the position of women, growing up and death as portrayed in Japanese cinema. Lectures, discussion, and readings in English. Films with English subtitles. GE credit: AH, VL, WC. Effective: 2017 Spring Quarter.

JPN 107—Modern Japanese Autobiographies (in English) (4)
Discussion—1 hour; Lecture—3 hours; Term Paper. Exploring the modern and contemporary Japanese social and cultural
landscape through critical analysis of modern Japanese autobiographies by prominent and other authors in the 19th and 20th centuries. GE credit: AH, WC. Effective: 2016 Spring Quarter.

JPN 108—Poetry of China and Japan (in English) (4)
Discussion—1 hour; Lecture—3 hours. A comparative approach to Chinese and Japanese poetry, examining poetic practice in the two cultures; includes a general outline of the two traditions, plus study of poetic forms, techniques, and distinct treatments of universal themes: love, nature, war, etc. (Chinese 108.) GE credit: AH, WC. Effective: 1997 Winter Quarter.

JPN 109—Japanese Popular Culture (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Japanese popular culture, from its medieval/early modern precedents to contemporary incarnations. Emphasis on major forms of popular culture that emerged in the 20th century, including comics, animation, science fiction, and fantasy. GE credit: AH, VL, WC. Effective: 2017 Fall Quarter.

JPN 111—Modern Japanese: Reading and Discussion (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 006 C- or better; Or the equivalent language proficiency. Readings in modern Japanese short stories, newspaper articles, and essays; conversation practice based on these readings. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

JPN 112—Modern Japanese: Reading and Discussion (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 111 C- or better; Or the equivalent language proficiency. Continuation of course 111. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

JPN 113—Modern Japanese: Reading and Discussion (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 112 C- or better; Or the equivalent language proficiency. Continuation of course 112. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

JPN 114A—Spoken Japanese (2)
Discussion—2 hours. Prerequisite(s): Consent of Instructor. Training in spoken Japanese for students with a basic working knowledge of the language. (P/NP grading only.) GE credit: OL. Effective: 2017 Spring Quarter.

JPN 114B—Spoken Japanese (2)
Discussion—2 hours. Prerequisite(s): JPN 114A C- or better; or Consent of Instructor. Or equivalent language proficiency. Continuation of course 114A. Training in spoken Japanese for students with a basic working knowledge of the language. (P/NP grading only.) GE credit: OL. Effective: 2016 Fall Quarter.

JPN 114C—Spoken Japanese (2)
Discussion—2 hours. Prerequisite(s): JPN 114B C- or better; or Consent of Instructor. Or equivalent language proficiency. Continuation of course 114B. Training in spoken Japanese for students with a basic working knowledge of the language. (P/NP grading only.) GE credit: OL. Effective: 2016 Fall Quarter.

JPN 115—Japanese Composition (2)
Lecture—2 hours. Prerequisite(s): JPN 006 C- or better; or Consent of Instructor. Development of skills in the techniques of writing Japanese. Practice in short essay writing with an aim toward mastery of the vocabulary and syntax of written style Japanese. Effective: 2016 Spring Quarter.

JPN 116—Culture and History in Kyoto (8)
Fieldwork; Lecture/Discussion—3 hours. Intensive course exploring the historical and cultural riches in Kyoto and its environs. Limited to students enrolled in the corresponding Quarter Abroad program. Takes place on-site in and around Kyoto, Japan. GE credit: AH, WC. Effective: 2017 Fall Quarter.

JPN 117S—Intensive Modern Japanese: Reading and Discussion (17)
Lecture/Discussion—17 hours. Prerequisite(s): JPN 005 C- or better; or Consent of Instructor. Or the equivalent language proficiency. Introduction to basic Japanese grammar and development of more advanced reading, writing, and conversation skills in a cultural context. Combination of courses 6, 111, 112, and 113 taught intensively in Japan. Not open to students who have taken JPN 006, JPN 111, JPN 112, or JPN 113; an exception can be made for students who have taken JPN 006 or its equivalent, provided that those five units are deducted from the 19 total unit load. GE credit: AH, OL, WC. Effective: 2017 Winter Quarter.

JPN 121—Advanced Japanese I (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 113 C- or better; or Consent of Instructor. First of three courses in a series of fourth year Advanced Japanese which focuses on the levels of formality or politeness in conversation as well as socio-cultural aspects and topics in the Japanese society. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

JPN 122—Advanced Japanese II (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 121 C- or better; or Consent of Instructor. Second of three courses in a series of fourth-year Advanced Japanese which focuses on the levels of formality or politeness in conversation as well as socio-cultural aspects and topics in the Japanese society. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

JPN 123—Advanced Japanese III (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 122 C- or better; or Consent of Instructor. Third of three courses in a series of 4th year Advanced Japanese which focuses on the levels of formality or politeness in conversation as well as socio-cultural aspects and topics in the Japanese society. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

JPN 130—Readings in Modern Japanese Literature to 1926 (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): JPN 113; or equivalent language proficiency. Restricted to completion of course 113 or equivalent as determined by taking a placement exam or consent of instructor. Short stories and essays by Japanese writers of the Meiji and Taishô eras, from 1868 to 1926. Authors include Natsume Sôseki, Izumi Kyôka, Tanizaki Jun'ichirô and Akutagawa Ryûnosuke. Readings and discussion in Japanese with some emphasis on translation into English. GE credit: AH, WC. Effective: 2017 Winter Quarter.

JPN 130—Readings in Modern Japanese Literature to 1926 (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): JPN 113; or equivalent language proficiency, or consent of instructor. Restricted to completion of course 113 or equivalent as determined by taking a placement exam or consent of instructor. Short stories and essays by Japanese writers of the Meiji and Taishô eras, from 1868 to 1926. Authors include Natsume Sôseki, Izumi Kyôka, Tanizaki Jun'ichirô and Akutagawa Ryûnosuke. Readings and discussion in Japanese with some emphasis on translation into English. GE credit: AH, WC. Effective: 2018 Fall Quarter.

JPN 131—Readings in Modern Japanese Literature: 1920-1945 (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 113; Or the equivalent language proficiency. Fourth-year level reading of representative works of modern Japanese literature including short stories, novellas, diaries, memoirs, poetry and excerpts from novels and plays from 1920 through the militaristic era, to the end of the war years in 1945. GE credit: AH. Effective: 2016 Spring Quarter.

JPN 131—Readings in Modern Japanese Literature: 1920-1945 (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 113; or equivalent language proficiency, or consent of instructor. Fourth-year level reading of representative works of modern Japanese literature including short stories, novellas, diaries, memoirs, poetry and excerpts from novels and plays from 1920 through the militaristic era, to the end of the war years in 1945. GE credit: AH. Effective: 2018 Fall Quarter.

JPN 132—Readings in Modern Japanese Literature: 1945-1970 (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 113; Or the equivalent language proficiency. Continuation of course 131, but may be taken independently. Covers selected texts from the immediate post-war years beginning in 1945 down to 1970 and the post-war recovery. GE credit: AH. Effective: 2016 Spring Quarter.

JPN 132—Readings in Modern Japanese Literature: 1945-1970 (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 113; Or equivalent language proficiency, or consent of instructor. Continuation of course 131, but may be taken independently. Covers selected texts from the immediate post-war years beginning in 1945 down to 1970 and the post-war recovery. GE credit: AH. Effective: 2018 Fall Quarter.

JPN 133—Readings in Modern Japanese Literature: 1970 to Present (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 113; Or the equivalent language proficiency. Continuation of course 132, but may be taken independently. Covers selected texts from 1970 to the present. GE credit: AH, WC. Effective: 2016 Spring Quarter.

JPN 133—Readings in Modern Japanese Literature: 1970-Present (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 113; or equivalent language proficiency, or consent of instructor. Continuation of course 132, but may be taken independently. Covers selected texts from 1970 to the present. GE credit: AH, WC. Effective: 2018 Fall Quarter.

JPN 134—Readings in the Humanities: Traditional Culture (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): JPN 113; Or the equivalent language proficiency. Fourth-year level reading of modern works by major specialists on traditional Japanese culture: history, religion, thought, art, international relations, and literary history and criticism. Focus is equally on developing reading skills and learning about Japanese culture. GE credit: AH, WC. Effective: 2016 Spring Quarter.

JPN 134—Readings in the Humanities: Traditional Culture (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): JPN 113; or equivalent language proficiency, or consent of instructor. Fourth-year level reading of modern works by major specialists on traditional Japanese culture: history, religion, thought, art, international relations, and literary history and criticism. Focus is equally on developing reading skills and learning about Japanese culture. GE credit: AH, WC. Effective: 2018 Fall Quarter.

JPN 135—Readings in the Humanities: The Modern Period (4) ***Review all entries***
Lecture—3 hours; Term Paper. Prerequisite(s): JPN 113; Or the equivalent language proficiency. Fourth-year level reading of authentic modern writings on Japanese culture, history, philosophy, society, religion, law, politics, international relations, aesthetics, and comparative culture by prominent critics, commentators, and scholars. GE credit: AH, WC. Effective: 2016 Spring Quarter.

JPN 135—Readings in the Humanities: The Modern Period (4) ***Review all entries***
Lecture—3 hours; Term Paper. Prerequisite(s): JPN 113; or equivalent language proficiency, or consent of instructor. Fourth-year level reading of authentic modern writings on Japanese culture, history, philosophy, society, religion, law, politics, international relations, aesthetics, and comparative culture by prominent critics, commentators, and scholars. GE credit: AH, WC. Effective: 2018 Fall Quarter.

JPN 136—Readings in Newspapers and Magazines (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 113; Or the equivalent language proficiency. Fourth-year level reading of newspaper and magazine reports, articles, and editorials on domestic and international affairs relating to contemporary Japan. GE credit: AH, WC. Effective: 2016 Spring Quarter.

JPN 136—Readings in Newspapers and Magazines (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 113; or equivalent language proficiency, or consent of instructor. Fourth-year level reading of newspaper and magazine reports, articles, and editorials on domestic and international affairs relating to contemporary Japan. GE credit: AH, WC. Effective: 2018 Fall Quarter.

JPN 137—Readings in Contemporary Japanese Literature (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): JPN 113; Consent of Instructor. Or the equivalent language proficiency. Readings of short stories and essays by contemporary writers. Representative writers include Yoshimoto Banana, Otsuichi, Suzuki Koji, Kyogoku Natsuhiko, Ogawa Yoko, and Murakami Haruki. Readings and discussion in Japanese with some emphasis on translation into English. GE credit: AH, WC. Effective: 2016 Spring Quarter.

JPN 137—Readings in Contemporary Japanese Literature (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): JPN 113; or equivalent language proficiency, or consent of instructor. Readings of short stories and essays by contemporary writers. Representative writers include Yoshimoto Banana, Otsuichi, Suzuki Koji, Kyogoku Natsuhiko, Ogawa Yoko, and Murakami Haruki. Readings and discussion in Japanese with some emphasis on translation into English. GE credit: AH, WC. Effective: 2018 Fall Quarter.

JPN 138—Readings in the Humanities: Japan Today (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): JPN 113; or equivalent language proficiency. Restricted to completion of course 113 or equivalent as determined by taking a placement exam or consent of instructor. Topical essays focused on contemporary Japan. Themes center on defining Japan today in terms of its future and past such as through its urban society, trends in architecture, "soft power" industries, and "traditional" elements as mainstays of Japan's cultural currency. GE credit: AH, WC. Effective: 2017 Winter Quarter.

JPN 138—Readings in the Humanities: Japan Today (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): JPN 113; or equivalent language proficiency, or consent of instructor. Restricted to completion of course 113 or equivalent as determined by taking a placement exam or consent of instructor. Topical essays focused on contemporary Japan. Themes center on defining Japan today in terms of its future and past such as through its urban society, trends in architecture, "soft power" industries, and "traditional" elements as mainstays of Japan's cultural currency. GE credit: AH, WC. Effective: 2018 Fall Quarter.

JPN 141—Introduction to Classical Japanese (4)
Lecture/Discussion—4 hours. Prerequisite(s): JPN 113; Or the equivalent language proficiency. Basic features of classical Japanese grammar through careful reading of selected literary texts such as Hojoki or Tsurezuregusa. Effective: 2016 Spring Quarter.

JPN 151—Japanese Linguistics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 003; Or equivalent language proficiency. Introduction to Japanese linguistics, featuring key aspects of the Japanese language. Analysis of Japanese from the perspectives of phonology, syntax, discourse analysis, sociolinguistics and psycholinguistics. GE credit: AH, WC, WE. Effective: 2017 Winter Quarter.

JPN 152—Traditional Japanese Drama (4)
Discussion—1 hour; Lecture—3 hours. Survey in English of Japanese drama, focusing on traditional forms: noh, kyôgen, bunraku puppet theater, and kabuki, with some attention to modern theater. Texts of plays and secondary works on performance techniques and the composition of plays. GE credit: AH, VL, WC, WE. Effective: 2011 Fall Quarter.

JPN 153—Love, Sexuality and the Family in Modern Japanese Literature (4)
Discussion—1 hour; Lecture—3 hours. Modern Japanese literature from the late 19th century to the present with a focus on love and sexuality in various forms, particularly as understood through the evolving institution of the Japanese family. Lectures, readings and discussions in English. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

JPN 154—Tourism and Heritage in Japan (4)
Discussion—1 hour; Lecture—3 hours. Focus on related concepts of tourism and cultural heritage within Japan, with attention to questions of tradition, authenticity and nostalgia. Examination of cultural heritage sites on various scales, including built environment, national cultural forms, and local performances such as festivals. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

JPN 155—Introduction to Japanese Folklore (4)
Discussion—1 hour; Lecture—3 hours. Focus on narrative genres of myth, legend, and folktale, with additional attention paid to festivals, folk art, belief systems, and the development of folklore studies (minzokugaku) as an academic discipline. Examination the relationship of folklore to ethnic and national identity. GE credit: AH, WC. Effective: 2016 Fall Quarter.

JPN 156—Japanese Literature on Film (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Survey of films based on works of Japanese literature, emphasis on pre-modern and early modern texts. Introduction to major directors of Japan, with a focus on cinematic adaptation. Lectures and readings in English. Films in Japanese with English subtitles. (Cinema and Technocultural Studies 148B.) GE credit: AH, VL, WC, WE. Effective: 2016 Winter Quarter.

JPN 157—Japanese Women Writers (4)
Lecture/Discussion—4 hours. Survey of women writers from earliest times to the present. Genres include poetry, narrative fiction, diaries, short stories, novels, and film. Representative authors include Murasaki Shikibu, Sei Shônagon, Higuchi Ichiyo, Enchi Fumiko and Ogawa Yôko. Readings and discussion in English. GE credit: AH, WC, WE. Effective: 2014 Fall Quarter.

JPN 158—The Supernatural in Japan (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Depictions of the supernatural in Japanese history through the contemporary era. Overview of Japanese literary and visual arts and the socio-historical contexts of the supernatural. Lectures and readings in English. Films in Japanese with English subtitles. GE credit: AH, VL, WC. Effective: 2016 Spring Quarter.

JPN 160—The Culture of Japanese Food (4)
Discussion—2 hours; Lecture—2 hours. Study of Japanese food and the culture of eating and drinking in Japan. Attention to symbolism, historical development, aesthetics, identity and global contexts. Materials examined include critical sources as well as literary texts, art, and films. GE credit: AH, SS, WC. Effective: 2017 Fall Quarter.

JPN 162—Japan Travelogue: Ethnographic Writing on Japanese Culture and People (4)
Lecture/Discussion—4 hours. Focuses on ethnographic writing about Japan. Includes modern scholarly ethnographies, travel writing, blog posts, etc. Critical analysis of how the Japanese "other" is represented across time. GE credit: AH, WC, WE. Effective: 2017 Fall Quarter.

JPN 192—Japanese Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Work experience in Japanese language, with analytical term paper on a topic approved by instructor. (P/NP grading only.) Effective: 2016 Fall Quarter.

JPN 194H—Special Study for Honors Students (1-5) ***Review all entries***
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. Senior standing and qualification for the Japanese Honors Program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in Japanese literature, civilization, or language studies. May be repeated up to 8 unit(s). (P/NP grading only.) GE credit: AH, WC, WE. Effective: 2014 Fall Quarter.

JPN 194H—Special Thesis Honors Project (1-5) ***Review all entries***
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. Senior standing and qualification for the Japanese Senior Thesis Project. Guided research, under the direction of a senate faculty member, leading to a senior thesis project on a topic in Japanese literature, culture, linguistics, or language studies. May be repeated up to 8 unit(s). (P/NP grading only.) GE credit: AH, WC, WE. Effective: 2018 Fall Quarter.

JPN 197T—Tutoring in Japanese (1-5) ***Review all entries***
Tutorial—1-5 hours. Prerequisite(s): Consent of Department Chairperson. Leading of small voluntary discussion groups affiliated with one of the Program's regular courses. May be repeated for credit, but only 2 units may be applied to the minor. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

JPN 197T—Tutoring in Japanese (1-5) ***Review all entries***
Tutorial—1-5 hours. Prerequisite(s): Consent of Department Chairperson. Leading of small voluntary discussion groups affiliated with one of the Program's regular courses. May be repeated for credit. (P/NP grading only.) Effective: 2018 Fall Quarter.

JPN 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study. (P/NP grading only.) GE credit: AH, WC. Effective: 2016 Spring Quarter.

JPN 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: AH, WC. Effective: 1997 Winter Quarter.

JPN 291—Seminar in Modern Japanese Literature: Major Writers (4)
Seminar—4 hours. Prerequisite(s): JPN 130 or JPN 131 or JPN 132 or JPN 133 or JPN 134 or JPN 135 or JPN 136 or JPN 137 or JPN 138; Or the equivalent language proficiency. In-depth reading and critical analyses of major works by and critical literature on one or two prominent modern or contemporary writers such as Natsume Soseki, Mori Ogai, Shimazaki Toson, Akutagawa Ryunosuke, Tanizaki Junichiro, Abe Kobo and Oe Kenzaburo. Effective: 2016 Spring Quarter.

JPN 297—Directed Independent Study (4)
Conference—1 hour; Independent Study; Term Paper. Prerequisite(s): Consent of Instructor. Restricted to graduate students. Directed independent study on a topic culminating in a term paper. Independent Studies may only be arranged with consent of the instructor and when graduate seminars are unavailable. May be repeated up to 5 time(s) when no seminars are available and topic differs. Effective: 2017 Spring Quarter.

JPN 299—Research (1-12)
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 2016 Spring Quarter.

East Asian Studies

East Asian Studies | EAS Information

(College of Letters and Science)

Xiaoling Shu, Ph.D., Program Director

Program Office. 1277 Social Science and Humanities Building; 530-752-3406; http://eastasian.ucdavis.edu

Faculty. http://eastasian.ucdavis.edu/contact/faculty

East Asian Studies | EAS A.B.

(College of Letters and Science)

Xiaoling Shu, Ph.D., Program Director

Program Office. 1277 Social Science and Humanities Building; 530-752-3406; http://eastasian.ucdavis.edu

Faculty. http://eastasian.ucdavis.edu/contact/faculty

The Major Program

The East Asian Studies major gives the student an understanding of East Asia and Southeast Asia through interdisciplinary studies, including courses on East Asian countries within the humanities and social sciences. Students are encouraged to pursue study abroad opportunities, as well as other guided studies pertaining to East and Southeast Asia.

The Program. The program offers core courses in East Asian humanities and social sciences, including history, comparative literature, languages, philosophy and religion, political science,

sociology, as well as courses focused on Southeast Asia. Science courses that closely engage the student of East and/or Southeast Asia are also eligible to count towards the major.

Along with taking the lower division and upper division depth subject courses; the student may choose additional courses that concentrate on a special field of interest, such as anthropology or history, or special courses such as honor thesis, independent study, internships, and study abroad.

Programs, Internships, and Career Alternatives. To enhance the student's understanding of East and Southeast Asia, our majors are strongly encouraged to participate in UC Davis's Study Abroad Program, which gives students the opportunity to live and experience a culture within East or Southeast Asia. Our majors are also encouraged to work with UC Davis's Internship and Career Center, which provides customized assistance for EAS students to obtain legislative, legal, and business internships and careers. Likewise, the UC Davis Sacramento and Washington Centers arrange internships and run full-credit academic programs in Sacramento and Washington D.C., with a wide range of opportunities for our majors. Graduating EAS majors are prepared for employment in government agencies (such as Foreign Service), state agencies, international or non-governmental organizations (NGO, such as the United Nations), foundations, journalism, teaching, counseling, and companies with international business interests, trade, or finance. The broad-based and multidisciplinary components of this major program enhance career prospects in jobs that demand knowledge of cultures of East and Southeast Asia.

Major Advisors. 2216 Social Science & Humanities Building; (530) 752-9241; easugadvisor@ucdavis.edu.

Preparatory Subject Matter **Units:** 21-22

HIS 009A	History of East Asian Civilization	4
HIS 009B	History of East Asian Civilization	4

Choose one:

AHI 001D	Arts of Asia	4
CHN 007	Chinese Business Culture	4
CHN 010	Modern Chinese Literature (In English)	4
CHN 011	Great Books of China (in English)	4
COM 053A	Literature of East Asia	4
EAS 088	Korean Society: Late 19th Century to the Present	4
JPN 010	Masterworks of Japanese Literature (in English)	4
JPN 025	Japanese Language and Culture (in English)	4
JPN 050	Introduction to the Literature of China and Japan	4
RST 075	Introduction to Chinese Philosophy	4

Choose two (or the equivalent) of Chinese, Japanese, or other East Asian language study:

CHN 001	Elementary Chinese	5
CHN 002	Elementary Chinese	5
OR		
JPN 001	Elementary Japanese	5
JPN 002	Elementary Japanese	5

Depth Subject Matter **Units:** 24

Choose 24 units:

ANT 134	Buddhism in Global Culture	4
ANT 137	Meditation and Culture	4
ANT 143A	Ethnology of Southeast Asia	4
ANT 148A	Culture and Political Economy in Contemporary China	4
ANT 149A	Traditional Japanese Society	4
ANT 149B	Contemporary Japanese Society	4

AHI 163A	Early Chinese Art	4
AHI 163B	Chinese Painting	4
AHI 163C	Early Modern Chinese Painting	4
AHI 164	The Arts of Japan	4
AHI 190F	Undergraduate Seminar in Art History: Chinese	4
AHI 190G	Undergraduate Seminar in Art History: Japanese	4
CHN 100A	Chinese Intellectual Traditions: Daoist Traditions	4
CHN 100B	Confucian Traditions	4
CHN 101	Chinese Film	4
CHN 102	Chinese American Literature (In English)	4
CHN 103	Modern Chinese Drama	4
CHN 104	Modern Chinese Fiction (in English)	4
CHN 105	Western Influences on Twentieth-Century Chinese Literature (in English)	4
CHN 106	Chinese Poetry (in English)	4
CHN 107	Traditional Chinese Fiction (in English)	4
CHN 108	Poetry of China and Japan (in English)	4
CHN 109A	Topics in Chinese Literature; Crime and Punishment	4
CHN 109C	Topics in Chinese Literature; Women Writers (in English)	4
CHN 109D	Topics in Chinese Literature; The Knight-Errant (in English)	4
CHN 109E	Topics in Chinese Literature; The City in Fiction (in English)	4
CHN 109G	Topics in Chinese Literature; The Literature of Twentieth-Century Taiwan (in English)	4
CHN 109H	Topics in Chinese Literature; Popular Literature (in English)	4
CHN 109I	Topics in Chinese Literature; Scholar & The Courtesan (in English)	4
CRD 153A	International Community Development: Asia	4
COM 110	Hong Kong Cinema	4
COM 153	The Forms of Asian Literature	4
DES 142A	World Textiles: Eastern Hemisphere	4
DRA 144A	Introduction to Traditional Chinese Embodied Culture	4
DRA 144B	Traditional Chinese Physical Culture	4
DRA 144C	Daoist Philosophy in Traditional Chinese Movement Culture	4
DRA 154	Asian Theatre and Drama: Contexts and Forms	4
EAS 113	Cinema and Society in China	4
EAS 190	East Asian Studies Seminar	4
ECN 171	Economy of East Asia	4
HIS 102G	Undergraduate Proseminar in History; China to 1800	5
HIS 102H	Undergraduate Proseminar in History; China Since 1800	5
HIS 102N	Undergraduate Proseminar in History; Japan	5
HIS 191A	Classical China	4
HIS 191B	High Imperial China	4
HIS 191C	Late Imperial China	4
HIS 191D	Nineteenth Century China: The Empire Confronts the West	4
HIS 191E	The Chinese Revolution	4
HIS 191F	History of the People's Republic of China	4
HIS 191G	Special Topics in Chinese History to 1800	4
HIS 191H	Special Topics in Chinese History after 1800	4
HIS 191J	Sex and Society in Modern Chinese History	4
HIS 194A	Aristocratic and Feudal Japan	4
HIS 194B	Early Modern Japan	4

HIS 194C	Modern Japan	4
HIS 194D	Business and Labor in Modern Japan	4
HIS 194E	Education and Technology in Modern Japan	4
HIS 195B	History of Modern Korea	4
JPN 101	Japanese Literature in Translation: The Early Period	4
JPN 102	Japanese Literature in Translation: The Middle Period	4
JPN 103	Japanese Literature in Translation: The Modern Period	4
JPN 104	Modern Japanese Literature: War and Revolution	3
JPN 105	Modern Japanese Literature: Hero and Anti-hero	4
JPN 106	Japanese Culture Through Film	4
JPN 107	Modern Japanese Autobiographies (in English)	4
JPN 108	Poetry of China and Japan (in English)	4
JPN 109	Japanese Popular Culture	4
JPN 152	Traditional Japanese Drama	4
JPN 156	Japanese Literature on Film	4
JPN 157	Japanese Women Writers	4
MUS 129C	Musics of East and Southeast Asia	4
POL 148B	Government and Politics in East Asia: Japan	4
RST 165	Islam in Asia	4
RST 170	Buddhism	4
RST 172	Ch'an (Zen) Buddhism	4
RST 175A	Chinese Intellectual Traditions: Daoist Traditions	4
SOC 147	Sociological Perspectives on East Asia	4
SOC 188	Markets, Culture and Inequality in China	4

Elective Requirement **Units:** 16

Choose 16 units:

Any EAS special course (approved courses: EAS 190, 192, 194H, 196A-B, 198—maximum 12 units from this list); any CHN or JPN upper division course; any Depth Subject Matter course; any upper division EAP course focusing on East Asia or Southeast Asia.

Total: 61-62

East Asian Studies | EAS Minor

(College of Letters and Science)

Xiaoling Shu, Ph.D., Program Director

Program Office. 1277 Social Science and Humanities Building; 530-752-3406; http://eastasian.ucdavis.edu

Courses taken for the minor are expected to reflect a predominant interest in East Asia or Southeast Asia. All upper division courses counting towards the East Asian Studies major, may be used to fulfill the requirements for the minor program, as long as they deal predominantly with East Asia or Southeast Asia.

East Asian Studies **Units:** 20

Choose any five upper division courses from the Depth Subject Matter list for the major, or from the following list:

Any CHN or JPN upper division course.

Any EAS special course; approved courses:

EAS 190	East Asian Studies Seminar	4
EAS 192	East Asian Studies Seminar	1-12
EAS 194H	Special Study for Honors Students	1-5
EAS 196A	Honors Seminar	4

EAS 196B	Honors Seminar	4
EAS 198	Directed Group Study	1-5

Upper division Education Abroad course focusing on East Asia or Southeast Asia.

Total: 20

East Asian Studies | EAS Courses

Courses in EAS:

EAS 088—Korean Society: Late 19th Century to the Present (4)
Lecture/Discussion—4 hours. Modern Korean society (late 19th Century to contemporary period), emphasizing the perseverance and transformations of traditional social and cultural patterns. Effective: 2001 Winter Quarter.

EAS 113—Cinema and Society in China (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): HIS 190C; HIS 193; or Consent of Instructor. Knowledge of Chinese not required. Viewing and analysis of one Chinese film with English subtitles each week, followed by discussion and short essays. Cinematic technique, social values and film topics from 1930s to today. Not open for credit to students who have completed CHN 113. Effective: 1997 Winter Quarter.

EAS 190—East Asian Studies Seminar (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Upper division standing or consent of instructor. Political, social, cultural, and economic issues in East Asia. Topic varies each year. May be repeated for credit when topic differs. Effective: 2004 Summer Session 2.

EAS 192—East Asian Studies Seminar (1-12)
Internship—3-36 hours; Term Paper. Prerequisite(s): Consent of Instructor. Upper division standing. Work experience in the East Asian Studies field, with analytical term paper on a topic approved by the instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

EAS 194H—Special Study for Honors Students (1-5)
Independent Study—1-5 hours. Prerequisite(s): Open only to majors of senior standing who qualify for Honors Program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in East Asian Studies culture, society, or language. (P/NP grading only.) Effective: 1997 Winter Quarter.

EAS 196A—Honors Seminar (4)
Conference—2 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. GPA of 3.500 in the major; senior standing. A two-quarter research project culminating in an Honors thesis. A grade of B or higher must be earned to qualify the student for honors distinction at graduation. (P/NP grading only.) Effective: 1997 Winter Quarter.

EAS 196B—Honors Seminar (4)
Conference—2 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. GPA of 3.500 in the major, senior standing. A two-quarter research project culminating in an Honors thesis. A grade of B or higher must be earned to qualify the student for honors distinction at graduation. (P/NP grading only.) Effective: 1997 Winter Quarter.

EAS 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

Ecological Management & Restoration

Ecological Management & Restoration | Ecological Management & Restoration B.S.

College of Agricultural and Environmental Sciences)

Faculty. http://www.plantsciences.ucdavis.edu/plantsciences/databases/directory/faculty.aspx

The Major Program

This major is designed for students who are interested in understanding how to manage and restore wildland and rangeland plant communities. Courses are selected to provide an interdisciplinary background that encompasses ecology, applied plant biology, and the social sciences. Students will acquire a core understanding of natural and managed ecosystems and how they function, interact with the natural environment, are connected with human society and social change, and are restored and managed.

The Program. The curriculum provides depth in the ecological and botanical sciences directed toward an integrated understanding of how communities and ecosystems function and how this knowledge can assist in their management and restoration. Courses in environmental policy and law expose the students to the social drivers and constraints of ecosystem management. All students gain practical experience through practical field courses and a required internship. Students may also pursue an Honors thesis in their senior year.

Major Advisor. T.P. Young

Advising Center for the major, including peer advising, is located in 1220 Plant and Environmental Sciences 530-752-9770.

Career Alternatives. Graduates from this program are prepared to pursue a wide range of careers, including positions in ecological restoration and ecosystem management; rangeland and reserve management; environmental consulting; public, private, or non-profit agencies concerned with restoration and natural resource management; Cooperative Extension; teaching; information and communication services. Graduates are qualified to pursue advanced studies in fields such as ecology, agroecology, environmental studies, geography or weed science.

Preparatory Subject Matter **Units:** 49-58

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
BIS 002C	Introduction to Biology: Biodiversity and the Tree of Life	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
PHY 001A	Principles of Physics	3
PHY 001B	Principles of Physics	3
OR		
PHY 007A	General Physics	4
PHY 007B	General Physics	4
PHY 007C	General Physics	4
MAT 016A	Short Calculus	3
MAT 016B	Short Calculus	3
OR		
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
PLS 120	Applied Statistics in Agricultural Sciences	4
SSC 100	Principles of Soil Science	5

PLS 101	Agriculture and the Environment	3
OR		
ESP 001	Environmental Analysis	4

Depth Subject Matter **Units:** 54-69

ENH 160	Restoration Ecology	3
ENH 160L	Restoration Ecology Laboratory	1
PLS 176	Introduction to Weed Science	4

Choose one:

SSC 102	Environmental Soil Chemistry	3
SSC 105	Field Studies of Soils in California Ecosystems	5
SSC 111	Soil Microbiology	4
SSC 118	Soils in Land Use and the Environment	4
SSC 120	Soil Genesis, Morphology, and Classification	5

PLS 152	Plant Genetics	4
OR		
ENH 150	Genetics and Plant Conservation: The Biodiversity Crisis	3

Choose two ecology courses:

ESP 155	Wetland Ecology	4
PLB 117	Plant Ecology	4
PLS 131	Identification and Ecology of Grasses	2
PLS 144	Trees and Forests	4
PLS 147	California Plant Communities	3
WFC 156	Plant Geography	4
WFC 157	Coastal Ecosystems	4

Choose one:

EVE 100	Introduction to Evolution	4
PLB 108	Systematics and Evolution of Angiosperms	5
PLS 102	California Floristics	5
PLS 116	Plant Morphology and Evolution	5

Choose four restoration/conservation courses:

PLS 130	Rangelands: Ecology, Conservation and Restoration	3
PLS 135	Ecology and Community Structure of Grassland and Savannah Herbivores	3
PLS 150	Sustainability and Agroecosystem Management	4
ESM 141	Role of Fire in Natural Ecosystems	4
ESP 127	Plant Conservation Biology	4
ESP 155L	Wetland Ecology Laboratory	3
WFC 154	Conservation Biology	4
WFC 155	Habitat Conservation and Restoration	3
WFC 155L	Habitat Conservation and Restoration Laboratory	2

Choose one:

ESM 100	Principles of Hydrologic Science	4
HYD 143	Ecohydrology	4
HYD 147	Runoff, Erosion and Water Quality Management	3
HYD 151	Field Methods in Hydrology	4
PLS 171	Principles and Practices of Plant Propagation	4

OR		
ENH 120	Management of Container Media	3
PLS 100C	Environmental Interactions of Cultivated Plants	3
OR		
PLS 163	Ecosystem and Landscape Ecology	4
PLB 111	Plant Physiology	3
OR		
PLS 100A	Metabolic Processes of Cultivated Plants	3
ESP 160	The Policy Process	4
OR		
ESP 161	Environmental Law	4
OR		
ESP 171	Urban and Regional Planning	4
OR		
ESP 172	Public Lands Management	4
OR		
ESP 179	Environmental Impact Assessment	4

Internship:
Must be selected in consultation with master advisor.

PLS 164	Practicum in Ecological Restoration	1
PLS 192	Internship	1-12

In addition to the required coursework listed above, students might consider taking some of the following courses:

ENT 107	California Insect Diversity	5
HYD 124	Plant-Water-Soil Relationships	4
LDA 150	Introduction to Geographic Information Systems	4
PLS 135	Ecology and Community Structure of Grassland and Savannah Herbivores	3
PLS 141	Ethnobotany	4
PLS 158	Mineral Nutrition of Plants	4
PLS 162	Urban Ecology	3
SAS 018	GIS and Society	3
SSC 109	Sustainable Nutrient Management	4

Total: 103-127

Ecology (Graduate Group)

Ecology (Graduate Group) | ECL Information

Edwin Grosholz, Ph.D., Chairperson of the Group

Group Office. 1005 Wickson Hall 530-752-6752; http://ecology.ucdavis.edu

Faculty. http://ecology.ucdavis.edu/people/faculty.html

Ecology (Graduate Group) | ECL M.S.

Edwin Grosholz, Ph.D., Chairperson of the Group

Group Office. 1005 Wickson Hall 530-752-6752; http://ecology.ucdavis.edu

Faculty. http://ecology.ucdavis.edu/people/faculty.html

Graduate Study. The Graduate Group in Ecology offers the M.S. and Ph.D. degrees. Ecology is a science that integrates numerous fields of study to attain deep understanding of natural and

societal influences on the distribution, abundances, behaviors, traits, and ecosystem functions of organisms. In order to accommodate varied student interests, the Group has developed several 'areas of emphasis' with specialized programs of study: agricultural ecology, conservation ecology, ecosystems and landscape ecology, ecotoxicology, environmental policy and human ecology, integrative ecology, marine ecology, physiological ecology and restoration ecology. For further details, contact the Group office.

Preparation. Appropriate preparation is undergraduate work in any of the biological, social or behavioral, and physical sciences, mathematics or engineering. Applicants will normally be expected to have completed the following courses during the undergraduate years or shortly after matriculating: two courses each in introductory biology, general chemistry and physical science; one course each in calculus, an upper division introduction to ecology course, and introductory statistics. Students that choose the environmental policy and human ecology area of emphasis are only required to complete one course in general chemistry. They may also substitute one quantitative course in social science such as micro- or macro-economics for one chemistry or physics requirement.

Ecology (Graduate Group) | ECL Ph.D.

Edwin Grosholz, Ph.D., Chairperson of the Group

Group Office. 1005 Wickson Hall 530-752-6752; http://ecology.ucdavis.edu

Faculty. http://ecology.ucdavis.edu/people/faculty.html

Graduate Study. The Graduate Group in Ecology offers the M.S. and Ph.D. degrees. Ecology is a science that integrates numerous fields of study to attain deep understanding of natural and societal influences on the distribution, abundances, behaviors, traits, and ecosystem functions of organisms. In order to accommodate varied student interests, the Group has developed several 'areas of emphasis' with specialized programs of study: agricultural ecology, conservation ecology, ecosystems and landscape ecology, ecotoxicology, environmental policy and human ecology, integrative ecology, marine ecology, physiological ecology and restoration ecology. For further details, contact the Group office.

Preparation. Appropriate preparation is undergraduate work in any of the biological, social or behavioral, and physical sciences, mathematics or engineering. Applicants will normally be expected to have completed the following courses during the undergraduate years or shortly after matriculating: two courses each in introductory biology, general chemistry and physical science; one course each in calculus, an upper division introduction to ecology course and introductory statistics. Students that choose the environmental policy and human ecology area of emphasis are only required to complete one course in general chemistry. They may also substitute one quantitative course in social science such as micro- or macro-economics for one chemistry or physics requirement.

Ecology (Graduate Group) | ECL Ph.D. (Joint Doctorate with SDSU)

Edwin Grosholz, Ph.D., Chairperson of the Group

Group Office. 1005 Wickson Hall 530-752-6752; http://ecology.ucdavis.edu

Faculty. http://ecology.ucdavis.edu/people/faculty.html

Graduate Study. The Graduate Group in Ecology offers the M.S. and Ph.D. degrees. Ecology is a science that integrates numerous fields of study to attain deep understanding of natural and societal influences on the distribution, abundances, behaviors, traits, and ecosystem functions of organisms. In order to accommodate varied student interests, the Group has developed several 'areas of emphasis' with specialized programs of study: agricultural ecology, conservation ecology, ecosystems and landscape ecology, ecotoxicology, environmental policy and human ecology, integrative ecology, marine ecology, physiological ecology and restoration ecology. For further details, contact the Group office.

Preparation. Appropriate preparation is undergraduate work in any of the biological, social or behavioral, and physical sciences, mathematics or engineering. Applicants will normally be expected to have completed the following courses during the undergraduate years or shortly after matriculating: two courses each in introductory biology, general chemistry and physical science; one course each in calculus, an upper division introduction to ecology course, an upper division introduction to evolution class and introductory statistics. Students that choose the environmental policy and human ecology area of emphasis are only required to complete one course in general chemistry. They may also substitute one quantitative course in social science such as micro- or macro-economics for one chemistry or physics requirement.

Ecology (Graduate Group) | ECL Courses

Courses in ECL:

ECL 200AN—Principles and Applications of Ecology (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): STA 102; MAT 016A; MAT 016B; or Consent of Instructor. First course in Ecology (e.g., Environmental Science and Policy 100). Pass One open to graduate majors. Course covers principles of community structure and functioning, species diversity patterns, ecosystem ecology and biogeochemistry, landscape ecology, biogeography and phylogenetics. Effective: 2017 Winter Quarter.

ECL 200BN—Principles and Applications of Ecology (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): STA 102; MAT 016A; MAT 016B; or Consent of Instructor. First course in Ecology (e.g., Environmental Science and Policy 100). Pass One open to graduate majors. Provides a broad background in the principles and applications of ecology, and serves as a foundation for advanced ecology courses. Topics include ecophysiology, behavioral ecology, population ecology, genetics and evolution. Emphasis on historical developments, current understanding, and real world applications. Effective: 2017 Winter Quarter.

ECL 203—Physiological Ecology (3)
Lecture—3 hours. Prerequisite(s): EVE 101 or EST 100; NPB 110 or PLB 111 or EST 129; elementary calculus. A comparative examination of several animal groups addressing fundamental physiological mechanisms that shape the ecology of each animal group. Effective: 1997 Winter Quarter.

ECL 205—Community Ecology (4)
Discussion—2 hours; Lecture—2 hours. Prerequisite(s): An upper division course in Ecology. Introduction to literature and contemporary research into processes structuring ecological communities. Effective: 1997 Winter Quarter.

ECL 206—Concepts and Methods in Plant Community Ecology (4)
Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Introductory courses in statistics and plant ecology. Principles and techniques of vegetation analysis, including structure, composition, and dynamics. Emphasis given to sampling procedures,
association analysis, ordination, processes and mechanisms of succession, and classification. Most techniques are demonstrated or conducted during field trips and laboratories. Effective: 1997 Winter Quarter.

ECL 207—Plant Population Biology (3)
Discussion/Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): Advanced undergraduate ecology course (e.g., ESP 100, EVE 101, ENT 104 or PLB 117), and advanced undergraduate course in genetics and/or evolution (e.g., BIS 101 or EVE 100). Introduction to theoretical and empirical research in plant population biology. Emphasis placed on linking ecological ecological and genetic approaches to plant population biology. (PBG 207.) Effective: 2000 Winter Quarter.

ECL 208—Issues in Conservation Biology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Introductory biology (e.g. BIS 002B) and an upper division organismal biology class. Graduate-level introduction to current research in conservation biology. Course will emphasize reading and discussing primary literature. Specific topics will reflect the research interests of UC Davis conservation biology faculty. Effective: 1997 Winter Quarter.

ECL 210N—Environmental Policy and Human Ecology (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Graduate standing in Anthropology, Ecology, Political Science, Sociology Graduate Groups, or consent of instructor. Principles drawn from social science, ecology and evolution to study of human populations and behavior, emphasizing environmental/resource issues. These principles form a synthetic framework that articulates elements drawn from the social sciences as well as biology. Effective: 2013 Spring Quarter.

ECL 212A—Environmental Policy Process (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Course in public policy (e.g., ESP 160); environmental law (e.g., ESP 161); course in statistics (e.g., SOC 106 or ARE 106). Introduction to selected topics of the policy process and applications to the field of environmental policy. Develops critical reading skills, understanding of policy theory, and an ability to apply multiple theories to the same phenomena. (ESP 212A and ENV 200C.) Effective: 2017 Fall Quarter.

ECL 212B—Environmental Policy Evaluation (4)
Discussion—1 hour; Lecture—2 hours; Seminar—2 hours. Prerequisite(s): (STA 108 or ARE 106); ARE 176; Intermediate microeconomics (e.g., ECN 100); policy analysis (e.g., ESP 168A or the equivalent). Method and practice, philosophical basis, and political role of policy analysis. Reviews basic concepts from economic theory; how and why environmental problems emerge in a market economy; and tools necessary for solving environmental problems. (ESP 212B and ENV 200B.) Effective: 2018 Winter Quarter.

ECL 214—Marine Ecology: Concepts and Practice (3)
Discussion—1.5 hours; Fieldwork—1.5 hours; Lecture—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing or one course in ecology, one course in evolution or genetics; survey course in marine ecology recommended. Critical review and analysis of concepts and practices in modern marine ecology at the interface of several fields of study including oceanography, evolution, behavior, and physiology. Emphasis on critical thinking, problem solving, and hands-on study. Two field trips required. Effective: 2016 Fall Quarter.

ECL 215—Social Ecological Systems (3)
Lecture/Discussion—3 hours. Prerequisite(s): Completion of core courses for specific graduate programs, for example Ecology 200A/B. Overview of social-ecological systems that links environmental policy and decision-making to ecological processes. Delves deeper into different social science topics related to this broader idea. Applying of course readings to case studies chosen by students and a final paper. Effective: 2016 Fall Quarter.

ECL 216—Ecology and Agriculture (4)
Lecture—3 hours; Term Paper. Prerequisite(s): EVE 011; or Consent of Instructor. Ecological principles as relevant to agriculture. Integration of ecological approaches into agricultural research to increase ecosystem functions and services. Topics include crop autoecology, biotic interactions among crops and pests, ecosystem and landscape ecology. Not open for credit to students who have completed VCR 216. (Former course VCR 216). Effective: 2011 Fall Quarter.

ECL 219—Ecosystem Biogeochemistry (4)
Discussion/Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): Introductory courses in ecology/biology and soils are recommended; undergraduates accepted with consent of instructor. Multi-disciplinary analysis of energy and nutrient transfers within terrestrial ecosystems. Examination of processes and inter- and intra-system interactions between the atmosphere, biosphere, lithosphere, and hydrosphere. Laboratory section uses biogeochemical simulation models to examine case studies. (SSC 219.) Effective: 1997 Winter Quarter.

ECL 225—Terrestrial Field Ecology (4)
Fieldwork—12 hours; Seminar—1 hour. Prerequisite(s): Introductory ecology and introductory statistics or consent of instructor. A field course conducted over spring break and four weekends at Bodega
Bay, emphasizing student projects. Ecological hypothesis testing, data gathering, analysis, and written and oral presentation of results will be stressed. (ENT 225 and PBG 225.) Effective: 1997 Spring Quarter.

ECL 231—Mathematical Methods in Population Biology (3)
Lecture—3 hours. Prerequisite(s): MAT 016C or MAT 021C; Or the equivalent. Mathematical methods used in population biology. Linear and nonlinear difference equation and differential equation models are studied, using stability analysis and qualitative methods. Partial differential equation models are introduced. Applications to population biology models are stressed. (PBG 231.) Effective: 1997 Spring Quarter.

ECL 232—Theoretical Ecology (3)
Lecture—3 hours. Examination of major conceptual and methodological issues in theoretical ecology. Model formulation and development will be emphasized. Topics will vary from year to year. May be repeated for credit. Effective: 1997 Winter Quarter.

ECL 233—Computational Methods in Population Biology (3)
Discussion/Laboratory—1 hour; Lecture/Lab—2 hours. Prerequisite(s): A course in theoretical ecology (e.g., ECL 231 or an equivalent to ESP 121 from your undergraduate institution) or consent of instructor; no programming experience required. Numerical methods for simulating population dynamics using the computational software package R. Emphasis placed on model formulation and development, theoretical concepts and philosophical principles to guide simulation efforts, model parameterization, and implementing simulations with R. (PBG 233.) (S/U grading only.) Effective: 2013 Fall Quarter.

ECL 242—Ecological Genetics: Applied Genetics for Ecology, Health, and Conservation of Natural Populations (3)
Discussion—0.5 hours; Laboratory—0.5 hours; Lecture—2 hours. Prerequisite(s): Undergraduate genetics and ecology/conservation biology courses recommended. Restricted to graduate students, 2nd or 3rd year veterinary students; advanced undergraduate students with consent of instructor. Introduction to the field of applied ecological genetics to include applications in conservation ecology, population genetics, population biology, wildlife health and disease ecology. Effective: 2017 Spring Quarter.

ECL 243—Ecological Genomics (4)
Lecture/Discussion—3 hours; Term Paper/Discussion. Prerequisite(s): ECL 242; Or equivalent training in ecology and genetics according to the discretion of the instructors. Genomics concepts, technologies, and analyses for ecology research. Mixture of lecture, discussion of recent literature, hands-on training in data analysis and experimental design, and research proposal preparation and evaluation. One all-day field trip is required. Effective: 2015 Fall Quarter.

ECL 245—Climate Change, Water and Society (4)
Lecture—4 hours. Class size limited to 25 students. Integration of climate science and hydrology with policy to understand hydroclimatology and its impact upon natural and human systems. Assignments: readings, take-home examination on climate and hydrologic science, paper that integrates course concepts into a research prospectus or review article. (HYD 245 and ATM 245.) Effective: 2015 Spring Quarter.

ECL 262—Advanced Population Dynamics (3)
Lecture—3 hours. Prerequisite(s): Graduate standing; advanced course in ecology (e.g., Evolution and Ecology 101), population dynamics (e.g., Wildlife, Fish, and Conservation 122), and one year of calculus; familiarity with matrix algebra and partial differential equations recommended. Logical basis for population models, evaluation of simple ecological models, current population models with age, size, and stage structure, theoretical basis for management and exemplary case histories. Emphasis on development and use of realistic population models in ecological research. (WFC 262.) Effective: 2016 Spring Quarter.

ECL 271—Research Conference in Ecology (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Critical presentation and evaluation of current literature and ongoing research in ecology. Requirements include active participation in weekly discussions and the presentation of a paper or chapter once per quarter. May be repeated for credit. (PBG 271.) (S/U grading only.) Effective: 2014 Winter Quarter.

ECL 280—Current Anthropology Journal Editorial Workshop (4)
Independent Study—3 hours; Workshop—1 hour. Prerequisite(s): Consent of Instructor. Students must enroll for all three quarters. Reading and offering workshop critiques of manuscripts submitted for publication, and reading and discussion of other relevant work in anthropology and human ecology. Track and edit published comments and authors' replies that accompany major features. Participation in the development of new sections for the electronic edition of the journal, including a "news and views" section and a debate section. May be repeated up to 12 unit(s) with consent of instructor. (ANT 280.) (S/U grading only.) Effective: 2000 Fall Quarter.

ECL 290—Seminar in Ecology (1-4)
Seminar—1-4 hours. Prerequisite(s): Consent of Instructor. Topics in ecology. Students are expected to present an oral seminar on a particular aspect of the general topic under consideration. (S/U grading only.) Effective: 2011 Fall Quarter.

ECL 296—Topics in Ecology and Evolution (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Seminars presented by visiting lecturers, UC Davis faculty, and graduate students. May be repeated for credit. (PBG 292.) (S/U grading only.) Effective: 1997 Winter Quarter.

ECL 297T—Tutoring in Ecology (1-4)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing in ecology. Teaching ecology including conducting discussion groups for regular departmental courses under direct guidance of staff. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

ECL 298—Group Study (1-5)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

ECL 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

Economics

Economics | ECN Information

(College of Letters and Science)

Giovanni Peri, Ph.D., Chairperson of the Department

Department Office. 2216 Social Sciences and Humanities Building; 530-752-9241; http://www.econ.ucdavis.edu

Economics | ECN A.B.

(College of Letters and Science)

Giovanni Peri, Ph.D., Chairperson of the Department

Department Office. 2216 Social Sciences and Humanities Building; 530-752-9241; http://www.econ.ucdavis.edu

Faculty. http://www.econ.ucdavis.edu/directory-of-people/econ-faculty

The Major Program

Economics is the study of how individuals, organizations, and societies choose among alternative uses of resources and how these resources are turned into the things people want.

The Program. Economics majors complete an introductory course sequence in economics, in addition to several courses in quantitative methods. Intermediate theory and economic history are taken on the upper division level and then students are free to concentrate the remainder of their units in various areas of interest, including more courses in economic theory or history,

international economics, labor, industry, alternative economic systems, economic development, public finance, econometrics, or mathematical economics.

Major Advisors. Contact Department office at ecnugadvisor@ucdavis.edu or 530-752-9142.

Internships and Career Alternatives. Internships for economics majors have been arranged at banks, brokerages, other business enterprises, and governmental units. The internships must complement the student's course work. A degree in economics is excellent preparation for students who want to go on to law school, business school, advanced work in economics, or graduate work in international relations. It is also a good background for careers in management and positions with the government.

Course Limits. Except under extraordinary circumstances, not more than two economics courses should be taken in any one quarter. In special cases, the department will accept a limited number of related upper division courses from other departments in satisfaction of the economics upper division course requirements. Approval from a departmental advisor is required in all such cases.

Graduation with High or Highest Honors. To be eligible for departmental recommendation for High or Highest Honors in Economics at graduation, a student must take all upper division courses in Economics for a letter grade, earn at least a 3.500 grade point average in those courses, and complete at least eight units of course work that result in the submission of an Honors project. Consult the College of Letters and Science section of this catalog and contact the Department for more information.

Study Abroad. The Economics Department wishes to accommodate students who would like to complement their economics degree with a study abroad experience. Up to 20 units of upper division credit from foreign campuses (excluding ECN 100 and 101) may be used towards the completion of the degree. To ensure that foreign courses will apply towards the economics degree, students need to select courses from the pre-approved list at the UC Davis Study Abroad office or seek pre-approval in the economics department for the foreign courses they wish to complete.

Graduate Study. Students who meet the admission requirements of Graduate Studies and the Department of Economics may pursue studies leading to the M.A. and Ph.D. degrees. Fields of emphasis for graduate study include: Economic Theory, Monetary Economics, Economic Development, Economic History, International Economics, Labor Economics, Industrial Organization, Economic Systems, Public Finance, Mathematical Economics, and Quantitative Methods (Econometrics). For information on admission to graduate study, degree requirements, and financial aid, consult the Graduate Announcement and http://www.econ.ucdavis.edu.

Graduate Advisors. Contact Department office.

Recommended. Students considering graduate study in economics are strongly urged to take MAT 021A-021B-021C and 022A.

American History and Institutions. This University requirement can be satisfied by completion of ECN 111A, 111B; see also under Bachelor's Degree Requirements.

Preparatory Subject Matter **Units:** 17-20

ECN 001A	Principles of Microeconomics	4
ECN 001B	Principles of Macroeconomics	4
STA 013	Elementary Statistics	4
OR		
STA 032	Gateway to Statistical Data Science	4
MAT 016A	Short Calculus	3
OR		
MAT 021A	Calculus	4
MAT 016B	Short Calculus	3

OR

MAT 021B	Calculus	4

Depth Subject Matter **Units:** 44

ECN 100A	Intermediate Micro Theory: Consumer and Producer Theory	4
ECN 100B	Intermediate Micro Theory: Imperfect Competition and Market Failure	4
ECN 101	Intermediate Macro Theory	4
ECN 102	Analysis of Economic Data	4

Choose one:

ECN 110A	World Economic History Before the Industrial Revolution	4
ECN 110B	World Economic History Since the Industrial Revolution	4
ECN 111A	Economic History	4
ECN 111B	Economics History	4

Choose one specialization below:

Specialization: General

Choose 12 units:

ECN 103	Economics of Uncertainty and Information	4
ECN 106	Decision Making	4
ECN 116	Comparative Economic Systems	4
ECN 121A	Industrial Organization	4
ECN 121B	Industrial Organization	4
ECN 122	Theory of Games and Strategic Behavior	4
ECN 125	Energy Economics	4
ECN 130	Public Microeconomics	4
ECN 131	Public Finance	4
ECN 132	Health Economics	4
ECN 134	Financial Economics	4
ECN 135	Money, Banks, and Financial Institutions	4
ECN 136	Topics in Macroeconomic Theory	4
ECN 137	Macroeconomic Policy	4
ECN 140	Econometrics	4
ECN 145	Transportation Economics	4
ECN 151A	Economics of the Labor Market	4
ECN 151B	Economics of Human Resources	4
ECN 152	Economics of Education	4
ECN 160A	International Microeconomics	4
ECN 160B	International Macroeconomics	4
ECN 194HA	Special Study for Honors Students	4
ECN 194HB	Special Study for Honors Students	4
ARE 156	Introduction to Mathematical Economics	4
ARE 175	Natural Resource Economics	4
ARE 176	Environmental Economics	4

Additional upper division Economics courses

Specialization: Behavior and Strategy

ECN 121A	Industrial Organization	4

OR

ECN 122	Theory of Games and Strategic Behavior	4

Choose two:

ECN 103	Economics of Uncertainty and Information	4
ECN 106	Decision Making	4

ECN 121A	Industrial Organization	4
ECN 121B	Industrial Organization	4
ECN 122	Theory of Games and Strategic Behavior	4

Additional upper division Economics courses

Specialization: Data Analytics and Economics Analysis

ECN 140	Econometrics	4

Choose two:

ECN 103	Economics of Uncertainty and Information	4
ECN 106	Decision Making	4
ECN 122	Theory of Games and Strategic Behavior	4
ECN 132	Health Economics	4
OR		
ECN 145	Transportation Economics	4

Additional upper division Economics courses

Specialization: International Macro-Finance

Choose three:

ECN 110B	World Economic History Since the Industrial Revolution	4
ECN 134	Financial Economics	4
ECN 135	Money, Banks, and Financial Institutions	4
ECN 136	Topics in Macroeconomic Theory	4
ECN 160B	International Macroeconomics	4
ECN 171	Economy of East Asia	4

Choose three:

ECN 103	Economics of Uncertainty and Information	4
ECN 106	Decision Making	4
ECN 116	Comparative Economic Systems	4
ECN 121A	Industrial Organization	4
ECN 121B	Industrial Organization	4
ECN 122	Theory of Games and Strategic Behavior	4
ECN 125	Energy Economics	4
ECN 130	Public Microeconomics	4
ECN 131	Public Finance	4
ECN 132	Health Economics	4
ECN 134	Financial Economics	4
ECN 135	Money, Banks, and Financial Institutions	4
ECN 136	Topics in Macroeconomic Theory	4
ECN 137	Macroeconomic Policy	4
ECN 140	Econometrics	4
ECN 145	Transportation Economics	4
ECN 151A	Economics of the Labor Market	4
ECN 151B	Economics of Human Resources	4
ECN 152	Economics of Education	4
ECN 160A	International Microeconomics	4
ECN 160B	International Macroeconomics	4
ECN 194HA	Special Study for Honors Students	4
ECN 194HB	Special Study for Honors Students	4
ARE 139	Futures and Options Markets	4
ARE 156	Introduction to Mathematical Economics	4
ARE 175	Natural Resource Economics	4

ARE 176	Environmental Economics	4

Specialization: Policy
Choose three:

ECN 125	Energy Economics	4
ECN 130	Public Microeconomics	4
ECN 131	Public Finance	4
ECN 145	Transportation Economics	4
ECN 151A	Economics of the Labor Market	4
ECN 151B	Economics of Human Resources	4
ECN 160A	International Microeconomics	4

Additional upper division Economics courses

Specialization: Poverty and Inequality
Choose three:

ECN 115A	Economic Development	4
ECN 115B	Economic Development	4
ECN 130	Public Microeconomics	4
ECN 151B	Economics of Human Resources	4

Choose three:

ECN 103	Economics of Uncertainty and Information	4
ECN 106	Decision Making	4
ECN 116	Comparative Economic Systems	4
ECN 121A	Industrial Organization	4
ECN 121B	Industrial Organization	4
ECN 122	Theory of Games and Strategic Behavior	4
ECN 125	Energy Economics	4
ECN 130	Public Microeconomics	4
ECN 131	Public Finance	4
ECN 132	Health Economics	4
ECN 134	Financial Economics	4
ECN 135	Money, Banks, and Financial Institutions	4
ECN 136	Topics in Macroeconomic Theory	4
ECN 137	Macroeconomic Policy	4
ECN 140	Econometrics	4
ECN 151A	Economics of the Labor Market	4
ECN 151B	Economics of Human Resources	4
ECN 152	Economics of Education	4
ECN 160A	International Microeconomics	4
ECN 160B	International Macroeconomics	4
ECN 194HA	Special Study for Honors Students	4
ECN 194HB	Special Study for Honors Students	4
ARE 139	Futures and Options Markets	4
ARE 156	Introduction to Mathematical Economics	4
ARE 175	Natural Resource Economics	4
ARE 176	Environmental Economics	4

Specialization: Economic History
Choose three:

ECN 110A	World Economic History Before the Industrial Revolution	4
ECN 110B	World Economic History Since the Industrial Revolution	4
ECN 111A	Economic History	4

ECN 111B	Economics History	4
One of which may be from:		
HIS 107	Medicine's Histories: Human and Veterinary Medicine from the Ancient World to One Health	4
HIS 108	Global Environmental History	4
HIS 109	Environmental Change, Disease and Public Health	4
HIS 110	Themes in World History	4
HIS 110A	Colonialism and the Making of the Modern World	4
HIS 111A	Ancient History	4
HIS 111B	Ancient History	4
HIS 111C	Ancient History	4
HIS 112A	Topics in Pre-Modern Jewish History	4
HIS 112B	Topics in Modern Jewish History	4
HIS 112C	History of Jews in the Muslim World	4
HIS 113	History of Modern Israel	4
HIS 115A	History of West Africa	4
HIS 115B	History of East Africa and the Indian Ocean	4
HIS 115C	History of Southern Africa from Exploration to the Rainbow Nation	4
HIS 115D	Postcolonial Africa	4
HIS 115E	Slavery, Africa, and the Atlantic World	4
HIS 115F	History of Modern North Africa, 1800 to the Present	4
HIS 116	African History: Special Themes	4
HIS 120	World War II	4
HIS 121A	Medieval History	4
HIS 121B	Medieval History	4
HIS 121C	Medieval History	4
HIS 122	Selected Themes in Medieval History	4
HIS 125	Topics in Early Modern European History	4
HIS 126Y	The History of Human Rights in Europe	4
HIS 130A	Christianity and Culture in Europe: 50-1450	4
HIS 130B	Christianity and Culture in Europe: 1450-1600	4
HIS 130C	Christianity and Culture in Europe: 1600-1850	4
HIS 131A	Early Modern European History	4
HIS 131B	European History During the Renaissance and Reformation	4
HIS 131C	The Old Regime: Absolution, Enlightenment and Revolution in Europe	4
HIS 132	Crime and Punishment in Early Modern Europe	4
HIS 133	European Thought and Culture from the Renaissance to the Enlightenment	4
HIS 134A	The Age of Revolution	4
HIS 135A	History of Science to the 18th Century	4
HIS 135B	History of Science, 18th to 20th Centuries	4
HIS 138A	The Rise of the Russian Empire, 1304-1825	4
HIS 138B	Reform and Revolution in Tsarist Russia, 1825-1917	4
HIS 138C	Russian History: The Rise and Fall of the Soviet Union, 1917 to the Present	4
HIS 139A	Medieval and Renaissance Medicine	4
HIS 140	The Rise of Capitalism in Europe	4
HIS 141	France Since 1815	4
HIS 142A	History of the Holocaust	4
HIS 142B	The Memory of the Holocaust	4
HIS 143	History of Eastern Europe and the Balkans	4

HIS 144A	History of Germany, 1450 to 1789	4
HIS 144B	History of Germany since 1789	4
HIS 145	War and Revolution in Europe 1789-1918	4
HIS 146A	Europe in the Twentieth Century	4
HIS 146B	Europe in the Twentieth Century	4
HIS 147A	European Intellectual History, 1800-1870	4
HIS 147B	European Intellectual History, 1870-1920	4
HIS 147C	European Intellectual History, 1920-1970	4
HIS 148A	Women and Society in Europe: 1500-1789	4
HIS 148B	Women and Society in Europe: 1789-1920	4
HIS 148C	Women in Society in Europe: 1914-Present	4
HIS 149	Comparative Cultural History of Modern Britain and France, 1880-1914	4
HIS 151A	England: The Middle Ages	4
HIS 151B	England: The Early Modern Centuries	4
HIS 151C	Eighteenth-Century England	4
HIS 151D	Industrial England	4
HIS 158	Special Topics in Latin American History	4
HIS 159	Women and Gender in Latin American History	4
HIS 160	Spain and America in the 16th century	4
HIS 162	History of the Andean Region	4
HIS 163A	History of Brazil	4
HIS 163B	History of Brazil	4
HIS 164	History of Chile	4
HIS 165	Latin American Social Revolutions	4
HIS 166A	History of Mexico to 1848	4
HIS 166B	History of Mexico since 1848	4
HIS 167	Modern Latin American Cultural and Intellectual History	4
HIS 168	History of Inter-American Relations	4
HIS 169A	Mexican-American History	4
HIS 169B	Mexican-American History	4
HIS 170A	Colonial America	4
HIS 170B	The American Revolution	4
HIS 170C	The Early National Period, 1789-1815	4
HIS 171A	Jacksonian America	4
HIS 171B	Civil War Era	4
HIS 171C	Reconstruction, America’s Second Founding	4
HIS 171D	Selected Themes in 19th Century American History	4
HIS 172	American Environmental History	4
HIS 173	Becoming an American: Immigration and American Culture	4
HIS 174A	The Gilded Age and Progressive Era: United States, 1876-1917	4
HIS 174B	War, Prosperity, and Depression: United States, 1917-1945	4
HIS 174C	The United States Since World War II, 1945 to the Present	4
HIS 174D	Selected Themes in 20th Century American History	4
HIS 175	American Intellectual History	4
HIS 176A	Cultural and Social History of United States	4
HIS 176B	Cultural and Social History of United States	4
HIS 177A	History of Black People and American Race Relations, 1450-1860	4

HIS 177B	History of Black People and American Race Relations, 1860-Present	4
HIS 178B	Race In America, 1865-Present (Discontinued)	4
HIS 179	Asian American History, 1850-Present	4
HIS 180C	The Fight for the Right to Vote	4
HIS 180AN	American Political History, 1789-1896	4
HIS 181	Religion in American History to 1890	4
HIS 182	Gender and Justice in American History	4
HIS 183A	The Frontier Experience: Trans-Mississippi West	4
HIS 183B	The Frontier Experience: Trans-Mississippi West	4
HIS 184	History of Sexuality in America	4
HIS 185A	History of Science in America	4
HIS 185B	History of Technology in America	4
HIS 187	History of US Foreign Relations in the Twentieth Century	4
HIS 188	America in the 1960s	4
HIS 189	California History	4
HIS 190A	Middle Eastern History I: The Rise of Islam, 600-1000	4
HIS 190B	Middle Eastern History II: The Age of the Crusades, 1001-1400	4
HIS 190C	Middle Eastern History III: The Ottomans, 1401-1730	4
HIS 190D	Middle Eastern History IV: Safavids Iran, 1300-1720	4
HIS 191A	Classical China	4
HIS 191B	High Imperial China	4
HIS 191C	Late Imperial China	4
HIS 191D	Nineteenth Century China: The Empire Confronts the West	4
HIS 191E	The Chinese Revolution	4
HIS 191F	History of the People's Republic of China	4
HIS 191G	Special Topics in Chinese History to 1800	4
HIS 191H	Special Topics in Chinese History after 1800	4
HIS 191J	Sex and Society in Modern Chinese History	4
HIS 193A	History of the Modern Middle East, 1750-1914	4
HIS 193B	History of the Modern Middle East, From 1914	4
HIS 193C	The Middle East Environment: Historical Change and Current Challenges	4
HIS 193D	History of Modern Iran, From 1850 to Present	4
HIS 194A	Aristocratic and Feudal Japan	4
HIS 194B	Early Modern Japan	4
HIS 194C	Modern Japan	4
HIS 194D	Business and Labor in Modern Japan	4
HIS 194E	Education and Technology in Modern Japan	4
HIS 195B	History of Modern Korea	4
HIS 195C	A History of Vietnam	4
HIS 196A	Medieval India	4
HIS 196B	Modern India	4

Choose three:

ECN 103	Economics of Uncertainty and Information	4
ECN 106	Decision Making	4
ECN 116	Comparative Economic Systems	4
ECN 121A	Industrial Organization	4
ECN 121B	Industrial Organization	4

ECN 122	Theory of Games and Strategic Behavior	4
ECN 125	Energy Economics	4
ECN 130	Public Microeconomics	4
ECN 131	Public Finance	4
ECN 132	Health Economics	4
ECN 134	Financial Economics	4
ECN 135	Money, Banks, and Financial Institutions	4
ECN 136	Topics in Macroeconomic Theory	4
ECN 137	Macroeconomic Policy	4
ECN 140	Econometrics	4
ECN 145	Transportation Economics	4
ECN 151A	Economics of the Labor Market	4
ECN 151B	Economics of Human Resources	4
ECN 152	Economics of Education	4
ECN 160A	International Microeconomics	4
ECN 160B	International Macroeconomics	4
ECN 194HA	Special Study for Honors Students	4
ECN 194HB	Special Study for Honors Students	4
ARE 139	Futures and Options Markets	4
ARE 156	Introduction to Mathematical Economics	4
ARE 175	Natural Resource Economics	4
ARE 176	Environmental Economics	4

Total: 61-64

Economics | ECN M.A.

(College of Letters and Science)

Giovanni Peri, Ph.D., Chairperson of the Department

Department Office. 2216 Social Sciences and Humanities Building; 530-752-9241; http://www.econ.ucdavis.edu

Graduate Study. Students who meet the admission requirements of Graduate Studies and the Department of Economics may pursue studies leading to the M.A. and Ph.D. degrees. Fields of emphasis for graduate study include: Economic Theory, Monetary Economics, Economic Development, Economic History, International Economics, Labor Economics, Industrial Organization, Economic Systems, Public Finance, Mathematical Economics, and Quantitative Methods (Econometrics). For information on admission to graduate study, degree requirements, and financial aid, consult the Graduate Announcement and http://www.econ.ucdavis.edu.

The Master of Arts degree is offered only en route to the Ph.D.

Graduate Advisors. Contact Department office.

Recommended. Students considering graduate study in economics are strongly urged to take MAT 021A-021B-021C and 022A.

Economics | ECN Ph.D.

(College of Letters and Science)

Giovanni Peri, Ph.D., Chairperson of the Department

Department Office. 2216 Social Sciences and Humanities Building; 530-752-9241; http://www.econ.ucdavis.edu

Graduate Study. Students who meet the admission requirements of Graduate Studies and the Department of Economics may pursue studies leading to the M.A. and Ph.D. degrees. Fields of emphasis for graduate study include: Economic Theory, Monetary Economics, Economic Development, Economic History, International Economics, Labor Economics, Industrial Organization, Economic Systems, Public Finance, Mathematical Economics, and Quantitative Methods (Econometrics). For information on admission to graduate study, degree requirements, and financial aid, consult the Graduate Announcement and http://www.econ.ucdavis.edu.

Graduate Advisors. Contact Department office.

Recommended. Students considering graduate study in economics are strongly urged to take MAT 021A-021B-021C and 022A.

Economics | ECN Minor

(College of Letters and Science)

Giovanni Peri, Ph.D., Chairperson of the Department

Department Office. 2216 Social Sciences and Humanities Building; 530-752-9241; http://www.econ.ucdavis.edu

Faculty. http://www.econ.ucdavis.edu/directory-of-people/econ-faculty

Economics is the study of how individuals, organizations, and societies choose among alternative uses of resources and how these resources are turned into the things people want.

Course Limits. Except under extraordinary circumstances, not more than two economics courses should be taken in any one quarter. In special cases, the department will accept a limited number of related upper division courses from other departments in satisfaction of the economics upper division course requirements. Approval from a departmental advisor is required in all such cases.

Preparation. ECN 001A, 001B; STA 013, 032, or 102; MAT106A, 016B or 021A, 021B. MAT 016A, 016B or 021A, 021B should be completed before taking ECN 100 and 101. Students need to complete ECN 100 and 101 before taking the advanced courses.

Economics **Units:** 20

ECN 100A	Intermediate Micro Theory: Consumer and Producer Theory	4
ECN 101	Intermediate Macro Theory	4

Choose eight units:

ECN 100B	Intermediate Micro Theory: Imperfect Competition and Market Failure	4
ECN 103	Economics of Uncertainty and Information	4
ECN 106	Decision Making	4
ECN 116	Comparative Economic Systems	4
ECN 121A	Industrial Organization	4
ECN 121B	Industrial Organization	4
ECN 122	Theory of Games and Strategic Behavior	4
ECN 125	Energy Economics	4
ECN 130	Public Microeconomics	4
ECN 131	Public Finance	4
ECN 132	Health Economics	4
ECN 134	Financial Economics	4
ECN 135	Money, Banks, and Financial Institutions	4
ECN 136	Topics in Macroeconomic Theory	4
ECN 137	Macroeconomic Policy	4
ECN 140	Econometrics	4
ECN 145	Transportation Economics	4

ECN 151A	Economics of the Labor Market	4
ECN 151B	Economics of Human Resources	4
ECN 152	Economics of Education	4
ECN 160A	International Microeconomics	4
ECN 160B	International Macroeconomics	4
ARE 139	Futures and Options Markets	4
ARE 156	Introduction to Mathematical Economics	4
ARE 175	Natural Resource Economics	4
ARE 176	Environmental Economics	4

Choose four units:

Upper division Economics courses

Total: 20

Economics | ECN Courses

Courses in ECN:

ECN 001A—Principles of Microeconomics (4)
Discussion—1 hour; Lecture—3 hours. Course 1A and 1B may be taken in either order. Analysis of the allocation of resources and the distribution of income through a price system; competition and monopoly; the role of public policy; comparative economic systems. GE credit: ACGH, QL, SS. Effective: 2004 Fall Quarter.

ECN 001AV—Principles of Microeconomics (4)
Web Electronic Discussion—1 hour; Web Virtual Lecture—3 hours. Analysis of the allocation of resources and the distribution of income through a price system; competition and monopoly; the role of public policy; comparative economic systems. GE credit: ACGH, QL, SS. Effective: 2017 Fall Quarter.

ECN 001B—Principles of Macroeconomics (4)
Discussion—1 hour; Lecture—3 hours. Course 1A and 1B may be taken in either order. Analysis of the economy as a whole; determinants of the level of income, employment and prices; money and banking, economic fluctuations, international trade, economic development; the role of public policy. GE credit: ACGH, QL, SS. Effective: 2004 Fall Quarter.

ECN 090X—Lower Division Seminar (1-2)
Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Limited enrollment. Examination of a special topic in Economics through shared readings, discussions, and written assignments. Effective: 1997 Winter Quarter.

ECN 092—Internship and Field Work (1-12)
Internship—3-36 hours; Term Paper. Prerequisite(s): MGT 011A; MGT 011B; and Consent of Instructor. Junior or senior standing; availability of internship position or approved field work project; stock-brokerage interns must have completed Management 11A-11B. Intensive study of practical application of concepts in economics, stressing research methods and empirical analysis. (P/NP grading only.) Effective: 1997 Winter Quarter.

ECN 098—Group Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Primarily for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

ECN 099—Individual Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

ECN 100—Intermediate Micro Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A C- or better or ECN 001AV C- or better); ECN 001B C- or better; ((MAT 016A C- or better, MAT 016B C- or better) or (MAT 021A C- or better, MAT 021B C- or better) or (MAT 017A C- or better, MAT 017B C- or better)) Price and distribution theory under conditions of perfect and imperfect competition. General equilibrium and welfare economics. Not open for credit to students who have taken ARE 100A or ARE 100B. Effective: 2018 Spring Quarter.

ECN 100A—Intermediate Micro Theory: Consumer and Producer Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A C- or better or ECN 001AV C- or better); ECN 001B C- or better; (MAT 016A C- or better or MAT 017A C- or better or MAT 021A C- or better); (MAT 016B C- or better or MAT 017B C- or better or MAT 021B C- or better) Consumer and producer theory. Equilibrium and welfare analysis. Topics include competitive markets, consumer and producer surplus at an intermediate level. Not open for credit to students that have taken ARE 100A or ECN 100. Effective: 2018 Winter Quarter.

ECN 100B—Intermediate Micro Theory: Imperfect Competition and Market Failure (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 100A Imperfect competition and market failure. Topics include exchange, monopoly, game theory, uncertainty, asymmetric information, and public goods. Not open for credit to students that have taken ARE 100B. Effective: 2017 Fall Quarter.

ECN 101—Intermediate Macro Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A C- or better or ECN 001AV C- or better); ECN 001B C- or better; ((MAT 016A C- or better, MAT 016B C- or better) or (MAT 021A C- or better, MAT 021B C- or better) or (MAT 017A C- or better, MAT 017B C- or better)) Theory of income, employment and prices under static and dynamic conditions, and long term growth. Effective: 2018 Winter Quarter.

ECN 102—Analysis of Economic Data (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ECN 001B; (STA 013 or STA 013Y or STA 032); (MAT 016A or MAT 017A or MAT 021A); (MAT 016B or MAT 017B or MAT 021B); or Consent of Instructor. Analysis of economic data to investigate key relationships emphasized in introductory micro and macro economics. Obtaining, transforming, displaying data; statistical analysis of economic data; basic univariate and multivariate regression analysis. Only two units of credit for students who have completed ECN 140 or ARE 106, and STA 108. GE credit: VL. Effective: 2018 Winter Quarter.

ECN 103—Economics of Uncertainty and Information (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 100 or (ARE 100A, ARE 100B)), (MAT 016A or MAT 017A or MAT 021A), (MAT 016B or MAT 017B or MAT 021B) Optimal decisions under uncertainty, expected utility theory, economics of insurance, asymmetric information, signalling in the job market, incentives and Principal-Agent theory, optimal search strategies and the reservation price principle. Effective: 2018 Winter Quarter.

ECN 106—Decision Making (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ((MAT 016A C- or better, MAT 016B C- or better) or (MAT 017A C- or better, MAT 017B C- or better) or (MAT 021A C- or better, MAT 021B C- or better)); (STA 013 C- or better or STA 013Y C- or better or STA 032 C- or better); or Consent of Instructor. Descriptive and normative analysis of individual decision making, with applications to personal, professional, financial, and public policy decisions. Emphasis on decision making under uncertainty and over time. Heuristics and biases in the psychology of decisions; overcoming decision traps. Effective: 2018 Winter Quarter.

ECN 107—Neuroeconomics/Reinforcement Learning and Decision Making (4)
Lecture—3 hours; Term Paper. Prerequisite(s): (PSC 100 or PSC 100Y or PSC 135 or ARE 100A or ECN 100A or NPB 162 or NPB 163); (STA 013 or STA 013Y or STA 100 or PSC 103A); or Consent of Instructor. Theoretical and empirical approaches to neuroeconomics (neuroscience of decision making) from psychology, neuroscience, economics, and computer science. Neuroscience of judgment and decision making, behavioral economics, and reinforcement learning. (PSC 133 and CGS 107.) GE credit: SL, SS. Effective: 2018 Spring Quarter.

ECN 110A—World Economic History Before the Industrial Revolution (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ECN 001B Development and application of analytical models to explain the nature and functioning of economies before the Industrial Revolution. Examples will be drawn from a variety of societies, including England, China, Polynesia, and Pre-Columbian America. GE credit: SS. Effective: 2018 Spring Quarter.

ECN 110B—World Economic History Since the Industrial Revolution (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ECN 001B Development and application of analytical models to explain the nature and functioning of economies since the Industrial Revolution. Examples will be drawn from a variety of societies, including England, China, Germany, and India. GE credit: SS. Effective: 2018 Winter Quarter.

ECN 111A—Economic History (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ECN 001B; or Consent of Instructor. Survey of economic change in the United States from Colonial times to 1865; reference to other regions in the Western Hemisphere. GE credit: SS. Effective: 2018 Spring Quarter.

ECN 111B—Economics History (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV) or ECN 001B; or Consent of Instructor. Survey of economic change in the United States from 1865 to the post World War II era. GE credit: SS. Effective: 2018 Spring Quarter.

ECN 115A—Economic Development (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ECN 001B Major issues encountered in emerging from international poverty, including problems of growth and structural change, human welfare,
population growth and health, labor markets and internal migration. Important issues of policy concerning international trade and industrialization. (ARE 115A.) GE credit: SS, WC. Effective: 2018 Winter Quarter.

ECN 115B—Economic Development (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ECN 001B Major macroeconomic issues of developing countries. Issues include problems in generating capital, conduct of monetary and fiscal
policies, foreign aid and investment. Important issues of policy concerning international borrowing and external debt of developing countries. (ARE 115B.) GE credit: SS, WC. Effective: 2018 Spring Quarter.

ECN 115BY—Economic Development (4)
Lecture—1.5 hours; Term Paper; Web Virtual Lecture—1.5 hours. Prerequisite(s): ECN 001A; ECN 001B Major macroeconomic issues of developing countries. Issues include problems in generating capital, conduct of monetary and fiscal
policies, foreign aid and investment. Important issues of policy concerning international borrowing and external debt of developing countries. GE credit: SS. Effective: 2016 Fall Quarter.

ECN 116—Comparative Economic Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 100 or (ARE 100A, ARE 100B)), (MAT 016B or MAT 017B or MAT 021B) Economics analysis of the relative virtues of capitalism and socialism, including welfare economics. Marxian exploitation theory, the socialist calculation debate (Hayek and Lange), alternative capitalist systems (Japan, Germany, U.S.) and contemporary models of market socialism. GE credit: WC. Effective: 2016 Fall Quarter.

ECN 121A—Industrial Organization (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ECN 001B; (ECN 100 or (ARE 100A, ARE 100B)); or Consent of Instructor. Appraisal of the role of competition and monopoly in the American economy; market structure, conduct, and economic performance of a variety of industries. GE credit: SS. Effective: 2018 Winter Quarter.

ECN 121B—Industrial Organization (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ECN 001B; (ECN 100 or (ARE 100A, ARE 100B)); or Consent of Instructor. Study of antitrust and economic regulation. Emphasis on applying theoretical models to U.S. industries and case studies, including telecommunications, software, and electricity markets. Topics include natural monopoly, optimal and actual regulatory mechanisms, deregulation, mergers, predatory pricing, and monopolization. GE credit: ACGH. Effective: 2018 Winter Quarter.

ECN 122—Theory of Games and Strategic Behavior (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (MAT 016A, MAT 016B) or (MAT 021A, MAT 021B) or (MAT 017A, MAT 017B); or Consent of Instructor. Introduction to game theory. Explanation of the behavior of rational individuals with interacting and often conflicting interests. Non-cooperative and cooperative theory. Applications to economics, political science and other fields. Effective: 2016 Fall Quarter.

ECN 125—Energy Economics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 100 or (ARE 100A, ARE 100B); or Consent of Instructor. Pass One open to Economics and Graduate School of Management majors. Application of theoretical and empirical models to examine efficiency in energy production and use. Energy and environmental policy, market structure and power, global climate change, optimal regulation, and real-world applications; e.g., California electricity crisis. GE credit: SS. Effective: 2017 Spring Quarter.

ECN 130—Public Microeconomics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 100 or (ARE 100A, ARE 100B); or Consent of Instructor. Public expenditures; theory and applications. Efficiency and equity of competitive markets; externalities, public goods, and market failures; positive and normative aspects of public policy for expenditure, including benefit-cost analysis. Topics include consumer protection, pollution, education, poverty and crime. Effective: 2016 Fall Quarter.

ECN 131—Public Finance (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 100 or (ARE 100A, ARE 100B) Economic burden of taxation; equity and efficiency considerations in tax design; structure and economic effects of the U.S. tax system (including personal income tax, corporation income tax, and property tax); tax loopholes; recent developments; tax reform proposals. Effective: 2016 Fall Quarter.

ECN 132—Health Economics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 100 or (ARE 100A, ARE 100B)), (ECN 102 or ECN 140 or ARE 106 or STA 108); or Consent of Instructor. The health care market, emphasizing the role and use of economics. Individual demand, provision of services by doctors and hospitals, health insurance, managed care and competition, the role of government access to health care. Effective: 2018 Winter Quarter.

ECN 133Y—Poverty, Inequality and Public Policy (4)
Discussion—2 hours; Web Virtual Lecture—2 hours. Prerequisite(s): (ECN 001A or ECN 001AV) or ECN 001B Class size limited to 99; 3 sections of 33 each. Examination of the economics of poverty and inequality in the United States, including measurement, trends, and related policies. Effective: 2018 Spring Quarter.

ECN 134—Financial Economics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ECN 001B; (ECN 100 or (ARE 100A, ARE 100B)), (MAT 016A or MAT 017A or MAT 021A), STA 013 General background and rationale of corporation; finance as resource allocation over time; decision making under uncertainty and the role of information; capital market and interest rate structure; financial decisions. Students who have completed ARE 171A may not receive credit for this course. Effective: 2018 Winter Quarter.

ECN 135—Money, Banks, and Financial Institutions (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 100 or (ARE 100A, ARE 100B)), ECN 101, (STA 013 or STA 013Y) Banks and the banking system. Uncertainty and asymmetric information in the lending process; efficiency of competitive equilibrium in lending markets. Regulation and the conduct of monetary policy. Effective: 2018 Winter Quarter.

ECN 136—Topics in Macroeconomic Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 101 Advanced Topics in macroeconomics theory. The course develops the theoretical and empirical analysis of a specific field of macroeconomics. Possible topics include, business cycle theories, growth theory, monetary economics, political economics and theories of unemployment and inflation. Effective: 2007 Fall Quarter.

ECN 137—Macroeconomic Policy (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 100 or (ARE 100A, ARE 100B)), ECN 101, (STA 013 or STA 013Y) Theory and practice of macroeconomic policy, both monetary and fiscal. Effective: 2018 Spring Quarter.

ECN 140—Econometrics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 100 or (ARE 100A, ARE 100B)), ECN 101, (STA 013 or STA 013Y), (MAT 016A or MAT 017A or MAT 021A), (MAT 016B or MAT 017B or MAT 021B) Pass One open to Economics Majors. Problems of observation, estimation and hypotheses testing in economics through the study of the theory and application of linear regression models. Critical evaluation of selected examples of empirical research and exercises in applied economics. Only two units of credit allowed to students who have completed two or more of the following courses: ECN 102, ARE 106 or STA 108. Effective: 2018 Winter Quarter.

ECN 145—Transportation Economics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 100 or (ARE 100A, ARE 100B)), ((MAT 016A, MAT 016B) or (MAT 017A, MAT 017B)), (STA 013 or STA 013Y), ECN 102, ECN 140, (ARE 106 or STA 108); or Consent of Instructor. Intended for advanced Economics undergraduates. Examination of fundamental problems of planning and financing transportation "infrastructure" (roads, ports, airports). The economics of the automobile industry, as well as the impact of government regulation and deregulation in the airlines and trucking industries. Effective: 2018 Spring Quarter.

ECN 151A—Economics of the Labor Market (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 100 or (ARE 100A, ARE 100B) Theory of labor supply and demand; determination of wages and employment in the labor market. Policy issues: labor force participation by married women; minimum wages and youth unemployment; effect of unions on wages. Effective: 2016 Fall Quarter.

ECN 151B—Economics of Human Resources (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 100 or (ARE 100A, ARE 100B) Human resource analysis; introduction to human capital theory and economics of education; the basic theory of wage differentials, including theories of labor market discrimination; income distribution; poverty. Policy issues; negative income tax; manpower training programs; incomes policy. Effective: 2016 Fall Quarter.

ECN 152—Economics of Education (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 100 C- or better or (ARE 100A C- or better, ARE 100B C- or better)), ECN 102 C- or better, (MAT 016B C- or better or MAT 017B C- or better or MAT 021B C- or better), (STA 013 C- or better or STA 013Y C- or better or STA 032 C- or better); or Consent of Instructor. Application of theoretical and empirical tools of economics to the education sector. Demand for Education; Education Production and Market Structures in Education. Policy applications: class size reduction, school finance equalization, accountability, and school choice. Effective: 2018 Spring Quarter.

ECN 160A—International Microeconomics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 100 or (ARE 100A, ARE 100B); or Consent of Instructor. International grade theory: impact of trade on the domestic and world economies; public policy toward external trade. Only 2 units of credit allowed to students who have completed ECN 162. Effective: 2016 Fall Quarter.

ECN 160B—International Macroeconomics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ECN 001B; (ECN 100 or (ARE 100A, ARE 100B)), ECN 101; or Consent of Instructor. Macroeconomic theory of an open economy. Balance of payments adjustment mechanism, international monetary economics issues; international financial institutions and their policies. Only 2 units of credit allowed to students who have completed ECN 162. Effective: 2018 Winter Quarter.

ECN 162—International Economic Relations (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ECN 001B; or Consent of Instructor. International trade and monetary relations, trade policy, exchange rate policy, policies toward international capital migration and investment. Emphasis on current policy issues. Course intended especially for
non-majors. Not open for credit to students who have completed course 160A or 160B. GE credit: SS, WC. Effective: 2018 Winter Quarter.

ECN 171—Economy of East Asia (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ECN 001B; or Consent of Instructor. Intensive reading, discussion and research on selected topics from the economies of the countries of East Asia. Consult department for course scheduling. Effective: 2018 Spring Quarter.

ECN 190—Topics in Economics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Selected topics in economic analysis and public policy. Variable content. May be repeated for credit topics differ. Effective: 2007 Fall Quarter.

ECN 190X—Upper-Division Seminar (1-4)
Seminar—1-4 hours. Prerequisite(s): ECN 100; ECN 101; and Consent of Instructor. In-depth examination at an upper division level of a special topic in Economics. Emphasis on focused analytical work. May not be repeated for credit. Limited enrollment. Effective: 2007 Fall Quarter.

ECN 192—Internship (1-6)
Internship—3-18 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Internship experience off and on campus in all subject areas offered in the Department of Economics. Supervised by a member of the staff. May be repeated for credit. (P/NP grading only.) Effective: 2014 Winter Quarter.

ECN 194HA—Special Study for Honors Students (4)
Independent Study—3 hours; Seminar—1 hour. Prerequisite(s): Major in Economics with senior standing; consent of instructor and completion of 135 units with a minimum GPA of 3.500 in courses counted toward the major. A program of research culminating in the writing of a senior honors thesis under the direction of a faculty advisor. Effective: 1997 Winter Quarter.

ECN 194HB—Special Study for Honors Students (4)
Independent Study—3 hours; Seminar—1 hour. Prerequisite(s): Major in Economics with senior standing; consent of instructor and completion of 135 units with a minimum GPA of 3.500 in courses counted toward the major. A program of research culminating in the writing of a senior honors thesis under the direction of a faculty advisor. Effective: 1997 Winter Quarter.

ECN 197T—Tutoring in Economics (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of instructor and chairperson. Undergraduates assist the instructor by tutoring students in one of the department's regularly scheduled courses. May be repeated up to 10 unit(s). (P/NP grading only.) Effective: 2004 Fall Quarter.

ECN 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

ECN 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

ECN 200A—Microeconomic Theory (5) ***Review all entries***
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): Graduate standing. Linear and non-linear optimization theory applied to develop the theory of the profit-maximizing firm and the utility-maximizing consumer. (Agricultural and Resource Economics 200A.) Effective: 1997 Winter Quarter.

ECN 200A—Microeconomic Theory (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Graduate standing. Linear and non-linear optimization theory applied to develop the theory of the profit-maximizing firm and the utility-maximizing consumer. (ARE 200A.) Effective: 2018 Fall Quarter.

ECN 200B—Microeconomic Theory (5) ***Review all entries***
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): ECN 200A Characteristics of market equilibrium under perfect competition, simple monopoly and monopsony. Emphasis on general equilibrium and welfare economics; the sources of market success and market failure. (Agricultural and Resource Economics 200B.) Effective: 1997 Winter Quarter.

ECN 200B—Microeconomic Theory (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200A Characteristics of market equilibrium under perfect competition, simple monopoly and monopsony. Emphasis on general equilibrium and welfare economics; the sources of market success and market failure. (ARE 200B.) Effective: 2018 Fall Quarter.

ECN 200C—Microeconomic Theory (5) ***Review all entries***
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): ECN 200B Uncertainty and information economics. Individual decision making under uncertainty. Introduction to game theory, with emphasis on applications
to markets with firms that are imperfect competitors or consumers that are imperfectly informed. (Agricultural and Resource Economics 200C.) Effective: 1997 Winter Quarter.

ECN 200C—Microeconomic Theory (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200B Uncertainty and information economics. Individual decision making under uncertainty. Introduction to game theory, with emphasis on applications to markets with firms that are imperfect competitors or consumers that are imperfectly informed. (ARE 200C.) Effective: 2018 Fall Quarter.

ECN 200D—Macroeconomic Theory (5) ***Review all entries***
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): ECN 101; MAT 021A; MAT 021B; MAT 021C Macro static theory of income, employment, and prices. Effective: 1997 Winter Quarter.

ECN 200D—Macroeconomic Theory (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 101; MAT 021A; MAT 021B; MAT 021C; or equivalent courses. Macro static theory of income, employment, and prices. Effective: 2018 Fall Quarter.

ECN 200E—Macroeconomic Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200B (can be concurrent); ECN 200D Macrodynamic theory of income, employment, and prices. Effective: 1997 Winter Quarter.

ECN 201A—History of Economic Thought (4)
Discussion—1 hour; Lecture—3 hours. Economic thought from the classical Greece era to modern times. Effective: 1997 Winter Quarter.

ECN 201B—History of Economic Thought II (4)
Discussion—1 hour; Lecture—3 hours. Origins and emergence of modern economic analysis. Effective: 1997 Winter Quarter.

ECN 203A—Advanced Economic Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200A; ECN 200B Advanced topics in general equilibrium theory and welfare economics: existence, determinateness and efficiency; intertemporal economies; uncertainty. Effective: 2007 Fall Quarter.

ECN 203B—Advanced Economic Theory: Game Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200A; ECN 200B; ECN 200C Covers the most recent developments in game theory, with the focus changing from year to year. Main topics are: refinements Nash equilibrium, repeated games, evolution, social situations, bounded rationality, and bargaining theory. Effective: 1997 Winter Quarter.

ECN 203C—Topics in Economic Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200A; ECN 200B; ECN 200C Selected topics in contemporary microeconomic theory. May be repeated
for credit with the consent of the Graduate Studies Committee. May be repeated for credit. Effective: 1997 Winter Quarter.

ECN 210A—Economic History (4)
Lecture/Discussion—4 hours. Economic history of the eastern hemisphere in the modern period. Medieval Europe or other regions may be studied, depending on student interest. Effective: 1997 Winter Quarter.

ECN 210B—Economic History (4)
Lecture/Discussion—4 hours. The United States from Colonial times to the present. Other areas of the
western hemisphere may be studied, according to student interest. Effective: 1997 Winter Quarter.

ECN 210C—Economic History (4)
Seminar—4 hours. Prerequisite(s): A graduate course in economic history. Selected topics and issues, emphasis on current research. (Quarter offered to be flexible.) Effective: 1997 Winter Quarter.

ECN 214—Development Economics (4)
Lecture—4 hours. Prerequisite(s): ARE 100A; ARE 100B; ECN 101; ARE 204/ECN 204 and ECN 160A-ECN 160B recommended. Review of the principal theoretical and empirical issues whose analysis has formed development economics. Analysis of economic development theories and development strategies and their application to specific
policy issues in developing country contexts. (ARE 214.) Effective: 1997 Winter Quarter.

ECN 215A—Microdevelopment Theory and Methods I (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200A or ECN 204; ECN 240A recommended. Agricultural development theory, with a focus on microeconomics. Agricultural household behavior with and without market imperfections and uncertainty. Analysis of rural land, labor, credit and insurance
markets, institutions, and contracts. (ARE 215A.) Effective: 1999 Fall Quarter.

ECN 215B—Open Macroeconomics of Development (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ARE 200A or ECN 200A); (ARE 204 or ECN 204); (ECN 214 or ECN 215A); ECN 200D or ECN 205 Models and policy approaches regarding trade, monetary and fiscal issues, capital flows and debt are discussed in the macroeconomic framework of an open developing country.The basic analytical focus is real exchange rate and its impact on sectoral allocation of resources. (ARE 215B.) Effective: 1997 Winter Quarter.

ECN 215C—Microdevelopment Theory and Methods II (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 215A Extension of development theory and microeconomic methods. Agricultural growth and technological change; poverty and income inequality; multisectoral, including village and regional models. Computable general equilibrium methods and applications. (ARE 215C.) Effective: 1999 Fall Quarter.

ECN 215D—Environmental and Economic Development (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200A; (ECN 204 or ARE 275) Interdisciplinary course drawing on theoretical and empirical research on interactions between environmental resource use and economic development processes. Analysis of issues emerging at the interface of environmental and development economics. (ARE 215D.) Effective: 1998 Spring Quarter.

ECN 216—Energy and Climate Policy (4)
Extensive Writing/Discussion; Lecture—3 hours. Prerequisite(s): ECN 100A or ARE 100A; or Consent of Instructor. Pass One restricted to graduate students in the following programs: Economics, Energy Graduate Group, and Transportation Technology and Policy Graduate Group. Fundamentals of energy technology, economics, and policy. Survey and analysis of current and prospective climate policies at the local and global level, including but not limited to cap-and-trade, emissions offsets, intensity standards, technology standards, mandates and subsidies. (EEG 202.) Effective: 2018 Spring Quarter.

ECN 221A—The Theory of Industrial Organization (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200A; ECN 200B; ECN 200C Game theory is used to analyze strategic interaction of firms in industries. Topics include models of competition, product differentiation, entry-deterring strategies, contractual arrangements, vertical control and antitrust issues. Effective: 2001 Fall Quarter.

ECN 221B—Empirical Analysis in Industrial Organization (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 221A; ECN 240B Recent empirical work in industrial organization. Topics include empirical analysis of cartels, product differentiation, innovation and technological change, and imperfect competition in international markets. Effective: 2002 Winter Quarter.

ECN 221C—Industrial Organization and Regulation (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 221A; ECN 240B Optimal regulation of natural monopoly. Topics include regulatory mechanisms for single and multiple output firms under symmetric and asymmetric information, optimality without regulation, the economic theory of regulation, and empirical studies of regulation and deregulation. Effective: 2002 Spring Quarter.

ECN 230A—Public Economics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200C Measures of deadweight loss and consumer surplus; optimal commodity and income taxation; tax incidence; policy issues in personal taxation, corporate taxation, and social insurance; the evaluation of effective tax rates. Effective: 2001 Fall Quarter.

ECN 230B—Public Economics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 240A; ECN 240B Effects of government policies on economic behavior; labor supply, program participation, investment, consumption and savings. Effective: 2016 Fall Quarter.

ECN 230C—Public Economics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200C; ECN 240B Advanced topics in economics of the public sector, with emphasis on current research. Topics may vary from year to year. Effective: 2001 Fall Quarter.

ECN 233—Poverty and Public Policy (4)
Lecture/Discussion—4 hours. Interdisciplinary course covering qualitative and quantitative U.S. based poverty research. Topics include measurement, statistics, theories and evidence on the causes and consequences of poverty, and the history and efficacy of major anti-poverty programs. Effective: 2016 Fall Quarter.

ECN 235A—Macroeconomics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200D; or Consent of Instructor. Frontiers of applied/empirical macroeconomics. Evidence and lessons from macroeconomic history for The Great Depression, financial crises, efficient markets, parity conditions, capital flows, default, financial crises, exchange rates, growth, and other current empirical research topics. Effective: 2016 Fall Quarter.

ECN 235B—Macroeconomics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200D; or Consent of Instructor. Search theory, theory of real-world markets characterized by search frictions, with applications: Labor economics: models of unemployment and wages differentials; Financial economics: determination of asset prices in OTC financial markets; Monetary Economics: foundations for money as a medium of exchange. Effective: 2016 Fall Quarter.

ECN 235C—Macroeconomics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200D; or Consent of Instructor. Basic numerical methods for analytically intractable problems in economics. Techniques presented applicable in a wide range of fields including macroeconomics, econometrics, resource economics, labor economics, economic theory, international trade, finance, game theory, public finance, contract theory, and others. Effective: 2016 Fall Quarter.

ECN 235D—Macroeconomics (4)
Discussion—1 hour; Lecture—3 hours. Selected topics in Macroeconomics. May be repeated for credit May be repeated for credit with the approval of the Economics Graduate Studies Committee. Effective: 2017 Winter Quarter.

ECN 239—Econometric Foundations (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Course will prepare students for econometric theory and empirical work by examining the statistical foundation of econometrics. Special attention is paid to problems specific to non-experimental data common to social sciences. Topics from matrix algebra are also covered. (ARE 239.) Effective: 2016 Fall Quarter.

ECN 240A—Econometric Methods (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 239; or Consent of Instructor. Least squares, instrumental variables, and maximum likelihood estimation and inference for single equation linear regression model; linear restrictions; heteroskedasticity; autocorrelation; lagged dependent variables. (ARE 240A.) Effective: 2017 Fall Quarter.

ECN 240B—Econometric Methods (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 240A Topics include asymptotic theory and instrumental variables, pooled time-series cross-section estimation, seemingly unrelated regression, classical hypothesis tests, identification and estimation of simultaneous equation models, cointegration, errorcorrection models, and qualitative and limited dependent variable models. (ARE 240B.) Effective: 2000 Spring Quarter.

ECN 240C—Time Series Econometrics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 240B; or Consent of Instructor. Probability theory; estimation, inference and forecasting of time series models; trends and non-standard asymptotic theory; vector time series methods and cointegration; time series models for higher order moments and transition data; state-space modeling and the Kalman filter. (ARE 240C.) Effective: 2016 Fall Quarter.

ECN 240D—Cross Section Econometrics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 240B; or Consent of Instructor. Estimation and inference for nonlinear regression models for cross-section data; models for discrete data and for limited dependent variables; models for panel data; additional topics such as bootstrap and semiparametric regression.
(Same course as Agricultural & Resource Economics 240D) (ARE 240D.) Effective: 2016 Fall Quarter.

ECN 240E—Topics in Time Series Econometrics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 240C; or Consent of Instructor. Modern econometric techniques for time series data. Expand on topics covered in Economics 240A, 240B and 240C. Contents may vary from year to year. (ARE 240E.) Effective: 2016 Fall Quarter.

ECN 240F—Topics in Cross Section Econometrics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 240D; or Consent of Instructor. Modern econometrics techniques for cross-section data. Expand on topics covered in Economics 240A, 240B and 240D. Contents may vary from year to year. (ARE 240F.) Effective: 2016 Fall Quarter.

ECN 250A—Labor Economics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 150A and ECN 150B) or the equivalent. Philosophy, theory and history of American and foreign labor movements; union structure, organization and collective bargaining under changing labor market conditions; current labor market issues. Effective: 1997 Winter Quarter.

ECN 250B—Labor Economics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 151A; or Consent of Instructor. ECN 204 or ECN 200A recommended. Microeconomic theory of labor supply and labor demand, estimation of labor supply and demand functions; human capital theory; labor market analysis. Effective: 1997 Winter Quarter.

ECN 260A—International Economics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200A or ECN 204 Theory of trade determinants; gains from trade; tariffs and effective protection; economic unions. Effective: 1997 Winter Quarter.

ECN 260B—International Economics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200D; ECN 200E Balance of payments adjustment mechanisms; foreign exchange markets
theories of balance of payments policy and international monetary mechanisms. Effective: 1997 Winter Quarter.

ECN 260CN—International Investment and Trade (4)
Seminar—4 hours. Prerequisite(s): ECN 260A Analysis of foreign investment and its links to trade; theories of the firm as they relate to firm's export and investment decisions; and an introduction to the political economy of trade policies. Effective: 1999 Winter Quarter.

ECN 260D—Topics in International Macroeconomics (4)
Seminar—4 hours. Prerequisite(s): ECN 260B; or Consent of Instructor. Survey of current literature in international macroeconomic theory. Effective: 1998 Spring Quarter.

ECN 260E—Topics in International Trade (4)
Seminar—4 hours. Prerequisite(s): ECN 260A; ECN 260B Current literature in international trade theory. Effective: 1999 Winter Quarter.

ECN 260F—International Macroeconomic Policy (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 260B Theory and practice of international macroeconomic policy. Topics include exchange rate regimes, international financial institutions, crises and current topics. Effective: 2011 Fall Quarter.

ECN 270A—Economics of Growth (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200D; ECN 200E Modern theories and empirics of economic growth beginning with the neoclassical theories up to current endogenous growth models. Emphasis on the analysis of human capital and growth, technological innovation, its diffusion and empirical evidence on growth. Effective: 2002 Fall Quarter.

ECN 270B—Economics of Growth (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200D; ECN 200E Empirical analysis of growth patterns and growth models. Emphasis on the relationship between macroeconomic management and long-term growth; the use of foreign capital in accelerating growth and its occasional mishaps; the comparison of growth performance in East Asia and Latin America since WW2; the experiences of centrally-planned economies and transitions to market-based growth; and the transformation from an industrial economy to a knowledge economy. Effective: 2003 Winter Quarter.

ECN 270C—Economics of Growth (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200D; ECN 200E Institutional bases; politics; contracts and commitment; money and finance; malthusian dynamics; modern economic growth; transition of industrialization; dual economies, core and periphery; sources of convergence and divergence; openness and growth; resources, demography, and geography; institutions, imperialism, and class conflicts. Effective: 2003 Spring Quarter.

ECN 280—Orientation to Economic Research (2)
Discussion—2 hours. Course tries to bridge the gap between students' classwork and their subsequent research. It deals with topics such as the origination of a research project, some mechanics of empirical research and hints on the submission of research papers. (S/U grading only.) Effective: 1997 Winter Quarter.

ECN 290—Topics in Economics (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Selected topics in economic analysis and public policy, focusing on current research. May be repeated for credit. Effective: 1997 Winter Quarter.

ECN 291—Contemporary Economics Seminar (2)
Seminar—2 hours. Prerequisite(s): Graduate standing in Economics. Seminar series on topics of current interest. May be repeated for credit. (S/U grading only.) Effective: 2007 Fall Quarter.

ECN 298—Group Study (1-5)
Discussion—1-5 hours. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

ECN 299—Individual Study (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

ECN 299D—Dissertation Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

ECN 397—Teaching of Economics (2)
Lecture/Discussion—2 hours. Prerequisite(s): Graduate standing in economics. Teaching of economics: methods of instruction, organization of courses,
examination and evaluation procedures. (S/U grading only.) Effective: 1997 Winter Quarter.

Education Minor

Education Minor | EDU Minor

(School of Education)

Lauren E. Lindstrom, Ph.D., Dean

Cynthia Carter Ching, Ph.D., Associate Dean for Academic Programs and Instruction

Peter C. Mundy, Ph.D., Associate Dean for Academic Personnel and Research

530-752-8258; Fax 530-754-8019; http://education.ucdavis.edu

Faculty. http://education.ucdavis.edu/faculty

Program Coordinator. 530-752-2367

Minor Requirements:

The UC Davis School of Education is committed to developing informed citizens and advocates for productive educational environments in a democratic society. Education courses are designed for undergraduate students from all majors.

A Minor in Education will help students:

- Develop an understanding of the issues and concerns of public and private education.
- Complete prerequisites for the teaching credential program.
- Work towards a master's degree or doctoral degree in education or related field.
- Seek employment in policy, advocacy, or other education related careers.

Courses. Students must complete 20 units the Minor program in Education. At least 12 units of the 20-unit minimum for the minor must be in Education. The remaining units for the minor may be in education or a related field as approved on the electives list.

Minor Advisors. A designated faculty member in the School of Education may advise students and give final approval on the minor. For additional information contact the Student Services office in School of Education Building.

Education **Units:** 20

Upper Division Required Courses

EDU 100	Introduction to Schools**	4
EDU 110	Educational Psychology: General	4
EDU 120	Philosophical and Social Foundations of Education	4

Elective Courses

Remaining eight units may be:

EDU 115	Educating Children with Disabilities	2
EDU 181	Teaching in Science and Mathematics**	2
EDU 183	Teaching High School Mathematics and Science**	3

Choose one:

EDU 114	Quantitative Methods in Educational Research	4
EDU 119	The Use and Misuse of Standardized Tests	4
EDU 121	Introduction to Education Policy Analysis: Tools, Methods and Frameworks	4
EDU 122	Children, Learning and Material Culture	4
EDU 130	Issues in Higher Education	4
EDU 142	Introduction to Environmental Education	4
EDU 147	Anglos, Latinos and the Spanish Black Legend: The Origins and Educational Implications of Anti-Hispanic Prejudice	4
EDU 150	Cultural Diversity and Education in a Sociopolitical Context	4
EDU 152	Academic Spanish for Bilingual Teachers	3

EDU 173	Language Development	4
EDU 185	Learning in a Digital Age: Information, Schooling, and Society	4
EDU 192	Internship	1-3
EDU 198	Directed Group Study*	1-5

Approved Courses Outside of Education

AED 100	Concepts in Agricultural and Environmental Education**	3
CHI 192	Internship in the Chicana/Chicano/Latina/Latino Community*	1-12
MAT 197TC	Tutoring Mathematics in the Community*	1-5
UWP 197TC	Community Tutoring in Writing*	1-4

Choose one:

AAS 130	Education in the African-American Community	4
AMS 152	The Lives of Children in America	4
BIS 195A OR	Science Teaching Internship Program*	4
BIS 195B	Science Teaching Internship*	1-5
CHI 132	Political Economy of Chicana/o Communities	4
ECN 152	Economics of Education	4
HDE 100A	Infancy and Early Childhood	4
HDE 100B	Middle Childhood and Adolescence	4
HDE 101	Cognitive Development	4
LIN 173	Language Development	4
LIN 180	Second Language Learning and Teaching	4
PSC 130	Human Learning and Memory	4
PSC 132	Language and Cognition	4
PSC 141	Cognitive Development	4
SOC 124	Education and Inequality in the U.S.	4
SPA 116	Applied Spanish Linguistics	4
SPA 117	Teaching Spanish as a Native Tongue in the U.S.: Praxis and Theory	4
UWP 104D	Writing in the Professions: Elementary and Secondary Education	4

**EDU 181 and 183-4 units or AED 100-3 units may serve as course substitutes for EDU 100; if EDU 100 is taken, EDU 181, 183 and/or AED 100 MAY not be taken as electives.
*Internship (192, 195A or B, 195TC, 197TC) and Independent Study (199), or a combination of both, may not exceed a total of four units. Elective courses may include only one internship.

Total: 20

Education Minor | EDU Courses

Courses in EDU:

EDU 065A—Foundations for University Success; Introduction to the University System (2)
Fieldwork; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Student must be a part of an approved Foundations for University Success program. Introduction to resources supporting first year student academic success and transition to a tier one research university. (P/NP grading only.) Effective: 2017 Summer Session 2.

EDU 065B—Foundations for University Success; Introduction to Research at a Tier 1 University (2)
Fieldwork; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Student must be a part of an approved Foundations for University Success program. Development of important skills necessary for research including critical thinking, study skills, writing skills, and presentation skills. (P/NP grading only.) Effective: 2017 Summer Session 2.

EDU 065C—Foundations for University Success; Internships, Graduate School and Careers (2)
Fieldwork; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Student must be a part of an approved Foundations for University Success program. Resources to explore academic and career connections and opportunities including internships, volunteer opportunities, graduate schools and careers. (P/NP grading only.) Effective: 2017 Summer Session 2.

EDU 081—Learning in Science and Mathematics (2)
Fieldwork—2 hours; Lecture/Discussion—2 hours. Limited to 26 students per section. Exploration of how students learn and develop understanding in science and mathematics classrooms. Introduction to case studies and interview techniques and their use in K-6 classrooms to illuminate factors that affect student learning. (GEL 081.) (P/NP grading only.) GE credit: SS, VL, WE. Effective: 2007 Winter Quarter.

EDU 092—Internship (1-3)
Internship—3-9 hours. Prerequisite(s): Consent of Instructor. Enrollment dependent on availability of intern placements. Internship as a teacher's aide or tutor in K-12 classrooms under the supervision of a faculty member. May be repeated for credit. (P/NP grading only.) Effective: 2001 Fall Quarter.

EDU 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Primarily for lower division students. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

EDU 100—Introduction to Schools (4)
Fieldwork—3 hours; Lecture—3 hours. Study of occupational concerns of teachers; skills for observing classroom activities; school organization and finance; school reform movement; observing, aiding, and tutoring in schools. GE credit: ACGH, DD, OL, SS. Effective: 2016 Fall Quarter.

EDU 110—Educational Psychology: General (4)
Lecture/Discussion—4 hours. Learning processes, cognitive development, individual differences, testing and evaluation. GE credit: SS, WE. Effective: 2016 Fall Quarter.

EDU 114—Quantitative Methods in Educational Research (4)
Lecture/Discussion—4 hours. Problems and methods in data analysis. Design of research projects. Some consideration of procedures suited to digital computers. GE credit: QL. Effective: 2016 Fall Quarter.

EDU 115—Educating Children with Disabilities (2)
Lecture—2 hours. Educational issues and processes involved in teaching children with disabilities. The course will focus on the structure of special education, with an emphasis on meeting the educational needs of children who are mainstreamed in regular classes. GE credit: SS. Effective: 2016 Fall Quarter.

EDU 119—The Use and Misuse of Standardized Tests (4)
Discussion—1 hour; Lecture—3 hours. Principles underlying educational and psychological testing. Purposes of testing for individual achievement and evaluation of school programs. Interpretation and misinterpretations of outcomes. Analysis of SAT, GRE and other common tests. Experience in test administration and outcome interpretation. GE credit: QL, SS, WE. Effective: 2016 Fall Quarter.

EDU 120—Philosophical and Social Foundations of Education (4)
Discussion—1 hour; Lecture—3 hours. Philosophical, historical, and sociological study of education and the school in our society. GE credit: ACGH, SS, WE. Effective: 2016 Fall Quarter.

EDU 121—Introduction to Education Policy Analysis: Tools, Methods and Frameworks (4)
Discussion—1 hour; Lecture—3 hours. Introduces students to the field of education policy analysis with a specific emphasis on the quantitative frameworks and analytical tools—drawn primarily from economics and statistics—that are used to guide and inform educational policymaking. GE credit: QL, SS. Effective: 2014 Fall Quarter.

EDU 122—Children, Learning and Material Culture (4)
Extensive Writing/Discussion—1 hour; Fieldwork; Lecture/Discussion—3 hours. How material artifacts shape what and how children learn in school, at home, and in the community. Artifacts examined include books, computers, household appliances, toys and games, entertainment media, collectibles, sports equipment, clothing, folk arts and crafts, and neighborhood space. GE credit: SS, VL, WE. Effective: 2017 Summer Session 1.

EDU 130—Issues in Higher Education (4)
Discussion—3 hours; Fieldwork—3 hours. Analysis of current issues in higher education and of some practical implications of varying philosophical approaches to the role of the university. GE credit: SS, WE. Effective: 2017 Summer Session 1.

EDU 142—Introduction to Environmental Education (4)
Fieldwork; Lecture/Discussion—3 hours. Study of history, philosophy, principles and approaches to environmental education (EE) and outreach; learning theories, teaching strategies and techniques in EE and outreach; evaluation of EE curricula in non-formal and in-school contexts; observing, aiding and facilitating local environmental education programs. GE credit: OL, SS. Effective: 2009 Fall Quarter.

EDU 147—Anglos, Latinos and the Spanish Black Legend: The Origins and Educational Implications of Anti-Hispanic Prejudice (4)
Fieldwork; Lecture/Discussion—3 hours; Term Paper. Examination of anti-Hispanic prejudice in the United States focusing on the "Black Legend," a 16th Century anti-Spanish myth underpinning the doctrine of "Manifest Destiny." Exploration of the Legend's presence in contemporary American society through interviews and analysis of school textbooks. (SPA 147.) GE credit: ACGH, AH, DD, WE. Effective: 2016 Fall Quarter.

EDU 150—Cultural Diversity and Education in a Sociopolitical Context (4)
Extensive Writing; Lecture/Discussion—4 hours. Introduction to cultural diversity and education in a sociopolitical context. Interactive course. Small and large-group discussions explore, extend, and apply readings; range of writing genres for responses to assignments and course themes; lectures, slide shows, speakers, brief fieldwork, and presentations. GE credit: DD, SS, WE. Effective: 2011 Fall Quarter.

EDU 151—Language Development in the Chicano Child (3)
Lecture/Discussion—3 hours. Bilingualism, first and second language acquisition, bilingual education, language assessment, Chicano Spanish and the role of dialect varieties in the classroom. Not open for credit to students who have completed EDU 151T. Effective: 2016 Fall Quarter.

EDU 151T—Language Development in the Chicano Child (3)
Lecture/Discussion—3 hours. Prerequisite(s): Acceptance in Teaching Credential Program. Open to UC Davis Teacher Credential candidates only. Bilingualism, first and second language acquisition, bilingual education, language assessment, Chicano Spanish and the role of dialect varieties in the classroom. Not open for credit to students who have completed EDU 151. Effective: 2016 Fall Quarter.

EDU 152—Academic Spanish for Bilingual Teachers (3)
Fieldwork; Lecture/Discussion—3 hours; Recitation—3 hours. Prerequisite(s): Acceptance in Teaching Credential Program or consent of instructor. Communicative class taught in Spanish focused on the development of Spanish communication skills for current and/or future bilingual teachers. Main topics are related to school content areas in bilingual settings, with an emphasis on standard and Southwest Spanish dialects. GE credit: AH, OL, SS, WE. Effective: 2016 Fall Quarter.

EDU 153—Diversity in the K-12 Classroom (2)
Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teaching Credential Program. Analysis of research on learning styles among culturally diverse students with review and evaluation of responsive curricula and classroom teaching techniques. The ethnographic interview as a research tool. Effective: 2016 Fall Quarter.

EDU 160A—Introduction to Peer Counseling (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Introduction to peer counseling techniques and development of peer counseling skills. (P/NP grading only.) Effective: 2016 Fall Quarter.

EDU 160B—Issues in Peer Counseling (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. In-depth review and development of skills for specific counseling topics. May be repeated once for credit when topic differs. May be repeated up to 1 time(s) May be repeated once for credit when topic differs. (P/NP grading only.) Effective: 2016 Fall Quarter.

EDU 163—Guidance and Counseling (4)
Lecture—4 hours. Nature and scope of pupil personnel services; basic tools and techniques of guidance; theory and practice of counseling psychology, with emphasis on educational and vocational adjustment. Effective: 2016 Fall Quarter.

EDU 173—Language Development (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 001 or LIN 001Y; or Consent of Instructor. LIN 103A, LIN 103B recommended. Theory and research on children's acquisition of their native language, including the sound system, grammatical systems, and basic semantic categories. (LIN 173.) GE credit: SS. Effective: 2018 Spring Quarter.

EDU 180A—Computers in Education (1)
Laboratory—2 hours; Lecture/Discussion—1 hour; Project (Term Project)—3 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Restricted to Teaching Credential Majors. Applications of computers in education as instructional, intellectual, and communication tools. Effective: 2013 Fall Quarter.

EDU 180B—Computers in Education (1)
Laboratory—2 hours; Lecture/Discussion—1 hour; Project (Term Project)—3 hours. Prerequisite(s): EDU 180A; Acceptance in Teacher Credential Program. Restricted to Teaching Credential Majors. Applications of computers in education as instructional, intellectual, and communication tools. Effective: 2013 Fall Quarter.

EDU 180C—Computers in Education (1)
Laboratory—2 hours; Lecture/Discussion—1 hour; Project (Term Project)—3 hours. Prerequisite(s): EDU 180B; Acceptance in Teacher Credential Program. Restricted to Teaching Credential Majors. Applications of computers in education as instructional, intellectual, and communication tools. Effective: 2013 Fall Quarter.

EDU 181—Teaching in Science and Mathematics (2)
Fieldwork—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Major in mathematics, science, or engineering; or completion of a one-year sequence of science or calculus. Class size limited to 40 students per section. Exploration of effective teaching practices based on examination of how middle school students learn math and science. Selected readings, discussion and field experience in middle school classrooms. (GEL 181.) (P/NP grading only.) GE credit: SS, WE. Effective: 2011 Fall Quarter.

EDU 182—Computer Project for Curricular Integration (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Design and implementation of a curricular unit to integrate computer technology into a K-12 classroom setting. A project-based seminar intended for students with substantial prior experience with instructional use of computers and related technologies. Not open for credit to students who have completed EDU 180 or EDU 181. Effective: 2016 Fall Quarter.

EDU 183—Teaching High School Mathematics and Science (3) ***Review all entries***
Fieldwork; Lecture/Discussion—2 hours. Prerequisite(s): Major in mathematics, science, or engineering; or consent of instructor with completion of a one-year sequence of science or calculus. Limited to 40 students per section. Exploration and creation of effective teaching practices based on examination of how high school students learn mathematics and science. Field experience in high school classrooms. (Geology 183.) GE credit: OL, SS, WE. Effective: 2017 Fall Quarter.

EDU 183—Teaching High School Mathematics and Science (3) ***Review all entries***
Fieldwork; Lecture/Discussion—2 hours. Prerequisite(s): Major in mathematics, science, or engineering; or completion of a one-year sequence of science or calculus and consent of the instructor. Limited to 40 students per section. Exploration and creation of effective teaching practices based on examination of how high school students learn mathematics and science. Field experience in high school classrooms. (GEL 183.) GE credit: OL, SS, WE. Effective: 2018 Fall Quarter.

EDU 185—Learning in a Digital Age: Information, Schooling, and Society (4)
Lecture/Discussion—2 hours; Lecture/Lab—2 hours. Focus on the changing nature of learning in a digital age: social media, ubiquitous connectivity, online education, electronic communication, writing, gaming, and youth culture. Readings will be drawn from major recent works detailing fundamental shifts in information, schooling, and society. GE credit: OL, SS, VL. Effective: 2013 Fall Quarter.

EDU 192—Internship (1-3)
Discussion—1 hour; Internship—2-8 hours. Prerequisite(s): Consent of Instructor. Internship as a tutor, teacher's aide, or peer counselor in a school or educational counseling setting under the supervision of a faculty member. May be repeated for credit. (P/NP grading only.) Effective: 2016 Fall Quarter.

EDU 197T—Tutoring in Education (1-2)
Tutorial—1-2 hours. Prerequisite(s): Consent of Instructor. Leading of small voluntary discussion groups affiliated with the School's upper division courses under the supervision of, and at the option of, the course instructor, who will submit a written evaluation of the student's work. May be repeated up to 1 time(s) for a total of 4 units. (P/NP grading only.) Effective: 2016 Fall Quarter.

EDU 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

EDU 199—Special Study for Advanced Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2016 Fall Quarter.

EDU 200—Educational Research (4)
Discussion—2 hours; Lecture—2 hours. Prerequisite(s): Introductory statistics or consent of instructor. Defining educational research questions, reviewing relevant literature, developing research designs, developing research instruments, selecting appropriate data analysis procedures, and writing research projects. A case problem will provide practice in designing and reporting research. Effective: 2016 Fall Quarter.

EDU 201—Qualitative Research in Education (4)
Lecture—2 hours; Seminar—2 hours. Prerequisite(s): Graduate standing or consent of instructor. Examines the design and conduct of educational research using non-numerical data (e.g., text, discourse, imagery and artifacts). Focuses on issues (e.g., validity, reliability, generalizability, ethics) and reporting genres (e.g., narrative accounts, case studies, and arguments). Effective: 1997 Fall Quarter.

EDU 202N—Computer Analysis of Qualitative Data (4)
Laboratory—2 hours; Seminar—3 hours. Critical and practical understanding of how to use computer software programs to analyze qualitative data (text, images, and videotape) in conducting social research. Effective: 2016 Fall Quarter.

EDU 203—Educational Testing and Evaluation (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Introduces the theoretical assumptions underlying traditional test construction, as well as the basic statistical principles involved in the design, evaluation, and interpretation of standardized tests. Also introduces the debates surrounding the uses of different kinds of tests and evaluation tools. Effective: 1997 Winter Quarter.

EDU 204A—Quantitative Methods in Educational Research: Analysis of Correlational Designs (4)
Discussion—2 hours; Discussion/Laboratory—2 hours. Prerequisite(s): Introductory statistics or consent of instructor. Methods for analysis of correlational data in educational research. Topics include multiple correlation and regression, discriminant analysis, logistic regression, and canonical correlation. Emphasis on conceptual understanding of the techniques and use of statistical software. Effective: 2016 Fall Quarter.

EDU 204B—Quantitative Methods in Educational Research: Experimental Designs (4)
Discussion—2 hours; Discussion/Laboratory—2 hours. Prerequisite(s): Introductory statistics or consent of instructor. Methods for analysis of experimental data in educational research. Topics include ANOVA, fixed v. random effects models, repeated measures ANOVA, analysis of co-variance, MANOVA, chi square tests, small sample solutions to t and ANOVA. Effective: 2016 Fall Quarter.

EDU 205A—Ethnographic Research in Schools I: Current Theory and Practice (4)
Lecture—4 hours. Current literature from anthropology and society related to schools.Emphasis on the organizational structure of institutions,and the analysis of face-to-face interaction.Will explore the relationship between field-based research and theory development on the acquisition of knowledge in specific social and cultural contexts. Effective: 2016 Fall Quarter.

EDU 205B—Ethnographic Research in Schools II: Field-Based Research Projects (4)
Discussion—4 hours. Prerequisite(s): EDU 205A Student research projects in specific schools with cooperative critical analysis of the design, data collection, and inferencing by researchers. Students will continue to meet with instructor as a group throughout the quarter to discuss specific projects. Effective: 2016 Fall Quarter.

EDU 206A—Inquiry into Classroom Practice: Traditions and Approaches (2)
Fieldwork; Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Introduction to traditions and approaches of teachers conducting research in their own classrooms: purposes, focal areas, methods of data collection and analysis, and written genre conventions. Effective: 2016 Fall Quarter.

EDU 206B—Inquiry into Classroom Practice: Application of Teacher Research Approaches (4)
Fieldwork—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): EDU 206A; or Consent of Instructor. Open to Graduate Teaching Credential students. Analysis and application of teacher research through the development, implementation and evaluation of a short-term classroom research-based intervention. Particular attention to research that enhances learning of English language learners and under-performing students. Effective: 2007 Spring Quarter.

EDU 206C—Inquiry into Classroom Practice: Study Design (4)
Fieldwork—1 hour; Seminar—3 hours. Prerequisite(s): EDU 206B; or Consent of Instructor. Open to Graduate MA Credential students. Proposal development for classroom-based inquiry designed to address student learning needs. Mixed methods research design and preliminary data collection approaches. Design and application of baseline student assessment for proposal development. Literature review. Data collection in K-12 classrooms required. Effective: 2007 Spring Quarter.

EDU 206D—Inquiry into Classroom Practice: Data Analysis and Research Reporting (4)
Extensive Writing/Discussion—1 hour; Fieldwork—1 hour; Seminar—2 hours. Prerequisite(s): EDU 206C; or Consent of Instructor. Open to Graduate MA Credential students. Support of the inquiry begun in course 206C through continuous collaborative critique and feedback resulting in the writing and presentation of a research study. Effective: 2007 Winter Quarter.

EDU 207—Concepts of the Curriculum (4)
Discussion—2 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Development of the skills of philosophical analysis and argument for the establishment of a point of view, in the consideration of curriculum theory and practice. Classical and contemporary approaches to subject matter and activity emphases, hidden curriculum, and moral education. Effective: 2016 Fall Quarter.

EDU 208—Presenting Educational Research in Written Reports (4)
Extensive Writing; Seminar—3 hours. Prerequisite(s): Consent of Instructor. Rhetorical and substantive challenges of presenting educational research through written reports; research rhetoric and genres; competing discourse conventions of educational research, policy, and practice; the social organization of publishing educational research. May be repeated up to 1 time(s). Effective: 2016 Fall Quarter.

EDU 209—Image-based Field Research (4)
Fieldwork—2 hours; Lecture/Discussion—3 hours. Critical and practical understanding of video tape and still photography as resources for enhancing field research in schools and other social setting. Effective: 2016 Fall Quarter.

EDU 210—Psychological Perspectives on School Learning (4)
Extensive Writing; Lecture/Discussion—3 hours. Study of human learning theory and research related to learning of academic content. Review of contemporary issues of constructivism, problem solving, expertise, conceptual change, transfer, and metacognition. Effective: 2016 Fall Quarter.

EDU 211—Sociocultural and Situative Perspectives on Learning and Cognition (4)
Extensive Writing; Lecture/Discussion—3 hours. Sociocultural and situative theories of cognition and learning. Major ideas of L.S. Vygotsky, followed by modern perspectives: situated cognition, cognitive apprenticeship, situated learning, communities of practice, cultural-historical activity theory, and distributed cognition. Implications of each theoretical perspective for educational practice. Effective: 2016 Fall Quarter.

EDU 213—Individual Assessment (4)
Lecture—4 hours. Prerequisite(s): Introductory statistics or consent of instructor. Theories of intellectual functioning and the measurement of cognitive abilities in school-aged children. Supervised practice in administration and scoring of contemporary tests for children including the WISC-R, the WAIS-R, the Stanford Binet, the McCarthy Scales of Children's Ability. Effective: 2016 Fall Quarter.

EDU 215—Research on Achievement Motivation in Education (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Analysis and critique of recent research on cognitive processes related to achievement motivation in school settings. Topics include self-determination theory, attribution theory, goal theory, intrinsic and extrinsic motivation, learned helplessness. psychological reactance, gender and culture, and research design. Effective: 2016 Fall Quarter.

EDU 220—Concepts and Methods of Policy Analysis (4)
Fieldwork; Seminar—3 hours; Term Paper. Introduction to concepts and methods of policy analysis. Emphasis on the relationship between educational issues and problems; policy development; constructing persuasive policy analyses; issues related to policy process. Effective: 2016 Fall Quarter.

EDU 221—Culture and Social Organization of Schools (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Culture and social organization of schools. Examines perspectives of social researchers, educational policy-makers, and school members and their implications for educational research, policy and practice. Effective: 2016 Fall Quarter.

EDU 222—School Change and Educational Reform (4)
Lecture/Discussion—2 hours; Seminar—2 hours. Analysis of models, processes, and case studies of school change and
educational reform with respect to variable characteristics of schools and schooling, planned and unplanned change, the moral evaluation of school change, and the role of educational research. Effective: 2016 Fall Quarter.

EDU 223—Education and Social Policy (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Focuses on understanding the social and political context of education
in the U.S. and California and how education policy is formed in the broader public arena. Develops skills in educational policy analysis. (Former course 237.) Effective: 2016 Fall Quarter.

EDU 225—Education Policy and Law (4)
Lecture/Discussion—4 hours. Examination of law as an instrument of social policy. Specific focus on the legalization of education decision making, its causes, dimensions, and effects on administrative and teacher authority. Effective: 2016 Fall Quarter.

EDU 226—Culture and Social Organization of Higher Education (4)
Fieldwork—1 hour; Seminar—3 hours. Prerequisite(s): Consent of Instructor. Critical study of culture and social organization of higher education institutions policies and functions in the U.S., with some attention to other countries. Effective: 2016 Fall Quarter.

EDU 228—Politics and Governance of Education (4)
Seminar—3 hours; Term Paper. Examination of political power, representation, influence, decision-making and inter-governmental relations in the public schools. Effective: 2016 Fall Quarter.

EDU 229—Education Finance Policy (4)
Seminar—3 hours; Term Paper. Examination of (1) United States financing public education, (2) the relationship between school finance and education policy, and (3) the relationship between education finance and education practice. Effective: 2016 Fall Quarter.

EDU 230—Special Topics in Education Policy (4)
Seminar—3 hours; Term Paper. Selected topics in education policy. Designed to facilitate preparation for the qualifying examination or dissertation. Students will critically analyze scholarly work including their own works in progress. May be repeated for credit for credit when topic differs. Effective: 2016 Fall Quarter.

EDU 235—Critical Pedagogy (4)
Seminar—4 hours. A socio-cultural critique, from an interdisciplinary perspective, of educational reform and change. The critique will include an analysis of the influence of text content on the perpetuation of social power differences. Effective: 2016 Fall Quarter.

EDU 236—Application of Hierarchical Linear Models in Education Research (4)
Discussion/Laboratory—2 hours; Lecture—2 hours; Term Paper. Prerequisite(s): EDU 204A; Or similar course with permission of the instructor. Application of hierarchical linear models in education research across multiple areas, such as policy, curriculum, and assessment. Develop working knowledge of hierarchical linear modeling and an understanding of its use in existing research as well as student's work. Effective: 2009 Spring Quarter.

EDU 237—Survey Research Methods (4)
Fieldwork—1 hour; Lecture/Discussion—3 hours; Term Paper. Theories, principles and application of survey research methodology. Students develop, validate, and administer survey instruments; select representative samples; conduct focus groups; and collect, organize, and analyze survey data. Familiarity with introductory concepts in descriptive and inferential statistics is assumed. Effective: 2016 Fall Quarter.

EDU 238—Participatory Action Research (PAR) (4)
Fieldwork—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): Introductory research methods course recommended. Principles and strategies of PAR and related methodologies that emphasize collaborating with those affected by the issue being researched in order to educate, take action or effect social change. Conduct interviews with potential collaborators, case analyses and research proposals. Effective: 2016 Fall Quarter.

EDU 239—Interview Methods (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): EDU 201 or equivalent course recommended. Introduction to qualitative interviewing, focused in particular on narrative and self-story as both practical method and theoretical stance. Students complete a case-focused interview project during the course: designing an interview protocol, conducting the interview, transcribing, analyzing, and presenting their research. Effective: 2015 Winter Quarter.

EDU 242—Research on Text Comprehension (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Analysis of recent research related to cognitive processing of written texts. Topics include word decoding, schema theory, background knowledge, assimilation, accommodation, working memory, processing depth, vocabulary acquisition, sentence-level processes, text-level processes, text structure, implications for curriculum and instruction. Effective: 2016 Fall Quarter.

EDU 243—Research on the Teaching and Learning of Writing (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Study of issues in research on composition; history of composition studies; data analysis techniques; product and process approaches; cognitive and social perspectives. Effective: 2016 Fall Quarter.

EDU 244—Topical Seminar in Language, Literacy and Culture (4)
Project (Term Project)—1 hour; Seminar—3 hours. Critical study of selected issues of language, literacy, and culture as they relate to education. May be repeated up to 2 time(s) topics differ. Effective: 2016 Fall Quarter.

EDU 245—Theory and Research in Early Literacy (4)
Fieldwork—1 hour; Seminar—3 hours. Analysis of children's initial processes in learning to read extending from the preschool years into second grade. Topics include emergent literacy, phonological awareness, word recognition, decoding, spelling, vocabulary, comprehension, second language reading, assessment, intervention, and instruction. GE credit: SS. Effective: 2016 Fall Quarter.

EDU 246—Reading as a Social and Cultural Process (4)
Fieldwork—1 hour; Lecture—3 hours. Prerequisite(s): EDU 211 recommended. Recent theoretical and empirical work on reading in social contexts. Topics include reading as an individual interactive process; reading as a social and cultural process; critical perspectives on reading; implications of contrastive theoretical perspectives for curriculum and instruction in reading. Effective: 2016 Fall Quarter.

EDU 247—Research on Response to Culturally Diverse Literature, K-12 (4)
Fieldwork—1 hour; Seminar—3 hours. Research on response to culturally diverse literature in classrooms and other K-12 settings. Topics include reader response theories, values in expanding the literary canon, problems of cultural authenticity, resistance to multicultural literature, and instruction for diverse texts and learners. Effective: 2006 Fall Quarter.

EDU 248—Academic Language and Literacies (4)
Fieldwork; Project (Term Project); Seminar—3 hours. Exploration of theories and research on academic language and literacies for
the schooling of first and second language learners. Students use basic
qualitative methods to collect and analyze classroom language and literacy
data. Effective: 2011 Fall Quarter.

EDU 249—Discourse Analysis in Educational Settings (4)
Seminar—3 hours; Term Paper. Prerequisite(s): An introductory linguistics or sociolinguistics course or consent of instructor. Examines form and type in discourse (e.g., narration, conversation, routines), approaches to discourse analysis, and research on classroom discourse (lessons, teaching/learning interactional sequences). Final term paper is an analysis of discourse data tape-recorded by student in a field setting. Effective: 2016 Fall Quarter.

EDU 251—Research in Bilingual and Second Language Education (3)
Seminar—3 hours. Discussion and analysis of recent research in bilingual and second language education. Topics include:language acquisition in second language learners and bilinguals, second language teaching methods, language-use models in bilingual education, interaction analysis in bilingual/cross-cultural classrooms,use of the vernacular in classrooms. Effective: 2016 Fall Quarter.

EDU 253—Language and Literacy in Linguistic Minorities (3)
Fieldwork—3 hours; Seminar—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Analysis and application of research on oral language development and literacy in language minority students, through the development, implementation, and evaluation of research-based language arts curriculum. Effective: 2016 Fall Quarter.

EDU 255—Curriculum Development and Evaluation in Mathematics (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Analysis of curricular issues and goals in mathematics education, including long-term trends, current status and influences, proposed changes, and evaluation issues. Selected curriculum projects will be examined. Effective: 2016 Fall Quarter.

EDU 256A—Research in Mathematics Education (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Examination of research process in mathematics education; review of critical productive problems identified by researchers; evolution of trends, issues, theories and hypotheses in various areas of mathematics education research. Course emphasizes foundations. Effective: 2016 Fall Quarter.

EDU 256B—Research in Mathematics Education (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Current research issues and activities in mathematics education: status, trends, theories and hypotheses. Formulation of research questions and design of studies. Projection of future directions for research. Effective: 2016 Fall Quarter.

EDU 257—Computer Technology in Mathematics Education (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Roles of calculators, computers, and graphing calculators in mathematics education will be addressed, with emphasis on the impact of these technologies on curriculum reform. Selected efforts to integrate technology into mathematics instruction will be examined. Effective: 2016 Fall Quarter.

EDU 260—The Modern History of Science Education (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. History of curricular issues and goals in science education from the late 19th century forward, including long-term trends, current status and influences, proposed changes, and evaluation issues. National science standards and curriculum projects. Effective: 2016 Fall Quarter.

EDU 262A—Research Topics in Science Education I (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Research process and product in science education; review of critical science education issues; evolution of trends, theories and hypotheses in various areas of science education research. Survey of current major research in science education. Effective: 2016 Fall Quarter.

EDU 262B—Research Topics in Science Education II (4)
Seminar—4 hours. Current research issues and activities in science education: status, trends, theories and hypotheses. Formulation of research questions, design of studies and critical, in-depth review of literature related to the student's research interests. Effective: 2016 Fall Quarter.

EDU 264—Scientific Literacy and Science Education Reform (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Current trends in science education reform locally, regionally, and
nationally focusing on scientific literacy. Equity, access and "science for all." Effective: 2016 Fall Quarter.

EDU 270—Research on Teacher Education and Development (4)
Project (Term Project); Seminar—3 hours. Research on teacher preparation in university credential programs and on professional development of in-service teachers, with special attention to teacher preparation for work with culturally and linguistically diverse youth. Effective: 2016 Fall Quarter.

EDU 271—Supervision of Student Teachers: Research, Theory & Practice (4)
Fieldwork—1 hour; Lecture/Discussion—3 hours. Research, theory and practice in the preparation and supervision of teachers. Practice in the supervision of candidates in university teaching credential programs during the student teaching field placement and the mentoring of novice teachers by expert teachers. Effective: 2016 Fall Quarter.

EDU 275A—Effective Instruction: Curriculum and Assessment-Theory, Research, and Practice (2)
Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Restricted to Teaching Credential majors. Examination of contemporary theories of curriculum development, research about the relationship among instructional planning, classroom assessment, and student learning to guide teaching practice. Effective: 2013 Fall Quarter.

EDU 275B—Effective Instruction: English Language Development and Instructing English Language Learners (2)
Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in the Teaching Credential Program. Analysis and application of English language acquisition and development research to teaching practice. Particular attention to research that enhances learning of English language learners and under-performing students. Effective: 2016 Fall Quarter.

EDU 280A—Inquiry and Practice: Qualitative Research for Educational Leaders (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Prepares students to understand the nature/assumptions/logic of qualitative methodology as applied to educational settings, focusing on issues of design/conceptualization/ interpretation/application of qualitative research procedures. Students will use these methods in conducting studies in their educational settings. Effective: 2009 Fall Quarter.

EDU 280B—Inquiry and Practice: Quantitative Research for Educational Leaders (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Field-based and general quantitative research methods in education will focus this course. Students acquire skills and knowledge to collect, organize, analyze, and interpret univariate and multivariate quantitative data in educational research, dissertation projects, and field-based projects. Effective: 2010 Winter Quarter.

EDU 280C—Inquiry and Practice: Research Design and Application for Educational Leaders (4)
Fieldwork; Lecture—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Educational leaders are introduced to qualitative, quantitative, and mixed-methods educational research methods and learn to frame research questions, identify data/data sources, use descriptive statistics, critically examine research studies, make sense of educational research/policy, and conduct independent studies. Effective: 2010 Spring Quarter.

EDU 281A—Problem-Based Learning Courses: Part 1 (4)
Extensive Writing/Discussion; Fieldwork; Lecture/Discussion—4 hours. Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Students identify problems from their educational settings, engage in data collection/analysis, write-up the process/results, and present to class. Work may become a dissertation proposal, if the problem or its extension is of sufficient interest and value. Effective: 2009 Fall Quarter.

EDU 281B—Problem-Based Learning Courses: Part 2 (4)
Extensive Writing/Discussion; Fieldwork; Lecture/Discussion—4 hours. Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Continuation of part one. Effective: 2010 Winter Quarter.

EDU 281C—Problem-Based Learning Courses: Part 3 (4)
Extensive Writing/Discussion; Fieldwork; Lecture/Discussion—4 hours. Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Continuation of part two. Effective: 2010 Spring Quarter.

EDU 282A—Beginning Issues and Practices: Contemporary Educational Leadership (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Students explore the history and emergent relationships among leadership theories/practice and their application to current educational settings. Students will reflect on and refine their personal theory of leadership. Effective: 2009 Fall Quarter.

EDU 282B—Beginning Issues and Practices: Diversity Issues for Educational Leaders (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. The diversity of stakeholders and community issues in California schools and colleges will be explored. Emphasis will be placed on the interaction between underrepresented segments of society and educational institutions. Best Practices in leading diverse schools will be explored. Effective: 2010 Winter Quarter.

EDU 283A—Advanced Issues and Practices: Leadership Across Communities (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Students examine the theory/practice/process of leadership in community-building and collaboration in/across communities, while addressing the utilization of human and material resources and the creation of partnerships, community linkages, and collaborative efforts. Effective: 2010 Spring Quarter.

EDU 283B—Advanced Issues and Practices: Leadership and Student Services (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Practical and theoretical perspectives for building a sense of vision to lead the profession of student affairs and to meet the needs of the whole student. Effective: 2010 Spring Quarter.

EDU 284A—Policy: History and Theory of Educational Policy (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Students learn/analyze the history/theory of educational policy. They see how education leaders have/can positively influence the process and implement effective policies in their local institutions. Policy issues covered: educational opportunity, equity, access, regulation, testing, tenure, accountability. Effective: 2009 Fall Quarter.

EDU 284B—Policy: Formulating and Influencing Policy (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Students will conduct critical analyses of policy at the federal, judicial, state, regional and local levels. Specific California and federal policy environment structures, processes and people will be examined for intended consequences, ethical dilemmas, social justice and equity issues. Effective: 2010 Winter Quarter.

EDU 284C—Policy: Possibilities and Limitations of Educational Policy in a Democracy (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Students will critically examine the democratic purposes of education in light of existing National, State, and local policy reform efforts. Questions like, In what ways are these reforms and policies guided by democratic ideas and challenged by those ideals. Effective: 2010 Winter Quarter.

EDU 285A—Educational Finance, Human Resources, and Law: Integrated Seminar: Human and Financial Assets: Allocations, and Budgets (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Topics include: education finance theory, contemporary finance policy issues, intergovernmental relations, effective resource management, budget analysis and preparation. Effective: 2010 Spring Quarter.

EDU 285B—Educational Finance, Human Resources, and Law: Ethical and Legal Issues in Education (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Human resource and legal concepts and activities governing decisions of school leaders in public education. Attention to theory, application, and practice of personnel and risk management, curriculum, student services, teacher rights, torts, student rights. Effective: 2009 Fall Quarter.

EDU 285C—Educational Finance, Human Resources, and Law: Human Resources and Personnel (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Human resource management research and theory and for applying human resource techniques in the educational setting. Effective: 2010 Spring Quarter.

EDU 286A—Organizational Structures and Change: Data-Driven Decision-Making for Change (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Students use and examine multiple sources of information and data and trends found in making quality decisions to improve P-12/community college settings and addressing problems at sites. Students learn limitations of these data sources. Effective: 2009 Fall Quarter.

EDU 286B—Organizational Structures and Change: Curriculum & Instruction Issues in Education (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. This course addresses the historical development of various curriculum and instructional methodologies found in public and private schools and colleges, and their impact on current curriculum development and reform efforts at the national, state and local level. Effective: 2010 Winter Quarter.

EDU 287—CANDEL Dissertation Seminars (6-12)
Variable—18-36 hours. Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Third year seminars encourage students to complete dissertations within the year. Cohort members meet together in every three-week meetings with faculty members and share their writing, data collection, analysis, discussion of results, development of conclusions/implications. May be repeated up to 9 time(s) until completion of dissertation. (S/U grading only.) Effective: 2009 Fall Quarter.

EDU 287D—CANDEL Dissertation (6-12)
Variable—18-36 hours. Prerequisite(s): Consent of Instructor. Passing of qualifying exams in CANDEL program and advancement to candidacy. Cohort members continue to meet with faculty and share their writing, data collection, analysis, development of conclusions/implications. May be repeated up to 9 time(s) until completion of dissertation. (S/U grading only.) Effective: 2016 Fall Quarter.

EDU 291—Proseminar in Education (4)
Fieldwork—3 hours; Seminar—3 hours. Prerequisite(s): Admission to the M.A. or Ph.D. graduate program in Education. Professional induction into educational research field and Graduate Group in Education at UC Davis. Introduction to landscape of educational research methodologies, purposes and theories. Analysis of debates within field. Investigation of K-12 educational outreach efforts at UC Davis. May be repeated up to 2 time(s) May take the course one time as an MA student and one time as a PhD student. Effective: 2016 Fall Quarter.

EDU 292—Special Topics in Education (2-4)
Variable—2-4 hours. Prerequisite(s): Consent of Instructor. Selected topics in education. Designed to facilitate preparation for the qualifying examination or dissertation. Students will critically analyze scholarly work including their own works in progress. May be repeated for credit. Effective: 2016 Fall Quarter.

EDU 294—Special Topics in Science, Agriculture and Mathematics Education (4)
Project (Term Project); Seminar—3 hours; Term Paper. Critical study of special topics of research relevant to science, agricultural and mathematics education. Students and faculty present work-in-progress on a major research project, and critically analyze and discuss one another's developing scholarly work. May be repeated for credit topic differs. Effective: 2016 Fall Quarter.

EDU 295—Special Topics in Learning and Mind Science (4)
Seminar—3 hours; Term Paper. Critical study of selected issues in the learning sciences, neurodevelopmental disorders, and psychometrics and measurement, as they relate to education. May be repeated for credit when topics differs. Effective: 2016 Fall Quarter.

EDU 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Group study. (S/U grading only.) Effective: 2016 Fall Quarter.

EDU 299—Individual Study (1-6)
Variable—3-18 hours. Prerequisite(s): Consent of Instructor. Individual study under the direction of a faculty member. (S/U grading only.) Effective: 2016 Fall Quarter.

EDU 299D—Research (1-12)
Independent Study—3-36 hours. Prerequisite(s): Consent of Instructor. Research for individual graduate students. (S/U grading only.) Effective: 2016 Fall Quarter.

EDU 300—Reading in the Elementary School (4)
Fieldwork—3 hours; Lecture—3 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Principles, procedures, and curriculum materials for teaching of reading. Includes decoding skills with a special emphasis on phonics, comprehension skills, study skills, and reading in the content areas. Effective: 2016 Fall Quarter.

EDU 301—Reading in the Secondary School (4)
Discussion—4 hours. Prerequisite(s): Graduate standing, enrollment in the secondary credential program or consent of instructor. Principles, procedures, and materials to help secondary school teachers improve the reading competence of students. Strategies for enhancing learning through reading and writing in all disciplines, with special attention to linguistically diverse populations. Effective: 1997 Winter Quarter.

EDU 301A—Teaching Literacy in High School Contexts (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Acceptance in Teacher Credential Program. Restricted to students enrolled in the secondary credential program. Focuses on secondary school literacy practices and strategies for engaging English-speaking and bilingual students with textual, image, and digital literacies across content areas. Covers reading and writing, the Common Core and Language Proficiency standards. Effective: 2016 Fall Quarter.

EDU 301B—Teaching Literacy in High School Contexts (2)
Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Restricted to students enrolled in the secondary credential program. Focuses on secondary school literacy practices and strategies for engaging English-speaking and bilingual students with textual, image, and digital literacies across content areas. Covers reading and writing, the Common Core and Language Proficiency standards. Effective: 2016 Fall Quarter.

EDU 302—Language Arts in the Elementary School (2)
Lecture—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Principles, procedures, and materials for the teaching of oral and written expression, listening skills, drama, and children's literature in elementary schools. Effective: 2016 Fall Quarter.

EDU 303—Art Education in the Elementary School (2)
Laboratory—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Understanding the principles of education in the arts through participation. Development of concepts, introduction to media, and techniques suitable for the elementary school with emphasis on cross-discipline exploration. Effective: 2016 Fall Quarter.

EDU 304A—Teaching in the Elementary Schools (2-18)
Fieldwork—9-48 hours; Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Supervised teaching in regular classrooms in elementary schools. Selection and organization of teaching materials. Introduction to techniques of diagnosing school achievement of children. Effective: 2016 Fall Quarter.

EDU 304B—Teaching in the Elementary Schools (2-18)
Fieldwork—9-48 hours; Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Supervised teaching in regular classrooms in elementary schools. Current conceptions of elementary school curriculum, emphasis on contributions
from the social, biological, and physical sciences. Emphasis on effective teaching methods. Effective: 2016 Fall Quarter.

EDU 304C—Teaching in the Elementary Schools (2-18)
Fieldwork—9-48 hours; Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Supervised teaching in regular classrooms in elementary schools. Evaluation of teaching materials including instructional technology. Current elementary school curriculum with emphasis on contributions from fine arts and humanities. Effective: 2016 Fall Quarter.

EDU 305A—Teaching in the Middle Grades (5-8)
Lecture—2 hours; Seminar—2 hours; Variable—15-30 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Supervised teaching in regular or special education classrooms in middle
grades. Current conceptions of the middle-grades curriculum with emphasis on social, biological, and physical sciences. Effective teaching methods. Effective: 2016 Fall Quarter.

EDU 306A—Teaching in the Secondary Schools (2-18)
Fieldwork—9-48 hours; Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Supervised teaching in regular secondary classrooms. Techniques for classroom communications; constructing goals and objectives; assessment of learning; special problems of adolescents; instructional technology. Effective: 2016 Fall Quarter.

EDU 306B—Teaching in the Secondary Schools (2-18)
Fieldwork—9-48 hours; Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Supervised teaching in regular secondary classrooms. Techniques for classroom communications; constructing goals and objectives; assessment of learning; special problems of adolescents; instructional technology. Effective: 2016 Fall Quarter.

EDU 306C—Teaching in the Secondary Schools (2-18)
Fieldwork—9-48 hours; Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Supervised teaching in regular secondary classrooms. Techniques for classroom communications; constructing goals and objectives; assessment of learning; special problems of adolescents; instructional technology. Effective: 2016 Fall Quarter.

EDU 307—Methods in Elementary Science (2)
Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Principles, procedures, and materials for teaching the biological and physical sciences in elementary schools. Effective: 2016 Fall Quarter.

EDU 308—Methods in Elementary Social Studies (2)
Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Principles, procedures, and materials for teaching history and the social sciences in elementary schools. Effective: 2016 Fall Quarter.

EDU 309—The Teaching of Mathematics, K-9 (3)
Lecture/Discussion—3 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Mathematics curriculum and teaching methods for K-9 reflecting the needs of California's diverse student populations. Effective: 2016 Fall Quarter.

EDU 310—Teaching as Reflective Practice (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Acceptance in Teacher Credential Program. Presentation of issues related to classroom instruction and professional practice, reflections on classroom instruction and other documentation related to student teaching experience. May be repeated up to 6 time(s). Effective: 2016 Fall Quarter.

EDU 320—Creating Classroom Communities (1)
Fieldwork—30 hours; Lecture/Discussion—2 hours. Acceptance in Teacher Credential Program. Observation of classrooms at beginning of academic year for first-hand experience with teachers' approaches to creating communities and setting routines. Candidates are placed with students they will teach during student teaching. Candidates may take on teaching tasks as appropriate. Effective: 2016 Summer Special Session.

EDU 322A—Pedagogical Preparation for Secondary Social Science I (3)
Discussion—1 hour; Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Introduction to teaching methods and curriculum approaches for secondary social science teaching. State and national curriculum standards; application of learning theory to effective instruction; interdisciplinary teaching and active learning approaches; effective teaching strategies for English learners. Effective: 2016 Fall Quarter.

EDU 322B—Pedagogical Preparation for Secondary Social Science II (3)
Discussion—2 hours; Lecture/Discussion—1 hour. Prerequisite(s): Acceptance in Teacher Credential Program. Intermediate teaching methods and curriculum approaches for secondary social science teaching. Interdisciplinary approaches to teaching major themes across social science content areas; teaching potentially controversial social science topics; teaching democratic civic values, student assessment and evaluation. Effective: 2016 Fall Quarter.

EDU 323A—Physical Science in the Secondary School (3)
Discussion/Laboratory—1 hour; Discussion/Laboratory—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Activity-based overview of concepts and processes in secondary school physical sciences. Emphasis upon philosophy, appropriate teaching methods, materials, assessment and evaluation of learning. Effective: 2016 Fall Quarter.

EDU 323B—Life Sciences in the Secondary School (3)
Discussion/Laboratory—2 hours; Discussion/Laboratory—1 hour. Prerequisite(s): Acceptance in Teacher Credential Program. Activity-based overview of concepts and processes in secondary school biology and life sciences. Emphasis on philosophy, appropriate teaching methods, materials, assessment and evaluation of learning, and issues. Effective: 2016 Fall Quarter.

EDU 324A—Methods and Technology in Secondary Mathematics I (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Acceptance in Teacher Credential Program. Introduction to methods and curriculum for teaching mathematics at the secondary level. Introduction to applications of computer technology as instructional, intellectual, and communication tools for mathematics teachers. Effective: 2016 Fall Quarter.

EDU 324B—Methods in Secondary Mathematics II (3)
Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Acceptance in Teacher Credential Program. Expansion of methods and curriculum for teaching mathematics at the secondary level. Intermediate applications of computer technology as instructional, intellectual, and communication tools in mathematics teaching. Effective: 2016 Fall Quarter.

EDU 325—Research and Methods in Secondary English Language Arts (4)
Discussion—4 hours. Prerequisite(s): Consent of Instructor. Acceptance in Teacher Credential Program. Research on teaching and learning in the language arts. Principles, procedures and materials for improving the writing, reading and oral language of secondary students, with special attention to students from culturally and linguistically diverse populations. Effective: 2016 Fall Quarter.

EDU 326—Teaching Language Minority Students in Secondary Schools: Methods and Research (4)
Fieldwork—3 hours; Seminar—3 hours. Prerequisite(s): Consent of Instructor. Acceptance in Teacher Credential Program. Research on principles, procedures and curricula for teaching discipline-specific concepts to language-minority students in secondary schools. Second-language acquisition principles and instructional strategies. Effective: 2016 Fall Quarter.

EDU 327A—Teaching Methods for Secondary Foreign Language/Spanish, Part I (3)
Lecture—3 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Introduction to methods for teaching Spanish as a foreign and a heritage language in secondary schools. State and National Standards. Theories on second language acquisition. Lesson plans. Effective teaching strategies and class management. Effective: 2016 Fall Quarter.

EDU 327B—Teaching Methods for Secondary Foreign Language/Spanish, Part II (3)
Lecture—3 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Continuation to methods for teaching Spanish as a foreign and a heritage language in secondary schools. Research and practice on foreign and heritage language teaching. Expansion of effective teaching strategies and class management. Effective: 2016 Fall Quarter.

EDU 398—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

EDU 399—Individual Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

Education (Graduate Group)

Education (Graduate Group) | EDU (Graduate Group) Information

(School of Education)

Lee Martin, Chairperson of the Group

Group Office. School of Education Building; 530-752-7259; Fax 530-754-6672; phdeduadvising@ucdavis.edu

Faculty. https://education.ucdavis.edu/graduate-group-education-faculty

Education (Graduate Group) | EDU M.A.

(School of Education)

Group Office. School of Education Building; 530-752-7259; Fax 530-754-6672; phdeduadvising@ucdavis.edu

Faculty. https://education.ucdavis.edu/graduate-group-education-faculty

****Admissions for the 2018-19 academic year have been suspended while our faculty review the program's current topical focus and requirements. We will not be offering the Master of Arts General Track for this admissions cycle.****

The Master of Arts in Education provides a course of study for examining research and theory about learners, teachers, schools, and related social institutions. The program prepares professionals to conduct research about the education of children, youth, and adults in a multicultural society. Graduates may assume leadership positions in school districts, state education agencies, and private organizations concerned with instructional research, policy and practice.

Education (Graduate Group) | EDU Ph.D.

(School of Education)

Lee Martin, Chairperson of the Group

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Faculty. https://education.ucdavis.edu/graduate-group-education-faculty

Graduate Study. The Graduate Group in Education offers programs of study and research leading to the Ph.D. degree. Students may concentrate in; language, literacy and culture; learning and mind sciences; mathematics education; school organization and educational policy; or science and agriculture education. Students may also combine these fields of study with designated emphasis areas such as Critical Theory; Second Language Acquisition, Women's Studies, and Writing, Rhetoric, and Composition Studies, Detailed information regarding graduate study may be obtained by writing the Graduate Coordinator or at http://education.ucdavis.edu/programs/PhDoverview.html.

Preparation. Students should have earned a Bachelor's or M.A. degree or the equivalent in a discipline relevant to their proposed emphasis program. For example, students applying for the mathematics education emphasis should have earned the B.A. or M.A. or M.A.T. degree in mathematics or mathematics education.

Graduate Advisers. Danny Martinez, Kevin Gee, Alexis Patterson

Graduate Coordinator. Mary M. Reid

Courses. See Education, School of.

Education (Graduate Group) | EDU Courses

Courses in EDU:

EDU 065A—Foundations for University Success; Introduction to the University System (2)
Fieldwork; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Student must be a part of an approved Foundations for University Success program. Introduction to resources supporting first year student academic success and transition to a tier one research university. (P/NP grading only.) Effective: 2017 Summer Session 2.

EDU 065B—Foundations for University Success; Introduction to Research at a Tier 1 University (2)
Fieldwork; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Student must be a part of an approved Foundations for University Success program. Development of important skills necessary for research including critical thinking, study skills, writing skills, and presentation skills. (P/NP grading only.) Effective: 2017 Summer Session 2.

EDU 065C—Foundations for University Success; Internships, Graduate School and Careers (2)
Fieldwork; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Student must be a part of an approved Foundations for University Success program. Resources to explore academic and career connections and opportunities including internships, volunteer opportunities, graduate schools and careers. (P/NP grading only.) Effective: 2017 Summer Session 2.

EDU 081—Learning in Science and Mathematics (2)
Fieldwork—2 hours; Lecture/Discussion—2 hours. Limited to 26 students per section. Exploration of how students learn and develop understanding in science and mathematics classrooms. Introduction to case studies and interview techniques and their use in K-6 classrooms to illuminate factors that affect student learning. (GEL 081.) (P/NP grading only.) GE credit: SS, VL, WE. Effective: 2007 Winter Quarter.

EDU 092—Internship (1-3)
Internship—3-9 hours. Prerequisite(s): Consent of Instructor. Enrollment dependent on availability of intern placements. Internship as a teacher's aide or tutor in K-12 classrooms under the supervision of a faculty member. May be repeated for credit. (P/NP grading only.) Effective: 2001 Fall Quarter.

EDU 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Primarily for lower division students. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

EDU 100—Introduction to Schools (4)
Fieldwork—3 hours; Lecture—3 hours. Study of occupational concerns of teachers; skills for observing classroom activities; school organization and finance; school reform movement; observing, aiding, and tutoring in schools. GE credit: ACGH, DD, OL, SS. Effective: 2016 Fall Quarter.

EDU 110—Educational Psychology: General (4)
Lecture/Discussion—4 hours. Learning processes, cognitive development, individual differences, testing and evaluation. GE credit: SS, WE. Effective: 2016 Fall Quarter.

EDU 114—Quantitative Methods in Educational Research (4)
Lecture/Discussion—4 hours. Problems and methods in data analysis. Design of research projects. Some consideration of procedures suited to digital computers. GE credit: QL. Effective: 2016 Fall Quarter.

EDU 115—Educating Children with Disabilities (2)
Lecture—2 hours. Educational issues and processes involved in teaching children with disabilities. The course will focus on the structure of special education, with an emphasis on meeting the educational needs of children who are mainstreamed in regular classes. GE credit: SS. Effective: 2016 Fall Quarter.

EDU 119—The Use and Misuse of Standardized Tests (4)
Discussion—1 hour; Lecture—3 hours. Principles underlying educational and psychological testing. Purposes of testing for individual achievement and evaluation of school programs. Interpretation and misinterpretations of outcomes. Analysis of SAT, GRE and other common tests. Experience in test administration and outcome interpretation. GE credit: QL, SS, WE. Effective: 2016 Fall Quarter.

EDU 120—Philosophical and Social Foundations of Education (4)
Discussion—1 hour; Lecture—3 hours. Philosophical, historical, and sociological study of education and the school in our society. GE credit: ACGH, SS, WE. Effective: 2016 Fall Quarter.

EDU 121—Introduction to Education Policy Analysis: Tools, Methods and Frameworks (4)
Discussion—1 hour; Lecture—3 hours. Introduces students to the field of education policy analysis with a specific emphasis on the quantitative frameworks and analytical tools—drawn primarily from economics and statistics—that are used to guide and inform educational policymaking. GE credit: QL, SS. Effective: 2014 Fall Quarter.

EDU 122—Children, Learning and Material Culture (4)
Extensive Writing/Discussion—1 hour; Fieldwork; Lecture/Discussion—3 hours. How material artifacts shape what and how children learn in school, at home, and in the community. Artifacts examined include books, computers, household appliances, toys and games, entertainment media, collectibles, sports equipment, clothing, folk arts and crafts, and neighborhood space. GE credit: SS, VL, WE. Effective: 2017 Summer Session 1.

EDU 130—Issues in Higher Education (4)
Discussion—3 hours; Fieldwork—3 hours. Analysis of current issues in higher education and of some practical implications of varying philosophical approaches to the role of the university. GE credit: SS, WE. Effective: 2017 Summer Session 1.

EDU 142—Introduction to Environmental Education (4)
Fieldwork; Lecture/Discussion—3 hours. Study of history, philosophy, principles and approaches to environmental education (EE) and outreach; learning theories, teaching strategies and techniques in EE and outreach; evaluation of EE curricula in non-formal and in-school contexts; observing, aiding and facilitating local environmental education programs. GE credit: OL, SS. Effective: 2009 Fall Quarter.

EDU 147—Anglos, Latinos and the Spanish Black Legend: The Origins and Educational Implications of Anti-Hispanic Prejudice (4)
Fieldwork; Lecture/Discussion—3 hours; Term Paper. Examination of anti-Hispanic prejudice in the United States focusing on the "Black Legend," a 16th Century anti-Spanish myth underpinning the doctrine of "Manifest Destiny." Exploration of the Legend's presence in contemporary American society through interviews and analysis of school textbooks. (SPA 147.) GE credit: ACGH, AH, DD, WE. Effective: 2016 Fall Quarter.

EDU 150—Cultural Diversity and Education in a Sociopolitical Context (4)
Extensive Writing; Lecture/Discussion—4 hours. Introduction to cultural diversity and education in a sociopolitical context. Interactive course. Small and large-group discussions explore, extend, and apply readings; range of writing genres for responses to assignments and course themes; lectures, slide shows, speakers, brief fieldwork, and presentations. GE credit: DD, SS, WE. Effective: 2011 Fall Quarter.

EDU 151—Language Development in the Chicano Child (3)
Lecture/Discussion—3 hours. Bilingualism, first and second language acquisition, bilingual education, language assessment, Chicano Spanish and the role of dialect varieties in the classroom. Not open for credit to students who have completed EDU 151T. Effective: 2016 Fall Quarter.

EDU 151T—Language Development in the Chicano Child (3)
Lecture/Discussion—3 hours. Prerequisite(s): Acceptance in Teaching Credential Program. Open to UC Davis Teacher Credential candidates only. Bilingualism, first and second language acquisition, bilingual education, language assessment, Chicano Spanish and the role of dialect varieties in the classroom. Not open for credit to students who have completed EDU 151. Effective: 2016 Fall Quarter.

EDU 152—Academic Spanish for Bilingual Teachers (3)
Fieldwork; Lecture/Discussion—3 hours; Recitation—3 hours. Prerequisite(s): Acceptance in Teaching Credential Program or consent of instructor. Communicative class taught in Spanish focused on the development of Spanish communication skills for current and/or future bilingual teachers. Main topics are related to school content areas in bilingual settings, with an emphasis on standard and Southwest Spanish dialects. GE credit: AH, OL, SS, WE. Effective: 2016 Fall Quarter.

EDU 153—Diversity in the K-12 Classroom (2)
Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teaching Credential Program. Analysis of research on learning styles among culturally diverse students with review and evaluation of responsive curricula and classroom teaching techniques. The ethnographic interview as a research tool. Effective: 2016 Fall Quarter.

EDU 160A—Introduction to Peer Counseling (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Introduction to peer counseling techniques and development of peer counseling skills. (P/NP grading only.) Effective: 2016 Fall Quarter.

EDU 160B—Issues in Peer Counseling (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. In-depth review and development of skills for specific counseling topics. May be repeated once for credit when topic differs. May be repeated up to 1 time(s) May be repeated once for credit when topic differs. (P/NP grading only.) Effective: 2016 Fall Quarter.

EDU 163—Guidance and Counseling (4)
Lecture—4 hours. Nature and scope of pupil personnel services; basic tools and techniques of guidance; theory and practice of counseling psychology, with emphasis on educational and vocational adjustment. Effective: 2016 Fall Quarter.

EDU 173—Language Development (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 001 or LIN 001Y; or Consent of Instructor. LIN 103A, LIN 103B recommended. Theory and research on children's acquisition of their native language, including the sound system, grammatical systems, and basic semantic categories. (LIN 173.) GE credit: SS. Effective: 2018 Spring Quarter.

EDU 180A—Computers in Education (1)
Laboratory—2 hours; Lecture/Discussion—1 hour; Project (Term Project)—3 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Restricted to Teaching Credential Majors. Applications of computers in education as instructional, intellectual, and communication tools. Effective: 2013 Fall Quarter.

EDU 180B—Computers in Education (1)
Laboratory—2 hours; Lecture/Discussion—1 hour; Project (Term Project)—3 hours. Prerequisite(s): EDU 180A; Acceptance in Teacher Credential Program. Restricted to Teaching Credential Majors. Applications of computers in education as instructional, intellectual, and communication tools. Effective: 2013 Fall Quarter.

EDU 180C—Computers in Education (1)
Laboratory—2 hours; Lecture/Discussion—1 hour; Project (Term Project)—3 hours. Prerequisite(s): EDU 180B; Acceptance in Teacher Credential Program. Restricted to Teaching Credential Majors. Applications of computers in education as instructional, intellectual, and communication tools. Effective: 2013 Fall Quarter.

EDU 181—Teaching in Science and Mathematics (2)
Fieldwork—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Major in mathematics, science, or engineering; or completion of a one-year sequence of science or calculus. Class size limited to 40 students per section. Exploration of effective teaching practices based on examination of how middle school students learn math and science. Selected readings, discussion and field experience in middle school classrooms. (GEL 181.) (P/NP grading only.) GE credit: SS, WE. Effective: 2011 Fall Quarter.

EDU 182—Computer Project for Curricular Integration (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Design and implementation of a curricular unit to integrate computer technology into a K-12 classroom setting. A project-based seminar intended for students with substantial prior experience with instructional use of computers and related technologies. Not open for credit to students who have completed EDU 180 or EDU 181. Effective: 2016 Fall Quarter.

EDU 183—Teaching High School Mathematics and Science (3) ***Review all entries***
Fieldwork; Lecture/Discussion—2 hours. Prerequisite(s): Major in mathematics, science, or engineering; or consent of instructor with completion of a one-year sequence of science or calculus. Limited to 40 students per section. Exploration and creation of effective teaching practices based on examination of how high school students learn mathematics and science. Field experience in high school classrooms. (Geology 183.) GE credit: OL, SS, WE. Effective: 2017 Fall Quarter.

EDU 183—Teaching High School Mathematics and Science (3) ***Review all entries***
Fieldwork; Lecture/Discussion—2 hours. Prerequisite(s): Major in mathematics, science, or engineering; or completion of a one-year sequence of science or calculus and consent of the instructor. Limited to 40 students per section. Exploration and creation of effective teaching practices based on examination of how high school students learn mathematics and science. Field experience in high school classrooms. (GEL 183.) GE credit: OL, SS, WE. Effective: 2018 Fall Quarter.

EDU 185—Learning in a Digital Age: Information, Schooling, and Society (4)
Lecture/Discussion—2 hours; Lecture/Lab—2 hours. Focus on the changing nature of learning in a digital age: social media, ubiquitous connectivity, online education, electronic communication, writing, gaming, and youth culture. Readings will be drawn from major recent works detailing fundamental shifts in information, schooling, and society. GE credit: OL, SS, VL. Effective: 2013 Fall Quarter.

EDU 192—Internship (1-3)
Discussion—1 hour; Internship—2-8 hours. Prerequisite(s): Consent of Instructor. Internship as a tutor, teacher's aide, or peer counselor in a school or educational counseling setting under the supervision of a faculty member. May be repeated for credit. (P/NP grading only.) Effective: 2016 Fall Quarter.

EDU 197T—Tutoring in Education (1-2)
Tutorial—1-2 hours. Prerequisite(s): Consent of Instructor. Leading of small voluntary discussion groups affiliated with the School's upper division courses under the supervision of, and at the option of, the course instructor, who will submit a written evaluation of the student's work. May be repeated up to 1 time(s) for a total of 4 units. (P/NP grading only.) Effective: 2016 Fall Quarter.

EDU 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

EDU 199—Special Study for Advanced Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2016 Fall Quarter.

EDU 200—Educational Research (4)
Discussion—2 hours; Lecture—2 hours. Prerequisite(s): Introductory statistics or consent of instructor. Defining educational research questions, reviewing relevant literature, developing research designs, developing research instruments, selecting appropriate data analysis procedures, and writing research projects. A case problem will provide practice in designing and reporting research. Effective: 2016 Fall Quarter.

EDU 201—Qualitative Research in Education (4)
Lecture—2 hours; Seminar—2 hours. Prerequisite(s): Graduate standing or consent of instructor. Examines the design and conduct of educational research using non-numerical data (e.g., text, discourse, imagery and artifacts). Focuses on issues (e.g., validity, reliability, generalizability, ethics) and reporting genres (e.g., narrative accounts, case studies, and arguments). Effective: 1997 Fall Quarter.

EDU 202N—Computer Analysis of Qualitative Data (4)
Laboratory—2 hours; Seminar—3 hours. Critical and practical understanding of how to use computer software programs to analyze qualitative data (text, images, and videotape) in conducting social research. Effective: 2016 Fall Quarter.

EDU 203—Educational Testing and Evaluation (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Introduces the theoretical assumptions underlying traditional test construction, as well as the basic statistical principles involved in the design, evaluation, and interpretation of standardized tests. Also introduces the debates surrounding the uses of different kinds of tests and evaluation tools. Effective: 1997 Winter Quarter.

EDU 204A—Quantitative Methods in Educational Research: Analysis of Correlational Designs (4)
Discussion—2 hours; Discussion/Laboratory—2 hours. Prerequisite(s): Introductory statistics or consent of instructor. Methods for analysis of correlational data in educational research. Topics include multiple correlation and regression, discriminant analysis, logistic regression, and canonical correlation. Emphasis on conceptual understanding of the techniques and use of statistical software. Effective: 2016 Fall Quarter.

EDU 204B—Quantitative Methods in Educational Research: Experimental Designs (4)
Discussion—2 hours; Discussion/Laboratory—2 hours. Prerequisite(s): Introductory statistics or consent of instructor. Methods for analysis of experimental data in educational research. Topics include ANOVA, fixed v. random effects models, repeated measures ANOVA, analysis of co-variance, MANOVA, chi square tests, small sample solutions to t and ANOVA. Effective: 2016 Fall Quarter.

EDU 205A—Ethnographic Research in Schools I: Current Theory and Practice (4)
Lecture—4 hours. Current literature from anthropology and society related to schools.Emphasis on the organizational structure of institutions,and the analysis of face-to-face interaction.Will explore the relationship between field-based research and theory development on the acquisition of knowledge in specific social and cultural contexts. Effective: 2016 Fall Quarter.

EDU 205B—Ethnographic Research in Schools II: Field-Based Research Projects (4)
Discussion—4 hours. Prerequisite(s): EDU 205A Student research projects in specific schools with cooperative critical analysis of the design, data collection, and inferencing by researchers. Students will continue to meet with instructor as a group throughout the quarter to discuss specific projects. Effective: 2016 Fall Quarter.

EDU 206A—Inquiry into Classroom Practice: Traditions and Approaches (2)
Fieldwork; Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Introduction to traditions and approaches of teachers conducting research in their own classrooms: purposes, focal areas, methods of data collection and analysis, and written genre conventions. Effective: 2016 Fall Quarter.

EDU 206B—Inquiry into Classroom Practice: Application of Teacher Research Approaches (4)
Fieldwork—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): EDU 206A; or Consent of Instructor. Open to Graduate Teaching Credential students. Analysis and application of teacher research through the development, implementation and evaluation of a short-term classroom research-based intervention. Particular attention to research that enhances learning of English language learners and under-performing students. Effective: 2007 Spring Quarter.

EDU 206C—Inquiry into Classroom Practice: Study Design (4)
Fieldwork—1 hour; Seminar—3 hours. Prerequisite(s): EDU 206B; or Consent of Instructor. Open to Graduate MA Credential students. Proposal development for classroom-based inquiry designed to address student learning needs. Mixed methods research design and preliminary data collection approaches. Design and application of baseline student assessment for proposal development. Literature review. Data collection in K-12 classrooms required. Effective: 2007 Spring Quarter.

EDU 206D—Inquiry into Classroom Practice: Data Analysis and Research Reporting (4)
Extensive Writing/Discussion—1 hour; Fieldwork—1 hour; Seminar—2 hours. Prerequisite(s): EDU 206C; or Consent of Instructor. Open to Graduate MA Credential students. Support of the inquiry begun in course 206C through continuous collaborative critique and feedback resulting in the writing and presentation of a research study. Effective: 2007 Winter Quarter.

EDU 207—Concepts of the Curriculum (4)
Discussion—2 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Development of the skills of philosophical analysis and argument for the establishment of a point of view, in the consideration of curriculum theory and practice. Classical and contemporary approaches to subject matter and activity emphases, hidden curriculum, and moral education. Effective: 2016 Fall Quarter.

EDU 208—Presenting Educational Research in Written Reports (4)
Extensive Writing; Seminar—3 hours. Prerequisite(s): Consent of Instructor. Rhetorical and substantive challenges of presenting educational research through written reports; research rhetoric and genres; competing discourse conventions of educational research, policy, and practice; the social organization of publishing educational research. May be repeated up to 1 time(s). Effective: 2016 Fall Quarter.

EDU 209—Image-based Field Research (4)
Fieldwork—2 hours; Lecture/Discussion—3 hours. Critical and practical understanding of video tape and still photography as resources for enhancing field research in schools and other social setting. Effective: 2016 Fall Quarter.

EDU 210—Psychological Perspectives on School Learning (4)
Extensive Writing; Lecture/Discussion—3 hours. Study of human learning theory and research related to learning of academic content. Review of contemporary issues of constructivism, problem solving, expertise, conceptual change, transfer, and metacognition. Effective: 2016 Fall Quarter.

EDU 211—Sociocultural and Situative Perspectives on Learning and Cognition (4)
Extensive Writing; Lecture/Discussion—3 hours. Sociocultural and situative theories of cognition and learning. Major ideas of L.S. Vygotsky, followed by modern perspectives: situated cognition, cognitive apprenticeship, situated learning, communities of practice, cultural-historical activity theory, and distributed cognition. Implications of each theoretical perspective for educational practice. Effective: 2016 Fall Quarter.

EDU 213—Individual Assessment (4)
Lecture—4 hours. Prerequisite(s): Introductory statistics or consent of instructor. Theories of intellectual functioning and the measurement of cognitive abilities in school-aged children. Supervised practice in administration and scoring of contemporary tests for children including the WISC-R, the WAIS-R, the Stanford Binet, the McCarthy Scales of Children's Ability. Effective: 2016 Fall Quarter.

EDU 215—Research on Achievement Motivation in Education (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Analysis and critique of recent research on cognitive processes related to achievement motivation in school settings. Topics include self-determination theory, attribution theory, goal theory, intrinsic and extrinsic motivation, learned helplessness. psychological reactance, gender and culture, and research design. Effective: 2016 Fall Quarter.

EDU 220—Concepts and Methods of Policy Analysis (4)
Fieldwork; Seminar—3 hours; Term Paper. Introduction to concepts and methods of policy analysis. Emphasis on the relationship between educational issues and problems; policy development; constructing persuasive policy analyses; issues related to policy process. Effective: 2016 Fall Quarter.

EDU 221—Culture and Social Organization of Schools (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Culture and social organization of schools. Examines perspectives of social researchers, educational policy-makers, and school members and their implications for educational research, policy and practice. Effective: 2016 Fall Quarter.

EDU 222—School Change and Educational Reform (4)
Lecture/Discussion—2 hours; Seminar—2 hours. Analysis of models, processes, and case studies of school change and
educational reform with respect to variable characteristics of schools and schooling, planned and unplanned change, the moral evaluation of school change, and the role of educational research. Effective: 2016 Fall Quarter.

EDU 223—Education and Social Policy (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Focuses on understanding the social and political context of education
in the U.S. and California and how education policy is formed in the broader public arena. Develops skills in educational policy analysis. (Former course 237.) Effective: 2016 Fall Quarter.

EDU 225—Education Policy and Law (4)
Lecture/Discussion—4 hours. Examination of law as an instrument of social policy. Specific focus on the legalization of education decision making, its causes, dimensions, and effects on administrative and teacher authority. Effective: 2016 Fall Quarter.

EDU 226—Culture and Social Organization of Higher Education (4)
Fieldwork—1 hour; Seminar—3 hours. Prerequisite(s): Consent of Instructor. Critical study of culture and social organization of higher education institutions policies and functions in the U.S., with some attention to other countries. Effective: 2016 Fall Quarter.

EDU 228—Politics and Governance of Education (4)
Seminar—3 hours; Term Paper. Examination of political power, representation, influence, decision-making and inter-governmental relations in the public schools. Effective: 2016 Fall Quarter.

EDU 229—Education Finance Policy (4)
Seminar—3 hours; Term Paper. Examination of (1) United States financing public education, (2) the relationship between school finance and education policy, and (3) the relationship between education finance and education practice. Effective: 2016 Fall Quarter.

EDU 230—Special Topics in Education Policy (4)
Seminar—3 hours; Term Paper. Selected topics in education policy. Designed to facilitate preparation for the qualifying examination or dissertation. Students will critically analyze scholarly work including their own works in progress. May be repeated for credit for credit when topic differs. Effective: 2016 Fall Quarter.

EDU 235—Critical Pedagogy (4)
Seminar—4 hours. A socio-cultural critique, from an interdisciplinary perspective, of educational reform and change. The critique will include an analysis of the influence of text content on the perpetuation of social power differences. Effective: 2016 Fall Quarter.

EDU 236—Application of Hierarchical Linear Models in Education Research (4)
Discussion/Laboratory—2 hours; Lecture—2 hours; Term Paper. Prerequisite(s): EDU 204A; Or similar course with permission of the instructor. Application of hierarchical linear models in education research across multiple areas, such as policy, curriculum, and assessment. Develop working knowledge of hierarchical linear modeling and an understanding of its use in existing research as well as student's work. Effective: 2009 Spring Quarter.

EDU 237—Survey Research Methods (4)
Fieldwork—1 hour; Lecture/Discussion—3 hours; Term Paper. Theories, principles and application of survey research methodology. Students develop, validate, and administer survey instruments; select representative samples; conduct focus groups; and collect, organize, and analyze survey data. Familiarity with introductory concepts in descriptive and inferential statistics is assumed. Effective: 2016 Fall Quarter.

EDU 238—Participatory Action Research (PAR) (4)
Fieldwork—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): Introductory research methods course recommended. Principles and strategies of PAR and related methodologies that emphasize collaborating with those affected by the issue being researched in order to educate, take action or effect social change. Conduct interviews with potential collaborators, case analyses and research proposals. Effective: 2016 Fall Quarter.

EDU 239—Interview Methods (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): EDU 201 or equivalent course recommended. Introduction to qualitative interviewing, focused in particular on narrative and self-story as both practical method and theoretical stance. Students complete a case-focused interview project during the course: designing an interview protocol, conducting the interview, transcribing, analyzing, and presenting their research. Effective: 2015 Winter Quarter.

EDU 242—Research on Text Comprehension (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Analysis of recent research related to cognitive processing of written texts. Topics include word decoding, schema theory, background knowledge, assimilation, accommodation, working memory, processing depth, vocabulary acquisition, sentence-level processes, text-level processes, text structure, implications for curriculum and instruction. Effective: 2016 Fall Quarter.

EDU 243—Research on the Teaching and Learning of Writing (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Study of issues in research on composition; history of composition studies; data analysis techniques; product and process approaches; cognitive and social perspectives. Effective: 2016 Fall Quarter.

EDU 244—Topical Seminar in Language, Literacy and Culture (4)
Project (Term Project)—1 hour; Seminar—3 hours. Critical study of selected issues of language, literacy, and culture as they relate to education. May be repeated up to 2 time(s) topics differ. Effective: 2016 Fall Quarter.

EDU 245—Theory and Research in Early Literacy (4)
Fieldwork—1 hour; Seminar—3 hours. Analysis of children's initial processes in learning to read extending from the preschool years into second grade. Topics include emergent literacy, phonological awareness, word recognition, decoding, spelling, vocabulary, comprehension, second language reading, assessment, intervention, and instruction. GE credit: SS. Effective: 2016 Fall Quarter.

EDU 246—Reading as a Social and Cultural Process (4)
Fieldwork—1 hour; Lecture—3 hours. Prerequisite(s): EDU 211 recommended. Recent theoretical and empirical work on reading in social contexts. Topics include reading as an individual interactive process; reading as a social and cultural process; critical perspectives on reading; implications of contrastive theoretical perspectives for curriculum and instruction in reading. Effective: 2016 Fall Quarter.

EDU 247—Research on Response to Culturally Diverse Literature, K-12 (4)
Fieldwork—1 hour; Seminar—3 hours. Research on response to culturally diverse literature in classrooms and other K-12 settings. Topics include reader response theories, values in expanding the literary canon, problems of cultural authenticity, resistance to multicultural literature, and instruction for diverse texts and learners. Effective: 2006 Fall Quarter.

EDU 248—Academic Language and Literacies (4)
Fieldwork; Project (Term Project); Seminar—3 hours. Exploration of theories and research on academic language and literacies for
the schooling of first and second language learners. Students use basic
qualitative methods to collect and analyze classroom language and literacy
data. Effective: 2011 Fall Quarter.

EDU 249—Discourse Analysis in Educational Settings (4)
Seminar—3 hours; Term Paper. Prerequisite(s): An introductory linguistics or sociolinguistics course or consent of instructor. Examines form and type in discourse (e.g., narration, conversation, routines), approaches to discourse analysis, and research on classroom discourse (lessons, teaching/learning interactional sequences). Final term paper is an analysis of discourse data tape-recorded by student in a field setting. Effective: 2016 Fall Quarter.

EDU 251—Research in Bilingual and Second Language Education (3)
Seminar—3 hours. Discussion and analysis of recent research in bilingual and second language education. Topics include:language acquisition in second language learners and bilinguals, second language teaching methods, language-use models in bilingual education, interaction analysis in bilingual/cross-cultural classrooms,use of the vernacular in classrooms. Effective: 2016 Fall Quarter.

EDU 253—Language and Literacy in Linguistic Minorities (3)
Fieldwork—3 hours; Seminar—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Analysis and application of research on oral language development and literacy in language minority students, through the development, implementation, and evaluation of research-based language arts curriculum. Effective: 2016 Fall Quarter.

EDU 255—Curriculum Development and Evaluation in Mathematics (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Analysis of curricular issues and goals in mathematics education, including long-term trends, current status and influences, proposed changes, and evaluation issues. Selected curriculum projects will be examined. Effective: 2016 Fall Quarter.

EDU 256A—Research in Mathematics Education (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Examination of research process in mathematics education; review of critical productive problems identified by researchers; evolution of trends, issues, theories and hypotheses in various areas of mathematics education research. Course emphasizes foundations. Effective: 2016 Fall Quarter.

EDU 256B—Research in Mathematics Education (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Current research issues and activities in mathematics education: status, trends, theories and hypotheses. Formulation of research questions and design of studies. Projection of future directions for research. Effective: 2016 Fall Quarter.

EDU 257—Computer Technology in Mathematics Education (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Roles of calculators, computers, and graphing calculators in mathematics education will be addressed, with emphasis on the impact of these technologies on curriculum reform. Selected efforts to integrate technology into mathematics instruction will be examined. Effective: 2016 Fall Quarter.

EDU 260—The Modern History of Science Education (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. History of curricular issues and goals in science education from the late 19th century forward, including long-term trends, current status and influences, proposed changes, and evaluation issues. National science standards and curriculum projects. Effective: 2016 Fall Quarter.

EDU 262A—Research Topics in Science Education I (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Research process and product in science education; review of critical science education issues; evolution of trends, theories and hypotheses in various areas of science education research. Survey of current major research in science education. Effective: 2016 Fall Quarter.

EDU 262B—Research Topics in Science Education II (4)
Seminar—4 hours. Current research issues and activities in science education: status, trends, theories and hypotheses. Formulation of research questions, design of studies and critical, in-depth review of literature related to the student's research interests. Effective: 2016 Fall Quarter.

EDU 264—Scientific Literacy and Science Education Reform (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Current trends in science education reform locally, regionally, and
nationally focusing on scientific literacy. Equity, access and "science for all." Effective: 2016 Fall Quarter.

EDU 270—Research on Teacher Education and Development (4)
Project (Term Project); Seminar—3 hours. Research on teacher preparation in university credential programs and on professional development of in-service teachers, with special attention to teacher preparation for work with culturally and linguistically diverse youth. Effective: 2016 Fall Quarter.

EDU 271—Supervision of Student Teachers: Research, Theory & Practice (4)
Fieldwork—1 hour; Lecture/Discussion—3 hours. Research, theory and practice in the preparation and supervision of teachers. Practice in the supervision of candidates in university teaching credential programs during the student teaching field placement and the mentoring of novice teachers by expert teachers. Effective: 2016 Fall Quarter.

EDU 275A—Effective Instruction: Curriculum and Assessment-Theory, Research, and Practice (2)
Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Restricted to Teaching Credential majors. Examination of contemporary theories of curriculum development, research about the relationship among instructional planning, classroom assessment, and student learning to guide teaching practice. Effective: 2013 Fall Quarter.

EDU 275B—Effective Instruction: English Language Development and Instructing English Language Learners (2)
Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in the Teaching Credential Program. Analysis and application of English language acquisition and development research to teaching practice. Particular attention to research that enhances learning of English language learners and under-performing students. Effective: 2016 Fall Quarter.

EDU 280A—Inquiry and Practice: Qualitative Research for Educational Leaders (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Prepares students to understand the nature/assumptions/logic of qualitative methodology as applied to educational settings, focusing on issues of design/conceptualization/ interpretation/application of qualitative research procedures. Students will use these methods in conducting studies in their educational settings. Effective: 2009 Fall Quarter.

EDU 280B—Inquiry and Practice: Quantitative Research for Educational Leaders (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Field-based and general quantitative research methods in education will focus this course. Students acquire skills and knowledge to collect, organize, analyze, and interpret univariate and multivariate quantitative data in educational research, dissertation projects, and field-based projects. Effective: 2010 Winter Quarter.

EDU 280C—Inquiry and Practice: Research Design and Application for Educational Leaders (4)
Fieldwork; Lecture—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Educational leaders are introduced to qualitative, quantitative, and mixed-methods educational research methods and learn to frame research questions, identify data/data sources, use descriptive statistics, critically examine research studies, make sense of educational research/policy, and conduct independent studies. Effective: 2010 Spring Quarter.

EDU 281A—Problem-Based Learning Courses: Part 1 (4)
Extensive Writing/Discussion; Fieldwork; Lecture/Discussion—4 hours. Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Students identify problems from their educational settings, engage in data collection/analysis, write-up the process/results, and present to class. Work may become a dissertation proposal, if the problem or its extension is of sufficient interest and value. Effective: 2009 Fall Quarter.

EDU 281B—Problem-Based Learning Courses: Part 2 (4)
Extensive Writing/Discussion; Fieldwork; Lecture/Discussion—4 hours. Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Continuation of part one. Effective: 2010 Winter Quarter.

EDU 281C—Problem-Based Learning Courses: Part 3 (4)
Extensive Writing/Discussion; Fieldwork; Lecture/Discussion—4 hours. Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Continuation of part two. Effective: 2010 Spring Quarter.

EDU 282A—Beginning Issues and Practices: Contemporary Educational Leadership (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Students explore the history and emergent relationships among leadership theories/practice and their application to current educational settings. Students will reflect on and refine their personal theory of leadership. Effective: 2009 Fall Quarter.

EDU 282B—Beginning Issues and Practices: Diversity Issues for Educational Leaders (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. The diversity of stakeholders and community issues in California schools and colleges will be explored. Emphasis will be placed on the interaction between underrepresented segments of society and educational institutions. Best Practices in leading diverse schools will be explored. Effective: 2010 Winter Quarter.

EDU 283A—Advanced Issues and Practices: Leadership Across Communities (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Students examine the theory/practice/process of leadership in community-building and collaboration in/across communities, while addressing the utilization of human and material resources and the creation of partnerships, community linkages, and collaborative efforts. Effective: 2010 Spring Quarter.

EDU 283B—Advanced Issues and Practices: Leadership and Student Services (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Practical and theoretical perspectives for building a sense of vision to lead the profession of student affairs and to meet the needs of the whole student. Effective: 2010 Spring Quarter.

EDU 284A—Policy: History and Theory of Educational Policy (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Students learn/analyze the history/theory of educational policy. They see how education leaders have/can positively influence the process and implement effective policies in their local institutions. Policy issues covered: educational opportunity, equity, access, regulation, testing, tenure, accountability. Effective: 2009 Fall Quarter.

EDU 284B—Policy: Formulating and Influencing Policy (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Students will conduct critical analyses of policy at the federal, judicial, state, regional and local levels. Specific California and federal policy environment structures, processes and people will be examined for intended consequences, ethical dilemmas, social justice and equity issues. Effective: 2010 Winter Quarter.

EDU 284C—Policy: Possibilities and Limitations of Educational Policy in a Democracy (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Students will critically examine the democratic purposes of education in light of existing National, State, and local policy reform efforts. Questions like, In what ways are these reforms and policies guided by democratic ideas and challenged by those ideals. Effective: 2010 Winter Quarter.

EDU 285A—Educational Finance, Human Resources, and Law: Integrated Seminar: Human and Financial Assets: Allocations, and Budgets (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Topics include: education finance theory, contemporary finance policy issues, intergovernmental relations, effective resource management, budget analysis and preparation. Effective: 2010 Spring Quarter.

EDU 285B—Educational Finance, Human Resources, and Law: Ethical and Legal Issues in Education (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Human resource and legal concepts and activities governing decisions of school leaders in public education. Attention to theory, application, and practice of personnel and risk management, curriculum, student services, teacher rights, torts, student rights. Effective: 2009 Fall Quarter.

EDU 285C—Educational Finance, Human Resources, and Law: Human Resources and Personnel (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Human resource management research and theory and for applying human resource techniques in the educational setting. Effective: 2010 Spring Quarter.

EDU 286A—Organizational Structures and Change: Data-Driven Decision-Making for Change (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Students use and examine multiple sources of information and data and trends found in making quality decisions to improve P-12/community college settings and addressing problems at sites. Students learn limitations of these data sources. Effective: 2009 Fall Quarter.

EDU 286B—Organizational Structures and Change: Curriculum & Instruction Issues in Education (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. This course addresses the historical development of various curriculum and instructional methodologies found in public and private schools and colleges, and their impact on current curriculum development and reform efforts at the national, state and local level. Effective: 2010 Winter Quarter.

EDU 287—CANDEL Dissertation Seminars (6-12)
Variable—18-36 hours. Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Third year seminars encourage students to complete dissertations within the year. Cohort members meet together in every three-week meetings with faculty members and share their writing, data collection, analysis, discussion of results, development of conclusions/implications. May be repeated up to 9 time(s) until completion of dissertation. (S/U grading only.) Effective: 2009 Fall Quarter.

EDU 287D—CANDEL Dissertation (6-12)
Variable—18-36 hours. Prerequisite(s): Consent of Instructor. Passing of qualifying exams in CANDEL program and advancement to candidacy. Cohort members continue to meet with faculty and share their writing, data collection, analysis, development of conclusions/implications. May be repeated up to 9 time(s) until completion of dissertation. (S/U grading only.) Effective: 2016 Fall Quarter.

EDU 291—Proseminar in Education (4)
Fieldwork—3 hours; Seminar—3 hours. Prerequisite(s): Admission to the M.A. or Ph.D. graduate program in Education. Professional induction into educational research field and Graduate Group in Education at UC Davis. Introduction to landscape of educational research methodologies, purposes and theories. Analysis of debates within field. Investigation of K-12 educational outreach efforts at UC Davis. May be repeated up to 2 time(s) May take the course one time as an MA student and one time as a PhD student. Effective: 2016 Fall Quarter.

EDU 292—Special Topics in Education (2-4)
Variable—2-4 hours. Prerequisite(s): Consent of Instructor. Selected topics in education. Designed to facilitate preparation for the qualifying examination or dissertation. Students will critically analyze scholarly work including their own works in progress. May be repeated for credit. Effective: 2016 Fall Quarter.

EDU 294—Special Topics in Science, Agriculture and Mathematics Education (4)
Project (Term Project); Seminar—3 hours; Term Paper. Critical study of special topics of research relevant to science, agricultural and mathematics education. Students and faculty present work-in-progress on a major research project, and critically analyze and discuss one another's developing scholarly work. May be repeated for credit topic differs. Effective: 2016 Fall Quarter.

EDU 295—Special Topics in Learning and Mind Science (4)
Seminar—3 hours; Term Paper. Critical study of selected issues in the learning sciences, neurodevelopmental disorders, and psychometrics and measurement, as they relate to education. May be repeated for credit when topics differs. Effective: 2016 Fall Quarter.

EDU 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Group study. (S/U grading only.) Effective: 2016 Fall Quarter.

EDU 299—Individual Study (1-6)
Variable—3-18 hours. Prerequisite(s): Consent of Instructor. Individual study under the direction of a faculty member. (S/U grading only.) Effective: 2016 Fall Quarter.

EDU 299D—Research (1-12)
Independent Study—3-36 hours. Prerequisite(s): Consent of Instructor. Research for individual graduate students. (S/U grading only.) Effective: 2016 Fall Quarter.

EDU 300—Reading in the Elementary School (4)
Fieldwork—3 hours; Lecture—3 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Principles, procedures, and curriculum materials for teaching of reading. Includes decoding skills with a special emphasis on phonics, comprehension skills, study skills, and reading in the content areas. Effective: 2016 Fall Quarter.

EDU 301—Reading in the Secondary School (4)
Discussion—4 hours. Prerequisite(s): Graduate standing, enrollment in the secondary credential program or consent of instructor. Principles, procedures, and materials to help secondary school teachers improve the reading competence of students. Strategies for enhancing learning through reading and writing in all disciplines, with special attention to linguistically diverse populations. Effective: 1997 Winter Quarter.

EDU 301A—Teaching Literacy in High School Contexts (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Acceptance in Teacher Credential Program. Restricted to students enrolled in the secondary credential program. Focuses on secondary school literacy practices and strategies for engaging English-speaking and bilingual students with textual, image, and digital literacies across content areas. Covers reading and writing, the Common Core and Language Proficiency standards. Effective: 2016 Fall Quarter.

EDU 301B—Teaching Literacy in High School Contexts (2)
Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Restricted to students enrolled in the secondary credential program. Focuses on secondary school literacy practices and strategies for engaging English-speaking and bilingual students with textual, image, and digital literacies across content areas. Covers reading and writing, the Common Core and Language Proficiency standards. Effective: 2016 Fall Quarter.

EDU 302—Language Arts in the Elementary School (2)
Lecture—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Principles, procedures, and materials for the teaching of oral and written expression, listening skills, drama, and children's literature in elementary schools. Effective: 2016 Fall Quarter.

EDU 303—Art Education in the Elementary School (2)
Laboratory—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Understanding the principles of education in the arts through participation. Development of concepts, introduction to media, and techniques suitable for the elementary school with emphasis on cross-discipline exploration. Effective: 2016 Fall Quarter.

EDU 304A—Teaching in the Elementary Schools (2-18)
Fieldwork—9-48 hours; Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Supervised teaching in regular classrooms in elementary schools. Selection and organization of teaching materials. Introduction to techniques of diagnosing school achievement of children. Effective: 2016 Fall Quarter.

EDU 304B—Teaching in the Elementary Schools (2-18)
Fieldwork—9-48 hours; Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Supervised teaching in regular classrooms in elementary schools. Current conceptions of elementary school curriculum, emphasis on contributions
from the social, biological, and physical sciences. Emphasis on effective teaching methods. Effective: 2016 Fall Quarter.

EDU 304C—Teaching in the Elementary Schools (2-18)
Fieldwork—9-48 hours; Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Supervised teaching in regular classrooms in elementary schools. Evaluation of teaching materials including instructional technology. Current elementary school curriculum with emphasis on contributions from fine arts and humanities. Effective: 2016 Fall Quarter.

EDU 305A—Teaching in the Middle Grades (5-8)
Lecture—2 hours; Seminar—2 hours; Variable—15-30 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Supervised teaching in regular or special education classrooms in middle
grades. Current conceptions of the middle-grades curriculum with emphasis on social, biological, and physical sciences. Effective teaching methods. Effective: 2016 Fall Quarter.

EDU 306A—Teaching in the Secondary Schools (2-18)
Fieldwork—9-48 hours; Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Supervised teaching in regular secondary classrooms. Techniques for classroom communications; constructing goals and objectives; assessment of learning; special problems of adolescents; instructional technology. Effective: 2016 Fall Quarter.

EDU 306B—Teaching in the Secondary Schools (2-18)
Fieldwork—9-48 hours; Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Supervised teaching in regular secondary classrooms. Techniques for classroom communications; constructing goals and objectives; assessment of learning; special problems of adolescents; instructional technology. Effective: 2016 Fall Quarter.

EDU 306C—Teaching in the Secondary Schools (2-18)
Fieldwork—9-48 hours; Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Supervised teaching in regular secondary classrooms. Techniques for classroom communications; constructing goals and objectives; assessment of learning; special problems of adolescents; instructional technology. Effective: 2016 Fall Quarter.

EDU 307—Methods in Elementary Science (2)
Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Principles, procedures, and materials for teaching the biological and physical sciences in elementary schools. Effective: 2016 Fall Quarter.

EDU 308—Methods in Elementary Social Studies (2)
Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Principles, procedures, and materials for teaching history and the social sciences in elementary schools. Effective: 2016 Fall Quarter.

EDU 309—The Teaching of Mathematics, K-9 (3)
Lecture/Discussion—3 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Mathematics curriculum and teaching methods for K-9 reflecting the needs of California's diverse student populations. Effective: 2016 Fall Quarter.

EDU 310—Teaching as Reflective Practice (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Acceptance in Teacher Credential Program. Presentation of issues related to classroom instruction and professional practice, reflections on classroom instruction and other documentation related to student teaching experience. May be repeated up to 6 time(s). Effective: 2016 Fall Quarter.

EDU 320—Creating Classroom Communities (1)
Fieldwork—30 hours; Lecture/Discussion—2 hours. Acceptance in Teacher Credential Program. Observation of classrooms at beginning of academic year for first-hand experience with teachers' approaches to creating communities and setting routines. Candidates are placed with students they will teach during student teaching. Candidates may take on teaching tasks as appropriate. Effective: 2016 Summer Special Session.

EDU 322A—Pedagogical Preparation for Secondary Social Science I (3)
Discussion—1 hour; Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Introduction to teaching methods and curriculum approaches for secondary social science teaching. State and national curriculum standards; application of learning theory to effective instruction; interdisciplinary teaching and active learning approaches; effective teaching strategies for English learners. Effective: 2016 Fall Quarter.

EDU 322B—Pedagogical Preparation for Secondary Social Science II (3)
Discussion—2 hours; Lecture/Discussion—1 hour. Prerequisite(s): Acceptance in Teacher Credential Program. Intermediate teaching methods and curriculum approaches for secondary social science teaching. Interdisciplinary approaches to teaching major themes across social science content areas; teaching potentially controversial social science topics; teaching democratic civic values, student assessment and evaluation. Effective: 2016 Fall Quarter.

EDU 323A—Physical Science in the Secondary School (3)
Discussion/Laboratory—1 hour; Discussion/Laboratory—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Activity-based overview of concepts and processes in secondary school physical sciences. Emphasis upon philosophy, appropriate teaching methods, materials, assessment and evaluation of learning. Effective: 2016 Fall Quarter.

EDU 323B—Life Sciences in the Secondary School (3)
Discussion/Laboratory—2 hours; Discussion/Laboratory—1 hour. Prerequisite(s): Acceptance in Teacher Credential Program. Activity-based overview of concepts and processes in secondary school biology and life sciences. Emphasis on philosophy, appropriate teaching methods, materials, assessment and evaluation of learning, and issues. Effective: 2016 Fall Quarter.

EDU 324A—Methods and Technology in Secondary Mathematics I (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Acceptance in Teacher Credential Program. Introduction to methods and curriculum for teaching mathematics at the secondary level. Introduction to applications of computer technology as instructional, intellectual, and communication tools for mathematics teachers. Effective: 2016 Fall Quarter.

EDU 324B—Methods in Secondary Mathematics II (3)
Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Acceptance in Teacher Credential Program. Expansion of methods and curriculum for teaching mathematics at the secondary level. Intermediate applications of computer technology as instructional, intellectual, and communication tools in mathematics teaching. Effective: 2016 Fall Quarter.

EDU 325—Research and Methods in Secondary English Language Arts (4)
Discussion—4 hours. Prerequisite(s): Consent of Instructor. Acceptance in Teacher Credential Program. Research on teaching and learning in the language arts. Principles, procedures and materials for improving the writing, reading and oral language of secondary students, with special attention to students from culturally and linguistically diverse populations. Effective: 2016 Fall Quarter.

EDU 326—Teaching Language Minority Students in Secondary Schools: Methods and Research (4)
Fieldwork—3 hours; Seminar—3 hours. Prerequisite(s): Consent of Instructor. Acceptance in Teacher Credential Program. Research on principles, procedures and curricula for teaching discipline-specific concepts to language-minority students in secondary schools. Second-language acquisition principles and instructional strategies. Effective: 2016 Fall Quarter.

EDU 327A—Teaching Methods for Secondary Foreign Language/Spanish, Part I (3)
Lecture—3 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Introduction to methods for teaching Spanish as a foreign and a heritage language in secondary schools. State and National Standards. Theories on second language acquisition. Lesson plans. Effective teaching strategies and class management. Effective: 2016 Fall Quarter.

EDU 327B—Teaching Methods for Secondary Foreign Language/Spanish, Part II (3)
Lecture—3 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Continuation to methods for teaching Spanish as a foreign and a heritage language in secondary schools. Research and practice on foreign and heritage language teaching. Expansion of effective teaching strategies and class management. Effective: 2016 Fall Quarter.

EDU 398—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

EDU 399—Individual Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

Electrical & Computer Engineering; Electrical & Computer Engineering

Electrical & Computer Engineering; Electrical & Computer Engineering | EEC Information

Saif Islam, Ph.D., Chairperson of the Department

Josh Hihath, Ph.D., Vice Chairperson for Undergraduate Studies

Khaled Abdel-Ghaffar, Ph.D., Vice Chairperson for Graduate Studies

Department Office. 2064 Kemper Hall; 530-752-0583; http://www.ece.ucdavis.edu

Faculty. http://www.ece.ucdavis.edu/people/faculty/

Electrical & Computer Engineering; Electrical & Computer Engineering | EEC B.S./M.S.

(College of Engineering)

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The Graduate Program in Electrical and Computer Engineering

M.S. and Ph.D.
http://www.ece.ucdavis.edu; 530-752-8251

The Department of Electrical and Computer Engineering prepares graduate students to do meaningful research and acquire skills and insights vital to solving some of the world's most complex technological problems. Our graduate program offers a challenging and stimulating environment, covering optical, wireline and wireless communications, telecommunication networks, computer engineering, circuits, electromagnetics, physical electronics, optoelectronics, control, and signal processing. The depth of resources in the study of circuit design alone, with one of the largest faculty groups in the field in the UC system, distinguishes us from other programs, while our program in microwave communications and devices is unique.

The Electrical and Computer Engineering Graduate Program benefits from the highly interdisciplinary culture at UC Davis and attracts faculty from biomedical, chemical, electrical, computer, civil, and mechanical engineering, as well as computer science and mathematics.

Many of our graduates go on to leadership and technology management roles in industry, returning each year for our industrial affiliates meeting to network with other industry representatives, current students and faculty.

Generous financial support is available in the form of research assistantships, teaching assistantships, fellowships and financial aid.

Research Highlights:

- Communications, control, networking, and signal processing
- Computer engineering
- Electronic circuits
- Optoelectronics
- RF, micro- and millimeter waves
- Physical electronics

Research Facilities and Partnerships:

- Center for Information Technology in the Interest of Society
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- Los Alamos National Laboratory
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- PlanetLab Consortium
- Sandia National Laboratory

Complete Information is on our website.

Electrical & Computer Engineering; Electrical & Computer Engineering | EEC M.S.

(College of Engineering)

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Electrical & Computer Engineering; Electrical & Computer Engineering | EEC Ph.D.

(College of Engineering)

Saif Islam, Ph.D., Chairperson of the Department

Josh Hihath, Ph.D., Vice Chairperson for Undergraduate Studies

Khaled Abdel-Ghaffar, Ph.D., Vice Chairperson for Graduate Studies

Department Office. 2064 Kemper Hall 530-752-0583; http://www.ece.ucdavis.edu

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- Sandia National Laboratory

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Electrical & Computer Engineering; Electrical & Computer Engineering | EEC Courses

Courses in EEC:

EEC 001—Introduction to Electrical and Computer Engineering (1)
Lecture—1 hour. Electrical and Computer Engineering as a professional activity. What Electrical and Computer Engineers know and how they use their knowledge. (P/NP grading only.) GE credit: SE. Effective: 2012 Fall Quarter.

EEC 010—Introduction to Digital and Analog Systems (4) ***Review all entries***
Laboratory—3 hours; Lecture—2 hours; Project (Term Project). Prerequisite(s): ECS 030; (PHY 009C (can be concurrent) or PHY 009HD (can be concurrent)); and Consent of Instructor. Open to Electrical and Computer Engineering sophomores. Interactive and practical introduction to fundamental concepts of electrical and computer engineering by implementing electronic systems, which can be digitally controlled and interrogated, with a programmable microcontroller with the ability to program the electrical connections between analog and digital components. GE credit: SE. Effective: 2017 Winter Quarter.

EEC 010—Introduction to Digital and Analog Systems (4) ***Review all entries***
Laboratory—3 hours; Lecture—2 hours; Project (Term Project). Prerequisite(s): (PHY 009C (can be concurrent) or PHY 009HD (can be concurrent)); (ECS 030 or ECS 036B or EEC 007); ENG 017; Consent of Instructor. Open to Electrical and Computer Engineering sophomores. Interactive and practical introduction to fundamental concepts of electrical and computer engineering by implementing electronic systems, which can be digitally controlled and interrogated, with a programmable microcontroller with the ability to program the electrical connections between analog and digital components. GE credit: SE. Effective: 2019 Winter Quarter.

EEC 089A—Special Topics in Electromagnetics (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Electromagnetics. May be repeated for credit if topic differs. GE credit: SE. Effective: 2011 Winter Quarter.

EEC 089B—Special Topics in Physical Electronics (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special topics in Physical Electronics. May be repeated for credit if topic differs. GE credit: SE. Effective: 2011 Winter Quarter.

EEC 089C—Special Topics in Active and Passive Circuits (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special topics in Active and Passive Circuits. May be repeated for credit if topic differs. GE credit: SE. Effective: 2011 Winter Quarter.

EEC 089D—Special Topics in Signals and Systems (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special topics in Signals and Systems. May be repeated for credit if topic differs. GE credit: SE. Effective: 2011 Winter Quarter.

EEC 089E—Special Topics in Computer Systems and Software (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special topics in Computer Systems and Software. May be repeated for credit if topic differs. GE credit: SE. Effective: 2011 Winter Quarter.

EEC 089F—Special Topics in Digital System Design (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special topics in Digital System Design. May be repeated for credit if topic differs. GE credit: SE. Effective: 2011 Winter Quarter.

EEC 090C—Research Group Conference in Electrical and Computer Engineering (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Lower division standing. Research group conferences. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

EEC 090X—Lower Division Seminar (1-4)
Seminar—1-4 hours. Prerequisite(s): Consent of Instructor. Examination of a special topic in a small group setting. May be repeated for credit. Effective: 1997 Winter Quarter.

EEC 092—Internship in Electrical and Computer Engineering (1-5)
Internship—3-15 hours. Prerequisite(s): Lower division standing; project approval prior to period of internship. Supervised work experience in Electrical and Computer Engineering. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

EEC 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

EEC 099—Special Study for Lower Division Students (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

EEC 100—Circuits II (5) ***Review all entries***
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 017 C- or better Restricted to the following majors: Electrical Engineering, Computer Engineering, Computer Science & Engineering, Electronic Materials Engineering, Electrical Engineering/Materials Science, Optical Science & Engineering, Biomedical Engineering, Applied Physics, Electrical & Computer Engineering graduate students. Theory, application, and design of analog circuits. Methods of analysis including frequency response, SPICE simulation, and Laplace transform. Operational amplifiers and design of active filters. Students who have completed Engineering 100 may receive 3.5 units of credit. GE credit: QL, SE, VL. Effective: 2014 Fall Quarter.

EEC 100—Circuits II (5) ***Review all entries***
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 017 C- or better; MAT 022B Restricted to the following majors: Electrical Engineering, Computer Engineering, Computer Science & Engineering, Electronic Materials Engineering, Electrical Engineering/Materials Science, Optical Science & Engineering, Biomedical Engineering, Applied Physics, Electrical & Computer Engineering graduate students. Theory, application, and design of analog circuits. Methods of analysis including frequency response, SPICE simulation, and Laplace transform. Operational amplifiers and design of active filters. Students who have completed ENG 100 may receive 3.5 units of credit. GE credit: QL, SE, VL. Effective: 2018 Fall Quarter.

EEC 110A—Electronic Circuits I (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 100; EEC 140A (can be concurrent) Use and modeling of nonlinear solid-state electronic devices in basic analog and digital circuits. Introduction to the design of transistor amplifiers and logic gates. GE credit: SE, VL. Effective: 2018 Winter Quarter.

EEC 110B—Electronic Circuits II (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 110A Analysis and design of integrated circuits. Single-stage amplifiers, cascaded amplifier stages, differential amplifiers, current sources, frequency response, and return-ratio analysis of feedback amplifiers. GE credit: SE, VL. Effective: 2009 Fall Quarter.

EEC 112—Communication Electronics (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 110A; EEC 150A; EEC 110B recommended. Electronic circuits for analog and digital communication, including oscillators, mixers, tuned amplifiers, modulators, demodulators, and phase-locked loops. Circuits for amplitude modulation (AM) and frequency modulation (FM) are emphasized. GE credit: SE. Effective: 2014 Spring Quarter.

EEC 116—VLSI Design (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 110A; EEC 180A recommended. CMOS devices, layout, circuits, and functional units; VLSI fabrication and design methodologies. GE credit: SE. Effective: 2014 Spring Quarter.

EEC 118—Digital Integrated Circuits (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 110A; EEC 180A Analysis and design of digital integrated circuits. Emphasis on MOS logic circuit families. Logic gate construction, voltage transfer characteristics, propagation delay, and power consumption. Regenerative circuits, sequential elements, interconnect, RAMs, ROMs, and PLAs. GE credit: SE. Effective: 2011 Spring Quarter.

EEC 119A—Integrated Circuit Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): EEC 116 or EEC 118 Design course involving architecture, circuit design, physical design, and validation through extensive simulation of a digital or mixed-signal integrated circuit of substantial complexity under given design constraints. Team project that includes a final report. GE credit: SE. Effective: 2014 Fall Quarter.

EEC 119B—Integrated Circuit Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): EEC 119A Design course involving architecture, circuit design, physical design, and validation through extensive simulation of a digital or mixed-signal integrated circuit of substantial complexity under given design constraints. Team project that includes a final report. GE credit: SE. Effective: 2014 Fall Quarter.

EEC 130A—Electromagnetics I (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021D; (PHY 009C or PHY 009HD); ENG 017 Basics of static electric and magnetic fields and fields in materials. Work and scalar potential. Maxwell's equations in integral and differential form. Plan waves in lossless media. Lossless transmission lines. GE credit: SE. Effective: 2016 Fall Quarter.

EEC 130B—Introductory Electromagnetics II (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 130A Plane wave propagation in lossy media, reflections, guided waves, simple modulated waves and dispersion, and basic antennas. GE credit: SE. Effective: 1997 Winter Quarter.

EEC 132A—RF and Microwaves in Wireless Communication (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 110A; EEC 130B Study of Radio Frequency and Microwave theory and practice for design of wireless electronic systems. Transmission lines, microwave integrated circuits, circuit analyis of electromagnetic energy transfer systems, the scattering parameters. GE credit: SE. Effective: 2015 Winter Quarter.

EEC 132B—RF and Microwaves in Wireless Communication (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 132A Passive RF and microwave device analysis, design, fabrication, and testing for wireless applications. RF and microwave filter and coupler design. Introductory analysis and design of RF and microwave transistor amplifiers. GE credit: SE. Effective: 2007 Winter Quarter.

EEC 132C—RF and Microwaves in Wireless Communications (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 132B RF and microwave amplifier theory and design, including transistor circuit models, stability considerations, noise models and low noise design. Theory and design of microwave transistor oscillators and mixers. Wireless system design and analysis. GE credit: SE. Effective: 2009 Spring Quarter.

EEC 133—Electromagnetic Radiation and Antenna Analysis (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 130B Properties of electromagnetic radiation; analysis and design of antennas: ideal cylindrical, small loop, aperture, and arrays; antenna field measurements. GE credit: SE. Effective: 1999 Fall Quarter.

EEC 133—Electromagnetic Radiation and Antenna Analysis (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 130B Properties of electromagnetic radiation; analysis and design of antennas: ideal cylindrical, small loop, aperture, and arrays; antenna field measurements. GE credit: SE. Effective: 2018 Fall Quarter.

EEC 134A—RF/Microwave Systems Design (3)
Laboratory—6 hours; Workshop—3 hours. Prerequisite(s): EEC 130B or EEC 110B or EEC 150A Class size limited to 24 students. Board-level RF design, fabrication, and characterization of an RF/microwave system, including the antenna, RF front-end, baseband, mix-signal circuits, and digital signal processing models. GE credit: SE. Effective: 2014 Fall Quarter.

EEC 134B—RF/Microwave Systems Design (3)
Laboratory—6 hours; Workshop—3 hours. Prerequisite(s): EEC 134A Class size limited to 24 students. Board-level RF design, fabrication, and characterization of an RF/microwave system, including the antenna, RF front-end, baseband, mix-signal circuits, and digital signal processing models. GE credit: SE. Effective: 2015 Winter Quarter.

EEC 135—Optical Communications I: Fibers (4)
Lecture—4 hours. Prerequisite(s): EEC 130B Principles of optical communication systems. Planar dielectric waveguides. Optical fibers: single-mode, multi-mode, step and graded index. Attenuation and dispersion in optical fibers. Optical sources (LEDs and lasers) and receivers. Design of digital optical transmission systems. GE credit: SE. Effective: 2012 Winter Quarter.

EEC 136A—Electronic Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): ECS 030; EEC 100; EEC 180A; (EEC 110B or EEC 157A (can be concurrent) or EEC 180B) Pass One restricted to major. Optical, electronic and communication-engineering design of an opto-electronic system operating under performance and economic constraints. Measurement techniques will be designed and implemented, and the system will be characterized. GE credit: SE. Effective: 2015 Fall Quarter.

EEC 136B—Electronic Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): EEC 136A Optical, electronic and communication-engineering design of an opto-electronic system operating under performance and economic constraints. Measurement techniques will be designed and implemented, and the system will be characterized. GE credit: SE. Effective: 2014 Fall Quarter.

EEC 140A—Principles of Device Physics I (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 017; (PHY 009D or PHY 009HE) Semiconductor device fundamentals, equilibrium and non-equilibrium statistical mechanics, conductivity, diffusion, electrons and holes, p-n and Schottky junctions, first-order metal-oxide-semiconductor (MOS) field effect transistors, bipolar junction transistor fundamentals. GE credit: SE, SL. Effective: 2016 Fall Quarter.

EEC 140A—Principles of Device Physics I (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 017 (can be concurrent); (PHY 009D or PHY 009HE) Semiconductor device fundamentals, equilibrium and non-equilibrium statistical mechanics, conductivity, diffusion, electrons and holes, p-n and Schottky junctions, first-order metal-oxide-semiconductor (MOS) field effect transistors, bipolar junction transistor fundamentals. GE credit: SE, SL. Effective: 2018 Fall Quarter.

EEC 140B—Principles of Device Physics II (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 140A Electrical properties, designs, models and advanced concepts for MOS, Bipolar, and Junction Field-Effect Transistors, including scaling, minority-carrier distributions, non-ideal effects, and device fabrication methods. MESFET and heterojunction bipolar transistors (HBTs). Fundamentals of solar cells, photodetectors, LEDs and semiconductor lasers. GE credit: SE. Effective: 2010 Spring Quarter.

EEC 145—Electronic Materials (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 140A Electronic and physical properties of materials used in electronics, ICs, optoelectronics and MEMS. Semiconductors, dielectrics, metals, optical materials, organic semiconductive, optical and nonlinear properties, as well as their synthesis and deposition methods. GE credit: SE. Effective: 2015 Fall Quarter.

EEC 146A—Integrated Circuits Fabrication (4)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): EEC 140A Theoretical and experimental study of basic fabrication processes for metal oxide semiconductor integrated circuits, including oxidation, photolithography, impurity diffusion, metallization, wet chemical etching, and characterization. GE credit: SE. Effective: 2018 Winter Quarter.

EEC 146B—Advanced Integrated Circuits Fabrication (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): EEC 146A Restricted to Electrical, Computer, and Electrical/Materials Science majors and Electrical Engineering graduate students; non-majors accommodated when space available. Fabrication processes for CMOS VLSI. Laboratory projects examine deposition of thin films, ion implantation, process simulation, anisotropic plasma etching, sputter metallization, and C-V analysis. Topics include isolation, projection alignment, epilayer growth, thin gate oxidation, and rapid thermal annealing. GE credit: SE. Effective: 1997 Winter Quarter.

EEC 150A—Introduction to Signals and Systems I (4)
Lecture—4 hours. Prerequisite(s): EEC 100; (ENG 006 (can be concurrent) or MAT 022AL (can be concurrent)) Characterization and analysis of continuous-time linear systems. Fourier series and transforms with applications. Introduction to communication systems. Transfer functions and block diagrams. Elements of feedback systems. Stability of linear systems. GE credit: QL, SE. Effective: 2013 Fall Quarter.

EEC 150B—Introduction to Signals and Systems II (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 150A Characterization and analysis of discrete time systems. Difference equation models. Ztransform analysis methods. Discrete and fast Fourier
transforms. Introduction to digital filter design. GE credit: QL, SE. Effective: 2012 Fall Quarter.

EEC 152—Digital Signal Processing (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): EEC 150B; (EEC 070 or ECS 050) Theory and practice of real-time digital signal processing. Fundamentals of real-time systems. Programmable architectures including I/O, memory, peripherals, interrupts, DMA. Interfacing issues with A/D and D/A converters to a programmable DSP. Specification driven design and implementation of simple DSP applications. GE credit: SE. Effective: 2014 Fall Quarter.

EEC 157A—Control Systems (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 100 Analysis and design of feedback control systems. Examples are drawn from electrical and mechanical systems as well as other engineering fields. Mathematical modeling of systems, stability criteria, root-locus and frequency domain design methods. GE credit: SE. Effective: 2013 Fall Quarter.

EEC 157B—Control Systems (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 157A Control system design; transfer-function and state-space methods; sampled-data implementation, digital control. Laboratory includes feedback system experiments and simulation studies. GE credit: SE. Effective: 1997 Winter Quarter.

EEC 160—Signal Analysis and Communications (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 150A Signal analysis based on Fourier methods. Fourier series and transforms; time-sampling, convolution, and filtering; spectral density; modulation: carrier-amplitude, carrier-frequency, and pulse-amplitude. GE credit: SE. Effective: 1997 Winter Quarter.

EEC 161—Probabilistic Analysis of Electrical & Computer Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 100; (ENG 006 or MAT 022AL) Probabilistic and statistical analysis of electrical and computer systems. Discrete and continuous random variables, expectation and moments. Transformation of random variables. Joint and conditional densities. Limit theorems and statistics. Noise models, system reliability and testing. GE credit: SE. Effective: 2016 Spring Quarter.

EEC 165—Statistical and Digital Communication (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 160; EEC 161 Introduction to random process models of modulated signals and noise, and analysis of receiver performance. Analog and digitally modulated signals. Signal-to-noise ratio, probability of error, matched filters. Intersymbol interference, pulse shaping and equalization. Carrier and clock synchronization. GE credit: SE. Effective: 2017 Winter Quarter.

EEC 170—Introduction to Computer Architecture (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 180A; ECS 030 Introduces basic aspects of computer architecture, including computer performance measurement, instruction set design, computer arithmetic, pipelined/non-pipelined implementation, and memory hierarchies (cache and virtual memory). Presents a simplified Reduced Instruction Set Computer using logic design methods from the prerequisite course. GE credit: SE. Effective: 2015 Winter Quarter.

EEC 171—Parallel Computer Architecture (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 170 or ECS 154B Organization and design of parallel processors including shared-memory multiprocessors, cache coherence, memory consistency, snooping protocols, synchronization, scalable multiprocessors, message passing protocols, distributed shared memory and interconnection networks. GE credit: SE. Effective: 2014 Fall Quarter.

EEC 172—Embedded Systems (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): (EEC 170 or ECS 154A); EEC 100 Introduction to embedded-system hardware and software. Topics include: embedded processor and memory architecture; input/output hardware and software, including interrupts and direct memory access; interfacing with sensors and actuators; wired and wireless embedded networking. GE credit: SE. Effective: 2016 Winter Quarter.

EEC 173A—Computer Networks (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 060; (ECS 132 or EEC 161 or MAT 135A or STA 131A or STA 120 or STA 032) Pass One open to Computer Science, Computer Science Engineering and Computer Engineering Majors only. Overview of computer networks, TCP/IP protocol suite, computer-networking applications and protocols, transport-layer protocols, network architectures, Internet Protocol (IP), routing, link-layer protocols, local area and wireless networks, medium access control, physical aspects of data transmission, and network-performance analysis. Only 2 units of credit for students who have taken ECS 157. (ECS 152A.) GE credit: SE. Effective: 2016 Fall Quarter.

EEC 173B—Design Projects in Communication Networks (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 173A or ECS 152A Advanced topics and design projects in communication networks. Example topics include wireless networks, multimedia networking, network design and management, traffic analysis and modeling, network simulations and performance analysis. Offered in alternate years. (ECS 152C.) GE credit: SE. Effective: 2005 Spring Quarter.

EEC 180A—Digital Systems I (5)
Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): PHY 009C or PHY 009HD Introduction to digital system design including combinational logic design, sequential and asynchronous circuits, computer arithmetic, memory systems and algorithmic state machine design; computer aided design (CAD) methodologies and tools. GE credit: SE. Effective: 2014 Spring Quarter.

EEC 180B—Digital Systems II (5)
Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): EEC 180A Computer-aided design of digital systems with emphasis on hardware description languages (VHDL), logic synthesis, and field-programmable gate arrays (FPGA). May cover advanced topics in digital system design such as static timing analysis, pipelining, memory system design, testing digital circuits. GE credit: SE. Effective: 2013 Fall Quarter.

EEC 181A—Digital Systems Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): EEC 180B; EEC 170 Digital-system and computer-engineering design course involving architecture, design, implementation and testing of a prototype application-specific processor under given design constraints. This is a team project that includes a final presentation and report. GE credit: SE. Effective: 2018 Winter Quarter.

EEC 181B—Digital Systems Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): EEC 181A Digital-system and computer-engineering design course involving architecture, design, implementation and testing of a prototype application-specific processor under given design constraints. This is a team project that includes a final presentation and report. GE credit: SE. Effective: 2015 Winter Quarter.

EEC 183—Testing and Verification of Digital Systems (5)
Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): EEC 170; EEC 180B Computer aided-testing and design verification techniques for digital systems; physical fault testing; simulation-based design verification; formal verification; timing analysis. GE credit: SE. Effective: 2012 Spring Quarter.

EEC 189A—Special Topics in Electrical Engineering and Computer Science; Computer Science (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Computer Science. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189B—Special Topics in Electrical Engineering and Computer Science; Programming Systems (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Programming Systems. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189C—Special Topics in Electrical Engineering and Computer Science; Digital Systems (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Digital Systems. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189D—Special Topics in Electrical Engineering and Computer Science; Communications (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Communications. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189E—Special Topics in Electrical Engineering and Computer Science; Signal Transmission (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Signal Transmission. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189F—Special Topics in Electrical Engineering and Computer Science; Digital Communication (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Digital Communication. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189G—Special Topics in Electrical Engineering and Computer Science; Control Systems (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Control Systems. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189H—Special Topics in Electrical Engineering and Computer Science; Robotics (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Robotics. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189I—Special Topics in Electrical Engineering and Computer Science; Signal Processing (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Signal Processing. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189J—Special Topics in Electrical Engineering and Computer Science; Image Processing (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Image Processing. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189K—Special Topics in Electrical Engineering and Computer Science; High-Frequency Phenomena and Devices (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in High-Frequency Phenomena and Devices. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189L—Special Topics in Electrical Engineering and Computer Science; Solid-State Devices and Physical Electronics (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Solid-State Devices and Physical Electronics. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189M—Special Topics in Electrical Engineering and Computer Science; Systems Theory (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Systems Theory. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189N—Special Topics in Electrical Engineering and Computer Science; Active and Passive Circuits (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Active and Passive Circuits. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189O—Special Topics in Electrical Engineering and Computer Science; Integrated Circuits (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Integrated Circuits. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189P—Special Topics in Electrical Engineering and Computer Science; Computer Software (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Computer Software. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189Q—Special Topics in Electrical Engineering and Computer Science; Computer Engineering (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Computer Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189R—Special Topics in Electrical Engineering and Computer Science; Microprocessing (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Microprocessing. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189S—Special Topics in Electrical Engineering and Computer Science; Electronics (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Electronics. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189T—Special Topics in Electrical Engineering and Computer Science; Electromagnetics (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Electromagnetics. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189U—Special Topics in Electrical Engineering and Computer Science; Opto-Electronics (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Opto-Electronics. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189W—Special Topics in Electrical and Computer Engineering; Computer Networks (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special topics in Computer Networks. May be repeated for credit when topic differs. GE credit: SE. Effective: 2018 Winter Quarter.

EEC 190C—Research Group Conferences in Electrical and Computer Engineering (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing in Electrical and Computer Engineering. Research group conferences. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 2013 Spring Quarter.

EEC 192—Internship in Electrical and Computer Engineering (1-5) ***Review all entries***
Internship—3-15 hours. Prerequisite(s): Consent of Instructor. Completion of a minimum of 84 units; project approval before period of internship. Supervised work experience in electrical and computer engineering. May be repeated for credit project is different. (P/NP grading only.) GE credit: SE. Effective: 2012 Fall Quarter.

EEC 192—Internship in Electrical and Computer Engineering (1-6) ***Review all entries***
Internship—3-18 hours. Prerequisite(s): Consent of Instructor. Completion of a minimum of 84 units; project approval before period of internship. Supervised work experience in electrical and computer engineering. May be repeated for credit if project differs. (P/NP grading only.) GE credit: SE. Effective: 2018 Fall Quarter.

EEC 193A—Senior Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): EEC 196 (can be concurrent); and Consent of Instructor. Restricted to senior standing in Electrical or Computer Engineering. Team design project for seniors in Electrical or Computer Engineering. Project involves analysis, design, implementation and evaluation of an Electrical Engineering or Computer Engineering system. Project is supervised by a faculty member. GE credit: SE. Effective: 2014 Fall Quarter.

EEC 193B—Senior Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): EEC 193A Team design project for seniors in Electrical Engineering or Computer Engineering. Project involves analysis, design, implementation and evaluation of an Electrical Engineering or Computer Engineering system. Project supervised by a faculty member. GE credit: SE. Effective: 2015 Winter Quarter.

EEC 195A—Autonomous Vehicle Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): ECS 030; EEC 180A; (EEC 110B or EEC 157A (can be concurrent) or EEC 180B or ECS 060) Pass One restricted to major. Design and construct an autonomous race car. Work in groups to design, build and test speed control circuits, track sensing circuits, and a steering control loop. GE credit: SE. Effective: 2015 Fall Quarter.

EEC 195B—Autonomous Vehicle Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): EEC 195A Design and construct an autonomous race car. Students work in groups to design, build and test speed control circuits, track sensing circuits, and a steering control loop. GE credit: SE. Effective: 2015 Winter Quarter.

EEC 196—Issues in Engineering Design (1)
Seminar—1 hour. Prerequisite(s): Senior standing in Electrical or Computer Engineering. The course covers various electrical and computer engineering standards and realistic design constraints including economic, manufacturability, sustainability, ethical, health and safety, environmental, social, and political. GE credit: SE. Effective: 2008 Fall Quarter.

EEC 197T—Tutoring in Electrical and Computer Engineering (1-3)
Discussion—1 hour; Discussion/Laboratory—2-8 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Tutoring in Electrical and Computer Engineering courses, especially introductory circuits. For upper-division undergraduate students who will provide tutorial assistance. (P/NP grading only.) Effective: 2007 Fall Quarter.

EEC 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. May be repeated up to 3 time(s). (P/NP grading only.) GE credit: SE. Effective: 2007 Fall Quarter.

EEC 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2007 Fall Quarter.

EEC 201—Digital Signal Processing (4)
Lecture—4 hours. Prerequisite(s): EEC 150B; STA 120 or MAT 131 or MAT 167 recommended. Theory and design of digital filters. Classification of digital filters, linear phase systems, all-pass functions, FIR and IIR filter design methods and optimality measures, numerically robust structures for digital filters. Effective: 2006 Winter Quarter.

EEC 202—Advanced Digital Signal Processing (4)
Lecture—4 hours. Prerequisite(s): EEC 201, EEC 260 and EEC 265, and MAT 167 are recommended. Multirate DSP theory and wavelets, optimal transform and subband coders in data compressions, advanced sampling theory and oversampled A/D converters, transmultiplexers and precoders in digital communication systems, genomic signal processing. Effective: 2006 Spring Quarter.

EEC 205—Computational Methods in Biomedical Imaging (4)
Lecture—4 hours. Prerequisite(s): (BIM 105 or STA 120); (BIM 108 or EEC 150A) Analytic tomographic reconstruction from projections in 2D and 3D; model-based image reconstruction methods; maximum likelihood and Bayesian methods; applications to CT, PET, and SPECT. (BIM 252.) Effective: 2011 Fall Quarter.

EEC 206—Digital Image Processing (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 150B Two-dimensional systems theory, image perception, sampling and quantization, transform theory and applications, enhancement, filtering
and restoration, image analysis, and image processing systems. Effective: 1997 Winter Quarter.

EEC 210—MOS Analog Circuit Design (3)
Lecture—3 hours. Prerequisite(s): EEC 110B; EEC 140A Analysis and design of MOS amplifiers, bias circuits, voltage references and other analog circuits. Stability and compensation of feedback amplifiers. Introduction to noise analysis in MOS circuits. Effective: 2016 Winter Quarter.

EEC 211—Advanced Analog Circuit Design (3)
Lecture—3 hours. Prerequisite(s): EEC 210; STA 131A and EEC 112 recommended. Noise and distortion in electronic circuits and systems. Application to communication circuits. Specific applications include mixers, low-noise amplifiers, power amplifiers, phase-locked loops, oscillators and receiver architectures. Effective: 2002 Winter Quarter.

EEC 212—Analog MOS IC Design for Signal Processing (3)
Lecture—3 hours. Prerequisite(s): EEC 210 Analysis and design of analog MOS integrated circuits. Passive components, single-ended and fully differential op amps, sampled-data and continuous-time filters. Effective: 1998 Spring Quarter.

EEC 213—Data-Conversion Techniques and Circuits (3)
Lecture—3 hours. Prerequisite(s): EEC 210 Digital-to-analog and analog-to-digital conversion; component characteristics and matching; sample-and-hold, comparator, amplifier, and reference circuits. Effective: 1997 Winter Quarter.

EEC 214—Computer-Aided Circuit Analysis and Design (3)
Lecture—3 hours. Prerequisite(s): EEC 110A; EEC 110B; And knowledge of FORTRAN or C. Network equation formulations. Nonlinear DC, linear AC, timedomain (both linear and nonlinear), steady-state (nonlinear) and harmonic analysis. DC, AC, and time-domain sensitivities of linear and nonlinear circuits. Gradient-based design optimization. Behavioral simulations. Extensive CAD project. Effective: 2000 Winter Quarter.

EEC 215—Circuits for Digital Communications (3)
Lecture—3 hours. Prerequisite(s): EEC 150B; EEC 210 (can be concurrent); EEC 165, EEC 166, or EEC 265 recommended. Analog, digital, and mixed-signal CMOS implementations of communication-circuit blocks: gain control, adaptive equalizers, sampling detectors, clock recovery. Effective: 2000 Fall Quarter.

EEC 216—Low Power Digital Integrated Circuit Design (3)
Lecture—3 hours. Prerequisite(s): EEC 118 IC design for low power and energy consumption. Low power architectures, logic styles and circuit design. Variable supply and threshold voltages. Leakage management. Power estimation. Energy sources, power electronics, and energy recovery. Applications in portable electronics and sensors. Thermodynamic limits. Effective: 2006 Winter Quarter.

EEC 217—Biomedical Electronics (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): EEC 210; or Consent of Instructor. Special consideration and accommodation will be made for biomedical or signal processing majors who have not taken EEC 210. Circuit design for medical applications including weak inversion amplifiers; integrated ULF filters; chopper stabilization; electrochemical interfaces; neurostimulation pulse generation; wireless powering of and communication with implantable devices. Electrophysiological signaling and aspects of signal processing for biomedical systems. Effective: 2013 Spring Quarter.

EEC 219—Advanced Digital Circuit Design (3)
Lecture—3 hours. Prerequisite(s): EEC 118 or EEC 218A Analysis and design of digital circuits. Both bipolar and MOS circuits are covered. Dynamic and static RAM cells and sense amplifiers. Advanced MOS families. Multi-valued logic. Effective: 1997 Winter Quarter.

EEC 221—Analog Filter Design (3)
Lecture—3 hours. Prerequisite(s): EEC 100; EEC 150A Design of active and passive filters including filter specification and approximation theory. Passive LC filter design will cover doubly-terminated reactance two-port synthesis. Active filter design will include sensitivity, op-amp building blocks, cascade, multi-loop, ladder and active-R filter design. Effective: 1997 Fall Quarter.

EEC 222—RF IC Design (3)
Lecture—3 hours. Prerequisite(s): EEC 132C; EEC 210 Radio frequency (RF) solid-state devices, RF device modeling and design rules; non-linear RF circuit design techniques; use of non-linear computer-aided (CAD) tools; RF power amplifier design. Effective: 2004 Winter Quarter.

EEC 224—Terahertz and mm-Wave Integrated Circuit Design (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): EEC 132A; EEC 112; or Consent of Instructor. Fundamental theory of RF transmitter and receiver, including noise analysis, transceiver architectures, and antenna arrays. Fundamental limitations, theory and design of amplifiers, oscillators and signal sources at THz and mm-wave frequencies Effective: 2018 Winter Quarter.

EEC 228—Advanced Microwave Circuit and Device Design Techniques (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 132B Theory, design, fabrication, analysis of advanced microwave circuits and devices. Wideband transformers, stripline/microstripline broadband couplers. Lumped and distributed filter synthesis. Broadband matching theory applied to microwave devices. Wideband and low noise FET/HEMT amplifiers. Advanced microwave oscillator theory. Phase noise analysis. Effective: 2007 Spring Quarter.

EEC 229—RF-MEMS and Adaptive Wireless Frontends (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 130A Focuses on the modeling, design, fabrication, and characterization of RF-MEMS while providing a thorough introduction to the technology with an emphasis on how it will benefit the design of adaptive RF/microwave wireless systems. Effective: 2015 Fall Quarter.

EEC 230—Electromagnetics (3)
Lecture—3 hours. Prerequisite(s): EEC 130B Maxwell's equations, plane waves, reflection and refraction, complex waves, waveguides, resonant cavities, and basic antennas. Effective: 2001 Fall Quarter.

EEC 231A—Plasma Physics and Controlled Fusion (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Equilibrium plasma properties; single particle motion; fluid equations; waves and instabilities in a fluid plasma; plasma kinetic theory and transport coefficients; linear and nonlinear Vlasov theory; fluctuations, correlations and radiation; inertial and magnetic confinement systems in controlled fusion. Effective: 2015 Spring Quarter.

EEC 231B—Plasma Physics and Controlled Fusion (3)
Lecture—3 hours. Prerequisite(s): EEC 231A; and Consent of Instructor. Equilibrium plasma properties; single particle motion; fluid equations; waves and instabilities in a fluid plasma; plasma kinetic theory and transport coefficients; linear and nonlinear Vlasov theory; fluctuations, correlations and radiation; inertial and magnetic confinement systems in controlled fusion. Effective: 2015 Spring Quarter.

EEC 231C—Plasma Physics and Controlled Fusion (3)
Lecture—3 hours. Prerequisite(s): EEC 231B; and Consent of Instructor. Equilibrium plasma properties; single particle motion; fluid equations; waves and instabilities in a fluid plasma; plasma kinetic theory and transport coefficients; linear and nonlinear Vlasov theory; fluctuations, correlations and radiation; inertial and magnetic confinement systems in controlled fusion. Effective: 2015 Spring Quarter.

EEC 232A—Advanced Applied Electromagnetics I (3)
Lecture—3 hours. Prerequisite(s): EEC 132B The exact formulation of applied electromagnetic problems using Green's functions. Applications of these techniques to transmission circuits. Effective: 2000 Fall Quarter.

EEC 232B—Advanced Applied Electromagnetics II (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 132B An advanced treatment of electromagnetics with applications to passive microwave devices and antennas. Effective: 2000 Fall Quarter.

EEC 233—High Speed Signal Integrity (3)
Lecture—3 hours. Prerequisite(s): EEC 130B Design and analysis of interconnects in high-speed circuits and sub-systems; understanding of high-speed signal propagation and signal integrity concepts; electromagnetic modeling tools and experimental techniques. Effective: 2008 Fall Quarter.

EEC 234A—Physics and Technology of Microwave Vacuum Electron Beam Devices I (4)
Lecture—4 hours. Prerequisite(s): B.S. degree in physics or electrical engineering or the equivalent background. Physics and technology of electron beam emissions, flow and transport, electron gun design, space charge waves and klystrons. Effective: 2015 Fall Quarter.

EEC 234B—Physics and Technology of Microwave Vacuum Electron Beam Devices II (4)
Lecture—4 hours. Prerequisite(s): EEC 234A Theory and experimental design of traveling wave tubes, backward wave oscillators, and extended interaction oscillators. Effective: 2016 Spring Quarter.

EEC 234C—Physics and Technology of Microwave Vacuum Electron Beam Devices III (4)
Lecture—4 hours. Prerequisite(s): EEC 234B Physics and technology of gyrotrons, gyro-amplifiers, free electron lasers, magnetrons, crossfield amplifiers and relativistic devices. Effective: 2015 Fall Quarter.

EEC 235—Photonics (4)
Lecture—3 hours; Project (Term Project)—1 hour. Prerequisite(s): EEC 230 (can be concurrent) Optical propagation of electromagnetic waves and beams in photonic components and the design of such devices using numerical techniques. Effective: 2004 Fall Quarter.

EEC 236—Nonlinear Optical Applications (3)
Lecture—3 hours. Prerequisite(s): EEC 130B; EEC 230 (can be concurrent) Nonlinear optical interactions in optical communication, optical information processing and integrated optics. Basic concepts underlying optical nonlinear interactions in materials and guided media. Not open for credit to students who have completed EEC 233. Effective: 2000 Fall Quarter.

EEC 237A—Lasers (3)
Lecture—3 hours. Prerequisite(s): EEC 235; EEC 130B; Or the equivalent of EEC 130B. Not open for credit to students who have completed course 226A. Theoretical and practical description of lasers. Theory of population inversion, amplification and oscillation using semiclassical oscillator model and rate equations. Description and design of real laser system (Not open for credit to students who have completed course 226A.) Effective: 1998 Winter Quarter.

EEC 237B—Laser Physics II (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): EEC 237A or EAD 265A Oscillation threshold. Coupled cavity/atomic rate equations, Linear pulse propagation; dispersion, broadening, compression. Nonlinear pulse propagation. Energy extraction. Optical beams, resonators, eigenmodes, axial/transverse modes. Paraxial ray optics, resonator stability, ABCD matrices. Laser dynamics; transients, spiking, Q-switching, active and passive modelocking. Not open for credit to students who have completed EEC 226B. Effective: 2014 Fall Quarter.

EEC 238—Semiconductor Diode Lasers (3)
Lecture—3 hours. Prerequisite(s): EEC 245A Understanding of fundamental optical transitions in semiconductor and quantum-confined systems are applied to diode lasers and selected photonic devices. The importance of radiative and non-radiative
recombination, simulated emission, excitons in quantum wells, and strained quantum layers are considered. Effective: 1998 Spring Quarter.

EEC 239A—Optical Fiber Communications Technologies (4)
Lecture—4 hours. Prerequisite(s): EEC 130B Physical layer issues for component and system technologies in optical fiber networks. Sources of physical layer impairments and limitations in network scalability. Enabling technologies for wavelength-division-multiplexing and time-division-multiplexing networks. Optical amplifiers and their impact in optical networks (signal-to-noise ratio, gain-equalization, and cascadability). Effective: 2002 Fall Quarter.

EEC 239B—Optical Fiber Communications Systems and Networking (4)
Lecture—4 hours. Prerequisite(s): EEC 239A Physical layer optical communications systems in network architectures and protocols. Optical systems design and integration using optical component technologies. Comparison of wavelength routed WDM, TDM, and NGI systems and networks. Case studies of next generation technologies. Effective: 2003 Winter Quarter.

EEC 240—Semiconductor Device Physics (3)
Lecture—3 hours. Prerequisite(s): EEC 140B Physical principles, characteristics and models of fundamental semiconductor device types, including P-N and Schottky diodes, MOSFETs and MESFETs Bipolar Junction Transistors, and light emitters/detectors. Effective: 1998 Fall Quarter.

EEC 241—Introduction to Molecular Electronics (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Examines molecules for electronic devices and sensors. Course covers: electronic states of molecules, charge transport in nanoscale systems, and fabrication and measurement of molecular-scale devices. Specific Topics: Hartree-Fock and Density Functional Theory, Landauer formalism, coulomb blockade, tunneling and hopping transport. Effective: 2016 Spring Quarter.

EEC 242—Advanced Nanostructured Devices (3)
Lecture—3 hours. Prerequisite(s): EEC 130A; EEC 140A Physics of nano-structured materials and device operation. Overview of new devices enabled by nanotechnology; fabrication and characterization methods; applications of nano-structures and devices. Effective: 2005 Fall Quarter.

EEC 244A—Design of Microelectromechanical Systems (MEMS) (3)
Lecture—3 hours. Prerequisite(s): EEC 140A; EEC 140B; or Consent of Instructor. Theory and practice of MEMS design. Micromechanical fundamentals, CAD tools, and case studies. A MEMS design project is required. The designs will be fabricated in a commercial foundry and tested in course 244B. Effective: 1997 Fall Quarter.

EEC 244B—Microsciences (4)
Lecture/Discussion—4 hours. Introduction to the theory of physical and chemical principles at the microscale. Scale effects, surface tension, microfluidic mechanics, micromechanical properties, intermolecular interactions and micro tribology. (BIM 218.) Effective: 2011 Fall Quarter.

EEC 245—Micro- and Nano-Technology in Life Sciences (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Survey of biomedical device design from the engineering and biological perspectives; micro-/nano-fabrication and characterization techniques; surface chemistry and mass transfer; essential biological processes and models; proposal development skills to merge aforementioned themes in a multidisciplinary project. (ECH 245 and EMS 245.) Effective: 2016 Winter Quarter.

EEC 246—Advanced Projects in IC Fabrication (3)
Discussion—1 hour; Laboratory—6 hours. Prerequisite(s): EEC 146B Individualized projects in the fabrication of analog or digital integrated circuits. Effective: 1997 Winter Quarter.

EEC 247—Advanced Semiconductor Devices (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): Graduate standing in Engineering. Semiconductor devices, including MOSFETs, heterojunction transistors, light-emitting diodes, lasers, sensors, detectors, power and high-voltage transistors, MEMS resonators, organic semiconductors and photovoltaics. All material is from recent literature, encouraging students to utilize search methods and critically assess the latest research. Effective: 2011 Fall Quarter.

EEC 248—Photovoltaics and Solar Cells (3)
Lecture—3 hours. Prerequisite(s): EEC 140B; or Consent of Instructor. Or equivalent. Physics and application of photovoltaics and solar cells, including design, fabrication technology, and grid incorporation. Mono and microcrystalline silicon devices; thin-film technologies, heterojunction and organic-semiconductor technologies. Collectors, electrical inverters and infrastructure issues. Challenges and concerns. (EMS 246.) Effective: 2014 Fall Quarter.

EEC 249—Nanofabrication (3)
Lecture—3 hours. Prerequisite(s): Graduate standing in Engineering. Theory and practices of nanofabrication used for producing ICs, electronic devices, optoelectronics, sensors, and microstructures. Major topics include electron-, photon-, and ion-beams and their interactions with solids, chemical vapor depositions, plasma processing and micromachining. Effective: 2014 Winter Quarter.

EEC 250—Linear Systems and Signals (4)
Lecture—4 hours. Prerequisite(s): EEC 150A Mathematical description of systems. Selected topics in linear algebra. Solution of the state equations and an analysis of stability, controllability, observability, realizations, state feedback and state estimation. Discrete-time signals and systems, and the Z-transform. Effective: 2002 Fall Quarter.

EEC 251—Nonlinear Systems (3)
Lecture—3 hours. Prerequisite(s): EEC 250 Nonlinear differential equations, second-order systems, approximation methods, Lyapunov stability, absolute stability, Popov criterion, circle criterion, feedback linearization techniques. Effective: 1997 Winter Quarter.

EEC 252—Multivariable Control System Design (3)
Lecture—3 hours. Prerequisite(s): EEC 250 Modern control system design, theory, and techniques. Topics will include single-loop feedback design; stability, performance and robustness of multivariable control systems; LQG design; H-infinity design; frequency response methods; and optimization-based design. Effective: 2005 Fall Quarter.

EEC 254—Optimization (3)
Lecture—3 hours. Prerequisite(s): MAT 022A; Knowledge of FORTRAN or C. Modeling optimization problems in engineering design and other applications; optimality conditions; unconstrained optimization (gradient, Newton, conjugate gradient and quasi-Newton methods); duality and Lagrangian relaxation constrained optimization. (Primal method and an introduction to penalty and augmented Lagrangian methods.) Effective: 1997 Winter Quarter.

EEC 255—Robotic Systems (3)
Lecture—3 hours. Introduction to robotic systems. Mechanical manipulators, kinematics, manipulator positioning and path planning. Dynamics of manipulators. Robot motion programming and control algorithm design. Effective: 2006 Winter Quarter.

EEC 256—Stochastic Optimization in Dynamic Systems (4)
Lecture—4 hours. Prerequisite(s): EEC 260; Or the equivalent. Markov Decision Processes (MDP), dynamic programming, multi-armed bandit, Partially observable MDP, optimal stopping, stochastic scheduling, sequential detection and quickest change detection, competitive MDP and game theory, applications in dynamic systems such as queueing networks, communication systems, and multi-agent systems. Effective: 2012 Spring Quarter.

EEC 260—Random Signals and Noise (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 120; EEC 150A; EEC 250 recommended. Random processes as probabilistic models for signals and noise. Review of probability, random variables, and expectation. Study of correlation function and spectral density, ergodicity and duality between time averages and expected values, filters and dynamical systems. Applications. Effective: 1997 Winter Quarter.

EEC 261—Signal Processing for Communications (4)
Lecture—4 hours. Prerequisite(s): EEC 165; EEC 260; or Consent of Instructor. Signal processing in wireless and wireline communication systems. Characterization and distortion of wireless and wireline channels. Channel equalization and maximum likelihood sequence estimation. Channel precoding and pre-equalization. OFDM and transmit diversity. Array processing. Effective: 2003 Spring Quarter.

EEC 262—Multi-access Communications Theory (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): (EEC 173A or ECS 152A); STA 120; Or equivalent of STA 120. Maximum stable throughput of Poisson collision channels. Classic collision resolution algorithms. Carrier sensing multiple access and its performance analysis. System stability analysis. Joint design of the physical/medium access control layers. Capacity region of multi-access channels. Multi-access with correlated sources. Effective: 2006 Spring Quarter.

EEC 263—Optimal and Adaptive Filtering (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 260 Geometric formulation of least-squares estimation problems. Theory and applications of optimum Wiener and Kalman filtering. MAP and maximum likelihood estimation of hidden Markov models, Viterbi algorithm. Adaptive filtering algorithms, properties and applications. Effective: 2002 Spring Quarter.

EEC 264—Estimation and Detection of Signals in Noise (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 260 Introduction to parameter estimation and detections of signals in noise. Bayes and Neyman-Pearson likelihood-ratio tests for signal detection. Maximum-likelihood parameter estimation. Detection of known and Gaussian signals in white or colored noise. Applications to communications, radar, signal processing. Effective: 2007 Fall Quarter.

EEC 265—Principles of Digital Communications (4)
Lecture—4 hours. Prerequisite(s): EEC 165; EEC 260; or Consent of Instructor. Introduction to digital communications. Coding for analog sources. Characterization of signals and systems. Modulation and demodulation for the additive Gaussian channel. Digital signaling over bandwidth-constrained linear filter channels and over fading multipath channels. Spread spectrum signals. Effective: 1997 Winter Quarter.

EEC 266—Information Theory and Coding (3)
Lecture—3 hours. Prerequisite(s): STA 120 Information theory and coding. Measure of information. Redundancy reduction encoding of an information source. Capacity of a communication channel, errorfree communications. Effective: 1997 Winter Quarter.

EEC 267—Mobile Communications (4)
Lecture/Lab—3 hours. Prerequisite(s): EEC 260; EEC 265 (can be concurrent) Time-varying multi-path fading channel models and receiver performance in fading channels; multiple access techniques and multiple access receivers design and performance; optimum design and the capacity of wireless channels. Effective: 2013 Spring Quarter.

EEC 269A—Error Correcting Codes I (3)
Lecture—3 hours. Prerequisite(s): MAT 022A; EEC 160 Introduction to the theory and practice of block codes,
linear block codes, cyclic codes, decoding algorithms, coding techniques. Effective: 2001 Fall Quarter.

EEC 269B—Error Correcting Codes II (3)
Lecture—3 hours. Prerequisite(s): EEC 165; EEC 269A Introduction to convolutional codes, turbo codes, trellis and block coded modulation codes,soft-decision decoding algorithms, the Viterbi algorithm,reliability-based decoding, trellis-based decoding, multistage decoding. Effective: 2002 Spring Quarter.

EEC 270—Computer Architecture (3)
Lecture—3 hours. Prerequisite(s): EEC 170 or ECS 154B Introduction to modern techniques for high-performance single and
multiple processor systems. Topics include advanced pipeline design, advanced memory hierarchy design, optimizing pipeline and memory use, and memory sharing among multiprocessors. Case studies of recent single and multiple processor systems. Effective: 1999 Winter Quarter.

EEC 272—High-Performance Computer Architecture (4)
Lecture—4 hours. Prerequisite(s): EEC 270 or ECS 201A Designing and analysis of high performance computer architecture with emphasis on vector processing, on-chip interconnect networks, chip-level multiprocessors, memory and storage subsystem design and impact of technological advances on computer architecture. Effective: 2015 Spring Quarter.

EEC 273—Networking Architecture and Resource Management (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): ECS 152A or EEC 173A Pass One and Pass Two open to Graduate Students in Computer Science and Electrical and Computer Engineering only. Concepts and design principles of computer networks. Network architectures, protocol mechanisms and implementation principles (transport/network/data-link layers), network algorithms, router mechanisms, design requirements of applications, network simulation, modeling and performance analysis. (ECS 258.) Effective: 2016 Fall Quarter.

EEC 274—Internet Measurements, Modeling and Analysis (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): ECS 252 or EEC 273 Advanced topics in the theoretical foundations of network measurements, modeling, and statistical inferencing. Applications to Internet engineering, routing optimization, load balancing, traffic engineering, fault tolerance, anomaly detection, and network security. Individual project requirement. Effective: 2007 Winter Quarter.

EEC 276—Fault-Tolerant Computer Systems: Design and Analysis (3)
Lecture—3 hours. Prerequisite(s): EEC 170; EEC 180A Introduces fault-tolerant digital system theory and practice. Covers recent and classic fault-tolerant techniques based on hardware redundancy, time redundancy, information redundancy, and software
redundancy. Examines hardware and software reliability analysis, and example fault-tolerant designs. Not open for credit to students who have completed EEC 276A. Effective: 1997 Fall Quarter.

EEC 277—Graphics Architecture (3)
Lecture—3 hours. Prerequisite(s): (ECS 154B or EEC 170); ECS 175 Design and analysis of the architecture of computer graphics systems. Topics include the graphics pipeline with a concentration on hardware technqiues and algorithms, exploiting parallelism in graphics, and case studies of noteworthy and modern graphics arhitectures. Effective: 2004 Winter Quarter.

EEC 278—Computer Arithmetic for Digital Implementation (3)
Lecture—3 hours. Prerequisite(s): EEC 170; EEC 180A The design and implementation of computer arithmetic logic units are studied with particular emphasis on high-speed performance requirements. Addition (subtraction), multiplication and division operations are covered, and fixed and floating-point representations are examined. Effective: 1997 Winter Quarter.

EEC 281—VLSI Digital Signal Processing (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): EEC 150B; EEC 170; EEC 180B; or Consent of Instructor. Digital signal processors, building blocks, and algorithms. Design and implementation of processor algorithms, architectures, control, functional units, and circuit topologies for increased performance and reduced circuit size and power dissipation. Effective: 2011 Spring Quarter.

EEC 282—Hardware Software Codesign (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): EEC 170; EEC 180B Specification and design of embedded systems; modeling and performance estimation; hardware/software partitioning; co-simulation; design re-use; platform-based design; reconfigurable computing. Effective: 2003 Spring Quarter.

EEC 283—Advanced Design Verification of Digital Systems (4)
Lecture—3 hours; Project (Term Project)—1 hour. Prerequisite(s): EEC 170; EEC 180A Design verification techniques for digital systems; simulation-based design verification techniques; formal verification techniques, including equivalence checking, model checking, and theorem proving; timing analysis and verification; application of design cerification techniques to microprocessors. Effective: 2000 Winter Quarter.

EEC 284—Design and Optimization of Embedded Computing Systems (4)
Lecture—4 hours. Prerequisite(s): EEC 170; EEC 180B; or Consent of Instructor. ECS 122A recommended. Introduction to design and optimization of digital computing systems for embedded applications. Topics include combinatorial optimization techniques, performance and energy optimization in embedded systems, compilation and architecture-specific mapping, programmable and reconfigurable platforms; design automation and algorithmic improvements to design process. Effective: 2007 Winter Quarter.

EEC 286—Introduction to Digital System Testing (3)
Lecture—3 hours. Prerequisite(s): EEC 180A; (STA 120 or STA 131A) A review of several current techniques used to diagnose faults in both combinational and sequential circuits. Topics include path sensitization procedures, Boolean difference, D-algorithm random test generation, TC testing and an analysis of the effects of intermittent faults. Not open for credit to students who have completed EEC 276A. Effective: 1998 Winter Quarter.

EEC 289A—Special Topics in Electrical and Computer Engineering; Computer Science (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Computer Science. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289B—Special Topics in Electrical and Computer Engineering; Programming Systems (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Programming Systems. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289C—Special Topics in Electrical and Computer Engineering; Digital Systems (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Digital Systems. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289D—Special Topics in Electrical and Computer Engineering; Digital Systems (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Digital Systems. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289E—Special Topics in Electrical and Computer Engineering; Signal Transmission (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Signal Transmission. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289F—Special Topics in Electrical and Computer Engineering; Digital Communication (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Digital Communication. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289G—Special Topics in Electrical and Computer Engineering; Control Systems (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Control Systems. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289H—Special Topics in Electrical and Computer Engineering; Robotics (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Robotics. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289I—Special Topics in Electrical and Computer Engineering; Signal Processing (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Signal Processing. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289J—Special Topics in Electrical and Computer Engineering; Image Processing (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Image Processing. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289K—Special Topics in Electrical and Computer Engineering; High Frequency Phenomena and Devices (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in High Frequency Phenomena and Devices. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289L—Special Topics in Electrical and Computer Engineering; Solid-State Devices and Physical Electronics (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Solid-State Devices and Physical Electronics. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289M—Special Topics in Electrical and Computer Engineering; Systems Theory (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Systems Theory. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289N—Special Topics in Electrical and Computer Engineering; Active and Passive Circuits (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Active and Passive Circuits. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289O—Special Topics in Electrical and Computer Engineering; Integrated Circuits (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Integrated Circuits. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289P—Special Topics in Electrical and Computer Engineering; Computer Software (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Computer Software. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289Q—Special Topics in Electrical and Computer Engineering; Computer Engineering (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Computer Engineering. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289R—Special Topics in Electrical and Computer Engineering; Microprocessing (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Microprocessing. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289S—Special Topics in Electrical and Computer Engineering; Electronics (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Electronics. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289T—Special Topics in Electrical and Computer Engineering; Electromagnetics (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Electromagnetics. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289U—Special Topics in Electrical and Computer Engineering; Optoelectronics (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Optoelectronics. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289W—Special Topics in Electrical and Computer Engineering; Computer Networks (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Computer Networks. May be repeated for credit when topic differs. Effective: 2018 Winter Quarter.

EEC 290—Seminar in Electrical and Computer Engineering (1)
Seminar—1 hour. Discussion and presentation of current research and development in Electrical and Computer Engineering. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

EEC 290C—Graduate Research Group Conference in Electrical and Computer Engineering (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Research problems, progress, and techniques in electrical and computer engineering. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

EEC 291—Solid-State Circuit Research Laboratory Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Lectures on solid-state circuit and system design by various visiting experts in the field. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

EEC 292—Seminar in Solid-State Technology (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Lectures on solid-state technology by various visiting experts in the field. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

EEC 293—Computer Engineering Research Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Lectures, tutorials and seminars on topics in computer engineering. May be repeated up to 4 time(s). (S/U grading only.) Effective: 2000 Winter Quarter.

EEC 294—Communications, Signal and Image Processing Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Communications, signal and image processing, video engineering and computer vision. May be repeated for credit. (S/U grading only.) Effective: 2003 Winter Quarter.

EEC 295—Systems, Control and Robotics Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Seminars on current research in systems and control by faculty and visiting experts. Technical presentations and lectures on current topics in robotics research and robotics technology. May be repeated for credit. (S/U grading only.) Effective: 1998 Winter Quarter.

EEC 296—Photonics Research Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Lectures on photonics and related areas by faculty and visiting experts. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1998 Winter Quarter.

EEC 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

EEC 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

EEC 390—The Teaching of Electrical Engineering (1)
Discussion—1 hour. Prerequisite(s): Meet qualifications for teaching assistant and/or associate-in in Electrical Engineering. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

EEC 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Electrical Engineering; Electrical & Computer Engineering

Electrical Engineering; Electrical & Computer Engineering | EEC Information

Saif Islam, Ph.D., Chairperson of the Department

Josh Hihath, Ph.D., Vice Chairperson for Undergraduate Studies

Khaled Abdel-Ghaffar, Ph.D., Vice Chairperson for Graduate Studies

Department Office. 2064 Kemper Hall; 530-752-0583; http://www.ece.ucdavis.edu

Faculty. http://www.ece.ucdavis.edu/people/faculty/

Electrical Engineering; Electrical & Computer Engineering | EEC B.S.

(College of Engineering)

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The Electrical and Computer Engineering Undergraduate Programs

The department administers two undergraduate curricula in the College of Engineering: (1) the Electrical Engineering curriculum and (2) the Computer Engineering curriculum.

Integrated Degree Program (IDP). The IDP leads to both the Bachelor of Science and the Master of Science degrees. The program provides a student the opportunity to obtain superior breadth and depth of technical material. The IDP program in the Department of Electrical and Computer Engineering is available only to UC Davis undergraduates with strong academic records enrolled in the Electrical Engineering, Computer Engineering, Electronic Materials Engineering or Applied Physics curricula. Applicants in their junior year must apply for the IDP by March 31. For more information on IDP, see http://www.ece.ucdavis.edu.

Mission. Under its land grant status, the University of California has a mission to provide the state with the trained workforce it needs and to advance knowledge and research in directions that contribute to the general welfare of the state and the nation. The Department of Electrical and Computer Engineering contributes to the mission of the University in three ways. First, its undergraduate and graduate education programs seek to provide students with an understanding of the fundamental principles of electrical and computer engineering, the skills needed to solve the complex technological problems of modern society and the ability to continue to learn and develop throughout their careers. Second, through its research programs, the department contributes to the development and progress of electronics, communications, and computer technology. Finally,

the department helps to transfer research results to industry through publication, public service and professional activities.

Objectives. *Teaching*—To provide undergraduate students with sufficient breadth to allow them to participate in teams, continue their own education after graduation and select a focus area intelligently; to provide undergraduate students with sufficient depth in a narrower discipline to allow them to develop the ability to solve complex engineering problems; to educate the students in the graduate program to be leaders in industry or to do meaningful research in industry, government or academia. *Research*—To develop and maintain research programs that produce useful technological advances while simultaneously training the next generation of researchers and leaders; to update and/or shift the foci of these programs frequently in response to the needs of our constituency and the nation; to provide a stimulating environment that encourages our graduate students to develop their abilities as far as possible.

Electrical Engineering Undergraduate Program

The Electrical Engineering program is accredited by the Engineering Accreditation Commission of ABET; see http://www.abet.org.

Electrical engineering involves the design, analysis, and effective use of electrical systems including electronic computers. Electrical systems and computers play a central role in nearly all aspects of modern life, including communication, medicine, education, environmental protection, space exploration, defense, and home entertainment.

Students who complete the Electrical Engineering curriculum will obtain a Bachelor of Science in Electrical Engineering, one of the engineering degrees recognized in all fifty states as eligible for registration as a Professional Engineer.

Objectives. The Electrical Engineering program has adopted the following objectives to serve the long-term interests of our students and the industries of Northern California and the nation. *Foundation*—To provide our graduates with a solid foundation in engineering science, including mathematics, physical science, and the fundamentals of electrical engineering. This foundation is necessary to succeed in more advanced engineering courses and to be able to continue learning throughout a career. *Breadth*—To provide our graduates the sufficient breadth in electrical engineering in order to understand engineering tradeoffs that cross disciplines, to contribute effectively to multidisciplinary projects and to make an informed decision about their area of specialization. *Depth*—To provide our graduates with sufficient depth in a specific area of electrical engineering necessary to solve complex real-world engineering problems and to contribute to a specific discipline within electrical engineering. *Ethics*—To provide our graduates with a basic understanding of, and ability to handle correctly, ethical problems that may arise during their careers. To provide them with an understanding of their obligations to society at large.

Exclusive of General Education units, the minimum number of units for the Electrical Engineering major is 146.

Students are encouraged to adhere carefully to all prerequisite requirements. The instructor is authorized to drop students from a course for which stated prerequisites have not been completed.

Electrical Engineering Curriculum

Areas of Specialization

For updated recommended courses, see the department website at http://www.ece.ucdavis.edu/undergrad/undergradhandbook.html.

Physical Electronics: Solid-state devices, circuits and fabrication and the theory courses supporting those subjects.

Recommended elective courses:

Core electives: Electrical and Computer Engineering 130B, 140B

Design Electives with Lab: Electrical and Computer Engineering 118, or 132A, 132B or 135. Select remaining upper-division design electives from Electrical and Computer Engineering 110B, 146A, 146B

Technical electives: Electrical and Computer Engineering 112, 180

Suggested Advisors. S. Chowdhury, E. Seker, J. Hihath, C.E. Hunt, S. Islam, J.M. Woodall

Electromagnetics: Microwave circuits and systems, and fiber optical systems.

Recommended elective courses:

Core electives: Electrical and Computer Engineering 130B, 140B

Design Electives with Lab: Electrical and Computer Engineering 132A, 132B. Select remaining upper division design electives from Electrical and Computer Engineering 110B, 132C, 135

Technical electives: Select from Electrical and Computer Engineering 112 and 133

Suggested Advisors. G.R. Branner, A. Knoesen, X. Liu, N. Luhmann, O. Momeni, A. Pham, B. Yoo

Analog Electronics: Transistor- and system-level analog circuit design.

Recommended elective courses:

Core electives: Electrical and Computer Engineering 110B, 140B, 150B

Design Electives with Lab: at least two from Electrical and Computer Engineering 112, 157A, 165, 195A-195B

Select remaining upper division design electives from Electrical and Computer Engineering 118, 132A, 132B, 132C, 157B, 160, 210

Technical electives: Select from Electrical and Computer Engineering 130B, 146A

Suggested Advisors. R. Amirtharajah, Q.J. Gu, P.J. Hurst, S.H. Lewis, O. Momeni

Digital Electronics: Transistor- and system-level digital circuit design.

Recommended elective courses:

Core electives: Electrical and Computer Engineering 110B, 140B, 150B

Design Electives with Lab: Electrical and Computer Engineering 118 and 180 or 172 or 183 or 195A-195B

Select remaining upper division design electives from Electrical and Computer Engineering 116, 170 or 171

Technical electives: Select from Electrical and Computer Engineering 130B and 112 or 146A or 157A or 160 or 210

Suggested Advisors. R. Amirtharajah, P.J. Hurst, S.H. Lewis

Communication Controls and Signal Processing: Digital communication, robotics, classical controls and communication, wireless and cellular digital communication systems, signal and image processing, and computer vision.

Recommended elective courses:

Core electives: Electrical and Computer Engineering 150B, 180

Design Electives with lab: Electrical and Computer Engineering 157A and 157B or 165

Select remaining upper division design electives from Electrical and Computer Engineering 160

Technical Electives: Select from Electrical and Computer Engineering 112, 195A-195B

Suggested Advisors. S. Cui, Z. Ding, A.N. Gündes, B.C. Levy

Lower Division Required Courses **Units:** 76

MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3
MAT 022B	Differential Equations	3
PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5
PHY 009D	Modern Physics	4
CHE 002A	General Chemistry	5
ECS 030	Programming and Problem Solving (Discontinued)	4
OR		
EEC 007	Introduction to Programming and Microcontrollers	4
ENG 006	Engineering Problem Solving	4
ENG 017	Circuits I	4
EEC 001	Introduction to Electrical and Computer Engineering	1
EEC 010	Introduction to Digital and Analog Systems	4

EEC 010 is designed for sophomore students and is not recommended for upper-division students. Transfer and change of major students who do not take EEC 010 will substitute four additional units of upper-division electives.

EEC 018	Digital Systems I	5

Choose one; a grade of C- or better is required:

ENL 003	Introduction to Literature	4
UWP 001	Expository Writing	4
UWP 001Y	Expository Writing	4
UWP 001V	Expository Writing	4
COM 001	Major Books of Western Culture: The Ancient World	4
COM 002	Major Books of Western Culture: From the Middle Ages to the Enlightenment	4
COM 003	Major Books of Western Culture: The Modern Crisis	4
COM 004	Major Books of the Contemporary World	4
NAS 005	Introduction to Native American Literature	4

Choose one:

CMN 001	Introduction to Public Speaking	4
CMN 003	Interpersonal Communication Competence	4
ENG 003	Introduction to Engineering Design	4

Upper Division Required Courses **Units:** 70-75

EEC 100	Circuits II	5
EEC 110A	Electronic Circuits I	4
EEC 130A	Electromagnetics I	4
EEC 140A	Principles of Device Physics I	4
EEC 150A	Introduction to Signals and Systems I	4
EEC 161	Probabilistic Analysis of Electrical & Computer Systems	4

EEC 196 Issues in Engineering Design 1

Choose one:

ENG 160	Environmental Physics and Society	3
ENG 190	Professional Responsibilities of Engineers	3
ECS 188	Ethics in an Age of Technology	4

Upper-Division Electives

Choose at least eight courses for a minimum of 32 units:

After completion of the upper division elective requirement (at least 8 courses, 2 core, 2 with labs, 1 project) any units in excess of 32 will count toward the Technical Elective requirement.

Two Core Electives:

A maximum of one course appearing on both the Core Elective list and the Design Elective list may be counted in both categories.

EEC 110B	Electronic Circuits II	4
EEC 130B	Introductory Electromagnetics II	4
EEC 140B	Principles of Device Physics II	4
EEC 170	Introduction to Computer Architecture	4
EEC 180	Digital Systems II	5

Choose one:

EEC 150B	Introduction to Signals and Systems II	4
EEC 157A	Control Systems	4
EEC 160	Signal Analysis and Communications	4

Design Laboratory Electives:

A maximum of one course appearing on both the Core Elective list and the Design Elective list may be counted in both categories.

Choose at least two Design electives with lab:

EEC 110B	Electronic Circuits II	4
EEC 112	Communication Electronics	4
EEC 116	VLSI Design	4
EEC 118	Digital Integrated Circuits	4
EEC 132A	RF and Microwaves in Wireless Communication	5
EEC 132B	RF and Microwaves in Wireless Communication	5
EEC 132C	RF and Microwaves in Wireless Communications	5
EEC 135	Optical Communications I: Fibers	4
EEC 146A	Integrated Circuits Fabrication	4
EEC 146B	Advanced Integrated Circuits Fabrication	3
EEC 152	Digital Signal Processing	4
EEC 157A	Control Systems	4
EEC 157B	Control Systems	4
EEC 165	Statistical and Digital Communication	4
EEC 172	Embedded Systems	4
EEC 180	Digital Systems II	5
EEC 183	Testing and Verification of Digital Systems	5

Choose at least one Design Project course:

All Design Project courses are also considered Design Laboratory courses and may be counted in both categories simultaneously.

EEC 119A	Integrated Circuit Design Project	3
EEC 119B	Integrated Circuit Design Project	3

EEC 134A	RF/Microwave Systems Design	3
EEC 134B	RF/Microwave Systems Design	3
EEC 136A	Electronic Design Project	3
EEC 136B	Electronic Design Project	3
EEC 181A	Digital Systems Design Project	3
EEC 181B	Digital Systems Design Project	3
EEC 193A	Senior Design Project	3
EEC 193B	Senior Design Project	3
EEC 195A	Autonomous Vehicle Design Project	3
EEC 195B	Autonomous Vehicle Design Project	3

The remaining electives may be any letter-graded upper division Electrical and Computer Engineering course not used to satisfy another major requirement:

ECS 040	Software Development and Object-Oriented Programming (Discontinued)	4
ECS 150	Operating Systems and System Programming	4
ECS 152B	Computer Networks	4
ECS 163	Information Interfaces	4
ECS 175	Computer Graphics	4
ECS 177	Scientific Visualization	4
ECS 178	Geometric Modeling	4

Technical Electives

After completion of the upper division elective requirement (at least 8 courses, 2 core, 2 with labs, 1 project) any units in excess of 32 will count toward the technical elective requirement.
CHE 002B, 002C and any upper-division course; except CHE 195, 197.
ENG 035, 045, and any upper-division engineering course not used in satisfaction of core degree requirements, excluding ENG 100, 160, 190 (each restricted to one unit of technical elective), 198, ECS 132, 155, 157, 188, 154A, & 154B (ECS 154AB courses may be used by EEEL majors who did not take EEC 170).
A maximum of 6 units for any combination of engineering courses numbered 190C, 192, 198, and 199 may be used.

Mathematics:

Any upper-division course except MAT 135A & 197TC.

Physics:

Any upper-division PHY course, except 116, 137, 160 (restricted to one unit of technical elective), 195, 197T.

Statistics:

Any upper-division course, except STA 100, 102, 103, 104, 106, 108, 120, 130A.

BIS 101	Genes and Gene Expression	4
BIS 101D	Genes and Gene Expression Discussion	1
BIS 102	Structure and Function of Biomolecules	3
BIS 103	Bioenergetics and Metabolism	3
BIS 104	Cell Biology	3
BIS 122	Population Biology and Ecology	3
BIS 122P	Population Biology and Ecology/Advanced Laboratory Topics	5
BIS 132	Introduction to Dynamic Models in Modern Biology	4
ECN 100	Intermediate Micro Theory	4

ECN 101	Intermediate Macro Theory	4
ECN 102	Analysis of Economic Data	4
ECN 103	Economics of Uncertainty and Information	4
ECN 122	Theory of Games and Strategic Behavior	4
ECN 140	Econometrics	4
MGT 011A	Elementary Accounting	4
MGT 011B	Elementary Accounting	4
MGT 100	Introduction to Financial Accounting	3
MGT 120	Managing and Using Information Technology	4
MGT 140	Marketing for the Technology-Based Enterprise	4
MGT 150	Technology Management	4
MGT 160	Financing New Business Ventures	4
MGT 170	Managing Costs and Quality	4
MGT 180	Supply Chain Planning and Management	4

Upper Division Composition Requirement:

Choose one; a grade of C- or better is required:

UWP 101	Advanced Composition	4
UWP 102A	Writing in the Disciplines: Special Topics	4
UWP 102B	Writing in the Disciplines: Biology	4
UWP 102C	Writing in the Disciplines: History	4
UWP 102D	Writing in the Disciplines: International Relations	4
UWP 102E	Writing in the Disciplines: Engineering	4
UWP 102F	Writing in the Disciplines: Food Science and Technology	4
UWP 102G	Writing in the Disciplines: Environmental Writing	4
UWP 102H	Writing in the Disciplines: Human Development and Psychology	4
UWP 102I	Writing in the Disciplines: Ethnic Studies	4
UWP 102J	Writing in the Disciplines: Fine Arts	4
UWP 102K	Writing in the Disciplines: Sociology	4
UWP 102L	Writing in the Disciplines: Film Studies	4
UWP 104A	Writing in the Professions: Business Writing	4
UWP 104B	Writing in the Professions: Law	4
UWP 104C	Writing in the Professions: Journalism	4
UWP 104D	Writing in the Professions: Elementary and Secondary Education	4
UWP 104E	Writing in the Professions: Science	4
UWP 104F	Writing in the Professions: Health	4
UWP 104I	Writing in the Professions: Internships	4
UWP 104J	Writing in the Professions: Writing for Social Justice	4
UWP 104T	Writing in the Professions: Technical Writing	4

Passing the Upper Division Composition Exam.

Total: 146

Electrical Engineering; Electrical & Computer Engineering | EEC Minor

(College of Engineering)

Saif Islam, Ph.D., Chairperson of the Department

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Faculty. http://www.ece.ucdavis.edu/people/faculty/

Electrical Engineering Minor

There has been an increasing need for professionals in most engineering disciplines to understand the fundamentals of electronic circuits, electronic signals, semiconductor devices, applied electromagnetics, control systems, computer systems, and communication systems.

The objective of this minor program is to prepare students with the necessary theoretical and practical training in one or many of the above mentioned fields. The minor program curriculum is designed to allow flexibility while ensuring a solid foundation of fundamental electrical engineering concepts. The program is expected to accommodate students of diverse backgrounds.

The minor must be outside the department or program of your major and no more than one course may be counted toward both your minor and your major. The courses you take to satisfy the requirements of a minor, including those completed elsewhere, must be approved by an advisor in the Department of Electrical and Computer Engineering. You must have a minimum overall GPA of 2.000 and satisfy the minor course requirements, listed below. To receive notation of this minor on your diploma, you must obtain a minor petition and file it no later than the deadline for filing for graduation.

Electrical Engineering		**Units:** 21
EEC 100	Circuits II	5
Choose at least one of the following combinations:		
Analog circuits:		
EEC 110A	Electronic Circuits I	4
EEC 110B	Electronic Circuits II	4
Electromagnetics:		
EEC 130A	Electromagnetics I	4
EEC 130B	Introductory Electromagnetics II	4
Physical Electronics:		
EEC 140A	Principles of Device Physics I	4
EEC 140B	Principles of Device Physics II	4
Signals and Systems:		
EEC 150A	Introduction to Signals and Systems I	4
EEC 150B	Introduction to Signals and Systems II	4
Communication:		
EEC 150A	Introduction to Signals and Systems I	4
EEC 160	Signal Analysis and Communications	4
Control Systems:		
EEC 150A	Introduction to Signals and Systems I	4
EEC 157A	Control Systems	4
Digital Systems:		
EEC 018	Digital Systems I	5
EEC 180	Digital Systems II	5

Choose at least eight additional units of EEC courses numbered 101 or above; except 190, 192, 196, 197, 198, 199, 298, 299, 390, 396. If you elect to do a design project, you must be registered for both quarters.

Total: 21

Electrical Engineering; Electrical & Computer Engineering | EEC Courses

Courses in EEC:

EEC 001—Introduction to Electrical and Computer Engineering (1)
Lecture—1 hour. Electrical and Computer Engineering as a professional activity. What Electrical and Computer Engineers know and how they use their knowledge. (P/NP grading only.) GE credit: SE. Effective: 2012 Fall Quarter.

EEC 010—Introduction to Digital and Analog Systems (4) ***Review all entries***
Laboratory—3 hours; Lecture—2 hours; Project (Term Project). Prerequisite(s): ECS 030; (PHY 009C (can be concurrent) or PHY 009HD (can be concurrent)); and Consent of Instructor. Open to Electrical and Computer Engineering sophomores. Interactive and practical introduction to fundamental concepts of electrical and computer engineering by implementing electronic systems, which can be digitally controlled and interrogated, with a programmable microcontroller with the ability to program the electrical connections between analog and digital components. GE credit: SE. Effective: 2017 Winter Quarter.

EEC 010—Introduction to Digital and Analog Systems (4) ***Review all entries***
Laboratory—3 hours; Lecture—2 hours; Project (Term Project). Prerequisite(s): (PHY 009C (can be concurrent) or PHY 009HD (can be concurrent)); (ECS 030 or ECS 036B or EEC 007); ENG 017; Consent of Instructor. Open to Electrical and Computer Engineering sophomores. Interactive and practical introduction to fundamental concepts of electrical and computer engineering by implementing electronic systems, which can be digitally controlled and interrogated, with a programmable microcontroller with the ability to program the electrical connections between analog and digital components. GE credit: SE. Effective: 2019 Winter Quarter.

EEC 089A—Special Topics in Electromagnetics (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Electromagnetics. May be repeated for credit if topic differs. GE credit: SE. Effective: 2011 Winter Quarter.

EEC 089B—Special Topics in Physical Electronics (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special topics in Physical Electronics. May be repeated for credit if topic differs. GE credit: SE. Effective: 2011 Winter Quarter.

EEC 089C—Special Topics in Active and Passive Circuits (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special topics in Active and Passive Circuits. May be repeated for credit if topic differs. GE credit: SE. Effective: 2011 Winter Quarter.

EEC 089D—Special Topics in Signals and Systems (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special topics in Signals and Systems. May be repeated for credit if topic differs. GE credit: SE. Effective: 2011 Winter Quarter.

EEC 089E—Special Topics in Computer Systems and Software (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special topics in Computer Systems and Software. May be repeated for credit if topic differs. GE credit: SE. Effective: 2011 Winter Quarter.

EEC 089F—Special Topics in Digital System Design (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special topics in Digital System Design. May be repeated for credit if topic differs. GE credit: SE. Effective: 2011 Winter Quarter.

EEC 090C—Research Group Conference in Electrical and Computer Engineering (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Lower division standing. Research group conferences. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

EEC 090X—Lower Division Seminar (1-4)
Seminar—1-4 hours. Prerequisite(s): Consent of Instructor. Examination of a special topic in a small group setting. May be repeated for credit. Effective: 1997 Winter Quarter.

EEC 092—Internship in Electrical and Computer Engineering (1-5)
Internship—3-15 hours. Prerequisite(s): Lower division standing; project approval prior to period of internship. Supervised work experience in Electrical and Computer Engineering. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

EEC 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

EEC 099—Special Study for Lower Division Students (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

EEC 100—Circuits II (5) ***Review all entries***
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 017 C- or better Restricted to the following majors: Electrical Engineering, Computer Engineering, Computer Science & Engineering, Electronic Materials Engineering, Electrical Engineering/Materials Science, Optical Science & Engineering, Biomedical Engineering, Applied Physics, Electrical & Computer Engineering graduate students. Theory, application, and design of analog circuits. Methods of analysis including frequency response, SPICE simulation, and Laplace transform. Operational amplifiers and design of active filters. Students who have completed Engineering 100 may receive 3.5 units of credit. GE credit: QL, SE, VL. Effective: 2014 Fall Quarter.

EEC 100—Circuits II (5) ***Review all entries***
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 017 C- or better; MAT 022B Restricted to the following majors: Electrical Engineering, Computer Engineering, Computer Science & Engineering, Electronic Materials Engineering, Electrical Engineering/Materials Science, Optical Science & Engineering, Biomedical Engineering, Applied Physics, Electrical & Computer Engineering graduate students. Theory, application, and design of analog circuits. Methods of analysis including frequency response, SPICE simulation, and Laplace transform. Operational amplifiers and design of active filters. Students who have completed ENG 100 may receive 3.5 units of credit. GE credit: QL, SE, VL. Effective: 2018 Fall Quarter.

EEC 110A—Electronic Circuits I (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 100; EEC 140A (can be concurrent) Use and modeling of nonlinear solid-state electronic devices in basic analog and digital circuits. Introduction to the design of transistor amplifiers and logic gates. GE credit: SE, VL. Effective: 2018 Winter Quarter.

EEC 110B—Electronic Circuits II (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 110A Analysis and design of integrated circuits. Single-stage amplifiers, cascaded amplifier stages, differential amplifiers, current sources, frequency response, and return-ratio analysis of feedback amplifiers. GE credit: SE, VL. Effective: 2009 Fall Quarter.

EEC 112—Communication Electronics (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 110A; EEC 150A; EEC 110B recommended. Electronic circuits for analog and digital communication, including oscillators, mixers, tuned amplifiers, modulators, demodulators, and phase-locked loops. Circuits for amplitude modulation (AM) and frequency modulation (FM) are emphasized. GE credit: SE. Effective: 2014 Spring Quarter.

EEC 116—VLSI Design (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 110A; EEC 180A recommended. CMOS devices, layout, circuits, and functional units; VLSI fabrication and design methodologies. GE credit: SE. Effective: 2014 Spring Quarter.

EEC 118—Digital Integrated Circuits (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 110A; EEC 180A Analysis and design of digital integrated circuits. Emphasis on MOS logic circuit families. Logic gate construction, voltage transfer characteristics, propagation delay, and power consumption. Regenerative circuits, sequential elements, interconnect, RAMs, ROMs, and PLAs. GE credit: SE. Effective: 2011 Spring Quarter.

EEC 119A—Integrated Circuit Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): EEC 116 or EEC 118 Design course involving architecture, circuit design, physical design, and validation through extensive simulation of a digital or mixed-signal integrated circuit of substantial complexity under given design constraints. Team project that includes a final report. GE credit: SE. Effective: 2014 Fall Quarter.

EEC 119B—Integrated Circuit Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): EEC 119A Design course involving architecture, circuit design, physical design, and validation through extensive simulation of a digital or mixed-signal integrated circuit of substantial complexity under given design constraints. Team project that includes a final report. GE credit: SE. Effective: 2014 Fall Quarter.

EEC 130A—Electromagnetics I (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021D; (PHY 009C or PHY 009HD); ENG 017 Basics of static electric and magnetic fields and fields in materials. Work and scalar potential. Maxwell's equations in integral and differential form. Plan waves in lossless media. Lossless transmission lines. GE credit: SE. Effective: 2016 Fall Quarter.

EEC 130B—Introductory Electromagnetics II (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 130A Plane wave propagation in lossy media, reflections, guided waves, simple modulated waves and dispersion, and basic antennas. GE credit: SE. Effective: 1997 Winter Quarter.

EEC 132A—RF and Microwaves in Wireless Communication (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 110A; EEC 130B Study of Radio Frequency and Microwave theory and practice for design of wireless electronic systems. Transmission lines, microwave integrated circuits, circuit analyis of electromagnetic energy transfer systems, the scattering parameters. GE credit: SE. Effective: 2015 Winter Quarter.

EEC 132B—RF and Microwaves in Wireless Communication (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 132A Passive RF and microwave device analysis, design, fabrication, and testing for wireless applications. RF and microwave filter and coupler design. Introductory analysis and design of RF and microwave transistor amplifiers. GE credit: SE. Effective: 2007 Winter Quarter.

EEC 132C—RF and Microwaves in Wireless Communications (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 132B RF and microwave amplifier theory and design, including transistor circuit models, stability considerations, noise models and low noise design. Theory and design of microwave transistor oscillators and mixers. Wireless system design and analysis. GE credit: SE. Effective: 2009 Spring Quarter.

EEC 133—Electromagnetic Radiation and Antenna Analysis (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 130B Properties of electromagnetic radiation; analysis and design of antennas: ideal cylindrical, small loop, aperture, and arrays; antenna field measurements. GE credit: SE. Effective: 1999 Fall Quarter.

EEC 133—Electromagnetic Radiation and Antenna Analysis (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 130B Properties of electromagnetic radiation; analysis and design of antennas: ideal cylindrical, small loop, aperture, and arrays; antenna field measurements. GE credit: SE. Effective: 2018 Fall Quarter.

EEC 134A—RF/Microwave Systems Design (3)
Laboratory—6 hours; Workshop—3 hours. Prerequisite(s): EEC 130B or EEC 110B or EEC 150A Class size limited to 24 students. Board-level RF design, fabrication, and characterization of an RF/microwave system, including the antenna, RF front-end, baseband, mix-signal circuits, and digital signal processing models. GE credit: SE. Effective: 2014 Fall Quarter.

EEC 134B—RF/Microwave Systems Design (3)
Laboratory—6 hours; Workshop—3 hours. Prerequisite(s): EEC 134A Class size limited to 24 students. Board-level RF design, fabrication, and characterization of an RF/microwave system, including the antenna, RF front-end, baseband, mix-signal circuits, and digital signal processing models. GE credit: SE. Effective: 2015 Winter Quarter.

EEC 135—Optical Communications I: Fibers (4)
Lecture—4 hours. Prerequisite(s): EEC 130B Principles of optical communication systems. Planar dielectric waveguides. Optical fibers: single-mode, multi-mode, step and graded index. Attenuation and dispersion in optical fibers. Optical sources (LEDs and lasers) and receivers. Design of digital optical transmission systems. GE credit: SE. Effective: 2012 Winter Quarter.

EEC 136A—Electronic Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): ECS 030; EEC 100; EEC 180A; (EEC 110B or EEC 157A (can be concurrent) or EEC 180B) Pass One restricted to major. Optical, electronic and communication-engineering design of an opto-electronic system operating under performance and economic constraints. Measurement techniques will be designed and implemented, and the system will be characterized. GE credit: SE. Effective: 2015 Fall Quarter.

EEC 136B—Electronic Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): EEC 136A Optical, electronic and communication-engineering design of an opto-electronic system operating under performance and economic constraints. Measurement techniques will be designed and implemented, and the system will be characterized. GE credit: SE. Effective: 2014 Fall Quarter.

EEC 140A—Principles of Device Physics I (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 017; (PHY 009D or PHY 009HE) Semiconductor device fundamentals, equilibrium and non-equilibrium statistical mechanics, conductivity, diffusion, electrons and holes, p-n and Schottky junctions, first-order metal-oxide-semiconductor (MOS) field effect transistors, bipolar junction transistor fundamentals. GE credit: SE, SL. Effective: 2016 Fall Quarter.

EEC 140A—Principles of Device Physics I (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 017 (can be concurrent); (PHY 009D or PHY 009HE) Semiconductor device fundamentals, equilibrium and non-equilibrium statistical mechanics, conductivity, diffusion, electrons and holes, p-n and Schottky junctions, first-order metal-oxide-semiconductor (MOS) field effect transistors, bipolar junction transistor fundamentals. GE credit: SE, SL. Effective: 2018 Fall Quarter.

EEC 140B—Principles of Device Physics II (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 140A Electrical properties, designs, models and advanced concepts for MOS, Bipolar, and Junction Field-Effect Transistors, including scaling, minority-carrier distributions, non-ideal effects, and device fabrication methods. MESFET and heterojunction bipolar transistors (HBTs). Fundamentals of solar cells, photodetectors, LEDs and semiconductor lasers. GE credit: SE. Effective: 2010 Spring Quarter.

EEC 145—Electronic Materials (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 140A Electronic and physical properties of materials used in electronics, ICs, optoelectronics and MEMS. Semiconductors, dielectrics, metals, optical materials, organic semiconductive, optical and nonlinear properties, as well as their synthesis and deposition methods. GE credit: SE. Effective: 2015 Fall Quarter.

EEC 146A—Integrated Circuits Fabrication (4)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): EEC 140A Theoretical and experimental study of basic fabrication processes for metal oxide semiconductor integrated circuits, including oxidation, photolithography, impurity diffusion, metallization, wet chemical etching, and characterization. GE credit: SE. Effective: 2018 Winter Quarter.

EEC 146B—Advanced Integrated Circuits Fabrication (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): EEC 146A Restricted to Electrical, Computer, and Electrical/Materials Science majors and Electrical Engineering graduate students; non-majors accommodated when space available. Fabrication processes for CMOS VLSI. Laboratory projects examine deposition of thin films, ion implantation, process simulation, anisotropic plasma etching, sputter metallization, and C-V analysis. Topics include isolation, projection alignment, epilayer growth, thin gate oxidation, and rapid thermal annealing. GE credit: SE. Effective: 1997 Winter Quarter.

EEC 150A—Introduction to Signals and Systems I (4)
Lecture—4 hours. Prerequisite(s): EEC 100; (ENG 006 (can be concurrent) or MAT 022AL (can be concurrent)) Characterization and analysis of continuous-time linear systems. Fourier series and transforms with applications. Introduction to communication systems. Transfer functions and block diagrams. Elements of feedback systems. Stability of linear systems. GE credit: QL, SE. Effective: 2013 Fall Quarter.

EEC 150B—Introduction to Signals and Systems II (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 150A Characterization and analysis of discrete time systems. Difference equation models. Ztransform analysis methods. Discrete and fast Fourier
transforms. Introduction to digital filter design. GE credit: QL, SE. Effective: 2012 Fall Quarter.

EEC 152—Digital Signal Processing (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): EEC 150B; (EEC 070 or ECS 050) Theory and practice of real-time digital signal processing. Fundamentals of real-time systems. Programmable architectures including I/O, memory, peripherals, interrupts, DMA. Interfacing issues with A/D and D/A converters to a programmable DSP. Specification driven design and implementation of simple DSP applications. GE credit: SE. Effective: 2014 Fall Quarter.

EEC 157A—Control Systems (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 100 Analysis and design of feedback control systems. Examples are drawn from electrical and mechanical systems as well as other engineering fields. Mathematical modeling of systems, stability criteria, root-locus and frequency domain design methods. GE credit: SE. Effective: 2013 Fall Quarter.

EEC 157B—Control Systems (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 157A Control system design; transfer-function and state-space methods; sampled-data implementation, digital control. Laboratory includes feedback system experiments and simulation studies. GE credit: SE. Effective: 1997 Winter Quarter.

EEC 160—Signal Analysis and Communications (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 150A Signal analysis based on Fourier methods. Fourier series and transforms; time-sampling, convolution, and filtering; spectral density; modulation: carrier-amplitude, carrier-frequency, and pulse-amplitude. GE credit: SE. Effective: 1997 Winter Quarter.

EEC 161—Probabilistic Analysis of Electrical & Computer Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 100; (ENG 006 or MAT 022AL) Probabilistic and statistical analysis of electrical and computer systems. Discrete and continuous random variables, expectation and moments. Transformation of random variables. Joint and conditional densities. Limit theorems and statistics. Noise models, system reliability and testing. GE credit: SE. Effective: 2016 Spring Quarter.

EEC 165—Statistical and Digital Communication (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 160; EEC 161 Introduction to random process models of modulated signals and noise, and analysis of receiver performance. Analog and digitally modulated signals. Signal-to-noise ratio, probability of error, matched filters. Intersymbol interference, pulse shaping and equalization. Carrier and clock synchronization. GE credit: SE. Effective: 2017 Winter Quarter.

EEC 170—Introduction to Computer Architecture (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 180A; ECS 030 Introduces basic aspects of computer architecture, including computer performance measurement, instruction set design, computer arithmetic, pipelined/non-pipelined implementation, and memory hierarchies (cache and virtual memory). Presents a simplified Reduced Instruction Set Computer using logic design methods from the prerequisite course. GE credit: SE. Effective: 2015 Winter Quarter.

EEC 171—Parallel Computer Architecture (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 170 or ECS 154B Organization and design of parallel processors including shared-memory multiprocessors, cache coherence, memory consistency, snooping protocols, synchronization, scalable multiprocessors, message passing protocols, distributed shared memory and interconnection networks. GE credit: SE. Effective: 2014 Fall Quarter.

EEC 172—Embedded Systems (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): (EEC 170 or ECS 154A); EEC 100 Introduction to embedded-system hardware and software. Topics include: embedded processor and memory architecture; input/output hardware and software, including interrupts and direct memory access; interfacing with sensors and actuators; wired and wireless embedded networking. GE credit: SE. Effective: 2016 Winter Quarter.

EEC 173A—Computer Networks (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 060; (ECS 132 or EEC 161 or MAT 135A or STA 131A or STA 120 or STA 032) Pass One open to Computer Science, Computer Science Engineering and Computer Engineering Majors only. Overview of computer networks, TCP/IP protocol suite, computer-networking applications and protocols, transport-layer protocols, network architectures, Internet Protocol (IP), routing, link-layer protocols, local area and wireless networks, medium access control, physical aspects of data transmission, and network-performance analysis. Only 2 units of credit for students who have taken ECS 157. (ECS 152A.) GE credit: SE. Effective: 2016 Fall Quarter.

EEC 173B—Design Projects in Communication Networks (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 173A or ECS 152A Advanced topics and design projects in communication networks. Example topics include wireless networks, multimedia networking, network design and management, traffic analysis and modeling, network simulations and performance analysis. Offered in alternate years. (ECS 152C.) GE credit: SE. Effective: 2005 Spring Quarter.

EEC 180A—Digital Systems I (5)
Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): PHY 009C or PHY 009HD Introduction to digital system design including combinational logic design, sequential and asynchronous circuits, computer arithmetic, memory systems and algorithmic state machine design; computer aided design (CAD) methodologies and tools. GE credit: SE. Effective: 2014 Spring Quarter.

EEC 180B—Digital Systems II (5)
Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): EEC 180A Computer-aided design of digital systems with emphasis on hardware description languages (VHDL), logic synthesis, and field-programmable gate arrays (FPGA). May cover advanced topics in digital system design such as static timing analysis, pipelining, memory system design, testing digital circuits. GE credit: SE. Effective: 2013 Fall Quarter.

EEC 181A—Digital Systems Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): EEC 180B; EEC 170 Digital-system and computer-engineering design course involving architecture, design, implementation and testing of a prototype application-specific processor under given design constraints. This is a team project that includes a final presentation and report. GE credit: SE. Effective: 2018 Winter Quarter.

EEC 181B—Digital Systems Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): EEC 181A Digital-system and computer-engineering design course involving architecture, design, implementation and testing of a prototype application-specific processor under given design constraints. This is a team project that includes a final presentation and report. GE credit: SE. Effective: 2015 Winter Quarter.

EEC 183—Testing and Verification of Digital Systems (5)
Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): EEC 170; EEC 180B Computer aided-testing and design verification techniques for digital systems; physical fault testing; simulation-based design verification; formal verification; timing analysis. GE credit: SE. Effective: 2012 Spring Quarter.

EEC 189A—Special Topics in Electrical Engineering and Computer Science; Computer Science (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Computer Science. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189B—Special Topics in Electrical Engineering and Computer Science; Programming Systems (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Programming Systems. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189C—Special Topics in Electrical Engineering and Computer Science; Digital Systems (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Digital Systems. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189D—Special Topics in Electrical Engineering and Computer Science; Communications (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Communications. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189E—Special Topics in Electrical Engineering and Computer Science; Signal Transmission (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Signal Transmission. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189F—Special Topics in Electrical Engineering and Computer Science; Digital Communication (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Digital Communication. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189G—Special Topics in Electrical Engineering and Computer Science; Control Systems (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Control Systems. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189H—Special Topics in Electrical Engineering and Computer Science; Robotics (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Robotics. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189I—Special Topics in Electrical Engineering and Computer Science; Signal Processing (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Signal Processing. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189J—Special Topics in Electrical Engineering and Computer Science; Image Processing (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Image Processing. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189K—Special Topics in Electrical Engineering and Computer Science; High-Frequency Phenomena and Devices (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in High-Frequency Phenomena and Devices. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189L—Special Topics in Electrical Engineering and Computer Science; Solid-State Devices and Physical Electronics (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Solid-State Devices and Physical Electronics. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189M—Special Topics in Electrical Engineering and Computer Science; Systems Theory (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Systems Theory. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189N—Special Topics in Electrical Engineering and Computer Science; Active and Passive Circuits (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Active and Passive Circuits. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189O—Special Topics in Electrical Engineering and Computer Science; Integrated Circuits (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Integrated Circuits. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189P—Special Topics in Electrical Engineering and Computer Science; Computer Software (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Computer Software. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189Q—Special Topics in Electrical Engineering and Computer Science; Computer Engineering (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Computer Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189R—Special Topics in Electrical Engineering and Computer Science; Microprocessing (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Microprocessing. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189S—Special Topics in Electrical Engineering and Computer Science; Electronics (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Electronics. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189T—Special Topics in Electrical Engineering and Computer Science; Electromagnetics (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Electromagnetics. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189U—Special Topics in Electrical Engineering and Computer Science; Opto-Electronics (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Opto-Electronics. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189W—Special Topics in Electrical and Computer Engineering; Computer Networks (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special topics in Computer Networks. May be repeated for credit when topic differs. GE credit: SE. Effective: 2018 Winter Quarter.

EEC 190C—Research Group Conferences in Electrical and Computer Engineering (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing in Electrical and Computer Engineering. Research group conferences. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 2013 Spring Quarter.

EEC 192—Internship in Electrical and Computer Engineering (1-5) ***Review all entries***
Internship—3-15 hours. Prerequisite(s): Consent of Instructor. Completion of a minimum of 84 units; project approval before period of internship. Supervised work experience in electrical and computer engineering. May be repeated for credit project is different. (P/NP grading only.) GE credit: SE. Effective: 2012 Fall Quarter.

EEC 192—Internship in Electrical and Computer Engineering (1-6) ***Review all entries***
Internship—3-18 hours. Prerequisite(s): Consent of Instructor. Completion of a minimum of 84 units; project approval before period of internship. Supervised work experience in electrical and computer engineering. May be repeated for credit if project differs. (P/NP grading only.) GE credit: SE. Effective: 2018 Fall Quarter.

EEC 193A—Senior Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): EEC 196 (can be concurrent); and Consent of Instructor. Restricted to senior standing in Electrical or Computer Engineering. Team design project for seniors in Electrical or Computer Engineering. Project involves analysis, design, implementation and evaluation of an Electrical Engineering or Computer Engineering system. Project is supervised by a faculty member. GE credit: SE. Effective: 2014 Fall Quarter.

EEC 193B—Senior Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): EEC 193A Team design project for seniors in Electrical Engineering or Computer Engineering. Project involves analysis, design, implementation and evaluation of an Electrical Engineering or Computer Engineering system. Project supervised by a faculty member. GE credit: SE. Effective: 2015 Winter Quarter.

EEC 195A—Autonomous Vehicle Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): ECS 030; EEC 180A; (EEC 110B or EEC 157A (can be concurrent) or EEC 180B or ECS 060) Pass One restricted to major. Design and construct an autonomous race car. Work in groups to design, build and test speed control circuits, track sensing circuits, and a steering control loop. GE credit: SE. Effective: 2015 Fall Quarter.

EEC 195B—Autonomous Vehicle Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): EEC 195A Design and construct an autonomous race car. Students work in groups to design, build and test speed control circuits, track sensing circuits, and a steering control loop. GE credit: SE. Effective: 2015 Winter Quarter.

EEC 196—Issues in Engineering Design (1)
Seminar—1 hour. Prerequisite(s): Senior standing in Electrical or Computer Engineering. The course covers various electrical and computer engineering standards and realistic design constraints including economic, manufacturability, sustainability, ethical, health and safety, environmental, social, and political. GE credit: SE. Effective: 2008 Fall Quarter.

EEC 197T—Tutoring in Electrical and Computer Engineering (1-3)
Discussion—1 hour; Discussion/Laboratory—2-8 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Tutoring in Electrical and Computer Engineering courses, especially introductory circuits. For upper-division undergraduate students who will provide tutorial assistance. (P/NP grading only.) Effective: 2007 Fall Quarter.

EEC 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. May be repeated up to 3 time(s). (P/NP grading only.) GE credit: SE. Effective: 2007 Fall Quarter.

EEC 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2007 Fall Quarter.

EEC 201—Digital Signal Processing (4)
Lecture—4 hours. Prerequisite(s): EEC 150B; STA 120 or MAT 131 or MAT 167 recommended. Theory and design of digital filters. Classification of digital filters, linear phase systems, all-pass functions, FIR and IIR filter design methods and optimality measures, numerically robust structures for digital filters. Effective: 2006 Winter Quarter.

EEC 202—Advanced Digital Signal Processing (4)
Lecture—4 hours. Prerequisite(s): EEC 201, EEC 260 and EEC 265, and MAT 167 are recommended. Multirate DSP theory and wavelets, optimal transform and subband coders in data compressions, advanced sampling theory and oversampled A/D converters, transmultiplexers and precoders in digital communication systems, genomic signal processing. Effective: 2006 Spring Quarter.

EEC 205—Computational Methods in Biomedical Imaging (4)
Lecture—4 hours. Prerequisite(s): (BIM 105 or STA 120); (BIM 108 or EEC 150A) Analytic tomographic reconstruction from projections in 2D and 3D; model-based image reconstruction methods; maximum likelihood and Bayesian methods; applications to CT, PET, and SPECT. (BIM 252.) Effective: 2011 Fall Quarter.

EEC 206—Digital Image Processing (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 150B Two-dimensional systems theory, image perception, sampling and quantization, transform theory and applications, enhancement, filtering
and restoration, image analysis, and image processing systems. Effective: 1997 Winter Quarter.

EEC 210—MOS Analog Circuit Design (3)
Lecture—3 hours. Prerequisite(s): EEC 110B; EEC 140A Analysis and design of MOS amplifiers, bias circuits, voltage references and other analog circuits. Stability and compensation of feedback amplifiers. Introduction to noise analysis in MOS circuits. Effective: 2016 Winter Quarter.

EEC 211—Advanced Analog Circuit Design (3)
Lecture—3 hours. Prerequisite(s): EEC 210; STA 131A and EEC 112 recommended. Noise and distortion in electronic circuits and systems. Application to communication circuits. Specific applications include mixers, low-noise amplifiers, power amplifiers, phase-locked loops, oscillators and receiver architectures. Effective: 2002 Winter Quarter.

EEC 212—Analog MOS IC Design for Signal Processing (3)
Lecture—3 hours. Prerequisite(s): EEC 210 Analysis and design of analog MOS integrated circuits. Passive components, single-ended and fully differential op amps, sampled-data and continuous-time filters. Effective: 1998 Spring Quarter.

EEC 213—Data-Conversion Techniques and Circuits (3)
Lecture—3 hours. Prerequisite(s): EEC 210 Digital-to-analog and analog-to-digital conversion; component characteristics and matching; sample-and-hold, comparator, amplifier, and reference circuits. Effective: 1997 Winter Quarter.

EEC 214—Computer-Aided Circuit Analysis and Design (3)
Lecture—3 hours. Prerequisite(s): EEC 110A; EEC 110B; And knowledge of FORTRAN or C. Network equation formulations. Nonlinear DC, linear AC, timedomain (both linear and nonlinear), steady-state (nonlinear) and harmonic analysis. DC, AC, and time-domain sensitivities of linear and nonlinear circuits. Gradient-based design optimization. Behavioral simulations. Extensive CAD project. Effective: 2000 Winter Quarter.

EEC 215—Circuits for Digital Communications (3)
Lecture—3 hours. Prerequisite(s): EEC 150B; EEC 210 (can be concurrent); EEC 165, EEC 166, or EEC 265 recommended. Analog, digital, and mixed-signal CMOS implementations of communication-circuit blocks: gain control, adaptive equalizers, sampling detectors, clock recovery. Effective: 2000 Fall Quarter.

EEC 216—Low Power Digital Integrated Circuit Design (3)
Lecture—3 hours. Prerequisite(s): EEC 118 IC design for low power and energy consumption. Low power architectures, logic styles and circuit design. Variable supply and threshold voltages. Leakage management. Power estimation. Energy sources, power electronics, and energy recovery. Applications in portable electronics and sensors. Thermodynamic limits. Effective: 2006 Winter Quarter.

EEC 217—Biomedical Electronics (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): EEC 210; or Consent of Instructor. Special consideration and accommodation will be made for biomedical or signal processing majors who have not taken EEC 210. Circuit design for medical applications including weak inversion amplifiers; integrated ULF filters; chopper stabilization; electrochemical interfaces; neurostimulation pulse generation; wireless powering of and communication with implantable devices. Electrophysiological signaling and aspects of signal processing for biomedical systems. Effective: 2013 Spring Quarter.

EEC 219—Advanced Digital Circuit Design (3)
Lecture—3 hours. Prerequisite(s): EEC 118 or EEC 218A Analysis and design of digital circuits. Both bipolar and MOS circuits are covered. Dynamic and static RAM cells and sense amplifiers. Advanced MOS families. Multi-valued logic. Effective: 1997 Winter Quarter.

EEC 221—Analog Filter Design (3)
Lecture—3 hours. Prerequisite(s): EEC 100; EEC 150A Design of active and passive filters including filter specification and approximation theory. Passive LC filter design will cover doubly-terminated reactance two-port synthesis. Active filter design will include sensitivity, op-amp building blocks, cascade, multi-loop, ladder and active-R filter design. Effective: 1997 Fall Quarter.

EEC 222—RF IC Design (3)
Lecture—3 hours. Prerequisite(s): EEC 132C; EEC 210 Radio frequency (RF) solid-state devices, RF device modeling and design rules; non-linear RF circuit design techniques; use of non-linear computer-aided (CAD) tools; RF power amplifier design. Effective: 2004 Winter Quarter.

EEC 224—Terahertz and mm-Wave Integrated Circuit Design (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): EEC 132A; EEC 112; or Consent of Instructor. Fundamental theory of RF transmitter and receiver, including noise analysis, transceiver architectures, and antenna arrays. Fundamental limitations, theory and design of amplifiers, oscillators and signal sources at THz and mm-wave frequencies Effective: 2018 Winter Quarter.

EEC 228—Advanced Microwave Circuit and Device Design Techniques (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 132B Theory, design, fabrication, analysis of advanced microwave circuits and devices. Wideband transformers, stripline/microstripline broadband couplers. Lumped and distributed filter synthesis. Broadband matching theory applied to microwave devices. Wideband and low noise FET/HEMT amplifiers. Advanced microwave oscillator theory. Phase noise analysis. Effective: 2007 Spring Quarter.

EEC 229—RF-MEMS and Adaptive Wireless Frontends (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 130A Focuses on the modeling, design, fabrication, and characterization of RF-MEMS while providing a thorough introduction to the technology with an emphasis on how it will benefit the design of adaptive RF/microwave wireless systems. Effective: 2015 Fall Quarter.

EEC 230—Electromagnetics (3)
Lecture—3 hours. Prerequisite(s): EEC 130B Maxwell's equations, plane waves, reflection and refraction, complex waves, waveguides, resonant cavities, and basic antennas. Effective: 2001 Fall Quarter.

EEC 231A—Plasma Physics and Controlled Fusion (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Equilibrium plasma properties; single particle motion; fluid equations; waves and instabilities in a fluid plasma; plasma kinetic theory and transport coefficients; linear and nonlinear Vlasov theory; fluctuations, correlations and radiation; inertial and magnetic confinement systems in controlled fusion. Effective: 2015 Spring Quarter.

EEC 231B—Plasma Physics and Controlled Fusion (3)
Lecture—3 hours. Prerequisite(s): EEC 231A; and Consent of Instructor. Equilibrium plasma properties; single particle motion; fluid equations; waves and instabilities in a fluid plasma; plasma kinetic theory and transport coefficients; linear and nonlinear Vlasov theory; fluctuations, correlations and radiation; inertial and magnetic confinement systems in controlled fusion. Effective: 2015 Spring Quarter.

EEC 231C—Plasma Physics and Controlled Fusion (3)
Lecture—3 hours. Prerequisite(s): EEC 231B; and Consent of Instructor. Equilibrium plasma properties; single particle motion; fluid equations; waves and instabilities in a fluid plasma; plasma kinetic theory and transport coefficients; linear and nonlinear Vlasov theory; fluctuations, correlations and radiation; inertial and magnetic confinement systems in controlled fusion. Effective: 2015 Spring Quarter.

EEC 232A—Advanced Applied Electromagnetics I (3)
Lecture—3 hours. Prerequisite(s): EEC 132B The exact formulation of applied electromagnetic problems using Green's functions. Applications of these techniques to transmission circuits. Effective: 2000 Fall Quarter.

EEC 232B—Advanced Applied Electromagnetics II (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 132B An advanced treatment of electromagnetics with applications to passive microwave devices and antennas. Effective: 2000 Fall Quarter.

EEC 233—High Speed Signal Integrity (3)
Lecture—3 hours. Prerequisite(s): EEC 130B Design and analysis of interconnects in high-speed circuits and sub-systems; understanding of high-speed signal propagation and signal integrity concepts; electromagnetic modeling tools and experimental techniques. Effective: 2008 Fall Quarter.

EEC 234A—Physics and Technology of Microwave Vacuum Electron Beam Devices I (4)
Lecture—4 hours. Prerequisite(s): B.S. degree in physics or electrical engineering or the equivalent background. Physics and technology of electron beam emissions, flow and transport, electron gun design, space charge waves and klystrons. Effective: 2015 Fall Quarter.

EEC 234B—Physics and Technology of Microwave Vacuum Electron Beam Devices II (4)
Lecture—4 hours. Prerequisite(s): EEC 234A Theory and experimental design of traveling wave tubes, backward wave oscillators, and extended interaction oscillators. Effective: 2016 Spring Quarter.

EEC 234C—Physics and Technology of Microwave Vacuum Electron Beam Devices III (4)
Lecture—4 hours. Prerequisite(s): EEC 234B Physics and technology of gyrotrons, gyro-amplifiers, free electron lasers, magnetrons, crossfield amplifiers and relativistic devices. Effective: 2015 Fall Quarter.

EEC 235—Photonics (4)
Lecture—3 hours; Project (Term Project)—1 hour. Prerequisite(s): EEC 230 (can be concurrent) Optical propagation of electromagnetic waves and beams in photonic components and the design of such devices using numerical techniques. Effective: 2004 Fall Quarter.

EEC 236—Nonlinear Optical Applications (3)
Lecture—3 hours. Prerequisite(s): EEC 130B; EEC 230 (can be concurrent) Nonlinear optical interactions in optical communication, optical information processing and integrated optics. Basic concepts underlying optical nonlinear interactions in materials and guided media. Not open for credit to students who have completed EEC 233. Effective: 2000 Fall Quarter.

EEC 237A—Lasers (3)
Lecture—3 hours. Prerequisite(s): EEC 235; EEC 130B; Or the equivalent of EEC 130B. Not open for credit to students who have completed course 226A. Theoretical and practical description of lasers. Theory of population inversion, amplification and oscillation using semiclassical oscillator model and rate equations. Description and design of real laser system (Not open for credit to students who have completed course 226A.) Effective: 1998 Winter Quarter.

EEC 237B—Laser Physics II (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): EEC 237A or EAD 265A Oscillation threshold. Coupled cavity/atomic rate equations, Linear pulse propagation; dispersion, broadening, compression. Nonlinear pulse propagation. Energy extraction. Optical beams, resonators, eigenmodes, axial/transverse modes. Paraxial ray optics, resonator stability, ABCD matrices. Laser dynamics; transients, spiking, Q-switching, active and passive modelocking. Not open for credit to students who have completed EEC 226B. Effective: 2014 Fall Quarter.

EEC 238—Semiconductor Diode Lasers (3)
Lecture—3 hours. Prerequisite(s): EEC 245A Understanding of fundamental optical transitions in semiconductor and quantum-confined systems are applied to diode lasers and selected photonic devices. The importance of radiative and non-radiative
recombination, simulated emission, excitons in quantum wells, and strained quantum layers are considered. Effective: 1998 Spring Quarter.

EEC 239A—Optical Fiber Communications Technologies (4)
Lecture—4 hours. Prerequisite(s): EEC 130B Physical layer issues for component and system technologies in optical fiber networks. Sources of physical layer impairments and limitations in network scalability. Enabling technologies for wavelength-division-multiplexing and time-division-multiplexing networks. Optical amplifiers and their impact in optical networks (signal-to-noise ratio, gain-equalization, and cascadability). Effective: 2002 Fall Quarter.

EEC 239B—Optical Fiber Communications Systems and Networking (4)
Lecture—4 hours. Prerequisite(s): EEC 239A Physical layer optical communications systems in network architectures and protocols. Optical systems design and integration using optical component technologies. Comparison of wavelength routed WDM, TDM, and NGI systems and networks. Case studies of next generation technologies. Effective: 2003 Winter Quarter.

EEC 240—Semiconductor Device Physics (3)
Lecture—3 hours. Prerequisite(s): EEC 140B Physical principles, characteristics and models of fundamental semiconductor device types, including P-N and Schottky diodes, MOSFETs and MESFETs Bipolar Junction Transistors, and light emitters/detectors. Effective: 1998 Fall Quarter.

EEC 241—Introduction to Molecular Electronics (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Examines molecules for electronic devices and sensors. Course covers: electronic states of molecules, charge transport in nanoscale systems, and fabrication and measurement of molecular-scale devices. Specific Topics: Hartree-Fock and Density Functional Theory, Landauer formalism, coulomb blockade, tunneling and hopping transport. Effective: 2016 Spring Quarter.

EEC 242—Advanced Nanostructured Devices (3)
Lecture—3 hours. Prerequisite(s): EEC 130A; EEC 140A Physics of nano-structured materials and device operation. Overview of new devices enabled by nanotechnology; fabrication and characterization methods; applications of nano-structures and devices. Effective: 2005 Fall Quarter.

EEC 244A—Design of Microelectromechanical Systems (MEMS) (3)
Lecture—3 hours. Prerequisite(s): EEC 140A; EEC 140B; or Consent of Instructor. Theory and practice of MEMS design. Micromechanical fundamentals, CAD tools, and case studies. A MEMS design project is required. The designs will be fabricated in a commercial foundry and tested in course 244B. Effective: 1997 Fall Quarter.

EEC 244B—Microsciences (4)
Lecture/Discussion—4 hours. Introduction to the theory of physical and chemical principles at the microscale. Scale effects, surface tension, microfluidic mechanics, micromechanical properties, intermolecular interactions and micro tribology. (BIM 218.) Effective: 2011 Fall Quarter.

EEC 245—Micro- and Nano-Technology in Life Sciences (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Survey of biomedical device design from the engineering and biological perspectives; micro-/nano-fabrication and characterization techniques; surface chemistry and mass transfer; essential biological processes and models; proposal development skills to merge aforementioned themes in a multidisciplinary project. (ECH 245 and EMS 245.) Effective: 2016 Winter Quarter.

EEC 246—Advanced Projects in IC Fabrication (3)
Discussion—1 hour; Laboratory—6 hours. Prerequisite(s): EEC 146B Individualized projects in the fabrication of analog or digital integrated circuits. Effective: 1997 Winter Quarter.

EEC 247—Advanced Semiconductor Devices (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): Graduate standing in Engineering. Semiconductor devices, including MOSFETs, heterojunction transistors, light-emitting diodes, lasers, sensors, detectors, power and high-voltage transistors, MEMS resonators, organic semiconductors and photovoltaics. All material is from recent literature, encouraging students to utilize search methods and critically assess the latest research. Effective: 2011 Fall Quarter.

EEC 248—Photovoltaics and Solar Cells (3)
Lecture—3 hours. Prerequisite(s): EEC 140B; or Consent of Instructor. Or equivalent. Physics and application of photovoltaics and solar cells, including design, fabrication technology, and grid incorporation. Mono and microcrystalline silicon devices; thin-film technologies, heterojunction and organic-semiconductor technologies. Collectors, electrical inverters and infrastructure issues. Challenges and concerns. (EMS 246.) Effective: 2014 Fall Quarter.

EEC 249—Nanofabrication (3)
Lecture—3 hours. Prerequisite(s): Graduate standing in Engineering. Theory and practices of nanofabrication used for producing ICs, electronic devices, optoelectronics, sensors, and microstructures. Major topics include electron-, photon-, and ion-beams and their interactions with solids, chemical vapor depositions, plasma processing and micromachining. Effective: 2014 Winter Quarter.

EEC 250—Linear Systems and Signals (4)
Lecture—4 hours. Prerequisite(s): EEC 150A Mathematical description of systems. Selected topics in linear algebra. Solution of the state equations and an analysis of stability, controllability, observability, realizations, state feedback and state estimation. Discrete-time signals and systems, and the Z-transform. Effective: 2002 Fall Quarter.

EEC 251—Nonlinear Systems (3)
Lecture—3 hours. Prerequisite(s): EEC 250 Nonlinear differential equations, second-order systems, approximation methods, Lyapunov stability, absolute stability, Popov criterion, circle criterion, feedback linearization techniques. Effective: 1997 Winter Quarter.

EEC 252—Multivariable Control System Design (3)
Lecture—3 hours. Prerequisite(s): EEC 250 Modern control system design, theory, and techniques. Topics will include single-loop feedback design; stability, performance and robustness of multivariable control systems; LQG design; H-infinity design; frequency response methods; and optimization-based design. Effective: 2005 Fall Quarter.

EEC 254—Optimization (3)
Lecture—3 hours. Prerequisite(s): MAT 022A; Knowledge of FORTRAN or C. Modeling optimization problems in engineering design and other applications; optimality conditions; unconstrained optimization (gradient, Newton, conjugate gradient and quasi-Newton methods); duality and Lagrangian relaxation constrained optimization. (Primal method and an introduction to penalty and augmented Lagrangian methods.) Effective: 1997 Winter Quarter.

EEC 255—Robotic Systems (3)
Lecture—3 hours. Introduction to robotic systems. Mechanical manipulators, kinematics, manipulator positioning and path planning. Dynamics of manipulators. Robot motion programming and control algorithm design. Effective: 2006 Winter Quarter.

EEC 256—Stochastic Optimization in Dynamic Systems (4)
Lecture—4 hours. Prerequisite(s): EEC 260; Or the equivalent. Markov Decision Processes (MDP), dynamic programming, multi-armed bandit, Partially observable MDP, optimal stopping, stochastic scheduling, sequential detection and quickest change detection, competitive MDP and game theory, applications in dynamic systems such as queueing networks, communication systems, and multi-agent systems. Effective: 2012 Spring Quarter.

EEC 260—Random Signals and Noise (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 120; EEC 150A; EEC 250 recommended. Random processes as probabilistic models for signals and noise. Review of probability, random variables, and expectation. Study of correlation function and spectral density, ergodicity and duality between time averages and expected values, filters and dynamical systems. Applications. Effective: 1997 Winter Quarter.

EEC 261—Signal Processing for Communications (4)
Lecture—4 hours. Prerequisite(s): EEC 165; EEC 260; or Consent of Instructor. Signal processing in wireless and wireline communication systems. Characterization and distortion of wireless and wireline channels. Channel equalization and maximum likelihood sequence estimation. Channel precoding and pre-equalization. OFDM and transmit diversity. Array processing. Effective: 2003 Spring Quarter.

EEC 262—Multi-access Communications Theory (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): (EEC 173A or ECS 152A); STA 120; Or equivalent of STA 120. Maximum stable throughput of Poisson collision channels. Classic collision resolution algorithms. Carrier sensing multiple access and its performance analysis. System stability analysis. Joint design of the physical/medium access control layers. Capacity region of multi-access channels. Multi-access with correlated sources. Effective: 2006 Spring Quarter.

EEC 263—Optimal and Adaptive Filtering (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 260 Geometric formulation of least-squares estimation problems. Theory and applications of optimum Wiener and Kalman filtering. MAP and maximum likelihood estimation of hidden Markov models, Viterbi algorithm. Adaptive filtering algorithms, properties and applications. Effective: 2002 Spring Quarter.

EEC 264—Estimation and Detection of Signals in Noise (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 260 Introduction to parameter estimation and detections of signals in noise. Bayes and Neyman-Pearson likelihood-ratio tests for signal detection. Maximum-likelihood parameter estimation. Detection of known and Gaussian signals in white or colored noise. Applications to communications, radar, signal processing. Effective: 2007 Fall Quarter.

EEC 265—Principles of Digital Communications (4)
Lecture—4 hours. Prerequisite(s): EEC 165; EEC 260; or Consent of Instructor. Introduction to digital communications. Coding for analog sources. Characterization of signals and systems. Modulation and demodulation for the additive Gaussian channel. Digital signaling over bandwidth-constrained linear filter channels and over fading multipath channels. Spread spectrum signals. Effective: 1997 Winter Quarter.

EEC 266—Information Theory and Coding (3)
Lecture—3 hours. Prerequisite(s): STA 120 Information theory and coding. Measure of information. Redundancy reduction encoding of an information source. Capacity of a communication channel, errorfree communications. Effective: 1997 Winter Quarter.

EEC 267—Mobile Communications (4)
Lecture/Lab—3 hours. Prerequisite(s): EEC 260; EEC 265 (can be concurrent) Time-varying multi-path fading channel models and receiver performance in fading channels; multiple access techniques and multiple access receivers design and performance; optimum design and the capacity of wireless channels. Effective: 2013 Spring Quarter.

EEC 269A—Error Correcting Codes I (3)
Lecture—3 hours. Prerequisite(s): MAT 022A; EEC 160 Introduction to the theory and practice of block codes,
linear block codes, cyclic codes, decoding algorithms, coding techniques. Effective: 2001 Fall Quarter.

EEC 269B—Error Correcting Codes II (3)
Lecture—3 hours. Prerequisite(s): EEC 165; EEC 269A Introduction to convolutional codes, turbo codes, trellis and block coded modulation codes,soft-decision decoding algorithms, the Viterbi algorithm,reliability-based decoding, trellis-based decoding, multistage decoding. Effective: 2002 Spring Quarter.

EEC 270—Computer Architecture (3)
Lecture—3 hours. Prerequisite(s): EEC 170 or ECS 154B Introduction to modern techniques for high-performance single and
multiple processor systems. Topics include advanced pipeline design, advanced memory hierarchy design, optimizing pipeline and memory use, and memory sharing among multiprocessors. Case studies of recent single and multiple processor systems. Effective: 1999 Winter Quarter.

EEC 272—High-Performance Computer Architecture (4)
Lecture—4 hours. Prerequisite(s): EEC 270 or ECS 201A Designing and analysis of high performance computer architecture with emphasis on vector processing, on-chip interconnect networks, chip-level multiprocessors, memory and storage subsystem design and impact of technological advances on computer architecture. Effective: 2015 Spring Quarter.

EEC 273—Networking Architecture and Resource Management (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): ECS 152A or EEC 173A Pass One and Pass Two open to Graduate Students in Computer Science and Electrical and Computer Engineering only. Concepts and design principles of computer networks. Network architectures, protocol mechanisms and implementation principles (transport/network/data-link layers), network algorithms, router mechanisms, design requirements of applications, network simulation, modeling and performance analysis. (ECS 258.) Effective: 2016 Fall Quarter.

EEC 274—Internet Measurements, Modeling and Analysis (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): ECS 252 or EEC 273 Advanced topics in the theoretical foundations of network measurements, modeling, and statistical inferencing. Applications to Internet engineering, routing optimization, load balancing, traffic engineering, fault tolerance, anomaly detection, and network security. Individual project requirement. Effective: 2007 Winter Quarter.

EEC 276—Fault-Tolerant Computer Systems: Design and Analysis (3)
Lecture—3 hours. Prerequisite(s): EEC 170; EEC 180A Introduces fault-tolerant digital system theory and practice. Covers recent and classic fault-tolerant techniques based on hardware redundancy, time redundancy, information redundancy, and software redundancy. Examines hardware and software reliability analysis, and example fault-tolerant designs. Not open for credit to students who have completed EEC 276A. Effective: 1997 Fall Quarter.

EEC 277—Graphics Architecture (3)
Lecture—3 hours. Prerequisite(s): (ECS 154B or EEC 170); ECS 175 Design and analysis of the architecture of computer graphics systems. Topics include the graphics pipeline with a concentration on hardware technqiues and algorithms, exploiting parallelism in graphics, and case studies of noteworthy and modern graphics arhitectures. Effective: 2004 Winter Quarter.

EEC 278—Computer Arithmetic for Digital Implementation (3)
Lecture—3 hours. Prerequisite(s): EEC 170; EEC 180A The design and implementation of computer arithmetic logic units are studied with particular emphasis on high-speed performance requirements. Addition (subtraction), multiplication and division operations are covered, and fixed and floating-point representations are examined. Effective: 1997 Winter Quarter.

EEC 281—VLSI Digital Signal Processing (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): EEC 150B; EEC 170; EEC 180B; or Consent of Instructor. Digital signal processors, building blocks, and algorithms. Design and implementation of processor algorithms, architectures, control, functional units, and circuit topologies for increased performance and reduced circuit size and power dissipation. Effective: 2011 Spring Quarter.

EEC 282—Hardware Software Codesign (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): EEC 170; EEC 180B Specification and design of embedded systems; modeling and performance estimation; hardware/software partitioning; co-simulation; design re-use; platform-based design; reconfigurable computing. Effective: 2003 Spring Quarter.

EEC 283—Advanced Design Verification of Digital Systems (4)
Lecture—3 hours; Project (Term Project)—1 hour. Prerequisite(s): EEC 170; EEC 180A Design verification techniques for digital systems; simulation-based design verification techniques; formal verification techniques, including equivalence checking, model checking, and theorem proving; timing analysis and verification; application of design cerification techniques to microprocessors. Effective: 2000 Winter Quarter.

EEC 284—Design and Optimization of Embedded Computing Systems (4)
Lecture—4 hours. Prerequisite(s): EEC 170; EEC 180B; or Consent of Instructor. ECS 122A recommended. Introduction to design and optimization of digital computing systems for embedded applications. Topics include combinatorial optimization techniques, performance and energy optimization in embedded systems, compilation and architecture-specific mapping, programmable and reconfigurable platforms; design automation and algorithmic improvements to design process. Effective: 2007 Winter Quarter.

EEC 286—Introduction to Digital System Testing (3)
Lecture—3 hours. Prerequisite(s): EEC 180A; (STA 120 or STA 131A) A review of several current techniques used to diagnose faults in both combinational and sequential circuits. Topics include path sensitization procedures, Boolean difference, D-algorithm random test generation, TC testing and an analysis of the effects of intermittent faults. Not open for credit to students who have completed EEC 276A. Effective: 1998 Winter Quarter.

EEC 289A—Special Topics in Electrical and Computer Engineering; Computer Science (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Computer Science. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289B—Special Topics in Electrical and Computer Engineering; Programming Systems (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Programming Systems. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289C—Special Topics in Electrical and Computer Engineering; Digital Systems (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Digital Systems. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289D—Special Topics in Electrical and Computer Engineering; Digital Systems (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Digital Systems. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289E—Special Topics in Electrical and Computer Engineering; Signal Transmission (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Signal Transmission. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289F—Special Topics in Electrical and Computer Engineering; Digital Communication (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Digital Communication. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289G—Special Topics in Electrical and Computer Engineering; Control Systems (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Control Systems. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289H—Special Topics in Electrical and Computer Engineering; Robotics (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Robotics. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289I—Special Topics in Electrical and Computer Engineering; Signal Processing (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Signal Processing. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289J—Special Topics in Electrical and Computer Engineering; Image Processing (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Image Processing. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289K—Special Topics in Electrical and Computer Engineering; High Frequency Phenomena and Devices (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in High Frequency Phenomena and Devices. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289L—Special Topics in Electrical and Computer Engineering; Solid-State Devices and Physical Electronics (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Solid-State Devices and Physical Electronics. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289M—Special Topics in Electrical and Computer Engineering; Systems Theory (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Systems Theory. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289N—Special Topics in Electrical and Computer Engineering; Active and Passive Circuits (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Active and Passive Circuits. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289O—Special Topics in Electrical and Computer Engineering; Integrated Circuits (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Integrated Circuits. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289P—Special Topics in Electrical and Computer Engineering; Computer Software (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Computer Software. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289Q—Special Topics in Electrical and Computer Engineering; Computer Engineering (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Computer Engineering. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289R—Special Topics in Electrical and Computer Engineering; Microprocessing (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Microprocessing. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289S—Special Topics in Electrical and Computer Engineering; Electronics (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Electronics. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289T—Special Topics in Electrical and Computer Engineering; Electromagnetics (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Electromagnetics. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289U—Special Topics in Electrical and Computer Engineering; Optoelectronics (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Optoelectronics. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289W—Special Topics in Electrical and Computer Engineering; Computer Networks (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Computer Networks. May be repeated for credit when topic differs. Effective: 2018 Winter Quarter.

EEC 290—Seminar in Electrical and Computer Engineering (1)
Seminar—1 hour. Discussion and presentation of current research and development in Electrical and Computer Engineering. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

EEC 290C—Graduate Research Group Conference in Electrical and Computer Engineering (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Research problems, progress, and techniques in electrical and computer engineering. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

EEC 291—Solid-State Circuit Research Laboratory Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Lectures on solid-state circuit and system design by various visiting experts in the field. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

EEC 292—Seminar in Solid-State Technology (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Lectures on solid-state technology by various visiting experts in the field. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

EEC 293—Computer Engineering Research Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Lectures, tutorials and seminars on topics in computer engineering. May be repeated up to 4 time(s). (S/U grading only.) Effective: 2000 Winter Quarter.

EEC 294—Communications, Signal and Image Processing Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Communications, signal and image processing, video engineering and computer vision. May be repeated for credit. (S/U grading only.) Effective: 2003 Winter Quarter.

EEC 295—Systems, Control and Robotics Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Seminars on current research in systems and control by faculty and visiting experts. Technical presentations and lectures on current topics in robotics research and robotics technology. May be repeated for credit. (S/U grading only.) Effective: 1998 Winter Quarter.

EEC 296—Photonics Research Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Lectures on photonics and related areas by faculty and visiting experts. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1998 Winter Quarter.

EEC 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

EEC 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

EEC 390—The Teaching of Electrical Engineering (1)
Discussion—1 hour. Prerequisite(s): Meet qualifications for teaching assistant and/or associate-in in Electrical Engineering. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

EEC 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Energy Efficiency Minor; Biological & Agricultural Engineering

Energy Efficiency Minor; Biological & Agricultural Engineering | Energy Efficiency Minor

(College of Engineering and College of Agricultural and Environmental Sciences)

Bryan M. Jenkins, Ph.D., Chairperson of the Department

Department Office. 2030 Bainer Hall; 530-752-0102; http://bae.engineering.ucdavis.edu

Energy Minor Programs

There is an urgent need to develop and commercialize technologies for the sustainable conversion and use of energy. The goal of these minors is to prepare students for careers that require training in energy science and technology, efficiency, and policy. Clean technologies and green technologies including energy are some of the fastest growing markets for new investments. Well-trained individuals in all related fields are needed to provide the level of expertise required to advance technology and policy and to satisfy national and global objectives for greater energy sustainability. The minors are designed to accommodate persons of diverse backgrounds with educational

interests in areas that may include engineering, science, policy, economics, planning, and management.

Energy Efficiency Minor

All courses must be taken for a letter grade. A grade of C- or better is required for all courses used to satisfy minor requirements with an overall GPA in the required minor courses of 2.000 or better. Only one course overlap allowed between major and minor.

Minor Advisors. F. Loge (Civil and Environmental Engineering), D. Sperling (Institute of Transportation Studies), M. Modera (Western Cooling Efficiency Center)

Energy Efficiency **Units:** 20

ENG 188	Science and Technology of Sustainable Power Generation	4
ECI 125	Building Energy Performance	4

Choose 12 units:

ECI 143	Green Engineering Design and Sustainability	4
ESP 167	Energy Policy	4
DES 136A	Lighting Technology and Design	4
DES 136B	Designing with Light - Industrial Design	4
DES 137A	Daylighting and Interior Design	4

Total: 20

Energy Policy Minor; Biological & Agricultural Engineering

Energy Policy Minor; Biological & Agricultural Engineering | Energy Policy Minor

(College of Engineering and College of Agricultural and Environmental Sciences)

Bryan M. Jenkins, Ph.D., Chairperson of the Department

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Energy Minor Programs

There is an urgent need to develop and commercialize technologies for the sustainable conversion and use of energy. The goal of these minors is to prepare students for careers that require training in energy science and technology, efficiency, and policy. Clean technologies and green technologies including energy are some of the fastest growing markets for new investments. Well-trained individuals in all related fields are needed to provide the level of expertise required to advance technology and policy and to satisfy national and global objectives for greater energy sustainability. The minors are designed to accommodate persons of diverse backgrounds with educational interests in areas that may include engineering, science, policy, economics, planning, and management.

All courses must be taken for a letter grade. A grade of C- or better is required for all courses used to satisfy minor requirements with an overall GPA in the required minor courses of 2.000 or better. Only one course overlap allowed between major and minor.

Minor Advisors. D. Niemeier (Department of Civil and Environmental Engineering), J. Ogden (Environmental Science and Policy)

Energy Policy **Units:** 18

ENG 188	Science and Technology of Sustainable Power Generation	4
ESP 167	Energy Policy	4

Choose 10 units:

ECI 125	Building Energy Performance	4
ESP 171	Urban and Regional Planning	4
ESP 163	Energy and Environmental Aspects of Transportation	4
ESP 168A	Methods of Environmental Policy Evaluation	5
POL 105	The Legislative Process	4
POL 109	Public Policy and the Governmental Process	4
POL 122	International Law	4
POL 164	Public Opinion	4
POL 162	Elections and Voting Behavior	4

Total: 18

Energy Science & Technology Minor; Biological & Agricultural Engineering

Energy Science & Technology Minor; Biological & Agricultural Engineering | Energy Science & Technology Minor

(College of Engineering and College of Agricultural and Environmental Sciences)

Bryan M. Jenkins, Ph.D., Chairperson of the Department

Department Office. 2030 Bainer Hall; 530-752-0102; http://bae.engineering.ucdavis.edu

Energy Minor Programs

There is an urgent need to develop and commercialize technologies for the sustainable conversion and use of energy. The goal of these minors is to prepare students for careers that require training in energy science and technology, efficiency, and policy. Clean technologies and green technologies including energy are some of the fastest growing markets for new investments. Well-trained individuals in all related fields are needed to provide the level of expertise required to advance technology and policy and to satisfy national and global objectives for greater energy sustainability. The minors are designed to accommodate persons of diverse backgrounds with educational interests in areas that may include engineering, science, policy, economics, planning, and management.

All courses must be taken for a letter grade. A grade of C- or better is required for all courses used to satisfy minor requirements with an overall GPA in the required minor courses of 2.000 or better. Only one course overlap allowed between major and minor.

Minor Advisors. B. Jenkins (Department of Biological and Agricultural Engineering), K. McDonald (Department of Chemical Engineering), C. van Dam (Department of Mechanical and Aerospace Engineering)

Energy Science and Technology **Units:** 20

ENG 105	Thermodynamics	4
OR		
ECH 152B	Chemical Engineering Thermodynamics	4
ENG 188	Science and Technology of Sustainable Power Generation	4

Choose 12 units:

EBS 161	Kinetics and Bioreactor Design	4
ECH 158C	Plant Design Project	4
ECH 161A	Biochemical Engineering Fundamentals	4
ECH 161B	Bioseparations	4
ECH 161L	Bioprocess Engineering Laboratory	4
ECH 166	Catalysis	3
ECI 125	Building Energy Performance	4

ECI 143	Green Engineering Design and Sustainability	4
ECI 163	Energy and Environmental Aspects of Transportation	4
EME 161	Combustion and the Environment	4
ARE 175	Natural Resource Economics	4
FST 123	Introduction to Enzymology	3
ABT 182	Environmental Analysis using GIS	4
ATM 116	Modern Climate Change	3
PLS 101	Agriculture and the Environment	3
ESP 167	Energy Policy	4

Total: 20

Energy Systems (Graduate Group)

Energy Systems (Graduate Group) | Energy Systems Information

Alissa Kendall, Ph.D., Chairperson of the Group

Annemarie Schaaf, Graduate Program Coordinator

Group Office. West Village, 1605 Tilia, Suite 100, Davis, CA 95616; 530-752-0247; https://eec.ucdavis.edu/energy-graduate-group/

Faculty. https://eec.ucdavis.edu/energy-graduate-group/egg-faculty/

Energy Systems (Graduate Group) | Energy Systems M.S.

Alissa Kendall, Ph.D., Chairperson of the Group

Annemarie Schaaf, Graduate Program Coordinator

Group Office. West Village, 1605 Tilia, Suite 100, Davis, CA 95616; 530-752-0247; https://eec.ucdavis.edu/energy-graduate-group/

Faculty. https://eec.ucdavis.edu/energy-graduate-group/egg-faculty/

Graduate Study. The Energy Graduate Group offers the M.S. (Plan 1—Thesis, and Plan II—Exam) and Ph.D. degrees in two tracks of study: Energy Science & Technology, and Energy Policy & Management. The program is designed to meet the world's growing needs for highly qualified, thoughtful and dedicated leaders in sustainable energy systems. Both tracks are aimed at a wide range of students, though Energy Science and technology students are expected to come from disciplinary backgrounds in engineering or the physical sciences, while Energy Management and Policy students are expected to come from a wider range of disciplines interested in economic, policy, business and social aspects of energy systems.

Graduate Advisors. Adam Moule (Energy Science & Technology), Katrina Jessoe (Energy Policy & Management), Julia Fan (Admissions)

Energy Systems (Graduate Group) | Energy Systems Ph.D.

Alissa Kendall, Ph.D., Chairperson of the Group

Annemarie Schaaf, Graduate Program Coordinator

Group Office. West Village, 1605 Tilia, Suite 100, Davis, CA 95616; 530-752-0247; https://eec.ucdavis.edu/energy-graduate-group/

Faculty. https://eec.ucdavis.edu/energy-graduate-group/egg-faculty/

Graduate Study. The Energy Graduate Group offers the M.S. (Plan 1—Thesis, and Plan II—Exam) and Ph.D. degrees in two tracks of study: Energy Science & Technology, and Energy Policy & Management. The program is designed to meet the world's growing needs for highly qualified,

thoughtful and dedicated leaders in sustainable energy systems. Both tracks are aimed at a wide range of students, though Energy Science and technology students are expected to come from disciplinary backgrounds in engineering or the physical sciences, while Energy Management and Policy students are expected to come from a wider range of disciplines interested in economic, policy, business and social aspects of energy systems.

Graduate Advisors. Adam Moule (Energy Science & Technology), Katrina Jessoe (Energy Policy & Management), Julia Fan (Admissions)

Energy Systems (Graduate Group) | EGG Courses

Courses in EGG:

EGG 200—Energy Systems (4)
Lecture/Discussion—4 hours. Prerequisite(s): ENG 105; or equivalent. Theory and application of energy systems. Systems analysis, energy conversion technologies, environmental considerations, economics and system optimization. (EBS 216) Effective: 2018 Spring Quarter.

EGG 202—Energy and Climate Policy (4)
Extensive Writing/Discussion; Lecture—3 hours. Prerequisite(s): ECN 100A or ARE 100A; or Consent of Instructor. Pass One restricted to graduate students in the following programs: Economics, Energy Graduate Group, and Transportation Technology and Policy Graduate Group. Fundamentals of energy technology, economics, and policy. Survey and analysis of current and prospective climate policies at the local and global level, including but not limited to cap-and-trade, emissions offsets, intensity standards, technology standards, mandates and subsidies. (ECN 216.) Effective: 2018 Spring Quarter.

EGG 299—Research (1-12)
Variable—1-12 hours. Prerequisite(s): Consent of Instructor. Research May be repeated for credit. (S/U grading only.) Effective: 2017 Fall Quarter.

Engineering

Engineering | Engineering Information

(College of Engineering)

Jennifer Sinclair Curtis, Ph.D., Dean

S. Felix Wu, Ph.D., Associate Dean—Academic Personnel and Planning

Jean S. VanderGheynst, Ph.D., Executive Associate Dean—Research and Graduate Studies

James A. Schaaf Ph.D., Associate Dean—Undergraduate Studies

C.P. (Case) van Dam, D. Engr., Associate Dean—Facilities and Capital Planning

College Office. 1042 Kemper Hall; 530-752-7642; http://engineering.ucdavis.edu; http://www.facebook.com/UCDEngineering

Undergraduate Study

The college has eight departments:

- Biological and Agricultural Engineering
- Biomedical Engineering
- Chemical Engineering
- Civil and Environmental Engineering
- Computer Science Engineering
- Electrical and Computer Engineering
- Materials Science and Engineering
- Mechanical and Aerospace Engineering

Graduate Study

Graduate degrees (M.S and Ph.D.) are offered in the following engineering disciplines:

- Biological Systems Engineering
- Biomedical Engineering
- Chemical Engineering
- Civil and Environmental Engineering
- Computer Science
- Electrical and Computer Engineering
- Materials Science and Engineering
- Mechanical and Aerospace Engineering
- Transportation Technology and Policy

The Major Programs

Twelve majors, leading to the B.S. degree, are open to students:

- Aerospace Science & Engineering
- Biochemical Engineering
- Biological Systems Engineering
- Biomedical Engineering
- Chemical Engineering
- Civil Engineering
- Computer Engineering
- Computer Science and Engineering
- Electrical Engineering
- Environmental Engineering
- Materials Science and Engineering
- Mechanical Engineering

Minor Programs

The College of Engineering offers nine undergraduate minors:

- Biomedical Engineering (Department of Biomedical Engineering)
- Computational Biology (Department of Computer Science)
- Construction Engineering and Management (Department of Civil and Environmental Engineering)
- Electrical Engineering (Department of Electrical and Computer Engineering)
- Energy Science and Technology (Department of Biological and Agricultural Engineering)
- Energy Policy (Department of Biological and Agricultural Engineering)
- Energy Efficiency (Department of Biological and Agricultural Engineering)
- Materials Science (Department of Materials Science and Engineering)
- Sustainability in the Built Environment (Department of Civil and Environmental Engineering)

Engineering | ENG Courses

Students are encouraged to carefully adhere to all prerequisite requirements. The instructor is authorized to drop students from a course for which stated prerequisites have not been completed.

Courses in ENG:

ENG 001—Introduction to Engineering (1)
Lecture—1 hour. Open to first year students only. Introduction to the role of engineers in the acquisition and development of engineering knowledge, the differences and similarities among engineering fields, and the work ethic and skills required for engineering. (P/NP grading only.) GE credit: SE. Effective: 2011 Fall Quarter.

ENG 002—Creativity and Entrepreneurship for Engineers (3)
Discussion—3 hours. Introduction to entrepreneurial thinking from an engineer's perspective. Focus on identifying entrepreneurial opportunities, developing prototypes, and generating business models. Emphasis on developing a creative and entrepreneurial mindset. GE credit: SE, SS. Effective: 2015 Fall Quarter.

ENG 003—Introduction to Engineering Design (4) ***Review all entries***
Lecture—2 hours; Project (Term Project)—4 hours; Studio—2 hours. Prerequisite(s): Must have satisfied the Entry Level Writing Requirement (ELWR). Pass One restricted to lower division College of Engineering students; Pass Two restricted to lower division students. Introduction to the engineering design process that incorporates the development of oral and written communication skills integral to the design process. Conducted in workshop format with hands-on engagement in the design process. GE credit: OL, SE, SS. Effective: 2017 Winter Quarter.

ENG 003—Introduction to Engineering Design (4) ***Review all entries***
Lecture—2 hours; Project (Term Project)—2 hours; Studio—2 hours. Prerequisite(s): Must have satisfied the Entry Level Writing Requirement (ELWR). Pass One restricted to lower division College of Engineering students; Pass Two restricted to lower division students. Introduction to the engineering design process that incorporates the development of oral and written communication skills integral to the design process. Conducted in workshop format with hands-on engagement in the design process. GE credit: OL, SE, SS. Effective: 2018 Fall Quarter.

ENG 004—Engineering Graphics in Design (3)
Laboratory—3 hours; Lecture—2 hours. Engineering design, descriptive geometry, pictorial sketching, computer-aided graphics, and their application in the solution of engineering problems. GE credit: SE, VL. Effective: 2003 Spring Quarter.

ENG 006—Engineering Problem Solving (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (MAT 016A C- or better or MAT 017A C- or better or MAT 021A C- or better); (MAT 016B C- or better (can be concurrent) or MAT 017B C- or better (can be concurrent) or MAT 021B C- or better (can be concurrent)) Methodology for solving engineering problems. Engineering computing and visualization based on MATLAB. Engineering examples and applications. GE credit: QL, SE. Effective: 2013 Spring Quarter.

ENG 007—Technology & Culture of the Internet (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Basic computer experience recommended. Technology and culture of networked computing and the Internet. Topics include the history and development of networked computing; Internet architecture and services; basics of Web page design and hypertext markup language; political, social, cultural, economic and ethical issues related to the Internet. GE credit: SE. Effective: 2001 Spring Quarter.

ENG 007—Technology & Culture of the Internet (4) ***Review all entries Discontinued***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Basic computer experience recommended. Technology and culture of networked computing and the Internet. Topics include the history and development of networked computing; Internet architecture and services; basics of Web page design and hypertext markup language; political, social, cultural, economic and ethical issues related to the Internet. GE credit: SE. Effective: 2018 Fall Quarter.

ENG 010—The Science Behind the Technology in Our Lives (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): High school algebra. Understanding of how the technology in our lives works using only basic concepts and rudimentry mathematics. GE credit: SE, SS. Effective: 2001 Fall Quarter.

ENG 011—Issues in Engineering (1)
Lecture—1 hour. Prerequisite(s): Participation in the MESA Engineering Program or consent of instructor. Designed to broaden the student's understanding of the engineering profession, its methods, principles, design and development process, career opportunities, and professional resources. Effective: 1999 Fall Quarter.

ENG 017—Circuits I (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (MAT 022A, MAT 022B (can be concurrent)); (PHY 009C or PHY 009HD); C- or better recommended for each course. Basic electric circuit analysis techniques, including electrical quantities and elements, resistive circuits, transient and steady-state responses of RLC circuits, sinusoidal excitation and phasors, and complex frequency and network functions. GE credit: SE, VL. Effective: 2014 Spring Quarter.

ENG 017—Circuits I (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021C; C- or better recommended. Basic electric circuit analysis techniques, including electrical quantities and elements, resistive circuits, transient and steady-state responses of RLC circuits, sinusoidal excitation and phasors, and complex frequency and network functions. GE credit: SE, VL. Effective: 2018 Fall Quarter.

ENG 020—Introduction to Space Exploration: Understanding the Technological and Environmental Challenges to Our Exploration of the Solar System (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): High school level Algebra, Geometry, General Science (Physics and Chemistry). Introductory overview of the space environment. Discussion of space exploration technology including propulsion, orbital mechanics, and spacecraft engineering. GE credit: QL, SE, SL. Effective: 2014 Winter Quarter.

ENG 035—Statics (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PHY 009A C- or better; MAT 021D C- or better (can be concurrent) Force systems and equilibrium conditions with emphasis on engineering problems. GE credit: SE. Effective: 2016 Fall Quarter.

ENG 035—Statics (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (PHY 009A C- or better or PHY 009HA C- or better); MAT 021D C- or better (can be concurrent) Force systems and equilibrium conditions with emphasis on engineering problems. GE credit: SE. Effective: 2018 Fall Quarter.

ENG 045—Properties of Materials (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (MAT 016C C- or better or MAT 021C C- or better); (CHE 002A C- or better, PHY 009A C- or better) Introductory course on the properties of engineering materials and their relation to the internal structure of materials. Not open for credit to students who have taken ENG 045Y. GE credit: QL, SE, SL, WE. Effective: 2013 Winter Quarter.

ENG 045H—Honors Properties of Materials (1)
Discussion—1 hour. Prerequisite(s): ENG 045 (can be concurrent) or ENG 045Y (can be concurrent); Enrollment in the Materials Science and Engineering Honors Program; ENG 045 or ENG 045Y required concurrently. Open only to students in the Materials Science and Engineering Honors Program. Examination of special materials science and engineering topics through additional readings, discussions, collaborative work, or special activities which may include projects, laboratory experience or computer simulations. Effective: 2018 Spring Quarter.

ENG 045Y—Properties of Materials (4)
Laboratory; Web Virtual Lecture. Prerequisite(s): (MAT 016C C- or better or MAT 021C C- or better); CHE 002A; PHY 009A Introductory course on the properties of engineering materials and their relation to the internal structure of materials. Not open for credit to students who have taken ENG 045. GE credit: QL, SE, SL. Effective: 2013 Summer Session 2.

ENG 098—Directed Group Study (1-4)
Variable. Restricted to College of Engineering students only. May be repeated up to 3 time(s) when content differs. (P/NP grading only.) Effective: 2001 Spring Quarter.

ENG 100—Electronic Circuits and Systems (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): ENG 017; C- or better recommended. Introduction to analog and digital circuit and system design through hands on laboratory design projects. Students who have completed EEC 100 may receive only 1.5 units of credit. GE credit: SE, VL. Effective: 2014 Spring Quarter.

ENG 102—Dynamics (4)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): ENG 035 C- or better; MAT 022B C- or better Open to College of Engineering students only. Kinematics and kinetics of particles, systems of particles, and of rigid bodies; application of these topics are applied to engineering problems. Only two units of credit allowed to students who have previously taken ENG 036. GE credit: SE, VL. Effective: 2017 Fall Quarter.

ENG 103—Fluid Mechanics (4) ***Review all entries***
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): ENG 035 C- or better; MAT 022B C- or better; PHY 009B C- or better Open to students in the College of Engineering and Hydrology majors. Fluid properties, fluid statics, continuity and linear momentum equations for control volumes, flow of incompressible fluids in pipes, dimensional analysis and boundary-layer flows. Not open for credit to students who have completed Chemical Engineering 150A. GE credit: SE. Effective: 2017 Winter Quarter.

ENG 103—Fluid Mechanics (4) ***Review all entries***
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): ENG 035 C- or better; MAT 022B C- or better; PHY 009B C- or better Open to students in the College of Engineering and Hydrology majors. Fluid properties, fluid statics, continuity and linear momentum equations for control volumes, flow of incompressible fluids in pipes, dimensional analysis and boundary-layer flows. Not open for credit to students who have completed ECH 150A. GE credit: SE. Effective: 2018 Fall Quarter.

ENG 104—Mechanics of Materials (4)
Lecture—4 hours. Prerequisite(s): ENG 035 C- or better; MAT 022B C- or better Open to Engineering majors only. Uniaxial loading and deformation. General concepts of stress-strain-temperature relations and yield criteria. Torsion of shafts. Bending of beams. Deflections due to bending. Introduction to stability and buckling. GE credit: QL, SE. Effective: 2010 Summer Session 1.

ENG 104L—Mechanics of Materials Laboratory (1)
Laboratory—3 hours. Prerequisite(s): ENG 104 Experiments which illustrate the basic principles and verify the analysis procedures used in the mechanics of materials are performed using the basic tools and techniques of experimental stress analysis. GE credit: SE. Effective: 1997 Winter Quarter.

ENG 105—Thermodynamics (4)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): MAT 022B C- or better; PHY 009B C- or better Open to College of Engineering students only. Fundamentals of thermodynamics: heat energy and work, properties of pure substances, First and Second Law for closed and open systems, reversibility, entropy, thermodynamic temperature scales. Applications of thermodynamics to engineering systems. GE credit: SE, VL. Effective: 2017 Fall Quarter.

ENG 106—Engineering Economics (3)
Lecture—3 hours. Prerequisite(s): Upper division standing in Engineering. The analysis of problems in engineering economy; the selection of alternatives; replacement decisions. Compounding, tax, origins and cost of capital, economic life, and risk and uncertainty are applied to methods of selecting most economic alternatives. GE credit: QL, SE, SL, SS, VL. Effective: 1997 Winter Quarter.

ENG 111—Electric Machinery Fundamentals (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 017 C- or better Principles of AC and DC electric motors and generators, their control systems and power sources. Selection of electric power equipment components based on their construction features and performance characteristics. GE credit: QL, SE, SL, VL. Effective: 2017 Winter Quarter.

ENG 121—Fluid Power Actuators and Systems (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 100 C- or better; ENG 102 C- or better Hydraulic and pneumatic systems with emphasis on analysis and control of actuators. Design of hydraulic and pneumatic systems, specification and sizing of components, and selection of electro-hydraulics/electro-pneumatics, servo valves, and closed loop systems to solve basic control problems. GE credit: QL, SE, SL, VL, WE. Effective: 2011 Fall Quarter.

ENG 122—Introduction to Mechanical Vibrations (4)
Lecture—4 hours. Prerequisite(s): ENG 102 C- or better; (ENG 006 C- or better or ENG 005 C- or better or ECS 030 C- or better); Ability to program in MATLAB. Free and forced vibrations in lumped-parameter systems with and without damping; vibrations in coupled systems; electromechanical analogs; use of energy conservation principles. GE credit: SE. Effective: 2017 Fall Quarter.

ENG 160—Environmental Physics and Society (3)
Lecture—3 hours. Prerequisite(s): (PHY 009D or PHY 010 or PHY 001B); MAT 016B; Or the equivalent of MAT 016B. Impact of humankind on the environment will be discussed from the point of view of the physical sciences. Calculations based on physical principles will be made, and the resulting policy implications will be considered. In the College of Engineering, students may receive only one unit of credit towards the Technical Electives requirement. (PHY 160.) GE credit: SE, SL. Effective: 1997 Winter Quarter.

ENG 180—Engineering Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ENG 006 C- or better or EME 005 C- or better or ECS 030 C- or better); (MAT 021D C- or better, MAT 022B C- or better) Solutions of systems of linear and nonlinear algebraic equations; approximation methods; solutions of ordinary differential equations; initial and boundary value problems; solutions of partial differential equations of Elliptic, parabolic, and hyperbolic types; Eigen value problems. GE credit: SE. Effective: 2013 Fall Quarter.

ENG 188—Science and Technology of Sustainable Power Generation (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PHY 007C or PHY 009C; Upper-division standing. Focus on scientific understanding and development of power generation that is the basis of modern society. Concentration on power generation methods that are sustainable, in particular, discussion of the most recent innovations. GE credit: SS. Effective: 2012 Fall Quarter.

ENG 190—Professional Responsibilities of Engineers (3)
Lecture—3 hours. Restricted to upper-division students in the College of Engineering. Organization of the engineering profession; introduction to contracts, specifications, business law, patents, and liability; discussion of professional, ethical, societal, and political issues related to engineering. GE credit: SS. Effective: 2013 Winter Quarter.

ENG 198—Directed Group Study (1-5)
May be repeated up to 3 time(s) content changes. (P/NP grading only.) GE credit: SE. Effective: 2001 Winter Quarter.

ENG 250—Technology Management (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Management of the engineering and technology activity. Functions of design, planning, production, marketing, sales, and maintenance. Technological product life cycle. Research and development activity. Project planning and organization. Manufacturing issues. Case studies. Effective: 1999 Spring Quarter.

English

English | ENL Information

(College of Letters and Science)

John Marx, Ph.D., Chairperson of the Department

Department Office. 176 Voorhies Hall; 530-752-2257; http://english.ucdavis.edu

Faculty.http://english.ucdavis.edu/people/faculty

English | ENL A.B.

(College of Letters and Science)

John Marx, Ph.D., Chairperson of the Department

Department Office. 176 Voorhies Hall; 530-752-2257; http://english.ucdavis.edu

Faculty. http://english.ucdavis.edu/people/faculty

The Major Program

The study of English develops skills in reading analytically and perceptively and in writing clearly and effectively.

The Program. The English department offers three kinds of courses: composition courses, undergraduate courses, and graduate courses. Composition courses develop skills in reading analytically and in writing persuasively. Undergraduate and graduate courses cover the entire range of English and American literature, as well as creative writing. Students majoring in English may elect a creative writing emphasis or a literature, criticism, and theory emphasis. All majors take courses introducing them to the literatures of various periods and places, to critical theory, and to frontiers of literary expression, such as the relationship of literature to environmentalism or the emergence of new media. The creative writing emphasis focuses on fiction, poetry, and article writing. The literature, criticism, and theory emphasis focuses on advanced critical analysis and research. All majors have the opportunity to work with distinguished writers, critics, scholars, and teachers.

Career Alternatives. Graduates have found the major excellent pre-professional training for careers in teaching, writing, law, medicine, library work, journalism, and more. Many graduates are employed in publishing, marketing, advertising, or the tech sector. Others have worked in local, state, and federal government agencies, as well as in industry. Many have gone on to graduate study in a wide range of fields including English, education, counseling, and more.

English Majors. Up to four upper division units in a national literature other than English or American, or in Comparative Literature, may count toward the requirements of the major.

Major Advisors. G. Bloom, S. Boluk, S. Chaganti, J. Clover, L. Corin, G. Dobbins, F. Dolan, K. Frederickson, E. Freeman, D. Heard Mollel, P. Houston, H. Hsu, M. Jerng, A. Johns, D. Martín, J. Marx, T. Menely, C. Milburn, E. Miller, K. Peterson, M. Ronda, P. Roy, S. Shershow, D. Simpson, M. Stratton, J. Townsend, M. Vernon, C. Waters, J. Wenderoth, T. Werth, M. Ziser

Major Advising. All new and prospective English majors are encouraged to see an undergraduate staff advisor, individually, once per year, at minimum.

Foreign Languages. Students who contemplate advanced study in English should prepare for foreign language requirements for higher degrees and should consult with the graduate advisor.

Undergraduate Advisor. See Department website at http://english.ucdavis.edu or the Departmental Advising Office in 177/179 Voorhies Hall.

Honors and Honors Program. A Senior Honors Program is available to an invited group of English majors, who prepare and write a Senior Thesis (either a research paper or creative writing) in their final year. The critical honors program consists of four units of 194H and four units of 195H, normally taken during Winter and Spring quarters of the senior year. The creative writing honors program consists of four units of 100FA or 100PA, normally taken during Spring quarter of the junior year, and four units of 195H, normally taken Winter quarter of the senior year. Completion of the program is a prerequisite for High or Highest Honors at graduation. Eligibility criteria and application materials may be obtained at the Undergraduate Advising office in 177 Voorhies Hall or by accessing the Department website at http://english.ucdavis.edu. For more details, see Graduation Honors.

Education Abroad Options. The department strongly encourages interested students to pursue their studies abroad. It is possible for students to complete significant portions of the English major provided that the course is evaluated as at least four UC Davis units; the course is considered upper division by the standards set forth by UC Davis Study Abroad; the student presents copies of the coursework, syllabus, and writing assignments to the department's advising staff.

Teaching Credential Subject Representative. See the Teacher Education program.

Graduate Study. The Department of English offers programs of study and research leading to the M.A. in literature and creative writing and the Ph.D. in literature. Detailed information may be obtained from the graduate advisor or the Chairperson of the Department.

The department's affiliation with the Critical Theory Program also provides the opportunity for students in English to prepare for the designated emphasis in Critical Theory (an interdisciplinary program in theories and methodologies in the humanities and social sciences).

Graduate Director. Desiree Martin, Ph.D.

Entry Level Writing. Students must have met the Entry Level Writing requirement before taking any course in English.

Prerequisites. ENL 003 or UWP 001 is required for admission into all preparatory courses (040, 043, 044, 045, 010A, 010B, 010C), and all upper division courses, unless otherwise stated in the course listings. COM 001, 002, 003, or 004 or NAS 005 may normally be substituted for ENL 003 or UWP 001.

Preparatory Subject Matter **Units:** 20

ENL 003	Introduction to Literature	4
OR		
UWP 001	Expository Writing	4
OR		
Equivalent		
ENL 010A	Literatures in English I: To 1700	4
ENL 010B	Literatures in English II: 1700-1900	4
ENL 010C	Literatures in English III: 1900 to Present	4

Choose one:

ENL 040	Introductory Topics in Literature	4
ENL 041	Introductory Topics in Literature and Media	4
ENL 043	Introductory Topics in Drama	4
ENL 044	Introductory Topics in Fiction	4
ENL 045	Introductory Topics in Poetry	4

Depth Subject Matter **Units:** 44

ENL 110A	Introduction to Literary Theory	4
OR		
ENL 110B	Introduction to Modern Literary and Critical Theory	4

Historical Distribution Requirements

Choose three courses focusing on literature written in English before 1800, at least one of which must be on literature written primarily before 1500:

Before 1500

ENL 111	Topics in Medieval Literature	4
ENL 113A	Chaucer: Troilus and the "Minor" Poems	4
ENL 113B	Chaucer: The Canterbury Tales	4

1500-1800

ENL 115	Topics in Sixteenth and Seventeenth Century Literature	4
ENL 117	Shakespeare	4
ENL 122	Milton	4
ENL 123	18th-Century British Literature	4
ENL 142	Early American Literature	4
ENL 150A	British Drama to 1800	4
ENL 155A	18th-Century British Novel	4
ENL 185A	Women's Writing I	4

Choose one course focusing on literature written in English between 1800 and 1900:

ENL 130	British Romantic Literature	4
ENL 133	19th-Century British Literature	4
ENL 143	19th-Century American Literature to the Civil War	4
ENL 144	Post-Civil War American Literature	4
ENL 155B	19th-Century British Novel	4
ENL 158A	The American Novel to 1900	4
ENL 181A	African American Literature to 1900	4
ENL 185B	Women's Writing II	4

Choose one course focusing on literature written in English between 1900 and present:

ENL 137	British Literature, 1900-1945	4
ENL 138	British Literature, 1945 to Present	4
ENL 146	American Literature 1900-1945	4
ENL 147	American Literature, 1945 to the Present	4
ENL 150B	Drama from 1800 to the Present	4
ENL 154	The Graphic Novel	4
ENL 155C	20th-Century British Novel	4
ENL 156	The Short Story	4
ENL 157	Detective Fiction	4
ENL 158B	The American Novel from 1900 to the Present	4
ENL 166	Love and Desire in Contemporary American Poetry	4
ENL 167	Twentieth-Century African American Poetry	4
ENL 168	20th Century American Poetry	4
ENL 181B	African American Literature 1900-Present	4
ENL 185C	Women's Writing III	4

Non-Historical Distribution Requirements

Choose one course on literature and ethnicity, literature and gender, or literature and sexuality:

ENL 125	Topics in Irish Literature	4
ENL 139	Topics in Global Literatures and Cultures	4
ENL 140	Topics in Postcolonial Literatures and Cultures	4
ENL 141	Topics in Diasporic Literatures and Migration	4
ENL 166	Love and Desire in Contemporary American Poetry	4
ENL 167	Twentieth-Century African American Poetry	4
ENL 178	Topics in Nations, Regions, and Other Cultural Geographies	4
ENL 179	Multi-Ethnic Literature of the United States	4
ENL 181A	African American Literature to 1900	4
ENL 181B	African American Literature 1900-Present	4
ENL 185A	Women's Writing I	4
ENL 185B	Women's Writing II	4
ENL 185C	Women's Writing III	4
ENL 186	Literature, Sexuality, and Gender	4

Choose one course in film and media studies, language studies, cultural studies and contexts, literature and science/technology, or literature and the environment:

ENL 105	History of the English Language	4
ENL 106	English Grammar	4
ENL 107	Freedom of Expression	4
ENL 120	Law and Literature	4
ENL 160	Film as Narrative	4

ENL 161A	Film History I: Origins to 1945	4
ENL 161B	Film History II: 1945 to present	4
ENL 162	Film Theory and Criticism	4
ENL 164	Writing Science	4
ENL 171A	The Bible as Literature: The Old Testament	4
ENL 171B	The Bible as Literature: Prophets and New Testament	4
ENL 172	Video Games and Culture	4
ENL 173	Science Fiction	4
ENL 175	American Literary Humor	4
ENL 180	Children's Literature	4
ENL 182	Literature of California	4
ENL 183	Young Adult Literature	4
ENL 184	Literature and the Environment	4
CDM 172	Video Games and Culture	0
LIN 106	English Grammar	4
STS 172	Video Games and Culture	4
STS 173	Science Fiction	4
UWP 106	English Grammar	4

Please note that while some courses are identified as fulfilling more than one distribution requirement, a given course can only fulfill one such requirement.

Area of Emphasis; choose at least one:

Literature, Criticism, and Theory

One upper division English elective.

Choose two advanced courses, one of which can be a seminar:

Please note that English 110A or 110B is a prerequisite for advanced study in the major.

ENL 149	Topics in Literature	4
ENL 153	Topics in Drama	4
ENL 159	Topics in the Novel	4
ENL 163	Literary Study in the British Isles	4
ENL 165	Topics in Poetry	4
ENL 177	Study of an Individual Author	4
ENL 187A	Topics in Literature and Media	4
ENL 188A	Topics in Literary and Critical Theory	4
ENL 189	Seminar in Literary Studies	4
ENL 194H	Seminar for Honors Students	4
ENL 195H	Honors Thesis	4

Creative Writing

Three sections of:

Please note that students must select courses in more than genre.

ENL 100F	Creative Writing: Fiction	4
ENL 100P	Creative Writing: Poetry	4
ENL 100NF	Creative Writing: Non-Fiction	4
ENL 100FA	Creative Writing Advanced Fiction	4
ENL 100PA	Creative Writing Advanced Poetry	4

Total: 64

English | ENL M.A.

(College of Letters and Science)

John Marx, Ph.D., Chairperson of the Department

Department Office. 176 Voorhies Hall; 530-752-2257; http://english.ucdavis.edu

Faculty. http://english.ucdavis.edu/people/faculty

Graduate Study. The Department of English offers programs of study and research leading to the M.A. in literature and creative writing and the Ph.D. in literature. Detailed information may be obtained from the graduate advisor or the Chairperson of the Department.

The department's affiliation with the Critical Theory Program also provides the opportunity for students in English to prepare for the designated emphasis in Critical Theory (an interdisciplinary program in theories and methodologies in the humanities and social sciences).

Master's degree offered only en route to Ph.D.

Graduate Director. Desiree Martin, Ph.D.

English | ENL Ph.D.

(College of Letters and Science)

John Marx, Ph.D., Chairperson of the Department

Department Office. 176 Voorhies Hall; 530-752-2257; http://english.ucdavis.edu

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Graduate Study. The Department of English offers programs of study and research leading to the M.A. in literature and creative writing and the Ph.D. in literature. Detailed information may be obtained from the graduate advisor or the Chairperson of the Department.

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Graduate Director. Desiree Martin, Ph.D.

English | ENL Minor

(College of Letters and Science)

John Marx, Ph.D., Chairperson of the Department

Department Office. 176 Voorhies Hall; 530-752-2257; http://english.ucdavis.edu

Faculty. http://english.ucdavis.edu/people/faculty

The Major Program

The study of English develops skills in reading analytically and perceptively and in writing clearly and effectively.

The Program. The English department offers three kinds of courses: composition courses, undergraduate courses, and graduate courses. Composition courses develop skills in reading analytically and in writing persuasively. Undergraduate and graduate courses cover the entire range of English and American literature, as well as creative writing. Students majoring in English may elect a creative writing emphasis or a literature, criticism, and theory emphasis. All majors take courses introducing them to the literatures of various periods and places, to critical theory, and to frontiers of literary expression, such as the relationship of literature to environmentalism or the emergence of new media. The creative writing emphasis focuses on fiction, poetry, and article writing. The literature, criticism, and theory emphasis focuses on advanced critical analysis and research. All majors have the opportunity to work with distinguished writers, critics, scholars, and teachers.

Career Alternatives. Graduates have found the major excellent pre-professional training for careers in teaching, writing, law, medicine, library work, journalism, and more. Many graduates are employed in publishing, marketing, advertising, or the tech sector. Others have worked in local, state, and federal government agencies, as well as in industry. Many have gone on to graduate study in a wide range of fields including English, education, counseling, and more.

English **Units:** 20

Five upper division courses; at least four of which will be literature courses.

Total: 20

English | ENL Courses

Courses in ENL:

ENL 003—Introduction to Literature (4)
Lecture/Discussion—4 hours. Prerequisite(s): Completion of Entry Level Writing requirement. Introductory study of several genres of English literature, emphasizing
both analysis of particular works and the range of forms and styles in English prose and poetry. Frequent writing assignments will be made. GE credit: AH, WE. Effective: 2012 Winter Quarter.

ENL 004—Critical Inquiry and Literature: Freshman Seminar (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Completion of Entry Level Writing requirement. Enrollment limited to freshmen. Critical inquiry into significant literary texts. Emphasis on close reading, classroom dialogue, and the writing of several papers or a longer seminar paper. GE credit: AH, WE. Effective: 2017 Winter Quarter.

ENL 005F—Introduction to Creative Writing: Fiction (4)
Lecture/Discussion—4 hours. Prerequisite(s): Completion of Entry Level Writing requirement. Elementary principles of writing fiction. Write both in prescribed forms and in experimental forms of their own choosing. No final examination. May be repeated up to 1 time(s). GE credit: AH, WE. Effective: 2014 Winter Quarter.

ENL 005NF—Introduction to Creative Writing: Non-Fiction (4)
Lecture/Discussion—4 hours. Prerequisite(s): Completion of Entry Level Writing requirement. Elementary principles of writing creative non-fiction. Work in prescribed literary forms (such as essay, meditation, biography, memoir, book review, documentary, or experimental non-fiction forms) and forms of students' choosing. No final examination. May be repeated up to 1 time(s) when instructor differs. GE credit: AH, WE. Effective: 2015 Fall Quarter.

ENL 005P—Introduction to Creative Writing: Poetry (4)
Lecture/Discussion—4 hours. Prerequisite(s): Completion of Entry Level Writing requirement. Elementary principles of writing poetry. Write both in prescribed forms and in experimental forms of their own choosing. No final examination. May be repeated up to 1 time(s). GE credit: AH. Effective: 2014 Winter Quarter.

ENL 010A—Literatures in English I: To 1700 (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or equivalent. Historical introduction to English language and literature from 800-1700. Linguistic borrowing, innovation, and change. Emergence of key literary genres. Colonial America as a new site of English literary production and consumption. GE credit: AH, WE. Effective: 2018 Winter Quarter.

ENL 010B—Literatures in English II: 1700-1900 (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or equivalent. Historical introduction to English language and literature from 1700-1900. Linguistic borrowing, innovation, colonization, and change. Emergence and development of key literary genres. America, Britain, Ireland, Scotland, and India as important sites of English literary production and consumption. GE credit: AH, WE. Effective: 2018 Winter Quarter.

ENL 010C—Literatures in English III: 1900 to Present (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or equivalent. Historical introduction to English language and literature from 1900-present. Linguistic borrowing, innovation, and change. Emergence and development of key literary genres. Formal experimentation. Modernism as transnational phenomenon. GE credit: AH, WE. Effective: 2018 Winter Quarter.

ENL 040—Introductory Topics in Literature (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or equivalent. Study of a special topic. Literature written in English in any period or place or genre. Thematic, formal, or temporal focus. May be repeated up to 2 time(s) content differs. GE credit: AH, WE. Effective: 2018 Winter Quarter.

ENL 041—Introductory Topics in Literature and Media (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): ENL 003 or (UWP 001 or UWP 001V or UWP 001Y); Or equivalent. Study of a topic centered on the relationships between literature and moving-image media. May be repeated up to 2 time(s) when content differs. GE credit: AH, VL, WE. Effective: 2018 Spring Quarter.

ENL 042—Approaches to Reading (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or (UWP 001 or UWP 001V or UWP 001Y); Or equivalent. Close reading and interpretation of literature from a variety of traditional and contemporary approaches. Topics include traditional textual and historical approaches; new criticism; formalism; psychological criticism; feminism and gender; reader-response; materialist approaches. Frequent written assignments. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 043—Introductory Topics in Drama (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or equivalent. Close reading of, and topics relating to selected works of British and American drama from a range of historical periods. May be repeated up to 2 time(s) when content differs. GE credit: AH, WE. Effective: 2018 Winter Quarter.

ENL 044—Introductory Topics in Fiction (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): ENL 003 or (UWP 001 or UWP 001V or UWP 001Y); Or equivalent. Close reading of, and topics relating to, British and American Fiction: short stories, novellas, novels. May be repeated up to 2 time(s) when content differs. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 045—Introductory Topics in Poetry (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): ENL 003 or (UWP 001 or UWP 001V or UWP 001Y); Or equivalent. Topical study and close reading of selections from English and American poetry. May be repeated up to 2 time(s) when content differs. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 051—Hot Bars, Supreme Lyrics, and Rhymes for Days: Hip Hop as Poetry (3)
Lecture/Discussion—3 hours. Literary approaches to hip hop as poetry. Formal examination of rap lyrics in relation to technology, visual expression, dance, and knowledge production. Historical and cultural consideration of race, ethnicity, gender, urban culture, and politics. GE credit: ACGH, AH, DD. Effective: 2018 Winter Quarter.

ENL 052—Pop Culture Shakespeare (3)
Lecture/Discussion—3 hours. Critical approaches to the study of Shakespeare's afterlife in contemporary American media. Focus on visual, audio, and kinesthetic modes of analysis and presentation. Relation of Shakespeare to contemporary society, politics, media, and economics. GE credit: AH, DD, VL. Effective: 2018 Winter Quarter.

ENL 072—Introduction to Games (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Introduction to the history, theory, and practice of play. Survey of both analog and digital games. Overview of gaming cultures, aesthetics, industries, and technologies. (CDM 072.) GE credit: AH, VL. Effective: 2017 Fall Quarter.

ENL 092—Internship in English (1-12)
Internship—3-36 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; and Consent of Instructor. Internships in fields where students can practice their skills. May be repeated for credit for a total of 12 units. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2018 Winter Quarter.

ENL 098—Directed Group Study (1-5)
Variable. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; and Consent of Instructor. (P/NP grading only.) Effective: 2018 Winter Quarter.

ENL 098F—Student Facilitated Course (1-4)
Variable—1-4 hours. Prerequisite(s): ENL 003 or (UWP 001 or UWP 001V or UWP 001Y); Consent of Instructor. Student facilitated course intended primarily for lower division students. (P/NP grading only.) Effective: 2018 Spring Quarter.

ENL 099—Special Study for Undergraduates (1-5)
(P/NP grading only.) Effective: 1997 Winter Quarter.

ENL 100F—Creative Writing: Fiction (4)
Discussion—4 hours. Prerequisite(s): ENL 005F or ENL 005P; ENL 005NF; and Consent of Instructor. Priority given to English (Creative Writing) majors. Writing of fiction. May be repeated for credit with consent of instructor. No final examination. Effective: 2017 Winter Quarter.

ENL 100FA—Creative Writing Advanced Fiction (4)
Discussion—4 hours. Prerequisite(s): ENL 100F Priority given to English majors; admission by application only. Development and evaluation of students' work in prose, primarily in the workshop format. Some reading and discussion of published novels and short stories. Conferences with individual students once per quarter. May be repeated up to 1 time(s) with consent of instructor. Effective: 2011 Fall Quarter.

ENL 100NF—Creative Writing: Non-Fiction (4)
Discussion—4 hours. Prerequisite(s): ENL 005F or ENL 005P or ENL 005NF; and Consent of Instructor. Priority given to English (Creative Writing) majors. Writing of non-fiction. May be repeated for credit with consent of instructor. No final examination. Effective: 2017 Winter Quarter.

ENL 100P—Creative Writing: Poetry (4)
Discussion—4 hours. Prerequisite(s): ENL 005F or ENL 005P or ENL 005NF; and Consent of Instructor. Priority given to English (Creative Writing) majors. Writing of poetry. May be repeated for credit with consent of instructor. Effective: 2007 Winter Quarter.

ENL 100PA—Creative Writing Advanced Poetry (4)
Discussion—4 hours. Prerequisite(s): ENL 100P Priority to English majors; admission by application only. Development and evaluation of students' work in poetry, primarily in the workshop format. Some reading and discussion of published works of poetry. Conferences with individual students once per quarter. May be repeated up to 1 time(s) with consent of instructor. Effective: 2011 Fall Quarter.

ENL 105—History of the English Language (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or (UWP 001 or UWP 001V or UWP 001Y); Or the equivalent. History of the English language. Examination of the language as recorded from Old English to present-day English. Relationship of English to other languages; development of vocabulary, phonology, and grammatical patterns. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 106—English Grammar (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or LIN 001 or UWP 001 or UWP 001V or UWP 001Y; or Consent of Instructor. Survey of present-day English grammar as informed by contemporary linguistic theories. The major syntactic structures of English; their variation across dialects, styles, and registers; their development; and their usefulness in describing the conventions of English. (LIN 106 and UWP 106.) GE credit: AH. Effective: 2018 Winter Quarter.

ENL 106P—English Grammar Practicum (2)
Discussion—2 hours. Prerequisite(s): ENL 106; LIN 106 (can be concurrent) Practice in teaching the principles of grammar to the kinds of audiences teachers encounter in California. Discussions with teachers who teach in these areas. Examination of pedagogical research on teaching grammar. (P/NP grading only.) Effective: 2000 Fall Quarter.

ENL 107—Freedom of Expression (4)
Lecture—3 hours; Term Paper. Prerequisite(s): ENL 003 or (UWP 001 or UWP 001V or UWP 001Y); Or the equivalent. Historical development of fundamental issues and contemporary controversies about freedom of expression, with emphasis on literary and artistic censorship. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 110A—Introduction to Literary Theory (4)
Extensive Writing/Discussion—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Key theoretical terms, concepts, and thinkers from the Greeks to the modern era. GE credit: AH, WE. Effective: 2018 Winter Quarter.

ENL 110B—Introduction to Modern Literary and Critical Theory (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y History of literary criticism in the modern era, with emphasis on the ties with the past and the special problems presented by modern literary theory. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 111—Topics in Medieval Literature (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically or thematically focused intensive examination of selected topics in Medieval British literature. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 113A—Chaucer: Troilus and the "Minor" Poems (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Development of the poet's artistry and ideas from his first work to his masterpiece, "Troilus and Criseyde." GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 113B—Chaucer: The Canterbury Tales (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Literary analysis of the complete "Canterbury Tales." Courtly love, literary forms, medieval science and astrology, theology and dogma as they inform the reading of Chaucer's work. GE credit: AH, WC, WE. Effective: 2018 Winter Quarter.

ENL 115—Topics in Sixteenth and Seventeenth Century Literature (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Historically or thematically focused study of works of the Renaissance. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 117—Shakespeare (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or equivalent. Historically, generically, or thematically focused study of Shakespeare's works. May be repeated up to 2 time(s) content differs. GE credit: AH, WC, WE. Effective: 2018 Winter Quarter.

ENL 120—Law and Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically, thematically, or generically focused study of the relationship between law and literature. GE credit: ACGH, AH, DD, OL, WE. Effective: 2018 Spring Quarter.

ENL 122—Milton (4)
Extensive Writing/Discussion—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Selected major works, including Paradise Lost. GE credit: AH, WC, WE. Effective: 2018 Winter Quarter.

ENL 123—18th-Century British Literature (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Historically or thematically focused study of 18th century English literature. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 125—Topics in Irish Literature (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or equivalent. Intensive study or treatment of special topics relating to the emergence, invention, and re-invention of Irish literature. May be repeated up to 2 time(s) when content differs. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 130—British Romantic Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically or thematically focused study of works of Romantic English literature. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 133—19th-Century British Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001V; Or the equivalent. Historically or thematically focused study of works of 19th-century English literature. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 137—British Literature, 1900-1945 (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically or thematically focused study of works of British literature (drama, poetry, prose fiction) from the period between 1900 and the end of World War II. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 138—British Literature, 1945 to Present (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically or thematically focused study of works of British literature (drama, poetry, prose fiction) from the period between 1945 and the present. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 139—Topics in Global Literatures and Cultures (4)
Extensive Writing/Discussion; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Historically or regionally focused study of world literatures in English (other than the national literatures of British Isles and the United States), particularly from post-colonial regions in Africa, the Caribbean , and Asia, and immigrant cultures in the English-speaking world. May be repeated up to 2 time(s) content differs. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 140—Topics in Postcolonial Literatures and Cultures (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Study of postcolonial literature of Anglophone colonies. Specific emphases may include literature from and about Anglophone India, the Caribbean, the Middle East, South Asia, Africa, and/or South America. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 141—Topics in Diasporic Literatures and Migration (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Study of literatures, histories, and cultures of one or more diasporic groups. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 142—Early American Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically or thematically focused study of American literature of the 17th and 18th centuries. GE credit: ACGH, AH, WE. Effective: 2018 Spring Quarter.

ENL 143—19th-Century American Literature to the Civil War (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically or thematically focused study of works of 19th-century American literature. GE credit: ACGH, AH, DD, WE. Effective: 2018 Spring Quarter.

ENL 144—Post-Civil War American Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically or thematically focused study of works of post-Civil War American literature. GE credit: ACGH, AH, WE. Effective: 2018 Spring Quarter.

ENL 146—American Literature 1900-1945 (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically or thematically focused study of American literature (drama, poetry, prose fiction) from the period between 1900 and the end of World War II. GE credit: ACGH, AH, DD, WE. Effective: 2018 Spring Quarter.

ENL 147—American Literature, 1945 to the Present (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or equivalent. Historically or thematically focused study of American literature (drama, poetry, prose fiction) from the period between 1945 and the present. GE credit: ACGH, AH, DD, WE. Effective: 2018 Spring Quarter.

ENL 149—Topics in Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Intensive examination of literature considered in topical terms, not necessarily historically. May be repeated for credit content differs. GE credit: AH, WE. Effective: 2018 Winter Quarter.

ENL 150A—British Drama to 1800 (4)
Extensive Writing/Discussion—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically or thematically focused study of works of English drama prior to 1800. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 150B—Drama from 1800 to the Present (4)
Extensive Writing/Discussion; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically or thematically focused study of works of British drama from 1800 to the present. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 153—Topics in Drama (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Historical or thematic study of drama. May be repeated for credit when topic differs. May be repeated for credit. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 154—The Graphic Novel (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or equivalent courses. Thematically, historically, and formally focused study of the graphic novel genre. Contents may include any regional, national, or transnational group of graphic novels. GE credit: AH, VL, WE. Effective: 2018 Spring Quarter.

ENL 155A—18th-Century British Novel (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically or thematically organized examination of the 18th-century British novel, with particular emphasis on its evolution, including the epistolary novel, the picaresque novel, and the Gothic novel: Richardson, Fielding, Sterne, Austen. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 155B—19th-Century British Novel (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically or thematically organized examination of 19th-century British novelists, with emphasis on the historical novel, the social novel, and novels by women: Scott, Dickens, the Brontes, Eliot, Hardy. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 155C—20th-Century British Novel (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically or thematically organized examination of the 20th-century British novel, with emphasis on impressionism; the revolt against naturalism; the experimental novel; the anti-modernist reaction: Conrad, Joyce, Woolf, Lawrence, Drabble, Rhys. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 156—The Short Story (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y The short story as a genre; its historical development, techniques, and formal character as a literary form. European as well as American writers. GE credit: AH, WE. Effective: 2018 Winter Quarter.

ENL 157—Detective Fiction (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Historically, formally, and thematically focused study of novels and short stories in the detective fiction genre. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 158A—The American Novel to 1900 (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically or thematically organized examination of the rise and development of the American novel from its beginnings; Hawthorne,
Melville, Twain, James, and others. GE credit: ACGH, AH, WE. Effective: 2018 Spring Quarter.

ENL 158B—The American Novel from 1900 to the Present (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically or thematically organized examination of important American novelists from 1900 to the present: authors may include Willa Cather, Nathanael West, William Faulkner, Ralph Ellison, Zora Neale Hurston, Thomas Pynchon, Ishmael Reed, Maria Helena Viramontes, Rachel Kushner, and others. GE credit: AH, DD, WE. Effective: 2018 Spring Quarter.

ENL 159—Topics in the Novel (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Examination of major novels arranged thematically. Topics might include Bildungsroman, stream-of-consciousness novel, Gothic novel, historical novel. May be repeated for credit topic differs. GE credit: AH, WE. Effective: 2018 Winter Quarter.

ENL 160—Film as Narrative (4)
Film Viewing—3 hours; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Study of modern film (1930 to present) as a storytelling medium. GE credit: AH, VL, WE. Effective: 2018 Spring Quarter.

ENL 161A—Film History I: Origins to 1945 (4)
Film Viewing—3 hours; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Cultural and aesthetic history of filmmaking from its origins in the 1890's through 1945. (Courses 161A and 161B need not be taken in sequence.) GE credit: AH, VL, WE. Effective: 2018 Spring Quarter.

ENL 161B—Film History II: 1945 to present (4)
Film Viewing—3 hours; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Cultural and aesthetic history of filmmaking from 1945 through the present. (Courses 161A and 161B need not be taken in sequence.) GE credit: AH, VL, WE. Effective: 2018 Spring Quarter.

ENL 162—Film Theory and Criticism (4)
Film Viewing—3 hours; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Film theory and criticism, with a study of ten major works of international film art. GE credit: AH, VL, WE. Effective: 2018 Spring Quarter.

ENL 163—Literary Study in the British Isles (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Enrollment by application only through the Education Abroad Center. Literary Study in the British Isles: On-site study of the literature, film, and/or performance of the British Isles. May be repeated up to 2 time(s) if subject matter differs. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 164—Writing Science (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): ENL 003; STS 001; Or equivalent. Texts and writing practices in the production of scientific knowledge. Surveys the literary structure of scientific arguments; history of scientific genres; rhetoric and semiotics in scientific culture; graphical systems in the experimental laboratory; narratives of science, including science fiction. (STS 164.) GE credit: AH, SL, WE. Effective: 2006 Fall Quarter.

ENL 165—Topics in Poetry (4)
Lecture/Discussion—3 hours; Term Paper—1 hour. Prerequisite(s): (ENL 003 or UWP 001 or UWP 001V or UWP 001Y); ENL 045 Intensive examination of various topics expressed in poetry from all periods of English and American literature. May be repeated for credit
when topic covers different poets and poems. May be repeated for credit. GE credit: AH, WE. Effective: 2018 Winter Quarter.

ENL 166—Love and Desire in Contemporary American Poetry (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Close reading of contemporary American poems on the theme of love and desire by poets of diverse ethnicities and of gay, lesbian, and heterosexual orientations. GE credit: ACGH, AH, WE. Effective: 2018 Winter Quarter.

ENL 167—Twentieth-Century African American Poetry (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V; UWP 001Y; Or the equivalent. Twentieth-century African American poetry, including oral and literary traditions. Authors covered may include Gwendolyn Brooks, Countee Cullen, Robert Hayden, and Langston Hughes. GE credit: ACGH, AH, WE. Effective: 2018 Spring Quarter.

ENL 168—20th Century American Poetry (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historical Study of American poetry since 1900, with thematic and formal focus at the instructor's discretion. GE credit: ACGH, AH, WE. Effective: 2018 Spring Quarter.

ENL 171A—The Bible as Literature: The Old Testament (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y May be taken independently of course 171B. Selected readings from the Old Testament illustrating various literary forms. Emphasis on the Pentateuch, the Historical Books, and the Wisdom Books. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 171B—The Bible as Literature: Prophets and New Testament (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y May be taken independently of course 171A. Selected readings from the Old Testament prophets and the New Testament. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 172—Video Games and Culture (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): TCS 001 or STS 001 or ENL 003; Or equivalent of any. Critical approaches to the study of video games, focusing on formal, historical, and cultural modes of analysis. History of software and hardware in North American and global contexts. Relations of games to society, politics, economics, literature, media, and the arts. (CTS 172 and STS 172.) GE credit: ACGH, AH, SS, VL. Effective: 2014 Fall Quarter.

ENL 173—Science Fiction (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): ENL 003 or STS 001; Or equivalent. Literary modes and methods of science fiction. Representative texts, authors, and themes of the genre—e.g., time travel, alternative universes, and utopias. Relations of science fiction to science, philosophy, and culture. (STS 173.) GE credit: AH, WE. Effective: 2008 Winter Quarter.

ENL 175—American Literary Humor (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or standing above freshman level. American humorous vision of man, nature, and the supernatural. Includes one or more of the following: colonial humor; southwestern and New England humor; pre- and post-Civil War masters; local colorists; journalistic gadflies; anti-provincialists; modernist poets and prose writers; black humor. GE credit: ACGH, AH, WE. Effective: 2018 Spring Quarter.

ENL 177—Study of an Individual Author (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 110A or ENL 110B In-depth study of an author's works; historical context; relation to predecessors and contemporaries; critical reception; influence. May be repeated up to 1 time(s) if author differs. GE credit: AH, WE. Effective: 2010 Fall Quarter.

ENL 178—Topics in Nations, Regions, and Other Cultural Geographies (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or equivalent. Literary productions of a local, regional, national, transnational, or other geographical formation; e.g., the global South; literature of Hawaii; literature of Australia. May be repeated up to 2 time(s) when topic differs. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 179—Multi-Ethnic Literature of the United States (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or standing above freshman level. Writings by American authors of diverse races and ethinicities (African American, Asian, Jewish, Latin American, Native American, and mixed ancestry) clarifying the roles of story-telling and cultural heritage in constructing identity, experiencing displacement, recovering history, and cultivating an inclusive society. May be repeated up to 2 time(s). GE credit: ACGH, AH, DD, WE. Effective: 2018 Winter Quarter.

ENL 180—Children's Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Historical backgrounds and development of types of children's literature, folklore and oral tradition, levels of interest, criticism and evaluation, illustration and bibliography. GE credit: AH, WE. Effective: 2018 Winter Quarter.

ENL 181A—African American Literature to 1900 (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y African American literature from the colonial period to 1900. Particular attention to the rapid development of the African American literary culture from a primarily oral tradition to various literary genres, including the slave narrative. GE credit: ACGH, AH, DD, WE. Effective: 2018 Winter Quarter.

ENL 181B—African American Literature 1900-Present (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Major African American writers in the context of cultural history from 1900 to the present. Writers may include Richard Wright, Ann Petry, James Baldwin, Ralph Ellison, Paule Marshall, Toni Morrison, Alice Walker, Clarence Major. GE credit: ACGH, AH, DD, WE. Effective: 2018 Spring Quarter.

ENL 182—Literature of California (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Focus is on the diverse contributions to the rise of California literature. Reading of poetry, fiction, and essays. Emphasis on 19th and 20th century naturalists, turn of the century novelists, the Beats, and writers of the last two decades. GE credit: ACGH, AH, DD, WE. Effective: 2018 Spring Quarter.

ENL 183—Young Adult Literature (4)
Lecture—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or equivalent. Theoretical, critical, and literary issues informing the study and teaching of American young adult literature. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 184—Literature and the Environment (4)
Discussion/Laboratory—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Historical and/or thematic survey of topics in writing about the environment. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 185A—Women's Writing I (4)
Extensive Writing/Discussion—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Women's Writing in English before 1800; organized by period, place, genre, or theme. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 185B—Women's Writing II (4)
Extensive Writing/Discussion—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Women's Writing in English from 1800 to 1900; organized by period, place, genre, or theme. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 185C—Women's Writing III (4)
Extensive Writing/Discussion—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Women's Writing in English after 1900; organized by period, place, genre, or theme. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 186—Literature, Sexuality, and Gender (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically or thematically focused intensive examinations of gender and sexuality in British and American literature. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 187A—Topics in Literature and Media (4)
Film Viewing—3 hours; Seminar—3 hours. Prerequisite(s): ENL 110A or ENL 110B; and Consent of Instructor. Group study of a topic centered on the relationships between literature and film or other moving-image media. Effective: 2009 Fall Quarter.

ENL 188A—Topics in Literary and Critical Theory (4)
Seminar—3 hours; Term Paper. Prerequisite(s): ENL 110A or ENL 110B; and Consent of Instructor. Intensive examination of theories addressing a particular problem, topic, or question. Effective: 2009 Fall Quarter.

ENL 189—Seminar in Literary Studies (4)
Seminar—3 hours; Term Paper. Prerequisite(s): ENL 110A or ENL 110B Intensive, focused study of literature at an advanced level. May be organized by topic, author, period, movement, or genre. High participation. GE credit: AH, WE. Effective: 2013 Fall Quarter.

ENL 192—Internship in English (1-12)
Internship—3-36 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Internships in fields where students can practice their skills. A maximum of four units is allowed toward the major in English. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2018 Winter Quarter.

ENL 194H—Seminar for Honors Students (4)
Seminar—3 hours; Term Paper. Prerequisite(s): ENL 110A or ENL 110B; One advanced study course; admission to English Department Senior Honors Program in Literature, Criticism, and Theory. Preparation for writing an honors thesis in course 195H. Limited enrollment; high level of participation expected. GE credit: AH, WE. Effective: 2010 Fall Quarter.

ENL 195H—Honors Thesis (4)
Independent Study—12 hours. Prerequisite(s): ENL 194H Preparation of a thesis, under the supervision of an instructor. Students satisfying requirements for the general major or the teaching emphasis write on a scholarly or critical subject; creative writing students submit a volume of poems or fiction. GE credit: AH, WE. Effective: 1997 Winter Quarter.

ENL 197T—Community Tutoring in English (1-5)
Tutorial—1-5 hours. Prerequisite(s): Upper division standing and consent of Chairperson. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. Does not fulfill requirement for major. May be repeated up to 8 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

ENL 197TC—Community Tutoring in English (1-4)
Tutorial—1-4 hours. Prerequisite(s): Upper division standing and a major in English; consent of Chairperson. Field experience, with individuals or in classroom in instruction of English language, literature, and composition. Does not fulfill requirement for major. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

ENL 198—Directed Group Study (1-5)
Variable. Prerequisite(s): ENL 003 or ENL 005F or ENL 005P or UWP 001 or UWP 001V or UWP 001Y (P/NP grading only.) Effective: 2018 Winter Quarter.

ENL 198F—Student Facilitated Course (1-4)
Variable—1-4 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Consent of Instructor. Student facilitated course intended primarily for upper division students. (P/NP grading only.) Effective: 2018 Spring Quarter.

ENL 198S—Directed Group Study (4)
Lecture/Discussion—4 hours. Prerequisite(s): ENL 163S (can be concurrent); and Consent of Instructor. ENL 163S required concurrently. Group study will be closely tied to the texts and periods studied in course 163S. Investigations of historical sites, museums, galleries, and performances. To be taught in London. (P/NP grading only.) Effective: 2002 Winter Quarter.

ENL 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

ENL 199FA—Student Facilitated Course Development (1-4)
Variable—1-4 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Consent of Instructor. Under the supervision of a faculty member, an undergraduate student plans and develops the course they will offer under 98F/198F. (P/NP grading only.) Effective: 2018 Winter Quarter.

ENL 200—Introduction to Graduate Studies in English (4)
Seminar—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing. Introduction to literary scholarship with special attention to the elements of professionalism and to different modes of literary investigation. (S/U grading only.) Effective: 2000 Fall Quarter.

ENL 205—Anglo-Saxon Language and Culture (4)
Lecture—3 hours; Term Paper/Discussion. The language and culture of Anglo-Saxon England; readings in Old English prose and poetry. (S/U grading only.) Effective: 1997 Winter Quarter.

ENL 206—Beowulf (4)
Conference; Discussion—3 hours; Term Paper/Discussion. Prerequisite(s): ENL 205; Or the equivalent. A study of the poem and the Heroic Age of Germanic literature. Effective: 1997 Winter Quarter.

ENL 207—Middle English (4)
Discussion—3 hours; Term Paper. Study of the phonology, morphology, syntax, and lexicon between 1100 and 1500 with investigation of the regional dialects; pertinent facts on both the internal and external linguistic history; intensive reading of texts. Effective: 1997 Winter Quarter.

ENL 210—Readings in English and American Literature (4)
Conference—1 hour; Seminar—3 hours. Prerequisite(s): Upper division course in area studied. Content varies according to specialty of instructor. May be repeated for credit topic differs. Effective: 2005 Winter Quarter.

ENL 225—Topics in Irish Literature (4)
Conference—1 hour; Seminar—3 hours. Prerequisite(s): Graduate standing. Varied topics, including the nineteenth-century novel, contemporary Irish poetry, rise of the drama, or a study of a major author. May be repeated for credit topic differs. Effective: 2004 Fall Quarter.

ENL 230—Study of a Major Writer (4)
Conference—1 hour; Seminar—3 hours. Artistic development of one major writer and his intellectual and
literary milieu. May be repeated for credit different writer is studied. Effective: 1997 Winter Quarter.

ENL 232—Problems in English Literature (4)
Conference—1 hour; Seminar—3 hours. Selected issues in the current study and critical assessment of a limited period or topic in English literature. May be repeated for credit different period or topic is studied. Effective: 1997 Winter Quarter.

ENL 233—Problems in American Literature (4)
Conference—1 hour; Seminar—3 hours. Selected topics for intensive investigation. May be repeated for credit different topic or period is studied. Effective: 1997 Winter Quarter.

ENL 234—Dramatic Literature (4)
Conference—1 hour; Lecture—3 hours. Historical introduction to dramatic theory; the genres of tragedy, comedy, and tragicomedy. May be repeated for credit topic differs. Effective: 2004 Fall Quarter.

ENL 235—Theory of Fiction (4)
Conference—1 hour; Seminar—3 hours. Prerequisite(s): Graduate standing. Theories of fiction as they relate to the professional writer's practice of the craft. For students in the Creative Writing Program. May be repeated for credit focus differs. Effective: 1998 Spring Quarter.

ENL 236—Poetics (4)
Conference—1 hour; Seminar—3 hours. Prerequisite(s): Graduate standing. Theories of poetry as revealed in structure, prosody, and idiom of British and American poems, variably approached-through intensive
study of a single poet, historically, or theoretically-at the instructor's discretion. For students in the Creative Writing Program. May be repeated for credit focus differs. Effective: 1998 Spring Quarter.

ENL 237—Seminar for Writers (4)
Extensive Writing; Seminar—3 hours. Prerequisite(s): Graduate standing. Varied topics in the study of literature and literary culture craft and poetics from the perspective of the writer/practitioner. May be repeated up to 2 time(s) If focus differs. Effective: 2015 Fall Quarter.

ENL 238—Special Topics in Literary Theory (4)
Seminar—3 hours; Term Paper. Prerequisite(s): ENL 237; Or the equivalent. Advanced topics in literary theory and criticism. Preparation and evaluation of research paper. May be repeated for credit when topic and/or reading list differs. Effective: 1997 Winter Quarter.

ENL 240—Medieval Literature (4)
Conference—1 hour; Seminar—3 hours. Studies of Medieval literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit different topic is studied. Effective: 1998 Fall Quarter.

ENL 242—Sixteenth-Century Literature (4)
Conference—1 hour; Seminar—3 hours. Studies in sixteenth-century literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit different topic is studied. Effective: 1997 Winter Quarter.

ENL 244—Shakespeare (4)
Conference—1 hour; Seminar—3 hours. Studies in Shakespeare. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit different topic is studied. Effective: 1998 Fall Quarter.

ENL 246—Seventeenth-Century Literature (4)
Conference—1 hour; Seminar—3 hours. Studies in seventeenth-century literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit different topic is studied. Effective: 1997 Winter Quarter.

ENL 248—Eighteenth-Century Literature (4)
Conference—1 hour; Seminar—3 hours. Studies in eighteenth-century literature. Course materials to be
selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit different topic is studied. Effective: 1997 Winter Quarter.

ENL 250—Romantic Literature (4)
Conference—1 hour; Seminar—3 hours. Studies in Romantic literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit different topic is studied. Effective: 1997 Winter Quarter.

ENL 252—Victorian Literature (4)
Conference—1 hour; Seminar—3 hours. Studies in Victorian literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit different topic is studied. Effective: 1997 Winter Quarter.

ENL 254—Twentieth-Century British Literature (4)
Conference—1 hour; Seminar—3 hours. Studies in twentieth-century British literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit different topic is studied. Effective: 1997 Winter Quarter.

ENL 256—Early American Literature (4)
Conference—1 hour; Seminar—3 hours. Studies in Early American literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit different topic is studied. Effective: 1997 Winter Quarter.

ENL 258—American Literature: 1800 to the Civil War (4)
Conference—1 hour; Seminar—3 hours. Studies in American literature from 1800 to Civil War. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit different topic is studied. Effective: 1997 Winter Quarter.

ENL 260—American Literature: Civil War to 1914 (4)
Conference—1 hour; Seminar—3 hours. Studies in American literature from the Civil War to 1914. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit different topic is studied. Effective: 1997 Winter Quarter.

ENL 262—American Literature after 1914 (4)
Conference—1 hour; Seminar—3 hours. Studies in American literature after 1914. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit different topic is studied. Effective: 1998 Fall Quarter.

ENL 264—Studies in Modern British and American Literature (4)
Conference—1 hour; Seminar—3 hours. Studies in modern British and American literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit different topic is studied. Effective: 1998 Fall Quarter.

ENL 270—Studies in Contemporary World Literature (4)
Conference—1 hour; Seminar—3 hours. Prerequisite(s): Graduate standing, consent of instructor, with preference given to those enrolled in the masters program in Creative Writing. Emerging global, international or transnational techniques, theories, and individual works of contemporary world prose or poetry. Discussion,
seminar reports, research papers. May be repeated for credit topic differs. Effective: 1998 Spring Quarter.

ENL 275—Proseminar in Research Practices (2)
Lecture/Discussion—2 hours. Must have passed Departmental Preliminary Exam. Study of various practical and technical skills needed to perform research in literary studies. Materials to be selected by the instructor. Evaluation based on student projects that involve hands-on application of skills taught in the proseminar. May be repeated for credit when content differs. Effective: 2016 Fall Quarter.

ENL 280—Seminar in Research Practices (4)
Lecture/Discussion—3 hours; Project (Term Project). Must have passed Departmental Preliminary Exam. Study of various practical and technical skills needed to perform research in literary studies. Course materials to be selected by the instructor. Evaluation based on student projects that involve hands-on application of skills taught in the seminar. May be repeated for credit when content differs. Effective: 2016 Fall Quarter.

ENL 285—Literature by Women (4)
Conference—1 hour; Seminar—3 hours. Studies in literature by women and the theoretical approaches to literature by women. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit topic and/or reading list differs. Effective: 1997 Winter Quarter.

ENL 287—Topics in Literature and Media (4)
Film Viewing—3 hours; Seminar—3 hours. Prerequisite(s): Graduate standing. Study of a topic centered on film or other moving-image media. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when content differs. Effective: 2009 Fall Quarter.

ENL 288—Prospectus Workshop (2)
Conference—2 hours. Must have passed Departmental Preliminary Exam. Training in writing the dissertation prospectus. Participation in group discussions of preparatory assignments and final proposal. (S/U grading only.) Effective: 2011 Fall Quarter.

ENL 289—Article Writing Workshop (2)
Conference—2 hours. Prerequisite(s): Consent of Instructor. Class size limited to 12 students; nomination for admission by Dissertation Director. Training in preparing an article for publication. Participation in group discussions of article drafts. May be repeated up to 1 time(s). (S/U grading only.) Effective: 2011 Fall Quarter.

ENL 290—Creative Writing: Special Topic (4)
Conference—1 hour; Seminar—3 hours. Prerequisite(s): Consent of Instructor. Writing that falls outside the generic confines of traditional genres (fiction, poetry, and nonfiction) or traditional workshop formats. Evaluation of written materials and individual student conferences. May be repeated for credit. Effective: 2015 Fall Quarter.

ENL 290F—Creative Writing: Fiction (4)
Conference—1 hour; Seminar—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing, with preference given to those enrolled in master's program in Creative Writing. Writing of prose fiction. Evaluation of written materials and individual student
conferences. May be repeated for credit. Effective: 2016 Winter Quarter.

ENL 290NF—Creative Writing: Non-Fiction (4)
Conference—1 hour; Seminar—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing; with preference given to those enrolled in the master's program in Creative Writing. Writing of literary non-fiction, with emphasis on autobiography, biography, memoir, the occasional or nature essay, or other non-fiction prose narratives. May be repeated for credit. Effective: 2016 Winter Quarter.

ENL 290P—Creative Writing: Poetry (4)
Conference—1 hour; Seminar—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing, with preference given to those enrolled in master's program in Creative Writing. Writing of poetry. Evaluation of written materials and individual student conferences. May be repeated for credit. Effective: 2016 Winter Quarter.

ENL 298—Directed Group Study (1-5)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

ENL 299—Individual Study (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

ENL 299D—Special Study for the Doctoral Dissertation (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

ENL 391—Teaching Creative Writing (2)
Discussion—2 hours. Prerequisite(s): Graduate standing; appointment as Teaching Assistant in the English Department. Designed for new instructors of English 5F or 5P; discussion of ways to facilitate creative writing workshops and to respond to student manuscripts. (S/U grading only.) Effective: 2007 Winter Quarter.

ENL 393—Teaching Literature and Composition (2)
Discussion—2 hours. Prerequisite(s): Graduate standing; appointment as Teaching Assistant in the English Department. Designed for new instructors of English 3 or the equivalent courses; discussion of problems related to teaching literature and composition to lower division students. (S/U grading only.) Effective: 2007 Winter Quarter.

ENL 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Entomology

Entomology | ENT Information

Formerly the departments of Entomology and Nematology

(College of Agricultural and Environmental Sciences)

Steve Nadler, Ph.D., Chairperson of the Department

Joanna Chiu, Ph.D., Vice Chairperson of the Department

Department Office. 367 Briggs Hall; 530-752-0492; http://entomology.ucdavis.edu

Faculty. http://entomology.ucdavis.edu/Faculty/

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The Major Program

The Entomology major is a general biological science program. The curriculum is designed to develop an understanding of fundamental biological concepts by studying insects. Insects offer unique opportunities to study biological systems and are model experimental animals. Many insects are either pests, or beneficial species that have great importance to the economy, environment or public health. Students may focus on specific areas of interest including agricultural entomology, insect systematics and evolution; behavior and ecology; medical entomology; and insect molecular biology, physiology and toxicology.

The Program. Students begin their study in entomology with selected insect biology courses. After completing these courses, students may enroll in courses in their particular area of interest. The Entomology Faculty encourages students to do research internships in their laboratories.

Career Alternatives. Entomology graduates find careers in many different areas of applied or basic biology. Graduates have the opportunity to continue in professional graduate programs such as veterinary or human medicine, or get advanced degrees leading to careers in biotechnology, conservation biology, or academic teaching and research. Many graduates have participated in internship programs with the California Department of Food and Agriculture and found careers in insect diagnostic laboratories, conducting insect surveys, and/or developing entomological collections. Other graduates have worked in agriculture in the area of insect pest management. Graduates are prepared for managerial and technical positions with state and federal agencies and in agricultural production and supporting industries. Some entomology graduates pursue careers in primary, secondary, and college level science education.

Major Advisors. S. Lawler, S. Nadler

Minor Requirements:

The Department of Entomology has five minor programs open to students in other disciplines who are interested in rounding out their academic study with a concentration in the area of entomology.

Minor Adviser. S. Lawler, S. Nadler

Graduate Study. The Department of Entomology offers a program of study and research leading to the M.S. and Ph.D. degrees. See Graduate Studies and the Graduate Announcement, for further details.

Graduate Advisor. See http://entomology.ucdavis.edu/Graduate/.

Related Courses. See courses in Nematology.

Preparatory Subject Matter **Units:** 49-55

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
BIS 002C	Introduction to Biology: Biodiversity and the Tree of Life	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 008A	Organic Chemistry: Brief Course	2
CHE 008B	Organic Chemistry: Brief Course	4
OR		
CHE 118A	Organic Chemistry for Health and Life Sciences	4
CHE 118B	Organic Chemistry for Health and Life Sciences	4
MAT 016A	Short Calculus	3
MAT 016B	Short Calculus	3
MAT 016C	Short Calculus	3
OR		
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
MAT 017C	Calculus for Biology and Medicine	4
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
PHY 001A	Principles of Physics	3

PHY 001B	Principles of Physics	3

Choose one:

STA 013	Elementary Statistics	4
STA 032	Gateway to Statistical Data Science	4
PLS 021	Application of Computers in Technology	3
PLS 120	Applied Statistics in Agricultural Sciences	4

Depth Subject Matter **Units:** 35-44

Choose one:

MIC 162	General Virology	4
PLB 148	Introductory Mycology	4
PLP 120	Introduction to Plant Pathology	4

BIS 101	Genes and Gene Expression	4

Choose one:

ENT 105	Insect Ecology	4
ESP 100	General Ecology	4
EVE 101	Introduction to Ecology	4

EVE 100	Introduction to Evolution	4
BIS 102	Structure and Function of Biomolecules	3
AND		
BIS 103	Bioenergetics and Metabolism	3
OR		
ABI 102	Animal Biochemistry and Metabolism	5
AND		
ABI 103	Animal Biochemistry and Metabolism	5
ENT 100	General Entomology	4
ENT 100L	General Entomology Laboratory	2

Choose at least seven units:

ENT 102	Insect Physiology	4
ENT 103	Insects Systematics	3
ENT 104	Behavioral Ecology of Insects	3
ENT 107	California Insect Diversity	5
ENT 109	Field Taxonomy and Ecology	7
ENT 116	Freshwater Macroinvertebrates	3
NEM 110	Introduction to Nematology	2

Restricted Electives **Units:** 23

Upper division Entomology and Nematology courses.

Upper division electives related to student's interest with approval of advisor.

Note: No more than a total of six units from Entomology 192, 197T and 199 may count toward fulfilling depth subject matter or restricted elective units.

Total: 107-122

Entomology | ENT M.S.

Formerly the departments of Entomology and Nematology

(College of Agricultural and Environmental Sciences)

Steve Nadler, Ph.D., Chairperson of the Department

Joanna Chiu, Ph.D., Vice Chairperson of the Department

Department Office. 367 Briggs Hall; 530-752-0492; http://entomology.ucdavis.edu

Faculty. http://entomology.ucdavis.edu/Faculty/

Graduate Study. The Department of Entomology offers a program of study and research leading to the M.S. and Ph.D. degrees. See Graduate Studies and the Graduate Announcement, for further details.

Graduate Advisers. See http://entomology.ucdavis.edu/Graduate/.

Entomology | ENT Ph.D.

Formerly the departments of Entomology and Nematology

(College of Agricultural and Environmental Sciences)

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Entomology | ENT Courses

Courses in ENT:

ENT 001—Art, Science and the World of Insects (3)
Laboratory—3 hours; Lecture—3 hours. Fusion of entomology and art to create an appreciation of insect biology, ecology, interactions with humans and importance in human culture. Multidisciplinary approaches in education and career paths in entomology and art will be highlighted. GE credit: AH, OL, SE, SS, VL, WE. Effective: 2013 Fall Quarter.

ENT 002—Biodiversity (3)
Lecture—2 hours; Lecture/Discussion—1 hour. Introduction to nature, scope and geographical distribution of biodiversity (diversity of life, with emphasis on plants and animals, especially insects).Humans and biodiversity - domestication, aesthetics, ethics and valuation.Species richness and "success".Biodiversity through time; monitoring, evaluation and conservation.Biomes-global, continental and Californian. (EVE 002.) GE credit: SE, SL, WE. Effective: 2013 Fall Quarter.

ENT 010—Natural History of Insects (3)
Lecture—3 hours. Introduction to the insects detailing their great variety, structures and functions, habits, and their significance in relation to plants and animals including man. Designed for students not specializing in entomology. Not open for credit to students who have had ENT 100, but students who have taken this course may take ENT 100 for credit. GE credit: SE, SL. Effective: 2013 Fall Quarter.

ENT 090X—Special Topics in Entomology (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. Freshman seminar course for indepth examination of a special topic within the subject area. May be repeated up to 2 time(s). (P/NP grading only.) Effective: 2013 Fall Quarter.

ENT 092—Internship (1-12)
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. Work-learn experience on and off campus in all subject areas offered by the department, supervised by a member of the faculty. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2013 Fall Quarter.

ENT 099—Special Study for Undergraduates (1-5)
Effective: 2013 Fall Quarter.

ENT 100—General Entomology (4)
Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): BIS 001B Biology, anatomy, physiology, development, classification, ecology and relation of insects to human welfare. GE credit: WE. Effective: 2013 Fall Quarter.

ENT 100L—General Entomology Laboratory (2)
Laboratory—6 hours. Prerequisite(s): ENT 100 (can be concurrent) Anatomy, development, population ecology, methods of collecting, classification and identification of insects of all orders and of major families. GE credit: VL. Effective: 2013 Fall Quarter.

ENT 101—Functional Insect Morphology (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): ENT 100 Study of the basic external and internal structures, organs and tissues of insects, with emphasis on functional systems. Functional anatomy, histology and fine structures of important organs and tissues will be discussed. Effective: 2013 Fall Quarter.

ENT 102—Insect Physiology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENT 100; Or course in physiology or invertebrate zoology. Processes by which insects maintain themselves, reproduce, and adapt to environment. Insects as models for basic/applied research through detailed analysis of metabolic, physiological, and behavioral processes. Emphasis on analysis of methodology, fact, and theory. GE credit: SE, WE. Effective: 2013 Fall Quarter.

ENT 103—Insects Systematics (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): Introductory course in zoology or entomology. Principles and methods of systematics, with particular reference to insects. Emphasis on different theories of classification, and analysis of phylogenetic relationships. Effective: 2013 Fall Quarter.

ENT 104—Behavioral Ecology of Insects (3)
Lecture—3 hours. Prerequisite(s): Introductory biology or zoology. Basic principles and mechanisms of insect behavior and ecology. An evolutionary approach to understanding behavioral ecology of insects. Effective: 2013 Fall Quarter.

ENT 105—Insect Ecology (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): BIS 002B (can be concurrent); Consent of Instructor. Introduction to insect ecology combining fundamental concepts and questions in ecology with ideas, hypotheses and insights from insects. Integrates aspects of individual, population, community and ecosystem ecology. GE credit: OL, SE, SL, WE. Effective: 2017 Fall Quarter.

ENT 107—California Insect Diversity (5)
Fieldwork—6 hours; Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): An introductory course in entomology. Survey of the diversity of insects from selected ecological zones in California with emphasis on collection, identification, and natural history. GE credit: SE. Effective: 2013 Fall Quarter.

ENT 109—Field Taxonomy and Ecology (7)
Laboratory—36 hours; Lecture—2 hours. Prerequisite(s): An introductory course in entomology or consent of instructor. GE credit: SE. Effective: 2013 Fall Quarter.

ENT 110—Arthropod Pest Management (5)
Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): BIS 001B Development of the ecological basis for the integrated pest management paradigm with emphasis on agriculture. Ecological and practical aspects of control tactics. Laboratory emphasizes identification of pests and beneficials of agriculture and urban situations. GE credit: SE, WE. Effective: 2013 Fall Quarter.

ENT 116—Freshwater Macroinvertebrates (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): BIS 002B; Or equivalent. Limited enrollment. Biology, ecology and taxonomy of freshwater macroinvertebrates, including insects, crustaceans, molluscs, worms, leeches, flatworms and others. Adaptations to life in freshwater. Aquatic food webs. Uses of macroinvertebrates in water quality monitoring. Field trips during regular lab hours. GE credit: SE, SL. Effective: 2013 Fall Quarter.

ENT 116L—Aquatic Insect Collection (2)
Fieldwork—2 hours; Laboratory—4 hours. Prerequisite(s): ENT 100L or ENT 116 (can be concurrent); Or prior experience with insect/arthropod identification to Family level. Restricted to 25 students. Collection of aquatic insects and identification to the Family level. Collections will require two, one-day weekend field trips (by arrangement). Collection requirement is 40 Families. Effective: 2016 Fall Quarter.

ENT 117—Longevity (4)
Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): Upper division standing or consent of instructor. Nature, origin, determinants, and limits of longevity with particular reference to humans; emphasis on implications of findings from non-human model systems including natural history, ecology and evolution of life span; description of basic demographic techniques including life table methods. (HDE 117.) GE credit: SE, SL, WE. Effective: 2013 Fall Quarter.

ENT 119—Apiculture (3)
Lecture—3 hours. Biology and behavior of honeybees; communication, orientation, social organization, foraging activities, honey production, pollination activities. GE credit: OL, SE, VL, WE. Effective: 2016 Fall Quarter.

ENT 123—Plant-Virus-Vector Interaction (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 101; PLB 105, PLP 120, and ENT 100 recommended. Analysis of interactions necessary for viruses to infect plants.Interactions among insect vectors and host plants involved in the plant-virus life cycle. Evolutionary aspects of the molecular components in viral infection and modern approaches to the interdiction of viral movement. (PBI 123 and PLP 123.) GE credit: SE, SL, WE. Effective: 2014 Winter Quarter.

ENT 135—Introduction to Biological Control (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENT 100 or ENT 110 Effective: 2013 Fall Quarter.

ENT 153—Medical Entomology (3)
Lecture—3 hours. Prerequisite(s): BIS 001A; BIS 001B; Upper division standing in one of the biological sciences, or consent of instructor. Basic biology and classification of medically important arthropods with special emphasis on the ecology of arthropodborne diseases and principles of their control. Relationships of arthropods to human health. GE credit: SE, SL, WE. Effective: 2013 Fall Quarter.

ENT 156—Biology of Parasitism (3)
Lecture/Discussion—3 hours. Prerequisite(s): BIS 001A; or Consent of Instructor. Lectures on the biological and ecological aspects affecting host-parasite relationships using selected examples from protozoan and metazoan fauna. GE credit: SE. Effective: 2013 Fall Quarter.

ENT 156L—Biology of Parasitism Laboratory (1)
Laboratory—3 hours. Prerequisite(s): ENT 156 (can be concurrent); ENT 156 required concurrently or consent of instructor. Laboratory demonstrations using selected examples of protozoan and metazoan organisms along with various techniques used in parasitology to exemplify concepts presented in the lecture course. GE credit: SE. Effective: 2013 Fall Quarter.

ENT 158—Forensic Entomology (3)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): BIS 001B or ENT 100; Upper division standing. Arthropods, their general biology, succession, developmental cycles and population biology in matters of criminal prosecution and civil litigation. Emphasis on basic arthropod biology, ecological and developmental concepts and methods, development of reasoning abilities, implication, development of opinions and evidence. GE credit: WE. Effective: 2013 Fall Quarter.

ENT 180A—Experimental Ecology and Evolution in the Field (4)
Fieldwork—3 hours; Lecture/Lab—3 hours. Prerequisite(s): (ENT 105 or ESP 100); EVE 100; EVE 101 Experimental design in field ecology. Examination of primary literature, experimental design, independent and collaborative research, analysis of data, development of original research paper based on field experiments. (EVE 180A.) GE credit: QL, SE, VL. Effective: 2014 Winter Quarter.

ENT 180B—Experimental Ecology and Evolution in the Field (4)
Fieldwork—3 hours; Lecture/Lab—3 hours. Prerequisite(s): (EVE 180A or ENT 180A); (EVE 100 or EVE 101 or ESP 100); ENT 105 Experimental design in field ecology. Examination of primary literature, experimental design, independent and collaborative research, analysis of data, development of original research paper based on field experiments. (EVE 180B.) GE credit: QL, SE, VL, WE. Effective: 2014 Winter Quarter.

ENT 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Laboratory experience or fieldwork off and on campus in all subject areas offered in the Department of Entomology. Internships supervised by a member of the faculty. (P/NP grading only.) Effective: 2013 Fall Quarter.

ENT 197T—Tutoring in Entomology (1-3)
Discussion—1-3 hours. Leading small discussion groups. Preview assignments and prepare guidelines for discussion. (P/NP grading only.) Effective: 2013 Fall Quarter.

ENT 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2013 Fall Quarter.

ENT 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 2013 Fall Quarter.

ENT 212—Molecular Biology of Insects and Insect Viruses (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. A molecular biological analysis of insect systematics, physiology, and defense mechanisms. Molecular biology of insect viruses. Baculovirus expresion vectors and post-translation modification of expressed polypeptides. Biological control of using neuropeptides and toxin genes in insect viruses. Effective: 2013 Fall Quarter.

ENT 214—Vector-borne Infectious Diseases: Changing Patterns (2)
Lecture/Discussion—2 hours. Prerequisite(s): Open to graduate students, MPVM and MPH students, DVM and medical students with second- or third-year standing. Open to upper division undergraduate students with consent of instructor(s). Vector-borne infectious diseases especially as they relate to changing patterns associated with climatic changes, trade and population movement. (PMI 214.) Effective: 2013 Fall Quarter.

ENT 225—Terrestrial Field Ecology (4)
Fieldwork—12 hours; Seminar—1 hour. Prerequisite(s): Introductory ecology and introductory statistics or consent of instructor. A field course conducted over spring break and four weekends at Bodega Bay, emphasizing student projects. Ecological hypothesis testing, data gathering, analysis and written and oral presentation of results. (ECK 225 and PBG 225.) Effective: 2013 Fall Quarter.

ENT 230—Advanced Biological Control (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): Graduate or upper division standing in biological science or consent of instructor. Principles and current issues in biological control of arthropod pests and weeds; laboratory devoted to identification and life history of the major groups of parasitic and predaceous arthropods. Effective: 2013 Fall Quarter.

ENT 253—Advanced Medical Entolomogy (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): One upper division course in Entomology (other than ENT 153) and one course in Microbiology: ENT 153 strongly recommended. An analysis of several anthropod-borne human diseases with emphasis on the relationships of the biology of the vector to the ecology of the disease. Discussion includes demonstration of vectors and techniques. Effective: 2013 Fall Quarter.

ENT 290—Exploratory Topics in Entomology (2)
Seminar—2 hours. Interdisciplinary topics in entomology, including innovative applications of entomological concepts to other fields of research and human endeavor (e.g. medicine, technology, art, criminology). May be repeated up to 8 unit(s) when topic differs. Effective: 2013 Fall Quarter.

ENT 291—Current topics in Medical and Veterinary Entomology (2)
Seminar—2 hours. Prerequisite(s): ENT 153 Discussions of parasitology, ecology and epidemiology related to vectors of pathogens causing disease in humans and animals. May be repeated up to 1 time(s). Effective: 2013 Fall Quarter.

ENT 292—Current Topics in Insect Physiology and Behavior (2)
Seminar—2 hours. Prerequisite(s): ENT 102 if topic is physiology, a course in behavior if topic is behavior, or either if topic bridges both. Analysis of contemporary advances in insect physiology, biochemistry and/or behavior. Interpretation and description of physiological and behavioral mechanisms and functions. Application of general principles to solution of problems in the laboratory and field. May be repeated up to 8 unit(s) topic differs. Effective: 2013 Fall Quarter.

ENT 293N—Current Topics in Insect Biotechnology and Genomics (2)
Seminar—2 hours. Prerequisite(s): ENT 212 Discussion of advances in insect biotechnology, including genetic engineering and genomics. May be repeated up to 6 unit(s) topic differs. Effective: 2013 Fall Quarter.

ENT 294—Current topics in Insect Ecology, Evolution, and Systematics (2)
Seminar—2 hours. Prerequisite(s): ENT 103; General course in ecology or evolution. Discussions of advanced topics in ecology, evolution and systematics with emphasis on analysis of factors influencing the distribution, abundance, adaptations and evolutionary relationships of insects. Includes consideration of applications of basic theory (e.g. biological control). May be repeated up to 8 unit(s) topic differs. Effective: 2013 Fall Quarter.

ENT 295—Current Topics in Agricultural Entomology and Bee Biology (2)
Seminar—2 hours. Prerequisite(s): ENT 110 if topic relates to pests and beneficial predators; ENT 119 if topic is bee biology; either if topic bridges both. Discussion of advanced topics about the biology, ecology, behavior, and management of pest and beneficial insects. May be repeated up to 8 unit(s) if topic differs. Effective: 2013 Fall Quarter.

ENT 297N—Seminar in Entomology (1)
Seminar—1 hour. Weekly Entomology seminar. May be repeated up to 9 unit(s) topic differs. (S/U grading only.) Effective: 2013 Summer Quarter.

ENT 298—Group Study (1-5)
Variable. (S/U grading only.) Effective: 2013 Fall Quarter.

ENT 299—Research (1-12)
Variable. (S/U grading only.) Effective: 2013 Fall Quarter.

Environmental Engineering

Environmental Engineering | Environmental Engineering B.S.

(College of Engineering)

Amit M. Kanvinde, Ph.D., Chairperson of the Department; 530-754-9471

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Faculty. http://cee.engr.ucdavis.edu/people/faculty-directory/

Environmental engineers are responsible for designing processes and infrastructure to ensure society has access to safe water, clean air, and healthy ecosystems. Environmental engineers apply knowledge from physics, chemistry, biology and the social sciences to problems in a variety of areas including water and wastewater treatment and ecosystem remediation, analysis of chemical fate and transport in the natural environment, and modeling of hydrologic and atmospheric flows. As climate change creates new challenges, such as in the form of droughts and intense weather events, the field of environmental engineering evolves to meet society's needs. As an environmental engineering student at UC Davis, you will gain skills that enable you to design sustainable solutions for society.

The Environmental Engineering major started in 2017 and has not yet undergone accreditation review, therefore students who are interested in majoring in environmental engineering are highly encouraged to double major in civil engineering.

Students are encouraged to adhere carefully to all prerequisite requirements. The instructor is authorized to drop students from a course for which stated prerequisites have not been completed. Exclusive of General Education units, the minimum number of units required for the Environmental Engineering major is 136 (72-73 units in lower division and 64-68 units in upper division).

Lower Division Required Courses **Units:** 72-73

MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3
MAT 022B	Differential Equations	3
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 002C	General Chemistry	5
PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
GEL 050	Physical Geology	3
OR		
ATM 060	Introduction to Atmospheric Science	4
ENG 006	Engineering Problem Solving	4
OR		
ECS 032A	Introduction to Programming	4
ENG 035	Statics	4
ECI 003	Civil Infrastructure and Society +	4
ECI 016	Spatial Data Analysis	2
ECI 040	Introduction to Environmental Engineering	4

Choose one of the following; a grade of C- or better is required:

ENL 003	Introduction to Literature	4
UWP 001	Expository Writing	4
UWP 001V	Expository Writing	4
UWP 001Y	Expository Writing	4
COM 001	Major Books of Western Culture: The Ancient World	4

COM 002	Major Books of Western Culture: From the Middle Ages to the Enlightenment	4
CMN 003	Interpersonal Communication Competence	4
COM 004	Major Books of the Contemporary World	4
NAS 005	Introduction to Native American Literature	4

[+]Civil and Environmental Engineering (ECI) 003 is designed for lower division students and is not open to upper-division students. Students who do not take this course will substitute four units of additional upper-division, letter graded Civil and Environmental Engineering coursework.

Upper Division Required Courses **Units:** 64-68

ENG 103	Fluid Mechanics	4
OR		
ECI 100	Introduction to Fluid Mechanics for Civil and Environmental Engineers	4
ENG 105	Thermodynamics	4
ENG 106	Engineering Economics	3
ECI 114	Probabilistic Systems Analysis for Civil Engineers	4
ECI 123	Urban Systems and Sustainability	4
ECI 140A	Environmental Analysis of Aqueous Systems	4
ECI 140B	Chemical Principles for Environmental Engineers	4
ECI 140C	Biological Principles for Environmental Engineering	4
ECI 140D	Water and Wastewater Treatment System Design	4
ECI 141	Engineering Hydraulics	3
ECI 141L	Engineering Hydraulics Laboratory	1
ECI 145	Hydraulic Structure Design	4
ECI 149	Air Pollution	4
ECI 150	Air Pollution Control System Design	4
ECI 171	Soil Mechanics	4
ECI 171L	Soil Mechanics Laboratory	1
ECI 193A	Civil and Environmental Engineering Senior Design	4
ECI 193B	Civil and Environmental Engineering Senior Design	4

Upper Division Composition Requirement

Choose one; a grade of C- or better is required:

UWP 101	Advanced Composition	4
UWP 102E	Writing in the Disciplines: Engineering	4
UWP 102G	Writing in the Disciplines: Environmental Writing	4
UWP 104A	Writing in the Professions: Business Writing	4
UWP 104E	Writing in the Professions: Science	4
UWP 104T	Writing in the Professions: Technical Writing	4

Passing the Upper Division Composition Exam.

Total: 136-141

Environmental Engineering | ECI Courses

Courses in ECI:

ECI 003—Civil Infrastructure and Society (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): MAT 021A (can be concurrent) Pass One restricted to lower division students; Civil Engineering majors. Introduction to civil infrastructure and its relationship with society and the natural environment. Exposure to innovative research on civil engineering and environmental systems. Participation in laboratory experiments illustrative of the solution of representative but simplified engineering problems. Not open for credit to upper division students. GE credit: OL, SE, SS. Effective: 2016 Winter Quarter.

ECI 016—Spatial Data Analysis (2)
Laboratory—3 hours; Lecture—1 hour. Restricted to Civil Engineering and Biological Systems Engineering majors; non-majors accommodated on a space-available basis. Computer-aided design and geographic information systems in civil engineering practice. GE credit: QL, SE. Effective: 2010 Spring Quarter.

ECI 019—C Programming for Civil and Environmental Engineers (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): MAT 021A (can be concurrent) Pass One open to Civil Engineering majors and Optical Science and Engineering majors. Computational problem solving techniques for Civil and Environmental Engineering applications using structured C programming. Algorithm design applied to realistic problems. GE credit: SE. Effective: 2011 Winter Quarter.

ECI 040—Introduction to Environmental Engineering (4)
Lecture—4 hours. Prerequisite(s): CHE 002B Pass One open to students in the College of Engineering. Introduction to topics in environmental engineering; discussion on influence of literary work, art, and media on the evolution of environmental engineering practice, relevant laws, and regulations; presentations of historical case studies. GE credit: AH. Effective: 2017 Winter Quarter.

ECI 090X—Lower Division Seminar (1-4)
Seminar—1-4 hours. Prerequisite(s): Consent of Instructor. Examination of a special topic in a small group setting. May be repeated for credit. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 092—Internship for Engineering (1-5)
Internship. Prerequisite(s): Lower division standing; approval of project prior to period of internship. Supervised work experience in civil engineering. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 100—Introduction to Fluid Mechanics for Civil and Environmental Engineers (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 035 C- or better; MAT 022B C- or better; PHY 009B C- or better Pass One restricted to Civil Engineering, Environmental Engineering and Hydrology majors. Fluid flow in civil & environmental engineering, basis for design, buoyancy, hydrostatics, gravity dams, hydraulic modeling: similarity & scaling, conservation laws, flow in bends, nozzles, pipes, pumps, turbines, complimentary lab experiments. Not open for credit to students who have taken ENG 103. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 114—Probabilistic Systems Analysis for Civil Engineers (4)
Lecture—4 hours. Prerequisite(s): MAT 021C C- or better Probabilistic concepts and models in engineering. Statistical analysis of engineering experimental and field data. Introduction to stochastic processes and models of engineering systems. Not open for credit to students who have completed STA 120. GE credit: QL, SE. Effective: 2013 Fall Quarter.

ECI 115—Computer Methods in Civil & Environmental Engineering (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (ENG 006 or ECS 030); MAT 022B Open to Civil Engineering majors only. Presentation, implementation and application of numerical algorithms and computer models for the solution of practical problems in Civil and Environmental Engineering. GE credit: SE. Effective: 2013 Fall Quarter.

ECI 119—Parallel Processing for Engineering Applications. (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): C programming or consent of instructor. Fundamental skills in parallel computing for engineering applications; emphasis on structured parallel programming for distributed memory parallel clusters. No credit allowed for students who have taken ECI 119B. GE credit: SE. Effective: 2005 Spring Quarter.

ECI 123—Urban Systems and Sustainability (4)
Lecture—4 hours. Prerequisite(s): Upper division standing. Systems-level approach of how to evaluate and then modify sustainability of urban systems based on interaction with natural environments. Topics include: definition/metrics of urban sustainability; system analyses of urban systems; enabling technology, policies, legislation; measures and modification of ecological footprints. GE credit: ACGH, DD, SE, SL, SS, WE. Effective: 2006 Fall Quarter.

ECI 125—Building Energy Performance (4)
Lecture—4 hours. Prerequisite(s): Upper division standing in Engineering. Open to students in the College of Engineering. Mechanisms of energy consumption in buildings including end uses, thermal loads, ventilation, air infiltration, thermal energy distribution, and HVAC systems; energy performance simulation; methods and strategies of energy efficiency. GE credit: SE. Effective: 2011 Winter Quarter.

ECI 130—Structural Analysis (4)
Lecture—4 hours. Prerequisite(s): ENG 104 C- or better; MAT 022A Open to Civil Engineering majors. Elastic structural analysis of determinate and indeterminate trusses, beams and frames. Plastic bending and limit analysis. GE credit: QL, SE. Effective: 2014 Winter Quarter.

ECI 131—Matrix Structural Analysis (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 104 C- or better; ENG 006 Open to Engineering majors only. Matrix formulation and computer analysis of statically indeterminate structures. Stiffness and flexibility formulations for elastic structures. Finite element methods for elasticity and bending problems. GE credit: SE. Effective: 2013 Fall Quarter.

ECI 132—Structural Design: Metallic Elements (4)
Lecture—4 hours. Prerequisite(s): ECI 130 Design of metallic beams, columns, and other members for various types of loading and boundary conditions; design of connections between members; member performance within structural systems. GE credit: SE, VL. Effective: 2013 Fall Quarter.

ECI 135—Structural Design: Concrete Elements (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECI 130 Restricted to Civil Engineering, Civil Engineering/Materials Science and Engineering, and Materials Science and Engineering majors only. Strength design procedures for columns, rectangular beams, T-beams and beams of general cross-section. Building code requirements for bending, shear, axial load, combined stresses and bond. Introduction to prestressed concrete. GE credit: QL, SE. Effective: 2013 Fall Quarter.

ECI 136—Building Design (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (ECI 130 or ECI 131); (ECI 135 or ECI 132) Design of a building structure for a specific need under the multiple constraints of safety, serviceability, cost and aesthetics. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 137—Construction Principles and Project Management (4)
Laboratory—3 hours; Lecture—3 hours. Restricted to upper division standing in Engineering. Project management, with civil engineering construction and design applications, including project scope, schedule, resources, cost, quality, risk, and control. Construction industry overview. Interactions between planning, design, construction, operations. Construction operations analysis. Contract issues. Project management software, field trips, guest lectures. GE credit: ACGH, OL, QL, SE, SS, VL, WE. Effective: 2013 Fall Quarter.

ECI 138—Earthquake Loads on Structures (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECI 130 or ECI 131 Determination of loads on structures due to earthquakes. Methods of estimating equivalent static lateral forces; response spectrum and time history analysis. Concepts of mass, damping and stiffness for typical structures. Design for inelastic behavior. Numerical solutions and Code requirements. GE credit: SE. Effective: 2013 Fall Quarter.

ECI 139—Advanced Structural Mechanics (4)
Lecture—4 hours. Prerequisite(s): ENG 104 C- or better Review of stress, strain, equilibrium, compatibility, and elastic material behavior. Plane stress and plane strain problems in elasticity; energy methods. Theories for unsymmetric bending, straight and curved beams. Beams on elastic foundations; stresses in plates and shells; elastic stability. GE credit: QL, SE. Effective: 2013 Fall Quarter.

ECI 140A—Environmental Analysis of Aqueous Systems (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 002B C- or better Pass One restricted to Environmental Engineering majors. Introduction to "wet chemical" and instrumental techniques commonly used in the examination of water and wastewater and associated data analysis. Not open for credit to students who have taken ECH 140 or CHE 100. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 140B—Chemical Principles for Environmental Engineers (4)
Lecture—4 hours. Prerequisite(s): CHE 002B C- or better Aqueous chemistry; equilibrium relationships; carbonate system; thermodynamics; kinetics & rate laws; precipitation, adsorption, & volatilization phenomenon; oxidation & reduction reactions; pH, pE and predominance diagrams; organic chemicals. Not open for credit to students who have taken ECI 140. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 140C—Biological Principles for Environmental Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 140A C- or better or ECI 140B C- or better Fundamental microbiology concepts for environmental engineers; provides background needed for the application of water and wastewater treatment, bioremediation, air pollution control and biotransformations in environmental engineered systems. Only two units of credit for students who have taken MIC 101 or MIC 102. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 140D—Water and Wastewater Treatment System Design (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (ENG 103 C- or better or ECI 100 C- or better); (ECI 140 C- or better or ECI 140A C- or better or ECI 140B C- or better or ECI 140C C- or better or ECI 148A C- or better) Evaluation and design of water and wastewater treatment systems. Not open for credit to students who have taken ECI 148B. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 141—Engineering Hydraulics (3)
Lecture—3 hours. Prerequisite(s): ENG 103 C- or better or ECI 100 C- or better Nature of flow of a real fluid; flow in pipes; open channel flow; turbomachinery; fluid forces on objects: boundary layers, lift and drag. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 141L—Engineering Hydraulics Laboratory (1)
Laboratory—3 hours. Prerequisite(s): ECI 141 (can be concurrent) Open to Engineering students only. Laboratory experiments and demonstrations on flow measurements, sluice gates, hydraulic jump, flow characteristics, and centrifugal pumps. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 142—Engineering Hydrology (4)
Lecture—4 hours. Prerequisite(s): ECI 141 (can be concurrent) Restricted to students in the College of Engineering. The hydrologic cycle. Evapotranspiration, interception, depression storage and infiltration. Streamflow analysis and modeling. Flood routing through channels and reservoirs. Frequency analysis of hydrologic variables. Precipitation analysis for hydrologic design. Hydrologic design. GE credit: QL, SE. Effective: 2013 Fall Quarter.

ECI 143—Green Engineering Design and Sustainability (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Upper division standing. Restricted to upper division standing; Pass One restricted to Civil Engineering majors. Application of concepts, goals and metrics of sustainability, green engineering and industrial ecology to engineering design. Other course topics include life-cycle assessments, analysis of environmental management systems, and economics of pollution prevention and sustainability. GE credit: QL, SE, SL, SS. Effective: 2017 Winter Quarter.

ECI 144—Groundwater Systems Design (4)
Lecture—4 hours. Prerequisite(s): ECI 141 Groundwater occurrence, distribution, and movement; groundwater flow systems; radial flow to wells and aquifer testing; aquifer management; groundwater contamination; solute transport by groundwater; fate and transport of subsurface contaminants. Groundwater supply and transport modeling. GE credit: SE. Effective: 2005 Spring Quarter.

ECI 144L—Groundwater Systems Design Laboratory (1)
Laboratory—3 hours. Prerequisite(s): ECI 144 (can be concurrent); ECI 144 required concurrently. Computer modeling of groundwater flow under regional gradient, well injection/withdrawal, and natural and engineered boundary conditions. Use of Groundwater Vistas computer program. Effective: 2010 Fall Quarter.

ECI 145—Hydraulic Structure Design (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): ECI 141 C- or better Project-based course on the design of an integrated urban drainage system with focus on consideration of design alternatives, multiple realistic constraints, quantification of uncertainty, codes and standards, technical drawing and cost analysis. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 146—Water Resources Simulation (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 103 C- or better or ECI 100 C- or better Computer simulation techniques in the analysis, design and operation of surface water systems; modeling concepts and practices with application to surface runoff; water quality in rivers and streams and dispersion of contaminants in water bodies. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 148A—Water Quality Management (4)
Lecture—4 hours. Prerequisite(s): CHE 002B C- or better Basic concepts of water quality measurements and regulations. Introduction to physical, biological and chemical processes in natural waters. Fundamentals of mass balances in water and wastewater treatment. GE credit: SE. Effective: 2013 Fall Quarter.

ECI 149—Air Pollution (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021D; MAT 022B; CHE 002B C- or better; (ATM 121A or ENG 103 C- or better or ECI 100 C- or better) Physical and technical aspects of air pollution. Emphasis on geophysical processes and air pollution meteorology as well as physical and chemical properties of pollutants. (ATM 149.) GE credit: QL, SE, SL. Effective: 2018 Winter Quarter.

ECI 150—Air Pollution Control System Design (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECI 149 C- or better or ATM 149 C- or better Design and evaluation of air pollution control devices and systems. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 153—Deterministic Optimization and Design (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): MAT 021C; MAT 022A; Computer programming course. Operations research. Optimization techniques such as linear programming, dynamic programming, and non-linear programming. Applications in civil engineering disciplines, including multiple realistic constraints, through computer-based course projects. GE credit: QL, SE, SL. Effective: 2013 Fall Quarter.

ECI 155—Water Resources Engineering Planning (4)
Lecture—4 hours. Prerequisite(s): (ENG 106 or ECN 001A or ECN 001AV); ECI 114 Basic engineering planning concepts; role of engineering, economic, environmental and social information and analysis; institutional, political and legal aspects. Case studies and computer models illustrate the planning of water resource systems. GE credit: QL, SE, SL, SS, WE. Effective: 2018 Winter Quarter.

ECI 161—Transportation System Operations (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021C C- or better; PHY 009A C- or better Principles of transportation system operations; traffic characteristics and methods of measurement; models of transportation operations and congestion applied to urban streets and freeways. GE credit: QL, SE. Effective: 2016 Fall Quarter.

ECI 163—Energy and Environmental Aspects of Transportation (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): ECN 001A or ECN 001AV or ENG 106 Engineering, economic, and systems planning concepts. Analysis and evaluation of energy, air quality and selected environmental attributes of transportation technologies. Strategies for reducing pollution and petroleum consumption in light of institutional and political constraints. Evaluation of vehicle emission models. (ESP 163.) GE credit: SE, SL, SS, WE. Effective: 2018 Spring Quarter.

ECI 165—Transportation Policy (3)
Lecture—3 hours. Transportation and associated environmental problems confronting urban areas, and prospective technological and institutional solutions. Draws upon concepts and methods from economics, engineering, political science and environmental studies. GE credit: QL, SE, SS. Effective: 2013 Fall Quarter.

ECI 171—Soil Mechanics (4)
Lecture—4 hours. Prerequisite(s): (ENG 103 (can be concurrent) or ECI 100 (can be concurrent)); ENG 104 C- or better; ECI 171L (can be concurrent); ECI 171L required concurrently. Restricted to Civil Engineering and Environmental Engineering majors only. Soil formations, mass-volume relationships, soil classification, effective stress, soil-water-void relationships, compaction, seepage, capillarity, compressibility, consolidation, strength, states of stress and failure, lateral earth pressures, and slope stability. GE credit: SE. Effective: 2018 Spring Quarter.

ECI 171L—Soil Mechanics Laboratory (1)
Laboratory—3 hours. Prerequisite(s): ECI 171 (can be concurrent); ECI 171 required concurrently. Laboratory studies utilizing standard testing methods to determine physical, mechanical and hydraulic properties of soil and demonstration of basic principles of soil behavior. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 173—Foundation Design (4)
Lecture—4 hours. Prerequisite(s): ECI 171 Foundation analysis and design, including site characterization, evaluation of shallow and deep foundation alternatives, evaluation of bearing capacity and settlements, design of retaining structures, and case-based design experiences. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 175—Geotechnical Earthquake Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 171 C- or better Tectonics, faults, site response, and probabilistic ground motion prediction equations. Cyclic loading and liquefaction of soil elements and layers. Empirical procedures and field tests for evaluation of triggering and consequences, of liquefaction. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 179—Pavement Engineering (4)
Discussion/Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 104 C- or better Pavement types (rigid, flexible, unsurfaced, rail), their applications (roads, airfields, ports, rail) and distress mechanisms. Materials, traffic and environment characterization. Empirical and mechanistic-empirical design procedures. Maintenance, rehabilitation and reconstruction; construction quality; asphalt concrete mix design. GE credit: QL, SE, SL, VL. Effective: 2013 Fall Quarter.

ECI 189A—Selected Topics in Civil Engineering; Environmental Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Environmental Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189B—Selected Topics in Civil Engineering; Hydraulics and Hydrologic Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Hydraulics and Hydrologic Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189C—Selected Topics in Civil Engineering; Engineering Planning (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Engineering Planning. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189D—Selected Topics in Civil Engineering; Geotechnical Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Geotechnical Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189E—Selected Topics in Civil Engineering; Structural Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Structural Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189F—Selected Topics in Civil Engineering; Structural Mechanics (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Structural Mechanics. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189G—Selected Topics in Civil Engineering; Transportation Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Transportation Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189H—Selected Topics in Civil Engineering; Transportation Planning (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Transportation Planning. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189I—Selected Topics in Civil Engineering; Water Resources Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Water Resources Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189J—Selected Topics in Civil Engineering; Water Resources Planning (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Water Resources Planning. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 190C—Research Group Conferences in Civil and Environmental Engineering (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing in Civil and Environmental Engineering. Research group conferences. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 192—Internship in Engineering (1-5)
Internship. Prerequisite(s): Upper division standing; approval of project prior to the period of the internship. Supervised work experience in civil engineering. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 193A—Civil and Environmental Engineering Senior Design (4) ***Review all entries***
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): (ECI 140D C- or better) or (ECI 171 C- or better, ECI 171L C- or better) or (ECI 132 C- or better or ECI 135 C- or better) or (ECI 161 C- or better or ECI 163 C- or better) or (ECI 141 C- or better, ECI 141L C- or better); and Consent of Instructor. And one ECI major depth course with a C- or better. Students must be in final year of study. Open to seniors in Civil Engineering and Environmental Engineering only; students must be in their final year of study. Culminating design experience for civil engineering and environmental engineering majors. Student teams work closely with faculty, city officials or consulting clients to propose, implement and validate a unique solution to a real-world problem. GE credit: OL, SE, WE. Effective: 2018 Winter Quarter.

ECI 193A—Civil and Environmental Engineering Senior Design (4) ***Review all entries***
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): (ECI 140D C- or better) or (ECI 171 C- or better, ECI 171L C- or better) or (ECI 132 C- or better or ECI 135 C- or better) or (ECI 161 C- or better or ECI 163 C- or better) or (ECI 141 C- or better, ECI 141L C- or better); and Consent of Instructor. And one other ECI major depth course with a C- or better; students must be in their final year of study. Open to seniors in Civil Engineering and Environmental Engineering only. Culminating design experience for civil engineering and environmental engineering majors. Student teams work closely with faculty, city officials or consulting clients to propose, implement and validate a unique solution to a real-world problem. GE credit: OL, SE, WE. Effective: 2018 Fall Quarter.

ECI 193B—Civil and Environmental Engineering Senior Design (4)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): ECI 193A Open to seniors in Civil Engineering and Environmental Engineering only. Culminating design experience for civil engineering and environmental engineering majors. Student teams work closely with faculty, city officials or consulting clients to propose, implement and validate a unique solution to a real-world problem. GE credit: OL, SE, VL, WE. Effective: 2017 Fall Quarter.

ECI 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 199—Special Study for Advanced Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Special study. (P/NP grading only.) GE credit: SE. Effective: 2016 Fall Quarter.

ECI 201—Introduction to Theory of Elasticity (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 104 Fundamental equations of elasticity in three dimensions; plane stress and plane strain; flexture and torsion of bars of various shapes. Introduction to variational and approximate methods. Effective: 1997 Winter Quarter.

ECI 203—Inelastic Behavior of Solids (3)
Lecture—3 hours. Prerequisite(s): ECI 201 Fundamentals of theories of plasticity, viscoelasticity and viscoplasticity for solids. Macroscopic constitutive modelling for engineering materials, e.g., metals, polymers, soils, etc., and microscopic motivation. Effective: 1997 Winter Quarter.

ECI 205—Continuum Mechanics (3)
Lecture—3 hours. Prerequisite(s): ECI 201 Tensor formulation of the field equations for continuum mechanics, including large deformation effects. Invariance and symmetry requirements. Introduction to nonlinear thermoelasticity and thermodynamics. Solution of three-dimensional problems. Selected topics. Effective: 1998 Winter Quarter.

ECI 206—Fracture Mechanics (4)
Lecture—4 hours. Prerequisite(s): ECI 201; ENG 104 Linear and nonlinear fracture mechanics, stress analysis, energy concepts, brittle fracture criteria, path independent integrals, Dugdale-Barenblatt model, general cohesive zone models, ductile fracture criteria, crack tip fields for stationary and propagating cracks, fatigue. Application of numerical methods for fracture mechanics. Effective: 2006 Winter Quarter.

ECI 211—Advanced Matrix Structural Analysis (4)
Lecture—4 hours. Prerequisite(s): ECI 131 Analysis of complex frameworks by the displacement method; treatment of tapered beams, curved beams, and beams on elastic foundations; partially rigid connections; geometric and material nonlinearities; buckling; flexibility-based formulations; FEM-software for nonlinear analysis of structures. Effective: 2003 Winter Quarter.

ECI 212A—Finite Element Procedures in Applied Mechanics (4)
Lecture—4 hours. Prerequisite(s): EAD 115 or (MAT 128A, MAT 128B (can be concurrent)) Weighted-residual and Rayleigh-Ritz methods. Weak/variational formulation and development of discrete equations using finite element approximations. Application to one- and two-dimensional problems (heat conduction). Effective: 2003 Winter Quarter.

ECI 212B—Finite Elements: Application to Linear and Non-Linear Structural Mechanics Problems (4)
Lecture—4 hours. Prerequisite(s): ECI 212A Application to linear and nonlinear structural mechanics problems. Linear elasticity, weak form, and finite element approximation. Incompressible media problems. Non-linear problems with material nonlinearity. Effective: 2003 Winter Quarter.

ECI 213—Analysis of Structures Subjected to Dynamic Loads (4)
Lecture—4 hours. Prerequisite(s): ECI 211 (can be concurrent) Analysis of structures subjected to earthquake, wind and blast loading; distributed, consistent and lumped mass techniques; computer implementation; nonlinear response spectrum; frequency and time domain analysis; seismic protection of structures; numerical methods in linear and nonlinear structural dynamics. Effective: 2012 Fall Quarter.

ECI 214—Probabilistic Seismic Hazard Analysis and Design Ground Motions (4)
Lecture—4 hours. Probabilistic seismic hazard analysis for use in developing design spectra and for seismic risk analyses, including the development of earthquake ground motion time series for use in dynamic analyses of structures. Effective: 2016 Winter Quarter.

ECI 216—Meshfree Methods and Partition of Unity Finite Elements (4)
Lecture—4 hours. Prerequisite(s): ECI 201; ECI 212A Advanced discretization techniques such as meshfree methods and partition of unity finite elements for the Galerkin solution of boundary-value problems in solid and structural mechanics. Application of meshfree and extended finite element methods in computational fracture. Effective: 2016 Winter Quarter.

ECI 221—Theory of Plates and Introduction to Shells (3)
Lecture—3 hours. Prerequisite(s): ECI 201 (can be concurrent) Development of classical and refined plate theories. Application to isotropic, orthotropic and composite plates. Solutions for rectangular
and circular plates. Membrane theory for axisymmetric shells and bending of circular shells. Effective: 1997 Winter Quarter.

ECI 223—Advanced Dynamics, Signal Processing, and Smart Structures Technology (4)
Lecture—4 hours. Prerequisite(s): ECI 213; Or equivalent. Signal processing and system identification of structures under dynamic excitations; Fourier and Laplace transforms; data acquisition and sensor design fundamentals; sensor technologies/techniques for nondestructive evaluation; structural control; actuators and dampers for smart structures; piezoelectrics and acoustic emissions; micro- and nano-fabrication. Effective: 2011 Winter Quarter.

ECI 232—Advanced Topics in Concrete Structures (4)
Lecture—4 hours. Prerequisite(s): ECI 130; ECI 135; ECI 138; Graduate standing. Ductility of reinforced concrete; strength of two-way slabs; modified compression field theory. Effective: 2001 Fall Quarter.

ECI 233—Advanced Design of Steel Structures (4)
Lecture—4 hours. Prerequisite(s): (ECI 130 or ECI 131); ECI 132 Review of Load and Resistance Factor Design (LRFD); steel-plate girder design; plastic design of indeterminate systems; moment frames and bracing systems; connection design; seismic design of steel structures; vibration of flooring systems; steel-concrete composite design. Effective: 2004 Winter Quarter.

ECI 234—Prestressed Concrete (4)
Lecture—4 hours. Prerequisite(s): ECI 135; (ECI 130 or ECI 131) Survey of methods and applications; prestressing materials and systems; prestress losses; flexural design; design for shear and torsion; deflection computation and control; continuous beams and indeterminate structures; floor systems; partial prestressing; design of compression members; strut-and-tie models. Effective: 2003 Fall Quarter.

ECI 235—Cement Composites (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 104 Applications of cement composites; materials selection and proportioning; component and composite properties; hydration reactions and microstructure development; mechanisms of failure; nondestructive test methods; fiber reinforcement; concrete durability; novel reinforcing materials; ferrocement; repair and retrofit technologies; applications to structural design. Effective: 2002 Fall Quarter.

ECI 236—Design of Fiber Reinforced Polymer Composite Structures (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECI 135 Basics of mechanics and design of polymer matrix composites: composite classification, manufacturing process, micromechanical property determination, classical lamination theory, strength theories, first-ply-failure, test methods, design practice, strengthening and retrofitting of existing reinforced concrete structures. Effective: 2008 Winter Quarter.

ECI 237—Bridge Design (4)
Lecture—4 hours. Prerequisite(s): ECI 130; ECI 135; ECI 234 recommended. Open to Graduate Students only. Bridge types, behavior and construction characteristics; design philosophy, details according to Caltrans and American Association of State Highway and Transportation Officials codes, principles; seismic design and retrofit of concrete bridges; modern bridges using advanced fiber reinforced polymer composites; fieldtrip required. Effective: 2007 Fall Quarter.

ECI 238—Performance-Based Seismic Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 138; ECI 213 Modern seismic design; performance-based seismic design; seismic hazard; seismic demands: linear and nonlinear procedures; performance assessment: deterministic and probabilistic procedure; review of FEMA-350, FEMA-356, ATC-40 and other performance-based guidelines. Effective: 2005 Spring Quarter.

ECI 240—Water Quality (4)
Lecture—4 hours. Prerequisite(s): ECI 141; ECI 142 Quality requirements for beneficial uses of water. Hydrologic cycle of quality. Hydromechanics in relation to quality of surface and groundwaters; transport and fate of waterborne pollutants. Heat
budget for surface waters; predictive methods; introduction to water quality modeling. Effective: 2000 Fall Quarter.

ECI 241—Environmental Reactive Chemical Transport Modeling (4)
Lecture—4 hours. Prerequisite(s): CHE 002A or CHE 002B or ECI 149; Or equivalent. Modeling of reactive chemical transport in air and water including kinetic reactions, equilibrium reactions, and phase partitioning. Emphasis on numerical solution schemes and programming techniques to provide deeper insight into model performance and limitations. Effective: 2014 Fall Quarter.

ECI 242—Air Quality (4)
Lecture—4 hours. Prerequisite(s): ENG 105; ECI 141; ECI 149; Or equivalents. Factors determining air quality. Effects of air pollutants. Physical and chemical fundamentals of atmospheric transport and reaction. Introduction to dispersion modeling. Effective: 2002 Fall Quarter.

ECI 243A—Water and Waste Treatment (4)
Lecture—4 hours. Prerequisite(s): ECI 148A; Or the equivalent. Characteristics of water and airborne wastes; treatment processes and process kinetics; treatment system design. Effective: 1999 Fall Quarter.

ECI 243B—Water and Waste Treatment (4)
Lecture—4 hours. Prerequisite(s): ECI 243A Continuation of course 243A. Aeration, thickening, biological processes, design of biological treatment systems. Effective: 2000 Winter Quarter.

ECI 243L—Pilot Plant Laboratory (4)
Discussion—1 hour; Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): ECI 243A; ECI 243B (can be concurrent); or Consent of Instructor. Graduate standing. Laboratory investigation of physical, chemical, and biological processes for water and wastewater treatment. Effective: 2016 Winter Quarter.

ECI 244—Life Cycle Assessment for Sustainable Engineering (4)
Lecture—4 hours. Prerequisite(s): Graduate standing. Life cycle assessment methodology is taught emphasizing applications to infrastructure and energy systems. Life cycle design, life cycle cost methods, other tools from industrial ecology, and links to policy are covered as well. Effective: 2011 Fall Quarter.

ECI 245A—Applied Environmental Chemistry: Inorganic (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 105; ECI 140; CHE 002B; Or the equivalent of CHE 002B; CHE 002C or CHE 107A recommended. Chemistry of natural and polluted waters. Topics include chemical, kinetic and equilibrium principles, redox reactions, gas solution and solid-solution equilibria, thermodynamics, carbonate systems, coordination chemistry, interfacial phenomena. Effective: 2000 Spring Quarter.

ECI 245B—Applied Environmental Chemistry: Organic (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 128A; CHE 128B; CHE 128C; Or the equivalent; CHE 002C or CHE 107A recommended. Transport and transformation of organic chemicals in the environment.
Topics include application of thermodynamics to predict solubility and activity coefficients; distribution of organic chemicals between the aqueous phase and air, solvent, or solid phases; chemical, photochemical and biological transformation reactions. Effective: 2001 Spring Quarter.

ECI 246N—Understanding Climate Change: Causes and Consequences (4)
Lecture—4 hours. Open to graduate students. Diverse physical processes that govern climate and drive climate change. Observational, experimental and modeling techniques and methods used in the development of our scientific understanding of the Earth system. Effective: 2016 Spring Quarter.

ECI 247—Aerosols (4)
Lecture—4 hours. Prerequisite(s): ENG 103; ENG 105; ECI 141; ECI 149 Behavior of airborne particles including particle formation, modification, and removal processes. Effective: 2002 Fall Quarter.

ECI 247L—Aerosols Laboratory (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): ECI 247 Methods of generation and characterization of aerosols. Detailed topics may include flow rate measurement, aerosol generation, aerosol collection, ions measurement, metals measurement, and carbon measurement. May be repeated up to 1 time(s). Effective: 2002 Fall Quarter.

ECI 248—Biofilm Processes (4)
Lecture—4 hours. Prerequisite(s): SSC 111 or SSC 211 or ECI 243B; or Consent of Instructor. Calculus and basic cell molecular biology are recommended. Natural and engineered biofilms, including biofilm occurrence and development, spatial structure, microbial processes, fundamental and applied research tools, biofilm reactors, beneficial uses, and detrimental effects. Effective: 2004 Spring Quarter.

ECI 249—Probabilistic Design and Optimization (4)
Lecture—4 hours. Prerequisite(s): ECI 114; ECI 153; ENG 106; Or equivalents. Design by optimization for probabilistic systems, decision theory, the value of information, probabilistic linear programming, probabilistic dynamic programming, nonlinear probabilistic optimization. Applications in civil engineering design, project evaluation, and risk management. Effective: 2006 Winter Quarter.

ECI 250—Civil Infrastructure System Optimization and Identification (4)
Lecture—4 hours. Prerequisite(s): MAT 021C; MAT 022A; Programming course; EAD 115 and mathematical modeling course recommended. Restricted to graduate standing. Applied mathematics with a focus on modeling, identifying, and controlling dynamic, stochastic, and underdetermined systems. Applications in transportation networks, water resource planning, and other civil infrastructure systems. Effective: 2005 Spring Quarter.

ECI 251—Transportation Demand Analysis (4)
Lecture—4 hours. Prerequisite(s): ECI 114; Or the equivalent. Procedures used in urban travel demand forecasting. Principles and assumptions of model components (trip generation, trip distribution, model split). New methods of estimating travel demand. Computer exercises using empirical data to calibrate models and forecast travel demand. Effective: 1999 Fall Quarter.

ECI 252—Sustainable Transportation Technology and Policy (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): ECI 165 Role of technical fixes and demand management in creating a sustainable transportation system. Emphasis on technology options, including alternative fuels, electric propulsion, and IVHS. Analysis of market demand and travel behavior, environmental impacts, economics and politics. (ESP 252.) Effective: 2000 Fall Quarter.

ECI 253—Dynamic Programming and Multistage Decision Processes (4)
Lecture—4 hours. Prerequisite(s): MAT 021C; MAT 022A; Programming course; EAD 115 recommended. Operations research. Optimization techniques with a focus on dynamic programming in treating deterministic, stochastic, and adaptive multistage decision processes. Brief review of linear programming and non-linear programming. Applications in transportation networks and other civil infrastructure systems. Effective: 2005 Spring Quarter.

ECI 254—Exploring Data from Built Environment Using R (4)
Laboratory—3 hours; Lecture—3 hours. Introduction to modern data science, specifically data acquisition, exploratory data analysis, visualization, and beginning data analysis using R. Emphasizes computational reasoning and working with tabular and non-standard data. Focus will be on data generated in the built environment. (Geography 279.) Effective: 2017 Fall Quarter.

ECI 256—Urban Traffic Management and Control (4)
Lecture—4 hours. Prerequisite(s): ECI 114 Basic concepts, models, and methods related to the branch of traffic science that deals with the movement of vehicles on a road network, including travel speed, travel time, congestion concepts, car-following and hydrodynamic traffic models. Effective: 2000 Fall Quarter.

ECI 257—Flow in Transportation Networks (4)
Lecture—4 hours. Prerequisite(s): ECI 153; ECI 161 or ECI 256 recommended. Elements of graph theory, a survey of pertinent optimization techniques, extremal principles in network flow problems, deterministic equilibrium assignment, stochastic equilibrium assignment, extensions of equilibrium assignments and dynamic transportation network assignment. Effective: 2000 Winter Quarter.

ECI 259—Asphalt and Asphalt Mixes (4)
Lecture—4 hours. Prerequisite(s): ECI 179; or Consent of Instructor. Asphalts and asphalt mix types and their use in civil engineering structures, with primary emphasis on pavements. Asphalt, aggregate properties and effects on mix properties. Design, construction, recycling. Recent developments and research. Effective: 2006 Winter Quarter.

ECI 260—Sediment Transport (4)
Lecture—4 hours. Prerequisite(s): ECI 141; Or equivalent. Sediment transport in hydrologic systems. Process-oriented course which will emphasize how sediment moves and the physical processes that affect sediment transport. Field trip. Effective: 2006 Winter Quarter.

ECI 264A—Transport, Mixing and Water Quality in River and Lakes (4)
Lecture—4 hours. Prerequisite(s): ECI 141; ECI 240 Principal causes of mixing and transport in rivers, lakes and reservoirs, and their impacts on water quality. Case studies of specific lakes and rivers. Effective: 2000 Fall Quarter.

ECI 264B—Transport, Mixing and Water Quality in Estuaries and Wetlands (4)
Lecture—4 hours. Prerequisite(s): ECI 141; ECI 240 Principal causes of mixing and transport in estuaries and wetlands, and their impacts on water quality. Topics include advection/diffusion; tides; transverse mixing; longitudinal dispersion; sediment transport; nutrient cycling; computer modeling of estuaries. Case studies of specific systems. Effective: 2000 Spring Quarter.

ECI 265—Stochastic Hydrology and Hydraulics (4)
Lecture—4 hours. Prerequisite(s): ECI 266; or Consent of Instructor. Physics-based stochastic methods in modeling hydrologic and hydraulic processes; theory for modeling hydrologic-hydraulic governing equations as stochastic partial differential equations applied to various hydrologic-hydraulic processes under uncertainty, including transport, open channel flow, overland flow, soil water flow, and groundwater. Effective: 2015 Winter Quarter.

ECI 266—Applied Stochastic Methods in Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 114 or MAT 131 or STA 130A or STA 131A or MAT 118A (can be concurrent) Stochastic processes classification; Gaussian random fields; stochastic calculus in mean square; Ito and Stratonovich stochastic differential equations; Fokker-Planck equation; stochastic differential equations
with random coefficients. Effective: 1999 Fall Quarter.

ECI 267—Water Resource Management (3)
Lecture—3 hours. Prerequisite(s): ECI 114; ECI 141; ECI 142; ECI 153 recommended. Engineering, institutional, economic, and social basis for managing local and regional water resources. Examples in the context of California's water development and management. Uses of computer modeling to improve water management. (GEO 212.) Effective: 2013 Fall Quarter.

ECI 268—Infrastructure Economics (3)
Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ENG 106; Or the equivalent. Economics applied to infrastructure engineering planning, operations, maintenance, and management problems; microeconomic and macroeconomic theories; benefit-cost analysis; effect of uncertainty; optimization economics; non-classical economics; public finance. Effective: 2018 Spring Quarter.

ECI 269—Transportation-Air Quality: Theory and Practice (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECI 149; Or the equivalent. Health and regulatory
aspects of airborne pollutants. Principles of modeling
vehicle emissions. Conformity issues and the regulatory
framework. Regional and micro-scale modeling. Effective: 1999 Fall Quarter.

ECI 270—Advanced Water Resources Management (3)
Lecture—3 hours. Prerequisite(s): ECI 153; ECI 267; Or the equivalent. Discussion of technical papers related to planning theory, system maintenance, regionalization, multi-objective methods, risk analysis, institutional issues, pricing model application, economic development, forecasting, operations, and other topics. Effective: 1997 Winter Quarter.

ECI 271—Inverse Problems (4)
Lecture—4 hours. Prerequisite(s): ECI 114; ECI 144; Or equivalents. Inverse calibration of distributed parameter models, using data representing model outputs. Forward and inverse mappings, stability, uniqueness, identifiability. Optimization formulation of inverse problems, maximum likelihood and other objective functions, indirect and direct approaches, solution by UCODE in hands-on project format. Effective: 2010 Fall Quarter.

ECI 272A—Advanced Hydrogeology (4)
Lecture—4 hours. Prerequisite(s): ECI 144; MAT 118A recommended. Flow in confined, unconfined, and leaky aquifers. Geological aspects of aquifers. Regional groundwater flow and hydraulics of pumping and recharging wells. Identification of aquifer parameters. Isotope hydrogeology and recharge estimation. Effective: 2000 Fall Quarter.

ECI 272B—Advanced Hydrogeology (4)
Lecture—4 hours. Prerequisite(s): ECI 212A; ECI 272A Processes of subsurface flows and transport. Numerical methods of subsurface fluid flow and transport systems. Flow in the unsaturated zone. Fresh water-salt water interface in coastal aquifers. Macrodispersion. Identification of regional aquifer parameters. Modeling of aquifer systems. Effective: 2000 Fall Quarter.

ECI 272C—Multiphase Reactive Transport (4)
Lecture—4 hours. Prerequisite(s): ECI 142; ECI 144; ECI 148A Multicomponent reactive transport including multiple phases. Advective/dispersive transport, chemical equilibria, and mass transformation kinetics. Natural chemical/microbiological processes including sorption, complexation, biodegradation, and diffusive mass transfer. Eulerian and Lagrangean averaging methods. Applications to contaminant remediation problems in river and subsurface hydrology. Effective: 2004 Fall Quarter.

ECI 273—Water Resources Systems Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 114; ECI 153; Or the equivalent. Planning and management of water resource systems. Deterministic and stochastic simulation and optimization techniques. Capacity design and operation of reservoir systems for water supply, hydropower, flood control, and environmental objectives. Effective: 2018 Winter Quarter.

ECI 275—Hydrologic Time-Series Analysis (4)
Lecture—4 hours. Prerequisite(s): ECI 114; ECI 142 Application of statistical methods for analysis and modeling of hydrologic series. Statistical simulation and prediction of hydrologic sequences using time series methodology. Effective: 2003 Fall Quarter.

ECI 276—Watershed Hydrology (4)
Lecture—4 hours. Prerequisite(s): ECI 142; Or the equivalent. Analysis and mathematical modeling of hydrologic processes taking place in a watershed. Precipitation analysis and modeling. Theory of overland flow and its kinematic wave approximation.Analysis and modeling of saturated and unsaturated subsurface flow processes taking place on a hill slope. Effective: 1997 Winter Quarter.

ECI 277A—Computational River Mechanics I (4)
Lecture—4 hours. Prerequisite(s): EAD 115 (can be concurrent); ECI 141 (can be concurrent) Unsteady open channel flows, computation of water surface profiles, shallow water equations, St. Venant equations, method of characteristics, finite difference methods, stability and accuracy of explicit and implicit schemes, flood routing in simple and compound channels, advection of plumes. Not open for credit to students who have taken ECI 277. Effective: 2004 Fall Quarter.

ECI 277B—Computational River Mechanics II (4)
Lecture—4 hours. Prerequisite(s): ECI 277A Open channel flows, physical aspects of river mechanics, formulation of depth-averaged equations, boundary conditions, coordinates transformation and grid generation, finite-difference solution techniques, applications to two-dimensional momentum and pollutant transport in rivers. Effective: 2004 Fall Quarter.

ECI 277C—Turbulence and Mixing Processes (4)
Lecture—4 hours. Prerequisite(s): Graduate standing. Nature of turbulent flows, conservation equations, momentum, heat and mass transport in free and wall-bounded flows, body forces and mixing, roughness effects, turbulence modeling and simulation. Effective: 2004 Fall Quarter.

ECI 278—Hydrodynamics (3)
Lecture—3 hours. Prerequisite(s): ECI 141 Perturbation methods. Basic water waves. Governing equations for fluid motion on a rotating earth. Rotation effects, vorticity dynamics, Ekman layer. Stratification effects, internal waves and turbulent mixing. Combined effects. Effective: 1997 Winter Quarter.

ECI 279—Advanced Mechanics of Fluids (4)
Lecture—4 hours. Prerequisite(s): ECI 141 Rotational flows. Navier-Stokes equations and solutions for laminar flow; boundary layer equations and solution techniques. Nature of turbulence. Reynolds equations. Introduction to turbulence modeling. Effective: 1997 Winter Quarter.

ECI 280A—Nonlinear Finite Elements for Elastic-Plastic Problems (4)
Lecture—4 hours. Prerequisite(s): Consent of Instructor. State of the art finite element methods and tools for elasticplastic problems, including computational techniques based on the finite element method and the theory of elastoplasticity. Effective: 2008 Spring Quarter.

ECI 280B—Nonlinear Dynamic Finite Elements (4)
Lecture—4 hours. Prerequisite(s): Consent of Instructor. State of the art computational methods and tools for analyzing linear and nonlinear dynamics problems. Effective: 2009 Spring Quarter.

ECI 281A—Advanced Soil Mechanics (4)
Lecture—4 hours. Prerequisite(s): ECI 171 Consolidation and secondary compression. Preloading and wick drains. Seepage and seepage pressures. Filtration, drainage, and dewatering. Shear strength: friction, cohesion, dilatancy and critical states. Effective: 2004 Fall Quarter.

ECI 281B—Advanced Soil Mechanics (5)
Laboratory—3 hours; Lecture—4 hours. Prerequisite(s): ECI 281A Site investigation and soil characterization within the context of slope stability analysis. Effective: 2014 Spring Quarter.

ECI 282—Pavement Design and Rehabilitation (4)
Lecture—4 hours. Prerequisite(s): ECI 179; or Consent of Instructor. Advanced pavement design and structural/functional condition evaluation for concrete and asphalt pavements. Highways, airfields, port facilities; new facilities, rehabilitation, reconstruction. Mechanistic-empirical procedures, materials, climate and traffic characterization. Use of current design methods; recent developments and research. Effective: 2004 Winter Quarter.

ECI 283—Physico-Chemical Aspects of Soil Behavior (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECI 171 Study of the geotechnical behavior of soils considering formation, transport, mineralogy, soil-fluid-electrolyte systems, surface tension, particle mechanics, shape, fabric, and structure. Laboratories demonstrate effects of fundamental interparticle forces (contact, Van Der Waals, capillarity and chemical). Effective: 2012 Fall Quarter.

ECI 284—Theoretical Geomechanics (4)
Lecture—4 hours. Prerequisite(s): ECI 171 Elasticity, plasticity, micromechanics, coupled behavior and large deformations for geomaterials. Prediction of stress-strain-volume change behavior of geomaterials. Monotonic and cyclic loading, anisotropy, bifurcation of deformation. Effective: 2004 Winter Quarter.

ECI 286—Advanced Foundation Design (4)
Lecture—4 hours. Prerequisite(s): ECI 173 Design and analysis of pile and pier foundations, including seismic effects; deep excavation systems; tie-back, nailing, and anchor systems; coffer dams; loads on buried conduits; ground modification techniques; and other related topics. Effective: 2004 Spring Quarter.

ECI 287—Geotechnical Earthquake Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 138; ECI 281A Characteristics and estimation of earthquake ground motions; wave propagation and local site response; liquefaction potential and remediation; residual strength and stability considerations; ground deformations; dynamic soil-structure interaction. Effective: 2004 Spring Quarter.

ECI 288—Earth and Rockfill Dams (4)
Lecture—4 hours. Prerequisite(s): ECI 281A; ECI 281B (can be concurrent) Site selection; design considerations; layout; seismic effects including considerations of fault movements; construction; environmental considerations, instrumentation; maintenance remediation and retrofit of existing dams. Effective: 2004 Winter Quarter.

ECI 289A—Selected Topics in Civil Engineering; Environmental Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Environmental Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289B—Selected Topics in Civil Engineering; Hydraulics and Hydrologic Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Hydraulics and Hydrologic Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289C—Selected Topics in Civil Engineering; Engineering Planning (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Engineering Planning. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289D—Selected Topics in Civil Engineering; Geotechnical Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Geotechnical Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289E—Selected Topics in Civil Engineering; Structural Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Structural Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289F—Selected Topics in Civil Engineering; Structural Mechanics (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Structural Mechanics. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289G—Selected Topics in Civil Engineering; Transportation Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Transportation Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289H—Selected Topics in Civil Engineering; Transportation Planning (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Transportation Planning. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289I—Selected Topics in Civil Engineering; Water Resources Engineering (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Directed group study in Water Resources Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 290—Seminar (1)
Seminar—1 hour. Discussion of current graduate research, and guest lectures on recent advances. Oral presentation of individual study. Course required of graduate degree candidates. (S/U grading only.) Effective: 1997 Winter Quarter.

ECI 290C—Graduate Research Group Conference (1)
Discussion—1 hour. Research problems, progress, and techniques in civil engineering. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

ECI 296—Topics in Water and Environmental Engineering (1)
Seminar—2 hours. Seminars presented by visiting lecturers, UC Davis faculty and, graduate students. May be repeated for credit. (S/U grading only.) Effective: 2000 Winter Quarter.

ECI 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

ECI 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

ECI 390—The Teaching of Civil Engineering (1)
Discussion—1 hour. Prerequisite(s): Meet qualifications for teaching assistant and/or associate-in in Civil Engineering. Participation as teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated up to 9 unit(s). (S/U grading only.) Effective: 1997 Winter Quarter.

Environmental Geology Minor; Geology

Environmental Geology Minor; Geology | Environmental Geology Minor

(College of Letters and Science)

Michael E. Oskin, Ph.D., Chairperson of the Department

David A. Osleger, Ph.D., Vice-Chairperson, Undergraduate Program

Sujoy Mukhopadhyay, Ph.D., Vice-Chairperson, Graduate Program

Department Office. 2119 Earth and Physical Sciences Building; 530-752-0350; http://www.geology.ucdavis.edu

Faculty. See http://geology.ucdavis.edu/people/faculty/index.php

The minor in Environmental Geology examines the multidisciplinary factors of geology and related earth science fields, and planning and resources oriented programs. Students in the minor are encouraged to participate in internship programs that assist them in solidifying the Environmental Geology minor with their Geology major or other major field areas that include geologic components.

The minor is sponsored by the Department of Earth and Planetary Sciences.

Minor Advisor. See Geology major advisors.

Environmental Geology **Units:** 27-28

GEL 130	Non-Renewable Natural Resources	3
GEL 134	Environmental Geology and Land Use Planning	3
ESM 186	Environmental Remote Sensing	5
SSC 118	Soils in Land Use and the Environment	4
HYD 141	Physical Hydrology	4
OR		
ECI 142	Engineering Hydrology	4

Choose two:

ESP 160	The Policy Process	4
ESP 171	Urban and Regional Planning	4
ESP 179	Environmental Impact Assessment	4
HYD 144	Groundwater Hydrology	4
HYD 146	Hydrogeology and Contaminant Transport	5

Total: 27-28

Environmental Horticulture & Urban Forestry

Environmental Horticulture & Urban Forestry | Environmental Horticulture & Urban Forestry B.S.

(College of Agricultural and Environmental Sciences)

Faculty. http://www.plantsciences.ucdavis.edu/plantsciences/databases/directory/faculty.aspx

The Major Program. Students majoring in Environmental Horticulture and Urban Forestry learn how plants improve the environment and the quality of our lives. The major focuses on the biological and physical concepts and horticultural principles of plant production, management of plants and plant ecosystems in landscape settings and sociological aspects of plant/people interactions in the urban environment. Plants are used to revegetate and restore disturbed landscapes, control erosion and reduce energy and water consumption. The ornamental use of plants to improve the aesthetic quality of urban and rural landscapes, recreational areas, interiorscapes and commercial sites is an important aspect of this major. Students may select one or more of the following three areas of specialization: Floriculture/Nursery, Plant Biodiversity/Restoration, or Urban Landscape Management.

Internships and Career Opportunities. Students are encouraged to develop internships on or off campus to augment their activities in the classroom and laboratory. Internships are available with the department's greenhouse facility, the UC Davis Arboretum, landscape designers, local nurseries, government agencies, regional non-profits, and restoration firms. Career opportunities in

this field include growing and/or managing plants in a variety of settings, including nurseries and arboreta, consulting as an arborist, or as an urban, landscape, or restoration horticulturist; business ownership; park management and landscape contracting; working in the public or private sector, or for non-profit organizations.

Major Advisor. T.P. Young

Preparatory Subject Matter **Units:** 56-62

Communications 1 recommended as part of the College English Composition Requirement or the Words and Images Core Literacy Component.

ENH 001	Introduction to Environmental Horticulture/Urban Forestry	3
ENH 006	Introduction to Environmental Plants	4
LDA 030	History of Environmental Design	4
BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
PLS 002	Botany and Physiology of Cultivated Plants	4
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5

Choose one:

ESP 001	Environmental Analysis	4
ESP 010	Current Issues in the Environment	3
ESP 030	World Ecosystems & Geography	3

PHY 001A	Principles of Physics	3
PHY 001B	Principles of Physics	3
PLS 021	Application of Computers in Technology	3

MAT 016A	Short Calculus	3
OR		
STA 013	Elementary Statistics	4

Choose one:

UWP 102B	Writing in the Disciplines: Biology	4
UWP 102G	Writing in the Disciplines: Environmental Writing	4
UWP 104E	Writing in the Professions: Science	4

Other upper division composition course. May overlap with college composition requirement; may be satisfied by passing the English Composition Exam.

Lower division restricted electives

Choose one lower division resource science course and one lower division social science/humanities course in consultation with adviser; minimum six units.

Depth Subject Matter **Units:** 39-43

ENH 102	Physiological Principles in Environmental Horticulture	4
OR		
PLS 100A	Metabolic Processes of Cultivated Plants	3

Choose one:

ENH 105	Taxonomy and Ecology of Environmental Plant Families	4

PLS 102	California Floristics	5
PLB 108	Systematics and Evolution of Angiosperms	5

PLB 117	Plant Ecology	4
OR		
PLS 150	Sustainability and Agroecosystem Management	4

PLS 171	Principles and Practices of Plant Propagation	4
SSC 100	Principles of Soil Science	5

Choose two:

ENT 110	Arthropod Pest Management	5
NEM 100	General Plant Nematology	4
PLP 120	Introduction to Plant Pathology	4
PLS 105	Concepts in Pest Management	3
PLS 176	Introduction to Weed Science	4

Internship or research; must be approved by major advisor.

Upper division restricted electives

In consultation with an advisor, choose three upper division courses in the areas of resource sciences and social sciences/humanities; at least one course must come from each of these two areas; minimum nine units.

Areas of Specialization (choose one)

No course may be used to satisfy more than one requirement.

Floriculture/Nursery Option

ENH 120	Management of Container Media	3
ENH 125	Greenhouse and Nursery Crop Production	5
ABT 165	Irrigation Practices for an Urban Environment	2
ENT 135	Introduction to Biological Control	4

Choose one:

PLS 100C	Environmental Interactions of Cultivated Plants	3
PLS 158	Mineral Nutrition of Plants	4
SSC 109	Sustainable Nutrient Management	4

Plant Biodiversity/Restoration Option

ENH 160	Restoration Ecology	3
ENH 160L	Restoration Ecology Laboratory	1

Choose one:

ENH 150	Genetics and Plant Conservation: The Biodiversity Crisis	3
EVE 100	Introduction to Evolution	4
PLB 116	Plant Morphology and Evolution	5

(a) Choose one:

ESM 141	Role of Fire in Natural Ecosystems	4
ESP 127	Plant Conservation Biology	4
ESP 155L	Wetland Ecology Laboratory	3
PLS 130	Rangelands: Ecology, Conservation and Restoration	3

PLS 150	Sustainability and Agroecosystem Management	4
WFC 155	Habitat Conservation and Restoration	3

(b) Choose one:

ESP 155	Wetland Ecology	4
PLB 108	Systematics and Evolution of Angiosperms	5
PLB 117	Plant Ecology	4
PLB 119	Population Biology of Invasive Plants and Weeds	3
PLS 102	California Floristics	5
PLS 144	Trees and Forests	4
PLS 147	California Plant Communities	3
AND		
PLS 147L	California Plant Communities Field Study	1
PLS 163	Ecosystem and Landscape Ecology	4
PLS 176	Introduction to Weed Science	4
WFC 156	Plant Geography	4
WFC 157	Coastal Ecosystems	4

Choose one additional class from section a or b.

Urban Landscape Management Option

ENH 100	Urban Forestry	4
ENH 133	Woody Plants in the Landscape: Growth, Ecology and Management	4
ABT 165	Irrigation Practices for an Urban Environment	2
PLS 162	Urban Ecology	3
SAS 018	GIS and Society	3
OR		
LDA 150	Introduction to Geographic Information Systems	4

Total: 95-105

Environmental Horticulture Minor; Plant Sciences

Environmental Horticulture Minor; Plant Sciences | Environmental Horticulture Minor

(College of Agricultural and Environmental Sciences)

Faculty. http://www.plantsciences.ucdavis.edu/plantsciences/databases/directory/faculty.aspx

Major Program. See Environmental Horticulture and Urban Forestry.

Related Undergraduate Programs. See the undergraduate majors in Ecological Management and Restoration, Plant Biology, and Plant Sciences.

Related Courses. See Plant Biology and Plant Sciences.

Minor Advisor. A. Volder (Plant Sciences)

Environmental Horticulture **Units:** 23-25

ENH 006	Introduction to Environmental Plants	4
ENH 105	Taxonomy and Ecology of Environmental Plant Families	4
PLS 171	Principles and Practices of Plant Propagation	4

Choose three:

ENH 100	Urban Forestry	4
ENH 120	Management of Container Media	3
ENH 125	Greenhouse and Nursery Crop Production	5
ENH 133	Woody Plants in the Landscape: Growth, Ecology and Management	4

Total: 23-25

Environmental Horticulture Minor; Plant Sciences | ENH Courses

Questions pertaining to the following courses should be directed to the instructor or to the Plant Sciences Advising Office in 1224 Plant and Environmental Sciences Building; 530-752-7738.

Courses in ENH:

ENH 001—Introduction to Environmental Horticulture/Urban Forestry (3)
Lecture—3 hours. Introduction to the use of plants to enhance the physical, visual and social environment, the use of ecological principles in developing sustainable, low maintenance landscape systems, and the career opportunities in these areas. GE credit: SE, SL. Effective: 2016 Winter Quarter.

ENH 006—Introduction to Environmental Plants (4)
Discussion—2 hours; Laboratory—3 hours; Lecture—1 hour. Classification, nomenclature and variation of environmental plants. The use of floral and vegetative characteristics and terminology to key unknown plants. Characteristics of plant groups and basics of climate, soils and plant selection. Identification of 150 common landscape plants. GE credit: SE, VL. Effective: 1999 Fall Quarter.

ENH 100—Urban Forestry (4)
Laboratory—3 hours; Lecture—2 hours; Term Paper. Prerequisite(s): ENH 001 or PLS 002 or BIS 002B Principles and practices of planning and managing urban vegetation. Basics of tree appraisal, natural resource inventory, and development of long term urban forest management plans. GE credit: SE. Effective: 2017 Winter Quarter.

ENH 101—Trees of the Urban Forest (2)
Laboratory—2 hours; Lecture—1 hour. Prerequisite(s): ENH 006; or Consent of Instructor. Identification and evaluation of 200 tree species of the urban forest on campus, in the Arboretum, and in the city of Davis; appraised and aesthetic values, condition, and branch structure; contribution of trees to this ecosystem. Bicycle required. GE credit: SE, VL. Effective: 2004 Fall Quarter.

ENH 102—Physiological Principles in Environmental Horticulture (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 001C Physiological principles and processes essential to floriculture, nursery crop production, turfculture and landscape horticulture. Emphasis on the control of vegetative and reproductive development for a broad species range in greenhouse and extensive landscape environments. GE credit: SE. Effective: 1997 Winter Quarter.

ENH 105—Taxonomy and Ecology of Environmental Plant Families (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): ENH 006; or Consent of Instructor. Classification and identification of introduced and native species used
in urban forests, with emphasis on floral and vegetative characteristics of the prominent families of angiosperms and gymnosperms, adaptations to environmental variations in western landscapes, and horticultural
classification. GE credit: SE, VL. Effective: 1998 Spring Quarter.

ENH 120—Management of Container Media (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): SSC 010 or SSC 100 Principles of soil science and practices related to management of container media are taught, emphasizing appropriate use of soils and amendments, irrigation, and fertilizers.Physical and chemical properties are tested and effects of management on crops are evaluated in the laboratory. GE credit: QL, SE, WE. Effective: 2017 Winter Quarter.

ENH 125—Greenhouse and Nursery Crop Production (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): PLS 002 or BIS 002C Principles and techniques for the production of ornamental greenhouse and nursery crops. Hands-on experience producing greenhouse crops. Optional weekend field trip. GE credit: SE, WE. Effective: 2017 Winter Quarter.

ENH 133—Woody Plants in the Landscape: Growth, Ecology and Management (4)
Discussion—1 hour; Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): PLS 002 or BIS 002C Principles and practices of managing trees and shrubs in the urban landscape and other managed environments. Topics include woody plant form; growth response and adaptation; tree management in relation to soil, moisture, climate; plant problems. GE credit: SE. Effective: 2017 Winter Quarter.

ENH 150—Genetics and Plant Conservation: The Biodiversity Crisis (3)
Lecture/Discussion—3 hours. Prerequisite(s): BIS 001C; Or the equivalent. Conservation of genic diversity, measurement of diversity, threats to
diversity and reasons for protection, the process of extinction, distribution of diversity, determination of what to conserve and means of conservation. Examples drawn largely from forest tree species. GE credit: SE, SL. Effective: 1998 Winter Quarter.

ENH 160—Restoration Ecology (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): PLB 117 or EVE 117 or PLB 147; or equivalent course in ecology/plant ecology Conceptual bases of restoration ecology; tools used by restoration ecologists to solve practical problems; scope and success of actual restoration projects. GE credit: SE, SL, WE. Effective: 2017 Winter Quarter.

ENH 160—Restoration Ecology (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): PLB 117 or EVE 117 or PLS 147; or equivalent course in ecology/plant ecology. Application of ecological complexity to restoration design, implementation and monitoring across variable environments and under changing environmental conditions. Integration of physiology, population, community, ecosystem, and landscape ecology. GE credit: SE, SL. Effective: 2018 Fall Quarter.

ENH 160L—Restoration Ecology Laboratory (1)
Discussion/Laboratory—3 hours. Prerequisite(s): ENH 160 (can be concurrent); and Consent of Instructor. Companion field course to course 160. A series of part-day and all day visits to various field sites, involving site evaluations, guest field presentations by local restorationists, and actual restoration activities. Not open for credit to students who completed ENH 160 prior to spring 2004. GE credit: SE, SL. Effective: 2004 Spring Quarter.

Environmental Policy & Management

Environmental Policy & Management | Environmental Policy & Management

John Muir Institute of the Environment

Program Coordinators: Jessica Penrose

Program Chair: Michael Springborn

The Master of Science in Environmental Policy & Management (EPM) program provides training in applying environmental science to real-world environmental policy and management issues. Graduates of this program are equipped to integrate technical and scientific expertise in a social-

political-natural context to provide effective environmental policy and management solutions; for more information, see Environmental Policy and Management.

Environmental Policy Analysis & Planning

Environmental Policy Analysis & Planning | EPA&P Information

(College of Agricultural and Environmental Sciences)

Faculty. http://desp.ucdavis.edu/faculty

Environmental Policy Analysis & Planning | EPA&P B.S.

(College of Agricultural and Environmental Sciences)

Faculty. http://desp.ucdavis.edu/faculty

The Major Program

The major in environmental policy analysis and planning develops skills for designing and assessing sustainable policies for environmental quality and natural resource management.

Any student in good standing is eligible to transfer to the major; to do so, please see the staff advisor, Melissa Whaley, in 2134 Wickson Hall, or the master advisor, Prof. J. Sanchirico, in 2102 Wickson Hall.

The Program. This major provides students with a strong background in policy analysis, including the evaluation of policy alternatives and the study of factors affecting policy formulation and implementation. Key components of this interdisciplinary training include a general background in the natural sciences relevant to environmental policy, economics, political science, statistics, and research methodology to quantitatively analyze environmental problems and policy options. In addition, students are encouraged to develop substantive knowledge in a specific field of environmental policy, such as urban and regional planning, water policy, transportation and energy, climate policy, or conservation management.

Careers. Environmental policy analysis and planning graduates are prepared for employment in environmental, natural resource, energy, and transportation focused public agencies, consulting firms, non-governmental organizations, and businesses, or as legislative aides for elected representatives. The major is also excellent preparation for students who want to go on to graduate work in law, planning, public policy, political science, economics, or business.

Major Advisor. J. Sanchirico (Environmental Science and Policy)

English Composition and Public Speaking Requirement **Units:** 3-8

Choose one:

UWP 101	Advanced Composition	4
UWP 102A	Writing in the Disciplines: Special Topics	4
UWP 102B	Writing in the Disciplines: Biology	4
UWP 102C	Writing in the Disciplines: History	4
UWP 102D	Writing in the Disciplines: International Relations	4
UWP 102E	Writing in the Disciplines: Engineering	4
UWP 102F	Writing in the Disciplines: Food Science and Technology	4
UWP 102G	Writing in the Disciplines: Environmental Writing	4
UWP 104A	Writing in the Professions: Business Writing	4
UWP 104B	Writing in the Professions: Law	4
UWP 104C	Writing in the Professions: Journalism	4

UWP 104D	Writing in the Professions: Elementary and Secondary Education	4
UWP 104E	Writing in the Professions: Science	4

Passing the Upper Division English Composition exam.

Choose one:

CMN 001	Introduction to Public Speaking	4
CMN 003	Interpersonal Communication Competence	4
DRA 010	Introduction to Acting	4

Preparatory Subject Matter **Units:** 46-52

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 010	Everyday Biology	4
OR		
BIS 010V	General Biology (Discontinued)	4
CHE 002A	General Chemistry	5
OR		
CHE 010	Concept of Chemistry	4
PHY 001A	Principles of Physics	3

Choose one:

BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
CHE 002B	General Chemistry	5
PHY 001B	Principles of Physics	3

PLS 021	Application of Computers in Technology	3
OR		
SAS 018	GIS and Society	3
ECN 001A	Principles of Microeconomics	4
ECN 001B	Principles of Macroeconomics	4

Choose one:

ANS 001	Domestic Animals and People	4
ATM 060	Introduction to Atmospheric Science	4
ESM 100	Principles of Hydrologic Science	4
GEL 001	The Earth	4
GEL 134	Environmental Geology and Land Use Planning	3
PLS 012	Plants and Society	4
WFC 011	Introduction to Conservation Biology	3

ESP 001	Environmental Analysis	4
MAT 016A	Short Calculus	3
MAT 016B	Short Calculus	3
OR		
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4

POL 001	American National Government	4
STA 013	Elementary Statistics	4
OR		
STA 032	Gateway to Statistical Data Science	4

Satisfaction of General Education requirement.

Depth Subject Matter **Units:** 49-51

Students must take these units on a letter grade basis, and must attain an overall grade point average of 2.000 or higher in the Depth Subject Matter courses.

ESP 110	Principles of Environmental Science	4
ESP 160	The Policy Process	4
ESP 161	Environmental Law	4
ESP 168A	Methods of Environmental Policy Evaluation	5
ESP 168B	Methods of Environmental Policy Analysis	4
ESP 178	Applied Research Methods	4
ESP 179	Environmental Impact Assessment	4

Choose one:

ARE 106	Econometric Theory and Applications	4
SOC 106	Intermediate Social Statistics	5
STA 100	Applied Statistics for Biological Sciences	4
STA 103	Applied Statistics for Business and Economics	4
STA 108	Applied Statistical Methods: Regression Analysis	4

ARE 100A	Intermediate Microeconomics: Theory of Production and Consumption	4
OR		
ECN 100	Intermediate Micro Theory	4
ABT 150	Introduction to Geographic Information Systems	4

Choose one:

ARE 176	Environmental Economics	4
ECN 125	Energy Economics	4
ESP 175	Natural Resource Economics	4

Choose one:

ABT 181N	Concepts and Methods in Geographic Information Systems	4
ABT 182	Environmental Analysis using GIS	4
ESM 185	Aerial Photo Interpretation and Remote Sensing	4
ESM 186	Environmental Remote Sensing	5

Areas of Specialization; choose one **Units:** 12-17

Students must choose courses in the Areas of Specialization that have not been taken in the Depth Subject Matter.

City & Regional Planning

ESP 171	Urban and Regional Planning	4
ESP 172	Public Lands Management	4

Choose one:

ECI 165	Transportation Policy	3
ESP 163	Energy and Environmental Aspects of Transportation	4

Choose one:

AHI 168	Great Cities	4
CRD 149	Community Development Perspectives on Environmental Justice	4
CRD 152	Community Development	4
CRD 156	Community Economic Development	5
CRD 171	Housing and Social Policy	4
ETX 110	Toxic Tragedies and Their Impact on Society	2
ESP 173	Land Use and Growth Controls	4
POL 100	Local Government and Politics	4

Climate Change Policy

ESP 165N Climate Policy (Discontinued) 3

Choose one:

ARE 176	Environmental Economics	4
ECN 125	Energy Economics	4
ESP 163	Energy and Environmental Aspects of Transportation	4
ESP 167	Energy Policy	4
ESP 171	Urban and Regional Planning	4

Choose two:

ATM 116	Modern Climate Change	3
ATM 133	Biometeorology	4
ATM 160	Introduction to Atmospheric Chemistry	4
ESM 131	Air as a Resource	3
ESM 116N (Nonexistent)		
SAS 025	Global Climate Change: Convergence of Biological, Geophysical, & Social Sciences	3
SAS 025V	Global Climate Change: Convergence of Biological, Geophysical, & Social Sciences	3

Conservation Management

Choose two:

ESP 166N	Ocean and Coastal Policy (Discontinued)	3
ESP 169	Water Policy and Politics	3
ESP 170	Conservation Biology Policy	4
ESP 172	Public Lands Management	4

Choose one:

ENH 160	Restoration Ecology	3
ESM 141	Role of Fire in Natural Ecosystems	4
ESM 100	Principles of Hydrologic Science	4
ESM 121	Water Science and Management	3
ESP 127	Plant Conservation Biology	4
EVE 115	Marine Ecology	4
EVE 138	Ecology of Tropical Latitudes	5
WFC 154	Conservation Biology	4
WFC 155	Habitat Conservation and Restoration	3

Choose one:

AAS 176	The Politics of Resources	4
AAS 177	Politics of Life in Africa	4
ARE 115A	Economic Development	4
ANT 103	Indigenous Peoples and Natural Resource Conservation	4
ASA 114	Asian Diasporas	4
CHI 112	Globalization, Transnational Migration, and Chicana/o and Latina/o Communities	4
CRD 153A	International Community Development: Asia	4
CRD 153B	International Community Development: Europe	4
CRD 153C	International Community Development: Africa	4
IRE 104	The Political Economy of International Migration	4
SOC 145A	Sociology of Third World Development	4

Energy & Transportation Planning

Choose one:

ECN 125	Energy Economics	4
ENG 106	Engineering Economics	3
ESP 175	Natural Resource Economics	4

Choose two:

ECI 165	Transportation Policy	3
ESP 163	Energy and Environmental Aspects of Transportation	4
ESP 167	Energy Policy	4
ESP 172	Public Lands Management	4

Choose one:

ATM 116	Modern Climate Change	3
ECI 123	Urban Systems and Sustainability	4
ECI 143	Green Engineering Design and Sustainability	4
ENG 160	Environmental Physics and Society	3
ESM 131	Air as a Resource	3
GEL 130	Non-Renewable Natural Resources	3

Environmental Policy & Politics

Choose one:

POL 100	Local Government and Politics	4
POL 104	California State Government and Politics	4
POL 105	The Legislative Process	4
POL 107	Environmental Politics and Administration	4
POL 109	Public Policy and the Governmental Process	4

Choose one:

POL 162	Elections and Voting Behavior	4
POL 164	Public Opinion	4
POL 165	Mass Media and Politics	4
POL 170	Political Psychology	4

Choose one:

ECI 165	Transportation Policy	3
ESP 165N	Climate Policy (Discontinued)	3
ESP 166N	Ocean and Coastal Policy (Discontinued)	3
ESP 167	Energy Policy	4

ESP 169	Water Policy and Politics	3
ESP 170	Conservation Biology Policy	4
ESP 171	Urban and Regional Planning	4
ESP 172	Public Lands Management	4

Choose one:

ARE 106	Econometric Theory and Applications	4
ARE 176	Environmental Economics	4
ECI 153	Deterministic Optimization and Design	4
ECN 130	Public Microeconomics	4
ESP 175	Natural Resource Economics	4

Integrative Policy

Students choosing this individualized track must consult with a faculty adviser to identify an area of emphasis within this track and to select four upper division courses with a common theme. Possible areas of emphasis are marine policy, pollutants in the environment, planning in the presence of environmental hazards, sustainable development, or environmental and natural resource economics. If you are considering this track, please contact the major adviser as soon as possible.

Water Management

Choose two:

ESP 166N	Ocean and Coastal Policy (Discontinued)	3
ESP 169	Water Policy and Politics	3
HYD 150	Water Law	3

Choose two:

ESM 100	Principles of Hydrologic Science	4
ESM 121	Water Science and Management	3
ESP 151	Limnology	4
ESP 155	Wetland Ecology	4
GEL 134	Environmental Geology and Land Use Planning	3
HYD 141	Physical Hydrology	4
HYD 143	Ecohydrology	4
SSC 118	Soils in Land Use and the Environment	4
WFC 120	Biology and Conservation of Fishes	3
BIS 124	Coastal Marine Research	6
ESP 116N	Oceanography	3
ESP 124	Marine and Coastal Field Ecology	3
ESP 150C	Biological Oceanography	4
ESP 152	Coastal Oceanography	3

Total: 110-128

Environmental Policy Analysis & Planning | EPA&P Minor

(College of Agricultural and Environmental Sciences)

Faculty. http://desp.ucdavis.edu/faculty

The faculty for environmental policy analysis and planning offers the following minor. The Environmental Policy Analysis minor is for natural and social science students desiring basic training in policy analysis theory and methods.

Minor Advisor. J. Sanchirico (Environmental Science and Policy)

Environmental Policy Analysis **Units:** 60-62

Preparation:

ECN 001A	Principles of Microeconomics	4
Basic course in political science		

ESP 001	Environmental Analysis	4
ESP 160	The Policy Process	4
ESP 161	Environmental Law	4
ESP 168A	Methods of Environmental Policy Evaluation	5

Choose two:

ESP 163	Energy and Environmental Aspects of Transportation	4
ESP 165N	Climate Policy (Discontinued)	3
ESP 166N	Ocean and Coastal Policy (Discontinued)	3
ESP 167	Energy Policy	4
ESP 168B	Methods of Environmental Policy Analysis	4
ESP 169	Water Policy and Politics	3
ESP 171	Urban and Regional Planning	4
ESP 172	Public Lands Management	4
ESP 179	Environmental Impact Assessment	4

Total: 60-62

Environmental Science & Management

Environmental Science & Management | ESM B.S.

(College of Agricultural and Environmental Sciences)

Randy Southard, Chairperson

Department Office. 1110 Plant and Environmental Sciences Building; 530-752-1130; http://lawr.ucdavis.edu

Faculty. http://www.lawr.ucdavis.edu/people/faculty

The Major Program

The Environmental Science and Management (ESM) major is designed for students who are interested in solving environmental problems from an interdisciplinary perspective linking the natural and social sciences.

Students who choose this major will study the interaction of physical, biological, and social components of environmental problems. Students completing the program will understand the scientific basis for environmental decision making and the legal, economic, and political issues involved in management of the environment.

The Program. Courses in biology, chemistry, physics, economics, geology, and calculus form the lower-division preparatory foundation of the curriculum. These are then tied together with Environmental Science and Policy 1, "Environmental Analysis" which provides an inter-disciplinary analysis of several environmental problems. The upper-division core consists of foundation courses in physical, biological, and social sciences, as well as applied courses in environmental monitoring, GIS, impact reporting, and statistical analysis. In their junior year, students must choose a specialized track from the following six options:

(a) Ecology, Biodiversity, and Conservation
(b) Natural Resource Management
(c) Climate Change and Air Quality
(d) Geospatial Information Science
(e) Watershed Science
(f) Soils and Biogeochemistry

A capstone course is required for all seniors and serves to integrate the science, policy/management and biology aspects of the ESM major. All students gain practical experience through field courses and a required internship. Selected students may also pursue an honors thesis in their senior year.

The ESM major is jointly administered by the Departments of Environmental Science and Policy (ESP) and Land, Air and Water Resources (LAWR). Any student in good standing is eligible to transfer to the major; to do so, please see the student affairs officers in 2134 Wickson Hall or in 1150 Plant and Environmental Sciences Building.

Careers. Graduates from this program are prepared to pursue careers as practicing environmental scientists, resource analysts and planners working for public agencies and private firms specializing in environmental quality, natural resources or ecological research. The major is also an excellent preparation for graduate or professional training in physical and/or biological environmental science graduate programs, as well as in environmental law, administration and environmental policy.

Major Advisors. Marcel Holyoak (Environmental Science and Policy) and Terrance Nathan (Land, Air and Water Resources)

Advising centers for the major, including peer advising, are located in both the Environmental Science and Policy and Land, Air and Water Resources departments. Students whose last names begin with the letters A-L, please see Melissa Whaley in 2134 Wickson Hall. Students whose last names begin with the letters M-Z, please see Lacole Brooks in 1150 Plant and Environmental Sciences.

English Composition and Public Speaking Requirement **Units:** 4-8

Choose one:

UWP 101	Advanced Composition	4
UWP 102A	Writing in the Disciplines: Special Topics	4
UWP 102B	Writing in the Disciplines: Biology	4
UWP 102C	Writing in the Disciplines: History	4
UWP 102D	Writing in the Disciplines: International Relations	4
UWP 102E	Writing in the Disciplines: Engineering	4
UWP 102F	Writing in the Disciplines: Food Science and Technology	4
UWP 102G	Writing in the Disciplines: Environmental Writing	4
UWP 104A	Writing in the Professions: Business Writing	4
UWP 104B	Writing in the Professions: Law	4
UWP 104C	Writing in the Professions: Journalism	4
UWP 104D	Writing in the Professions: Elementary and Secondary Education	4
UWP 104E	Writing in the Professions: Science	4

Passing the Upper Division English Composition exam.

Choose one:

CMN 001	Introduction to Public Speaking	4
CMN 003	Interpersonal Communication Competence	4
DRA 010	Introduction to Acting	4

Preparatory Subject Matter **Units:** 48-57

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
BIS 002C	Introduction to Biology: Biodiversity and the Tree of Life	5
GEL 001	The Earth	4

OR

GEL 050	Physical Geology	3

GEL 050 Recommended.

CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
OR		
CHE 002AH	Honors General Chemistry	5
CHE 002BH	Honors General Chemistry	5
CHE 002C	General Chemistry	0
OR		
CHE 002CH	Honors General Chemistry	0

CHE 002C or CHE 002CH Recommended, but not required.

PHY 001A	Principles of Physics	3
PHY 001B	Principles of Physics	3
OR		
PHY 007A	General Physics	4
PHY 007B	General Physics	4
PHY 007C	General Physics	4
ECN 001A	Principles of Microeconomics	4
MAT 016A	Short Calculus	3
MAT 016B	Short Calculus	3
OR		
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4

MAT 017A & MAT 017B Recommended.

OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
ESP 001	Environmental Analysis	4

Satisfaction of the General Education requirement.

Depth Subject Matter **Units:** 28-32

ESM 120	Global Environmental Interactions	4
ESP 100	General Ecology	4
OR		
EVE 101	Introduction to Ecology	4
ESP 162	Environmental Policy	4
STA 013	Elementary Statistics	4
OR		
STA 100	Applied Statistics for Biological Sciences	4

STA 100 Recommended.

Choose one:

ESM 108	Environmental Monitoring	3
ESP 179	Environmental Impact Assessment	4

ABT 150	Introduction to Geographic Information Systems	4

Internship:

ESM 192	Internship	3
OR		
ESP 192	Internship	3

Capstone Class:

ESM 195	Integrating Environmental Science and Management	2

Honors Thesis; optional:

ESM 194H	Senior Honor Thesis	0-3

Ecology, Biodiversity and Conservation Track **Units:** 36-46

EVE 100	Introduction to Evolution	4

Choose one:

ATM 060	Introduction to Atmospheric Science	4
ATM 116	Modern Climate Change	3
ATM 133	Biometeorology	4
ESM 121	Water Science and Management	3
ESM 131	Air as a Resource	3
ESP 152	Coastal Oceanography	3
GEL 134	Environmental Geology and Land Use Planning	3
SSC 100	Principles of Soil Science	5

Choose one:

ESP 170	Conservation Biology Policy	4
ESP 171	Urban and Regional Planning	4
ESP 172	Public Lands Management	4
ESP 179	Environmental Impact Assessment	4
SOC 160	Sociology of the Environment	4

Choose one:

ESP 127	Plant Conservation Biology	4
WFC 154	Conservation Biology	4

Choose one:

ESP 123	Introduction to Field and Laboratory Methods in Ecology	4
ESP 124	Marine and Coastal Field Ecology	3
EVE 180A	Experimental Ecology and Evolution in the Field	4
WFC 100	Field Methods in Wildlife, Fish, & Conservation Biology	4
OR		
ENH 160	Restoration Ecology	3
AND		
ENH 160L	Restoration Ecology Laboratory	1
OR		
PLS 147	California Plant Communities	3
AND		
PLS 147L	California Plant Communities Field Study	1

Choose one:

ESP 121	Population Ecology	4
WFC 122	Population Dynamics and Estimation	4

Choose one:

EVE 104	Community Ecology	4
EVE 115	Marine Ecology	4
EVE 181	Ecology and Evolution of Animal-Plant Interactions	4
ESP 151	Limnology	4
ESP 155	Wetland Ecology	4
PLB 117	Plant Ecology	4
WFC 155	Habitat Conservation and Restoration	3

Choose one:

EVE 147	Biogeography	4
PLS 162	Urban Ecology	3
ENH 160	Restoration Ecology	3

Choose one biome level course on wetlands, forests, or water:

ESM 144	Trees and Forests	4
ESP 124	Marine and Coastal Field Ecology	3
ESP 150C	Biological Oceanography	4
ESP 151	Limnology	4
ESP 155	Wetland Ecology	4
EVE 115	Marine Ecology	4
EVE 138	Ecology of Tropical Latitudes	5
PLS 130	Rangelands: Ecology, Conservation and Restoration	3

Choose one organismal biology course on birds, mammals, or plants:

ENT 103	Insects Systematics	3
ENT 116	Freshwater Macroinvertebrates	3
EVE 112	Biology of Invertebrates	3
EVE 114	Experimental Invertebrate Biology	3
PLB 102	California Floristics	5
	PLB 102 fulfills both the organismal lecture and lab requirements, simultaneously.	
PLB 116	Plant Morphology and Evolution	5
	PLB 116 fulfills both the organismal lecture and lab requirements, simultaneously.	
PLB 119	Population Biology of Invasive Plants and Weeds	3
	PLB 119 fulfills both the organismal lecture and lab requirements, simultaneously.	
WFC 110	Biology and Conservation of Wild Mammals	3
WFC 111	Biology and Conservation of Wild Birds	3
WFC 120	Biology and Conservation of Fishes	3
WFC 134	Herpetology	3

Complete one lab associated with either the biome level or organismal biology course:

ENT 116L	Aquatic Insect Collection	2
ESP 151L	Limnology Laboratory	3
ESP 155L	Wetland Ecology Laboratory	3
EVE 112L	Biology of Invertebrates Laboratory	2
EVE 180B	Experimental Ecology and Evolution in the Field	4
WFC 110L	Laboratory in Biology and Conservation of Wild Mammals	3
WFC 111L	Laboratory in Biology and Conservation of Wild Birds	3
WFC 120L	Laboratory in Biology and Conservation of Fishes	2
WFC 134L	Herpetology Laboratory	3

Natural Resource Management Track **Units:** 32-42

STA 103	Applied Statistics for Business and Economics	4
OR		
Equivalent upper-division statistics.		

Choose three:

ESP 160	The Policy Process	4
ESP 165N	Climate Policy (Discontinued)	3
ESP 166N	Ocean and Coastal Policy (Discontinued)	3
ESP 167	Energy Policy	4
ESP 168A	Methods of Environmental Policy Evaluation	5
ESP 169	Water Policy and Politics	3
ESP 171	Urban and Regional Planning	4
ESP 172	Public Lands Management	4
ESP 179	Environmental Impact Assessment	4
SOC 160	Sociology of the Environment	4

Choose one:

ESP 161	Environmental Law	4
HYD 150	Water Law	3

Choose two:

ENT 104	Behavioral Ecology of Insects	3
ESM 141	Role of Fire in Natural Ecosystems	4
ESM 144	Trees and Forests	4
ESP 151	Limnology	4
ESP 155	Wetland Ecology	4
EVE 115	Marine Ecology	4
PLB 117	Plant Ecology	4
PLS 130	Rangelands: Ecology, Conservation and Restoration	3
WFC 110	Biology and Conservation of Wild Mammals	3
WFC 111	Biology and Conservation of Wild Birds	3
WFC 120	Biology and Conservation of Fishes	3
WFC 134	Herpetology	3

Choose two:

ATM 116	Modern Climate Change	3
ESM 121	Water Science and Management	3
ESM 131	Air as a Resource	3
SSC 100	Principles of Soil Science	5

ESM 185	Aerial Photo Interpretation and Remote Sensing	4
OR		
ESM 186	Environmental Remote Sensing	5

Climate Change and Air Quality Track **Units:** 32-41

ATM 060	Introduction to Atmospheric Science	4

Choose three:

ATM 115	Hydroclimatology	3
ATM 116	Modern Climate Change	3
ATM 133	Biometeorology	4

ATM 160	Introduction to Atmospheric Chemistry	4
ESM 131	Air as a Resource	3
GEL 108	Earth History: Paleoclimates	3

Choose two:

ESM 100	Principles of Hydrologic Science	4
ESM 121	Water Science and Management	3
ESP 166N	Ocean and Coastal Policy (Discontinued)	3
HYD 143	Ecohydrology	4
SSC 100	Principles of Soil Science	5

Choose one:

ESM 144	Trees and Forests	4
ESP 124	Marine and Coastal Field Ecology	3
ESP 150C	Biological Oceanography	4
ESP 151	Limnology	4
ESP 155	Wetland Ecology	4
EVE 115	Marine Ecology	4
PLS 130	Rangelands: Ecology, Conservation and Restoration	3

Choose one:

EVE 147	Biogeography	4
EVE 149	Evolution of Ecological Systems	4

Choose two:

ESP 163	Energy and Environmental Aspects of Transportation	4
ESP 165N	Climate Policy (Discontinued)	3
ESP 166N	Ocean and Coastal Policy (Discontinued)	3
ESP 167	Energy Policy	4
ESP 171	Urban and Regional Planning	4
ESP 172	Public Lands Management	4
ESP 179	Environmental Impact Assessment	4
SOC 160	Sociology of the Environment	4

Geospatial Information Science Track **Units:** 31-39

Choose two:

ABT 181N	Concepts and Methods in Geographic Information Systems	4
ABT 182	Environmental Analysis using GIS	4
ESM 185	Aerial Photo Interpretation and Remote Sensing	4
ESM 186	Environmental Remote Sensing	5

Choose two:

ESP 163	Energy and Environmental Aspects of Transportation	4
ESP 165N	Climate Policy (Discontinued)	3
ESP 166N	Ocean and Coastal Policy (Discontinued)	3
ESP 169	Water Policy and Politics	3
ESP 171	Urban and Regional Planning	4
ESP 172	Public Lands Management	4
ESP 179	Environmental Impact Assessment	4
SOC 160	Sociology of the Environment	4

Choose two:

ESP 121	Population Ecology	4
STA 104	Applied Statistical Methods: Nonparametric Statistics	4

STA 106	Applied Statistical Methods: Analysis of Variance	4
STA 108	Applied Statistical Methods: Regression Analysis	4
STA 130A	Mathematical Statistics: Brief Course	4
STA 130B	Mathematical Statistics: Brief Course	4
STA 137	Applied Time Series Analysis	4

Other applicable information technology courses from the Engineering department including database management, digital library science and network and Web technologies may be substituted for spatial information with approval.

Choose three from the following options; must cover both physical and biological courses:

ATM 110	Weather Observation and Analysis	4
ATM 116	Modern Climate Change	3
ATM 133	Biometeorology	4
SSC 100	Principles of Soil Science	5
ESP 124	Marine and Coastal Field Ecology	3
ESP 150C	Biological Oceanography	4
ESP 151	Limnology	4
ESP 152	Coastal Oceanography	3
ESP 155	Wetland Ecology	4
GEL 136	Ecogeomorphology of Rivers and Streams	5
PLS 101	Agriculture and the Environment	3
PLB 117	Plant Ecology	4

Soils and Biogeochemistry **Units:** 38-46

SSC 100 Principles of Soil Science 5

Choose four:

ESM 100	Principles of Hydrologic Science	4
HYD 134	Aqueous Geochemistry	6
SSC 102	Environmental Soil Chemistry	3
SSC 105	Field Studies of Soils in California Ecosystems	5
SSC 107	Soil Physics	5
SSC 109	Sustainable Nutrient Management	4
SSC 111	Soil Microbiology	4
SSC 120	Soil Genesis, Morphology, and Classification	5

Choose two:

ESM 121	Water Science and Management	3
ESP 165N	Climate Policy (Discontinued)	3
ESP 166N	Ocean and Coastal Policy (Discontinued)	3
ESP 171	Urban and Regional Planning	4
ESP 172	Public Lands Management	4
ESP 179	Environmental Impact Assessment	4
SOC 160	Sociology of the Environment	4

Choose one:

ESM 185	Aerial Photo Interpretation and Remote Sensing	4
GEL 134	Environmental Geology and Land Use Planning	3
HYD 147	Runoff, Erosion and Water Quality Management	3
SSC 118	Soils in Land Use and the Environment	4

Choose two:

ATM 160	Introduction to Atmospheric Chemistry	4
ESM 144	Trees and Forests	4
ESP 116N	Oceanography	3
ESP 150A	Physical and Chemical Oceanography	4
ESP 150C	Biological Oceanography	4
ESP 151	Limnology	4
ESP 155	Wetland Ecology	4
GEL 132	Introductory Inorganic Geochemistry	3
PLB 117	Plant Ecology	4
PLS 130	Rangelands: Ecology, Conservation and Restoration	3

Watershed Science Track **Units:** 38-47

ATM 133	Biometeorology	4
ESM 121	Water Science and Management	3
OR		
HYD 010	Water, Power, Society	3
SSC 100	Principles of Soil Science	5

Choose two:

ESM 100	Principles of Hydrologic Science	4
OR		
HYD 141	Physical Hydrology	4
HYD 142	Systems Hydrology	4
HYD 143	Ecohydrology	4
ESM 108	Environmental Monitoring	3
OR		
HYD 151	Field Methods in Hydrology	4

Choose one:

GEL 035	Rivers	3
GEL 136	Ecogeomorphology of Rivers and Streams	5
GEL 139	Rivers: Form, Function and Management	4
GEL 140	Introduction to Process Geomorphology	4

Choose one:

ABT 181N	Concepts and Methods in Geographic Information Systems	4
ABT 182	Environmental Analysis using GIS	4

Choose one:

SSC 105	Field Studies of Soils in California Ecosystems	5
SSC 118	Soils in Land Use and the Environment	4
SSC 120	Soil Genesis, Morphology, and Classification	5

Choose two:

ESP 166N	Ocean and Coastal Policy (Discontinued)	3
ESP 168A	Methods of Environmental Policy Evaluation	5
ESP 169	Water Policy and Politics	3
ESP 172	Public Lands Management	4
ESP 179	Environmental Impact Assessment	4
HYD 150	Water Law	3

LDA 060	Landform and Grading Studio	6

Choose one:

ENT 116	Freshwater Macroinvertebrates	3
EVE 115	Marine Ecology	4
WFC 120	Biology and Conservation of Fishes	3
WFC 134	Herpetology	3

Total: 111-114

Environmental Science & Management | ESM Courses

Courses in ESM:

ESM 008—Water Quality at Risk (3)
Discussion—1 hour; Lecture—2 hours. Not open to students who have successfully completed Environmental and Resource Sciences 8. (Formerly Environmental and Resource Sciences 8.) Natural and human threats to water quality. Balance of science and policy in all aspects of attaining, maintaining, and managing water quality, water contamination. Decoding popular media coverage of water quality and water contamination. (SAS 008.) GE credit: SE, SL, SS, WE. Effective: 2011 Fall Quarter.

ESM 030—World Ecosystems & Geography (3)
Lecture—3 hours. Not open to students who have successfully completed Environmental and Resource Sciences 30. (Formerly Environmental and Resource Sciences 30.) Introduction to the earth's major geographic regions and associated ecosystems, such as deserts, temperate forests, and oceans with an examination of how climate, vegetation regimes, ecological processes, agriculture and other human activities interact in different regions of the world. (ESP 030.) GE credit: SE, SL, WC. Effective: 2011 Fall Quarter.

ESM 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Work experience off and on campus in resource sciences. Internship supervised by a member of the faculty. May be repeated for credit. (P/NP grading only.) Effective: 2011 Fall Quarter.

ESM 098—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Primarily for lower division students. (P/NP grading only.) Effective: 2011 Fall Quarter.

ESM 098F—Student Facilitated Course Development (1-3)
Variable—1-3 hours. Prerequisite(s): Consent of Instructor. Student-facilitated (taught) course intended for lower division students. (P/NP grading only.) Effective: 2016 Winter Quarter.

ESM 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2011 Fall Quarter.

ESM 100—Principles of Hydrologic Science (4)
Lecture—4 hours. Prerequisite(s): CHE 002B; MAT 016B; (PHY 007A or PHY 009A) Not open to students who have successfully completed Environmental and Resource Sciences 100. (Formerly Environmental and Resource Sciences 100.) Topics include hydrology (surface and ground water), hydraulic
flow through porous media, water in the soil-plant-atmosphere continuum, water quality, flow through open channels, and representative water-resource problems. GE credit: QL, SE, SL. Effective: 2011 Fall Quarter.

ESM 108—Environmental Monitoring (3)
Fieldwork; Laboratory—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): EVE 101; ESP 100; ETX 101; WFC 100; ERS 100; SSC 100; ENH 100; LDA 050; Or the equivalent for any of theses courses. Not open to students who have successfully completed Environmental and Resource Sciences 108. (Formerly Environmental and Resource Sciences 108.) Instrumentation and methods for environmental and ecological monitoring; GPS, sensors, datalogging, and GIS. Wide range of measurement techniques for environmental parameters. GE credit: SE, SL. Effective: 2011 Fall Quarter.

ESM 120—Global Environmental Interactions (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): One college level chemistry course; one college level biology course. Limited to 25 students per discussion section. Not open to students who have successfully completed Environmental Resources Sciences 60 or 120. (Formerly Environmental Resources Sciences 60 and 120.) Relationships among climate, hydrology, biogeochemical cycles, soils and vegetation distribution in diverse landscapes and biomes. Emphasis on physical, chemical, and biological processes affecting ecosystems from the poles to the equator, and human impacts on the environment. Effective: 2010 Fall Quarter.

ESM 121—Water Science and Management (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): PHY 010 or GEL 001 Not open to students who have successfully completed Environmental and Resource Sciences 121. (Formerly Environmental and Resource Sciences 121.) Role of water as an essential natural resource in contemporary society. Aspects of the scientific method, including descriptions of natural phenomena and underlying physical causes. Water for cities, agriculture, industry, wildlife and recreation; case studies of water management. GE credit: QL, SE, SL. Effective: 2011 Fall Quarter.

ESM 131—Air as a Resource (3) ***Review all entries***
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): CHE 010 Not open to students who have successfully completed Environmental and Resource Sciences 131. (Formerly Environmental and Resource Sciences 131.) Degradation of the atmospheric resource, historical aspects and effects of air pollution examined. Evaluation of primary gaseous and particulate pollutants and discussion of their impact. GE credit: QL, SE, SL. Effective: 2011 Fall Quarter.

ESM 131—Air as a Resource (3) ***Review all entries***
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): (CHE 010 or CHE 002A); CHE 002B Not open to students who have successfully completed Environmental and Resource Sciences 131. (Formerly Environmental and Resource Sciences 131.) Degradation of the atmospheric resource, historical aspects and effects of air pollution examined. Evaluation of primary gaseous and particulate pollutants and discussion of their impact. GE credit: QL, SE, SL. Effective: 2019 Winter Quarter.

ESM 141—Role of Fire in Natural Ecosystems (4)
Lecture—3 hours; Term Paper. Prerequisite(s): (BIS 002A or PLS 002); (BIS 002B or BIS 002C); Basic biological, ecology/evolution concepts. Not open to students who have successfully completed Environmental and Resource Sciences 141. (Formerly Environmental and Resource Sciences 141.) Fire regimes and roles in major North American vegetation types, especially in the west. Physics of fire, fire effects on organisms and ecosystem functioning, reconstructing fire histories, fire in resource management, and fire use by indigenous people. GE credit: SE, SL, WE. Effective: 2011 Fall Quarter.

ESM 144—Trees and Forests (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PLS 002 or BIS 001C or BIS 002C Biological structure and function of trees as organisms; understanding of forests as communities and as ecosystems; use of forests by humans; tree phenology, photosynthesis, respiration, soil processes, life histories, dormancy, forest biodiversity, and agroforestry. Not open for credit to students who have completed PLB 144 or ENH 144 or ERS 144. (Former course PLB/ENH/ERS 144.). (PLS 144.) GE credit: SE, VL. Effective: 2011 Fall Quarter.

ESM 185—Aerial Photo Interpretation and Remote Sensing (4)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): Upper division standing. Not open to students who have successfully completed Environmental Resource Science 185. (Formerly Environmental Resource Science 185.) Basics of remote sensing and photogrammetry, grids and map projections, aerial photo interpretation, sensors and platforms for aerial and space photography and non-photographic imaging systems, aerial thermography, microwave sensing, and introduction to remote sensing applications. Effective: 2011 Fall Quarter.

ESM 186—Environmental Remote Sensing (5)
Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): MAT 016B; (PHY 007C or PHY 009B); Upper division standing; LDA 150 recommended. Not open to students who have successfully completed Hydrologic Science 186 or Environmental and Resource Sciences 186. (Formerly Hydrologic Science 186 and formerly Environmental and Resource Sciences 186.) Overview of satellite, airborne, and ground-based remote sensing, building on properties of electromagnetic radiation. Applications include hydrologic processes, weather and climate, ecology and land use, soils, geology, forestry, and agriculture. Computer based analysis and visualization of images and processing techniques. GE credit: QL, SE, VL. Effective: 2014 Winter Quarter.

ESM 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Work experience off and on campus in resource sciences. Internship supervised by a member of the faculty. (P/NP grading only.) Effective: 2011 Fall Quarter.

ESM 194H—Senior Honor Thesis (2-6)
Independent Study—2-6 hours. Prerequisite(s): Senior standing, overall GPA of 3.50 or higher and consent of master advisor. Independent study, guided research on an environmentally related subject of special interest to the student. May be repeated for credit. GE credit: SE, WE. Effective: 2011 Fall Quarter.

ESM 195—Integrating Environmental Science and Management (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Senior status in Environmental Science and Management major or other environmental science major (e.g. Environmental Resource Science; Environmental Biology and Management; Environmental Toxicology; Environmental Policy Analysis and Planning, Wildlife, Fish, and Conservation Biology; Hydrologic Science). Practical aspects of environmental improvement through integrated analyses of contemporary issues or problems associated with advocacy, regulation, science and resource management from the perspectives of the physical and ecological sciences and current policy/management. May be repeated up to 2 time(s). GE credit: SE, SS. Effective: 2011 Fall Quarter.

ESM 198—Directed Group Study (1-5)
Variable. May be repeated for credit. (P/NP grading only.) Effective: 2011 Fall Quarter.

ESM 198F—Student Facilitated Course (1-3)
Variable—1-3 hours. Prerequisite(s): Consent of Instructor. Restricted to upper division standing or consent of instructor. Student-facilitated (taught) course intended for upper division students. (P/NP grading only.) Effective: 2016 Spring Quarter.

ESM 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2011 Fall Quarter.

ESM 199FA—Student Teaching Course Development (1-3)
Variable—1-3 hours. Prerequisite(s): Consent of Instructor. Restricted to upper division standing. Under the supervision of a faculty member, an undergraduate student plans and develops the course they will teach under 98F/198F. (P/NP grading only.) Effective: 2016 Winter Quarter.

ESM 199FB—Student Teaching Course Development (1-3)
Variable—1-3 hours. Prerequisite(s): Consent of Instructor. Student facilitated. Under the supervision of a faculty member, an undergraduate student teaches a course under 98F/198F. (P/NP grading only.) Effective: 2016 Winter Quarter.

Environmental Science & Policy

Environmental Science & Policy | ESP Information

(College of Agricultural and Environmental Sciences)

Marcel Holyoak, Ph.D., Chairperson of the Department

Mark N. Lubell, Ph.D., Vice Chairperson

Department Office. 2132 Wickson Hall; 530-752-3026; http://desp.ucdavis.edu/

Faculty. http://desp.ucdavis.edu/faculty

The Program of Study

Environmental Science and Policy is a teaching and research department offering courses, workshops, and directed group study classes that focus on the complex trade-offs that arise from interdependencies between natural and human systems. The department offers Bachelor of Science degrees in Environmental Science and Management and in Environmental Policy Analysis and Planning. Courses in Environmental Science and Policy also supplement major programs in a wide variety of established disciplines.

Current Information. Through its continuing contacts with many other departments and teaching divisions on the campus, the department develops a variety of special courses and workshops each year. Check with the Department office for up-to-date information about our courses and workshops.

Graduate Study. The Graduate Group in Ecology which is housed in Environmental Science & Policy offers an M.S. and Ph.D. degree program. Further information about graduate programs in ecology should be obtained from the chairperson of the Graduate Group in Ecology.

Group Office. 1005 Wickson Hall; 530-752-6752; http://ecology.ucdavis.edu/

Environmental Science & Policy | ESP Courses

Courses in ESP:

ESP 001—Environmental Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): UWP 001 (can be concurrent) or UWP 001Y (can be concurrent) or UWP 001V (can be concurrent) or ENL 003 (can be concurrent); Or equivalent; sophomore standing; ECN 001A and BIS 002B recommended. Analysis of the physical, biological, and social interactions which constitute environmental problems. Emphasis on analysis of environmental problems, the consequences of proposed solutions, and the interaction of environmental science and public policy in creating solutions. GE credit: SE, SL, SS. Effective: 2018 Spring Quarter.

ESP 010—Current Issues in the Environment (3)
Lecture—3 hours. Prerequisite(s): Elementary biology recommended. The science behind environmental issues, and policies affecting our ability to solve domestic and international environmental problems. Resources, environmental quality, regulation, environmental perception and conservation. Integrative case studies. Not open for credit to students who have completed ESP 1. GE credit: SE, SL, SS, WE. Effective: 2004 Fall Quarter.

ESP 030—World Ecosystems & Geography (3)
Lecture—3 hours. Not open to students who have successfully completed Environmental and Resource Sciences 30. (Formerly Environmental and Resource Sciences 30.) Introduction to the earth's major geographic regions and associated ecosystems, such as deserts, temperate forests, and oceans with an examination of how climate, vegetation regimes, ecological processes, agriculture and other human activities interact in different regions of the world. (ESM 030.) GE credit: SE, SL, WC. Effective: 2011 Fall Quarter.

ESP 092—Internship (1-12)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. Work experience off and on campus in all subject areas offered in the
College of Agricultural and Environmental Sciences. Internship supervised by member of the faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

ESP 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Primarily for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

ESP 100—General Ecology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (BIS 002A, BIS 002B, BIS 002C); ((MAT 016A, MAT 016B) or (MAT 017A, MAT 017B) or (MAT 021A, MAT 021B)); STA 013 recommended. Theoretical and experimental analysis of the distribution, growth and
regulation of species populations; predator-prey and competitive interactions; and the organization of natural communities. Application of evolutionary and ecological principles to selected environmental problems. GE credit: SE, SL. Effective: 2016 Fall Quarter.

ESP 101—Ecology, Nature, and Society (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 001 or ANT 002 or ESP 030 or EVE 100 or BIS 101 recommended. Interdisciplinary study of diversity and change in human societies, using frameworks from anthropology, evolutionary ecology, history, archaeology, psychology, and other fields. Topics include population dynamics, subsistence transitions, family organization, disease, economics, warfare, politics, and resource conservation. (ANT 101.) GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ESP 105—Evolution of Societies and Cultures (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 001 or ANT 002 or ESP 030 or EVE 100 or BIS 101 recommended. Interdisciplinary study of social and cultural evolution in humans. Culture as a system of inheritance,psychology of cultural learning, culture as an adaptive system,evolution of maladaptations, evolution of technology and institutions,evolutionary transitions in human history, coevolution of genetic and cultural variation. Only two units of credit for students who took ESP 101 or ANT 101 prior to fall 2004. (ANT 105.) GE credit: QL, SS, WC, WE. Effective: 2016 Fall Quarter.

ESP 110—Principles of Environmental Science (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (PHY 001A or PHY 007A); (MAT 016B or MAT 017B or MAT 021B); BIS 002A or BIS 010 recommended; upper division standing. Application of physical and chemical principles, ecological concepts, and systems approach to policy analysis of atmospheric environments, freshwater and marine environments, land use, energy supplies and technology, and other resources. GE credit: QL, SE, SL. Effective: 2018 Winter Quarter.

ESP 111—Marine Environmental Issues (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Examination of critical environmental issues occurring in coastal waters including the effects of climate change, overfishing, and other human impacts. Through readings and group discussions, students will develop an integrative understanding of the oceanographic and ecological processes. May be repeated up to 2 time(s) when topics differ. (EVE 111.) GE credit: SE, SL. Effective: 2015 Summer Session 1.

ESP 116N—Oceanography (3)
Fieldwork; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): GEL 001 or GEL 002 or GEL 016 or GEL 050 Advanced oceanographic topics: Chemical, physical, geological, and biological processes; research methods and data analysis; marine resources, anthropogenic impacts, and climate change; integrated earth/ocean/atmosphere systems; weekly lab and one weekend field trip. (GEL 116N.) GE credit: SE, SL. Effective: 2017 Winter Quarter.

ESP 121—Population Ecology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B; BIS 002C; (MAT 016B or MAT 017B or MAT 021B or MAT 021BH) Development of exponential and logistic growth models for plant and animal populations, analysis of age structure and genetic structure, analysis of competition and predator-prey systems. Emphasis is on developing models and using them to make predictions and solve problems. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

ESP 123—Introduction to Field and Laboratory Methods in Ecology (4)
Fieldwork—4 hours; Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): (ESP 100 or EVE 101); STA 100; Or equivalent of EVE 101 and STA 100. Introduces students to methods used for collecting ecological data in field and laboratory situations. Methods used by population ecologists and community ecologists; emphasis on experimental design, scientific writing and data analysis. GE credit: SE, SL. Effective: 2015 Spring Quarter.

ESP 124—Marine and Coastal Field Ecology (3)
Discussion—1 hour; Fieldwork—3 hours; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Upper division standing or consent of instructor. Introductory animal biology (BIS 001B) recommended; residence at or near Bodega Marine Lab required. Enrollment restricted to application at http://www.bml.ucdavis.edu. Ecology of marine populations and communities living in diverse habitats along the California coast. Hands-on learning using scientific process and tools of the biological trade to address ecological questions arising during field trips. Critical thinking through discussing scientific literature. GE credit: SE, SL. Effective: 2006 Summer Session 1.

ESP 127—Plant Conservation Biology (4)
Discussion—1 hour; Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ESP 100 or EVE 101; Or equivalent upper division general ecology. Principles governing the conservation of plant species and plant communities, including the roles of fire, exotic species, grazing, pollination, soils, and population genetics; analytic and practical techniques for plant conservation; and introduction to relevant legal, ethical, and policy issues. GE credit: SE, SL. Effective: 2016 Fall Quarter.

ESP 150A—Physical and Chemical Oceanography (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ESP 116N or GEL 116N); PHY 009B; MAT 021D; CHE 002C; and Consent of Instructor. Physical and chemical properties of seawater, fluid dynamics, air-sea interaction, currents, waves, tides, mixing, major oceanic geochemical cycles. (GEL 150A.) GE credit: QL, SE. Effective: 2017 Winter Quarter.

ESP 150B—Geological Oceanography (3)
Lecture—3 hours. Prerequisite(s): GEL 050 or (GEL 116N or ESP 116N) Introduction to the origin and geologic evolution of ocean basins. Composition and structure of oceanic crust; marine volcanism; and deposition of marine sediments. Interpretation of geologic history of the ocean floor in terms of sea-floor spreading theory. (GEL 150B.) GE credit: SE. Effective: 2017 Winter Quarter.

ESP 150C—Biological Oceanography (4)
Discussion—1 hour; Fieldwork; Lecture—3 hours. Prerequisite(s): BIS 002A; Consent of Instructor. A course in general ecology. Ecology of major marine habitats, including intertidal, shelf benthic, deep-sea and plankton communities. Existing knowledge and contemporary issues in research. Segment devoted to human use. One weekend field trip required. (GEL 150C.) GE credit: SE, SL. Effective: 2017 Winter Quarter.

ESP 151—Limnology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B; (BIS 002C and ESP 100 or EVE 101 recommended.) Biology and productivity of inland waters with emphasis on the physical and chemical environment. GE credit: SE. Effective: 2017 Spring Quarter.

ESP 151L—Limnology Laboratory (3)
Laboratory—6 hours. Prerequisite(s): ESP 151 (can be concurrent); Junior, senior, or graduate standing. Limnological studies of lakes, streams, and reservoirs with interpretation of aquatic ecology. GE credit: SE. Effective: 1997 Winter Quarter.

ESP 152—Coastal Oceanography (3)
Discussion—1 hour; Fieldwork—3 hours; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Upper division standing or consent of the instructor; physics (PHY 009B), calculus (MAT 021B) and exposure to physical and chemical oceanography (GEL 150A and ESP 150A) are recommended; residence at or near Bodega Marine Laboratory required. Enrollment restricted to application at http://www.bml.ucdavis.edu. Oceanography of coastal waters, including bays, river plumes, nearshore and estuaries; focus on transport patterns, how they are forced and implications for ecological and environmental problems. Pertinent for students in oceanography, ecology, environmental engineering, geology and hydrology. GE credit: SE, SL. Effective: 2006 Summer Special Session.

ESP 155—Wetland Ecology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 002A; Or equivalent of BIS 002A; ESP 100 or EVE 101 recommended. Introduction to wetland ecology. The structure and function of major wetland types and principles that are common to wetlands and that distinguish them from terrestrial and aquatic ecosystems. GE credit: SE. Effective: 2016 Fall Quarter.

ESP 155L—Wetland Ecology Laboratory (3)
Fieldwork; Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): ESP 155 (can be concurrent) Modern and classic techniques in wetland field ecology. Emphasis on sampling procedures, vegetation analysis, laboratory analytical procedures, and examples of successful wetland restoration techniques. GE credit: SE, SL. Effective: 1997 Winter Quarter.

ESP 160—The Policy Process (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): POL 001; ECN 001A and STA 013 recommended. Alternative models of public policymaking and application to case studies in the U.S. and California. GE credit: SS. Effective: 2016 Fall Quarter.

ESP 161—Environmental Law (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Upper division standing and one course in environmental science or political science recommended. Introduction for non-Law School students to some of the principal issues in environmental law and the judicial interpretation of some important environmental statutes, e.g., NEPA. GE credit: SS. Effective: 1997 Winter Quarter.

ESP 162—Environmental Policy (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 001A or ECN 001AV Compares economic with socio-cultural approaches to understanding the causes of environmental problems and strategies for addressing them. Includes different approaches to the policy process, policy instruments, and environmental behavior. Applies these principles to several problems. GE credit: SS. Effective: 2018 Winter Quarter.

ESP 163—Energy and Environmental Aspects of Transportation (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): ECN 001A or ECN 001AV or ENG 106 Engineering, economic, and systems planning concepts. Analysis and evaluation of energy, air quality and selected environmental attributes of transportation technologies. Strategies for reducing pollution and petroleum consumption in light of institutional and political constraints. Evaluation of vehicle emission models. (ECI 163.) GE credit: SE, SL, SS, WE. Effective: 2018 Spring Quarter.

ESP 164—Ethical Issues in Environmental Policy (3)
Lecture—3 hours. Prerequisite(s): ESP 160; ESP 168A; Seniors only in Environmental Policy Analysis and Planning or by consent of instructor. Basic modes of ethical reasoning and criteria of distributive justice
applied to selected topics in environmental policymaking. GE credit: SS. Effective: 1997 Winter Quarter.

ESP 165—Climate Policy (3)
Lecture—3 hours. Prerequisite(s): ESP 001 or ECN 001A or ECN 001AV; or Consent of Instructor. Models, data and assumptions behind competing arguments regarding societal response to the prospect of climate change at the state, national and international level from economic, ethical and policy science perspectives. Effective: 2018 Spring Quarter.

ESP 166—Ocean and Coastal Policy (3)
Lecture—3 hours. Prerequisite(s): ESP 001; or Consent of Instructor. Limited enrollment. Overview of U.S. and International ocean and coastal policy, including energy, coastal land-use and water quality, protected areas and species. GE credit: SS. Effective: 2017 Spring Quarter.

ESP 167—Energy Policy (4)
Lecture—4 hours; Term Paper. Prerequisite(s): (ECN 001A or ECN 001AV); (MAT 016B or MAT 017B or MAT 021B); or Consent of Instructor. Survey of primary energy resources (fossil, renewable, nuclear), energy conversion methods, future energy demand scenarios, and environmental impacts of energy. Overview of energy policy in the U.S. Analysis of policy alternatives for addressing energy-related environmental and national security issues. GE credit: SS. Effective: 2018 Spring Quarter.

ESP 168A—Methods of Environmental Policy Evaluation (5) ***Review all entries***
Discussion—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): (ESP 001 or ESP 010); (STA 013 or STA 100); ECN 001A; ECN 100 recommended. Evaluation of alternatives for solution of complex environmental problems; impact analysis, benefitcost analysis, distributional analysis, decision making under uncertainty, and multi-objective evaluation. GE credit: SS. Effective: 2018 Spring Quarter.

ESP 168A—Methods of Environmental Policy Evaluation (5) ***Review all entries***
Discussion—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): (ESP 001 or ESP 010); (STA 013 or STA 013Y or STA 100); (ECN 001A or ECN 001AV); ECN 100 recommended. Evaluation of alternatives for solution of complex environmental problems; impact analysis, benefitcost analysis, distributional analysis, decision making under uncertainty, and multi-objective evaluation. GE credit: SS. Effective: 2018 Summer Quarter.

ESP 168B—Methods of Environmental Policy Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ESP 168A Continuation of course 168A, with emphasis on examination of the literature for applications of research and evaluation techniques to problems of transportation, air and water pollution, land use, and energy policy. GE credit: SS. Effective: 1997 Winter Quarter.

ESP 169—Water Policy and Politics (3)
Lecture—3 hours. Prerequisite(s): ECN 001A or POL 001 recommended. Governance of water, including issues of water pollution/quality and water supply. The politics of water decision-making and effectiveness of water policy. Broad focus on federal water policy, with case examples from nationally significant U.S. watersheds. GE credit: SS. Effective: 2016 Fall Quarter.

ESP 170—Conservation Biology Policy (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): One course in environmental science (e.g., ESP 1), conservation (e.g., WFC 11 or WFC 154), or government (e.g., POL 1) recommended. Analysis of policies designed to conserve species and their habitats. Emphasis on how individual incentives affect the success of conservation policies. Valuation of endangered species and biodiversity. Criteria for deciding conservation priorities. GE credit: SE, SS. Effective: 2016 Fall Quarter.

ESP 171—Urban and Regional Planning (4)
Discussion—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): ESP 001 recommended. How cities plan for growth in ways that minimize environmental harm. Standard city planning tools (general plan, zoning ordinance) and innovative new approaches. Focus on planning requirements and practices in California. Relationships between local, regional, state, and federal policy. GE credit: SS, WE. Effective: 2016 Fall Quarter.

ESP 172—Public Lands Management (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 001A recommended. Investigation of alternative approaches to public lands management by Federal and state agencies. The role each agency's legislation plays in determining the range of resource allocations. GE credit: ACGH, SS. Effective: 2016 Fall Quarter.

ESP 173—Land Use and Growth Controls (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Upper division standing; one course in environmental policy. Exposes students to the economic, political, and legal factors affecting land use and growth controls, and helps students critically evaluate written materials in terms of their arguments and supporting data. GE credit: SS. Effective: 2016 Fall Quarter.

ESP 175—Natural Resource Economics (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100B or ECN 100; Or the equivalent. Pass One open to Managerial Economics (AMGE) and Environmental Policy Analysis and Planning (AEPP) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Economic concepts and policy issues associated with natural resources,
renewable resources (ground water, forests, fisheries, and wildlife populations) and non-renewable resources (minerals and energy resources, soil). (Agricultural and Resource Economics 175.) GE credit: SS. Effective: 2017 Winter Quarter.

ESP 175—Natural Resource Economics (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A C- or better or ECN 100A C- or better or ECN 100 C- or better Pass One open to Managerial Economics (AMGE) and Environmental Policy Analysis and Planning (AEPP) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Economic concepts and policy issues associated with natural resources, renewable resources (ground water, forests, fisheries, and wildlife populations) and non-renewable resources (minerals and energy resources, soil). (ARE 175.) GE credit: SS. Effective: 2018 Fall Quarter.

ESP 178—Applied Research Methods (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 103 or STA 100 or STA 108 or SOC 106 or ARE 106; Or the equivalent. Research methods for analysis of urban and regional land use, transportation, and environmental problems. Survey research and other data collection techniques; demographic analysis; basic forecasting, air quality, and transportation models. Collection, interpretation, and critical evaluation of data. GE credit: QL, SS. Effective: 2016 Fall Quarter.

ESP 179—Environmental Impact Assessment (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ESP 001; Or the equivalent. Introduction to the information resources and methods typically used in environmental impact analysis. Emphasis on how environmental information is applied to planning, environmental regulation, and public policymaking, with case studies from California land use and natural resource policy. GE credit: SS. Effective: 2016 Fall Quarter.

ESP 179L—Environmental Impact Reporting Using Geographic Information (2)
Discussion/Laboratory—2 hours; Laboratory—4 hours. Prerequisite(s): ESP 179 (can be concurrent); ESP 179 required concurrently. Introduction to Geographic Information Systems (GIS) by using ArcView for assessment and environmental planning. Not open for credit to students who have completed ABT 180, ABT 181, or ASE 132. GE credit: SE. Effective: 2002 Fall Quarter.

ESP 190—Workshops on Environmental Problems (1-8)
Laboratory—2-16 hours. Prerequisite(s): Consent of Instructor. Open to all upper division and graduate students on application. Workshops featuring empirical analyses of contemporary environmental problems by multidisciplinary student teams. Guided by faculty and lay professionals, the teams seek to develop an integrated view of a problem and outline a series of alternative solutions. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ESP 191A—Workshop on Food System Sustainability (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): PLS 015; CRD 020; ARE 121; PLS 150; or Consent of Instructor. Upper division standing. Priority enrollment for seniors in the sustainable agriculture and food systems major; limited to 25 students per section. First in a two-quarter senior capstone course sequence. Identify projects addressing specific problems and opportunities of sustainable agriculture and food systems, form multidisciplinary teams, and identify and consult with key stakeholders to understand their needs and concerns. GE credit: SE. Effective: 2009 Fall Quarter.

ESP 191B—Workshop on Food System Sustainability (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): ESP 191A Priority enrollment for seniors in the sustainable agriculture and food systems major; limited to 25 students per section. Continuation of course 191A. Student teams conduct analyses of a specific issue in sustainable agriculture or food systems, prepare a critical assessment of technological, economic, environmental, and social dimensions of options for action and present their results to stakeholders. GE credit: SE. Effective: 2010 Winter Quarter.

ESP 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Work experience off and on campus in all subject areas offered in the
College of Agricultural and Environmental Sciences. Internships supervised by a member of the faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

ESP 197T—Tutoring in Environmental Science and Policy (1-5)
Tutorial—2-6 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Experience in teaching under guidance of faculty member. (P/NP grading only.) Effective: 2014 Winter Quarter.

ESP 198—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

ESP 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

ESP 212A—Environmental Policy Process (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Course in public policy (e.g., ESP 160); environmental law (e.g., ESP 161); course in statistics (e.g., SOC 106 or ARE 106). Introduction to selected theories of the policy process and applications to the field of environmental policy. Develops critical reading skills, understanding of policy theory, and an ability to apply multiple theories to the same phenomena. (ECL 212A and ENV 200C.) Effective: 2017 Fall Quarter.

ESP 212B—Environmental Policy Evaluation (4)
Discussion—1 hour; Lecture—2 hours; Seminar—2 hours. Prerequisite(s): (STA 108 or ARE 106); ARE 176; Intermediate microeconomics (e.g., ECN 100); policy analysis (e.g., ESP 168A or the equivalent). Method and practice, philosophical basis, and political role of policy analysis. Reviews basic concepts from economic theory; how and why environmental problems emerge in a market economy; and tools necessary for solving environmental problems. (ECL 212B and ENV 200B.) Effective: 2018 Winter Quarter.

ESP 220—Tropical Ecology (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): ESP 100; EVE 101; EVE 117; EVE 138 recommended. Open to graduate and undergraduate students who meet requirement
subject to consent of instructor. An overview of present status of knowledge on structure and processes of major tropical ecosystems. Differences and similaritiees among tropical and temperate systems
stressed. Effective: 1997 Winter Quarter.

ESP 228—Advanced Simulation Modeling (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): (STA 108 or ARE 106); (ESP 128 and ESP 128L) Advanced techniques in simulation modeling; optimization and simulation,
dynamic parameter estimation, linear models, error propagation, and sensitivity testing. Latter half of course will introduce model evaluation in ecological and social system models. Effective: 1997 Winter Quarter.

ESP 252—Sustainable Transportation Technology and Policy (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): ESP 160; Or the equivalent. Role of technical fixes and demand management in creating a sustainable
transportation system. Emphasis on technology options, including alternative fuels, electric propulsion, and IVHS. Analysis of market demand and travel behavior, environmental impacts, economics and politics. (ECI 252.) Effective: 1997 Winter Quarter.

ESP 275—Economic Analysis of Resource and Environmental Policies (4)
Lecture/Discussion—4 hours. Prerequisite(s): ARE 204 or ECN 204 Development of externality theory, market failure concepts, welfare economics, theory of renewable and non-renewable resource use, and political economic models. Applications to policy issues regarding the agricultural/environment interface and managing resources in the public domain. (ARE 275.) Effective: 1999 Spring Quarter.

ESP 278—Research Methods in Environmental Policy (3)
Lecture/Discussion—3 hours. Prerequisite(s): ARE 106; Or the equivalent. Introduction to scientific research in environmental policy.Major issues in the philosophy of the social sciences.How to design research that acknowledges theoretical assumptions and that is likely to produce evidence in an intersubjectively reliable fashion with explicit recognition of its uncertainties. Effective: 1998 Winter Quarter.

ESP 298—Directed Group Study (1-5)
Variable. Effective: 1997 Winter Quarter.

ESP 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

ESP 396—Teaching Assistant Training Practicum (1-4)
Variable—3-12 hours. Prerequisite(s): Consent of Instructor. Open to graduate students only. Teaching assistant training practicum. May be repeated for credit. (S/U grading only.) Effective: 2017 Spring Quarter.

Environmental Toxicology

Environmental Toxicology | ETX Information

(College of Agricultural and Environmental Sciences)

Robert H. Rice, Ph.D., Chairperson of the Department

Department Office. 4138 Meyer Hall; 530-752-1142; http://etox.ucdavis.edu

Faculty. http://etox.ucdavis.edu/directory/faculty/

Environmental Toxicology | ETX B.S.

(College of Agricultural and Environmental Sciences)

Robert H. Rice, Ph.D., Chairperson of the Department

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The Major Program

Toxic agents in the environment include pesticides, food additives, industrial waste, and metals as well as chemicals produced by animals, plants, fungi and bacteria. Students in the Environmental Toxicology major learn how toxicants produce adverse effects by understanding their environmental fates and biological activities. They learn about monitoring concentrations and the distribution and persistence of agents found in water, soil, air and foods. Toxicity testing procedures and exposure assessments are used to help evaluate potential for harm to humans and other species. By understanding the cellular targets and biochemical mechanisms of perturbation by toxicants, toxicologists can better estimate adverse effects. Overall, students learn mechanisms by which toxic agents act, their origin and fate and how toxicologists evaluate the risk of adverse effects and balance them against the benefits.

The Program. Preparatory courses in biology, chemistry, mathematics, and physics are required to provide fundamental principles that underlie toxicology. Students in the major are expected to understand the environmental fates and biological activities of different classes of toxic substances,

and the legislative issues that arise from chemical use. Opportunities are available to develop in-depth understanding in areas of emphasis through selection of electives.

Emphases. Elective course work in many disciplines can complement the required core courses. Providing a framework for selecting restricted electives, the major offers specializations in (1) Ecotoxicology and Environmental Chemistry,(2) Forensic Science and Regulatory Toxicology, and (3) Molecular and Biomedical Toxicology. The first category includes topics in chemical fate, transport and degradation, as well as ecology, wildlife, and aquatic toxicology. The second category includes forensic science, environmental policy and management, and public health. The third category includes pharmacology, biotechnology, medicine, veterinary medicine, and food toxicology. Students are encouraged to select course work from these Emphases and beyond to match their interests.

Internships and Career Alternatives. Occupations that use environmental toxicology include risk assessment, pharmaceutical development, food additive toxicity testing, managing regulatory compliance, residue or forensic analysis, pest control, monitoring and field sampling, industrial hygiene, and environmental health and safety. A substantial proportion of graduates elect to pursue advanced training in graduate or professional schools. Others with the B.S. degree go on to law, medical, pharmacy, or veterinary medical school, as well as to graduate programs in pharmacology, toxicology, agricultural and environmental chemistry, or public health. During undergraduate study, optional internships or research projects are recommended to provide training and work experience to help students pursue future goals.

Major Advisor. Matthew Wood

Advising Center for the major is in 4111 Meyer Hall. Contact the Academic Program Advisor at 530-752-1042.

Preparatory Subject Matter **Units:** 72-74

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
BIS 002C	Introduction to Biology: Biodiversity and the Tree of Life	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 002C	General Chemistry	5
OR		
CHE 002AH	Honors General Chemistry	5
CHE 002BH	Honors General Chemistry	5
CHE 002CH	Honors General Chemistry	5
OR		
CHE 003A	Chemistry for Life Sciences: Determining Structure and Predicting Properties	5
CHE 003B	Chemistry for Life Sciences: Predicting and Characterizing Chemical Change	5
CHE 003C	Chemistry for Life Sciences: Controlling Processes and Synthetic Pathways	5
CHE 118A	Organic Chemistry for Health and Life Sciences	4
CHE 118B	Organic Chemistry for Health and Life Sciences	4
CHE 118C	Organic Chemistry for Health and Life Sciences	4
OR		
CHE 128A	Organic Chemistry	3
CHE 128B	Organic Chemistry	3

CHE 128C	Organic Chemistry	3
CHE 129A	Organic Chemistry Laboratory	2
OR		
CHE 103A	Chemistry for Life Sciences: Determining Organic Structures and Properties	5
CHE 103B	Chemistry for Life Sciences: Predicting and Controlling Organic Pathways	5
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
MAT 017C	Calculus for Biology and Medicine	4
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
PHY 007A	General Physics	4
PHY 007B	General Physics	4
PHY 007C	General Physics	4

Choose one:

STA 100	Applied Statistics for Biological Sciences	4
STA 102	Introduction to Probability Modeling and Statistical Inference (Discontinued)	4
STA 103	Applied Statistics for Business and Economics	4
STA 104	Applied Statistical Methods: Nonparametric Statistics	4
STA 106	Applied Statistical Methods: Analysis of Variance	4
STA 108	Applied Statistical Methods: Regression Analysis	4

Upper Division Writing

Preferably, the course should be taken prior to enrollment in Environmental Toxicology 102B and 103B.

UWP 101	Advanced Composition	4
UWP 104A	Writing in the Professions: Business Writing	4
UWP 104B	Writing in the Professions: Law	4
UWP 104C	Writing in the Professions: Journalism	4
UWP 104D	Writing in the Professions: Elementary and Secondary Education	4
UWP 104E	Writing in the Professions: Science	4
UWP 104F	Writing in the Professions: Health	4
UWP 104G	(Nonexistent)	
UWP 104H	(Nonexistent)	
UWP 104I	Writing in the Professions: Internships	4

Satisfaction of the General Education requirement to include courses selected with advisor's approval to complement the major; courses in agricultural economics, environmental studies, political science, psychology, and sociology are particularly recommended.

Depth Subject Matter **Units:** 34-39

BIS 101	Genes and Gene Expression	4
BIS 102	Structure and Function of Biomolecules	3
OR		
BIS 102	Structure and Function of Biomolecules	3

BIS 103	Bioenergetics and Metabolism	3
ETX 101	Principles of Environmental Toxicology	4
ETX 102A	Environmental Fate of Toxicants	4
ETX 102B	Quantitative Analysis of Environmental Toxicants	5
ETX 103A	Biological Effects of Toxicants	4
ETX 103B	Biological Effects of Toxicants: Experimental Approaches	5

Choose ETX 127 or two others:

ETX 104	Environmental and Nutritional Factors in Cellular Regulation and Nutritional Toxicants	4
ETX 120	Perspectives in Aquatic Toxicology	4
ETX 127	Environmental Stress and Development in Marine Organisms	10
ETX 128	Food Toxicology	3
ETX 130	The Role and Applications of Toxicology in Modern Industry	3
ETX 131	Environmental Toxicology of Air Pollutants	3
ETX 135	Health Risk Assessment of Toxicants	3
ETX 138	Legal Aspects of Environmental Toxicology	3
ETX 146	Exposure and Dose Assessment	3

Restricted Electives; 3-4 courses **Units:** 12-16

Electives selected for area of Emphasis with faculty advisor's approval with six unit combined maximum of 190, 192, 198, and 199 with advisor approval; see department website for details.

Total: 118-129

Environmental Toxicology | ETX Minor

(College of Agricultural and Environmental Sciences)

Robert H. Rice, Ph.D., Chairperson of the Department

Department Office. 4138 Meyer Hall; 530-752-1142; http://etox.ucdavis.edu

Faculty. http://etox.ucdavis.edu/directory/faculty/

Environmental Toxicology explores the effects of toxicants (both human made and naturally occurring) on the normal biochemical, cellular, and physiological functioning of biological systems. The minor will complement your course of study by enhancing your appreciation of the complexity and resiliency of biological systems when challenged by chemical agents and the fate and impact of chemicals in the environment. The science underlying a variety of current environmental issues is presented.

Minor Advisor. Qi Zhang

Advising Center for the major and minor is in 4111 Meyer Hall. Contact the Academic Program Advisor at 530-752-1042.

Environmental Toxicology **Units:** 18-26

ETX 101	Principles of Environmental Toxicology	4

ETX 102A	Environmental Fate of Toxicants	4
ETX 103A	Biological Effects of Toxicants	4

Choose two; six units minimum:

ETX 104	Environmental and Nutritional Factors in Cellular Regulation and Nutritional Toxicants	4
ETX 120	Perspectives in Aquatic Toxicology	4
ETX 127	Environmental Stress and Development in Marine Organisms	10
ETX 128	Food Toxicology	3
ETX 130	The Role and Applications of Toxicology in Modern Industry	3
ETX 131	Environmental Toxicology of Air Pollutants	3
ETX 135	Health Risk Assessment of Toxicants	3
ETX 138	Legal Aspects of Environmental Toxicology	3
ETX 146	Exposure and Dose Assessment	3

Total: 18-26

Environmental Toxicology | ETX Courses

Courses in ETX:

ETX 010—Introduction to Environmental Toxicology (3)
Lecture—3 hours. Hazardous substances, their effects on humans and their actions and movement in the environment. Emphasis on substances of current concern. GE credit: SE, SL. Effective: 2000 Fall Quarter.

ETX 020—Introduction to Forensic Science (3)
Lecture—3 hours. Basic principles of forensic science, types of information on which investigations focus, how information is obtained and used in criminal investigations, types of scientific skills required to practice forensic science, guidance on training. Real cases discussed; demonstrations of methods provided. GE credit: SE, SL, VL. Effective: 2012 Spring Quarter.

ETX 030—Chemical and Drug Use and Abuse (3)
Lecture—3 hours. An overview of chemical use and abuse in our society. The effects of chemicals (therapeutic drugs, pesticides, food additives, herbal remedies, environmental contaminants, and recreational drugs) on humans and other living systems. GE credit: SE. Effective: 2006 Winter Quarter.

ETX 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Work experience off and on campus in all subject areas offered in the
College of Agricultural and Environmental Sciences. Internships supervised by a member of the faculty. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ETX 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ETX 101—Principles of Environmental Toxicology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (CHE 008B or CHE 118B or CHE 128B); BIS 001A Principles of toxicology with a focus on environmental, industrial, and natural chemicals. Topics include fate and effects of chemicals in organisms and the environment, air pollutants, insecticides, aquatic toxicology, endocrine disruptors, biomarkers and bioassays, and risk assessment. GE credit: SE, SL. Effective: 2003 Fall Quarter.

ETX 102A—Environmental Fate of Toxicants (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 008B; CHE 118B; CHE 128B; or Consent of Instructor. Properties of toxic chemicals influencing their distribution and transformations; action of environmental forces affecting toxicant breakdown, movement, and accumulation; sources and occurrence of major classes of environmental toxicants. Not open for credit to students who have completed ETX 112A. GE credit: QL, SE, SL, VL, WE. Effective: 2004 Winter Quarter.

ETX 102B—Quantitative Analysis of Environmental Toxicants (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ETX 102A Sample preparation methods for trace analysis of environmental toxicants. Concept and techniques of advanced analytical instrumentation. Interpretation and use of analytical data. Not open for credit to students who have completed course ETX 112B. GE credit: SE, VL. Effective: 2004 Spring Quarter.

ETX 103A—Biological Effects of Toxicants (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 102; ETX 101 and NPB 101 recommended. Biological effects of toxic substances in living organisms. Metabolism, cellular and tissue targets, mechanisms of action, and pathological effects. Not open for credit to students who have taken ETX 114A. GE credit: SE. Effective: 2004 Winter Quarter.

ETX 103B—Biological Effects of Toxicants: Experimental Approaches (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ETX 103A Experimental approaches for assessing the biological effects of toxicants. Not open for credit to students who have taken ETX 114B. GE credit: SE, VL, WE. Effective: 2004 Spring Quarter.

ETX 104—Environmental and Nutritional Factors in Cellular Regulation and Nutritional Toxicants (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 101; (BIS 103 or ABI 103) Cellular regulation from nutritional/toxicological perspective. Emphasis: role of biofactors on modulation of signal transduction pathways, role of specific organelles in organization/regulation of metabolic transformations, major cofactor functions, principles of pharmacology/toxicology important to understanding nutrient/toxicant metabolism. (NUT 104.) GE credit: OL, SE, SL. Effective: 2005 Spring Quarter.

ETX 110—Toxic Tragedies and Their Impact on Society (2)
Lecture—2 hours. Prerequisite(s): BIS 010; or Consent of Instructor. Or equivalent; CHE 118A recommended. Examination of toxic tragedies, their origins, consequences, and effects on toxic regulation. GE credit: OL, SE, SL, WE. Effective: 2004 Winter Quarter.

ETX 111—Introduction to Mass Spectrometry (3)
Lecture—3 hours. Prerequisite(s): CHE 118C Introduction to mass spectrometry, including ionization techniques, mass analyzers, interpretation of mass spectra, and applications of mass spectrometry. Emphasis on fundamental concepts of mass spectrometry necessary to identify and quantify organic molecules. GE credit: SE. Effective: 2004 Winter Quarter.

ETX 120—Perspectives in Aquatic Toxicology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 008B; (CHE 118B or CHE 128B); BIS 001A; or Consent of Instructor. Toxic substances, their fate in marine and freshwater systems, and their effects on aquatic organisms, populations, and ecosystems. Emphasis will be on substances and issues of current concern. GE credit: OL, SE, SL, VL, WE. Effective: 2004 Winter Quarter.

ETX 127—Environmental Stress and Development in Marine Organisms (10)
Discussion—2 hours; Laboratory—12 hours; Lecture—4 hours. Prerequisite(s): ETX 101 or BIS 102 or BIS 104; and Consent of Instructor. Or the equivalent; ETX 114A or NUT 114 recommended. Course taught at Bodega Marine Laboratory. Effects of environmental and nutritional stress, including pollutants, on development and function in embryos and larvae of marine organisms. Emphasis on advanced experimental methods. (NUT 127.) GE credit: OL, QL, SE, SL, VL, WE. Effective: 2002 Summer Session 1.

ETX 128—Food Toxicology (3)
Lecture—3 hours. Prerequisite(s): BIS 102; BIS 103 Chemistry and biochemistry of toxins occurring in foods, including plant and animal toxins, intentional and unintentional food additives. The assessment of food safety and toxic hazards. (FST 128.) GE credit: SE. Effective: 1997 Winter Quarter.

ETX 130—The Role and Applications of Toxicology in Modern Industry (3)
Lecture—3 hours. Prerequisite(s): ETX 101; ETX 103A recommended. Role of toxicology in industry research and development, human health and environmental protection, hazard and risk evaluations, risk management and communications, product stewardship, and regulatory compliance. Scientific principles and methods of toxicology in chemical, energy, pharmaceutical, pesticide, biotechnology industries. GE credit: OL, SE, SL, VL, WE. Effective: 2008 Spring Quarter.

ETX 131—Environmental Toxicology of Air Pollutants (3)
Lecture—3 hours. Prerequisite(s): CHE 008B (can be concurrent); Or the equivalent; BIS 102 recommended. Field trip required. Toxicology of air pollutants in the ambient, indoor, and occupational environments. Health effects, sources, environmental fates, pulmonary responses, sampling and analyses, and air-quality criteria and standards. Field trip required. GE credit: SE, VL. Effective: 2003 Fall Quarter.

ETX 135—Health Risk Assessment of Toxicants (3)
Lecture—3 hours. Prerequisite(s): ETX 101; ETX 114A recommended. Current practices of health risk assessment of environmental chemicals using toxicological principles and their application to regulatory control of these chemicals. GE credit: QL, SE, SL, VL. Effective: 1997 Winter Quarter.

ETX 138—Legal Aspects of Environmental Toxicology (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. ETX 010 or ETX 101 recommended. Federal and California legislation concerning air and water pollution, pesticide use, food and feed additives, consumer protection, and occupational exposure to toxic substances; roles of federal regulatory agencies; alternatives to government control. GE credit: SE, VL, WE. Effective: 2001 Fall Quarter.

ETX 140—Genes and the Environment (3)
Lecture/Discussion—3 hours. Prerequisite(s): BIS 101; Biological Science 101 required or permission of instructor; coursework in genetics and molecular biology and/or environmental toxicology recommended. Evaluation of evidence that human health and disease susceptibility result from complex interactions between genes and the environment. Emphasis on cancer, metabolic, cardiovascular, and neurological health outcomes assessed by genotoxicity and toxicogenomic methods. Effective: 2015 Fall Quarter.

ETX 146—Exposure and Dose Assessment (3)
Lecture—3 hours. Prerequisite(s): ETX 112A; ETX 135 recommended. The exposure component of risk assessment; specifically, the presence and/or formation of toxic substances in environmental media, their movement within and between contaminated media, and the contacts of human populations with those media. GE credit: QL, SE, SL, VL. Effective: 1997 Winter Quarter.

ETX 190—Seminar (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Selected topics presented by students, faculty, or outside speakers covering current research and instructional activities within environmental toxicology. Reports and discussion concerning oral and written presentations, literature sources, and career opportunities. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ETX 190C—Research Group Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Weekly conference of advanced research methods and the interpretation of research results. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ETX 190S—Environmental Toxicology Career Seminar (1)
Seminar—1 hour. Careers in environmental toxicology; discussions with graduates from the Department of Environmental Toxicology and other experts in the field. (P/NP grading only.) GE credit: SE. Effective: 2003 Fall Quarter.

ETX 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Work experience off and on campus in all subject areas offered in the
College of Agricultural and Environmental Sciences. Internships supervised by a member of the faculty. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ETX 194HA—Honors Research (3)
Discussion—1 hour; Laboratory—6 hours. Prerequisite(s): Consent of Instructor. Senior standing; minimum GPA of 3.250. Specific research project conducted under the supervision of a faculty sponsor. Experience to include experimental design, learning new techniques, data analysis and interpretation of findings. GE credit: SE. Effective: 1997 Winter Quarter.

ETX 194HB—Honors Research (3)
Discussion—1 hour; Laboratory—6 hours. Prerequisite(s): Consent of Instructor. Senior standing; minimum GPA of 3.250. Specific research project conducted under the supervision of a faculty sponsor. Experience to include experimental design, learning new techniques, data analysis and interpretation of findings. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ETX 194HC—Honors Research (3)
Discussion—1 hour; Laboratory—9 hours. Prerequisite(s): Consent of Instructor. Senior standing, minimum GPA of 3.250. Continuation of course 194HA-194HB. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ETX 197T—Tutoring in Environmental Toxicology (1-5)
Variable. Prerequisite(s): Consent of Instructor. Advanced standing in Environmental Toxicology, a related major, or the equivalent experience. Teaching toxicology including conducting discussion groups for regular departmental courses under direct guidance of staff. May be repeated up to 5 unit(s). (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ETX 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ETX 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ETX 203—Environmental Toxicants (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 008B or CHE 128C; and Consent of Instructor. Or the equivalent of CHE 128C. Toxic chemicals: selected topics illustrating their occurrence, structure, and the reactions underlying detection, toxicity, fate, and ecological importance. Effective: 1997 Winter Quarter.

ETX 214—Mechanisms of Toxic Action (3)
Lecture—3 hours. Prerequisite(s): BIS 102; BIS 103; and Consent of Instructor. Chemical, biochemical, and molecular mechanisms underlying the adverse effects of toxic chemicals. Students are required to write a grant proposal and participate in a grant review panel. Effective: 1999 Spring Quarter.

ETX 220—Analysis of Toxicants (3)
Lecture—3 hours. Prerequisite(s): Coursework in organic chemistry. Principles of microanalysis of toxicants. Theoretical considerations regarding separation, detection and quantitative determination of toxicants using chemical and instrumental techniques. (FOR 220.) Effective: 2006 Winter Quarter.

ETX 220L—Analysis of Toxicants Laboratory (2)
Laboratory—6 hours. Prerequisite(s): ETX 220 (can be concurrent); and Consent of Instructor. Laboratory techniques for microanalysis of toxicants. Separation, detection, and quantitative determination of toxicants using chemical and instrumental methods. Effective: 1997 Winter Quarter.

ETX 228—Gas Chromatography/Mass Spectrometry of Toxic Chemicals (3)
Discussion—1 hour; Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): ETX 220; CHE 129C; and Consent of Instructor. Application of GC/MS techniques to investigate toxic chemicals. Mass spectral fragmentations and their application to the structural elucidation. Practical application of GC/MS in current research. Preference given to environmental toxicology graduate students. Effective: 1997 Winter Quarter.

ETX 234—Current Topics in Neurotoxicology (3)
Lecture—3 hours. Prerequisite(s): Core courses in one of the following graduate programs: Pharmacology and Toxicology, Agricultural and Environmental Chemistry, Biochemistry and Molecular Biology, Cell and Developmental Biology, Immunology, Molecular Cellular and Integrative Physiology or Neuroscience. Restricted to upper level undergraduate students must obtain permission from the course coordinator. General principles of neurotoxicology, the cell and molecular mechanisms and health impacts of specific neurotoxicants and the contribution of neurotoxic compounds to complex eurodevelopmental disorders and neurodegenerative diseases. (VMB 234 and MCP 234.) Effective: 2010 Fall Quarter.

ETX 240—Ecotoxicology (3)
Lecture—3 hours. Prerequisite(s): or Consent of Instructor. Elementary course in toxicology and ecology or the equivalent. Principles of toxicology as applied to chemical action on natural populations, communities, and ecosystems. Physical, chemical, and biological characteristics which influence ecotoxic effects, modeling, and field research. Selected case histories are analyzed and presented in class. Effective: 1997 Winter Quarter.

ETX 250—Reproductive Toxicology (3)
Lecture—1.5 hours; Lecture/Discussion—1.5 hours. Prerequisite(s): PTX 203 Application of toxicological principles in reproductive studies. Effects of toxicants on the male, female, and developing embryo/fetus. Critical
evaluation of reproductive toxicity studies and development of mechanistic approaches to understanding how chemical exposure can adversely affect reproduction. Effective: 2000 Winter Quarter.

ETX 260—Immunotoxicology (3)
Lecture—3 hours. Prerequisite(s): Undergraduate or graduate introduction to immunology coursework recommended but not required; graduate standing or consent of instructor. Provides students with skills and knowledge for evaluating and applying research on the impact of environmental toxicants on immunological function in human and wildlife populations. Effective: 2005 Fall Quarter.

ETX 270—Toxicology of Pesticides (3)
Lecture—3 hours. Prerequisite(s): ETX 101; One course each in (a) Organic Chemistry, (b) Biochemistry, (c) Toxicology (ETX 101 or equivalent), or with consent of instructor; graduate standing. Classification and chemical properties of pesticides, their mode of action, metabolism and disposition, pesticide resistance, effects on human health and ecological health and methods of risk benefit analyses. Effective: 2007 Winter Quarter.

ETX 278—Molecular Techniques (3)
Lecture—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Recombinant DNA technology and its applications. (FOR 278.) Effective: 2002 Spring Quarter.

ETX 280—Forensic DNA Analysis (3)
Lecture—3 hours. Prerequisite(s): Coursework in genetics and molecular biology. Graduate standing; consent of instructor required for all students not enrolled in the MS Forensics program. Foundation in theory and practice of forensic DNA analysis; past, present, and emerging technologies; legal and quality assurance issues. DNA extraction, DNA quantitation, multiplex amplification of STR loci, capillary electrophoresis of amplified products, and analysis of STR typing data. (FOR 280.) Effective: 2003 Spring Quarter.

ETX 281—Principles and Practice of Forensic Serology and DNA Analysis (3)
Discussion/Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): (FOR 278 or ETX 278) or (FOR 280 or ETX 280); Or equivalent; consent of instructor. Restricted to students enrolled in the M.S. in Forensic Science Program or by consent of Forensic Science Program Director. Comprehensive overview of forensic serology and DNA typing techniques and technologies. Strong emphasis on real-world applications, including preservation and tracking of biological evidence, detection and identification of bodily fluids, and methods to extract, quantify, and type human DNA. (FOR 281.) Effective: 2011 Spring Quarter.

ETX 284—Non-Human Forensic DNA--Theory and Casework Application (2)
Lecture—2 hours. Prerequisite(s): Consent of instructor required for all students not enrolled in the MS Forensics program; upper division Molecular Biology and Genetics or its equivalent. Restricted to graduate standing. Provides a comprehensive understanding of plant and animal forensic biology in terms of sample collection, preservation, analytical methods, and of the invaluable lines of inquiry these forensic evidence may permit. (FOR 284.) Effective: 2010 Fall Quarter.

ETX 290—Seminar (1)
Seminar—1 hour. Current topics in environmental toxicology. (S/U grading only.) Effective: 1997 Winter Quarter.

ETX 290C—Advanced Research Conference (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Presentation and critical discussion of advanced research methods and interpretation of research results. Designed primarily for graduate students. (S/U grading only.) Effective: 1997 Winter Quarter.

ETX 297T—Tutoring in Environmental Toxicology (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing in Environmental Toxicology, a related major, or the equivalent experience. Teaching toxicology including conducting discussion groups for regular departmental courses under direct guidance of staff. May be repeated up to 5 unit(s). (S/U grading only.) Effective: 1997 Winter Quarter.

ETX 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Effective: 1997 Winter Quarter.

ETX 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

ETX 396—Teaching Assistant Training Practicum (1-4)
Variable. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Epidemiology (Graduate Group)

Epidemiology (Graduate Group) | EPI Information

Lorena Garcia, M.P.H., Dr.P.H. Chairperson of the Group

Group Office. 1022 SVM Administrative Building; 530-752-2657; Fax 530-754-0225; http://www.epi.ucdavis.edu

Faculty. http://www.vetmed.ucdavis.edu/gge/faculty/

Epidemiology (Graduate Group) | EPI M.S.

Lorena Garcia, M.P.H., Dr.P.H. Chairperson of the Group

Group Office. 1022 SVM Administrative Building; 530-752-2657; Fax 530-754-0225; http://www.epi.ucdavis.edu

Faculty. http://www.vetmed.ucdavis.edu/gge/faculty/

Graduate Study. The Graduate Group in Epidemiology offers programs of study and research leading to the M.S. and Ph.D. degrees. Areas of emphasis include environmental/occupational epidemiology; infectious disease epidemiology; zoonotic and vector-borne diseases; epidemiologic methods and biostatistics; health services and health economics; nutritional epidemiology; reproductive, perinatal, developmental and pediatric epidemiology; wildlife epidemiology; and social and behavioral epidemiology. For detailed information regarding the program, address the chairperson of the group or see the website.

Graduate Advisors. Christopher Barker, (Population Health & Reproduction) Diana Cassady (Department of Public Health Sciences), Janet Foley (Medicine and Epidemiology), Lihong Qi (Public Health Sciences)

Required Courses for the Program **Units:** 58.5-65.5

Prerequisite Courses

Prerequisites may be taken concurrently with required courses below.

MAT 016A	Short Calculus	3
MAT 016B	Short Calculus	3
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
STA 106	Applied Statistical Methods: Analysis of Variance	4
STA 108	Applied Statistical Methods: Regression Analysis	4
OR		
MPM 402	Medical Statistics I	5
MPM 403	Medical Statistics II (Discontinued)	3

Required Courses

Required of all students in the program; M.S. and Ph.D. degrees. Requirements cannot be waived and must be met before a student's Qualifying Examination.

EPI 202	Quantitative Epidemiology I: Probability	5
EPI 203	Quantitative Epidemiology II: Statistical Inference	4
EPI 204	Quantitative Epidemiology III: Statistical Models	4
EPI 205	Principles of Epidemiology	4
EPI 206	Epidemiologic Study Design	4
EPI 207	Advanced Epidemiologic Methodology	4
EPI 208	Analysis and Interpretation of Epidemiologic Data	3
EPI 290	Seminars in Epidemiology	0.5

Choose one:

PHR 202	Sampling in Health-Related Research	3
STA 144	Sampling Theory of Surveys	4

Related Courses

For additional course work in Epidemiology, see Medicine and Epidemiology, Preventive Veterinary Medicine, Population Health and Reproduction, Public Health Sciences, and Statistics.

Epidemiology (Graduate Group) | EPI Ph.D.

Lorena Garcia, M.P.H., Dr.P.H. Chairperson of the Group

Group Office. 1022 SVM Administrative Building; 530-752-2657; Fax 530-754-0225; http://www.epi.ucdavis.edu

Faculty. http://www.vetmed.ucdavis.edu/gge/faculty/

Graduate Study. The Graduate Group in Epidemiology offers programs of study and research leading to the M.S. and Ph.D. degrees. Areas of emphasis include environmental/occupational epidemiology; infectious disease epidemiology; zoonotic and vector-borne diseases; epidemiologic methods and biostatistics; health services and health economics; nutritional epidemiology; reproductive, perinatal, developmental and pediatric epidemiology; wildlife epidemiology; and social and behavioral epidemiology. For detailed information regarding the program, address the chairperson of the group or see the website.

Graduate Advisors. Christopher Barker, (Population Health & Reproduction) Diana Cassady (Department of Public Health Sciences), Janet Foley (Medicine and Epidemiology), Lihong Qi (Public Health Sciences)

Required Courses for the Program **Units:** 58.5-65.5

Prerequisite Courses

Prerequisites may be taken concurrently with required courses below.

MAT 016A	Short Calculus	3
MAT 016B	Short Calculus	3
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
STA 106	Applied Statistical Methods: Analysis of Variance	4
STA 108	Applied Statistical Methods: Regression Analysis	4
OR		
MPM 402	Medical Statistics I	5
MPM 403	Medical Statistics II (Discontinued)	3

Required Courses

Required of all students in the program; M.S. and Ph.D. degrees. Requirements cannot be waived and must be met before a student's Qualifying Examination.

EPI 202	Quantitative Epidemiology I: Probability	5
EPI 203	Quantitative Epidemiology II: Statistical Inference	4
EPI 204	Quantitative Epidemiology III: Statistical Models	4
EPI 205	Principles of Epidemiology	4
EPI 206	Epidemiologic Study Design	4
EPI 207	Advanced Epidemiologic Methodology	4
EPI 208	Analysis and Interpretation of Epidemiologic Data	3
EPI 290	Seminars in Epidemiology	0.5

Choose one:

PHR 202	Sampling in Health-Related Research	3
STA 144	Sampling Theory of Surveys	4

Related Courses

For additional course work in Epidemiology, see Medicine and Epidemiology, Preventive Veterinary Medicine, Population Health and Reproduction, Public Health Sciences, and Statistics.

Epidemiology (Graduate Group) | EPI Courses

Courses in EPI:

EPI 202—Quantitative Epidemiology I: Probability (5)
Laboratory—2 hours; Lecture—4 hours. Prerequisite(s): ((MAT 016A, MAT 016B) or (MAT 017A, MAT 017B) or (MAT 021A, MAT 021B)); STA 102; STA 108; or Population Health and Reproduction 402 and 403 or equivalent of any listed course; concurrent or previous enrollment in a basic epidemiology course (e.g., course 205). Foundations in probability for epidemiologists. Emphasis on properties of and relationships between distributions and application of probability concepts to epidemiology. Includes a mathematical skills laboratory to assist in solution of epidemiologic problems. Effective: 2013 Fall Quarter.

EPI 203—Quantitative Epidemiology II: Statistical Inference (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): (EPI 202 or STA 130A or STA 131A or STA 133); EPI 205; A basic course in Epidemiology (EPI 205 or equivalent). Provides the mathematical statistics foundation for statistical models, methods, and data analysis. Effective: 2014 Winter Quarter.

EPI 204—Quantitative Epidemiology III: Statistical Models (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): (EPI 203 or STA 130B or STA 131B or STA 133); EPI 205; STA 108 recommended; a basic course in Epidemiology (EPI 205 or equivalent); consent of instructor. Introduces statistical models, methods, and data analysis in the areas of generalized linear model and survival analysis methodology. Effective: 2014 Spring Quarter.

EPI 204A—Foundation of Statistical Models, Methods, and Data Analysis for Scientists (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 130A or STA 131A or STA 133; EPI 228 recommended. Provides the mathematical statistics foundation for statistical models, methods, and data analysis. Effective: 2006 Winter Quarter.

EPI 204B—Statistical Models, Methods, and Data Analysis for Scientists (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): EPI 204A; STA 108 recommended. Introduces statistical models, methods, and data analysis in the areas of generalized linear, survival, and correlated data methodology. Effective: 2006 Winter Quarter.

EPI 205—Principles of Epidemiology (4)
Lecture—4 hours. Prerequisite(s): MPM 202; or Consent of Instructor. An introductory statistics course. Basic epidemiologic concepts and approaches to epidemiologic research, with examples from veterinary and human medicine, including outbreak investigation, infectious disease epidemiology, properties of tests, and an introduction to epidemiologic study design and surveillance. (MPM 205.) Effective: 2017 Winter Quarter.

EPI 205B—Integration of Epidemiologic Concepts (2)
Discussion—2 hours. In-depth analysis and integration of basic epidemiologic concepts and approaches to epidemiologic research presented in Preventive Veterinary Medicine 405/course 205A, with more mathematical and theoretical basis and examples from veterinary and human medicine, including outbreak investigation, infectious disease epidemiology, properties of diagnostic tests, study design, and surveillance. Effective: 1999 Fall Quarter.

EPI 206—Epidemiologic Study Design (4)
Discussion—9 hours; Laboratory—2 hours; Lecture—30 hours. Prerequisite(s): EPI 205; or Consent of Instructor. Builds on concepts presented in course 205. Concepts of epidemiologic study design—clinical trials, observational cohort studies, case control studies—introduced in course 205A are covered in more depth, using a problem-based format. Discussion of published epidemiologic studies. (MPM 206.) Effective: 2014 Spring Quarter.

EPI 207—Advanced Epidemiologic Methodology (4)
Lecture/Discussion—4 hours. Prerequisite(s): EPI 206 In-depth integration of advanced epidemiological concepts. Theory, methods, and applications for observational studies including random and systematic error, confounding, counterfactuals, causal inference, effect modification, internal and external validity, estimability, and interpretation of effect measures, and advanced study designs. (SPH 207.) Effective: 2016 Winter Quarter.

EPI 208—Analysis and Interpretation of Epidemiologic Data (3)
Laboratory—21 hours; Lecture—16 hours; Project (Term Project). Prerequisite(s): EPI 204 (can be concurrent); EPI 207; (STA 144 or PHR 202); And entry level skill in standard statistical software (eg. SPSS, BMDP, SAS, Stata, MinTab, S-Plus). Application of theory and concepts of statistics and epidemiology to analysis and interpretation of data typically found in veterinary and human epidemiologic research. Effective: 2001 Spring Quarter.

EPI 209—History of Epidemiology in Public Health (2)
Discussion—1.5 hours; Lecture—0.5 hours. Introduction to the history of epidemiology in solving major public health problems. Original historical articles will be read/discussed. Topics may include: infectious disease, accidents/adverse events, nutritional deficiencies, community vaccination trials, occupational exposures, cancer, birth defects, cardiovascular disease, and smoking. (SPH 209.) Effective: 2014 Fall Quarter.

EPI 220—Problems in Epidemiologic Study Design (4)
Lecture—3 hours; Term Paper. Prerequisite(s): MPM 405; STA 102; STA 106; or the equivalent; MPM 406 or the equivalent; PHR 207 required concurrently. Design and development of research protocols and funding applications for peer review. Application of research methods data collection and management and statistical analysis in research proposals. Methods of evaluating research proposals, mechanisms of funding, specifying human subjects considerations. Effective: 1997 Winter Quarter.

EPI 222—Epidemiological Modeling (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): MPM 405 Techniques of model building and simulation of infectious diseases will be explored. Epidemiologic modeling philosophy, construction and validation will be emphasized. Effective: 1997 Winter Quarter.

EPI 223—Spatial Epidemiology (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): EPI 205A or MPM 205 Geographic Information Systems (GIS) and spatial statistics. Students are expected to complete a term project based on their graduate research. Effective: 1997 Winter Quarter.

EPI 224—Health and Ecological Risk Analysis (4)
Laboratory—4 hours; Lecture—2 hours. Methodological approach to risk analysis for human and animal-related health and ecological issues. Basic principles of risk analysis, including perception, communication, assessment and management. Emphasis on the assessment of risk. Effective: 2017 Winter Quarter.

EPI 225—Advanced Topics in Epidemiology Methods (2)
Discussion—2 hours. Prerequisite(s): EPI 205B; EPI 206; EPI 207; Or equivalents, with consent of instructor. An in-depth study of topics in epidemiology theory and methods, selected from: causal inference, confounding, study design, or other related areas, with year to year variation. Readings are assigned and students are expected to lead discussions on them. May be repeated for credit when topic differs. Effective: 2006 Winter Quarter.

EPI 226—Methods for Longitudinal and Repeated Measurement Data (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): EPI 204; or Consent of Instructor. Mixed models for longitudinal data (LD)/repeated measurements; Mean and covariance models; General linear LD models; Random coefficients models; Linear mixed effects models for continuous outcome; Generalized linear mixed effects model for discrete outcome including binary, ordinal and count data. Effective: 2009 Fall Quarter.

EPI 229—Geographic Information Systems for Health Professionals (4)
Laboratory—6 hours; Lecture—2 hours. Emphasis on basic geographic and data management principles. Focus on software proficiency in application to analyzing/solving health-related problems. For graduate and professional students in epidemiology, public health, preventive veterinary medicine, health informatics with interest in spatial techniques in research. Effective: 2010 Spring Quarter.

EPI 230—Introduction to Molecular Epidemiology (3)
Lecture/Discussion—3 hours. Prerequisite(s): EPI 205 Overview of the modern field of molecular epidemiology. Integrates molecular biology into traditional epidemiologic research by identifying pathways, molecules and genes that influence the risk of developing disease. Effective: 2014 Fall Quarter.

EPI 231—Infectious Disease Epidemiology (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): Introductory epidemiology course (e.g., EPI 205). Infectious disease epidemiology and prevention, with emphasis on human and veterinary diseases of global health importance. Major global health epidemics and challenges of infectious diseases, by mode of transmission. Effective: 2017 Spring Quarter.

EPI 232—Advanced Data Analysis with SAS (3)
Lecture—3 hours. Prerequisite(s): EPI 202; EPI 203; EPI 204; or the equivalent, or Consent of Instructor. Provide an overview of common advanced statistical methods as well as a treatment of how to use SAS to implement them. Learn the ideas of reproducible research and reporting of statistical analyses. Effective: 2017 Winter Quarter.

EPI 240—Principles of Injury Epidemiology (3)
Lecture/Discussion—3 hours. Overview of the epidemiology of human injury, including general principles, surveillance methods, behavioral factors, environmental factors, treatment issues and engineering and legal interventions related to vehicular injuries, drownings, falls, fires and burns, poisonings, firearm injuries, and other intentional injuries. Effective: 1997 Winter Quarter.

EPI 251—Environmental Epidemiology (3)
Lecture—3 hours. Prerequisite(s): MPM 405 (can be concurrent); Upper division undergraduates who have completed EST 126; or the equivalent. Examination of the human health effects and the risk of disease from community, occupational, and personal exposure to toxic substances. Effective: 1997 Winter Quarter.

EPI 252—Social Epidemiology (2)
Lecture/Discussion—2 hours. Prerequisite(s): EPI 205A; and Consent of Instructor. Social determinants of health; psychosocial and physiological pathways; health and social inequality; gender and racial/ethnic disparities in health; social support, social cohesion and health; social gradient in behavioral risk factors; social ecological approaches to health intervention; interventions addressing social determinants. (SPH 252.) Effective: 2009 Spring Quarter.

EPI 260—Epidemiology of Chronic Diseases and Aging (3)
Lecture/Discussion—3 hours. Overview of the epidemiology of chronic disease in old age. Topics include biology of aging, epidemiology of cardiovascular disease, neoplasms, osteoporosis and fractures, psychosocial factors and health in old age, dementias, functional status and prevention of disease. Effective: 1997 Winter Quarter.

EPI 270—Research Methods in Occupational Epidemiology (3)
Lecture/Discussion—3 hours. Prerequisite(s): (EPI 205A or MPM 205); (MPM 202 or STA 102) Methods used in epidemiologic research on occupational hazards. Topics include design and analysis of cohort and case-control studies, sample size, measuring dose, choosing a control group, validation of employment and health data, interpreting negative studies, and analysis software. Effective: 1997 Winter Quarter.

EPI 272—Cancer Epidemiology (2)
Discussion—1 hour; Recitation—1 hour. Prerequisite(s): EPI 205A; EPI 205B; EPI 206 (can be concurrent); STA 102; Must have basic understanding of epidemiologic and statistical concepts covered in the above courses. We will cover the underlying concepts essential to understanding cancer epidemiology, such as trends in incidence and survival, epidemiologic methods used to assess cancer etiology, prevention and control, and an introduction to the cancer initiation and progression multi-stage model. Effective: 2005 Winter Quarter.

EPI 277—Mathematical Models in Epidemiology (3)
Laboratory—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): MPM 403; MPM 405; and Consent of Instructor. Although not required, students encouraged to refresh their knowledge of high school calculus and differential equations. Class size limited to 30 students. Theory of epidemics and mathematical modeling concepts for infectious diseases to include discrete and continuous time models, their use to explore disease dynamics and investigate prevention and control strategies for human and veterinary infectious diseases. (PHR 277.) Effective: 2013 Fall Quarter.

EPI 280—Introduction to SAS Programming (3)
Discussion/Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): Introductory statistics course (e.g., MPM 402, STA 102). Introduction to SAS, an integrated software system for data retrieval and management, data manipulation and programming. (SPH 280.) Effective: 2016 Fall Quarter.

EPI 290—Seminars in Epidemiology (0.5)
Seminar—0.5 hours. Faculty and students will present and lead discussion of ongoing or published epidemiologic research. (S/U grading only.) Effective: 2015 Winter Quarter.

EPI 291—Seminars in Human Health Services Research and Clinical Epidemiology (1)
Seminar—1 hour. Critical review, evaluation, and discussion of research in health services and clinical epidemiology. Presentation of statistical, epidemiologic, and econometric methods. Students present their own research and critique the work of others. May be repeated for credit. May be repeated for credit. (GMD 291.) (S/U grading only.) Effective: 1998 Fall Quarter.

EPI 298—Group Study (1-5)
Seminar—1-5 hours. Group study in selected areas of epidemiology. Effective: 1997 Winter Quarter.

EPI 299—Research (1-12)
Variable. Research in selected areas of epidemiology. (S/U grading only.) Effective: 1997 Winter Quarter.

Evolution & Ecology

Evolution & Ecology | EVE Information

(College of Biological Sciences)

John Stachowicz, Ph.D., Chairperson of the Department

Department Office. 2320 Storer Hall; 530-752-1272; http://www.eve.ucdavis.edu

Faculty. http://www.eve.ucdavis.edu/facultyresearch.html

The department of Evolution & Ecology offers the major and minor in Evolution, Ecology and Biodiversity.

Evolution & Ecology | EE&B A.B.

(College of Biological Sciences)

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Department Office. 2320 Storer Hall; 530-752-1272; http://www.eve.ucdavis.edu

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The Evolution, Ecology and Biodiversity Major Program

The major in Evolution, Ecology and Biodiversity offers the student a broad background in the theoretical and empirical basis of our understanding of the diversity and distribution of living organisms.

The Program. The program of study for the major begins with a core of introductory courses in mathematics, physical sciences, and biology. These are followed by survey courses in biodiversity, evolution and ecology and various more specialized courses that focus the student on particular

disciplines or organisms, with an emphasis on problem-solving and critical thinking. Evolution, Ecology and Biodiversity majors may earn either a Bachelor of Science or a Bachelor of Arts degree. The requirements for the B.S. degree program include more science courses, such as biochemistry, whereas those for the A.B. degree program allow room for more electives within the humanities and social sciences. The A.B. degree is especially appropriate for those students who wish to combine arts or languages with evolution and ecology for career preparation in such areas as scientific writing, translating or illustration.

Major Advisor. Students transferring to UC Davis from another institution and majoring in Evolution, Ecology and Biodiversity must consult an advisor immediately upon matriculation so that their transfer credits can be applied to the major requirements. All new students in the major should contact the Biology Academic Success Center for advisor assignment. Substitutions of courses not on the above list for major requirements are arranged through the advisor.

Advising Center for the major is located at the Biology Academic Success Center (BASC); 1023 Sciences Laboratory Building; 530-752-0410; http://basc.ucdavis.edu/.

Career Alternatives. A degree in Evolution, Ecology and Biodiversity prepares the student for career opportunities in research, teaching, health professions, veterinary medicine, agriculture, environmental management, and industry. Many students gain some research experience while at UC Davis and choose to continue their training at the graduate level. This track offers careers in academics, government, environmental organizations, or business.

Teaching Credential Subject Representative. Students planning for a teaching career should consult the School of Education in regards to preparation for certification; see the Teaching Credential/M.A. Program.

Preparatory Subject Matter **Units:** 41-45

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
BIS 002C	Introduction to Biology: Biodiversity and the Tree of Life	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
OR		
CHE 003A	Chemistry for Life Sciences: Determining Structure and Predicting Properties	5
CHE 003B	Chemistry for Life Sciences: Predicting and Characterizing Chemical Change	5
CHE 008A	Organic Chemistry: Brief Course	2
CHE 008B	Organic Chemistry: Brief Course	4
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
MAT 017C	Calculus for Biology and Medicine	4
MAT 017C Recommended.		
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021C Recommended.		
OR		
STA 100	Applied Statistics for Biological Sciences	4
PHY 001A	Principles of Physics	3
PHY 001B	Principles of Physics	3

Depth Subject Matter **Units:** 36

BIS 101	Genes and Gene Expression	4

Choose one:

EVE 100	Introduction to Evolution	4
GEL 107	Earth History: Paleobiology	3
ANT 151	Primate Evolution	4

Choose one:

EVE 101	Introduction to Ecology	4
ESP 100	General Ecology	4
WFC 151	Wildlife Ecology	4

Choose additional upper division restricted electives in biological science relevant to the student's interest. Chosen in consultation with the advisor to achieve a total of 36 or more units.

Include at least one course from each of the areas of study below.

Areas of Study:

(1) Biodiversity:

EVE 105	Phylogenetic Analysis of Vertebrate Structure	4
EVE 108	Systematics and Evolution of Angiosperms	5
EVE 112	Biology of Invertebrates	3
EVE 114	Experimental Invertebrate Biology	3
EVE 140	Paleobotany	4
MIC 105	Microbial Diversity	3
NEM 110	Introduction to Nematology	2
PLB 116	Plant Morphology and Evolution	5
PLB 148	Introductory Mycology	4
PLS 147	California Plant Communities	3
WFC 110	Biology and Conservation of Wild Mammals	3
WFC 111	Biology and Conservation of Wild Birds	3
WFC 120	Biology and Conservation of Fishes	3
WFC 134	Herpetology	3

(2) Advanced Evolution and Ecology:

EVE 102	Population and Quantitative Genetics	4
EVE 103	Phylogeny, Speciation and Macroevolution	4
EVE 104	Community Ecology	4
EVE 106	Mechanical Design in Organisms	3
EVE 107	Animal Communication	4
EVE 110	Running, Swimming and Flying	3
EVE 115	Marine Ecology	4
EVE 117	Plant Ecology	4
EVE 119	Population Biology of Invasive Plants and Weeds	3
EVE 120	Global Change Ecology	3
EVE 131	Human Genetic Variation and Evolution	3
EVE 138	Ecology of Tropical Latitudes	5
EVE 141	Principles of Systematics	3
EVE 147	Biogeography	4
EVE 149	Evolution of Ecological Systems	4
EVE 150	Evolution of Animal Development	3
EVE 161	Microbial Phylogenomics - Genomic Perspectives on the Diversity and Diversification of Microbes	3
EVE 175	Computational Genetics	3

EVE 180A AND	Experimental Ecology and Evolution in the Field	4
EVE 180B	Experimental Ecology and Evolution in the Field	4
EVE 181	Ecology and Evolution of Animal-Plant Interactions	4

Note: A maximum of four units of variable-unit courses (numbered 192, 198, 199) may be applied to upper division elective unit requirements. Courses numbered 197T are not applicable to the upper division elective unit requirement.

Total: 77-81

Evolution & Ecology | EE&B B.S.

(College of Biological Sciences)

John Stachowicz, Ph.D., Chairperson of the Department

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The Evolution, Ecology and Biodiversity Major Program

The major in Evolution, Ecology and Biodiversity offers the student a broad background in the theoretical and empirical basis of our understanding of the diversity and distribution of living organisms.

The Program. The program of study for the major begins with a core of introductory courses in mathematics, physical sciences, and biology. These are followed by survey courses in biodiversity, evolution and ecology and various more specialized courses that focus the student on particular disciplines or organisms, with an emphasis on problem-solving and critical thinking. Evolution, Ecology and Biodiversity majors may earn either a Bachelor of Science or a Bachelor of Arts degree. The requirements for the B.S. degree program include more science courses, such as biochemistry, whereas those for the A.B. degree program allow room for more electives within the humanities and social sciences. The A.B. degree is especially appropriate for those students who wish to combine arts or languages with evolution and ecology for career preparation in such areas as scientific writing, translating or illustration.

Major Advisor. Students transferring to UC Davis from another institution and majoring in Evolution, Ecology and Biodiversity must consult an advisor immediately upon matriculation so that their transfer credits can be applied to the major requirements. All new students in the major should contact the Biology Academic Success Center for advisor assignment. Substitutions of courses not on the above list for major requirements are arranged through the advisor.

Advising Center for the major is located at the Biology Academic Success Center (BASC); 1023 Sciences Laboratory Building; 530-752-0410; http://basc.ucdavis.edu/.

Career Alternatives. A degree in Evolution, Ecology and Biodiversity prepares the student for career opportunities in research, teaching, health professions, veterinary medicine, agriculture, environmental management, and industry. Many students gain some research experience while at UC Davis and choose to continue their training at the graduate level. This track offers careers in academics, government, environmental organizations, or business.

Teaching Credential Subject Representative. Students planning for a teaching career should consult the School of Education in regards to preparation for certification; see the Teaching Credential/M.A. Program.

Preparatory Subject Matter **Units:** 56-66

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
BIS 002C	Introduction to Biology: Biodiversity and the Tree of Life	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 002C	General Chemistry	5
OR		
CHE 003A	Chemistry for Life Sciences: Determining Structure and Predicting Properties	5
CHE 003B	Chemistry for Life Sciences: Predicting and Characterizing Chemical Change	5
CHE 003C	Chemistry for Life Sciences: Controlling Processes and Synthetic Pathways	5
CHE 008A	Organic Chemistry: Brief Course	2
CHE 008B	Organic Chemistry: Brief Course	4
OR		
CHE 118A	Organic Chemistry for Health and Life Sciences	4
CHE 118B	Organic Chemistry for Health and Life Sciences	4
CHE 118C	Organic Chemistry for Health and Life Sciences	4
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
MAT 017C	Calculus for Biology and Medicine	4
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021C Recommended.		
PHY 007A	General Physics	4
PHY 007B	General Physics	4
PHY 007C	General Physics	4

Depth Subject Matter **Units:** 49

BIS 101	Genes and Gene Expression	4
BIS 105	Biomolecules and Metabolism	3
OR		
BIS 102	Structure and Function of Biomolecules	3
BIS 103	Bioenergetics and Metabolism	3
BIS 104	Cell Biology	3
EVE 100	Introduction to Evolution	4
EVE 101	Introduction to Ecology	4
STA 100	Applied Statistics for Biological Sciences	4
STA 130A	Mathematical Statistics: Brief Course	4
STA 130B	Mathematical Statistics: Brief Course	4

Choose additional upper division restricted electives in biological science relevant to the student's interest chosen in consultation with the advisor to achieve a total of 49 or more units, at least one of the courses taken to fulfill these requirements must include a 6 hour per week laboratory or field component or two courses with a 3 hour per week laboratory or field component.

Include at least one course from the Biodiversity area of study and two courses from the Advanced Evolution and Ecology areas of study below.

Areas of Study:

(1) Biodiversity:

EVE 105	Phylogenetic Analysis of Vertebrate Structure	4
EVE 108	Systematics and Evolution of Angiosperms	5
EVE 112	Biology of Invertebrates	3
EVE 114	Experimental Invertebrate Biology	3
EVE 140	Paleobotany	4
MIC 105	Microbial Diversity	3
NEM 110	Introduction to Nematology	2
PLB 116	Plant Morphology and Evolution	5
PLB 148	Introductory Mycology	4
PLS 147	California Plant Communities	3
WFC 110	Biology and Conservation of Wild Mammals	3
WFC 111	Biology and Conservation of Wild Birds	3
WFC 120	Biology and Conservation of Fishes	3
WFC 134	Herpetology	3

(2) Advanced Evolution and Ecology:

EVE 102	Population and Quantitative Genetics	4
EVE 103	Phylogeny, Speciation and Macroevolution	4
EVE 104	Community Ecology	4
EVE 106	Mechanical Design in Organisms	3
EVE 107	Animal Communication	4
EVE 110	Running, Swimming and Flying	3
EVE 115	Marine Ecology	4
EVE 117	Plant Ecology	4
EVE 119	Population Biology of Invasive Plants and Weeds	3
EVE 120	Global Change Ecology	3
EVE 131	Human Genetic Variation and Evolution	3
EVE 138	Ecology of Tropical Latitudes	5
EVE 141	Principles of Systematics	3
EVE 147	Biogeography	4
EVE 149	Evolution of Ecological Systems	4
EVE 150	Evolution of Animal Development	3
EVE 161	Microbial Phylogenomics - Genomic Perspectives on the Diversity and Diversification of Microbes	3
EVE 175	Computational Genetics	3
EVE 180A AND	Experimental Ecology and Evolution in the Field	4
EVE 180B	Experimental Ecology and Evolution in the Field	4
EVE 181	Ecology and Evolution of Animal-Plant Interactions	4

Note: A maximum of 4 units of variable-unit courses (numbered 192, 198, 199) may be applied to upper division elective unit requirements, but not to the upper division laboratory requirement. Courses numbered 197T are not applicable to the upper division elective unit requirement.

Total: 105-115

Evolution & Ecology | EE&B Minor

(College of Biological Sciences)

John Stachowicz, Ph.D., Chairperson of the Department

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Career Alternatives. A degree in Evolution, Ecology and Biodiversity prepares the student for career opportunities in research, teaching, health professions, veterinary medicine, agriculture, environmental management, and industry. Many students gain some research experience while at UC Davis and choose to continue their training at the graduate level. This track offers careers in academics, government, environmental organizations, or business.

Major Advisor. Students transferring to UC Davis from another institution and majoring in Evolution, Ecology and Biodiversity must consult an advisor immediately upon matriculation so that their transfer credits can be applied to the major requirements. All new students in the major should contact the Biology Academic Success Center for advisor assignment. Substitutions of courses not on the above list for major requirements are arranged through the advisor.

Advising Center for the major is located at the Biology Academic Success Center (BASC); 1023 Sciences Laboratory Building; 530-752-0410; http://basc.ucdavis.edu/.

Teaching Credential Subject Representative. Students planning for a teaching career should consult the School of Education in regards to preparation for certification; see the Teaching Credential/M.A. Program.

Evolution, Ecology and Biodiversity **Units:** 18

EVE 100	Introduction to Evolution	4
EVE 101	Introduction to Ecology	4

Biodiversity; choose one:

ENT 103	Insects Systematics	3
EVE 105	Phylogenetic Analysis of Vertebrate Structure	4
EVE 108	Systematics and Evolution of Angiosperms	5

EVE 112	Biology of Invertebrates	3
EVE 112L	Biology of Invertebrates Laboratory	2
EVE 114	Experimental Invertebrate Biology	3
EVE 140	Paleobotany	4
PLB 116	Plant Morphology and Evolution	5
PLB 148	Introductory Mycology	4
PLS 147	California Plant Communities	3
WFC 110	Biology and Conservation of Wild Mammals	3
WFC 110L	Laboratory in Biology and Conservation of Wild Mammals	3
WFC 111	Biology and Conservation of Wild Birds	3
WFC 111L	Laboratory in Biology and Conservation of Wild Birds	3
WFC 120	Biology and Conservation of Fishes	3
WFC 120L	Laboratory in Biology and Conservation of Fishes	2
WFC 134	Herpetology	3
WFC 134L	Herpetology Laboratory	3
MIC 105	Microbial Diversity	3
MIC 105L	Microbial Diversity Laboratory	3
NEM 110	Introduction to Nematology	2

Advanced Ecology or Evolution; choose two:

EVE 102	Population and Quantitative Genetics	4
EVE 103	Phylogeny, Speciation and Macroevolution	4
EVE 107	Animal Communication	4
EVE 115	Marine Ecology	4
EVE 117	Plant Ecology	4
EVE 119	Population Biology of Invasive Plants and Weeds	3
EVE 120	Global Change Ecology	3
EVE 131	Human Genetic Variation and Evolution	3
EVE 138	Ecology of Tropical Latitudes	5
EVE 141	Principles of Systematics	3
EVE 147	Biogeography	4
EVE 149	Evolution of Ecological Systems	4
EVE 150	Evolution of Animal Development	3
EVE 161	Microbial Phylogenomics - Genomic Perspectives on the Diversity and Diversification of Microbes	3
EVE 180A	Experimental Ecology and Evolution in the Field	4
AND		
EVE 180B	Experimental Ecology and Evolution in the Field	4
EVE 181	Ecology and Evolution of Animal-Plant Interactions	4

Laboratory or field course: At least one of the courses taken to fulfill these requirements must include a 6 hour per week laboratory or field component or two courses with a 3 hour per week laboratory or field component.

Total: 18

Evolution & Ecology | EVE Courses

Courses in EVE:

EVE 002—Biodiversity (3)
Lecture—2 hours; Lecture/Discussion—1 hour. Introduction to nature, scope and geographical distribution of biodiversity (the diversity of life, with emphasis on plants and animals, especially insects). Humans and biodiversity - domestication, aesthetics, ethics and valuation. Species richness and "success." Biodiversity through time; monitoring, evaluation and conservation. Biomes - global, continental and Californian. (ENT 002.) GE credit: SE, SL, WE. Effective: 2001 Fall Quarter.

EVE 010—Evolution for Non-Biologists (3)
Lecture—3 hours. Introduction to evolutionary biology for the general population. GE credit: QL, SE, SL. Effective: 2013 Fall Quarter.

EVE 011—Principles of Ecology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Elementary biology recommended. Ecological principles with emphasis on humans and their interactions with the environment; how humans affect and depend on natural ecosystems; the future of the Earth's biosphere. GE credit: OL, SE, SL, WE. Effective: 2004 Spring Quarter.

EVE 012—Life in the Sea (3)
Lecture—3 hours. Diversity of life in the sea; adaptations to physical/chemical ocean environment; marine science research methods; utilization of living marine resources by humans; factors and processes that influence diversity of sea life, including humans. GE credit: SE, SL. Effective: 2015 Spring Quarter.

EVE 013—Sex in the Natural World (3)
Lecture/Discussion—3 hours. Explores the diversity, mechanisms and evolution of sexual behaviors across the kingdoms of life. GE credit: SE, SL, VL. Effective: 2014 Fall Quarter.

EVE 017—Dining with Darwin: Evolutionary Insights Into Your Diet (3)
Lecture—3 hours. Crave salty, fatty, sugary foods? Want to know why? Evolution of cravings, metabolism and dentition, and of cooking our food. Relate Paleo, South Beach, and vegan diets to ancestral and global diets and current metabolism. For majors and nonmajors. GE credit: SE, SS, WC. Effective: 2016 Fall Quarter.

EVE 020—Darwinian Medicine (3)
Lecture—3 hours. Introduction for non-biologists to the evolved traits of humans and pathogens that influence human biological variation, health, and disease. GE credit: QL, SE, SL. Effective: 2017 Fall Quarter.

EVE 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Work experience off and on campus in all subject areas offered in the
Department of Evolution and Ecology. Internships supervised by a member of the faculty. May be repeated for credit. (P/NP grading only.) Effective: 2010 Spring Quarter.

EVE 098—Directed Group Study (1-5)
Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 2004 Winter Quarter.

EVE 099—Special Study for Lower Division Students (1-5)
Variable. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

EVE 100—Introduction to Evolution (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (BIS 002A, BIS 002B, BIS 002C); (MAT 016A or MAT 017A or MAT 021A); (MAT 016B or MAT 017B or MAT 021B); STA 100 recommended. General survey of the origins of biological diversity and evolutionary mechanisms. GE credit: QL, SE, SL. Effective: 2018 Winter Quarter.

EVE 101—Introduction to Ecology (4)
Lecture—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): (BIS 002A, BIS 002B, BIS 002C); (MAT 016A or MAT 017A or MAT 021A); (MAT 016B or MAT 017B or MAT 021B); Or the equivalent. General survey of the principles of ecology. GE credit: QL, SE, SL, VL. Effective: 2018 Winter Quarter.

EVE 101Q—Introduction to Computer Models in Ecology (1)
Auto Tutorial—1.5 hours; Extensive Problem Solving—1.5 hours. Prerequisite(s): EVE 101 (can be concurrent); EVE 101 required concurrently. Computational methods and mathematical models used to study ecological phenomena. Effective: 2006 Fall Quarter.

EVE 102—Population and Quantitative Genetics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 101; (STA 100 or STA 102); EVE 100 Evolution as caused by random mating, genetic drift, natural selection, inbreeding, migration,and mutation in theory and actuality. The
resemblance between relatives and consequences of selection for quantitative traits. Application of these ideas to topics such as the evolution of sex. GE credit: SE. Effective: 1997 Winter Quarter.

EVE 103—Phylogeny, Speciation and Macroevolution (4)
Discussion/Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EVE 100 Statistical inference of evolutionary patterns and processes above the species level. Topics include estimation of phylogenies and divergence times, character evolution, biogeographic history, and rates and patterns of lineage diversification, with an emphasis on the origin of species. GE credit: QL, SE, SL. Effective: 2012 Winter Quarter.

EVE 104—Community Ecology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EVE 101 or ESP 100 Population growth and density dependence; predation; exploitative, interference and apparent competition; coexistence mechanisms; niches, spatial and temporal variation; stability, diversity, and productivity of food webs; applications to conservation and biological control. Emphasis on quantitative understanding through models, concepts,and empirical evidence. GE credit: SE, SL, VL. Effective: 1999 Spring Quarter.

EVE 105—Phylogenetic Analysis of Vertebrate Structure (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): (BIS 001A, BIS 001B) or (BIS 002B, BIS 002C) The structure of the classes and subclasses of vertebrates is described
and interpreted in terms of phylogeny. GE credit: SE. Effective: 2008 Fall Quarter.

EVE 106—Mechanical Design in Organisms (3)
Discussion—1 hour; Fieldwork—3 hours; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Upper division standing or consent of instructor; introductory animal biology (BIS 001B or BIS 002B), invertebrate zoology (EVE 112), and/or ecology (EVE 101) are recommended; residence at or near Bodega Marine Lab required. Enrollment restricted to application at http://www.bml.ucdavis.edu. Explores fundamental principles in the form and function of organisms, examining how basic properties of size, shape, structure, and habitat constrain ways in which plants and animals interact and cope with their physical surroundings. GE credit: QL, SE, VL, WE. Effective: 2008 Summer Session 1.

EVE 107—Animal Communication (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 002B How animals use songs, dances, colors, chemicals, electricity and vibrations to communicate. Mechanisms of signal production and detection (sensory systems), theory of information transfer and signal design, and the role of natural selection in shaping communication. GE credit: QL, SE, VL. Effective: 2013 Fall Quarter.

EVE 108—Systematics and Evolution of Angiosperms (5)
Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): (BIS 001A, BIS 001B, BIS 001C) or (BIS 002A, BIS 002B, BIS 002C) Diversity and classification of angiosperms (flowering plants) on a world scale, and current understanding of the origin of angiosperms and evolutionary relationships and trends within them based on morphological and molecular evidence. (PLB 108.) Effective: 2008 Spring Quarter.

EVE 110—Running, Swimming and Flying (3)
Discussion—1 hour; Fieldwork—3 hours; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Upper division standing or consent of instructor; introductory animal biology (BIS 001B or BIS 002B), invertebrate zoology (EVE 112), and/or ecology (EVE 101) are recommended; residence at or near Bodega Marine Lab required. Enrollment restricted to application at http://www.bml.ucdavis.edu. Examines the bases of organism movement in terrestrial, aquatic, and aerial environments, emphasizing both the unifying principles underlying locomotion, as well as a range of strategies employed across diverse groups of organisms. GE credit: QL, SE, VL, WE. Effective: 2008 Summer Session 1.

EVE 111—Marine Environmental Issues (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Examination of critical environmental issues occurring in coastal waters including the effects of climate change, overfishing, and other human impacts. Through readings and group discussions, students will develop an integrative understanding of the oceanographic and ecological processes. May be repeated up to 2 time(s) when topics differ. (ESP 111.) GE credit: SE, SL. Effective: 2015 Summer Session 1.

EVE 112—Biology of Invertebrates (3)
Lecture—3 hours. Prerequisite(s): BIS 001B or (BIS 002B, BIS 002C); Courses in systematics, ecology, and evolution recommended. Limited enrollment. Survey of the invertebrate phyla, emphasizing aquatic forms, and focusing on morphology, development, natural history, ecology, and phylogenetic relationships. Effective: 2008 Fall Quarter.

EVE 112L—Biology of Invertebrates Laboratory (2)
Laboratory—6 hours. Prerequisite(s): (BIS 001B or (BIS 002B, BIS 002C)), EVE 112 (can be concurrent); EVE 112 required concurrently. Enrollment limited to 50 students. Field and laboratory experience with representative members of the major invertebrate phyla discussed in course 112. Emphasis on comparative morphology, natural history, ecology, and behavior of living invertebrates. Two field trips required. Effective: 2008 Fall Quarter.

EVE 114—Experimental Invertebrate Biology (3)
Discussion—1 hour; Fieldwork—3 hours; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Upper division standing or consent of instructor; introductory cell, animal and plant biology (BIS 001A and BIS 001B and BIS 001C, or BIS 002B), invertebrate zoology (EVE 112), ecology (EVE 101), and/or evolution (EVE 100) are recommended; residence at or near Bodega Marine Lab required. Enrollment restricted to application at http://www.bml.ucdavis.edu. Biology, ecology, and evolution of local marine invertebrates with a focus on adaptations to environmental and biological factors encountered on the California coast. Hands-on field and laboratory learning with an emphasis on generating and testing hypotheses. GE credit: QL, SE, VL, WE. Effective: 2008 Summer Session 1.

EVE 115—Marine Ecology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EVE 101 or ESP 100 or BIS 002B; or Consent of Instructor. Processes affecting the distribution, abundance, and diversity of plant and animal life in the sea. Introduction to marine habitat diversity and human impacts on marine ecosystems. GE credit: SE, SL, VL, WE. Effective: 2008 Fall Quarter.

EVE 117—Plant Ecology (4)
Fieldwork—3 hours; Lecture—3 hours. Prerequisite(s): (BIS 001A, BIS 001B, BIS 001C) or (BIS 002A, BIS 002B, BIS 002C); PLB 111 recommended. The study of the interactions between plants, plant populations or vegetation types and their physical and biological environment. Special emphasis on California. Four full-day field trips and brief write-up of class project required. (PLB 117.) Effective: 2008 Fall Quarter.

EVE 119—Population Biology of Invasive Plants and Weeds (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): (BIS 001A, BIS 001B, BIS 001C) or (BIS 002A, BIS 002B, BIS 002C); Introductory statistics recommended. Origin and evolution of invasive plant species and weeds, reproduction and dispersal, seed ecology, modeling of population dynamics, interactions between invasive species, native species, and crops, biological control. Laboratories emphasize design of competition experiments and identification of weedy species. (PLB 119.) GE credit: SE. Effective: 2011 Spring Quarter.

EVE 120—Global Change Ecology (3)
Lecture/Discussion—3 hours. Prerequisite(s): EVE 100; EVE 101; Or equivalents. Treatment of historical evolution of the biosphere resulting from physical, chemical, and biological influences. Special focus upon changes caused by humans. Topics pertain to biodiversity, resources, conservation, and ecosystem services. Effective: 2010 Spring Quarter.

EVE 131—Human Genetic Variation and Evolution (3)
Lecture—3 hours. Prerequisite(s): BIS 001B or BIS 002B Introduction to genome-wide nucleotide sequence variation in human populations and computational methods for its analysis. Topics to include forensics, disease gene mapping, and studies of human evolutionary history. Misuses, such as eugenics, and ethical/legal issues will be discussed. Effective: 2010 Spring Quarter.

EVE 138—Ecology of Tropical Latitudes (5)
Discussion—1 hour; Extensive Writing; Lecture—3 hours. Prerequisite(s): and Consent of Instructor. One course in Biological Sciences, Entomology, Wildlife, Fish, and Conservation Biology, Geography, or tropical experience. Biological, physical, and human-related aspects of the ecology of low latitudes. Distribution, numbers, and relationships of tropical organisms. Problems of development and conservation in the context of ecological and evolutionary theory. GE credit: SE, SL, WE. Effective: 1999 Spring Quarter.

EVE 140—Paleobotany (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (BIS 001A, BIS 001B, BIS 001C) or (BIS 002A, BIS 002B, BIS 002C) Introduction to plant fossil record, beginning with invasion of land in the Silurian, emphasizing origin and evolution of major groups and adaptations and changing composition and distribution of floras in relation to plate tectonics and climatic change. Effective: 2008 Fall Quarter.

EVE 141—Principles of Systematics (3)
Independent Study; Lecture—2 hours. Prerequisite(s): BIS 001B or BIS 001C or BIS 002B; EVE 100 recommended. Historical background, philosophical rationale, contemporary approaches, and working rules of biosystematics, including International Code of Zoological Nomenclature. GE credit: OL, QL, SE, SL, VL, WE. Effective: 2008 Fall Quarter.

EVE 147—Biogeography (4)
Lecture—3 hours; Term Paper. Prerequisite(s): BIS 002B or (BIS 001A, BIS 001B) Movements of terrestrial organisms. The role of geologic, climatic, and biologic changes in the geographic distribution of organisms. GE credit: QL, SE, SL, VL, WE. Effective: 2008 Fall Quarter.

EVE 149—Evolution of Ecological Systems (4)
Lecture—3 hours; Term Paper. Prerequisite(s): (EVE 101 or ESP 100); EVE 100; Or equivalent courses. Evolution as an organizing force in natural communities. Coadaptation in trophic and competitive relationships. Ecology of polymorphisms, clines, and speciation. GE credit: SE, SL, WE. Effective: 1997 Winter Quarter.

EVE 150—Evolution of Animal Development (3)
Lecture—3 hours. Prerequisite(s): BIS 101; EVE 100; EVE 100 (may be waived for graduate students with consent of instructor). Comparative analysis of animal development and the genetic basis of morphological diversification. GE credit: SE, WE. Effective: 2013 Winter Quarter.

EVE 161—Microbial Phylogenomics - Genomic Perspectives on the Diversity and Diversification of Microbes (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B; BIS 002C; Or equivalent. Use of DNA and genomic sequencing in studies of the diversity of microorganisms. Diversity of microbes, phylogenetics, genome sequencing, comparative genomics, phylogenomics, lateral gene transfer, molecular ecology, metagenomics, and studies of the human microbiome. GE credit: SE. Effective: 2013 Spring Quarter.

EVE 175—Computational Genetics (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): BIS 101; (STA 100 or STA 102) The use of computers to solve problems in genetics and evolution.
Introduction to a general purpose computer language (Python),
computational statistical methods, and applications such as QTL mapping, linkage detection, estimation of rates of evolution, and gene finding. Effective: 2004 Winter Quarter.

EVE 180A—Experimental Ecology and Evolution in the Field (4)
Fieldwork—3 hours; Lecture/Lab—3 hours. Prerequisite(s): EVE 100; (EVE 101 or ESP 100); ENT 105 Experimental design in field ecology. Examination of primary literature, experimental design, independent and collaborative research, analysis of data, development of original research paper based on field experiments. (ENT 180A.) GE credit: QL, SE, VL. Effective: 2014 Winter Quarter.

EVE 180B—Experimental Ecology and Evolution in the Field (4)
Fieldwork—3 hours; Lecture/Lab—3 hours. Prerequisite(s): (EVE 180A or ENT 180A); EVE 100; (EVE 101 or ESP 100); ENT 105 Experimental design in field ecology. Examination of primary literature, experimental design, independent and collaborative research, analysis of data, development of original research paper based on field experiments. (ENT 180B.) GE credit: QL, SE, VL, WE. Effective: 2014 Winter Quarter.

EVE 181—Ecology and Evolution of Animal-Plant Interactions (4)
Extensive Writing/Discussion; Lecture—1.5 hours; Lecture/Discussion—1.5 hours; Term Paper. Prerequisite(s): BIS 002B; BIS 002C (can be concurrent) Animal adaptations for eating plants, pollinating flowers, dispersing seeds. Plant adaptations to herbivore defense, attraction of mutualists; role of coevolutionary arms race, mutualists and cheaters in plant/animal speciation. Exploration through lectures, original scientific literature, discussions and term paper. GE credit: OL, QL, SE, SL, WE. Effective: 2010 Fall Quarter.

EVE 189—Introduction to Biological Research (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing in Evolution and Ecology or related biological science. Introduction to research methods in biology. Presentation and discussion
of research by faculty, graduate, and undergraduate students. May be repeated up to 6 unit(s). (P/NP grading only.) GE credit: SE. Effective: 2010 Winter Quarter.

EVE 190—Undergraduate Seminar (2)
Seminar—2 hours. Prerequisite(s): Upper division standing in the biological sciences or a related discipline. Student reports on current topics with emphasis on integration of concepts, synthesis, and state-of-the-art research approaches. Reviews of literature and reports of undergraduate research may be included. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

EVE 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Work experience off and on campus in all subject areas offered in the
Department of Evolution and Ecology. Internships supervised by a member of the faculty. May be repeated for credit. (P/NP grading only.) Effective: 2008 Fall Quarter.

EVE 194HA—Research Honors (2)
Laboratory—6 hours. Prerequisite(s): Students who have completed 135 units and qualify for the Honors Program (as defined by the current catalog). Students pursue intensive research under the guidance of a faculty advisor. Students are expected to complete the full three-quarter sequence culminating in the writing of an honors thesis. GE credit: SE, WE. Effective: 1997 Winter Quarter.

EVE 194HB—Research Honors (2)
Laboratory—6 hours. Prerequisite(s): Students who have completed 135 units and qualify for the Honors Program (as defined by the current catalog). Students pursue intensive research under the guidance of a faculty advisor. Students are expected to complete the full three-quarter sequence culminating in the writing of an honors thesis. GE credit: SE, WE. Effective: 1997 Winter Quarter.

EVE 194HC—Research Honors (2)
Laboratory—6 hours. Prerequisite(s): Students who have completed 135 units and qualify for the Honors Program (as defined by the current catalog). Students pursue intensive research under the guidance of a faculty advisor. Students are expected to complete the full three-quarter sequence culminating in the writing of an honors thesis. GE credit: SE, WE. Effective: 1997 Winter Quarter.

EVE 197T—Tutoring in Biological Sciences 2B (1-2)
Tutorial—3 hours. Prerequisite(s): BIS 001B B or better Assisting the instructor by tutoring students in a Biological Sciences 2B laboratory. Tutoring is voluntary and is supervised by a Laboratory Teaching Assistant and the Laboratory Coordinator. May be repeated up to 3 time(s). (P/NP grading only.) GE credit: SE. Effective: 2008 Fall Quarter.

EVE 198—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

EVE 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

EVE 210—Molecular Phylogenetic Analysis (3)
Laboratory—3 hours; Lecture—2 hours. Theory and practice of inferring phylogenetic trees using molecular sequence data. Practical techniques for obtaining sequence data, advantages and disadvantages of common approaches for inferring trees, statistical methods for comparing alternative hypotheses. (NEM 210.) Effective: 2001 Spring Quarter.

EVE 211—Applied Phylogenetics (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): EVE 103 or EVE 210 or PBG 200C; Or equivalent, graduate standing. Applications of phylogenetic methods to fields outside of systematics. Core lectures/labs in remedial phylogenetics, phylogeography, conservation and comparative morphology. Special topics vary yearly. May be repeated up to 1 time(s). Effective: 2002 Spring Quarter.

EVE 220—Species and Speciation (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): EVE 100 or PHI 108; Or the equivalent; HPS 130B recommended. Current status of species concepts, models of speciation, current research on speciation, and relevance of species to conservation biology. Effective: 2005 Winter Quarter.

EVE 231—Principles of Biological Data Analysis (3)
Laboratory—3 hours; Lecture—2 hours. Introduction to the principles of data analysis, experimental design, statistical modeling, inference, and hypothesis tests. Statistical methods of particular importance in biological applications will be emphasized. Examples will be presented from the fields of ecology and evolutionary genetics. (S/U grading only.) Effective: 2006 Winter Quarter.

EVE 240—Paleobotany and Angiosperm Evolution (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): PLB 108 or PLB 116 or EVE 140 Critical analysis of the plant fossil record as a source of evidence
on origin, evolution, and phylogeny of the angio-sperms, Cretaceous and Tertiary climates, geographic history of modern taxa, and origin of
modern vegetation types. Effective: 1997 Winter Quarter.

EVE 290C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Presentation and discussion of faculty and graduate student research in biology. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

EVE 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

EVE 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

EVE 390—Methods of Teaching (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Practical experience in the methods and problems of teaching. Includes analyses of texts and supporting material, discussion of teaching techniques and preparing and conducting of laboratory and discussion sections. May be repeated up to 8 unit(s). (S/U grading only.) Effective: 1997 Winter Quarter.

Exercise Biology Minor; Neurobiology, Physiology, & Behavior

Exercise Biology Minor; Neurobiology, Physiology, & Behavior | EXB Minor

(College of Biological Sciences)

W. Martin Usrey, Ph.D., Chairperson of the Department

Department Office. 196 Briggs Hall; 530-752-0203; http://www.npb.ucdavis.edu

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https://npb.ucdavis.edu/people?first=&last=&title=&unit=&field_sf_person_type_target_id[0]=26

Master Advisor. Aldrin Gomes, Ph.D.

Exercise Biology **Units:** 18

Choose at least 15 units:

EXB 101	Exercise Physiology	4
EXB 102	Introduction to Motor Learning and the Psychology of Sport and Exercise	4
EXB 110	Exercise Metabolism	3
EXB 111	Environmental Effects on Physical Performance	3
EXB 112	Clinical Exercise Physiology	4
EXB 115	Biomechanical Bases of Movement	3
EXB 117	Exercise and Aging in Health and Disease	3
EXB 124	Physiology of Maximal Human Performance	4
NPB 109	Kinesiology—Analysis and Control of Human Movement	4

Exercise Biology or other approved course:
An additional three upper division units from either the previous list of Exercise Biology courses OR from:

EXB 106	Human Gross Anatomy	4
NPB 101	Systemic Physiology	5
BIS 101	Genes and Gene Expression	4
BIS 104	Cell Biology	3
BIS 105	Biomolecules and Metabolism	3

Total: 18

Exercise Biology Minor; Neurobiology, Physiology, & Behavior | EXB Courses

Courses in EXB:

EXB 010—Exercise and Fitness: Principles and Practice (3)
Lecture—3 hours. Human movement from physiological, psychological, sociological, and historical perspectives. Biology and psychology of exercise across the human lifespan. Not open for credit to students who have taken an upper division EXB course. GE credit: SE, SL. Effective: 2004 Winter Quarter.

EXB 090C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): EXB 099 (can be concurrent); Lower division standing in Exercise Biology or related biological science and consent of instructor; EXB 099 required concurrently. Research findings and methods in exercise biology. Presentation and discussion of research by faculty and students. May be repeated for credit. (P/NP grading only.) Effective: 2006 Fall Quarter.

EXB 090X—Lower Division Seminar (1-2)
Lecture—1-2 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Gives freshman or sophomore level students the opportunity to study a special topic in the general area of Exercise Biology in a small class setting. GE credit: SE. Effective: 1997 Winter Quarter.

EXB 092—Exercise Biology Internship (1-5)
Internship—3-15 hours. Prerequisite(s): Consent of Instructor. Enrollment dependent on availability of intern positions. Work experience in the application of physical activity programs to teaching, recreational, clinical or research situations under department faculty supervision. May be repeated up to 1 time(s). No internship units will be counted towards the Exercise Biology major. (P/NP grading only.) Effective: 2003 Spring Quarter.

EXB 097T—Tutoring in Exercise Biology (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Assisting the professor by tutoring students in exercise biology course-related projects. May be repeated up to 10 unit(s) including courses EXB 097TC, EXB 197T and EXB 197TC. No tutorial units will be counted towards the Exercise Biology major. (P/NP grading only.) Effective: 2004 Fall Quarter.

EXB 097TC—Tutoring Exercise Biology in the Community (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of instructor and chairperson. Tutoring in the community in exercise biology related projects under the guidance of the faculty. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 2003 Spring Quarter.

EXB 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of instructor and chairperson. (P/NP grading only.) Effective: 1997 Winter Quarter.

EXB 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

EXB 101—Exercise Physiology (4)
Lecture—4 hours. Prerequisite(s): NPB 101 or NPB 110C Physiologic responses to acute exercise, and physiologic adaptations to both chronic exercise (training) and selected environmental stresses. Emphasis is placed on the muscular, metabolic, cardiovascular, respiratory and renal responses and adaptations to exercise. Only 1 unit of credit allowed to students who have completed EXS 101; only 3 units of credit allowed to students who have completed EXS 102; not open for credit to students who have completed EXS 101 and EXS 102. GE credit: SE, SL. Effective: 2018 Winter Quarter.

EXB 102—Introduction to Motor Learning and the Psychology of Sport and Exercise (4)
Lecture—4 hours. Prerequisite(s): PSC 001 recommended. Theoretical and practical issues in motor learning, sport psychology, and exercise psychology are examined. Emphasis is placed on how motor skills are acquired and retained, and on the application of social psychology and human motivation studies to human performance. Only 2 units of credit allowed for students who have completed EXB 104; only 2 units of credit allowed for students who have completed EXB 105; not open for credit to students who have completed EXS 104 and EXS 105. GE credit: SS. Effective: 2002 Winter Quarter.

EXB 104L—Exercise Biology Laboratory (3)
Discussion—1 hour; Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): EXB 101 (can be concurrent); EXB 102 (can be concurrent); EXB 103 (can be concurrent); The last taken of the three courses may be taken concurrently. Principles and analytical procedures for assessing fundamental physiological, biomechanical, motor learning and motor control factors which underlie human movement and performance. Only 1 unit of credit allowed to students who have completed EXS 101L; only 1 unit of credit allowed to students who have completed EXS 103; not open for credit to students who have completed EXS 101L and EXS 103. (Former EXS 101L and EXS 103.). GE credit: SE, WE. Effective: 2004 Winter Quarter.

EXB 106—Human Gross Anatomy (4)
Lecture—4 hours. Prerequisite(s): BIS 002A; Concurrent enrollment in EXB 106L or CHA 101L strongly recommended. Upper division students only; Pass One open to upper division Exercise Biology or Anthropology majors only; Pass Two open to Seniors in any major; open enrollment at the start of the quarter for upper division students in any major. Detailed study of the gross anatomical structure of the human body, with emphasis on function and clinical relevance to students entering health care professions. (CHA 101.) GE credit: SE. Effective: 2010 Fall Quarter.

EXB 106L—Human Gross Anatomy Laboratory (3)
Laboratory—9 hours. Prerequisite(s): BIS 002A; EXB 106 (can be concurrent) or CHA 101 (can be concurrent); Must have completed EXB 106 or CHA 101 or required concurrently. Upper division students only; Pass One open to upper division Exercise Biology or Anthropology majors only; Pass Two open to Seniors in any major; open enrollment at the start of the quarter for upper division students in any major; mandatory attendance on first day of lab. Detailed study of prosected human cadavers in small group format with extensive hands-on experience. (CHA 101L.) GE credit: SE. Effective: 2010 Fall Quarter.

EXB 110—Exercise Metabolism (3)
Lecture—3 hours. Prerequisite(s): EXB 101 or NPB 101 or NPB 110C Exercise metabolism, with emphasis on skeletal muscle and cardiac muscle metabolism during activity and inactivity. Basics of bioenergetics, substrate utilization, and cell signaling; mechanisms that regulate these properties, and differences between skeletal muscle and cardiac muscle metabolism. GE credit: SE. Effective: 2018 Winter Quarter.

EXB 111—Environmental Effects on Physical Performance (3)
Discussion/Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): EXB 101; or Consent of Instructor. The effects of thermal, barometric and gravitational conditions on physiological function and physical performance of humans. Acute and chronic effects, emphasizing physiological adaptations and limitations, will be studied. GE credit: QL, SE. Effective: 2007 Winter Quarter.

EXB 112—Clinical Exercise Physiology (4)
Discussion/Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EXB 101; or Consent of Instructor. Physical activity as a therapeutic modality in normal and diseased populations (cardiovascular, pulmonary, diabetic). Effects of exercise and inactivity in terms of normal physiology, pathophysiology, and therapeutic benefit. Exercise fitness and disease assessment methods. GE credit: SE, SL. Effective: 2009 Spring Quarter.

EXB 115—Biomechanical Bases of Movement (3)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): EXB 103; or Consent of Instructor. Biomechanical bases of human movement investigated; topics include musculo-skeletal mechanics, tissue mechanics, electromyography,
and measurement and analysis techniques. Application made to sport, clinical, and work environments, including extensive analysis of
locomotion. GE credit: QL, SE, VL, WE. Effective: 1997 Winter Quarter.

EXB 116—Nutrition for Physically Active Persons (3)
Lecture—3 hours. Prerequisite(s): EXB 101; NPB 101 The role of nutrition and exercise in modifying metabolism, body composition, performance and health of humans. GE credit: SE. Effective: 1997 Winter Quarter.

EXB 117—Exercise and Aging in Health and Disease (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): EXB 101 or EXB 113 (can be concurrent) Etiology of and standard therapy for various diseases associated with aging (e.g., cardiovascular, pulmonary, and renal diseases, diabetes, obesity, lipemias, etc.). Exercise will then be considered as a protective and/or therapeutic modality. GE credit: SE. Effective: 2007 Spring Quarter.

EXB 120—Sport in American Society (3)
Lecture—3 hours. Sociological approaches to the study of sport and contemporary American culture, including sport interaction with politics, economics, religion, gender, race, media and ethics. Socialization factors involving youth, scholastic, collegiate, and Olympic sport. (PHE 120.) GE credit: SS. Effective: 2009 Summer Session 1.

EXB 121—Advanced Sport Psychology (3)
Lecture—3 hours. Prerequisite(s): EXB 102; PSC 001 recommended. Advanced study and consideration of major theoretical and practical issues in sport psychology. Emphasis on practical application to sport and human performance. Effective: 2010 Winter Quarter.

EXB 122—Psychological Effects of Physical Activity (3)
Lecture—3 hours. Prerequisite(s): PSC 001 or PSC 001Y Upper division standing. Physical activity is evaluated in terms of its ability to enhance the quality of life. Topics studied include: individual factors (self concept, type A); special populations (elderly, cardiovascular); and mental health changes (depression, anxiety). Effective: 2018 Spring Quarter.

EXB 124—Physiology of Maximal Human Performance (4)
Lecture—3 hours; Practice—4 hours. Prerequisite(s): EXB 101; or Consent of Instructor. BIS 101, BIS 102, and BIS 103 recommended. Molecular mechanisms underlying adaptation to training. Learn how to exercise to maximize their own performance as well as learning how the frequency, intensity and timing of exercise and nutrition affect the molecular signals that underlie performance. GE credit: SE. Effective: 2011 Winter Quarter.

EXB 125—Neuromuscular and Behavioral Aspects of Motor Control (3)
Discussion/Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): EXB 101 Factors which affect control of movement from neuropsychological, physiological, behavioral, and mechanical viewpoints. Topics include central vs. peripheral control mechanisms, open and closed loop theories, motor programming, cognitive learning strategies, and the effects of biochemical and biomechanical influences. GE credit: SE. Effective: 2006 Fall Quarter.

EXB 148—Theory and Practice of Exercise Testing (1)
Lecture/Discussion—1 hour. Prerequisite(s): EXB 112 (can be concurrent) Theory and practice of exercise testing applied to older adult populations. Physiological responses to and limitations of exercise testing. Application of exercise testing and training to healthy and diseased populations. (P/NP grading only.) GE credit: SE. Effective: 2006 Fall Quarter.

EXB 148L—Adult Fitness Testing Laboratory (1)
Laboratory—3 hours. Prerequisite(s): EXB 148 (can be concurrent); EXB 148 required concurrently. Testing symptomatic and asymptomatic older adults for functional aerobic capacity, body composition, blood lipids, pulmonary function, and cardiovascular disease risk. Counseling adults in appropriate exercise programs and lifestyle modifications. Two quarters minimum; third quarter permitted. (Former course Physical Education 148L). May be repeated up to 2 time(s). (P/NP grading only.) GE credit: QL, SE. Effective: 2006 Fall Quarter.

EXB 179—Frontiers in Exercise Biology (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): EXB 101; EXB 102; EXB 103 (can be concurrent); EXB 104L recommended. Lectures by leading authorities and discussion of the latest research in newly emerging areas in exercise biology. Offered every fourth year. GE credit: SE. Effective: 2007 Spring Quarter.

EXB 189—International Perspectives in Exercise Biology (4)
Lecture—4 hours. Prerequisite(s): EXB 010; Or upper division standing in Exercise Biology; consent of instructor: students will be accepted based upon academic merit, personal experience, and academic discipline in order to provide multidisciplinary perspectives. Restricted to 22 students. Compare and contrast exercise science issues between the US and an international location. Identify political, economic, cultural, technological and environmental issues that impact human exercise, physical activity, wellness, and sport from a global perspective. Effective: 2009 Summer Session 1.

EXB 190C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): EXB 099 (can be concurrent); Upper division standing in Exercise Biology or related biological science and consent of instructor; EXB 199 required concurrently. Restricted to upper division students. Research findings and methods in exercise biology. Presentation and discussion of research by faculty and students. May be repeated for credit. (P/NP grading only.) Effective: 2006 Fall Quarter.

EXB 192—Exercise Biology Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Enrollment dependent on availability of intern positions. Work experience in the application of physical activity programs to teaching, recreational, clinical or research situations under program faculty supervision. Written report required. May be repeated up to 15 unit(s) including course 92. (P/NP grading only.) Effective: 2003 Spring Quarter.

EXB 194H—Research Honors (2)
Independent Study—6 hours. Prerequisite(s): Senior standing, minimum of 6 units of EXB 199, 3.50 GPA or greater in major courses, consent of honors thesis advisor. Completion of individual honors research project in Exercise Biology, under the guidance of an Exercise Biology faculty advisor, culminating in written honors thesis. (P/NP grading only.) GE credit: SE. Effective: 2004 Fall Quarter.

EXB 197T—Tutoring in Exercise Biology (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Assisting the instructor by tutoring students in exercise biology course-related projects. May be repeated up to 10 unit(s) including courses EXB 097T, EXB 097TC and EXB 197TC. No tutorial units will be counted towards the Exercise Biology major. (P/NP grading only.) Effective: 2004 Fall Quarter.

EXB 197TC—Tutoring Exercise Biology in the Community (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of instructor and chairperson. Tutoring in the community in exercise biology related projects under the guidance of the faculty. May be repeated up to 10 unit(s) including courses 97T, 97TC and 197T. (P/NP grading only.) Effective: 2003 Spring Quarter.

EXB 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of instructor and chairperson. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

EXB 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of chairperson. (P/NP grading only.) Effective: 1997 Winter Quarter.

Exercise Biology Minor; Neurobiology, Physiology, & Behavior | NPB Courses

Courses in NPB:

NPB 010—Elementary Human Physiology (3)
Lecture—3 hours. Introduction to physiology for non-science majors. Includes basic cell physiology and survey of major organ systems and how they function in homeostasis and human health. Not open for credit to students who have completed NPB 101. GE credit: SE. Effective: 2016 Winter Quarter.

NPB 012—The Human Brain and Disease (3)
Lecture—3 hours. Normal function and diseases of the human brain and nervous system. Diseases discussed include Parkinson's, Alzheimer's, leprosy, amnesia and schizophrenia. Intended for non-science majors. Not open for credit for students who have completed NPB 100, NPB 101, NPB 112, or PSC 121. GE credit: SL. Effective: 1997 Spring Quarter.

NPB 014—Illusions: Fooling the Brain (3)
Lecture—3 hours. Introduction to perceptual processing in the human nervous system; illusions. GE credit: QL, SE, SL. Effective: 2012 Winter Quarter.

NPB 015—The Biology and Physiology of Aging (4)
Discussion—1 hour; Lecture—3 hours. Broad examination of age-associated changes in body functions. Includes basic cell physiology, a survey of major organ systems and the age-induced alterations in system function. Some age-associated diseases will also be examined. Intended for non-science majors. Not open for credit to students who have completed NPB 15V. GE credit: SE. Effective: 2012 Fall Quarter.

NPB 015V—The Biology and Physiology of Aging (4)
Web Electronic Discussion—1 hour; Web Virtual Lecture—3 hours. Broad examination of the biological and physiological basis of aging in animals and plants. Concepts in demographic, evolutionary, genetic, and cell aging. Major human organ systems, age-related alterations in system function, and age-related diseases. Intended for non-science majors. Not open for credit to students who have completed NPB 15. GE credit: SE, SL. Effective: 2012 Fall Quarter.

NPB 017—The Path to Cyborgs: Introduction to Prostheses and Human Machine Interfaces (3)
Lecture—3 hours. Interface of biology and technology. Mind-controlled prosthetic limbs, artificial organs, and implantable devices. Emphasis on basic physiological functions and how they can be replaced by devices. Suitable for majors and non-majors. GE credit: SE, SL. Effective: 2016 Winter Quarter.

NPB 018—Biological Science for Social Justice (3)
Lecture—3 hours. Broad survey of the many ways one can use the biological sciences to better the lives of others and break down barriers that have restricted social mobility. GE credit: DD, SE, SL, SS. Effective: 2018 Spring Quarter.

NPB 068—Biology of Drug Addiction and Abuse (3)
Lecture—3 hours. Broad examination of addictive substances and their use/abuse. Topics include historical perspective, physiological effects, etiology, neurobiology of addiction and the impact of drugs on contemporary society. Intended for non-science majors. Not open for credit to students having completed NPB 168. Effective: 2008 Spring Quarter.

NPB 090A—Lower Division Seminar: Issues in Body Weight Regulation (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Limited enrollment. Critical examination of issues in body weight regulation through shared readings, discussions, written assignments, debates and oral presentations. Limited enrollment. Effective: 2000 Winter Quarter.

NPB 090B—Human Color Perception (2)
Seminar—2 hours; Term Paper. Prerequisite(s): Lower division standing. Class size limited to 15 students with lower division standing. Neural determinants of color appearance, and why we see the world in the way we do. Discussions center around demonstrations of color phenomena and what they tell us about the human brain. Effective: 2008 Spring Quarter.

NPB 090C—Current Issues in Animal Behavior (2)
Seminar—2 hours. Prerequisite(s): Lower division standing. Limited enrollment. The mechanisms and outcomes of sexual selection (mate choice and mate competition). Theory, current models and evidence that supports or refutes the models. Effective: 2003 Winter Quarter.

NPB 090D—Lower Division Seminar: Current Issues in Reproductive Endocrinology (2)
Seminar—2 hours. Prerequisite(s): Lower division standing. The integrative roles of reproductive hormones in mammalian reproduction and health. Current theory and models regarding hormone function and use in reproductive health and contraception, and evidence that supports or refutes the models. Effective: 2002 Fall Quarter.

NPB 090E—Biology of Aging (2)
Seminar—2 hours. Prerequisite(s): Freshman standing. Current theories on the biology of aging covering genetic, biochemical, and physiological aspects. Emphasis on critical evaluation of controversial and contemporary issues. Effective: 2003 Fall Quarter.

NPB 090F—Visual Impairment and Blindness: A World Wide Problem (2)
Seminar—2 hours. Prerequisite(s): Lower division standing. Examination of various abnormalities of the eye and the important geographic and cultural factors that influence the epidemiology of those abnormalities. Effective: 2007 Winter Quarter.

NPB 091C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): NPB 099 (can be concurrent); and Consent of Instructor. Lower division standing in Neurobiology, Physiology and Behavior or related biological science; NPB 099 required concurrently. Restricted to lower division students. Research findings and methods in neurobiology, physiology, and/or behavior. Presentation and discussion of research by faculty and students. May be repeated for credit. (P/NP grading only.) Effective: 2003 Fall Quarter.

NPB 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Work experience off and on campus in all subject areas offered in the
Department of Neurobiology, Physiology, and Behavior. Internships supervised by a member of the faculty. May be repeated for credit. (P/NP grading only.) Effective: 2008 Fall Quarter.

NPB 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) Effective: 2000 Winter Quarter.

NPB 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) Effective: 1999 Winter Quarter.

NPB 100—Neurobiology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 002A; PHY 009A, PHY 009B or PHY 007A, PHY 007B recommended. Brains and nervous systems, neurons and neural circuits. Coordination of movement. Development of nervous systems. Vision, hearing, and feature extraction by the central nervous system. The cell biology of learning and memory. Perception, cognition, and disorders of the brain. Not open for credit to students who have completed NPB 110B, NPB 112, NPB 160, NPB 161 or NPB 162, or NSC 221 or NSC 222. GE credit: QL, SE. Effective: 2018 Spring Quarter.

NPB 100L—Neurobiology Laboratory (3)
Extensive Writing/Discussion; Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): NPB 100 (can be concurrent) or NPB 110B (can be concurrent) Experimental basis of neurobiology principles discussed in course 100. Topics include neurophysiology, sensory systems, motor systems, cellular neuroscience, cognitive neuroscience, and quantitative data analysis and modeling techniques. GE credit: SE. Effective: 2017 Winter Quarter.

NPB 100Q—Quantitative Foundations of Neurobiology (1)
Auto Tutorial—1.5 hours; Extensive Problem Solving—1.5 hours. Prerequisite(s): NPB 100 (can be concurrent) Computational methods and mathematical models used to study phenomena in neurobiology. GE credit: QL, VL. Effective: 2010 Spring Quarter.

NPB 101—Systemic Physiology (5)
Lecture—5 hours. Prerequisite(s): BIS 001A or BIS 002A; CHE 002B; PHY 001B or PHY 007C strongly recommended. Systemic physiology with emphasis on aspects of human physiology. Functions of major organ systems, with the structure of those systems described as a basis for understanding the functions. Not open for credit to students who have completed NSC 110C. GE credit: SE. Effective: 2017 Winter Quarter.

NPB 101D—Systemic Physiology Discussion (1.5)
Discussion—1.5 hours. Prerequisite(s): NPB 101 (can be concurrent); Consent of Instructor. Discussion and problem solving related to fundamental principles of systemic physiology as presented in course 101. (P/NP grading only.) Effective: 2017 Spring Quarter.

NPB 101L—Systemic Physiology Laboratory (3)
Discussion—2 hours; Laboratory—3 hours; Term Paper. Prerequisite(s): NPB 101 or NPB 110C Selected experiments to illustrate functional characteristics of organ systems discussed in course 101. Effective: 2017 Winter Quarter.

NPB 102—Animal Behavior (3)
Lecture—3 hours. Prerequisite(s): (BIS 001A, BIS 001B, BIS 001C) or (BIS 002A, BIS 002B, BIS 002C) Basic principles of behavioral organization in vertebrate and invertebrate animals. Underlying physiological and ethological mechanisms. The evolution of behavior, with special emphasis on behavior under natural conditions. Not open for credit to students who have completed NPB 155. (Former NPB 155.). GE credit: SL. Effective: 2008 Fall Quarter.

NPB 102Q—Quantitative Topics in Animal Behavior (1)
Auto Tutorial—1.5 hours; Extensive Problem Solving—1.5 hours. Prerequisite(s): MAT 016B; NPB 102 (can be concurrent) Study of the quantitative concepts and exemplar models used in animal behavior. Effective: 2009 Spring Quarter.

NPB 103—Cellular Physiology/Neurobiology (3)
Lecture—3 hours. Prerequisite(s): (BIS 103 or BIS 105); BIS 104; PHY 007C recommended. Cellular physiology with emphasis on membrane transport processes and neuronal physiology. Fundamental physical-chemical and biological mechanisms of membrane transport will be considered in relation to
cytoplasmic homeostasis, communication between cells,and the cellular mechanisms of sensory and motor transduction. Not open for credit to students who have completed NPB 100B. (Former NPB 100B.). Effective: 2008 Spring Quarter.

NPB 104L—Cellular Physiology/Neurobiology Laboratory (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—1 hour; Term Paper/Discussion. Prerequisite(s): NPB 101L; (BIS 103 or BIS 105) Experiments in the physical and chemical processes of cells and tissues. Effective: 2018 Winter Quarter.

NPB 105—Introduction to Computer Models (4)
Lecture—3 hours; Lecture/Lab—1 hour. Prerequisite(s): CHE 002C; PHY 007C; (NPB 100 or NPB 101); MAT 016C; Or the equivalent to MAT 016C. Introduction to the ideas, mathematical techniques and computer tools required for developing models of cellular processes in physiology and neurobiology. Applications include membrane transport, ionic channels, action potentials, Ca2+ oscillations, respiration, and muscle contraction. Effective: 1997 Winter Quarter.

NPB 106—Experiments in Neurobiology, Physiology, and Behavior: Design and Execution (3)
Discussion—0.5 hours; Laboratory—7.5 hours. Prerequisite(s): (NPB 110A or NPB 100 or NPB 101 or NPB 102); NPB 199; and Consent of Instructor. Design and execution of experiments in neurobiology, physiology, and/or behavior. Students choose and design a project in consultation with the sponsoring faculty member. May be repeated once for credit to complete the project, with consent of instructor. May be repeated up to 1 time(s). (P/NP grading only.) GE credit: OL, QL, VL, WE. Effective: 2018 Winter Quarter.

NPB 107—Cell Signaling in Health and Disease (3)
Lecture—3 hours. Prerequisite(s): BIS 102 or BIS 105 Basics of cell signaling pathways, their disruption in disease, and their current utility and future potential as therapeutic targets. Focus is on signaling pathways specific to nervous, endocrine and immune systems, and those fundamental to all cells. GE credit: SL. Effective: 2009 Winter Quarter.

NPB 108Y—Animal Behavior Laboratory (3)
Lecture—3 hours; Web Electronic Discussion—12 hours. Hybrid course, consisting of limited in-person lectures and the rest laboratory exercises. The laboratory exercises will be online, and will require students to view and score videos of animal behavior in order to test behavioral hypotheses. Effective: 2016 Summer Session 2.

NPB 109—Kinesiology—Analysis and Control of Human Movement (4)
Lecture—4 hours. Prerequisite(s): PHY 007A; PHY 007B; NPB 101 or NPB 110C recommended; CHA 101 and CHA 101L (same as EXB 106 and EXB 106L) or equivalent recommended. Functional anatomy, motor control, and biomechanics of human movement understood in the context of body structures, basic principles of physics, and functional characteristics of muscle. GE credit: SE. Effective: 2018 Spring Quarter.

NPB 110A—Foundations 1: From Molecules to Individuals (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): (BIS 002A, BIS 002B); (CHE 002B or CHE 003A); PHY 007A and PHY 007B recommended; BIS 002C recommended. Pass One restricted to majors in Neurobiology, Physiology and Behavior. Major concepts in cell biology with special emphasis on connections between cell biology and behavior. Includes: cellular metabolism, cellular sensing and signaling, membrane structure-function, molecular switches, electrical and chemical signaling, endocrine signaling, cell cycle and differentiation, cytoskeleton, and integrative examples. Credit limited to 3 units for students who have taken BIS 104. GE credit: SE. Effective: 2018 Winter Quarter.

NPB 110B—Foundations 2: Neurobiology (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): NPB 110A C- or better; PHY 007A and PHY 007B recommended. Open to declared NPB majors only. Core concepts of neurobiology including single-neuron biophysics, synapses and transmitters, neuronal development, motor systems, central pattern generation, neuronal circuits, intracellular signal transduction, sensory processing, multisensory integration, autonomic nervous system, neuromodulation, learning and memory, and higher cognition and disease. Credit limited to 2 units for students who have taken NPB 100. GE credit: SE. Effective: 2017 Winter Quarter.

NPB 110C—Foundations 3: Physiology (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): NPB 110A C- or better; PHY 007A; PHY 007B and PHY 007C recommended. Open to declared NPB majors only. Focuses on the structure, function, and interactions of animal organ systems in homeostasis and reproduction, and the response to perturbations of homeostasis; neural and endocrine signaling; skeletal muscle and movement; cardiovascular and respiratory systems; renal, digestive, immune, and reproductive physiology. Credit limited to 2 units for students who have taken NPB 101. GE credit: SE. Effective: 2018 Winter Quarter.

NPB 111L—Advanced Systemic Physiology Laboratory (4)
Discussion—2 hours; Laboratory—6 hours; Lecture—1 hour; Term Paper. Prerequisite(s): NPB 101L Selected comprehensive experiments in the autonomic nervous system and the cardiovascular, respiratory, and neuromuscular systems. Emphasis on conceptual and methodological approaches in demonstrating the physiology of organ systems. Effective: 2018 Winter Quarter.

NPB 113—Cardiovascular, Respiratory, and Renal Physiology (4)
Lecture—4 hours. Prerequisite(s): (NPB 110C or NPB 101); CHE 008B, PHY 007B and PHY 007C recommended. An intense and advanced presentation of concepts in cardiovascular, respiratory, and renal physiology including discussion of acid-base balance. Effective: 2018 Winter Quarter.

NPB 114—Gastrointestinal Physiology (3)
Lecture—3 hours. Prerequisite(s): (NPB 110C or NPB 101); BIS 105 or BIS 103 recommended, BIS 105 preferred. Gastrointestinal anatomy and physiology. Digestion, secretion, absorption, motility, comparative physiology and pathology. Strong emphasis on neural and hormonal regulation and on cellular mechanisms of secretion and absorption. Effective: 2018 Winter Quarter.

NPB 117—Avian Physiology (3)
Lecture—3 hours. Prerequisite(s): (BIS 002A, BIS 002B); CHE 002B; NPB 101 or NPB 110C strongly recommended. Physiology of the various systems of birds with emphasis on digestion, respiration, excretion, and endocrine systems. Effective: 2018 Spring Quarter.

NPB 121—Physiology of Reproduction (4)
Lecture/Discussion—4 hours. Prerequisite(s): NPB 101 or NPB 110C or ANS 100 Physiological mechanisms related to reproduction, breeding efficiency and fertility, with special reference to domestic animals. GE credit: QL, SL. Effective: 2018 Spring Quarter.

NPB 121L—Physiology of Reproduction Laboratory (1)
Laboratory—3 hours. Prerequisite(s): NPB 121 (can be concurrent) Experiments on the reproductive systems of domestic animals including male and female gametes. (P/NP grading only.) Effective: 2017 Spring Quarter.

NPB 122—Developmental Endocrinology (3)
Lecture—3 hours. Prerequisite(s): NPB 101 Restricted to upper division standing. Hormonal control of development, maturation and senescence from the cellular to organismal level, with emphasis on the human. Prenatal and neonatal life, childhood and adolescence, adulthood and pregnancy, as well as the endocrinology of aging. Effective: 2003 Spring Quarter.

NPB 123—Comparative Vertebrate Organology (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (BIS 001A, BIS 001B) or (BIS 002A, BIS 002B) Functional anatomy of major organ systems in vertebrates. Each system examined from cellular to gross level in fish, birds, and mammals. Emphasis on how differentiated cell types are integrated into tissues and organs to perform diverse physiological functions. (Anatomy, Physiology and cell Biology 100.) Effective: 2008 Winter Quarter.

NPB 124—Comparative Neuroanatomy (4) ***Review all entries***
Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): PSC 101 or NPB 100 or NPB 101 Overview of the neuroanatomy of the nervous system in a variety of mammalian and non-mammalian vertebrates. Examine changes or modifications to neural structures as a result of morphological or behavioral specializations. (Psychology 124) GE credit: SL. Effective: 1997 Fall Quarter.

NPB 124—Comparative Neuroanatomy (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): NPB 101 or NPB 100 or NPB 110B or PSC 121 Overview of the neuroanatomy in mammalian vertebrates, focusing on the cerebral cortex and experimental techniques. Examine changes or modifications to neural structures as a result of morphological or behavioral specializations. (PSC 124.) Effective: 2018 Fall Quarter.

NPB 124L—Comparative Neuroanatomy Laboratory (2)
Laboratory—6 hours. Prerequisite(s): NPB 124 (can be concurrent) Pass One restricted to PSC and NPB majors; must be concurrently enrolled in NPB 124. Comparative neuroanatomy laboratory illustrating modern neuroanatomical techniques in determining neural connections within the mammalian brain. Includes experimentation and presentation of results. (PSC 124L.) Effective: 2018 Fall Quarter.

NPB 126—Comparative Physiology: Sensory Systems (3)
Lecture—3 hours. Prerequisite(s): NPB 100 or NPB 101 Basic physiological mechanisms involved in sensory systems. Comparative approach to considerations of mechanosensitive systems (audition, lateral lines, touch, echolocation, equilibrium), chemosensitive systems (olfaction, taste, pheromones), photosensitive systems (vision, infrared detection, UV detection), electroreception, and pain. Emphasis on receptors. Effective: 1997 Winter Quarter.

NPB 128—Comparative Physiology: Endrocrinology (3)
Lecture—3 hours. Prerequisite(s): NPB 101 Comparison of physiological functions in the animal kingdom: animal hormones and their functions. Effective: 1997 Winter Quarter.

NPB 130—Physiology of the Endocrine Glands (4)
Lecture—4 hours. Prerequisite(s): NPB 110C or NPB 101 Advanced presentation of concepts in endocrinology with emphasis on the role of hormones in reproduction, metabolism, and disease. GE credit: VL. Effective: 2018 Winter Quarter.

NPB 132—Nature vs. Nurture: Physiological Interactions Among Genes, Nutrients and Health (3)
Lecture—3 hours. Prerequisite(s): BIS 001A or BIS 002A; or Consent of Instructor. Biochemical, physiological, genetic, and nutritional causes of important medical problems such as obesity, anorexia, heart disease and diabetes. One unit of credit allowed to students who have completed NPB 131. Effective: 2008 Fall Quarter.

NPB 134—General Immunology for Physiologists (3)
Lecture—2 hours; Lecture/Discussion—1 hour. Prerequisite(s): NPB 101 C- or better or NPB 110C C- or better; or Consent of Instructor. Immunology for undergrads interested in physiology aimed at understanding the physiological role of immune responses. Illustrated with examples of human diseases including diabetes, allergies and asthma, and emerging diseases such as Ebola and Zika. GE credit: SE. Effective: 2017 Fall Quarter.

NPB 139—Frontiers in Physiology (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): NPB 100; NPB 101; NPB 102 (can be concurrent) Lectures by leading authorities and discussion of the latest research in newly emerging areas in physiology. Offered every fourth year. GE credit: QL, SE. Effective: 2010 Fall Quarter.

NPB 140—Principles of Environmental Physiology (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): NPB 101; BIS 102 recommended. Physiological aspects of interactions of organisms and environmental,
cellular, system, and organismal levels. Emphasis on regulatory responses/mechanisms to thermal, pressure, gravity and light environmental variables. Not open for credit to students who have completed course 148. (Former course 148.). GE credit: WE. Effective: 1997 Winter Quarter.

NPB 140—Principles of Environmental Physiology (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): NPB 101 or NPB 110C; BIS 102 recommended. Physiological aspects of interactions of organisms and environmental, cellular, system, and organismal levels. Emphasis on regulatory responses/mechanisms to thermal, pressure, gravity and light environmental variables. Not open for credit to students who have completed NPB 148. (Former NPB 148.). GE credit: WE. Effective: 2018 Fall Quarter.

NPB 141—Physiological Adaptation of Marine Organisms (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Upper division standing; residence at Bodega Marine Laboratory required. Students must submit application available at http://www.bml.ucdavis.edu. Physiological adaptation to the environment among organisms in marine and estuarine habitats. GE credit: QL, VL, WE. Effective: 2006 Summer Session 1.

NPB 141P—Physiological Adaptation of Marine Organisms/Advanced Laboratory Topics (5)
Discussion—1 hour; Laboratory—12 hours. Prerequisite(s): NPB 141 (can be concurrent); Residence at Bodega Marine Laboratory required; NPB 141 required concurrently. Students must submit application available at http://www.bml.ucdavis.edu. Training in scientific research from hypothesis to publication, including methods of library research. Research related to a topic covered in course 141. GE credit: VL, WE. Effective: 2006 Spring Quarter.

NPB 142—Environmental Endocrinology: Mechanisms for Life Cycles (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B; BIS 002C Effects of environmental factors on endocrine responses that affect vertebrate life history and fitness. Introduction to finite state machine theory and allostasis in life histories and coping strategies. Focus on life history stages including non-breeding, hibernation, reproduction, migration and moult. GE credit: SE, WE. Effective: 2015 Winter Quarter.

NPB 150—Advanced Animal Behavior (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): NPB 102 or PSC 101; or Consent of Instructor. Advanced integrative survey of biological principles of behavioral organization, emphasizing historical roots, current research directions, conceptual issues and controversies. Laboratory exercises on the description and analysis of the behavior of captive and free-living animals. (Psychology 122) Effective: 2018 Winter Quarter.

NPB 152—Hormones and Behavior (3)
Lecture—3 hours. Prerequisite(s): (NPB 101 or NPB 110C); (NPB 102 or PSC 101) Endocrine physiology with an emphasis on the principles of behavior. Fundamental relationships between hormones and various behaviors engaged in by the organism during its lifetime. Role of hormones in behavioral homeostasis, social behavior, reproductive behavior, parental behavior, adaptation to stress. (Psychology 123) Effective: 2018 Winter Quarter.

NPB 157—Advanced Physiology of Animal/Human Disease (3)
Lecture—1 hour; Lecture/Discussion—2 hours. Prerequisite(s): NPB 101 B+ or better or NPB 110C B+ or better; Consent of Instructor. Limited to 35 students initially. Centers on fundamental mechanisms and pathophysiological basis for animal and human diseases. Course is case-based and uses animal and human diseases to help exemplify the physiological consequences of organ dysfunction. (HPH 157.
) Effective: 2017 Spring Quarter.

NPB 159—Frontiers in Behavior (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): NPB 100; NPB 101; NPB 102 Lectures by leading authorities and discussion of the latest research in newly emerging areas in behavioral biology. Offered every fourth year. GE credit: QL, SE. Effective: 2010 Fall Quarter.

NPB 161—Developmental Neurobiology (3)
Lecture—3 hours. Prerequisite(s): NPB 100 or NPB 101 or NPB 110B Issues, theoretical concepts, and methodologies in developmental neurobiology. Topics include prenatal and postnatal differentiation of neurons, and plasticity in the mature and aging brain. Integration of neurochemical, structural, physiological and behavioral perspectives. GE credit: SE. Effective: 2018 Winter Quarter.

NPB 162—Neural Mechanisms of Behavior (3)
Lecture—3 hours. Prerequisite(s): NPB 100 or NPB 101 or NPB 110B Relationship between brain and behavior. Identification and analysis of the relevant neural circuits involved. Examples of systems to be considered are birdsong, locomotion, echolocation. Effective: 2018 Winter Quarter.

NPB 163—Systems Neuroscience (4)
Lecture—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): NPB 100 or NPB 110B; Or equivalent basic neuroscience training with consent of instructor. Concepts and techniques in systems neuroscience: e.g., measuring and manipulating neural activity, structure of neocortex, sensory processing, motor control, storage of information, neural codes, neural mechanisms underlying cognitive functions. GE credit: SE. Effective: 2017 Spring Quarter.

NPB 164—Mammalian Vision (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): NPB 100 or NPB 110B or PSC 101 Structure and function of the mammalian visual system, from the formation of images on the retina through visually guided behavior and perception. Emphasis on biological mechanisms underlying vision. Effective: 2017 Spring Quarter.

NPB 165—Neurobiology of Speech Perception (3)
Lecture—3 hours. Prerequisite(s): NPB 110B or NPB 100 or NPB 101; or Consent of Instructor. Interdisciplinary approach to speech perception with emphasis on functional neuroanatomy and behavior. Topics include auditory processing in time and space, intelligibility in noisy environments, visual speech, evolution of vocal communication, models of speech perception, development, and hearing impairment. GE credit: SL. Effective: 2018 Winter Quarter.

NPB 166—Math Tools for Neuroscience (4)
Lecture—4 hours. Prerequisite(s): (NPB 100 or NPB 110B); (MAT 016A, MAT 016B, MAT 016C) or (MAT 017A, MAT 017B, MAT 017C) or (MAT 021A, MAT 021B, MAT 021C); or Consent of Instructor. Introduction to mathematics techniques used in neuroscience. Applications to neuroscience of differential equations, linear algebra, Fourier transforms, correlation and convolution, and probability theory. GE credit: QL. Effective: 2018 Winter Quarter.

NPB 167—Computational Neuroscience (5)
Lecture—4 hours; Lecture/Lab—3 hours. Prerequisite(s): (NPB 100 or NPB 110B); (MAT 016A, MAT 016B, MAT 016C) or (MAT 017A, MAT 017B, MAT 017C) or (MAT 021A, MAT 021B, MAT 021C); or Consent of Instructor. PHY 007A, PHY 007B or equivalent recommended. Mathematical models and data analysis techniques used to describe computations performed by nervous systems. Lecture topics include single neuron biophysics, neural coding, network dynamics, memory, plasticity, and learning. Lab topics include programming mathematical models and data analysis techniques in MATLAB. GE credit: QL, SE. Effective: 2018 Winter Quarter.

NPB 168—Neurobiology of Addictive Drugs (4)
Lecture/Discussion—4 hours. Prerequisite(s): NPB 100 or NPB 110B or NPB 110C or NPB 101; Or equivalents. Neurobiological basis for the effects and mechanisms of action of drugs with addictive potential, including opiates (morphine, heroin, methadone), amphetamines, cocaine, nicotine, marijuana (cannabinoids), alcohol, caffeine, and mind-altering drugs such as LSD and antidepressants. GE credit: SL, VL. Effective: 2018 Winter Quarter.

NPB 169—Frontiers in Neurobiology (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): NPB 100; NPB 101; NPB 102 (can be concurrent) Lectures by leading authorities and discussion of the latest research in newly emerging areas in neurobiology. Offered every fourth year. GE credit: QL. Effective: 2010 Fall Quarter.

NPB 171—Physiology of Neuroimmune Interactions (4)
Lecture—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): BIS 002A; (NPB 012 (can be concurrent) or NPB 100 (can be concurrent) or NPB 110B (can be concurrent)); or Consent of Instructor. Completion of PMI 126 or MMI 188 recommended prior to this course. Explores the complex interactions of the nervous and immune systems, and examine how the systems function together to serve homeostasis, behavior, and disease (such as Alzheimer's, autism, and multiple sclerosis). GE credit: SL. Effective: 2017 Fall Quarter.

NPB 172—Map Formation in the Brain (3)
Lecture—3 hours. Prerequisite(s): NPB 100 C- or better or NPB 110B C- or better; or equivalent basic neuroscience training with consent of instructor. Topographic map connection is a fundamental principle for establishing neural network in the brain. This course will provide comprehensive understanding of the current concepts of map formation in various sensory and motor nervous systems. GE credit: SE. Effective: 2017 Spring Quarter.

NPB 173—Neurobiology of Brain Disorders (3)
Lecture—3 hours. Prerequisite(s): NPB 110B or NPB 100; or Consent of Instructor. Examination of brain disorders from a basic science perspective to gain insights into the mechanisms of their action. Genetic, molecular, cellular, circuit, and environmental basis of a variety of brain disorders. How insights about underlying mechanisms may lead to the development of improved therapies. Effective: 2018 Spring Quarter.

NPB 190C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): NPB 199 (can be concurrent); and Consent of Instructor. Upper division standing in Neurobiology, Physiology, and Behavior or related biological science; NPB 199 required concurrently. Research findings and methods in neurobiology, physiology, and/or behavior. Presentation and discussion of research by faculty and students. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 1999 Spring Quarter.

NPB 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Work experience off and on campus in all subject areas offered in neurobiology, physiology, & behavior. May be repeated for credit. (P/NP grading only.) Effective: 2008 Fall Quarter.

NPB 194HA—Neurobiology, Physiology, and Behavior–Honors (1)
Laboratory—12 hours. Prerequisite(s): Senior standing; minimum 3.500 GPA in courses counted toward major; approval by the master advisor. Honors project in Neurobiology, Physiology, and Behavior. Laboratory research on a specific question. The project is developed with the sponsoring faculty member and approved by the student's Honors Thesis Committee. Honors thesis to be submitted upon completion of the project. (P/NP grading only.) Effective: 1997 Winter Quarter.

NPB 194HB—Neurobiology, Physiology and Behavior–Honors (4)
Laboratory—12 hours. Prerequisite(s): Senior standing; minimum 3.500 GPA in courses counted toward major; approval by the master advisor. Honors project in Neurobiology, Physiology, and Behavior. Laboratory research on a specific question. The project is developed with the sponsoring faculty member and approved by the student's Honors Thesis Committee. Honors thesis to be submitted upon completion of the project. (P/NP grading only.) Effective: 2003 Spring Quarter.

NPB 194HC—Neurobiology, Physiology, and Behavior–Honors (2)
Laboratory—12 hours. Prerequisite(s): Senior standing; minimum 3.500 GPA in courses counted toward major; approval by the master advisor. Honors project in Neurobiology, Physiology, and Behavior. Laboratory research on a specific question. The project is developed with the sponsoring faculty member and approved by the student's Honors Thesis Committee. Honors thesis to be submitted upon completion of the project. (P/NP grading only.) Effective: 1997 Winter Quarter.

NPB 197T—Tutoring in Neurobiology, Physiology, and Behavior (1-5)
Discussion—2-6 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Assisting the instructor by tutoring students in one of the Department's regular courses. May be repeated for credit. (P/NP grading only.) Effective: 2008 Fall Quarter.

NPB 198—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

NPB 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

NPB 211—Advanced Topics in Neuroimaging (3)
Laboratory—1 hour; Seminar—2 hours. Prerequisite(s): PSC 210; or Consent of Instructor. Restricted to 16 students. Critical presentation and discussion of the most influential advanced issues in neuroimaging, emphasizing fMRI design/analysis and the integration of fMRI with EEG/MEG. May be repeated for credit Course may be repeated when topics differ. (Neuroscience 211 and Psychology 211.) (S/U grading only.) Effective: 2017 Spring Quarter.

NPB 212—Light and Fluorescence Microscopy (3)
Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Restricted to maximum 16 students. Theory and practical application of light and fluorescence microscopy in the biological sciences. Laboratory component will focus on an optics bench, where we build simple compound and confocal microscopes on an optical rail. Effective: 2017 Spring Quarter.

NPB 217—Advanced Avian Physiology (1)
Project (Term Project)—1 hour. Prerequisite(s): NPB 117; and Consent of Instructor. Graduate standing; NPB 117 required concurrently. Study in depth of a topic in avian physiology through development of a lecture with associated instructional materials such as lesson plan, readings, presentation, and evaluation aids. Effective: 2009 Summer Session 1.

NPB 221—Cellular Neuroscience (4)
Discussion—1.5 hours; Lecture—3 hours. Advanced course on cellular and subcellular organization of the nervous system. Membrane channels, sensory transduction, synaptic transmission and cellular aspects of development and learning. Effective: 2015 Winter Quarter.

NPB 222—Systems Neuroscience (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Integrative and information-processing aspects of nervous system organization. Topics include sensory systems, motor function, sensorimotor integration, the limbic system, and the neurobiology of learning and memory. (Neuroscience 222.) Effective: 2002 Winter Quarter.

NPB 245—Computational Models of Cellular Signaling (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Computational and mathematical techniques in modeling of regulatory and signaling phenomena in neurobiology and cell physiology, focusing on linear and nonlinear ordinary differential equation models. Applications include ion channel kinetics, electrical activity, signal transduction, calcium oscillations, and simple neural circuits. Effective: 1997 Winter Quarter.

NPB 247—Topics in Functional Neurogenomics (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): Graduate standing or consent of instructor. The theory, methods and principles of functional neurogenomics with emphasis on the relationship to molecular mechanisms involved in development and disease of the nervous system. (Neuroscience 247.) Effective: 2003 Spring Quarter.

NPB 261A—Topics in Vision: Eyes and Retinal Mechanisms (2)
Lecture/Discussion—2 hours. Prerequisite(s): NPB 100 or NPB 112; Or the equivalent; graduate standing. Structure and function of the visual system, with emphasis on the eye and retina, including optics, anatomy, transduction, retinal synapses, adaptation, and parallel processing. (Neuroscience 261A and Molecular, Cellular, and Integrative Physiology 261A.) (S/U grading only.) Effective: 2004 Winter Quarter.

NPB 261B—Topics in Vision: Systems, Psychophysics, Computational Models (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. NPB 261A recommended. Functions of the central visual pathways and their underlying mechanisms. Recent research on aspects of anatomy, biochemistry, electrophysiology, psychophysics, development, and genetics of the visual system. (Neuroscience 261B and Molecular, Cellular, and Integrative Physiology 261B.) (S/U grading only.) Effective: 2004 Winter Quarter.

NPB 261C—Topics in Vision: Clinical Vision Science (2)
Lecture/Discussion—2 hours. Prerequisite(s): NPB 261A; NPB 261B; or Consent of Instructor. Causes and mechanistic bases of major blinding diseases. Recent research on aspects of anatomy, biochemistry, electrophysiology, psychophysics, development, and genetics of the visual system related to disease. (Neuroscience 261C and Molecular, Cellular, and integrative Physiology 261C.) (S/U grading only.) Effective: 2005 Spring Quarter.

NPB 263—Modeling in Systems Neuroscience (4)
Lecture—3 hours; Lecture/Lab—1 hour. Prerequisite(s): Consent of Instructor. Modeling as a tool in systems neuroscience. Mathematical techniques will be introduced and used to explore advanced topics in echolocation, sound localization, electroreception, communications, and motor systems. Other topics include transforms, modeling assumptions, scales and linearity. Effective: 1997 Winter Quarter.

NPB 267—Computational Neuroscience (5)
Lecture—4 hours; Lecture/Lab—3 hours. Prerequisite(s): One course in general Neuroscience at the level of NPB 100 or NPB 110B; one year college-level Calculus at the level of MAT 016A, MAT 016B, MAT 016C or higher; one year Physics at the level of PHY 007A, PHY 007B, PHY 007C recommended; or Consent of Instructor. Mathematical models and data analysis techniques used to describe computations performed by nervous systems. Lecture topics include single-neuron biophysics, neural coding, network dynamics, memory, plasticity, and learning. Lab topics include programming mathematical models and data analysis techniques in MATLAB. (Neuroscience 267.) Effective: 2018 Winter Quarter.

NPB 270—How to Write a Fundable Grant Proposal in the Biomedical Sciences (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Restricted to members of the Neuroscience and BMCDB graduate groups; graduate students in other biomedical programs may enroll with instructor permission. Teaches the do’s and don’ts of writing grants in the biomedical sciences and the mechanisms of the review process. May be repeated for credit. (Neuroscience 270.
) Effective: 2016 Spring Quarter.

NPB 285—Literature in Visual Neuroscience (2)
Seminar—2 hours. May be repeated for credit. (Neuroscience 285.) (S/U grading only.) Effective: 2008 Fall Quarter.

NPB 287A—Topics in Theoretical Neuroscience (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. In-depth exploration of topics in theoretical neuroscience. Topic varies each year. Fall quarter (287A): foundational material from books and review articles. Spring quarter (287B): continuation of year's topic through readings of seminal articles from the primary literature. May be repeated for credit. (Neuroscience 287A.) (S/U grading only.) Effective: 2017 Spring Quarter.

NPB 287B—Topics in Theoretical Neuroscience (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. In-depth exploration of topics in theoretical neuroscience. Topic varies each year. Fall quarter (287A): foundational material from books and review articles. Spring quarter (287B): continuation of year's topic through readings of seminal articles from the primary literature. May be repeated for credit. (Neuroscience 287B.) (S/U grading only.) Effective: 2009 Spring Quarter.

NPB 291—Auditory Neuroscience (1)
Discussion—0.5 hours; Seminar—0.5 hours. Prerequisite(s): NPB 100 or NPB 112 or NSC 222; Or the equivalent. Exploration of various important aspects of auditory physiology, behavior and psychophysics through review of original literature. New topic each quarter. May be repeated for credit with consent of instructor. May be repeated for credit. (S/U grading only.) Effective: 1998 Spring Quarter.

Family Nurse Practitioner Program; Nursing

Family Nurse Practitioner Program; Nursing | Family Nurse Practitioner Program M.S.

Heather M. Young, Ph.D., R.N., F.A.A.N.; Associate Vice Chancellor for Nursing, UC Davis; Dean and Professor, Betty Irene Moore School of Nursing

Theresa A. Harvath, Ph.D., R.N., F.A.A.N.; Executive Associate Dean

Elizabeth Rice, Ph.D., P.M.H.N.P.-B.C., R.N.; Associate Dean for Clinical Education and Practice, Director for the Master of Science—Family Nurse Practitioner Degree Program

Betty Irene Moore Hall
2570 48th St., Sacramento, CA 95817
916-734-2145
http://nursing.ucdavis.edu

Faculty. http://nursing.ucdavis.edu

Mission Statement

The Betty Irene Moore School of Nursing at UC Davis cultivates academic excellence through immersive, interprofessional and interdisciplinary education and research in partnership with the communities serves. Faculty, staff and students discover and disseminate knowledge to advance health, improve quality of care and shape policy.

Nursing Science and Health-Care Leadership Graduate Degree Program

Irene Moore School of Nursing at UC Davis, the Nursing Science and Health-Care Leadership Graduate Degree Programs prepare nurse leaders, physician assistants, nurse practitioners, researchers and faculty in a unique interdisciplinary and interprofessional environment. The full-time, academic, doctoral program prepares graduates as leaders in health care, health policy and nurse faculty/researchers at the university level. The master's degree Physician Assistant Studies program prepares graduates to deliver care as physician assistants. Graduates of the professional master's degree leadership program are prepared for health-care leadership roles in a variety of organizations and as nurse faculty at the community college and prelicensure education levels. Graduates of the master's degree Nurse Practitioner Program are prepared to deliver care as nurse practitioners.

Faculty

The UC Davis Nursing Science and Health-Care Leadership Graduate Group includes a wide cross-section of academic disciplines with faculty from the Betty Irene Moore School of Nursing as well as UC Davis Health System and other UC Davis schools, colleges, and departments. Within the graduate group faculty are experts in nursing, medicine, health informatics, nutrition, biostatistics, public health and other fields.

The Master of Science—Family Nurse Practitioner Degree Program prepares graduates to deliver care as family nurse practitioners (FNP). In alignment with the school's vision to advance health, the mission of the family nurse practitioner program is to educate health care professionals to lead clinical programs in collaborative teams and to improve the availability of culturally relevant primary health care to underserved populations throughout California.

Feminist Theory & Research

Feminist Theory & Research | Feminist Theory & Research (Designated Emphasis)

Wendy Ho, Ph.D., Advisor

Program Office. 1219 Hart Hall; 530-752-6429; http://gsws.ucdavis.edu/welcome

Graduate Study. The Gender, Sexuality and Women's Studies Program at UC Davis offers a Designated Emphasis in Feminist Theory & Research. Currently graduate students in the following

fourteen affiliated Ph.D. programs are eligible to participate: Anthropology, Comparative Literature, Cultural Studies, Education, English, French, German, Geography, History, Native American Studies, Performance Studies, Psychology, Sociology, Spanish, and the Study of Religion.

The Designated Emphasis in Feminist Theory and Research affords graduate students in affiliated programs the opportunity to augment their Ph.D. in a given discipline with a specialization in Feminist Theory and Research. Typically a doctoral student in good standing may seek admission to the Designated Emphasis in Feminist Theory and Research and enroll in Designated Emphasis in Feminist Theory and Research courses. Those students in affiliated Ph.D. programs who complete the requirements of the Designated Emphasis will have this noted on their transcripts and their Ph.D. diploma will note the "Special Emphasis in Feminist Theory & Research."

Students must complete all the requirements for the Ph.D. in their home department. The requirements for the Designated Emphasis in Feminist Theory and Research are the successful completion of the two core courses, Women's Studies 200A and Women's Studies 200B, and two additional courses focusing on gender, sexuality and women's studies; one in the student's home department and one outside their home department. A member of the DE affiliated faculty must be a member of the student's qualifying examination. As with the Qualifying Exam, one member of the candidate's dissertation committee must be a member of the DE. Analysis of gender or sexuality is expected to be a central component of both the student's qualifying examination and doctoral research.

Students should consult with the Chair of the Designated Emphasis in Feminist Theory and Research before enrolling in a graduate course for which they wish to receive credit to ensure that it will count toward fulfilling the requirements of the Designated Emphasis. If possible, please bring a copy of the syllabus or an expanded course description to your meeting.

Graduate Advisor. Wendy Ho; 1219 Hart Hall; 530-752-6429; waho@ucdavis.edu.

Fiber & Polymer Science

Fiber & Polymer Science | FPS Information

(College of Agricultural and Environmental Sciences)

Faculty. http://textiles.ucdavis.edu/faculty.html

Fiber & Polymer Science | FPS B.S.

(College of Agricultural and Environmental Sciences)

Faculty. http://textiles.ucdavis.edu/faculty.html

The Major Program

The Fiber and Polymer Science major is concerned with the physical, chemical, and structural properties of fibers and polymers and how these relate to fiber and polymer performance and end-use.

The Program. All students in this major take a common core of course work in chemistry, physics, and mathematics, and depth subject matter in fiber and polymer science, organic and physical chemistry, and technical writing. In the restricted electives, students select courses from areas such as computer science and mathematics, chemistry, marketing and management, material and advanced fiber and polymer science, and textiles.

Career Alternatives. The major prepares the student for a career in a wide range of industries in the areas of research and development, technical marketing and management, production, quality control, and science teaching (on completion of an additional year in the teaching credential program). The companies employing Fiber and Polymer Science graduates are in the fiber, polymer, industrial product, textile and/or chemical business. Graduates are prepared to enter the graduate program in textiles or agricultural and environmental chemistry with a specialization in

fiber and polymer chemistry, fiber and materials science and polymer engineering programs at other universities.

Major Advisor. Y. L. Hsieh (Textiles and Clothing)

Advising Center for the major is located in 1204 RMI south 530-752-3250 or 129B Everson Hall 530-754-8368.

Preparatory Subject Matter **Units:** 52-55

CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 002C	General Chemistry	5
ECS 015	Introduction to Computers	4
OR		
ECS 030	Programming and Problem Solving (Discontinued)	4
MAT 016A	Short Calculus	3
MAT 016B	Short Calculus	3
MAT 016C	Short Calculus	3
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
PHY 007A	General Physics	4
PHY 007B	General Physics	4
PHY 007C	General Physics	4
OR		
PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5
STA 013	Elementary Statistics	4
OR		
PLS 120	Applied Statistics in Agricultural Sciences	4
TXC 006	Introduction to Textiles	4
AND		
TXC 008	The Textiles and Apparel Industries	4
OR		
ENG 045	Properties of Materials	4

Depth Subject Matter **Units:** 37-39

TXC 163	Textile Coloration and Finishing	3
TXC 163L	Textile Coloration and Finishing Laboratory	1
FPS 100	Principles of Polymer Materials Science	3
FPS 150	Polymer Syntheses and Reactions	3
FPS 161	Structure and Properties of Fibers	3
FPS 161L	Textile Chemical Analysis Laboratory	1
FPS 180A	Introduction to Research in Fiber and Polymer Science	2
FPS 180B	Introduction to Research in Fiber and Polymer Science	2
CHE 128A	Organic Chemistry	3
CHE 128B	Organic Chemistry	3
CHE 128C	Organic Chemistry	3

CHE 129A	Organic Chemistry Laboratory	2
CHE 129B	Organic Chemistry Laboratory	2
CHE 110A	Physical Chemistry: Introduction to Quantum Mechanics	4
CHE 110C	Physical Chemistry: Thermodynamics, Equilibria and Kinetics	4
OR		
CHE 107A	Physical Chemistry for the Life Sciences	3
CHE 107B	Physical Chemistry for the Life Sciences	3

Restricted Electives **Units:** 30

Choose 30 units:

Computer Science and Mathematics:

PLS 021	Application of Computers in Technology	3
MAT 022A	Linear Algebra	3
MAT 022B	Differential Equations	3

Chemistry:

CHE 108	Molecular Biochemistry	3
CHE 115	Instrumental Analysis	4
CHE 121	Introduction to Molecular Structure and Spectra	4
CHE 124A	Inorganic Chemistry: Fundamentals	3
CHE 124B	Inorganic Chemistry: Main Group Elements	3
CHE 124C	Inorganic Chemistry: d and f Block Elements	3
CHE 131	Modern Methods of Organic Synthesis	3

Marketing/Management:

ARE 100A	Intermediate Microeconomics: Theory of Production and Consumption	4
ARE 100B	Intermediate Microeconomics: Imperfect Competition, Markets and Welfare Economics	4
ARE 113	Fundamentals of Marketing Management	4
ARE 136	Managerial Marketing	4
ARE 157	Analysis for Operations and Production Management	4
ECN 001A	Principles of Microeconomics	4
ECN 001B	Principles of Macroeconomics	4
STA 103	Applied Statistics for Business and Economics	4

Material and Advanced Fiber/Polymer Science:

EAE 137	Structural Composites	4
ENG 104	Mechanics of Materials	4
ENG 104L	Mechanics of Materials Laboratory	1
TXC 250A (Discontinued 1998)		
TXC 250B (Discontinued 1999)		
TXC 250C (Discontinued 1999)		
TXC 250D (Discontinued 1998)		
TXC 250E (Discontinued 1998)		
TXC 250F (Discontinued 1998)		
TXC 290	Seminar	1
TXC 293	Recent Advances in Textiles	3

Textiles:

TXC 162	Textile Fabrics	3
TXC 162L	Textile Fabrics Laboratory	1
TXC 164	Principles of Apparel Production	3

TXC 165	Textile Processes	3
TXC 173	Principles of Fashion Marketing	3
TXC 174	Introduction to World Trade in Textiles and Clothing	4

Total: 119-124

Fiber & Polymer Science | FPS Minor

(College of Agricultural and Environmental Sciences)

Faculty. http://textiles.ucdavis.edu/faculty.html

The Major Program

The Fiber and Polymer Science major is concerned with the physical, chemical, and structural properties of fibers and polymers and how these relate to fiber and polymer performance and end-use.

The Program. All students in this major take a common core of course work in chemistry, physics, and mathematics, and depth subject matter in fiber and polymer science, organic and physical chemistry, and technical writing. In the restricted electives, students select courses from areas such as computer science and mathematics, chemistry, marketing and management, material and advanced fiber and polymer science, and textiles.

Career Alternatives. The major prepares the student for a career in a wide range of industries in the areas of research and development, technical marketing and management, production, quality control, and science teaching (on completion of an additional year in the teaching credential program). The companies employing Fiber and Polymer Science graduates are in the fiber, polymer, industrial product, textile and/or chemical business. Graduates are prepared to enter the graduate program in textiles or agricultural and environmental chemistry with a specialization in fiber and polymer chemistry, fiber and materials science and polymer engineering programs at other universities.

Minor Advisor. Y. L. Hsieh (Textiles and Clothing)

Advising Center for the major is located in 1204 RMI south 530-752-3250 or 129B Everson Hall 530-754-8368.

Fiber and Polymer Science **Units:** 18

TXC 006	Introduction to Textiles	4
OR		
ENG 045	Properties of Materials	4

Choose 14 units:

FPS 100	Principles of Polymer Materials Science	3
FPS 150	Polymer Syntheses and Reactions	3
FPS 161	Structure and Properties of Fibers	3
FPS 161L	Textile Chemical Analysis Laboratory	1
FPS 180A	Introduction to Research in Fiber and Polymer Science	2
AND		
FPS 180B	Introduction to Research in Fiber and Polymer Science	2
TXC 163	Textile Coloration and Finishing	3
AND		
TXC 163L	Textile Coloration and Finishing Laboratory	1

Total: 18

Fiber & Polymer Science | FPS Courses

Courses in FPS:

FPS 100—Principles of Polymer Materials Science (3)
Lecture—3 hours. Prerequisite(s): CHE 002A; CHE 002B; ((CHE 008A, CHE 008B) or (ENG 045 or ENG 045Y)); Introductory physics. Basic principles of polymer science are presented including polymer structure and synthesis; polymerization mechanisms, polymer classes, properties, and reactions; polymer morphology, rheology, and characterization; polymer processing. (EMS 147.) GE credit: QL, SE. Effective: 2018 Winter Quarter.

FPS 110—Plastics in Society and the Environment (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 010; Or introductory course in physical sciences. Basic concepts and methodologies in the study of plastics. Formation, classification, structure, properties, processing, and formulation. Their application to societal needs, and their impact on society and the environment. GE credit: SE, SL, SS, WE. Effective: 1997 Winter Quarter.

FPS 150—Polymer Syntheses and Reactions (3)
Lecture—3 hours. Prerequisite(s): (CHE 128B or CHE 008B); CHE 107A Organic and physical chemistry aspects of polymer syntheses and reactions including polymerization mechanisms, kinetics and thermodynamics for major types of organic high polymers. GE credit: OL, QL, SE, SL, VL, WE. Effective: 1997 Winter Quarter.

FPS 161—Structure and Properties of Fibers (3)
Lecture—3 hours. Prerequisite(s): TXC 006; CHE 008B The structure, properties and reactions of natural- and man-made fibers; the relations between molecular structure of fibers and their physical properties; interactions of fibers and detergents. GE credit: OL, QL, SE, SL, VL, WE. Effective: 1997 Winter Quarter.

FPS 161L—Textile Chemical Analysis Laboratory (1)
Laboratory—3 hours. Prerequisite(s): FPS 161 (can be concurrent) Laboratory methods and procedures employed in qualitative and quantitative analysis of textile fibers and auxiliaries. GE credit: OL, QL, SE, SL, VL, WE. Effective: 1997 Winter Quarter.

FPS 180A—Introduction to Research in Fiber and Polymer Science (2)
Lecture/Discussion—6 hours. Prerequisite(s): Consent of Instructor. Senior standing in major related to Fiber and Polymer Science. Senior thesis on independent problems. Research begun in course 180A will be continued and completed in course 180B. GE credit: QL, SE, VL, WE. Effective: 1998 Fall Quarter.

FPS 180B—Introduction to Research in Fiber and Polymer Science (2)
Lecture/Discussion—6 hours. Prerequisite(s): Consent of Instructor. Senior standing in major related to Fiber and Polymer Science. Senior thesis on independent problems. Research begun in course 180A will be continued and completed in course 180B. GE credit: QL, SE, VL, WE. Effective: 1998 Fall Quarter.

FPS 192—Internship in Fiber and Polymer Science (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Work experience off campus in a fiber and polymer science related area. Supervision by a member of the Textiles and Clothing faculty. (P/NP grading only.) Effective: 1998 Fall Quarter.

FPS 197T—Tutoring in Fiber and Polymer Science (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division fiber and polymer science related major. Tutoring of students in Fiber and Polymer Science courses. Assistance with discussion groups and laboratory sections under supervision of instructor. May be repeated for credit tutoring in another Fier and Polymer Science course. (P/NP grading only.) Effective: 1998 Fall Quarter.

FPS 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1998 Fall Quarter.

FPS 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1998 Fall Quarter.

FPS 250A—Special Topics in Polymer and Fiber Science (3)
Lecture—3 hours. Prerequisite(s): FPS 100; or Consent of Instructor. Selected topics of current interest in polymer and fiber science. Topics will vary each time the course is offered. (EMS 250A.) Effective: 1997 Winter Quarter.

FPS 250B—Special Topics in Polymer and Fiber Science (3)
Lecture—3 hours. Prerequisite(s): FPS 100; or Consent of Instructor. Selected topics of current interest in polymer and fiber science. Topics will vary each time the course is offered. (EMS 250B.) Effective: 1997 Winter Quarter.

FPS 250C—Special Topics in Polymer and Fiber Science (3)
Lecture—3 hours. Prerequisite(s): FPS 100; or Consent of Instructor. Selected topics of current interest in polymer and fiber science. Topics will vary each time the course is offered. (EMS 250C.) Effective: 1997 Winter Quarter.

FPS 250D—Special Topics in Polymer and Fiber Science (3)
Lecture—3 hours. Prerequisite(s): FPS 100; or Consent of Instructor. Selected topics of current interest in polymer and fiber science. Topics will vary each time the course is offered. (EMS 250D.) Effective: 1997 Winter Quarter.

FPS 250E—Special Topics in Polymer and Fiber Science (3)
Lecture—3 hours. Prerequisite(s): FPS 100; or Consent of Instructor. Selected topics of current interest in polymer and fiber science. Topics will vary each time the course is offered. (EMS 250E.) Effective: 1997 Winter Quarter.

FPS 250F—Special Topics in Polymer and Fiber Science (3)
Lecture—3 hours. Prerequisite(s): FPS 100; or Consent of Instructor. Selected topics of current interest in polymer and fiber science. Topics will vary each time the course is offered. (EMS 250F.) Effective: 1997 Winter Quarter.

FPS 299—Research (1-12)
Independent Study—3-36 hours. (S/U grading only.) Effective: 1998 Fall Quarter.

FPS 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Film Studies

Film Studies | FMS Information

(College of Letters and Science)

Michael Neff, Ph.D., Chairperson of the Department

Department Office. 101 Art Building; 530-752-0105; http://arts.ucdavis.edu/cinema-and-digital-media

Faculty. http://arts.ucdavis.edu/cinema-digital-media-program-faculty

Film Studies | FMS A.B.

(College of Letters and Science)

Michael Neff, Ph.D., Chairperson of the Department

Department Office. 101 Art Building; 530-752-0105; http://arts.ucdavis.edu/cinema-and-digital-media

Faculty. http://arts.ucdavis.edu/cinema-digital-media-program-faculty

The Film Studies Major Program

Major is closed to new students as of 2015-2016.

Interested students are encouraged to explore the Film Studies minor which is open to new and current students, and the Cinema and Digital Media major which incorporates many of the courses previously offered through Film Studies.

The Program. The interdisciplinary major in Film Studies takes one of the most influential art forms of the twentieth century and today as its object of study. The field of Film Studies addresses the history, theory, and culture of this art form and asks questions about film texts themselves: modes of production (including everything from filmmakers' aesthetic choices to the role of the global economy); historical, national, and cultural contexts; and spectators and audiences. Questions of gender, race, sexuality, and nationality, in all of these areas, have been central to Film Studies almost since its inception and continue to shape much of the work in the field. While the program emphasizes film history, criticism, and theory, students also have opportunities to explore film/video production.

Students majoring in Film Studies take upper-division courses in film history and film theory, as well as in at least three of five general areas of study. Students also develop a thematic emphasis, in consultation with an advisor, that draws on courses from at least two different departments/programs and that allows them to pursue their particular interests within the field of Film Studies. Students have the option of completing a senior thesis (either a written paper or an original film/video) within this emphasis.

Major Advisor. Information on the current Academic Advisors can be obtained by contacting the Arts Group Advising Center at 530-752-0616 or http://arts.ucdavis.edu/arts-group-undergraduate-advising.

Career Alternatives. The A.B. degree in Film Studies prepares students for a variety of careers in media industries: for example, local and national film and television production companies, local television newsrooms, community television stations, computer graphic companies, advertising and marketing companies, public relations departments, and film distribution companies. Students wishing to pursue graduate work will be prepared to go on in film studies, as well as a variety of other fields that draw on interdisciplinary study: for example, American studies, English, literatures and languages, drama, communication, computer science, cultural studies, women and gender studies, and ethnic studies programs. Many film students also choose to go on to law school, and the analytical skills, writing abilities, and familiarity with theoretical thought developed through the film major prepare them well for the study and practice of law.

Preparatory Subject Matter **Units:** 20-40

FMS 001	Introduction to Film Studies	4

A four-course sequence in a single language or equivalent.

Choose one:

AAS 015	Introduction to African American Humanities	4
AAS 050	Black Popular Culture	4
AMS 001A	Science and American Culture	4
AMS 021	Objects and Everyday Life	4
AMS 030	Images of America and Americans in Popular Culture	4
AHI 005	Understanding Visual Culture	4
ART 030	Introduction to Contemporary Visual Culture	4
CHI 050	Chicana and Chicano Culture	4
CHI 060	Chicana and Chicano Representation in Cinema	4
DES 001	Introduction to Design	4
FRE 050	French Film	4
HUM 060	Narrative and Argumentative Approaches to Major Current Issues in the Media, Culture, and Society	4
ITA 050	Studies in Italian Cinema	4
JPN 025	Japanese Language and Culture (in English)	4

NAS 032	Native American Music and Dance	4
TXC 007	Style and Cultural Studies	4
WMS 020	Cultural Representations of Gender	4
WMS 025	Gender and Global Cinema	4

Choose one:

AAS 010	African-American Culture and Society	4
AAS 015	Introduction to African American Humanities	4
AAS 050	Black Popular Culture	4
ASA 001	Historical Experience of Asian Americans	4
ASA 002	Contemporary Issues of Asian Americans	4
CHI 010	Introduction to Chicana/o Studies	4
CHI 050	Chicana and Chicano Culture	4
CHI 060	Chicana and Chicano Representation in Cinema	4
NAS 001	Introduction to Native American Studies	4
NAS 010	Native American Experience	4
NAS 032	Native American Music and Dance	4
NAS 033	Introduction to Native American Art	4
WMS 020	Cultural Representations of Gender	4
WMS 025	Gender and Global Cinema	4
WMS 050	Introduction to Critical Gender Studies	4
WMS 070	Theory and History of Sexualities	4
WMS 080	Special Topics in Critical Gender Studies	4

Choose two:

AHI 001A	Ancient Mediterranean Art	4
AHI 001B	Medieval and Renaissance Art	4
AHI 001C	Baroque to Modern Art	4
AHI 001D	Arts of Asia	4
ASA 002	Contemporary Issues of Asian Americans	4
CHN 010	Modern Chinese Literature (In English)	4
CHN 011	Great Books of China (in English)	4
CLA 010	Greek, Roman, and Near Eastern Mythology	3
COM 003	Major Books of Western Culture: The Modern Crisis	4
COM 004	Major Books of the Contemporary World	4
COM 005	Fairy Tales, Fables, and Parables	4
COM 006	Myths and Legends	4
COM 007	Literature of Fantasy and the Supernatural	4
DRA 001	Theatre, Performance and Culture	4
DRA 020	Introduction to Dramatic Art	4
ENL 043	Introductory Topics in Drama	4
ENL 044	Introductory Topics in Fiction	4
GER 048	Myth and Saga in the Germanic Cultures	4
HIS 004C	History of Western Civilization	4
HIS 010C	World History III	4
HIS 017B	History of the United States	4
HIS 072B	Women and Gender in America, 1865-Present	4
JPN 010	Masterworks of Japanese Literature (in English)	4
MUS 010	Introduction to Musical Literature	4
MUS 028	Introduction to African American Music	4
NAS 033	Introduction to Native American Art	4

Note: One of the two may be:

DES 015	Form and Color	4
DES 016	Graphic Design and Computer Technology	4
DRA 010	Introduction to Acting	4

DRA 021A	Fundamentals of Acting	4
DRA 024	Visual Aspects of Dramatic Art	4

Depth Subject Matter **Units:** 36-40

Choose one:

ENL 161A	Film History I: Origins to 1945	4
ENL 161B	Film History II: 1945 to present	4
FMS 124	Topics in U.S. Film History	4

Choose one:

ENL 162	Film Theory and Criticism	4
FMS 127	Film Theory	4
WMS 162	Feminist Film Theory and Criticism	4

Choose one from three of these topic areas:

Cinematic Traditions and Movements.
Visual and Popular Culture.
Gender/Sexuality/Class.
Race/Ethnicity/Class.
Production and Performance.
A current list of approved classes is available from the Advising office and from the faculty advisor.

16-20 units in one of the two breadth areas not used to satisfy the breadth requirement, or development of a thematic area in consultation with a faculty advisor.

Qualified students who complete 20 units and have an overall GPA of 3.500 may choose the senior thesis option (194H-196H) for 8 of those 20 units.

No course may be counted for more than one requirement for the major.

Total: 56-80

Film Studies | FMS Minor

(College of Letters and Science)

Michael Neff, Ph.D., Chairperson of the Department

Program Office. 101 Art Building; 530-752-0105; http://arts.ucdavis.edu/cinema-and-digital-media

Faculty.http://arts.ucdavis.edu/cinema-digital-media-program-faculty

Minor Advisor. Information on the current Academic Advisors can be obtained by contacting the Arts Group Advising Center at 530-752-0616 or http://arts.ucdavis.edu/arts-group-undergraduate-advising.

Film Studies **Units:** 24

FMS 001	Introduction to Film Studies	4

Choose no more than two from any one category:

(a) Problems and Themes in Cinema:

ANT 136	Ethnographic Film	4
CLA 102	Film and the Classical World	4
DRA 115	Advanced Study of Major Film Makers	4
ENL 160	Film as Narrative	4
ENL 161A	Film History I: Origins to 1945	4
ENL 161B	Film History II: 1945 to present	4
ENL 162	Film Theory and Criticism	4
FMS 124	Topics in U.S. Film History	4
FMS 125	Topics in Film Genres	4
WMS 162	Feminist Film Theory and Criticism	4

(b) Cinema, Nation and Nationality:

GER 119	From German Fiction to German Film	4
GER 142	New German Cinema	4
FMS 176A	Classic Weimar Cinema	4
FMS 176B	Postwar German Cinema	4
ITA 150	Studies in Italian Cinema	4
JPN 106	Japanese Culture Through Film	4
RUS 129	Russian Film	4
SPA 148	Cinema in the Spanish-Speaking World in Translation	4

(c) Film and Social Identities:

AAS 170	African-American Film and Video	4
AAS 171	Black African and Black European Film and Video	4
FMS 120	Italian-American Cinema	4
JST 120	Cinema and the American Jewish Experience	4
WMS 160	Women, 'Race' and Sexuality in Postcolonial Cinema	4
WMS 164	Topics in Gender and Cinematic Representation	4

(d) Film/Video Production:

ART 117	Advanced Video and Electronic Arts	4
ART 150	Theory and Criticism of Electronic Media	4

(e) Popular and Visual Culture:

AMS 130	American Popular Culture	4
AMS 139	Feminist Cultural Studies	4
ART 150	Theory and Criticism of Electronic Media	4
CMN 140	Introduction to Mass Communication	4
POL 165	Mass Media and Politics	4
TXC 107	Social and Psychological Aspects of Clothing	4
WMS 139	Feminist Cultural Studies	4

Total: 24

Film Studies | FMS Courses

Courses in FMS:

FMS 001—Introduction to Film Studies (4)
Discussion—1 hour; Film Viewing—3 hours; Lecture—2 hours. Analysis of film form and narrative, including cinematography, editing, and sound. Issues in film studies, including authorship, stardom, race, gender, class, and cultural identity. Includes introduction to selected cinematic movements and national film traditions. Not open for credit to students who have taken HUM 010. GE credit: AH, OL, VL, WC, WE. Effective: 2012 Fall Quarter.

FMS 045—Vampires and Other Horrors in Film and Media (4)
Discussion—1 hour; Film Viewing—3 hours; Lecture—2 hours. History of representations of vampires and horror generally from the 19th through 21st centuries. Emphasis on transnational history of the horror genre; psychologies of horror effects; issues of race, gender, and class; intersections with prejudice, medicine, modernity. (GER 045.) GE credit: ACGH, AH, DD, OL, VL, WC, WE. Effective: 2012 Fall Quarter.

FMS 090X—Lower Division Seminar (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Study of a special topic in Film Studies in a small class setting. May be repeated for credit if topics differs. (P/NP grading only.) Effective: 2012 Fall Quarter.

FMS 092—Internship (1-12) ***Review all entries***
Internship—3-36 hours. Supervised internship off and on campus in areas of Film Studies. May be repeated for credit. (P/NP grading only.) Effective: 2012 Fall Quarter.

FMS 092—Internship (1-12) ***Review all entries Discontinued***
Internship—3-36 hours. Supervised internship off and on campus in areas of Film Studies. May be repeated for credit. (P/NP grading only.) Effective: 2018 Fall Quarter.

FMS 098—Directed Group Study (1-5) ***Review all entries***
Variable—3-15 hours. Directed Group Study (P/NP grading only.) Effective: 2012 Fall Quarter.

FMS 098—Directed Group Study (1-5) ***Review all entries Discontinued***
Variable—3-15 hours. Directed Group Study (P/NP grading only.) Effective: 2018 Summer Session 1.

FMS 099—Special Study for Undergraduates (1-5) ***Review all entries***
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Special Study for Undergraduates (P/NP grading only.) Effective: 2012 Fall Quarter.

FMS 099—Special Study for Undergraduates (1-5) ***Review all entries Discontinued***
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Special Study for Undergraduates (P/NP grading only.) Effective: 2018 Summer Session 1.

FMS 120—Italian-American Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): FMS 001 Exploration of representations of Italian-American identity in American (U.S.) cinema. Analysis of both Hollywood and independently produced films, especially as they represent ethnicity, gender, and social class of Italian Americans. Not open for credit to students who have taken HUM 120. GE credit: ACGH, AH, DD, OL, VL, WC, WE. Effective: 2012 Fall Quarter.

FMS 121—New Italian Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): FMS 001; And upper-division standing, or consent of instructor. Italian cinema of the 21st century in the context of profound cultural and social changes in Italy since World War II. Productions by representative directors such as Amelio, Giordana, Moretti, Muccino are included. Knowledge of Italian not required. (ITA 121.) GE credit: AH, OL, VL, WC, WE. Effective: 2012 Fall Quarter.

FMS 121S—New Italian Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): FMS 001; And upper-division standing or consent of instructor. Italian cinema of the 21st century in the context of profound cultural and social changes in Italy since World War II. Productions by representative directors such as Amelio, Giordana, Moretti, Muccino are included. Knowledge of Italian not required. (ITA 121S.) GE credit: AH, OL, VL, WC, WE. Effective: 2012 Fall Quarter.

FMS 124—Topics in U.S. Film History (4)
Film Viewing—3 hours; Lecture—3 hours. Prerequisite(s): FMS 001 Study of an aspect of American film history (such as the silent era; the studio system; U.S. avant-garde cinema), including the influences of technological, economic, regulatory, cultural, and artistic forces. May be repeated up to 2 time(s) when topic differs. Not open for credit to students who have completed HUM 124, unless topic differs. GE credit: ACGH, AH, DD, OL, VL, WE. Effective: 2012 Fall Quarter.

FMS 125—Topics in Film Genres (4)
Film Viewing—3 hours; Lecture—3 hours. Prerequisite(s): FMS 001 A study of one or more of the film genres (such as the documentary, the musical, film noir, screwball comedy, or the western), including genre theory and the relationship of the genre(s) to culture, history, and film industry practices. May be repeated up to 2 time(s) when topic differs. Not open for credit to students who have completed HUM 125, unless topic differs. GE credit: AH, OL, VL, WE. Effective: 2012 Fall Quarter.

FMS 127—Film Theory (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): FMS 001; or Consent of Instructor. Survey of the conceptual frameworks used to study film (including semiotics, psychoanalysis, spectatorship, auteur, genre and narrative theories). Historical survey of major film theorists. GE credit: AH, OL, VL, WC, WE. Effective: 2012 Fall Quarter.

FMS 129—Russian Film (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): Completion of Subject A requirement. History of Russian film; film and social revolution, the cult of Stalin, dissident visions; film and the collapse of the Soviet empire; gender and the nation in Russian film. Course taught in English; films are in Russian with English subtitles. (RUS 129.) GE credit: AH, VL, WC, WE. Effective: 2012 Fall Quarter.

FMS 142—New German Cinema (4)
Extensive Writing; Lecture/Discussion—3 hours. German filmmakers of the 1960s-1980s such as Fassbinder, Herzog, Syberberg, Brückner, Schlöndorf, Kluge, Wenders. Knowledge of German is not required. May be repeated for credit with consent of instructor. (GER 142.) GE credit: AH, OL, VL, WC, WE. Effective: 2012 Fall Quarter.

FMS 176A—Classic Weimar Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): HUM 001 German Weimar (1919-1933) cinema. Fritz Lang, F.W. Murnau, and G.W. Pabst among others. Influence on world-wide (esp. Hollywood) film genres such as film noir, horror, science fiction, and melodrama. Not open for credit to students who have taken HUM 176. (GER 176A.) GE credit: AH, OL, VL, WC, WE. Effective: 2012 Fall Quarter.

FMS 176B—Postwar German Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): FMS 001 Exploration of German cinema from 1945 to 1980, when the Nazi past was a central theme. Includes study of postwar "rubble films," escapist "homeland films," and New German Cinema of the 1970s (including films by Fassbinder, Kluge, Syberberg, and Herzog). Not open for credit to students who have taken HUM 177. GE credit: AH, OL, VL, WC, WE. Effective: 2012 Fall Quarter.

FMS 189—Special Topics in Film Studies (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): FMS 001; or Consent of Instructor. Upper division standing. Group study of a special topic in film, focusing on a national tradition, a major filmmaker, or a specific era. May be repeated up to 3 time(s). GE credit: AH, OL, VL, WE. Effective: 2012 Fall Quarter.

FMS 190X—Upper Division Seminar (4)
Seminar—4 hours. Prerequisite(s): Upper division standing or consent of instructor. Study of a special topic in film studies in a small class setting. May be repeated for credit if topic differs. (P/NP grading only.) Effective: 2012 Fall Quarter.

FMS 192—Internship (1-12) ***Review all entries***
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. Supervised internship off and on campus in areas of film studies. May be repeated for credit. (P/NP grading only.) Effective: 2012 Fall Quarter.

FMS 192—Internship (1-12) ***Review all entries Discontinued***
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. Supervised internship off and on campus in areas of film studies. May be repeated for credit. (P/NP grading only.) Effective: 2018 Fall Quarter.

FMS 194H—Special Study for Honors Students (1-5)
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. Senior standing; GPA of at least 3.500. Guided research on a topic in Film Studies in preparation for the writing of an honors thesis in course 195H or the creation of an honors project in course 196H. May be repeated up to 2 time(s). (P/NP grading only.) Effective: 2012 Fall Quarter.

FMS 195H—Honors Thesis (1-5)
Independent Study—3-15 hours. Prerequisite(s): FMS 194H; and Consent of Instructor. GPA of at least 3.500; senior standing. Writing of an honors thesis on a topic in Film Studies under the direction of a faculty member. May be repeated up to 2 time(s). (P/NP grading only.) GE credit: AH, VL, WE. Effective: 2012 Fall Quarter.

FMS 196H—Honors Project (1-5)
Project (Term Project)—3-15 hours. Prerequisite(s): FMS 194H; and Consent of Instructor. Senior standing, GPA of at least 3.500. Creation of an honors film, video, or mixed-media project under the direction of a faculty member. May be repeated up to 2 time(s). (P/NP grading only.) GE credit: AH, VL, WE. Effective: 2012 Fall Quarter.

FMS 197T—Tutoring in Film Studies (1-5) ***Review all entries***
Tutorial—3-15 hours. Prerequisite(s): Consent of program director. Leading of small voluntary discussion groups affiliated with one of the program's regular courses. May be repeated for credit. (P/NP grading only.) Effective: 2012 Fall Quarter.

FMS 197T—Tutoring in Film Studies (1-5) ***Review all entries Discontinued***
Tutorial—3-15 hours. Prerequisite(s): Consent of program director. Leading of small voluntary discussion groups affiliated with one of the program's regular courses. May be repeated for credit. (P/NP grading only.) Effective: 2018 Summer Session 1.

FMS 198—Directed Group Study (1-5) ***Review all entries***
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Directed Group Study (P/NP grading only.) Effective: 2012 Fall Quarter.

FMS 198—Directed Group Study (1-5) ***Review all entries Discontinued***
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Directed Group Study (P/NP grading only.) Effective: 2018 Fall Quarter.

FMS 199—Special Study for Advanced Undergraduates (1-5) ***Review all entries***
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Special Study for Advanced Undergraduates (P/NP grading only.) Effective: 2012 Fall Quarter.

FMS 199—Special Study for Advanced Undergraduates (1-5) ***Review all entries Discontinued***
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Special Study for Advanced Undergraduates (P/NP grading only.) Effective: 2018 Fall Quarter.

FMS 396—Teaching Assistant Training Practicum (1-4) ***Review all entries***
Variable—3-12 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Teaching Assistant Training Practicum May be repeated for credit. (S/U grading only.) Effective: 2012 Fall Quarter.

FMS 396—Teaching Assistant Training Practicum (1-4) ***Review all entries Discontinued***
Variable—3-12 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Teaching Assistant Training Practicum May be repeated for credit. (S/U grading only.) Effective: 2018 Summer Session 1.

First-Year Seminar Program

First-Year Seminar Program | First-Year Seminar Program

Program Office. The Grove, Room 1350 (Surge III); http://fys.ucdavis.edu/; http://fys.ucdavis.edu/student/

First-Year Seminar Program | FRS Courses

Questions pertaining to the following courses should be directed to the instructor or to the First-Year Seminar Office in Undergraduate Education.

Courses in FRS:

FRS 001—First-Year Seminar (1)
Seminar—1 hour. Open only to: students who have completed fewer than 45 quarter units; transfer students in their first academic year at UC Davis. Investigation of a special topic through shared readings, discussions, written assignments, term papers, and special activities (such as fieldwork, site visits, laboratory work, etc.). Emphasis placed upon student participation in learning. Students may take more than one First-Year Seminar, but may not take more than one in any given quarter. May be repeated for credit if topics differ. Effective: 2009 Fall Quarter.

FRS 002—First-Year Seminar (2)
Seminar—2 hours. Open only to: students who have completed fewer than 45 quarter units; transfer students in their first academic year at UC Davis. Investigation of a special topic through shared readings, discussions, written assignments, term papers, and special activities (such as fieldwork, site visits, laboratory work, etc.). Emphasis placed upon student participation in learning. Students may take more than one First-Year Seminar, but may not take more than one in any given quarter. May be repeated for credit if topics differ. Effective: 2009 Fall Quarter.

FRS 003—First-Year Seminar (1)
Seminar—1 hour. Open only to: students who have completed fewer than 45 quarter units; transfer students in their first academic year at UC Davis. Investigation of a special topic through shared readings, discussions, written assignments, term papers, and special activities (such as fieldwork, site visits, laboratory work, etc.). Emphasis placed upon student participation in learning. Students may take more than one First-Year Seminar, but may not take more than one in any given quarter. May be repeated for credit if topics differ. (P/NP grading only.) Effective: 2009 Fall Quarter.

FRS 004—First-Year Seminar (2)
Seminar—2 hours. Open only to: students who have completed fewer than 45 quarter units; transfer students in their first academic year at UC Davis. Investigation of a special topic through shared readings, discussions, written assignments, term papers, and special activities (such as fieldwork, site visits, laboratory work, etc.). Emphasis placed upon student participation in learning. Students may take more than one First-Year Seminar, but may not take more than one in any given quarter. May be repeated for credit if topics differ. (P/NP grading only.) Effective: 2009 Fall Quarter.

Food Science

Food Science | Food Science B.S.

(College of Agricultural and Environmental Sciences)

Department of Food Science and Technology

Linda J. Harris, Ph.D., Chairperson of the Department

Department Office. 1136 RMI North Building; 530-752-1482; http://foodscience.ucdavis.edu

Faculty. http://foodscience.ucdavis.edu/people/faculty/

The Major Program

Food Science is a discipline in which biological, physical, and sensory sciences are integrated for the study of foods to ensure their safety, quality, and healthful properties. The food science curriculum encompasses food chemistry and biochemistry, food safety and microbiology, food processing and preservation, and sensory and consumer sciences.

The Program. Food Science is a multidisciplinary major that includes core competencies in food chemistry and analysis, food safety and microbiology, and food processing and engineering. After

completing the preparatory course work, students focus on advanced subject courses in food chemistry and biochemistry, food processing, sensory evaluation, and food microbiology applied to improve the safety, stability, taste, nutrition, convenience, sustainability and value of foods.

Career Alternatives. Opportunities for employment include positions in the food and allied industries, government agencies, and educational and research institutions. Graduate study for the food science student may lead to the M.S. or Ph.D. degree in food science, or in related fields such as agricultural chemistry, biochemistry, microbiology, nutrition and health sciences.

Advising Center for the major is located in 1204 RMI South Building; 530-752-3250.

Major Advisor. A.E. Mitchell (Food Science and Technology)

Graduate Study. A program of study and research leading to the M.S. and Ph.D. degrees in Food Science is available. For further information on graduate study, contact the graduate advisor.

Preparatory Subject Matter **Units:** 65

Choose one:

UWP 102F	Writing in the Disciplines: Food Science and Technology	4
UWP 104A	Writing in the Professions: Business Writing	4
UWP 104E	Writing in the Professions: Science	4

The upper-division composition exam will satisfy this requirement.

CMN 001	Introduction to Public Speaking	4
MAT 016A	Short Calculus	3
MAT 016B	Short Calculus	3
MAT 016C	Short Calculus	3
BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 002C	General Chemistry	5
CHE 008A	Organic Chemistry: Brief Course	2
CHE 008B	Organic Chemistry: Brief Course	4

OR

More advanced series.

PHY 007A	General Physics	4
PHY 007B	General Physics	4
PHY 007C	General Physics	4
FST 050	Introduction to Food Preservation	3
STA 013	Elementary Statistics	4
NUT 010	Discoveries and Concepts in Nutrition	3

OR

Approved substitute.

Depth Subject Matter **Units:** 50

BIS 102	Structure and Function of Biomolecules	3
BIS 103	Bioenergetics and Metabolism	3
MIC 102	Introductory Microbiology	3
MIC 103L	Introductory Microbiology Laboratory	2
FST 100A	Food Chemistry	4

FST 100B	Food Properties	4
FST 101A	Food Chemistry Laboratory	3
FST 101B	Food Properties Laboratory	2
FST 103	Physical and Chemical Methods for Food Analysis	4
FST 104	Food Microbiology	3
FST 104L	Food Microbiology Laboratory	4
FST 110	Food Processing	4
FST 110L	Food Processing Laboratory	2
FST 190	Senior Seminar	1
FST 117	Design and Analysis for Sensory Food Science	4
OR		
STA 106	Applied Statistical Methods: Analysis of Variance	4
FST 127	Sensory Evaluation of Foods	4
OR		
FST 107	Food Sensory Science	4

Restricted Electives **Units:** 18

FST 003	Introduction to Brewing and Beer	3
FST 102A	Malting and Brewing Science	4
FST 102B	Practical Malting and Brewing	4
FST 107	Food Sensory Science	4
FST 109	Principles of Quality Assurance in Food Processing	3
FST 119	Chemistry and Technology of Milk and Dairy Products	4
FST 123	Introduction to Enzymology	3
FST 123L	Enzymology Laboratory	2
FST 128	Food Toxicology	3
FST 159	New Food Product Ideas	3
FST 160	Food Product Development	4
FST 192	Internship for Advanced Undergraduates	1-12
FST 199	Special Study for Advanced Undergraduates	1-5
FST 213	Flavor Chemistry of Foods and Beverages	3
FST 219	Biochemistry, Microbiology and Technology of Cheeses of the World	4
ARE 018	Business Law	4
ARE 100A	Intermediate Microeconomics: Theory of Production and Consumption	4

ARE 100B	Intermediate Microeconomics: Imperfect Competition, Markets and Welfare Economics	4
ARE 112	Fundamentals of Organization Management	4
ARE 136	Managerial Marketing	4
ARE 146	Business, Government Regulation, and Society	4
ARE 155	Operations Research and Management Science	4
ARE 157	Analysis for Operations and Production Management	4
AMS 055	Food in American Culture	4
ABT 110L	Experiments in Food Engineering	2
BIS 101	Genes and Gene Expression	4
BIS 101D	Genes and Gene Expression Discussion	1
BIS 104	Cell Biology	3
BIT 171	Professionalism and Ethics in Genomics and Biotechnology	3
CHA 101	Human Gross Anatomy	4
CHE 107A	Physical Chemistry for the Life Sciences	3
CHE 107B	Physical Chemistry for the Life Sciences	3
CHE 124A	Inorganic Chemistry: Fundamentals	3
CHE 124B	Inorganic Chemistry: Main Group Elements	3
CHE 124C	Inorganic Chemistry: d and f Block Elements	3
CHE 129C	Organic Chemistry Laboratory	2
CHE 131	Modern Methods of Organic Synthesis	3
CHE 150	Chemistry of Natural Products	3
CMN 003	Interpersonal Communication Competence	4
CMN 135	Nonverbal Communication (Discontinued)	4
CMN 136	Organizational Communication	4
CMN 140	Introduction to Mass Communication	4
CNS 100	Consumer Behavior	3
ECH 001	Design of Coffee–An Introduction to Chemical Engineering	3
ECN 001A	Principles of Microeconomics	4

ECN 001B	Principles of Macroeconomics	4
MGT 011A	Elementary Accounting	4
MGT 011A	Elementary Accounting	4
MIC 105	Microbial Diversity	3
MIC 120	Microbial Ecology	3
MIC 140	Bacterial Physiology	3
MIC 150	Genomes of Pathogenic Bacteria	3
MIC 155L	Bacterial Physiology Lab	4
MIC 162	General Virology	4
MIC 170	Yeast Molecular Genetics	3
MCB 120L	Molecular Biology and Biochemistry Laboratory	3
MCB 121	Advanced Molecular Biology	3
MCB 123	Behavior and Analysis of Enzyme and Receptor Systems	3
MCB 126	Plant Biochemistry	3
MCB 140	Cell Biology Laboratory Associated Lecture	3
MCB 150	Developmental Biology	4
MCB 160L	Principles of Genetics Laboratory	5
NPB 101	Systemic Physiology	5
NPB 101L	Systemic Physiology Laboratory	3
NUT 105	Nutrition and Aging	3
NUT 111B	Recommendations and Standards for Human Nutrition	2
NUT 112	Nutritional Assessment	4
NUT 116A	Clinical Nutrition	3
NUT 116B	Clinical Nutrition	3
NUT 118	Community Nutrition	4
NUT 120AN	Nutritional Anthropology	4
PMI 126	Fundamentals of Immunology	3
PMI 127	Medical Bacteria and Fungi	3

PLB 105	Developmental Plant Anatomy	5
PLB 111	Plant Physiology	3
PLB 119	Population Biology of Invasive Plants and Weeds	3
PLB 126	Plant Biochemistry	3
PLB 148	Introductory Mycology	4
PLP 040	Edible Mushroom Cultivation	2
PLP 140	Agricultural Biotechnology and Public Policy	4
PLP 148	Introductory Mycology	4
PLS 172	Postharvest Physiology and Technology	4
PLS 174	Microbiology and Safety of Fresh Fruits and Vegetables	3
PLS 196	Postharvest Technology of Horticultural Crops	3
PSC 041	Research Methods in Psychology	4
SOC 139	Corporations and Society	4
VEN 123	Analysis of Musts and Wines	2
VEN 124	Wine Production	2
VEN 125	Wine Types and Sensory Evaluation	2
VEN 128	Wine Microbiology	2
VEN 140	Distilled Beverage Technology	3

Brewing Science Option **Units:** 18

The Brewing Science option prepares Food Science students for careers in production or quality assurance within the brewing industry or other food fermentation industries. The option also prepares students for graduate study in food science or related programs, and exposes the students to diverse disciplines, including chemistry, biochemistry, microbiology, and processing.

Specific course requirements:

FST 102A	Malting and Brewing Science	4
FST 102B	Practical Malting and Brewing	4
FST 123	Introduction to Enzymology	3

Selected additional courses:

FST 003	Introduction to Brewing and Beer	3
FST 109	Principles of Quality Assurance in Food Processing	3
FST 159	New Food Product Ideas	3
FST 160	Food Product Development	4

Total: 133

Food Science | FST Courses

Courses in FST:

FST 001—Principles of Food Science (3)
Discussion—1 hour; Lecture—2 hours. Not open for credit to students who have completed any Food Science and Technology course except course 10. Food science fundamentals. Fresh and processed food technologies;
world food problems; food composition; food microbiological and toxicological safety; food laws; evaluation of acceptability and nutritional value. GE credit: SE, VL. Effective: 2001 Winter Quarter.

FST 003—Introduction to Brewing and Beer (3)
Lecture—3 hours. Basic description of brewing and associated processes, from raw materials to final product; history of brewing and brewing science; types of beer worldwide; world beer markets; basics of beer quality, including wholesomeness; role of scientist in brewing. Not open for credit to students who have taken FST 003V. GE credit: SE, SL. Effective: 2017 Fall Quarter.

FST 003V—Introduction to Brewing and Beer (3)
Project (Term Project); Web Electronic Discussion—1.5 hours; Web Virtual Lecture—1 hour. Basic description of brewing and associated processes, from raw materials to final product; history of brewing and brewing science; types of beer worldwide; world beer markets; basics of beer quality, including wholesomeness; role of scientist in brewing. Not open for credit to students who have taken FST 003. GE credit: SE, SL. Effective: 2017 Spring Quarter.

FST 010—Food Science, Folklore and Health (3)
Lecture—3 hours. Not open for credit to students who have completed course 2. Ancient and modern food folklore in relation to health and well-being. Food safety, organic food, herbalism, food preservation, and nutritional enhancement. GE credit: SE, SL, SS, VL, WC. Effective: 2000 Fall Quarter.

FST 050—Introduction to Food Preservation (3) ***Review all entries***
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): CHE 002A; STA 013 (can be concurrent); BIS 002A (can be concurrent) Restricted to Food Science Majors. Introduction to modes of fresh food preservation including use of chemicals and microbes, heat and energy, control of water and atmosphere, and by indirect approaches such as packaging, hygienic design and sanitation. GE credit: QL, SE. Effective: 2018 Winter Quarter.

FST 050—Introduction to Food Preservation (3) ***Review all entries***
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): CHE 002A; BIS 002A (can be concurrent); (STA 013 (can be concurrent) or STA 013Y (can be concurrent) or STA 100 (can be concurrent)) Pass One restricted to Food Science majors; Pass Two open to all students. Introduction to modes of fresh food preservation including use of chemicals and microbes, heat and energy, control of water and atmosphere, and by indirect approaches such as packaging, hygienic design and sanitation. GE credit: QL, SE. Effective: 2018 Fall Quarter.

FST 055—Food in American Culture (4)
Discussion—1 hour; Lecture—3 hours. Relationship between food and culture; relationship between food and the social order; influences on eating habits and the tensions between them including identity, convenience, and responsibility; multiple disciplines and genres. (AMS 055.) GE credit: ACGH, AH, DD, SS, WE. Effective: 2018 Winter Quarter.

FST 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

FST 100A—Food Chemistry (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 008B; BIS 002A recommended. Chemical aspects of food composition. Emphasis on the functional properties and chemical reactions of the major components of foods: carbohydrates, lipids, proteins, and water. GE credit: SE, VL. Effective: 2017 Winter Quarter.

FST 100A—Food Chemistry (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (CHE 008B or CHE 118B or CHE 128B); BIS 002A recommended. Open to Food Science, Clinical Nutrition, and Nutrition Science majors only. Chemical aspects of food composition. Emphasis on the functional properties and chemical reactions of the major components of foods: carbohydrates, lipids, proteins, and water. GE credit: SE, VL. Effective: 2018 Fall Quarter.

FST 100B—Food Properties (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): FST 100A; CHE 008B; and Consent of Instructor. Sensory quality, chemical and microbial safety, and nutritional properties of foods. Effects of food processing and preparation on these properties. Selected properties of food commodities. GE credit: QL, SE, VL. Effective: 2017 Winter Quarter.

FST 101A—Food Chemistry Laboratory (3) ***Review all entries***
Discussion—1 hour; Laboratory—3 hours; Lecture—1 hour. Concurrent enrollment in FST 100A required. Study of basic chemical and physical properties that influence the reactivity and functional properties of components in food systems. GE credit: QL, SE, VL, WE. Effective: 2017 Spring Quarter.

FST 101A—Food Chemistry Laboratory (3) ***Review all entries***
Discussion—1 hour; Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): FST 100A (can be concurrent) Open to Food Science and Clinical Nutrition majors only. Study of basic chemical and physical properties that influence the reactivity and functional properties of components in food systems. GE credit: QL, SE, VL, WE. Effective: 2018 Fall Quarter.

FST 101B—Food Properties Laboratory (2)
Lecture/Lab—3 hours. Prerequisite(s): FST 100B (can be concurrent); Must be taken concurrently. Study of properties of food described in course 100B. GE credit: QL, SE, VL, WE. Effective: 2017 Winter Quarter.

FST 102A—Malting and Brewing Science (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): BIS 102; BIS 103; Senior standing recommended. The technology of the malting, brewing and fermentation processes is integrated with the chemistry, biochemistry and microbiology that determine industrial practices and product quality. Not open for credit to students who have taken course 102. GE credit: SE. Effective: 1997 Winter Quarter.

FST 102A—Malting and Brewing Science (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): (BIS 102, BIS 103) or BIS 105; Senior standing recommended. The technology of the malting, brewing and fermentation processes is integrated with the chemistry, biochemistry and microbiology that determine industrial practices and product quality. Not open for credit to students who have taken FST 102. GE credit: SE. Effective: 2018 Fall Quarter.

FST 102B—Practical Malting and Brewing (4)
Laboratory—6 hours; Lecture/Discussion—2 hours. Prerequisite(s): FST 102A; CHE 002C Open to seniors only in Fermentation Science or Food Science and Technology. Provides practical working knowledge of analytical methods used in malting and brewing and experience with brewing materials and processes, by analysis of samples that illustrate the range of values experienced in practice and pilot scale brewing. GE credit: QL, SE. Effective: 2017 Winter Quarter.

FST 103—Physical and Chemical Methods for Food Analysis (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): CHE 002C; CHE 008B; BIS 103; FST 100B Theory and application of physical and chemical methods for determining the constituents of foods. Modern separation and instrumental analysis
techniques are stressed. GE credit: QL, SE, WE. Effective: 2017 Winter Quarter.

FST 104—Food Microbiology (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 103; MIC 102; MIC 103L Microorganisms in food safety, spoilage, and production. Food-borne disease agents and their control. Growth parameters of food spoilage agents. Destruction of microbes in food. Food fermentations. The development of microbes as a resource for the food industry. GE credit: QL, SE, VL. Effective: 2017 Winter Quarter.

FST 104—Food Microbiology (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 103; MIC 102 Microorganisms in food safety, spoilage, and production. Food-borne disease agents and their control. Growth parameters of food spoilage agents. Destruction of microbes in food. Food fermentations. The development of microbes as a resource for the food industry. GE credit: QL, SE, VL. Effective: 2019 Winter Quarter.

FST 104L—Food Microbiology Laboratory (4)
Discussion—1 hour; Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): BIS 002A; BIS 103; FST 104 Cultural and morphological characteristics of microorganisms involved in food spoilage, in foodborne disease, and food fermentation. Analysis of microbiological quality of foods. GE credit: QL, SE, VL, WE. Effective: 2017 Spring Quarter.

FST 107—Food Sensory Science (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): FST 117 (can be concurrent); (STA 013 or STA 013Y) Critical examination of techniques and theories of sensory measurement of food; measures of consumer perception and acceptance. An introduction to the sensory and cognitive systems associated with the perception of food. Not open for credit to students who have completed FST 107A. GE credit: QL, SE, WE. Effective: 2018 Spring Quarter.

FST 109—Principles of Quality Assurance in Food Processing (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): STA 013 or STA 013Y Quality assurance measurement techniques applied to selected food processed products emphasized. Rationale for establishing valid quality assurance programs including selection of samples at critical points. Statistical problems in quality assurance programs used by the food industry. GE credit: QL, SE, SL, VL. Effective: 2018 Spring Quarter.

FST 110—Food Processing (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PHY 007A; PHY 007B; PHY 007C; MAT 016A; MAT 016B; MAT 016C; Or equivalent to PHY 007 series or MAT 016 series. Application of the conservation of mass and energy to food processing. Elements of engineering thermodynamics, fluid mechanics, heat and mass transfer. Quantitative analysis through problem solving and simulation. Not open for credit to students enrolled in College of Engineering. GE credit: QL, SE, VL. Effective: 2017 Spring Quarter.

FST 110—Food Processing (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PHY 007A; PHY 007B; PHY 007C (can be concurrent); (MAT 016C or MAT 017C or MAT 021C) Application of the conservation of mass and energy to food processing. Elements of engineering thermodynamics, fluid mechanics, heat and mass transfer. Quantitative analysis through problem solving and simulation. Not open for credit to students enrolled in College of Engineering. GE credit: QL, SE, VL. Effective: 2018 Fall Quarter.

FST 110L—Food Processing Laboratory (2) ***Review all entries***
Discussion—1 hour; Laboratory—3 hours. Prerequisite(s): FST 110 (can be concurrent); FST 050 Open to Food Science majors only. Laboratory exercises to gain experience with common food processing operations at the bench and pilot plant scales. GE credit: QL, SE, SL, VL. Effective: 2017 Spring Quarter.

FST 110L—Food Processing Laboratory (2) ***Review all entries***
Discussion—1 hour; Laboratory—3 hours. Prerequisite(s): FST 110 (can be concurrent) Open to Food Science majors only. Laboratory exercises to gain experience with common food processing operations at the bench and pilot plant scales. GE credit: QL, SE, SL, VL. Effective: 2018 Fall Quarter.

FST 115—Fermented Foods (4)
Lecture—3 hours; Term Paper/Discussion. Prerequisite(s): BIS 103; MIC 102; or Consent of Instructor. Pass One restricted to upper division or graduate level Food Science and Viticulture and Enology majors. Physiology, biochemistry, and genetics of microorganisms important in food fermentations. How microorganisms are used in fermentations and how raw materials are converted into finished fermented foods and beverages. Effective: 2017 Spring Quarter.

FST 117—Design and Analysis for Sensory Food Science (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 013 Methods of design and analysis for sensory food science. Experimental design strategies. Use of taste panels and consumer testing. Data analysis and computation including the relative merits and limitations of parametric and nonparametic approaches. Modifications for quality assurance. GE credit: QL, SE. Effective: 2017 Spring Quarter.

FST 119—Chemistry and Technology of Milk and Dairy Products (4)
Lecture—4 hours. Prerequisite(s): BIS 002A; BIS 102; Consent of Instructor. Composition, structure and properties of milk and products derived from milk. Relates chemical, microbiological, and technological principles to commercial practices in processing of milk and its products. GE credit: QL, SE, VL. Effective: 2017 Spring Quarter.

FST 123—Introduction to Enzymology (3)
Lecture—3 hours. Prerequisite(s): FST 123L (can be concurrent); BIS 102; BIS 103 Principles of physical, chemical and catalytic properties of enzymes and their importance. Purification, characterization, and quantitative evaluation of reaction conditions on activity are stressed. Specificity and mechanism of action illustrated by use of selected enzymes. (Former course Biochemistry and Biophysics 123.) GE credit: QL, SE, VL. Effective: 2017 Spring Quarter.

FST 123L—Enzymology Laboratory (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): BIS 103; FST 123 (can be concurrent); FST 123 required concurrently. Laboratory procedures involved in detection, purification and characterization of enzymes. (Former course Biochemistry and Biophysics 123L.) GE credit: QL, SE, VL, WE. Effective: 1997 Winter Quarter.

FST 127—Sensory Evaluation of Foods (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): FST 117 Critical examination of methods of sensory measurement applied to food and beverage systems; descriptive analysis and consumer tests and their application to quality assurance, product development and optimization. GE credit: QL, SE, WE. Effective: 2017 Winter Quarter.

FST 128—Food Toxicology (3)
Lecture—3 hours. Prerequisite(s): BIS 102; BIS 103 Chemistry and biochemistry of toxins occurring in foods, including plant and animal toxins, intentional and unintentional food additives. The
assessment of food safety and toxic hazards. (ETX 128.) GE credit: SE. Effective: 1997 Winter Quarter.

FST 131—Food Packaging (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 008B; BIS 001B; PHY 007C Class size limited to 50 students. Principles of food packaging. Functions of packaging. Properties of metal, glass, paper and plastic materials and packages. Design, fabrication, and applications of food packaging. Packaging of fresh and processed foods, including fruits and vegetables, dairy foods, beer and wine. GE credit: SE. Effective: 2016 Summer Session 1.

FST 151Y—Food Freezing (1)
Discussion—1 hour; Web Virtual Lecture. Prerequisite(s): FST 110A; Or the equivalent. Mechanisms of ice crystallization, interpretation of freezing diagrams, and modes of heat transfer. Food properties at sub-freezing temperatures, refrigeration requirements, and estimation of freezing times. Industrial systems used in freezing foods. GE credit: QL, SE. Effective: 2013 Fall Quarter.

FST 159—New Food Product Ideas (3)
Lecture—3 hours. Prerequisite(s): FST 050; BIS 002A; PHY 007A; PHY 007B; PHY 007C; CHE 002A; CHE 002B; CHE 002C Create, refine, test and present viable ideas for new food products. Activities include trend monitoring, consumer research, idea generation, concept screening, and new product concept presentations. GE credit: AH, OL, SS, WE. Effective: 2017 Spring Quarter.

FST 160—Food Product Development (4)
Discussion—1 hour; Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): FST 050; FST 103; FST 104; FST 110 Product implementation stage of food product development including preliminary product description, prototype development, product testing, and formal presentation of a new product development. GE credit: OL, SE, VL. Effective: 2017 Winter Quarter.

FST 190—Senior Seminar (1)
Seminar—1 hour. Prerequisite(s): Senior standing or consent of instructor. Selected topics presented by students on recent advances in food science and technology. Reports and discussions concerning oral and written presentations, literature sources and career opportunities. GE credit: OL, SE. Effective: 1997 Winter Quarter.

FST 192—Internship for Advanced Undergraduates (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Work experience on or off campus in the practical application of food science. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

FST 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

FST 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

FST 201—Food Chemistry and Biochemistry (4)
Lecture—4 hours. Prerequisite(s): Undergraduate courses in organic chemistry and biochemistry; undergraduate course in food chemistry is recommended. Restricted to Food Science graduate level standing or consent of instructor. Advanced topics in food chemistry and biochemistry, emphasizing the application of the basic principles of chemistry and biochemistry to food composition, properties, preservation and processing. Chemical structures, interactions, reaction mechanisms and experimental methods are stressed. Effective: 2017 Fall Quarter.

FST 202—Physical Chemistry of Foods (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 107A; CHE 107B; BIS 102 recommended. Fundamental principles of chemistry and physics are applied to a study of changes in water binding properties and activity, changes in proteins, nutrients, toxic constituents, and other compounds during storage, heating, freezing, dehydrating, and concentrating of food materials. Effective: 2017 Winter Quarter.

FST 203—Food Processing (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): FST 110A; PHY 007C); CHE 107B; or Consent of Instructor. Principles of food engineering applied to food processing. Relationship of Newtonian and non-Newtonian fluid properties to heat and momentum transfer. Application of mass transfer in controlling kinetics and quality changes of foods. Effective: 2013 Spring Quarter.

FST 204—Advanced Food Microbiology (3)
Lecture—3 hours. Prerequisite(s): BIS 001C; BIS 103; FST 104; Or a course in microbiology. Principles of and recent developments in food microbiology, including food pathogen virulence and detection, parameters of microbial growth in food, and the microbiology of food and beverage fermentations. Effective: 1997 Winter Quarter.

FST 205—Industrial Microbiology (3)
Lecture—3 hours. Prerequisite(s): BIS 001A; BIS 102; BIS 103; MIC 130A and MIC 130B or BIS 101 recommended. Use of microorganisms for producing substances such as amino acids, peptides, enzymes, antibiotics and organic acids. Emphasis on metabolic regulation of pathways leading to fermentation products, on yeast fermentations, and on genetic manipulations (including recombinant DNA techniques) of industrial microorganisms. Effective: 1997 Winter Quarter.

FST 207—Advanced Sensory-Instrumental Analyses (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): FST 107; and Consent of Instructor. Basic principles of measurement of color, texture, and flavor of foods by sensory and instrumental methods. Advanced statistical analysis of relation of colorimetry, texturometry, and chemistry of volatile compounds to perception of appearance, texture, flavor. Effective: 1997 Winter Quarter.

FST 210—Proteins: Functional Activities and Interactions (3)
Lecture—3 hours. Prerequisite(s): BIS 103 The relationships of structure of proteins to their biological functions. Structural proteins, complexing proteins, and catalytic proteins in plant and animal materials and products. Effective: 1997 Winter Quarter.

FST 211—Lipids: Chemistry and Nutrition (3)
Lecture—3 hours. Prerequisite(s): BIS 103; CHE 107B; CHE 128B Chemistry of lipids as it pertains to research in food and nutrition. Relations between lipid structure and their physical properties in tissues and foods. Regulation of absorption, transport, and metabolism of lipids. Implications of dietary fats and health. Effective: 1997 Winter Quarter.

FST 213—Flavor Chemistry of Foods and Beverages (3)
Lecture/Discussion—3 hours. Prerequisite(s): CHE 008B; VEN 123; (VEN 123L or FST 103); or Consent of Instructor. Students will become familiar with basic principles of flavor chemistry, analysis, and formation in fresh and processed foods. Students will be required to read and critically evaluate flavor chemistry literature. (VEN 213.) Effective: 2009 Spring Quarter.

FST 217—Advanced Food Sensory Science (3)
Lecture—3 hours. Prerequisite(s): FST 107 (can be concurrent); or Consent of Instructor. Advanced study of the techniques and theory of the sensory measurement of food as an analytical tool and as a measure of consumer perception and acceptance. Advanced examination of the sensory and cognitive systems associated with the perception of food. Effective: 2010 Fall Quarter.

FST 219—Biochemistry, Microbiology and Technology of Cheeses of the World (4)
Lecture—4 hours. Prerequisite(s): FST 119; (BIS 103 or FST 100A); FST 123; BIS 103; CHE 107B; CHE 128B; or Consent of Instructor. Restricted to graduate level students or senior undergraduate students with appropriate background in biochemistry and microbiology. Compositional and physico-chemical aspects of milk and their implications on cheesemaking; enzymatic, microbiological and physical aspects of cheesemaking; cheese as a biological composite; designing cheese quality attributes; cheese aging. Cheese from all over the world will be tasted and discussed. Effective: 2008 Fall Quarter.

FST 227—Food Perception and the Chemical Senses (2)
Lecture—2 hours. Prerequisite(s): FST 107B (can be concurrent); and Consent of Instructor. Examination of the anatomy and physiology of the chemical senses (taste, smell, and the trigeminal senses) and how they are involved in the perception of food and food intake. Effective: 1997 Winter Quarter.

FST 230—Food & Gut Microbiota (4)
Discussion—1.5 hours; Lecture—1.5 hours; Term Paper. Prerequisite(s): Microbiology and molecular biology undergraduate coursework or Consent of Instructor. Upper division or graduate standing. Impact of specific food structures on the structure and function of the animal gut microbiota. How food is transformed by, and modulates, the gut microbiota to provide the host with nutrients and protection. Effective: 2017 Spring Quarter.

FST 290—Seminar (1)
Seminar—1 hour. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

FST 290C—Advanced Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Critical presentation and evaluation of original research by graduate students. Planning of research programs and proposals. Discussion led by individual major instructors for their research group. (S/U grading only.) Effective: 1997 Winter Quarter.

FST 291—Advanced Food Science Seminar (1)
Seminar—1 hour. Prerequisite(s): FST 290; Completion of at least one quarter of FST 290. Oral presentation of student's original research, discussion, and critical evaluation. (S/U grading only.) Effective: 1997 Winter Quarter.

FST 298—Group Study (1-5)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

FST 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

FST 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Food Science (Graduate Group)

Food Science (Graduate Group) | Food Science Information

Gary M. Smith, Ph.D., Chairperson of the Group

Group Office. 1204 RMI South Building; 530-752-3250; bftvadvising@ucdavis.edu; http://www.foodscience.ucdavis.edu

Faculty. Includes members from twelve departments in the Colleges of Agricultural and Environmental Sciences and Engineering, and the Schools of Medicine and Veterinary Medicine.

Food Science (Graduate Group) | Food Science M.S.

Gary M. Smith, Ph.D., Chairperson of the Group

Group Office. 1204 RMI South Building; 530-752-3250; bftvadvising@ucdavis.edu; http://www.foodscience.ucdavis.edu

Faculty. Includes members from twelve departments in the Colleges of Agricultural and Environmental Sciences and Engineering, and the Schools of Medicine and Veterinary Medicine.

Graduate Study. The interdepartmental Graduate Group in Food Science offers programs of study leading to the M.S. degree and to the Ph.D. degree. Graduate studies stress the application of the biological, chemical, physical, and behavioral sciences to processing, preservation, quality evaluation, public health aspects, and utilization of foods. For the M.S. degree, there are five areas of specialization: chemistry-biochemistry, microbiology, engineering-technology, brewing and sensory science. Individually designed programs are also acceptable. For the Ph.D., there are four areas of emphasis: biochemistry, chemistry, microbiology/fermentation, and sensory science. Detailed information regarding graduate study is available through the Group Chairperson or the Group office.

Graduate Advisor. Contact the Food Science Graduate Group office at bftvadvising@ucdavis.edu.

Food Science (Graduate Group) | Food Science Ph.D.

Gary M. Smith, Ph.D., Chairperson of the Group

Group Office. 1204 RMI South Building; 530-752-3250; bftvadvising@ucdavis.edu; http://www.foodscience.ucdavis.edu

Faculty. Includes members from twelve departments in the Colleges of Agricultural and Environmental Sciences and Engineering, and the Schools of Medicine and Veterinary Medicine.

Graduate Study. The interdepartmental Graduate Group in Food Science offers programs of study leading to the M.S. degree and to the Ph.D. degree. Graduate studies stress the application of the biological, chemical, physical, and behavioral sciences to processing, preservation, quality evaluation, public health aspects, and utilization of foods. For the M.S. degree, there are five areas of specialization: chemistry-biochemistry, microbiology, engineering-technology, brewing and sensory science. Individually designed programs are also acceptable. For the Ph.D., there are four areas of emphasis: biochemistry, chemistry, microbiology/fermentation, and sensory science. Detailed information regarding graduate study is available through the Group Chairperson or the Group office.

Graduate Advisor. Contact the Food Science Graduate Group office at bftvadvising@ucdavis.edu.

Food Science & Technology

Food Science & Technology | FST Information

(College of Agricultural and Environmental Sciences)

Department of Food Science and Technology

Linda J. Harris, Ph.D., Chairperson of the Department

Department Office. 1136 RMI North Building; 530-752-1482; http://foodscience.ucdavis.edu

Faculty. http://foodscience.ucdavis.edu/people/faculty/

Major Program and Graduate Study. See the major in Food Science; and for graduate study, see Graduate Studies.

Related Courses. See courses in Consumer Science, Engineering, Molecular & Cellular Biology, Nutrition, Viticulture & Enology, Environmental Toxicology, Population Health & Reproduction, and Plant Biology.

Food Science & Technology | FST Courses

Courses in FST:

FST 001—Principles of Food Science (3)
Discussion—1 hour; Lecture—2 hours. Not open for credit to students who have completed any Food Science and Technology course except course 10. Food science fundamentals. Fresh and processed food technologies;
world food problems; food composition; food microbiological and toxicological safety; food laws; evaluation of acceptability and nutritional value. GE credit: SE, VL. Effective: 2001 Winter Quarter.

FST 003—Introduction to Brewing and Beer (3)
Lecture—3 hours. Basic description of brewing and associated processes, from raw materials to final product; history of brewing and brewing science; types of beer worldwide; world beer markets; basics of beer quality, including wholesomeness; role of scientist in brewing. Not open for credit to students who have taken FST 003V. GE credit: SE, SL. Effective: 2017 Fall Quarter.

FST 003V—Introduction to Brewing and Beer (3)
Project (Term Project); Web Electronic Discussion—1.5 hours; Web Virtual Lecture—1 hour. Basic description of brewing and associated processes, from raw materials to final product; history of brewing and brewing science; types of beer worldwide; world beer markets; basics of beer quality, including wholesomeness; role of scientist in brewing. Not open for credit to students who have taken FST 003. GE credit: SE, SL. Effective: 2017 Spring Quarter.

FST 010—Food Science, Folklore and Health (3)
Lecture—3 hours. Not open for credit to students who have completed course 2. Ancient and modern food folklore in relation to health and well-being. Food safety, organic food, herbalism, food preservation, and nutritional enhancement. GE credit: SE, SL, SS, VL, WC. Effective: 2000 Fall Quarter.

FST 050—Introduction to Food Preservation (3) ***Review all entries***
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): CHE 002A; STA 013 (can be concurrent); BIS 002A (can be concurrent) Restricted to Food Science Majors. Introduction to modes of fresh food preservation including use of chemicals and microbes, heat and energy, control of water and atmosphere, and by indirect approaches such as packaging, hygienic design and sanitation. GE credit: QL, SE. Effective: 2018 Winter Quarter.

FST 050—Introduction to Food Preservation (3) ***Review all entries***
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): CHE 002A; BIS 002A (can be concurrent); (STA 013 (can be concurrent) or STA 013Y (can be concurrent) or STA 100 (can be concurrent)) Pass One restricted to Food Science majors; Pass Two open to all students. Introduction to modes of fresh food preservation including use of chemicals and microbes, heat and energy, control of water and atmosphere, and by indirect approaches such as packaging, hygienic design and sanitation. GE credit: QL, SE. Effective: 2018 Fall Quarter.

FST 055—Food in American Culture (4)
Discussion—1 hour; Lecture—3 hours. Relationship between food and culture; relationship between food and the social order; influences on eating habits and the tensions between them including identity, convenience, and responsibility; multiple disciplines and genres. (AMS 055.) GE credit: ACGH, AH, DD, SS, WE. Effective: 2018 Winter Quarter.

FST 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

FST 100A—Food Chemistry (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 008B; BIS 002A recommended. Chemical aspects of food composition. Emphasis on the functional properties and chemical reactions of the major components of foods: carbohydrates, lipids, proteins, and water. GE credit: SE, VL. Effective: 2017 Winter Quarter.

FST 100A—Food Chemistry (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (CHE 008B or CHE 118B or CHE 128B); BIS 002A recommended. Open to Food Science, Clinical Nutrition, and Nutrition Science majors only. Chemical aspects of food composition. Emphasis on the functional properties and chemical reactions of the major components of foods: carbohydrates, lipids, proteins, and water. GE credit: SE, VL. Effective: 2018 Fall Quarter.

FST 100B—Food Properties (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): FST 100A; CHE 008B; and Consent of Instructor. Sensory quality, chemical and microbial safety, and nutritional properties of foods. Effects of food processing and preparation on these properties. Selected properties of food commodities. GE credit: QL, SE, VL. Effective: 2017 Winter Quarter.

FST 101A—Food Chemistry Laboratory (3) ***Review all entries***
Discussion—1 hour; Laboratory—3 hours; Lecture—1 hour. Concurrent enrollment in FST 100A required. Study of basic chemical and physical properties that influence the reactivity and functional properties of components in food systems. GE credit: QL, SE, VL, WE. Effective: 2017 Spring Quarter.

FST 101A—Food Chemistry Laboratory (3) ***Review all entries***
Discussion—1 hour; Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): FST 100A (can be concurrent) Open to Food Science and Clinical Nutrition majors only. Study of basic chemical and physical properties that influence the reactivity and functional properties of components in food systems. GE credit: QL, SE, VL, WE. Effective: 2018 Fall Quarter.

FST 101B—Food Properties Laboratory (2)
Lecture/Lab—3 hours. Prerequisite(s): FST 100B (can be concurrent); Must be taken concurrently. Study of properties of food described in course 100B. GE credit: QL, SE, VL, WE. Effective: 2017 Winter Quarter.

FST 102A—Malting and Brewing Science (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): BIS 102; BIS 103; Senior standing recommended. The technology of the malting, brewing and fermentation processes is integrated with the chemistry, biochemistry and microbiology that determine industrial practices and product quality. Not open for credit to students who have taken course 102. GE credit: SE. Effective: 1997 Winter Quarter.

FST 102A—Malting and Brewing Science (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): (BIS 102, BIS 103) or BIS 105; Senior standing recommended. The technology of the malting, brewing and fermentation processes is integrated with the chemistry, biochemistry and microbiology that determine industrial practices and product quality. Not open for credit to students who have taken FST 102. GE credit: SE. Effective: 2018 Fall Quarter.

FST 102B—Practical Malting and Brewing (4)
Laboratory—6 hours; Lecture/Discussion—2 hours. Prerequisite(s): FST 102A; CHE 002C Open to seniors only in Fermentation Science or Food Science and Technology. Provides practical working knowledge of analytical methods used in malting and brewing and experience with brewing materials and processes, by analysis of samples that illustrate the range of values experienced in practice and pilot scale brewing. GE credit: QL, SE. Effective: 2017 Winter Quarter.

FST 103—Physical and Chemical Methods for Food Analysis (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): CHE 002C; CHE 008B; BIS 103; FST 100B Theory and application of physical and chemical methods for determining the constituents of foods. Modern separation and instrumental analysis
techniques are stressed. GE credit: QL, SE, WE. Effective: 2017 Winter Quarter.

FST 104—Food Microbiology (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 103; MIC 102; MIC 103L Microorganisms in food safety, spoilage, and production. Food-borne disease agents and their control. Growth parameters of food spoilage agents. Destruction of microbes in food. Food fermentations. The development of microbes as a resource for the food industry. GE credit: QL, SE, VL. Effective: 2017 Winter Quarter.

FST 104—Food Microbiology (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 103; MIC 102 Microorganisms in food safety, spoilage, and production. Food-borne disease agents and their control. Growth parameters of food spoilage agents. Destruction of microbes in food. Food fermentations. The development of microbes as a resource for the food industry. GE credit: QL, SE, VL. Effective: 2019 Winter Quarter.

FST 104L—Food Microbiology Laboratory (4)
Discussion—1 hour; Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): BIS 002A; BIS 103; FST 104 Cultural and morphological characteristics of microorganisms involved in food spoilage, in foodborne disease, and food fermentation. Analysis of microbiological quality of foods. GE credit: QL, SE, VL, WE. Effective: 2017 Spring Quarter.

FST 107—Food Sensory Science (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): FST 117 (can be concurrent); (STA 013 or STA 013Y) Critical examination of techniques and theories of sensory measurement of food; measures of consumer perception and acceptance. An introduction to the sensory and cognitive systems associated with the perception of food. Not open for credit to students who have completed FST 107A. GE credit: QL, SE, WE. Effective: 2018 Spring Quarter.

FST 109—Principles of Quality Assurance in Food Processing (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): STA 013 or STA 013Y Quality assurance measurement techniques applied to selected food processed products emphasized. Rationale for establishing valid quality assurance programs including selection of samples at critical points. Statistical problems in quality assurance programs used by the food industry. GE credit: QL, SE, SL, VL. Effective: 2018 Spring Quarter.

FST 110—Food Processing (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PHY 007A; PHY 007B; PHY 007C; MAT 016A; MAT 016B; MAT 016C; Or equivalent to PHY 007 series or MAT 016 series. Application of the conservation of mass and energy to food processing. Elements of engineering thermodynamics, fluid mechanics, heat and mass transfer. Quantitative analysis through problem solving and simulation. Not open for credit to students enrolled in College of Engineering. GE credit: QL, SE, VL. Effective: 2017 Spring Quarter.

FST 110—Food Processing (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PHY 007A; PHY 007B; PHY 007C (can be concurrent); (MAT 016C or MAT 017C or MAT 021C) Application of the conservation of mass and energy to food processing. Elements of engineering thermodynamics, fluid mechanics, heat and mass transfer. Quantitative analysis through problem solving and simulation. Not open for credit to students enrolled in College of Engineering. GE credit: QL, SE, VL. Effective: 2018 Fall Quarter.

FST 110L—Food Processing Laboratory (2) ***Review all entries***
Discussion—1 hour; Laboratory—3 hours. Prerequisite(s): FST 110 (can be concurrent); FST 050 Open to Food Science majors only. Laboratory exercises to gain experience with common food processing operations at the bench and pilot plant scales. GE credit: QL, SE, SL, VL. Effective: 2017 Spring Quarter.

FST 110L—Food Processing Laboratory (2) ***Review all entries***
Discussion—1 hour; Laboratory—3 hours. Prerequisite(s): FST 110 (can be concurrent) Open to Food Science majors only. Laboratory exercises to gain experience with common food processing operations at the bench and pilot plant scales. GE credit: QL, SE, SL, VL. Effective: 2018 Fall Quarter.

FST 115—Fermented Foods (4)
Lecture—3 hours; Term Paper/Discussion. Prerequisite(s): BIS 103; MIC 102; or Consent of Instructor. Pass One restricted to upper division or graduate level Food Science and Viticulture and Enology majors. Physiology, biochemistry, and genetics of microorganisms important in food fermentations. How microorganisms are used in fermentations and how raw materials are converted into finished fermented foods and beverages. Effective: 2017 Spring Quarter.

FST 117—Design and Analysis for Sensory Food Science (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 013 Methods of design and analysis for sensory food science. Experimental design strategies. Use of taste panels and consumer testing. Data analysis and computation including the relative merits and limitations of parametric and nonparametic approaches. Modifications for quality assurance. GE credit: QL, SE. Effective: 2017 Spring Quarter.

FST 119—Chemistry and Technology of Milk and Dairy Products (4)
Lecture—4 hours. Prerequisite(s): BIS 002A; BIS 102; Consent of Instructor. Composition, structure and properties of milk and products derived from milk. Relates chemical, microbiological, and technological principles to commercial practices in processing of milk and its products. GE credit: QL, SE, VL. Effective: 2017 Spring Quarter.

FST 123—Introduction to Enzymology (3)
Lecture—3 hours. Prerequisite(s): FST 123L (can be concurrent); BIS 102; BIS 103 Principles of physical, chemical and catalytic properties of enzymes and their importance. Purification, characterization, and quantitative evaluation of reaction conditions on activity are stressed. Specificity and mechanism of action illustrated by use of selected enzymes. (Former course Biochemistry and Biophysics 123.) GE credit: QL, SE, VL. Effective: 2017 Spring Quarter.

FST 123L—Enzymology Laboratory (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): BIS 103; FST 123 (can be concurrent); FST 123 required concurrently. Laboratory procedures involved in detection, purification and characterization of enzymes. (Former course Biochemistry and Biophysics 123L.) GE credit: QL, SE, VL, WE. Effective: 1997 Winter Quarter.

FST 127—Sensory Evaluation of Foods (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): FST 117 Critical examination of methods of sensory measurement applied to food and beverage systems; descriptive analysis and consumer tests and their application to quality assurance, product development and optimization. GE credit: QL, SE, WE. Effective: 2017 Winter Quarter.

FST 128—Food Toxicology (3)
Lecture—3 hours. Prerequisite(s): BIS 102; BIS 103 Chemistry and biochemistry of toxins occurring in foods, including plant and animal toxins, intentional and unintentional food additives. The
assessment of food safety and toxic hazards. (ETX 128.) GE credit: SE. Effective: 1997 Winter Quarter.

FST 131—Food Packaging (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 008B; BIS 001B; PHY 007C Class size limited to 50 students. Principles of food packaging. Functions of packaging. Properties of metal, glass, paper and plastic materials and packages. Design, fabrication, and applications of food packaging. Packaging of fresh and processed foods, including fruits and vegetables, dairy foods, beer and wine. GE credit: SE. Effective: 2016 Summer Session 1.

FST 151Y—Food Freezing (1)
Discussion—1 hour; Web Virtual Lecture. Prerequisite(s): FST 110A; Or the equivalent. Mechanisms of ice crystallization, interpretation of freezing diagrams, and modes of heat transfer. Food properties at sub-freezing temperatures, refrigeration requirements, and estimation of freezing times. Industrial systems used in freezing foods. GE credit: QL, SE. Effective: 2013 Fall Quarter.

FST 159—New Food Product Ideas (3)
Lecture—3 hours. Prerequisite(s): FST 050; BIS 002A; PHY 007A; PHY 007B; PHY 007C; CHE 002A; CHE 002B; CHE 002C Create, refine, test and present viable ideas for new food products. Activities include trend monitoring, consumer research, idea generation, concept screening, and new product concept presentations. GE credit: AH, OL, SS, WE. Effective: 2017 Spring Quarter.

FST 160—Food Product Development (4)
Discussion—1 hour; Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): FST 050; FST 103; FST 104; FST 110 Product implementation stage of food product development including preliminary product description, prototype development, product testing, and formal presentation of a new product development. GE credit: OL, SE, VL. Effective: 2017 Winter Quarter.

FST 190—Senior Seminar (1)
Seminar—1 hour. Prerequisite(s): Senior standing or consent of instructor. Selected topics presented by students on recent advances in food science and technology. Reports and discussions concerning oral and written presentations, literature sources and career opportunities. GE credit: OL, SE. Effective: 1997 Winter Quarter.

FST 192—Internship for Advanced Undergraduates (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Work experience on or off campus in the practical application of food science. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

FST 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

FST 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

FST 201—Food Chemistry and Biochemistry (4)
Lecture—4 hours. Prerequisite(s): Undergraduate courses in organic chemistry and biochemistry; undergraduate course in food chemistry is recommended. Restricted to Food Science graduate level standing or consent of instructor. Advanced topics in food chemistry and biochemistry, emphasizing the application of the basic principles of chemistry and biochemistry to food composition, properties, preservation and processing. Chemical structures, interactions, reaction mechanisms and experimental methods are stressed. Effective: 2017 Fall Quarter.

FST 202—Physical Chemistry of Foods (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 107A; CHE 107B; BIS 102 recommended. Fundamental principles of chemistry and physics are applied to a study of changes in water binding properties and activity, changes in proteins, nutrients, toxic constituents, and other compounds during storage, heating, freezing, dehydrating, and concentrating of food materials. Effective: 2017 Winter Quarter.

FST 203—Food Processing (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): FST 110A; PHY 007C); CHE 107B; or Consent of Instructor. Principles of food engineering applied to food processing. Relationship of Newtonian and non-Newtonian fluid properties to heat and momentum transfer. Application of mass transfer in controlling kinetics and quality changes of foods. Effective: 2013 Spring Quarter.

FST 204—Advanced Food Microbiology (3)
Lecture—3 hours. Prerequisite(s): BIS 001C; BIS 103; FST 104; Or a course in microbiology. Principles of and recent developments in food microbiology, including food pathogen virulence and detection, parameters of microbial growth in food, and the microbiology of food and beverage fermentations. Effective: 1997 Winter Quarter.

FST 205—Industrial Microbiology (3)
Lecture—3 hours. Prerequisite(s): BIS 001A; BIS 102; BIS 103; MIC 130A and MIC 130B or BIS 101 recommended. Use of microorganisms for producing substances such as amino acids, peptides, enzymes, antibiotics and organic acids. Emphasis on metabolic regulation of pathways leading to fermentation products, on yeast fermentations, and on genetic manipulations (including recombinant DNA techniques) of industrial microorganisms. Effective: 1997 Winter Quarter.

FST 207—Advanced Sensory-Instrumental Analyses (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): FST 107; and Consent of Instructor. Basic principles of measurement of color, texture, and flavor of foods by sensory and instrumental methods. Advanced statistical analysis of relation of colorimetry, texturometry, and chemistry of volatile compounds to perception of appearance, texture, flavor. Effective: 1997 Winter Quarter.

FST 210—Proteins: Functional Activities and Interactions (3)
Lecture—3 hours. Prerequisite(s): BIS 103 The relationships of structure of proteins to their biological functions. Structural proteins, complexing proteins, and catalytic proteins in plant and animal materials and products. Effective: 1997 Winter Quarter.

FST 211—Lipids: Chemistry and Nutrition (3)
Lecture—3 hours. Prerequisite(s): BIS 103; CHE 107B; CHE 128B Chemistry of lipids as it pertains to research in food and nutrition. Relations between lipid structure and their physical properties in tissues and foods. Regulation of absorption, transport, and metabolism of lipids. Implications of dietary fats and health. Effective: 1997 Winter Quarter.

FST 213—Flavor Chemistry of Foods and Beverages (3)
Lecture/Discussion—3 hours. Prerequisite(s): CHE 008B; VEN 123; (VEN 123L or FST 103); or Consent of Instructor. Students will become familiar with basic principles of flavor chemistry, analysis, and formation in fresh and processed foods. Students will be required to read and critically evaluate flavor chemistry literature. (VEN 213.) Effective: 2009 Spring Quarter.

FST 217—Advanced Food Sensory Science (3)
Lecture—3 hours. Prerequisite(s): FST 107 (can be concurrent); or Consent of Instructor. Advanced study of the techniques and theory of the sensory measurement of food as an analytical tool and as a measure of consumer perception and acceptance. Advanced examination of the sensory and cognitive systems associated with the perception of food. Effective: 2010 Fall Quarter.

FST 219—Biochemistry, Microbiology and Technology of Cheeses of the World (4)
Lecture—4 hours. Prerequisite(s): FST 119; (BIS 103 or FST 100A); FST 123; BIS 103; CHE 107B; CHE 128B; or Consent of Instructor. Restricted to graduate level students or senior undergraduate students with appropriate background in biochemistry and microbiology. Compositional and physico-chemical aspects of milk and their implications on cheesemaking; enzymatic, microbiological and physical aspects of cheesemaking; cheese as a biological composite; designing cheese quality attributes; cheese aging. Cheese from all over the world will be tasted and discussed. Effective: 2008 Fall Quarter.

FST 227—Food Perception and the Chemical Senses (2)
Lecture—2 hours. Prerequisite(s): FST 107B (can be concurrent); and Consent of Instructor. Examination of the anatomy and physiology of the chemical senses (taste, smell, and the trigeminal senses) and how they are involved in the perception of food and food intake. Effective: 1997 Winter Quarter.

FST 230—Food & Gut Microbiota (4)
Discussion—1.5 hours; Lecture—1.5 hours; Term Paper. Prerequisite(s): Microbiology and molecular biology undergraduate coursework or Consent of Instructor. Upper division or graduate standing. Impact of specific food structures on the structure and function of the animal gut microbiota. How food is transformed by, and modulates, the gut microbiota to provide the host with nutrients and protection. Effective: 2017 Spring Quarter.

FST 290—Seminar (1)
Seminar—1 hour. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

FST 290C—Advanced Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Critical presentation and evaluation of original research by graduate students. Planning of research programs and proposals. Discussion led by individual major instructors for their research group. (S/U grading only.) Effective: 1997 Winter Quarter.

FST 291—Advanced Food Science Seminar (1)
Seminar—1 hour. Prerequisite(s): FST 290; Completion of at least one quarter of FST 290. Oral presentation of student's original research, discussion, and critical evaluation. (S/U grading only.) Effective: 1997 Winter Quarter.

FST 298—Group Study (1-5)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

FST 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

FST 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Food Service Management Minor; Nutrition

Food Service Management Minor; Nutrition | FSM Minor Information

(College of Agricultural and Environmental Sciences)

Francene M. Steinberg, Ph.D., RD., Chair of the Department

Sheri Zidenberg-Cherr, Ph.D., Vice Chairperson of the Department

Department Office. 3135 Meyer Hall; 530-752-4630; http://nutrition.ucdavis.edu

Faculty. http://nutrition.ucdavis.edu/people/faculty/index.html

The Department of Nutrition offers four minor programs open to students majoring in other disciplines who wish to complement their study programs with a concentration in the area of food and nutrition.

Graduate Study. Programs of study leading to the M.S. and Ph.D. degrees are available in Nutrition. For information on graduate study contact the Nutrition Graduate Group.

Minor Advisor. 3202 Meyer Hall; 530-752-2512

Food Service Management **Units:** 25

Preparation.
Plan in advance to include the required course prerequisites.

FST 100A	Food Chemistry	4
FST 100B	Food Properties	4
FST 101A	Food Chemistry Laboratory	3
FST 101B	Food Properties Laboratory	2
FSM 120	Principles of Quantity Food Production	4
FSM 120L	Quantity Food Production Laboratory	2
FSM 122	Food Service Systems Management	3
ARE 112	Fundamentals of Organization Management	4

Replacement courses; see note below:
Note: If the student's major program requires the same course in biochemistry and physiology, only one of the courses may duplicate credit toward the minor. Each program below lists replacement courses to fulfill the minimum unit requirement.

NUT 010	Discoveries and Concepts in Nutrition	3
NUT 111AY	Introduction to Nutrition and Metabolism	3
NUT 111B	Recommendations and Standards for Human Nutrition	2
NUT 114	Developmental Nutrition	4
NUT 116A	Clinical Nutrition	3
NUT 116B	Clinical Nutrition	3
NUT 120AN	Nutritional Anthropology	4
NUT 120BN	Nutritional Geography	4
ECN 001A	Principles of Microeconomics	4
ECN 001B	Principles of Macroeconomics	4

Total: 25

Food Service Management Minor; Nutrition | NUT Courses

Courses in NUT:

NUT 010—Discoveries and Concepts in Nutrition (3)
Lecture—3 hours; Project (Term Project). Nutrition as a science; historical development of nutrition concepts; properties of nutrients and foods. Not open for credit to students who have taken an upper division course in nutrition. No credit will be granted to students who have completed NUT 010Y or NUT 010V or an upper-division nutrition course. GE credit: SE, SL. Effective: 2018 Winter Quarter.

NUT 010V—Discoveries and Concepts in Nutrition (3)
Project (Term Project); Web Virtual Lecture—3 hours. Nutrition as a science; historical development of nutrition concepts; properties of nutrients and foods. Not open for credit to students who have taken an upper division course in nutrition. No credit will be granted to students who have completed NUT 010 or NUT 010Y or an upper-division nutrition course. GE credit: SE, SL. Effective: 2018 Winter Quarter.

NUT 010Y—Discoveries and Concepts in Nutrition (3)
Project (Term Project); Web Virtual Lecture—3 hours. Nutrition as a science; historical development of nutrition concepts; properties of nutrients and foods. Not open for credit to students who have taken an upper division course in nutrition. No credit will be granted to students who have completed NUT 010 or NUT 010V or an upper-division nutrition course. GE credit: SE, SL. Effective: 2018 Winter Quarter.

NUT 011—Current Topics and Controversies in Nutrition (2)
Discussion—1.5 hours; Term Paper. Exploration of current applications and controversies in nutrition. Students read scientific journal articles and write summaries, as well as give brief oral presentations. Topics change to reflect current interests and issues. GE credit: OL, SE, WE. Effective: 2010 Winter Quarter.

NUT 099—Individual Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

NUT 104—Environmental & Nutritional Factors in Cellular Regulation and Nutritional Toxicants (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 101; (BIS 103 or ABI 103) Cellular regulation from nutritional/toxicological perspective. Emphasis: role of biofactors on modulation of signal transduction pathways, role of specific organelles in organization/regulation of metabolic transformations, major cofactor functions, principles of pharmacology/toxicology important to understanding nutrient/toxicant metabolism. (Environmental Toxicology 104.) GE credit: OL, SE, SL. Effective: 2008 Fall Quarter.

NUT 105—Nutrition and Aging (3)
Lecture—3 hours. Prerequisite(s): (NUT 111AV or NUT 111AY); ABI 103; Or the equivalent course to ABI 103. Role of nutrition in the aging process from both an organismal/cell perspective, including demographics, theories of aging, nutrition and evolution, nutritional manipulation and life-span extension, and nutrition's impact on the diseases of aging. GE credit: SE. Effective: 2017 Spring Quarter.

NUT 111AY—Introduction to Nutrition and Metabolism (3)
Lecture/Discussion—1 hour; Web Virtual Lecture—2 hours. Prerequisite(s): CHE 008B; NPB 101; Or the equivalent of NPB 101. Restricted to upper division or graduate level students only. Introduction to metabolism of protein, fat and carbohydrate: the biological role of vitamins and minerals; nutrient requirements during the life cycle; assessment of dietary intake and nutritional status. Not open for credit to students who have completed NUT 101 or NUT 111AV. GE credit: SE. Effective: 2016 Fall Quarter.

NUT 111B—Recommendations and Standards for Human Nutrition (2)
Lecture—2 hours. Prerequisite(s): CHE 008B; NPB 101; (NUT 111AV or NUT 111AY); Or the equivalent of NPB 101. Critical analysis of the development of nutritional recommendations for humans. Topics include: history of modern recommendations, development of the Recommended Dietary Allowance (RDA) and other food guides; the Dietary Reference Intakes (DRI); administrative structure of regulatory agencies pertinent to nutrition recommendations; introduction to scientific methods used to determine the recommendations; food labeling laws; nutrition recommendations in other countries and cultures. Not open for credit to students who have completed NUT 111. Effective: 2017 Spring Quarter.

NUT 112—Nutritional Assessment (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ((ABI 102, ABI 103) or (BIS 102, BIS 103)); NUT 111AY; (STA 013 or STA 013Y or PLS 120) Restricted to upper division or graduate level Nutrition students only. Methods of human nutritional assessment, including dietary, anthropometric, biochemical methods. Principles of precision, accuracy, and interpretation of results for individuals and populations. GE credit: QL, SE. Effective: 2018 Spring Quarter.

NUT 113—Principles of Epidemiology in Nutrition (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): PLS 120; Or equivalent. Introduction to epidemiology as it relates to the field of nutrition, including study design, principles of epidemiologic inference, criteria for causality, and interpreting measures of disease risk. GE credit: QL, SE. Effective: 2014 Fall Quarter.

NUT 113—Principles of Epidemiology in Nutrition (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): STA 013 or STA 013Y or PLS 120 or STA 100 Introduction to epidemiology as it relates to the field of nutrition, including study design, principles of epidemiologic inference, criteria for causality, and interpreting measures of disease risk. GE credit: QL, SE. Effective: 2018 Fall Quarter.

NUT 114—Developmental Nutrition (4)
Lecture—4 hours. Prerequisite(s): ABI 102; ABI 103; (NUT 111AV or NUT 111AY); NUT 111B Role of nutritional factors in embryonic and postnatal development. GE credit: SE. Effective: 2017 Winter Quarter.

NUT 115—Animal Nutrition (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 008B or CHE 118B; or Consent of Instructor. Comparative differences among animals in digestion and metabolism of nutrients. Nutrient composition of feeds, digestive systems, digestion, absorption, feeding strategies. GE credit: OL, QL, SE, SL, VL, WE. Effective: 2017 Winter Quarter.

NUT 116A—Clinical Nutrition (3)
Lecture—3 hours. Prerequisite(s): (NUT 111AV or NUT 111AY); NUT 111B; NUT 112; NPB 101; Or the equivalent to NPB 101. Biochemical and physiological bases for therapeutic diets. Problems in planning diets for normal and pathological conditions. GE credit: SE. Effective: 2016 Fall Quarter.

NUT 116AL—Clinical Nutrition Practicum (3)
Discussion—1 hour; Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): NUT 116A (can be concurrent) Fundamental principles of planning and evaluating therapeutic diets and patient education for pathological conditions covered in 116A. GE credit: SE. Effective: 1997 Fall Quarter.

NUT 116B—Clinical Nutrition (3)
Lecture—3 hours. Prerequisite(s): (NUT 111AV or NUT 111AY); NUT 111B; NUT 112; NPB 101; Or the equivalent to NPB 101. Biochemical and physiological bases for therapeutic diets. Problems in planning diets for normal and pathological conditions. GE credit: SE. Effective: 2017 Winter Quarter.

NUT 116BL—Clinical Nutrition Practicum (3)
Discussion—1 hour; Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): NUT 116AL; NUT 116B (can be concurrent) Fundamental principles of planning and evaluating therapeutic diets and patient education for pathological conditions covered in 116B. Continuation of course 116AL. GE credit: SE. Effective: 2017 Winter Quarter.

NUT 117—Experimental Nutrition (6)
Extensive Writing; Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): (NUT 111AV or NUT 111AY); NUT 111B; NUT 112; BIS 102; BIS 103; MCB 120L or other laboratory course in biochemistry is recommended. Methods of assessing nutritional status. Application of chemical, microbiological, chromatographic and enzymatic techniques to current problems in nutrition. GE credit: SE, WE. Effective: 2016 Fall Quarter.

NUT 118—Community Nutrition (4)
Lecture—4 hours. Prerequisite(s): NUT 116A; (NUT 111AV or NUT 111AY); NUT 111B Nutrition problems in contemporary communities and of selected target groups in the United States and in developing countries. Nutrition programs and policy, principles of nutrition education. GE credit: SE, SL. Effective: 2017 Winter Quarter.

NUT 119A—International, community-based nutritional assessment. (1)
Lecture/Discussion—1 hour. Prerequisite(s): NUT 112 (can be concurrent); and Consent of Instructor. Issues and problems related to community-based nutritional assessment in a low-income country, major nutritional problems in low-income countries; ethical issues in human investigation; survey design, data collection techniques, and data analysis; preparation for international travel; cross-cultural communication, health, and safety while living abroad. Effective: 2002 Spring Quarter.

NUT 119B—International, Community-Based Nutritional Assessment (6)
Fieldwork—12 hours; Lecture—2 hours. Prerequisite(s): NUT 119A; and Consent of Instructor. Restricted to upper division students in Clinical Nutrition, Community Nutrition, Dietetics, and Nutrition Science. A six-week summer course in Peru. Implementation of a community-based nutritional assessment survey, including development of the survey instrument, selection. Effective: 2002 Summer Special Session.

NUT 120AN—Nutritional Anthropology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): NUT 010 and ANT 002 recommended. Nutritional anthropology from historical and contemporary perspectives; the anthropological approach to food and diet; field work methods; case histories that explore food patterns and their nutritional implications. GE credit: SE, SS. Effective: 2017 Spring Quarter.

NUT 120BN—Nutritional Geography (4)
Discussion—1 hour; Lecture—3 hours. Nutritional geography from historical and contemporary perspectives; the geographical approach to food and diet; cultural and environmental factors that influence dietary practices; food-related landscapes and patterns. GE credit: SE, SS. Effective: 2016 Fall Quarter.

NUT 122—Ruminant Nutrition and Digestive Physiology (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (ABI 103 or BIS 103); BIS 002A; BIS 002B; BIS 002C; (ANS 100 or NPB 101); or Consent of Instructor. MAT 016B recommended. Study of nutrient utilization as influenced by the unique aspects of digestion and fermentation in ruminants, both domestic and wild. Laboratories include comparative anatomy, feed evaluation, digestion kinetics using fistulated cows, computer modeling, and microbial exercises. GE credit: QL, SE. Effective: 2017 Spring Quarter.

NUT 123—Comparative Animal Nutrition (3)
Lecture—3 hours. Prerequisite(s): ABI 103 or BIS 103 Restricted to upper division and graduate level students. Comparative nutrition of animals; including laboratory, companion, zoo, and wild, animals. Digestion and metabolic adaptations required for animal species to consume diverse diets. Relation of nutrition to metabolic adaptations and physiological states, including growth, reproduction, and diseases. GE credit: SE. Effective: 2017 Spring Quarter.

NUT 123L—Comparative Animal Nutrition Laboratory (1)
Laboratory—3 hours. Prerequisite(s): ABI 103 or BIS 103 Laboratory exercises leading to written reports on establishment of nutritional requirements and formulation of complete diets for laboratory, companion, zoo and wild animals. Effective: 2017 Spring Quarter.

NUT 124—Nutrition and Feeding of Finfishes (3)
Lecture—3 hours. Prerequisite(s): BIS 103 or ABI 103 Principles of nutrition and feeding of fishes under commercial situations; implication of fish nutrition to the environment and conservation of endangered species. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

NUT 127—Environmental Stress and Development in Marine Organisms (10)
Discussion—2 hours; Laboratory—12 hours; Lecture—4 hours. Prerequisite(s): ETX 101 or BIS 102 or BIS 104; or equivalent course. ETX 114A or NUT 114 recommended. Course taught at Bodega Marine Laboratory. Effects of environmental and nutritional stress, including pollutants, on development and function in embryos and larvae of marine organisms. Emphasis on advanced experimental methods. (Environmental Toxicology 127.) GE credit: OL, QL, SE, SL, VL, WE. Effective: 2002 Summer Session 1.

NUT 129—Journalistic Practicum in Nutrition (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): (NUT 111AV or NUT 111AY); NUT 111B; or Consent of Instructor. A course in written or oral expression. Critical analysis and discussion of current, controversial issues in nutrition; use of journalistic techniques to interpret scientific findings for the lay public. Students required to write several articles for campus media. May be repeated up to 1 time(s). GE credit: OL, SE, SL, WE. Effective: 2017 Spring Quarter.

NUT 130—Experiments in Nutrition: Design and Execution (2)
Laboratory—6 hours. Prerequisite(s): Consent of Instructor. NUT 111AV, NUT 111AY, NUT 111B or NUT 114 recommended. Experiments in current nutritional problems. Experimental design:students choose project and, independently or in groups of two-three, design a protocol, complete the project, and report findings. May be repeated for credit up to six times(three times per instructor)with consent of instructor. May be repeated up to 6 time(s) three times per instructor with consent of instructor. GE credit: SE. Effective: 2016 Fall Quarter.

NUT 190—Proseminar in Nutrition (1)
Seminar—1 hour. Prerequisite(s): (NUT 111AV or NUT 111AY); NUT 111B Restricted to senior standing. Discussion of human nutrition problems. Each term will involve a different emphasis among experimental, clinical, and dietetic problems of community, national and international scope. May be repeated twice for credit with consent of instructor. May be repeated up to 2 time(s). GE credit: OL, SE, VL. Effective: 2016 Fall Quarter.

NUT 190C—Nutrition Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing in Nutrition or related biological science. Introduction to research findings and methods in nutrition. Presentation and discussion of research by faculty and students. May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

NUT 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. One upper division course in nutrition. Work experience on or off campus in practical application of nutrition, supervised by a faculty member. (P/NP grading only.) Effective: 1997 Winter Quarter.

NUT 197T—Tutoring in Nutrition (1-2)
Discussion/Laboratory—3-6 hours. Prerequisite(s): Consent of Instructor. Nutrition Science, Clinical Nutrition or related major. Tutoring of students in nutrition courses, assistance with discussion groups or laboratory sections, weekly conference with instructor in charge of course: written evaluations. May be repeated if tutoring a different course. May be repeated for credit. (P/NP grading only.) Effective: 2016 Fall Quarter.

NUT 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

NUT 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

NUT 219A—International Nutrition (3)
Lecture—3 hours. Prerequisite(s): NUT 111AV; NUT 111AY; Graduate Standing; undergraduates only admitted with consent of instructor. Epidemiology, etiology, and consequences of undernutrition, with particular focus on the nutritional problems of children and women in low income populations. Effective: 2018 Spring Quarter.

NUT 219B—International Nutrition (3)
Lecture—3 hours. Prerequisite(s): NUT 219A Intervention programs to prevent or ameliorate nutritional problems in low-income populations. Planning, implementing, and evaluating nutrition intervention programs. Effective: 2004 Fall Quarter.

NUT 230—Experiments in Nutrition: Design and Execution (2)
Laboratory—6 hours. Prerequisite(s): Consent of Instructor. NUT 201, NUT 202, NUT 203, NUT 204, or the equivalent recommended. Student selected projects to enhance laboratory skills. Independently, or in groups of two-three students, design a protocol, carry out the project, analyze the results and report the findings. May be repeated up to 6 time(s) with consent of instructor (limit of three times per instructor). Effective: 1999 Fall Quarter.

NUT 250—Metabolic Homeostasis (3)
Discussion—1.5 hours; Lecture—2 hours. Prerequisite(s): Passing the Nutrition Graduate Group Preliminary Examination or consent of instructor. Preference given to students in advanced standing in the Nutrition Graduate Group. Regulatory mechanisms of carbohydrate, lipid, and protein homeostasis; mechanisms of metabolic enzyme regulation and of the metabolic hormones; homeostatic mechanisms and interactions; fuel-fuel interactions; nutrition-energy balance. Effective: 2001 Spring Quarter.

NUT 251—Nutrition and Immunity (2)
Lecture/Discussion—2 hours. Prerequisite(s): PMI 126; ABI 102; MMI 107; Or the equivalent to MMI 107. Cellular and molecular mechanisms underlying interactions of nutrition and immune function, including modulation of immunocompetence by diet and effects of immune responses on nutritional needs. Lectures and discussion explore implications for resistance to infection, autoimmunity and cancer. Effective: 2000 Winter Quarter.

NUT 252—Nutrition and Development (3)
Lecture—3 hours. Prerequisite(s): NUB 210A, NUB 210B, and NUB 210C recommended. Relationship of nutrition to prenatal and early postnatal development. Effective: 2018 Spring Quarter.

NUT 253—Control of Energy Balance and Body Weight (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Comprehensive study of the biochemical, nutritional and physiological mechanisms controlling food intake, body composition and energy expenditure. Subject matter will be approached through lectures and discussions where students and staff will critically evaluate the literature. Effective: 2016 Spring Quarter.

NUT 254—Applications of Systems Analysis in Nutrition (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): NUT 202; Or the equivalent. Quantitative aspects of digestion and metabolism; principles of systems analysis. Evolution of models of energy metabolism as applied in current feeding systems. Critical evaluations of mechanistic models used analytically in support of nutritional research. Effective: 1997 Winter Quarter.

NUT 258—Field Research Methods in International Nutrition (3)
Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Issues and problems related to implementation of nutrition field research in less-developed countries, including ethics; relationships with local governments, communities, and scientists; data collection techniques and quality assurance; field logistics; research budgets; and other administrative and personal issues. Effective: 1997 Winter Quarter.

NUT 259—Nutrition and Aging (2)
Lecture—2 hours. Prerequisite(s): NUT 201; NUT 202; NUT 203; NUT 204; Three courses. Interaction between nutrition and aging. Topics include physiological/biochemical basis of aging, age-related changes affecting nutritional requirements, nutrition and mortality rate, assessment of nutritional status in the elderly, and relationship between developmental nutrition and the rate of aging. Effective: 1997 Fall Quarter.

NUT 270—Scientific Ethics in Biomedical Studies: Emphasis on Nutrition (3)
Discussion—1 hour; Lecture—1 hour; Term Paper. Restricted to graduate standing or consent of instructor. Scientific ethics in biomedical studies, especially nutrition. Discussion and case study presentations on scientific integrity, fraud, misconduct, conflict of interest, human and animal research protections. Not open for credit to students who have completed NUT 492B. Effective: 2003 Spring Quarter.

NUT 290—Beginning Nutrition Seminar (2)
Lecture/Discussion—1 hour; Seminar—1 hour. Prerequisite(s): First-year graduate standing. Discussion and critical evaluation of topics in nutrition with emphasis on literature review and evaluation in this field. Students give oral presentations on relevant topics. Effective: 1997 Fall Quarter.

NUT 290C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Major professors lead research discussions with their graduate students.
Research papers are reviewed and project proposals presented and evaluated. Format will combine seminar and discussion style. (S/U grading only.) Effective: 1997 Winter Quarter.

NUT 291—Advanced Nutrition Seminar (1)
Seminar—1 hour. Prerequisite(s): Second-year graduate standing. Advanced topics in nutrition research. Multiple sections may be taken concurrently for credit. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

NUT 293A—Current Topics in Obesity, Food Intake and Energy Balance (3)
Discussion—1 hour; Lecture—1 hour; Seminar—1 hour. Prerequisite(s): NUT 129; Or graduate standing; Undergraduates with upper division standing with at least one writing course may enroll with consent of instructor. Current research and its evaluation. Principles of experimental design and scientific background for given article. Articles summarized for
posting on Internet for use by healthcare professionals. May be repeated for credit with consent of instructor. May be repeated for credit. Effective: 1997 Fall Quarter.

NUT 293B—Current Topics in Obesity, Food Intake, and Energy Balance with Special Topics (3)
Discussion—1 hour; Lecture—1 hour; Seminar—1 hour. Prerequisite(s): NUT 129; Graduate standing. Undergraduates with upper division standing with at least one writing course may enroll with consent of instructor. A continuation of course 293A, with additional special topics. May be repeated for credit up to 3 times with consent of instructor. May be repeated up to 3 time(s). Effective: 1997 Fall Quarter.

NUT 294A—Current Topics in Developmental Nutrition (2)
Seminar—2 hours. Prerequisite(s): NUT 114 or NUT 252; or Consent of Instructor. Restricted to graduate standing or consent of instructor. Effects of nutrition on embryology, morphogenesis, and developmental mechanisms. May be repeated for credit when topic differs. Effective: 2004 Winter Quarter.

NUT 297T—Supervised Teaching in Nutrition (1-3)
Variable. Prerequisite(s): Graduate standing in nutrition or consent of instructor. Practical experience in teaching nutrition at the university level; curriculum design and evaluation; preparation and presentation of material. Assistance in laboratories, discussion sections, and evaluation of student work. (S/U grading only.) Effective: 1997 Winter Quarter.

NUT 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Effective: 1997 Winter Quarter.

NUT 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

NUT 492A—Professionalism: An Academic Perspective (2)
Lecture/Discussion—2 hours. Prerequisite(s): Graduate standing. For graduate students in their initial quarter of residence. Professionalism topics are presented and examples drawn from both the biological and social sciences. Effective: 1997 Fall Quarter.

NUT 492C—Grant Writing (3)
Discussion—1.5 hours; Lecture—1.5 hours. Prerequisite(s): Graduate standing in Nutrition or consent of instructor. Preparation of grants for governmental agencies (particularly NIH and USDA) and private foundations. Students will write a research grant or
fellowship application. May be repeated once for credit with consent of instructor. May be repeated up to 1 time(s). Effective: 1997 Fall Quarter.

Food Service Management; Nutrition

Food Service Management; Nutrition | Food Service Management Information

(College of Agricultural and Environmental Sciences)

Faculty. http://nutrition.ucdavis.edu/people/faculty/

The Major Program and Graduate Study. Food Service Management is incorporated within the major of Clinical Nutrition. If you are interested in preparing for a career in commercial organizations such as hotels, restaurants, industrial cafeterias, or contract food services, as well as in public or private institutions such as hospitals, correctional institutions, schools, or colleges, consult the Department of Nutrition.

Related Courses. See Nutrition.

Food Service Management; Nutrition | FSM Courses

Questions pertaining to the following courses should be directed to the instructor or to the Nutrition Department Advising office in 3202 Meyer Hall; 530-752-2512.

Courses in FSM:

FSM 120—Principles of Quantity Food Production (4)
Independent Study—1 hour; Lecture—3 hours. Prerequisite(s): FST 100B; FST 101B Restricted to upper division Clinical Nutrition students only. Fundamental principles of food service management, including quantity food preparation, institutional equipment, receiving and storage, service, menu planning, merchandising, and safety. Students will earn food safety certification. Effective: 2008 Spring Quarter.

FSM 120L—Quantity Food Production Laboratory (2)
Laboratory—6 hours. Prerequisite(s): FSM 120 Laboratory experience in quantity food production and service. Effective: 1997 Winter Quarter.

FSM 122—Food Service Systems Management (3)
Lecture—3 hours. Prerequisite(s): ARE 112; FSM 120 Principles of quantity food production management: production schedules, portion control, financial management, layout and equipment planning, evaluation of alternative systems, and computer applications. Effective: 2017 Winter Quarter.

FSM 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. One upper division course in Food Service Management. Work experience on or off campus in practical aspects of food service management, supervised by a faculty member. (P/NP grading only.) Effective: 1997 Winter Quarter.

FSM 197T—Tutoring in Food Service Management (1-2)
Discussion/Laboratory—3-6 hours. Prerequisite(s): Dietetics or related major; completion of the Food Service Management course in which tutoring is done. Tutoring of students in food service management, assistance with discussion groups or laboratory sections; weekly conference with instructor in charge of course; written evaluations. May be repeated if tutoring a different course. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

FSM 198—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

FSM 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

Forensic Entomology Minor; Entomology & Nematology

Forensic Entomology Minor; Entomology & Nematology | Forensic Entomology Minor

Formerly the departments of Entomology and Nematology

(College of Agricultural and Environmental Sciences)

Steve Nadler, Ph.D., Chairperson of the Department

Joanna Chiu, Ph.D., Vice Chairperson of the Department

Department Office. 367 Briggs Hall; 530-752-0492; http://entomology.ucdavis.edu

Faculty. http://entomology.ucdavis.edu/Faculty/

Minor Requirements:

The Department of Entomology has five minor programs open to students in other disciplines who are interested in rounding out their academic study with a concentration in the area of entomology.

Minor Adviser. S. Lawler, S. Nadler

Forensic Entomology **Units:** 20

ENT 100	General Entomology	4
ENT 100L	General Entomology Laboratory	2
ENT 102	Insect Physiology	4
ENT 104	Behavioral Ecology of Insects	3
ENT 158	Forensic Entomology	3

Choose one:

ENT 105	Insect Ecology	4
EVE 101	Introduction to Ecology	4
ESP 100	General Ecology	4

Total: 20

Forensic Science (Graduate Group)

Forensic Science (Graduate Group) | Forensic Science M.S.

Kent Pinkerton, Ph.D., Chairperson of the Group

Group Office. 1909 Galileo Ct., Suite B; Davis, CA 95618; 530-747-3922; http://forensicscience.ucdavis.edu

Faculty. http://forensicscience.ucdavis.edu/administration/

Graduate Study. The Forensic Science Graduate Group offers the degree of MS in Forensic Science. This program, offering a Plan I-Thesis option, has two tracks, DNA or Criminalistics, enabling the student to take core courses emphasizing the physical or biological sciences. Each track requires the student to take eight to nine core courses, totaling 24-27 units, three units of seminar, and the appropriate number of elective/research units for a total of 54 units. Students can take courses outside their specializations, but they must complete the courses required for their own track. The FOR seminar course in the fall quarter is required for new students. The FOR spring seminar can be taken in any spring quarter before graduation. Students must also take one additional seminar course in another department or program.

Preparation. Appropriate preparation is an undergraduate degree in physical or natural sciences, engineering or a closely related field with a GPA of 3.000 or higher. Examples include Biochemistry, Chemistry, Molecular Biology, Biology, Genetics, and Engineering. Applicants must have completed at least one year each of general chemistry, organic chemistry, general physics, math through calculus and a class in statistics. Other recommended courses include general biology, biochemistry and genetics.

Graduate Advisors. Ruth Dickover (Forensic Science), You-Lo Hsieh (Division of Textiles and Clothing), Robert B. Kimsey (Entomology), Donald Land (Chemistry), Terence Murphy (Plant Biology), Ben Sacks (Population Health & Reproduction/Canid Diversity and Conservation Laboratory-Center for Veterinary Genetics), Bahram Ravani (Mechanical & Aeronautical Engineering), Moshe Rosenberg (Food Science and Technology), Matt Wood (Environmental Toxicology)

Forensic Science (Graduate Group) | FOR Courses

Courses in FOR:

FOR 200—Fundamental Concepts in Forensic Science (3)
Fieldwork—0.25 hours; Lecture—2 hours; Lecture/Lab—0.25 hours; Seminar—0.5 hours. Restricted to students enrolled in the M.S. in Forensic Science Program. Overview of Forensic Science. Problem definition, strategies for problem solving, analytical tools, and professional and ethical considerations. Effective: 2003 Winter Quarter.

FOR 201A—Forensic Science Fundamentals-A (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Enrolled in the Forensic Science Graduate Program. Open to Forensic Science Graduate Program students only. Professional responsibilities and ethics, physical evidence concepts, drug chemistry and toxicology, controlled substances and analytical chemistry and instrumentation as practiced in the forensic sciences. First of three courses that, in part, covers the curriculum
requirements of the Forensic Education Program Accreditation Committee (FEPAC). Effective: 2018 Spring Quarter.

FOR 201B—Forensic Science Fundamentals-B (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Enrolled in the Forensic Science Graduate Program. Open to Forensic Science Graduate Program students only. Forensic biology and DNA, microscopy and materials analysis and pattern evidence as practiced in the forensic sciences. Second in a series of three courses which covers the curriculum requirements of the Forensic Education Program Accreditation Committee
(FEPAC). Effective: 2018 Spring Quarter.

FOR 201C—Forensic Science Fundamentals-C (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Enrolled in the Forensic Science Graduate Program. Arson and explosives, quality assurance and accreditation, the law and science interface and court testimony as practiced in the forensic sciences. This course is the third in a series of three courses that covers the curriculum requirements of the Forensic Education Program Accreditation Committee (FEPAC). Effective: 2018 Spring Quarter.

FOR 205—Microscopy and Microanalytical Methods in Forensic Science (3)
Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Restricted to students enrolled in the M.S. in Forensic Science Program; a minimum, year each of the following chemistry, organic chemistry, calculus, & physics. Introduction to optical and electron microscopy. Transmission, diffraction, reflection and absorption; polarized light and polarizing crystals; phase contrast. Radiography; image recording, SEM analysis of gunshot residues, paints, glass. EDS, XRF analysis, signal-to-noise ratios, minimum detectable levels and homogeneity. Effective: 2006 Spring Quarter.

FOR 207—Advanced Spectroscopy Methods in Forensic Science (3)
Lecture—3 hours. Restricted to Forensic Science Graduate program or consent of instructor. Discuss, evaluate and interpret advanced molecular spectra/structure, Infrared Spectroscopy, such as chemical applications of spectroscopic methods, vibrational, rotational spectra; electronic spectra, photoelectron spectroscopy generated by various analytical instruments used in forensic science community. Effective: 2014 Fall Quarter.

FOR 208—Forensic Toxicology (3)
Lecture—3 hours. Forensic toxicology as related to driving under the influence of drugs (DUID) investigations, detection, and evaluation through the use of standardized field sobriety tests and drug recognition protocols. Effective: 2018 Spring Semester.

FOR 210—Personal Identification Methods In Forensic Science (3)
Lecture—3 hours. Restricted to students enrolled in the M.S. in Forensic Science Program or by consent of instructor. Methods for identifying individuals from evidence collected at crime scenes, suspects or victims, crime scene examination and analytical methods used to support such investigations. Topics include forensic anthropology and odontology; latent prints; shoe prints; facial reconstruction/recognition; eyewitness identifications; biometric systems. Effective: 2003 Spring Quarter.

FOR 212—Scientific Evidence and Courtroom Testimony (3)
Discussion—1 hour; Lecture—2 hours. Restricted to graduate students enrolled in the MS Forensic Science program or by the consent of the instructor. Explores the relationship between science and the criminal justice system. Admissibility of scientific testimony and documentary proof during the trial, concepts of relevancy, hearsay and opinion rule, examination of expert witnesses, impact of Kelley-Fry and Daubert decisions & court testimony. Effective: 2007 Fall Quarter.

FOR 215—Forensic Fire and Arson Investigation (3)
Lecture—3 hours. Restricted to students enrolled in the M.S. Forensic Science program or by consent of the Forensic Science Program Director Principles and techniques of scientific investigation of fires and related crimes; offer peer-reviewed protocols for processing fire and explosion scenes; discuss recognition, collection, analysis of physical evidence, and describe the scientific method for decision-making in fire/arson investigation. Effective: 2007 Fall Quarter.

FOR 218—Technical Writing in Forensic Science (3)
Extensive Writing/Discussion—1 hour; Lecture—2 hours. Prerequisite(s): Consent of the instructor required for all students not enrolled in the Forensic Science program. Restricted to graduate standing in the Forensic Science program. How to write clear, credible forensic science reports and scientific articles, that (a) serve the ends of the justice system, (b) meet their readers' varying needs and (c) reflect well on the author. Effective: 2011 Fall Quarter.

FOR 220—Analysis of Toxicants (3)
Lecture—3 hours. Prerequisite(s): Coursework in organic chemistry. Principles of microanalysis of toxicants. Theoretical considerations regarding separation, detection and quantitative determination of toxicants using chemical and instrumental techniques. (ETX 220.) Effective: 2006 Winter Quarter.

FOR 221L—Forensic Science Analytical Instrumentation (2)
Discussion/Laboratory—1 hour; Laboratory—3 hours. Enrollment limited to students accepted in the Forensic Science Graduate program or subject to the approval of the instructor if the student has the appropriate chemistry, calculus and physics courses required of students in the graduate forensic science program. Methodology and instruments used for the analysis of substances of interest in the discipline of Forensic Science. Practical experience with modern instrumental techniques & methodologies used in the advanced forensic science laboratory. Effective: 2007 Fall Quarter.

FOR 240—Homicide Crime Scene Investigation (3)
Laboratory—3 hours; Lecture—2 hours. Restricted to Forensic Science Masters Program Students; enrollment is limited to 15 students per class. Processing and evaluating complex homicide scenes. Functions and activities of police agencies. Recognition, documentation, identification, and collection of evidence. Event sequence reconstruction. Evidence collection, preservation, report writing. Courtroom presentation. Effective: 2004 Winter Quarter.

FOR 263—Forensic Computer Science Investigations (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Graduate student. Restricted to students in the Forensic Science Graduate program unless approved by instructor. Discuss the threats to the security of any kind of evidence that is captured, transmitted, or stored digitally and develop critical thinking and basic knowledge of computer forensic science issues in the evaluation of digital evidence. Effective: 2013 Fall Quarter.

FOR 268—Statistics in Forensic Science (3)
Lecture—3 hours. Restricted to students enrolled in the M.S. in Forensic Science Program or by consent of forensic program director. Statistics that are used by the forensic scientist, their limitations/applications in presenting evidential results in such areas as DNA-STR results, trace evidence correlation, fingerprint statistics, population sampling and the Bayes method. Effective: 2006 Spring Quarter.

FOR 277—Forensic Genetics; Next Generation Techniques and Applications (3)
Lecture—3 hours. Prerequisite(s): Undergraduate courses in fundamental and applied principles of: genetics, biochemistry, and molecular biology, or consent of instructor. Restricted to Forensic Science Graduate students (GFOR) or consent of instructor. Review organization/function of the human genome, recent developments, next generation sequencing techniques including the preparation of DNA samples, principles of the new generation sequencing assay formats and biochemical reactions. Will include quality control parameter, and bioinformatic approaches. Effective: 2013 Fall Quarter.

FOR 278—Molecular Techniques (3)
Lecture—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Recombinant DNA technology and its applications. (ETX 278.) Effective: 2002 Spring Quarter.

FOR 280—Forensic DNA Analysis (3)
Lecture—3 hours. Prerequisite(s): Coursework in genetics and molecular biology. Graduate standing; consent of instructor required for all students not enrolled in the MS Forensics program. Foundation in theory and practice of forensic DNA analysis; past, present, and emerging technologies; legal and quality assurance issues. DNA extraction, DNA quantitation, multiplex amplification of STR loci, capillary electrophoresis of amplified products, and analysis of STR typing data. (ETX 280.) Effective: 2003 Spring Quarter.

FOR 281—Principles and Practice of Forensic Serology and DNA Analysis (3)
Discussion/Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): (FOR 278 or ETX 278) or (FOR 280 or ETX 280); and Consent of Instructor. Or equivalent of FOR 280/ETX 280. Restricted to students enrolled in the M.S. in Forensic Science Program or by consent of Forensic Science Program Director. Comprehensive overview of forensic serology and DNA typing techniques and technologies. Strong emphasis on real-world applications, including preservation and tracking of biological evidence, detection and identification of bodily fluids, and methods to extract, quantify, and type human DNA. (ETX 281.) Effective: 2011 Spring Quarter.

FOR 283—Forensic Biology (3)
Discussion—1 hour; Lecture—2 hours. Restricted to students enrolled in the M.S. in Forensic Science program or by consent of the Forensic Science Program Director. Overview to the foundational concepts in forensic biology: chemistry and molecular biology of biological evidence, genetic basis of biological uniqueness, evolutionary basis of species differences, patterns and dynamics of evidence deterioration, and the legal/ professional considerations associated with biological evidence. Effective: 2009 Fall Quarter.

FOR 284—Non-Human Forensic DNA--Theory and Casework Application (2)
Lecture—2 hours. Prerequisite(s): Consent of instructor required for all students not enrolled in the MS Forensics program; upper division Molecular Biology and Genetics or its equivalent. Restricted to graduate standing. Provides a comprehensive understanding of plant and animal forensic biology in terms of sample collection, preservation, analytical methods, and of the invaluable lines of inquiry these forensic evidence may permit. (ETX 284.) Effective: 2010 Fall Quarter.

FOR 289—Survey in Forensic Science (3)
Lecture—3 hours. Restricted to students enrolled in the M.S. in Forensic Science Program. Analytical methods in contemporary forensic science. Clandestine laboratories in California, crime scene management, examination and analysis of human hair, forensic ballistics/trajectory reconstruction, shoe/tire print impressions, serial number restoration, forensic aspects of alcohol impairment, bloodstain pattern interpretation, microscopy of building materials, biological aspect of forensic science. May be repeated for credit when topics differ. Effective: 2002 Fall Quarter.

FOR 290—Seminar in Forensic Science (1)
Seminar—3 hours. Restricted to students enrolled in the M.S. in Forensic Science Program. Students will be exposed to topical areas in Forensic Science by presentations conducted by expert guest speakers. The seminar will also serve as a medium whereby the exiting students will present the research conducted as part of their thesis requirement. May be repeated for credit when topic differs. (S/U grading only.) Effective: 2006 Spring Quarter.

FOR 290C—Graduate Research Conference in Forensic Science (1)
Independent Study—1 hour. Restricted to students enrolled in the M.S. in Forensic Science Program. Individual and/or group conference on problems, progress and techniques in forensic science and research. May be repeated for credit when topic differs. (S/U grading only.) Effective: 2003 Winter Quarter.

FOR 293—Forensic Science Research Methodology (2)
Extensive Writing/Discussion—0.5 hours; Lecture—1.5 hours. Restricted to students enrolled in the Graduate Forensic Science program or by consent of the instructor. Introduction to identification, formulation, and solution of meaningful scientific problems encountered in the Forensic Science area including experimental design and/or theoretical analysis of new and prevailing techniques, theories and hypotheses. Students will present and defend their thesis research/journal article proposals. (S/U grading only.) Effective: 2007 Fall Quarter.

FOR 298—Group Study in Forensic Science (1-5)
Independent Study—1-5 hours. Restricted to students enrolled in the M.S. in Forensic Science Program. May be repeated for credit when topic differs. (P/NP grading only.) Effective: 2002 Fall Quarter.

FOR 299—Research in Forensic Science (1-12)
Independent Study—1-12 hours. Prerequisite(s): Consent of Instructor. Restricted to students enrolled in the M.S. in Forensic Science Program. May be repeated for credit. (P/NP grading only.) Effective: 2002 Fall Quarter.

French

French | FRE Information

(College of Letters and Science)

Noah Guynn, Ph.D., Chairperson of the Department

Department Office. 213 Sproul Hall; 530-752-1219; http://french.ucdavis.edu

Faculty. http://frenchanditalian.ucdavis.edu/people-french

French | FRE A.B.

(College of Letters and Science)

Noah Guynn, Ph.D., Chairperson of the Department

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Faculty. http://frenchanditalian.ucdavis.edu/people-french

The Major Program

The major program assures proficiency in all four language skills—speaking, listening, reading, and writing—and acquaints students with the intellectual and cultural contributions of the French-speaking world through the study of its literatures, traditions, and institutions.

The Program. The department encourages its students to work closely with the academic advisor in designing a major tailored to their needs and interests within the broad requirements prescribed by the program and to avail themselves of the guidance of an excellent teaching faculty. Each year, a substantial number of students with good preparation in French participate in the university's very popular Education Abroad Program, which maintains centers in Bordeaux, Lyon, and Paris.

Career Alternatives. Foreign language teachers, a cardiologist, a veterinarian, a naval commander at the Pentagon, a professor of Political Science, lawyers, sales representatives, journalists, a speech pathologist, a law professor, translators, a senior applications programmer, travel agents, independent business owners, a senior museum curator, nurses, financial managers, stock brokers, and an industrial attaché for a French trade commission—all graduated with an A.B. in French from UC Davis. These represent only a small fraction of the career choices documented in a survey of department graduates.

Major Advisor. T. Warner

Honors Program. Candidates for high or highest honors in French must write a senior thesis under the direction of a faculty member. For this purpose, honors candidates must enroll in FRE 194H (4 units) and FRE 195H (4 units). Normally, a student will undertake the honors project during the first two quarters of the senior year; other arrangements must be authorized by the department chair. Only students who, at the end of the junior year (135 units), have attained a cumulative grade-point average of 3.500 in courses required for the major will be eligible for the honors program. The requirements for earning high and highest honors in French are in addition to the regular requirements for the major in French.

Education Abroad Program. The department of French and Italian encourages students to study abroad in the Education Abroad Program. With the approval of a major advisor, applicable courses taken abroad may be accepted in the major or minor programs.

Graduate Study. The department offers programs of study and research leading to the M.A. and Ph.D. degrees in French. Candidates for the Ph.D. have the option of enriching their degree program by preparing a designated emphasis in African American and African Studies, Classics and Classical Receptions, Critical Theory, Feminist Theory and Research, Second Language Acquisition, or Studies in Performance and Practice. Detailed information may be obtained from the graduate advisor or the department chairperson.

Graduate Advisor. C. Goldstein

Prerequisite Credit. Credit will not normally be given for a course if it is the prerequisite of a course already successfully completed. Exceptions can be made by the department chairperson only.

Preparatory Subject Matter **Units:** 0-30

FRE 001	Elementary French	5
FRE 002	Elementary French	5
FRE 003	Elementary French	5

OR
The equivalent.

FRE 021	Intermediate French	5
FRE 022	Intermediate French	5
FRE 023	Intermediate French	5

OR
The equivalent.

Depth Subject Matter **Units:** 44

FRE 100	Composition in French	4

French Literature, choose three:
At least one must cover literature prior to the French Revolution; such courses are marked with an asterisk.

FRE 101	Introduction to French Poetry	4
FRE 102	Introduction to French Drama	4
FRE 103	Introduction to French Prose	4
FRE 115	Medieval French Literature and Society*	4
FRE 116	The French Renaissance*	4
FRE 117A	Baroque and Preclassicism*	4
FRE 117B	The Classical Moment*	4
FRE 118A	The Age of Reason and Revolution*	4
FRE 118B	Private Lives and Public Secrets: The Early French Novel*	4
FRE 119A	The Romantic Imaginary	4
FRE 119B	Realism, History and the Novel	4
FRE 119C	From Baudelaire to Surrealism	4
FRE 120	Modern French Thought	4
FRE 121	Twentieth Century French Novel	4
FRE 122	French and Francophone Film	4
FRE 124	Post-Colonial and Francophone Literature	4
FRE 125	French Literature and Other Arts	4
FRE 130	From Page to Stage: Theatre and Theatricality	4
FRE 133	Gender and Politics in French Literature and Culture	4
FRE 140	Study of a Major Writer	4
FRE 141	Selected Topics in French Literature	4

French culture, choose two:

FRE 107A	Pre and Early Modern France	4
FRE 107B	The Making of Modern France	4
FRE 108	Modern French Culture	4
FRE 127	Paris: Modernity and Metropolitan Culture	4
FRE 128	Topics in French Culture	4

French Linguistics & Language Science, choose two:

FRE 105	Advanced French Grammar	4
FRE 109	French Phonetics	4
FRE 160	Linguistic Study of French-Sound and Form	4

FRE 161	Linguistic Study of French-Form and Meaning	4
FRE 162	History of the French Language	4

Electives in French Literature, Language, or Culture, to be chosen in consultation with an undergraduate advisor:

FRE 101	Introduction to French Poetry	4
FRE 102	Introduction to French Drama	4
FRE 103	Introduction to French Prose	4
FRE 104	Translation	4
FRE 105	Advanced French Grammar	4
FRE 106	French in Business and the Professions	4
FRE 107A	Pre and Early Modern France	4
FRE 107B	The Making of Modern France	4
FRE 108	Modern French Culture	4
FRE 109	French Phonetics	4
FRE 110	Stylistics and Creative Composition	4
FRE 115	Medieval French Literature and Society	4
FRE 116	The French Renaissance	4
FRE 117A	Baroque and Preclassicism	4
FRE 117B	The Classical Moment	4
FRE 118A	The Age of Reason and Revolution	4
FRE 118B	Private Lives and Public Secrets: The Early French Novel	4
FRE 119A	The Romantic Imaginary	4
FRE 119B	Realism, History and the Novel	4
FRE 119C	From Baudelaire to Surrealism	4
FRE 120	Modern French Thought	4
FRE 121	Twentieth Century French Novel	4
FRE 122	French and Francophone Film	4
FRE 124	Post-Colonial and Francophone Literature	4
FRE 125	French Literature and Other Arts	4
FRE 127	Paris: Modernity and Metropolitan Culture	4
FRE 128	Topics in French Culture	4
FRE 130	From Page to Stage: Theatre and Theatricality	4
FRE 133	Gender and Politics in French Literature and Culture	4
FRE 140	Study of a Major Writer	4
FRE 141	Selected Topics in French Literature	4
FRE 160	Linguistic Study of French-Sound and Form	4
FRE 161	Linguistic Study of French-Form and Meaning	4
FRE 162	History of the French Language	4

*Literature prior to the French Revolution.

Total: 44-74

French | FRE M.A.

(College of Letters and Science)

Noah Guynn, Ph.D., Chairperson of the Department

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Faculty. http://frenchanditalian.ucdavis.edu/people-french

Graduate Study. The department offers programs of study and research leading to the M.A. and Ph.D. degrees in French. Candidates for the Ph.D. have the option of enriching their degree program by preparing a designated emphasis in African American and African Studies, Classics and Classical Receptions, Critical Theory, Feminist Theory and Research, Second Language Acquisition,

and/or Studies in Performance and Practice. Detailed information may be obtained from the graduate advisor or the department chairperson.

Graduate Advisor. C. Goldstein

Prerequisite Credit. Credit will not normally be given for a course if it is the prerequisite of a course already successfully completed. Exceptions can be made by the department chairperson only.

French | FRE Ph.D.

(College of Letters and Science)

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Graduate Study. The department offers programs of study and research leading to the M.A. and Ph.D. degrees in French. Candidates for the Ph.D. have the option of enriching their degree program by preparing a designated emphasis in African American and African Studies, Classics and Classical Receptions, Critical Theory, Feminist Theory and Research, Second Language Acquisition, and/or Studies in Performance and Practice. Detailed information may be obtained from the graduate advisor or the department chairperson.

Graduate Advisor. C. Goldstein

Prerequisite Credit. Credit will not normally be given for a course if it is the prerequisite of a course already successfully completed. Exceptions can be made by the department chairperson only.

French | FRE Minor

(College of Letters and Science)

Noah Guynn, Ph.D., Chairperson of the Department

Department Office. 213 Sproul Hall; 530-752-1219; http://french.ucdavis.edu

Faculty. http://frenchanditalian.ucdavis.edu/people-french

The Minor Program

The minor program develops proficiency in all four language skills—speaking, listening, reading, and writing—and acquaints students with the intellectual and cultural contributions of the French-speaking world through the study of its literature, traditions, and institutions.

The Program. The department encourages its students to work closely with the academic advisor in designing a minor tailored to their needs and interests within the broad requirements prescribed by the program and to avail themselves of the guidance of an excellent teaching faculty.

Minor Advisor. T. Warner

Education Abroad Program. With the approval of a minor advisor, applicable courses taken abroad may be accepted in the minor programs.

Prerequisite Credit. Credit will not normally be given for a course if it is the prerequisite of a course already successfully completed. Exceptions can be made by the department chairperson only.

French **Units:** 24

FRE 100	Composition in French	4

French Literature, choose one:

FRE 101	Introduction to French Poetry	4
FRE 102	Introduction to French Drama	4
FRE 103	Introduction to French Prose	4
FRE 115	Medieval French Literature and Society	4
FRE 116	The French Renaissance	4
FRE 117A	Baroque and Preclassicism	4
FRE 117B	The Classical Moment	4
FRE 118A	The Age of Reason and Revolution	4
FRE 118B	Private Lives and Public Secrets: The Early French Novel	4
FRE 119A	The Romantic Imaginary	4
FRE 119B	Realism, History and the Novel	4
FRE 119C	From Baudelaire to Surrealism	4
FRE 120	Modern French Thought	4
FRE 121	Twentieth Century French Novel	4
FRE 122	French and Francophone Film	4
FRE 124	Post-Colonial and Francophone Literature	4
FRE 125	French Literature and Other Arts	4
FRE 130	From Page to Stage: Theatre and Theatricality	4
FRE 133	Gender and Politics in French Literature and Culture	4
FRE 140	Study of a Major Writer	4
FRE 141	Selected Topics in French Literature	4

French Culture, choose one:

FRE 107A	Pre and Early Modern France	4
FRE 107B	The Making of Modern France	4
FRE 108	Modern French Culture	4
FRE 127	Paris: Modernity and Metropolitan Culture	4
FRE 128	Topics in French Culture	4

French Linguistics & Language Science, choose one:

FRE 105	Advanced French Grammar	4
FRE 109	French Phonetics	4
FRE 160	Linguistic Study of French-Sound and Form	4
FRE 161	Linguistic Study of French-Form and Meaning	4
FRE 162	History of the French Language	4

French Literature, Language, or Culture, choose two electives:

FRE 101	Introduction to French Poetry	4
FRE 102	Introduction to French Drama	4
FRE 103	Introduction to French Prose	4
FRE 104	Translation	4
FRE 105	Advanced French Grammar	4
FRE 106	French in Business and the Professions	4
FRE 107A	Pre and Early Modern France	4
FRE 107B	The Making of Modern France	4
FRE 108	Modern French Culture	4
FRE 109	French Phonetics	4
FRE 110	Stylistics and Creative Composition	4
FRE 115	Medieval French Literature and Society	4
FRE 116	The French Renaissance	4
FRE 117A	Baroque and Preclassicism	4
FRE 117B	The Classical Moment	4
FRE 118A	The Age of Reason and Revolution	4

FRE 118B	Private Lives and Public Secrets: The Early French Novel	4
FRE 119A	The Romantic Imaginary	4
FRE 119B	Realism, History and the Novel	4
FRE 119C	From Baudelaire to Surrealism	4
FRE 120	Modern French Thought	4
FRE 121	Twentieth Century French Novel	4
FRE 122	French and Francophone Film	4
FRE 124	Post-Colonial and Francophone Literature	4
FRE 125	French Literature and Other Arts	4
FRE 127	Paris: Modernity and Metropolitan Culture	4
FRE 128	Topics in French Culture	4
FRE 130	From Page to Stage: Theatre and Theatricality	4
FRE 133	Gender and Politics in French Literature and Culture	4
FRE 140	Study of a Major Writer	4
FRE 141	Selected Topics in French Literature	4
FRE 160	Linguistic Study of French-Sound and Form	4
FRE 161	Linguistic Study of French-Form and Meaning	4
FRE 162	History of the French Language	4

Total: 24

French | FRE Courses

Courses in FRE:

FRE 001—Elementary French (5)
Discussion—5 hours; Laboratory—1 hour. Introduction to French grammar and development of all language skills in a cultural context with special emphasis on communication. Not open for credit to students who have taken FRE 001A; students who have successfully completed FRE 002 or FRE 003 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only, although a passing grade will be charged to the student's P/NP option, no petition is required; all other students will receive a letter grade unless a P/NP petition is filed. GE credit: AH, WC. Effective: 2014 Winter Quarter.

FRE 001A—Accelerated Intensive Elementary French (15)
Lecture/Discussion—15 hours. Prerequisite(s): Placement exam required. Introduction to French grammar and development of all language skills in a cultural context with special emphasis on communication. Special 12-week, accelerated, intensive summer session course that combines the work of courses 1, 2, and 3. Not open for credit to students who have completed FRE 001, FRE 001S, FRE 002, FRE 002S, FRE 003, or FRE 003S. GE credit: AH, WC. Effective: 2014 Winter Quarter.

FRE 001S—Elementary French (5)
Discussion—5 hours; Laboratory—1 hour. Introduction to French grammar and development of all language skills in a cultural context with special emphasis on communication. Course is taught abroad. Students who have successfully completed FRE 002 or 003 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only, although a passing grade will be charged to the student's P/NP option, no petition is required; all other students will receive a letter grade unless a P/NP petition is filed; not open for credit to students who have completed FRE 001 or FRE 001A. GE credit: AH, WC. Effective: 2013 Fall Quarter.

FRE 002—Elementary French (5)
Discussion—5 hours; Laboratory—1 hour. Prerequisite(s): FRE 001 Continuation of course 1. Not open for credit to students who have taken FRE 001A. GE credit: AH, WC. Effective: 2014 Winter Quarter.

FRE 002S—Elementary French (5)
Discussion—5 hours; Laboratory—1 hour. Prerequisite(s): FRE 001 or FRE 001S Continuation of course 1. Course is taught abroad. Not open for credit to students who have completed FRE 001A or FRE 002. GE credit: AH, WC. Effective: 2013 Fall Quarter.

FRE 003—Elementary French (5)
Discussion—5 hours; Laboratory—1 hour. Prerequisite(s): FRE 002 Continuation of course 2. Not open for credit to students who have taken FRE 001A. GE credit: AH, WC. Effective: 2014 Winter Quarter.

FRE 003S—Elementary French (5)
Discussion—5 hours; Laboratory—1 hour. Prerequisite(s): FRE 002 or FRE 002S Continuation of course 2. Course is taught abroad. Not open for credit to students who have completed FRE 001A or FRE 003. GE credit: AH, WC. Effective: 2013 Fall Quarter.

FRE 021—Intermediate French (5)
Laboratory—1 hour; Lecture/Discussion—4 hours. Prerequisite(s): FRE 001A or FRE 003 or FRE 003S Review of grammar and vocabulary acquired in the elementary sequence, as well as the study of new grammatical structures and a continuing enrichment of vocabulary through oral work in class, written exercises, readings and compositions. Not open for credit to students who have completed FRE 021S. GE credit: AH, OL, WC, WE. Effective: 2014 Winter Quarter.

FRE 021S—Intermediate French (5)
Laboratory—1 hour; Lecture/Discussion—4 hours. Prerequisite(s): FRE 001A or FRE 003 or FRE 003S Review of grammar and vocabulary acquired in the elementary sequence, as well as the study of new grammatical structures and a continuing enrichment of vocabulary through oral work in class, written exercises, readings and compositions. Not open for credit to students who have completed FRE 021. GE credit: AH, OL, WC, WE. Effective: 2013 Fall Quarter.

FRE 022—Intermediate French (5)
Laboratory—1 hour; Lecture/Discussion—4 hours. Prerequisite(s): FRE 021 or FRE 021S Continuation of course 21 or 21S. Review of grammar and vocabulary, as well as the study of new grammatical structures and a continuing enrichment of vocabulary. Not open for credit to students who have completed FRE 022S. GE credit: AH, OL, WC, WE. Effective: 2014 Winter Quarter.

FRE 022S—Intermediate French (5)
Laboratory—1 hour; Lecture/Discussion—4 hours. Prerequisite(s): FRE 021 or FRE 021S Continuation of 21 or 21S. Review of grammar and vocabulary, as well as, the study of new grammatical structures and a continuing enrichment of vocabulary. Not open for credit to students who have completed FRE 022. GE credit: AH, OL, WC, WE. Effective: 2013 Fall Quarter.

FRE 023—Intermediate French (5)
Laboratory—1 hour; Lecture/Discussion—4 hours. Prerequisite(s): FRE 022 or FRE 022S Continuation of course 22 or 22S. Review of grammar and vocabulary, as well as the study of new grammatical structures and a continuing enrichment of vocabulary. Not open for credit to students who have completed FRE 023S. GE credit: AH, OL, WC, WE. Effective: 2014 Winter Quarter.

FRE 023S—Intermediate French (5)
Laboratory—1 hour; Lecture/Discussion—4 hours. Prerequisite(s): FRE 022 or FRE 022S Continuation of course 22 or 22S. Review of grammar and vocabulary, as well as, the study of new grammatical structures and a continuing enrichment of vocabulary. Not open for credit to students who have completed FRE 023. GE credit: AH, OL, WC, WE. Effective: 2013 Fall Quarter.

FRE 050—French Film (4)
Discussion—2 hours; Lecture—1 hour; Term Paper. Introduction to the tradition of French cinema from its invention by Méliès and the Lumière brothers through New Wave (especially the works of Truffaut and Godard) and more recent developments in French and Francophone film. Taught in English. GE credit: AH, VL, WC, WE. Effective: 1997 Winter Quarter.

FRE 051—Major Works of French Literature in Translation (4)
Discussion—1 hour; Lecture—2 hours; Term Paper—1 hour. Readings in English translation of key works of French and Francophone literature from the Middle Ages to the Present. Particular attention is given to the long-standing interest of French writers in issues of social, regional, gender, sexual, and ethnic identity. GE credit: AH, WC, WE. Effective: 2002 Fall Quarter.

FRE 052—France and the French-Speaking World (4)
Discussion—1 hour; Lecture—2 hours; Term Paper—1 hour. This course is taught in English. A survey of the history and culture of France and the French-speaking world, especially Canada, the Caribbean and Africa. Study of social, historical and cultural issues that occupy the French-speaking world, with particular attention to mass media. GE credit: AH, WC, WE. Effective: 2002 Spring Quarter.

FRE 053—French as a World Language (4)
Lecture/Discussion—3 hours; Term Paper. The linguistic status of French and its function in multilingual societies and international arenas. Linguistico-political landscape of communities in Euroasia, Africa, and the Americas. Sociolinguistic concepts and emergence of French as a world language. GE credit: AH, OL, WC, WE. Effective: 2007 Fall Quarter.

FRE 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

FRE 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

FRE 100—Composition in French (4)
Lecture—3 hours; Term Paper. Prerequisite(s): FRE 023 Instruction and practice in expository writing in French, with emphasis on organization, correct syntax, and vocabulary building. GE credit: AH, WC, WE. Effective: 2004 Spring Quarter.

FRE 101—Introduction to French Poetry (4)
Lecture—3 hours. Prerequisite(s): FRE 100; or Consent of Instructor. Analysis and evaluation of works representing the main types of French
poetry. Study of French poetic conventions and versification. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

FRE 102—Introduction to French Drama (4)
Lecture—3 hours. Prerequisite(s): FRE 100; or Consent of Instructor. Analysis and evaluation of plays representing the main types of French
drama, with emphasis on dramatic structure and techniques. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

FRE 103—Introduction to French Prose (4)
Lecture—3 hours. Prerequisite(s): FRE 100; or Consent of Instructor. Analysis and evaluation of works representing main types of French prose, with emphasis on narrative structure and techniques. GE credit: WE. Effective: 1997 Winter Quarter.

FRE 104—Translation (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): FRE 100; Or the equivalent. Practice in English-to-French and French-to-English translation using a variety of non-literary materials, illustrating different problems and styles. Effective: 2004 Fall Quarter.

FRE 105—Advanced French Grammar (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): FRE 023; Or equivalent. Understanding of, and extensive practice with, various grammatical structures in French. Lexical-semantic, morphological, and syntactic analysis. GE credit: WE. Effective: 2005 Winter Quarter.

FRE 105S—Advanced French Grammar (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): FRE 023 or FRE 023S Understanding of, and extensive practice with, various grammatical structures in French. Lexical-semantic, morphological, and syntactic analysis. Taught abroad. Not open for credit to students who have taken FRE 105. GE credit: WE. Effective: 2013 Fall Quarter.

FRE 106—French in Business and the Professions (4)
Discussion—2 hours; Lecture—1 hour. Prerequisite(s): FRE 100; or Consent of Instructor. French language as used in the commercial sphere. Emphasis on proper style and form in letter-writing, and in non-literary composition. Technical terminology in such diverse fields as government and world business. GE credit: WE. Effective: 1997 Winter Quarter.

FRE 107—The Making of Modern France (4)
Lecture—3 hours; Term Paper. Prerequisite(s): FRE 023; Consent of Instructor. Introduction to French culture through a historical approach to topics such as the citizen and the state (politics, justice, social security), the nation and centralization, the rise of public education, colonization, class and social relationships. GE credit: AH, WE. Effective: 2016 Fall Quarter.

FRE 107A—Pre and Early Modern France (4)
Lecture—3 hours; Term Paper. Prerequisite(s): FRE 023; Consent of Instructor. Introduction to pre- and early modern French culture through a historical approach to topics such as the feudal system, the rise of the monarchy, the Reformation and religious wars. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

FRE 107B—The Making of Modern France (4)
Lecture—3 hours; Term Paper. Prerequisite(s): FRE 023; Consent of Instructor. Introduction to French culture through a historical approach to topics such as the absolute monarchy, the role of the parlements, the French revolution, and the political regimes of the nineteenth century. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

FRE 107S—The Making of Modern France (4)
Lecture—3 hours; Term Paper. Prerequisite(s): FRE 023 or FRE 023S Introduction to French culture through a historical approach to topics such as the nation-state, centralization of the monarchy, and the rise of public education, colonization, class and social relationships. Taught abroad. Not open for credit to students who have completed FRE 107. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

FRE 108—Modern French Culture (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): FRE 023 Survey of modern French culture from the Dreyfus affair to the present day. Topics may include women and French culture, decolonialization and modernization, education, social welfare and immigration. GE credit: WC, WE. Effective: 2016 Spring Quarter.

FRE 109—French Phonetics (4)
Laboratory—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): FRE 023; Or equivalent. Introduction to the sound-inventory of French and practice in phonetic transcription, with a focus on ways in which phonetic contrasts signal grammatical contrasts; spoken forms and spelling; formal differences between the "Standard" and other varieties across the French-speaking world. GE credit: SS. Effective: 2005 Spring Quarter.

FRE 110—Stylistics and Creative Composition (4)
Lecture—3 hours. Prerequisite(s): FRE 100; or Consent of Instructor. Intensive course in creative composition using a variety of techniques
and literary styles, patterned on Queneau's Exercices de style. Practice in such stylistic modifications as inversion, antithesis, changes in tense, mood, tonality, etc. The writing of poetry. GE credit: WE. Effective: 1999 Fall Quarter.

FRE 115—Medieval French Literature and Society (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Social and cultural life of medieval France as studied through its
representation in such literary works as La Chanson de Roland, courtly love lyric, the Arthurian romances of Chrétien de Troyes, Aucassin et Nicolette, selected fabliaux and farces. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

FRE 116—The French Renaissance (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Overview of major works and writers with particular attention to the historical context of the turbulent 16th century. Writers to be read may include Rabelais, Marot, Ronsard, Du Bellay, Labé, Marguerite de Navarre, Montaigne, and D'Aubigné. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

FRE 117A—Baroque and Preclassicism (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Literature and intellectual culture of the period between the Renaissance and French classicism. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

FRE 117B—The Classical Moment (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Literature, culture, and politics in the Age of Louis XIV. May be repeated up to 1 time(s) when topic differs. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

FRE 118A—The Age of Reason and Revolution (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100 Literature and philosophy of the French Enlightenment. Readings from such authors as Bayle, Fontenelle, Montesquieu, Voltaire, Rousseau and Diderot. GE credit: AH, OL, WC, WE. Effective: 2011 Fall Quarter.

FRE 118B—Private Lives and Public Secrets: The Early French Novel (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. History of the French roman from the Middle Ages to the Revolution with particular emphasis on the novels of the 18th century. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

FRE 119A—The Romantic Imaginary (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Major concepts and themes of French Romanticism, such as dream and the supernatural, impossible love, exoticism, revolution, individualism, nature, the mal du siècle, Romantic irony, the creative imagination, the cult of ruin. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

FRE 119B—Realism, History and the Novel (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Narrative and historical codes of French realist fiction, with emphasis on the representation of history in the realist novel, its depiction of social "realities" such as class and gender, and its relation to the historical situation of post-revolutionary society. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

FRE 119C—From Baudelaire to Surrealism (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Study of the main poets and poetic movements from the mid-19th to the early 20th century, including Baudelaire, the Symbolists, and the Surrealists. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

FRE 120—Modern French Thought (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Overview of post-Second World War French intellectual currents from existentialism to structuralism and deconstructionism. Readings will include Sartre and de Beauvoir, Camus, Lévi-Strauss, Lacan, Barthes, Foucault, Derrida, Kristeva, Sollers, Cixous, and Irigaray. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

FRE 121—Twentieth Century French Novel (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Novels and theories of the novel, from Proust to the Nouveau Roman and beyond. Readings from among Gide, Sartre, de Beauvoir, Camus, Breton, Beckett, Robbe-Grillet, Sarraute, Simon, Barthes, Duras, Tournier, Perec, Modiano, Guibert, Toussaint. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

FRE 122—French and Francophone Film (4)
Extensive Writing; Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): FRE 100; or Consent of Instructor. French and Francophone film from the Lumière Brothers to the present. Topics may include analysis of film form and narrative, major filmmakers and filmic traditions, and film theory. May be repeated up to 1 time(s) when topic differs. GE credit: AH, VL, WC, WE. Effective: 2007 Fall Quarter.

FRE 124—Post-Colonial and Francophone Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Post-Independence Black African and/or Caribbean and/or North African literatures written in French. Selected topics include: identity and subjectivity, the role of the intellectual, women's voices, languages and oral literatures, cultural syncretism, theories of post-colonialism. May be repeated up to 1 time(s) with approval of major advisor and instructor; when content differs; for example, students may take the course for repeat credit when the geographical focus (West Africa, North, African or Caribbean) or theme is substantially different from previous iterations. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

FRE 125—French Literature and Other Arts (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Relationship between French literature and other arts-painting, music, cinema, architecture, opera-from different periods. May be repeated up to 1 time(s) when topic differs. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

FRE 125S—French Literature and Other Arts (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Relationship between French literature and other arts, such as painting, music, cinema, architecture, or opera, from different periods. Taught abroad. May be repeated up to 1 time(s) when topic differs. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

FRE 127—Paris: Modernity and Metropolitan Culture (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Representation of Paris in 19th and 20th century texts and its importance in defining the experience and art of modernity. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

FRE 128—Topics in French Culture (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): FRE 100; or Consent of Instructor. In-depth study of a particular topic in French culture. Topics may include the Court of Louis XIV, the French Revolution and Immigration. May be repeated up to 1 time(s) when topic differs. GE credit: WE. Effective: 2007 Fall Quarter.

FRE 128S—Topics in French Culture (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): FRE 100; or Consent of Instructor. In-depth study of a particular topic in French culture. Topics may include the Court of Louis XIV, the French Revolution, and Immigration. Taught abroad. May be repeated up to 1 time(s) when topic differs. GE credit: AH, WC, WE. Effective: 2013 Fall Quarter.

FRE 130—From Page to Stage: Theatre and Theatricality (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. French theater as literature and performance. May be repeated up to 1 time(s) when topic differs. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

FRE 133—Gender and Politics in French Literature and Culture (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Thematic, theoretical and political tendencies in contemporary French fiction. Barthes, Foucault, Duras, Guibert, considered in terms of their writing on identity and gender. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

FRE 140—Study of a Major Writer (4)
Lecture—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Concentrated study of works of a single author. May be repeated up to 1 time(s) if author-subject changes. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

FRE 141—Selected Topics in French Literature (4)
Lecture—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Subjects and themes such as satiric and didactic poetry of the Middle Ages, poetry of the Pléiade, theater in the eighteenth century, pre-romantic poetry, autobiography, literature and film, etc. May be repeated up to 2 time(s) when topic differs. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

FRE 141S—Selected Topics in French Literature (4)
Lecture—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Subjects and themes such as satiric and didactic poetry of the Middle Ages, poetry of the Pléiade, theater in the eighteenth century, pre-romantic poetry, autobiography, literature and film, etc. Taught abroad. May be repeated up to 2 time(s) when topic differs. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

FRE 160—Linguistic Study of French-Sound and Form (4)
Seminar—3 hours; Term Paper. Prerequisite(s): FRE 100 or LIN 001 or LIN 001Y Introduction to the linguistic study of modern French, with focus on sound structure and form, inflection and derivation. GE credit: AH, SS, WE. Effective: 2018 Spring Quarter.

FRE 161—Linguistic Study of French-Form and Meaning (4)
Seminar—3 hours; Term Paper. Prerequisite(s): FRE 100 or LIN 001 or LIN 001Y Introduction to the linguistic study of modern French, with focus on sentence construction and constituency, meaning and discourse functions. GE credit: AH, SS. Effective: 2018 Spring Quarter.

FRE 162—History of the French Language (4)
Lecture—3 hours; Term Paper. Prerequisite(s): FRE 100 or LIN 001 or LIN 001Y Main periods in development of the French language, from Latin to contemporary popular aspects, with emphasis on relationship between socio-cultural patterns and evolution of the language. GE credit: AH, SS, WC, WE. Effective: 2018 Spring Quarter.

FRE 192—Internship (1-12)
Internship—3-36 hours; Term Paper. Prerequisite(s): Consent of Instructor. Upper division standing. Practical application of the French language through work experience in government and/or business, culminating in an analytical term paper on a topic approved by the sponsoring instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

FRE 194H—Special Study for Honors Students (4)
Independent Study—4 hours. Prerequisite(s): Open only to French majors of senior standing who qualify for Honors Program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in French literature, civilization, or
language studies. (P/NP grading only.) GE credit: AH, WC, WE. Effective: 1998 Fall Quarter.

FRE 195H—Honors Thesis (4)
Independent Study—4 hours. Prerequisite(s): FRE 194H Writing of an honors thesis on a topic in French literature, civilization, or language studies under the direction of a faculty member. (P/NP grading only.) GE credit: AH, WC, WE. Effective: 1998 Fall Quarter.

FRE 197T—Tutoring in French (1-4)
Laboratory—1-2 hours; Seminar—1-2 hours. Prerequisite(s): Upper division standing and consent of Chairperson. Tutoring in undergraduate courses including leadership in small voluntary discussion groups affiliated with departmental courses. May be repeated for credit for a total of 6 units. May be repeated up to 6 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

FRE 197TC—Tutoring in the Community (2-4)
Laboratory—1-2 hours; Seminar—1-2 hours. Prerequisite(s): Upper division standing and consent of Chairperson. Tutoring in public schools under the guidance of a regular teacher and supervision by a departmental faculty member. May be repeated for credit for a total of 6 units. May be repeated up to 6 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

FRE 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

FRE 198S—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Group study on focused topics in French literature and culture. Taught abroad. May be repeated for credit. (P/NP grading only.) Effective: 2013 Fall Quarter.

FRE 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

FRE 200—Introduction to Graduate Study in French (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Introduction to a range of methodologies and critical practices in the field of French Studies, including literature, culture, and linguistics. Covers basic principles of bibliographic research in the humanities. (S/U grading only.) Effective: 2016 Spring Quarter.

FRE 201—History of French (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Graduate standing. Presentation of the main changes in the grammatical structures of French, from Latin to contemporary usage, involving textual analysis and sociolinguistic description. Effective: 2016 Spring Quarter.

FRE 202—Topics in French Civilization (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Graduate standing. Interdisciplinary approach to the study of French and Francophone civilization from the Middle Ages to the present. Course content will vary by instructor. May be repeated for credit when content differs. Effective: 2016 Spring Quarter.

FRE 204—Topics in Medieval Literature (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Graduate standing. Study of Medieval French literature, focusing on a particular period,
milieu, literary movement, genre, or theoretical approach. May be repeated for credit when topic differs. May be repeated for credit. Effective: 2016 Spring Quarter.

FRE 205A—Sixteenth-Century Literature: The Humanists (4)
Seminar—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing. French humanism in its most varied forms. Although at different times Rabelais and Montaigne will be primarily studied, other leading intellectuals and religious writers will also receive attention. May be repeated for credit when different topic is studied. May be repeated for credit. Effective: 2016 Spring Quarter.

FRE 206A—Seventeenth-Century Literature: Theater (4)
Seminar—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Works of Corneille, Racine, Molière, and minor dramatists. One or more authors may be covered. May be repeated for credit with consent of instructor when different topics are studied. May be repeated for credit. Effective: 2016 Spring Quarter.

FRE 206B—Seventeenth-Century Literature: Prose (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Graduate standing. Works of authors such as Pascal, Descartes, Mme de Lafayette. One or more authors may be covered. May be repeated for credit with consent of instructor as different topics are studied from quarter to quarter. May be repeated for credit. Effective: 2016 Spring Quarter.

FRE 206C—Seventeenth-Century Literature: Poetry (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Graduate standing. Studies of the works of one or more poets of the period. May be repeated for credit with consent of instructor. May be repeated for credit. Effective: 2016 Spring Quarter.

FRE 207A—Eighteenth-Century Literature: Philosophies (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Graduate standing. Not a course in philosophy, but an examination of the role of philosophy in the design and context of literary works. Study of one or more authors. May be repeated for credit. Effective: 2016 Spring Quarter.

FRE 207B—Eighteenth-Century Literature: Novel (4)
Seminar—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Rise of the novel. Study of narrative experiments in the context of the philosophical climate and new literary values. Course may treat one or more novelists of the period. May be repeated for credit when different topics are studied. May be repeated for credit. Effective: 2016 Spring Quarter.

FRE 208A—Nineteenth-Century Literature: Fiction (4)
Seminar—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Study of the works of one or several novelists and/or short-story writers of the period. May be repeated for credit with consent of instructor when different topics are studied. May be repeated for credit. Effective: 2016 Spring Quarter.

FRE 208B—Nineteenth-Century Literature: Poetry (4)
Seminar—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Study of the works of one or several poets of the period. May be repeated for credit with consent of instructor when different topics are
studied. May be repeated for credit. Effective: 2016 Spring Quarter.

FRE 209A—Twentieth-Century: Prose (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Graduate standing. Study of the works of one or several writers of the period. Effective: 2016 Spring Quarter.

FRE 209B—Twentieth-Century: Theater (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Graduate standing. Study of the works of one or several dramatists of the period. Effective: 2016 Spring Quarter.

FRE 209C—Twentieth-Century: Poetry (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Graduate standing. Study of the works of one or several poets of the period. May be repeated for credit with consent of instructor. Effective: 2016 Spring Quarter.

FRE 210—Studies in Narrative Fiction (4)
Seminar—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit with consent of instructor when different topic is studied. May be repeated for credit. Effective: 2016 Spring Quarter.

FRE 211—Studies in Criticism (4)
Seminar—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit with consent of instructor when different topic is studied. May be repeated for credit. Effective: 2016 Spring Quarter.

FRE 212—Studies in Theater (4)
Seminar—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit with consent of instructor when different topic is studied. May be repeated for credit. Effective: 2016 Spring Quarter.

FRE 213—Studies in Poetry (4)
Seminar—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit with consent of instructor when different topic is studied. May be repeated for credit. Effective: 2016 Spring Quarter.

FRE 214—Study of a Literary Movement (4)
Seminar—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit with consent of instructor when different topic is studied. May be repeated for credit. Effective: 2016 Spring Quarter.

FRE 215—Topics in French and Francophone Film (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Graduate standing. Aspects of French and Francophone film from the Lumière Brothers through the present. Topics may include a specific historical period of filmmaking, film theories and the analysis of film form and narrative, and major filmmakers and filmic traditions. May be repeated up to 2 time(s). Effective: 2016 Winter Quarter.

FRE 224—Francophone Literatures (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Graduate standing. Study of cultural productions (literature, film, visual arts) by Francophone peoples such as found in North Africa, West Africa, the Caribbean, South-East Asia, the Americas, and Metropolitan France. May be repeated for credit when topic differs and with consent of instructor. Effective: 2016 Spring Quarter.

FRE 250A—French Linguistics I (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Graduate standing. Theoretical approach to the forms and functions of French, with emphasis on phonology and morphology. Overview of current linguistic theories and their application to French. Offered in alternate years. Effective: 2016 Spring Quarter.

FRE 250B—French Linguistics II (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Graduate standing. Theoretical approach to the forms and functions of French, with emphasis on syntax and semantics. Overview of current linguistic theories and their application to French. Offered in alternate years. Effective: 2016 Spring Quarter.

FRE 251—Topics in the Linguistic Study of French (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Graduate standing. Questions relevant to the linguistic study of French, such as language acquisition, sociolinguistics, or theoretical examination of structure. Intended for students in French Linguistics and those applying linguistic models to literature or teaching. Repeatable for credit when topic differs. May be repeated for credit topic differs. Effective: 2016 Spring Quarter.

FRE 291—Foreign Language Learning in the Classroom (4)
Project (Term Project); Seminar—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Overview of approaches to university-level foreign language instruction and the theoretical notions underlying current trends in classroom practices across commonly taught foreign languages. (GER 291 and SPA 291.) Effective: 2016 Spring Quarter.

FRE 297—Individual Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 2016 Spring Quarter.

FRE 298—Group Study (1-5)
Seminar—1-5 hours. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit with consent of instructor. May be repeated for credit. Effective: 2016 Spring Quarter.

FRE 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 2016 Spring Quarter.

FRE 299D—Dissertation Research (1-12)
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 2016 Spring Quarter.

FRE 300—Teaching of a Modern Foreign Language (3)
Lecture/Discussion—3 hours. Prerequisite(s): Senior or graduate standing; a major or minor in a modern foreign language. Effective: 1997 Winter Quarter.

FRE 390A—The Teaching of French in College (2)
Lecture/Discussion—2 hours. Prerequisite(s): Graduate standing or consent of instructor. Course designed for graduate teaching assistants with emphasis on problems and procedures encountered by teachers of lower division classes at the university. May be repeated for credit with consent of instructor. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

FRE 390B—The Teaching of French in College (2)
Lecture/Discussion—2 hours. Prerequisite(s): Graduate standing or consent of instructor. Course designed for graduate teaching assistants with emphasis on problems and procedures encountered by teachers of lower division classes at the university. (S/U grading only.) Effective: 1997 Winter Quarter.

FRE 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.)
Effective: 1997 Winter Quarter.

Fungal Biology & Ecology Minor; Plant Pathology

Fungal Biology & Ecology Minor; Plant Pathology | Fungal Biology & Ecology Minor

(College of Agricultural and Environmental Sciences)

The minor in Fungal Biology and Ecology is open to all students interested in a concentrated exposure to and knowledge of the fungi and allied organisms.

The minor is sponsored by the Plant Pathology Department.

Minor Advisor. T. Gordon

Fungal Biology and Ecology **Units:** 18-20

PLP 130	Fungal Biotechnology and Biochemistry	3
PLP 148	Introductory Mycology	4
PLP 150	Fungal Ecology	3

Choose seven-nine units:

FST 104	Food Microbiology	3
PLP 040	Edible Mushroom Cultivation	2
PLP 135	Field Identification of Mushrooms	1
PLP 185	Advanced Mushroom Taxonomy	2
SAS 030	Mushrooms, Molds, and Society	3
SSC 111	Soil Microbiology	4
PLP 224	Advanced Mycology	3

PLP 224 available to advanced students with consent of instructor.

Total: 18-20

Gender, Sexuality & Women's Studies

Gender, Sexuality & Women's Studies | WMS Information

(College of Letters and Science)

Maxine Craig, Ph.D., Department Chairperson

Program Office. 1200 Hart Hall; 530-752-6429; http://gsws.ucdavis.edu/

Faculty.http://gsws.ucdavis.edu/faculty

Gender, Sexuality & Women's Studies | WMS A.B.

(College of Letters and Science)

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Faculty. http://gsws.ucdavis.edu/faculty

The Major Program

Gender, Sexuality and Women's Studies is an interdisciplinary major founded on the understanding that the social production of gender is inseparable from that of race, sexuality, class, nationality, ability and other categories of difference. Our curriculum places feminist concerns within a transnational context, while respecting the need for geographic and historical specificity. These frameworks inform our teaching, our research, our institutional and community practices, and the principles we bring to our classrooms. Gender, Sexuality and Women's Studies offers a wide range of classes that use the lens of gender to examine colonialism and post colonialism, globalization, history, sexuality, queer theory, literature, popular culture, feminist video production, area studies, film fashion and food. The Department offers both an undergraduate major and minor. We also work collaboratively with other units on campus to sponsor two undergraduate minors, Sexuality Studies and Social and Ethnic Relations, and an undergraduate concentration in transnational production and consumption.

The Department. One of the most exciting and challenging aspects of the Gender, Sexuality and Women's Studies Department is that students, in consultation with the peer and faculty advisors, can pursue their particular academic interests and design their course of study accordingly. In devising their major plan, students will draw on courses offered in African American and African Studies, American Studies, Anthropology, Asian American Studies, Chicana/o Studies, Comparative Literature, English, French, German and Italian Studies, History, Linguistics, Native American Studies, Political Science, Psychology, Sociology, Spanish, Textiles and Clothing, and other related disciplines.

In addition to offering a broad array of courses that deal with gender, class, race, ethnicity, and sexuality, the Gender, Sexuality and Women's Studies Department affords interested students the opportunity to earn internship credit and conduct independent research as well as take advantage of the Honors Thesis option.

Students design a program of study in consultation with an adviser that is in accordance with their individual career goals. Many Gender, Sexuality and Women's Studies majors find it advantageous to pursue a double major, or to minor in another field of study. Upon successful completion of the degree requirements, students majoring in the department will graduate with a Bachelor of Arts in Gender, Sexuality and Women's Studies.

Career Alternatives. A degree in Gender, Sexuality and Women's Studies opens many possibilities for future employment. The major introduces students to relevant social issues, fosters critical thinking, develops strong verbal, writing and research skills and encourages social advocacy.

Pre-professional students will discover that a major in Gender, Sexuality and Women's Studies offers useful preparatory training for medical or law school. It is particularly suitable for those interested in specializing in social policy, international development, social justice or gender-related work in a wide range of institutions and contexts. Students who plan to do practical work in counseling, clinical psychology, social services, education, media or politics will also find a major in Gender, Sexuality and Women's Studies provides a strong foundation. Those who wish to pursue graduate level research in such fields as anthropology, comparative literature, cultural studies, economics, education, ethnic studies, English, film studies, history, languages and literatures, performance studies, philosophy, political science, and sociology will also benefit from a strong Gender, Sexuality and Women's Studies undergraduate background in critical theory, social analysis, history and a sound understanding of cultural representation and narratives of difference.

Increasingly, media and cultural institutions, corporations, and personnel firms are hiring specialists in women and gender studies trained in understanding the complex cultural challenges and demands arising from diverse communities. State and federal agencies need people who have special understanding of the problems that diverse groups of women face in society, industry, and the professions. Educational institutions across the spectrum need specialists to develop and administer women and gender studies programs, multi-cultural community centers, LGBTQ organizations and other organizations designed specifically to deal with gender, social diversity and inequality, and a growing range of old and new social challenges arising in the context of globalization.

Some of our alumni have developed careers other than those described above. Gender, Sexuality and Women's Studies faculty and peer advisors can provide even more ideas about possible future careers. Doing internships related to coursework enables students to integrate theory with hands-on practice and service in the community.

Graduate Study. The Gender, Sexuality and Women's Studies Department offers a designated emphasis in Feminist Theory and Research for students enrolled in the Ph.D. programs of fifteen other affiliated departments.

Major Advisor. All Gender, Sexuality and Women's Studies majors and minors must consult with a faculty advisor, individually, at least once each academic year.

Preparatory Subject Matter **Units:** 20

WMS 050	Introduction to Critical Gender Studies	4
WMS 060	Feminist Critiques of Western Thought	4
WMS 070	Theory and History of Sexualities	4

Choose two:

AAS 010	African-American Culture and Society	4
AAS 017	Women in African Societies	4
AMS 021	Objects and Everyday Life	4
AMS 030	Images of America and Americans in Popular Culture	4
ANT 002	Cultural Anthropology	5
ANT 020	Comparative Cultures	4
ANT 030	Sexualities	4
ASA 001	Historical Experience of Asian Americans	4
ASA 002	Contemporary Issues of Asian Americans	4
CHI 010	Introduction to Chicana/o Studies	4
CHI 021S	Chicana/o and Latina/o Health Care Issues	4
CHI 050	Chicana and Chicano Culture	4
COM 012	Introduction to Women Writers	4
DRA 001	Theatre, Performance and Culture	4
ENL 003	Introduction to Literature	4
HIS 072A	Women and Gender in America, to 1865	4
HIS 072B	Women and Gender in America, 1865-Present	4
HIS 085	Nature, Man, and the Machine in America	4
NAS 010	Native American Experience	4
NAS 032	Native American Music and Dance	4
POL 007	Contemporary Issues in Law and Politics	4
PSC 001	General Psychology	4
STS 001	Introduction to Science, Technology and Medicine Studies	4
STS 002	Introduction to the History of Science and Technology	4
STS 020	Methods in Science, Technology and Medicine Studies	4
STS 032	Drugs, Science and Culture	4
SOC 002	Self and Society	4
SOC 003	Social Problems	4
SOC 011	Sociology of Labor and Employment	4
SOC 030A	Intercultural Relations in Multicultural Societies	3
SOC 030B	Intercultural Relations in Multicultural Societies	3
TXC 007	Style and Cultural Studies	4
WMS 020	Cultural Representations of Gender	4
WMS 080	Special Topics in Critical Gender Studies	4

Depth Subject Matter **Units:** 44

WMS 103	Introduction to Feminist Theory	4
WMS 104	Feminist Research	4
WMS 137	Contemporary Debates in Western Feminist Theory	4
WMS 190	Senior Seminar	4

Histories and Cultures

Choose three to meet this requirement. May not duplicate those used to meet other Gender, Sexuality and Women's Studies major requirements. The list that follows represents a partial list of options; other courses may be included with the consent of the Gender, Sexuality and Women's Studies Advisor.

AAS 107A	African Descent Communities and Culture in the Caribbean and Latin America	4
AAS 107C	African Descent Communities and Culture in Asia	4
AAS 123	Black Female Experience in Contemporary Society	4
AAS 133	The Black Family In America	4
AAS 181	Hip Hop in Urban America	4
ANT 126B	Women and Development	4
ANT 130A	Cultural Dimensions of Globalization	4
ANT 139AN	Race, Class, Gender Systems	4
ANT 139BN	Gender and Sexuality	4
ASA 112	Asian American Women	4
ASA 150	Filipino American Experience	4
CHI 111	Chicanas/Mexicanas in Contemporary Society	4
CHI 122	Psychology Perspectives Chicana/o and Latina/o Family	4
CHI 131	Chicanas in Politics and Public Policy	4
COM 135	Women Writers	4
COM 138	Gender and Interpretation in the Renaissance	4
COM 159	Women in Literature	4
DES 143	History of Fashion	4
ENL 185A	Women's Writing I	4
ENL 185B	Women's Writing II	4
FRE 124	Post-Colonial and Francophone Literature	4
GER 114	From Marlene Dietrich to Run, Lola Run: German Women and Film	4
GER 168	Multiculturalism in German Literature	4
GER 176A	Classic Weimar Cinema	4
HIS 102M	Undergraduate Proseminar in History; United States Since 1896	5
HIS 148A	Women and Society in Europe: 1500-1789	4
HIS 148B	Women and Society in Europe: 1789-1920	4
HIS 159	Women and Gender in Latin American History	4
HIS 184	History of Sexuality in America	4
HIS 193A	History of the Modern Middle East, 1750-1914	4
HIS 193B	History of the Modern Middle East, From 1914	4
HIS 193C	The Middle East Environment: Historical Change and Current Challenges	4
NAS 134	Race, Culture, and Nation	4
NAS 135	Gender Construction in Native Societies	4
NAS 180	Native American Women	4
POL 166	Women in Politics	4
RST 157	Hindu Women and Goddesses	4
RST 161	Modern Islam	4
SOC 131	The Family	4

SOC 134	Sociology of Racial Ethnic Families	4
SOC 145B	Gender and Rural Development in the Third World	4
SOC 158	Women's Social Movements in Latin America	4
SOC 172	Ideology of Class, Race and Gender	4
WMS 102	Gender and Post Colonialism	4
WMS 130	Globalization and Politics of Family Change	4
WMS 138	Critical Fashion Studies	4
WMS 145	Women's Movements in Transnational Perspective	4
WMS 146	Gender, War and Peace	4
WMS 148	Science, Gender, and Social Justice	4
WMS 158	Masculinities	4
WMS 160	Women, 'Race' and Sexuality in Postcolonial Cinema	4
WMS 174	Body Politics	4
WMS 175	Gender and Experience of Race	4
WMS 178A	Women Writers and the Transnational Imaginary; The Arab World	4
WMS 178B	Women Writers and the Transnational Imaginary; Asia	4
WMS 178C	Women Writers and the Transnational Imaginary; The Caribbean	4
WMS 178D	Women Writers and the Transnational Imaginary; Africa	4
WMS 178E	Women Writers and the Transnational Imaginary; Diasporic Women Writers in Europe	4
WMS 178F	Transnationalism and Writing by Women of Color	4
WMS 180	Women of Color Writing in the United States	4
WMS 182	Globalization, Gender and Culture	4
WMS 184	Gender in the Arab World	4
WMS 185	Women and Islamic Discourses	4
WMS 187	Gender and Public Policy	4

Thematic Cluster Tracks

Choose one of three cluster tracks. Choose four courses that form a thematic cluster, at least two of which are Women's Studies courses specified for the track. Courses used to meet this requirement may not duplicate those used to meet other Gender, Sexuality and Women's Studies major requirements. Students may also develop their own thematic or interdisciplinary cluster in consultation with the faculty advisor.

Track 1: Social Justice, Gender Politics and Activism

Women's Studies, requires two:

WMS 102	Gender and Post Colonialism	4
WMS 140	Gender and Law	4
WMS 145	Women's Movements in Transnational Perspective	4
WMS 146	Gender, War and Peace	4
WMS 148	Science, Gender, and Social Justice	4
WMS 170	Queer Studies	4
WMS 175	Gender and Experience of Race	4
WMS 182	Globalization, Gender and Culture	4
WMS 187	Gender and Public Policy	4
WMS 192	Internship in Women's Studies	1-12
WMS 193	Feminist Leadership Seminar	2

Depth Electives, requires two:

AAS 017	Women in African Societies	4

AAS 123	Black Female Experience in Contemporary Society	4
AAS 133	The Black Family In America	4
ANT 126B	Women and Development	4
ANT 139BN	Gender and Sexuality	4
ASA 112	Asian American Women	4
CHI 100	Chicana/ Chicano Theoretical Perspective	4
CHI 110	Sociology of the Chicana/o Experience	4
CHI 111	Chicanas/Mexicanas in Contemporary Society	4
CHI 112	Globalization, Transnational Migration, and Chicana/o and Latina/o Communities	4
CHI 130	United States-Mexican Border Relations	4
CHI 131	Chicanas in Politics and Public Policy	4
CHI 131S	Chicanas in Politics and Public Policy	4
CHI 182	Race and Juvenile Justice	4
HIS 159	Women and Gender in Latin American History	4
HIS 160	Spain and America in the 16th century	4
NAS 180	Native American Women	4
POL 166	Women in Politics	4
SOC 133	Sexual Stratification and Politics	4
SOC 158	Women's Social Movements in Latin America	4
SOC 172	Ideology of Class, Race and Gender	4
STS 129	Health and Medicine in a Global Context	4
STS 150	Gender and Science	4

Track 2: Culture, Power, and Resources

Women's Studies, requires two:

WMS 136	Critical Food Studies	4
WMS 138	Critical Fashion Studies	4
WMS 139	Feminist Cultural Studies	4
WMS 148	Science, Gender, and Social Justice	4
WMS 160	Women, 'Race' and Sexuality in Postcolonial Cinema	4
WMS 162	Feminist Film Theory and Criticism	4
WMS 164	Topics in Gender and Cinematic Representation	4
WMS 165	Feminist Media Production	6
WMS 178A	Women Writers and the Transnational Imaginary; The Arab World	4
WMS 178B	Women Writers and the Transnational Imaginary; Asia	4
WMS 178C	Women Writers and the Transnational Imaginary; The Caribbean	4
WMS 178D	Women Writers and the Transnational Imaginary; Africa	4
WMS 178E	Women Writers and the Transnational Imaginary; Diasporic Women Writers in Europe	4
WMS 178F	Transnationalism and Writing by Women of Color	4
WMS 180	Women of Color Writing in the United States	4
WMS 182	Globalization, Gender and Culture	4

WMS 185	Women and Islamic Discourses	4

Depth Electives, requires two:

AAS 181	Hip Hop in Urban America	4
ASA 141	Asian Americans and the Political Culture of Fashion in the U.S. and Asia	4
ANT 126B	Women and Development	4
ANT 128B	Self, Identity, and Family	4
CHI 160	Mexican Film and Greater Mexican Identity	4
CHI 170	Contemporary Issues in Chicano Art	4
CHI 171	Mexican and Chicano Mural Workshop	4
COM 159	Women in Literature	4
ENL 155B	19th-Century British Novel	4
ENL 185A	Women's Writing I	4
FMS 120	Italian-American Cinema	4
FMS 125	Topics in Film Genres	4
FMS 129	Russian Film	4
GER 114	From Marlene Dietrich to Run, Lola Run: German Women and Film	4
LIN 163	Language, Gender, and Society	4
STS 129	Health and Medicine in a Global Context	4
STS 150	Gender and Science	4
TXC 107	Social and Psychological Aspects of Clothing	4

Track 3: Sexualities, Subjectivities and Body Politics

WMS 170	Queer Studies	4

Choose one:

WMS 130	Globalization and Politics of Family Change	4
WMS 136	Critical Food Studies	4
WMS 138	Critical Fashion Studies	4
WMS 158	Masculinities	4
WMS 160	Women, 'Race' and Sexuality in Postcolonial Cinema	4
WMS 174	Body Politics	4
WMS 175	Gender and Experience of Race	4
WMS 187	Gender and Public Policy	4

Depth Electives, choose two:

AAS 123	Black Female Experience in Contemporary Society	4
ASA 112	Asian American Women	4
ANT 139BN	Gender and Sexuality	4
CHI 112	Globalization, Transnational Migration, and Chicana/o and Latina/o Communities	4
CHI 120	Chicana/ o Psychology	4
CHI 122	Psychology Perspectives Chicana/o and Latina/o Family	4
CHI 154	The Chicana/o Novel	4
CHI 160	Mexican Film and Greater Mexican Identity	4
ENL 166	Love and Desire in Contemporary American Poetry	4
ENL 186	Literature, Sexuality, and Gender	4
HIS 102M	Undergraduate Proseminar in History; United States Since 1896	5

HIS 184	History of Sexuality in America	4
NAS 134	Race, Culture, and Nation	4
NAS 135	Gender Construction in Native Societies	4
NAS 180	Native American Women	4
PSC 158	Sexual Orientation and Prejudice	4
PSC 159	Gender and Human Reproduction	4

Total: 64

Gender, Sexuality & Women's Studies | WMS Minor

(College of Letters and Science)

Maxine Craig, Ph.D., Program Director

Program Office. 1200 Hart Hall; 530-752-6429; http://gsws.ucdavis.edu/

Faculty. http://gsws.ucdavis.edu/faculty

The Major Program

Gender, Sexuality and Women's Studies is an interdisciplinary major founded on the understanding that the social production of gender is inseparable from that of race, sexuality, class, nationality, ability and other categories of difference. Our curriculum places feminist concerns within a transnational context, while respecting the need for geographic and historical specificity. These frameworks inform our teaching, our research, our institutional and community practices, and the principles we bring to our classrooms. Gender, Sexuality and Women's Studies offers a wide range of classes that use the lens of gender to examine colonialism and post colonialism, globalization, history, sexuality, queer theory, literature, popular culture, feminist video production, area studies, film fashion and food. The Program offers both an undergraduate major and minor. We also work collaboratively with other units on campus to sponsor two undergraduate minors, Sexuality Studies and Social and Ethnic Relations, and an undergraduate concentration in transnational production and consumption.

The Program. One of the most exciting and challenging aspects of the Gender, Sexuality and Women's Studies Program is that students, in consultation with the peer and faculty advisors, can pursue their particular academic interests and design their course of study accordingly. In devising their major plan, students will draw on courses offered in African American and African Studies, American Studies, Anthropology, Asian American Studies, Chicana/o Studies, Comparative Literature, English, French, German and Italian Studies, History, Linguistics, Native American Studies, Political Science, Psychology, Sociology, Spanish, Textiles and Clothing, and other related disciplines.

In addition to offering a broad array of courses that deal with gender, class, race, ethnicity, and sexuality, the Gender, Sexuality and Women's Studies Program affords interested students the opportunity to earn internship credit and conduct independent research as well as take advantage of the Honors Thesis option.

Students design a program of study in consultation with an adviser that is in accordance with their individual career goals. Many Gender, Sexuality and Women's Studies majors find it advantageous to pursue a double major, or to minor in another field of study. Upon successful completion of the degree requirements, students majoring in the program will graduate with a Bachelor of Arts in Gender, Sexuality and Women's Studies.

Career Alternatives. A degree in Gender, Sexuality and Women's Studies opens many possibilities for future employment. The major introduces students to relevant social issues, fosters critical thinking, develops strong verbal, writing and research skills and encourages social advocacy.

Pre-professional students will discover that a major in Gender, Sexuality and Women's Studies offers useful preparatory training for medical or law school. It is particularly suitable for those interested in specializing in social policy, international development, social justice or gender-related

work in a wide range of institutions and contexts. Students who plan to do practical work in counseling, clinical psychology, social services, education, media or politics will also find a major in Gender, Sexuality and Women's Studies provides a strong foundation. Those who wish to pursue graduate level research in such fields as anthropology, comparative literature, cultural studies, economics, education, ethnic studies, English, film studies, history, languages and literatures, performance studies, philosophy, political science, and sociology will also benefit from a strong Gender, Sexuality and Women's Studies undergraduate background in critical theory, social analysis, history and a sound understanding of cultural representation and narratives of difference.

Increasingly, media and cultural institutions, corporations, and personnel firms are hiring specialists in women and gender studies trained in understanding the complex cultural challenges and demands arising from diverse communities. State and federal agencies need people who have special understanding of the problems that diverse groups of women face in society, industry, and the professions. Educational institutions across the spectrum need specialists to develop and administer women and gender studies programs, multi-cultural community centers, LGBTQ organizations and other organizations designed specifically to deal with gender, social diversity and inequality, and a growing range of old and new social challenges arising in the context of globalization.

Some of our alumni have developed careers other than those described above. Gender, Sexuality and Women's Studies faculty and peer advisors can provide even more ideas about possible future careers. Doing internships related to coursework enables students to integrate theory with hands-on practice and service in the community.

Graduate Study. The Gender, Sexuality and Women's Studies Program offers a designated emphasis in Feminist Theory and Research for students enrolled in the Ph.D. programs of fifteen other affiliated departments.

Major Advisor. All Gender, Sexuality and Women's Studies majors and minors must consult with a faculty advisor, individually, at least once each academic year

Gender, Sexuality and Women's Studies **Units:** 24

Choose one:		
WMS 050	Introduction to Critical Gender Studies	4
WMS 060	Feminist Critiques of Western Thought	4
WMS 070	Theory and History of Sexualities	4
WMS 080	Special Topics in Critical Gender Studies	4
Choose one:		
AAS 123	Black Female Experience in Contemporary Society	4
AAS 133	The Black Family In America	4
ANT 126B	Women and Development	4
ANT 130A	Cultural Dimensions of Globalization	4
ANT 139BN	Gender and Sexuality	4
ASA 112	Asian American Women	4
CHI 111	Chicanas/Mexicanas in Contemporary Society	4
CHI 122	Psychology Perspectives Chicana/o and Latina/o Family	4
CHI 131	Chicanas in Politics and Public Policy	4
NAS 134	Race, Culture, and Nation	4
NAS 180	Native American Women	4
SOC 131	The Family	4
SOC 132	The Sociology of Gender	4
SOC 134	Sociology of Racial Ethnic Families	4
SOC 145B	Gender and Rural Development in the Third World	4
SOC 158	Women's Social Movements in Latin America	4
SOC 172	Ideology of Class, Race and Gender	4

WMS 160	Women, 'Race' and Sexuality in Postcolonial Cinema	4
WMS 180	Women of Color Writing in the United States	4

Choose one:

COM 135	Women Writers	4
COM 138	Gender and Interpretation in the Renaissance	4
COM 159	Women in Literature	4
ENL 185A	Women's Writing I	4
ENL 185B	Women's Writing II	4
HIS 102G	Undergraduate Proseminar in History; China to 1800	5
HIS 102H	Undergraduate Proseminar in History; China Since 1800	5
HIS 102M	Undergraduate Proseminar in History; United States Since 1896	5
HIS 148A	Women and Society in Europe: 1500-1789	4
HIS 148B	Women and Society in Europe: 1789-1920	4
WMS 102	Gender and Post Colonialism	4
WMS 180	Women of Color Writing in the United States	4
WMS 182	Globalization, Gender and Culture	4
WMS 184	Gender in the Arab World	4

Choose additional electives from approved list of upper division cross-listed and Women's Studies courses.

Note: With prior consultation with an advisor, other upper division courses may be accepted toward the minor program. Under no circumstances may more than one lower division course be offered in satisfaction of requirements for the minor.

Total: 24

Gender, Sexuality & Women's Studies | WMS Courses

Courses in WMS:

WMS 020—Cultural Representations of Gender (4)
Lecture/Discussion—4 hours. Interdisciplinary investigation of how specific cultures represent gender difference. Examine a variety of cultural forms and phenomena including film, television, literature, music, popular movements, and institutions. GE credit: ACGH, AH, DD, SS, VL, WC, WE. Effective: 2016 Spring Quarter.

WMS 025—Gender and Global Cinema (4)
Film Viewing—3 hours; Lecture—3 hours. The role gender plays in film history/culture in various geographical contexts and in aspects of contemporary globalization. Films from nations such as China, Colombia, Cuba, Ethiopia, India, Iran, Korea, New Zealand, and the U.S. GE credit: AH, VL, WC, WE. Effective: 2016 Fall Quarter.

WMS 050—Introduction to Critical Gender Studies (4)
Discussion—1 hour; Lecture—3 hours. Introduction to interdisciplinary, critical gender studies. Addresses the emergence of women's, gender and feminist studies internationally, its links to women's movements, and its influence within the various arts, humanities and social science disciplines. GE credit: ACGH, AH, DD, SS, VL, WE. Effective: 2016 Fall Quarter.

WMS 060—Feminist Critiques of Western Thought (4)
Lecture/Discussion—4 hours. Critical introduction to major traditions of social thinking in the West from a feminist perspective. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Spring Quarter.

WMS 070—Theory and History of Sexualities (4)
Lecture/Discussion—4 hours. Key issues in the social construction, organization, and reproduction of sexualities such as the intersection of sexual identity with gender, race, ethnicity, and class, and the relation between movements for sexual liberation and the regulation of the body. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

WMS 080—Special Topics in Women's Studies (4) ***Review all entries***
Lecture/Discussion—4 hours. Limited enrollment. In-depth examination of a women's studies topic related to the research interest of the instructor. May be repeated for credit when topic differs. May be repeated for credit. Effective: 2016 Fall Quarter.

WMS 080—Special Topics in Critical Gender Studies (4) ***Review all entries***
Lecture/Discussion—4 hours. In-depth examination of a women and gender studies topic related to the research interest of the instructor. May be repeated up to 1 time(s) when topic differs. GE credit: SS, WE. Effective: 2018 Fall Quarter.

WMS 090X—Lower Division Seminar (2)
Seminar—2 hours. Examination of a special topic in Womens Studies through shared readings, discussions, and written assignments. Effective: 2016 Fall Quarter.

WMS 091—Research Seminar in the Transnational Production and Consumption of Fashion (1-2)
Seminar—1-2 hours. Preparation for a research conference. May be repeated for credit when topic differs. Effective: 2016 Fall Quarter.

WMS 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2016 Fall Quarter.

WMS 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2016 Fall Quarter.

WMS 102—Gender and Post Colonialism (4)
Lecture/Discussion—4 hours; Term Paper. Explores changing configurations of race, gender, sexuality, class and implications for governmentality in one or more colonial or postcolonial regimes in one or more societies. GE credit: AH, DD, SS, WC, WE. Effective: 2018 Winter Quarter.

WMS 103—Introduction to Feminist Theory (4)
Lecture/Discussion—4 hours. Prerequisite(s): WMS 050 recommended or consent of instructor. Introduction to the emergence of feminist theory and to key concepts in feminist theorizing. Examination of past and current debates over sexuality, race, identity politics, and the social construction of womens experience. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

WMS 104—Feminist Research (4)
Lecture/Discussion—4 hours. Prerequisite(s): Required for Women's Studies major. Introduction to feminist applications and transformations of traditional disciplinary research practices; initial training in methodologies for feminist interdisciplinary work. GE credit: AH, DD, OL, SS, WE. Effective: 2018 Winter Quarter.

WMS 130—Globalization and Politics of Family Change (4)
Lecture/Discussion—4 hours. Political/cultural changes, conflicts, and economic disparities that have led to greater mobility and dispersal of families. Transnationalism on gender relations, sexualities, and the meaning of family. GE credit: AH, OL, SS, WC, WE. Effective: 2018 Spring Quarter.

WMS 136—Critical Food Studies (4)
Lecture/Discussion—4 hours. Production and consumption of food at the intersections of gender, race, ethnicity, nation, and body. Individual and familial experiences as part of larger economic and political structures in the U.S. and globally. GE credit: ACGH, AH, DD, OL, SS, WE. Effective: 2018 Spring Quarter.

WMS 137—Contemporary Debates in Western Feminist Theory (4)
Lecture/Discussion—4 hours. Prerequisite(s): WMS 060; or Consent of Instructor. Interpretations of poststructuralist, postmodern, and postcolonial thought from a critical feminist perspective; includes methods of applying theory to concrete social/cultural problems of gender, race, sexuality, class. GE credit: ACGH, AH, DD, SS, WE. Effective: 2018 Spring Quarter.

WMS 138—Critical Fashion Studies (4)
Lecture/Discussion—4 hours. Feminist cultural studies of style-fashion-dress through transnational circuits, personal subjectivities. Fashion as means of gender oppression and liberation. Histories and discourses of masculinities and femininities. Clothing works on global assembly line. Use of dress in construction/regulation of identities. GE credit: AH, DD, SS, VL, WC, WE. Effective: 2016 Fall Quarter.

WMS 139—Feminist Cultural Studies (4)
Lecture/Discussion—4 hours. Histories, theories, and practices of feminist traditions within Cultural Studies. (American Studies 139) GE credit: ACGH, AH, DD, SS, VL, WE. Effective: 2016 Fall Quarter.

WMS 140—Gender and Law (4)
Lecture/Discussion—4 hours. Exploration of womens legal rights in historical and contemporary context, discussing a variety of legal issues and applicable feminist theories. Topics include constitutional equal protection, discrimination in employment and education, sexual orientation discrimination, and the regulation of abortion. GE credit: ACGH, DD, SS. Effective: 2016 Fall Quarter.

WMS 145—Women's Movements in Transnational Perspective (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): WMS 050 recommended. Class size limited to 90 students. Transnational perspectives on twentieth and twenty-first century women's movements in Western, colonial and post-colonial contexts, examining movement's forms and political orientations and relationships between women's movements and other forces for change. GE credit: AH, OL, SS, WC, WE. Effective: 2016 Fall Quarter.

WMS 146—Gender, War and Peace (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Applies a critical gender perspective to militarism as manifest in contexts of military rule, war, conflict, peacebuilding and security post-conflict. Addresses the changing configurations of gender and sexuality in military institutions and militarized economies and cultures from an interdisciplinary perspective. GE credit: ACGH, AH, DD, SS, WC, WE. Effective: 2018 Winter Quarter.

WMS 148—Science, Gender, and Social Justice (4)
Lecture/Discussion—4 hours; Term Paper. Class size limited to 60 students. Critical reading and reflection on the history of Western science, scientific institutions and the changing role of science in relation to inequalities of class, race, gender and sexuality, and global struggles for equality and justice. GE credit: AH, DD, SS, WC, WE. Effective: 2016 Spring Quarter.

WMS 158—Masculinities (4)
Lecture/Discussion—3 hours; Term Paper. Cultural, economic, and political forces which shape historical and contemporary masculinities. Impact of race, class, ability, nation and sexuality on experiences and cultural representations of masculinity. GE credit: ACGH, AH, DD, SS, WE. Effective: 2018 Spring Quarter.

WMS 160—Women, 'Race' and Sexuality in Postcolonial Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Class size limited to 90 students. Feminist analysis of race, sexuality and class in the representation of women in commercial and/or independent films. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

WMS 162—Feminist Film Theory and Criticism (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Historical overview of and contemporary issues in feminist film theory, including representation, spectatorship, and cultural production. Film stars, women filmmakers, and the intersections of gender, race, sexuality, and class in films and their audiences. GE credit: ACGH, AH, DD, VL, WC, WE. Effective: 2016 Spring Quarter.

WMS 164—Topics in Gender and Cinematic Representation (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Examination of a specific topic within the broad rubric of gender and cinema. Possible topics include Latinas in Hollywood; gender, nation, cinema; and gender and film genre. Topics vary. May be repeated up to 2 time(s) when topic differs. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

WMS 165—Feminist Media Production (6) ***Review all entries***
Fieldwork—6 hours; Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): CTS 020; or equivalent. One course in Women and Gender Studies or consent of instructor. Media production as a mode of cultural criticism, furthering feminist/ social justice activist goals. Fundamentals of camera, editing and distribution via a social engagement model. Study and hands-on response to key historic and contemporary feminist and social justice media discourses. (CDM 105) GE credit: ACGH, AH, DD, SS, VL. Effective: 2017 Winter Quarter.

WMS 165—Feminist Media Production (6) ***Review all entries***
Fieldwork—6 hours; Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): (CTS 020 or CDM 020); or two WMS courses Media production as a mode of cultural criticism, furthering feminist/ social justice activist goals. Fundamentals of camera, editing and distribution via a social engagement model. Study and hands-on response to key historic and contemporary feminist and social justice media discourses. (CDM 105) GE credit: ACGH, AH, DD, SS, VL. Effective: 2018 Fall Quarter.

WMS 170—Queer Studies (4)
Lecture/Discussion—4 hours. Prerequisite(s): WMS 070 recommended or consent of instructor. Study of queer sexualities, identities, theories, practices. Alternative sexualities as historical, social, and cultural constructions in intersections with race, gender, class, nationality. Interdisciplinary exploration of sexual liberation and the regulation of sexuality through history, theory and expressive cultural forms. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

WMS 174—Body Politics (4)
Lecture/Discussion—4 hours. The body as a site where status inequalities are formed and resisted. Self-making through bodywork, history of gendered and racial meanings of the body, and analysis of normalizing discourses and practices. GE credit: AH, DD, SS, WC, WE. Effective: 2018 Winter Quarter.

WMS 175—Gender and Experience of Race (4)
Lecture/Discussion—4 hours. Exploration of the co-construction of "race" and gender in comparative national historical contexts and contemporary lived experience. Study of intersections of race and gender in identities and how institutions, labor migration, social movements and consumption shape racialized gendered identities. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

WMS 176—Autobiography, Narrative, Memoir (4)
Discussion—1 hour; Lecture—2 hours; Term Paper. Prerequisite(s): Consent of Instructor. Class size limited to 30 students. Life narrative writings by women. Transgressive voices exploring issues of race, class, and sexuality, women's silence and marginalization. Theories of autobiography, autoethnography and memoir included. May be repeated for credit if subject matter differs. GE credit: AH, DD, SS, WE. Effective: 2018 Summer Session 1.

WMS 178A—Women Writers and the Transnational Imaginary; The Arab World (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Writings by women from diverse regions and cultures, understood in their cultural, socio-economic, and historical contexts, with each course offering a focus on women's writing in specific geographic/national locations and their diasporas: The Arab World. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

WMS 178B—Women Writers and the Transnational Imaginary; Asia (4)
Lecture/Discussion—4 hours. Writings by women from diverse regions and cultures, understood in their cultural, socio-economic, and historical contexts, with each course offering a focus on women's writing in specific geographic/national locations and their diasporas: Asia. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

WMS 178C—Women Writers and the Transnational Imaginary; The Caribbean (4)
Lecture/Discussion—4 hours. Writings by women from diverse regions and cultures, understood in their cultural, socio-economic, and historical contexts, with each course offering a focus on women's writing in specific geographic/national locations and their diasporas: The Caribbean. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

WMS 178D—Women Writers and the Transnational Imaginary; Africa (4)
Lecture/Discussion—4 hours. Writings by women from diverse regions and cultures, understood in their cultural, socio-economic, and historical contexts, with each course offering a focus on women's writing in specific geographic/national locations and their diasporas: Africa. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

WMS 178E—Women Writers and the Transnational Imaginary; Diasporic Women Writers in Europe (4)
Lecture/Discussion—4 hours. Writings by women from diverse regions and cultures, understood in their cultural, socio-economic, and historical contexts, with each course offering a focus on women's writing in specific geographic/national locations and their diasporas: Diasporic Women Writers in Europe. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

WMS 178F—Transnationalism and Writing by Women of Color (4)
Lecture/Discussion—4 hours. Writings by women of color in a transnational framework, understood in their cultural, socio-economic, and historical contexts. The interrelation among gender, writing, nationalism, and transnationalism with focus on women's writing in specific geographic/national locations and their diasporas: Topics on Women Writers of Color. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

WMS 179—Gender and Literature (4)
Lecture/Discussion—4 hours. Prerequisite(s): One course in Women's Studies or consent of instructor. Role of literature, especially novels, in constructing, challenging, and transforming normative genders in society. Transhistorical and transnational focus on gender in its intersections with race, class, sexuality, and politics. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

WMS 180—Women of Color Writing in the United States (4)
Lecture/Discussion—4 hours. Literature, especially novels, written by contemporary women of color in the United States, understood in their socio-economic, cultural and historical contexts. GE credit: ACGH, AH, DD, WE. Effective: 2016 Fall Quarter.

WMS 182—Globalization, Gender and Culture (4)
Lecture/Discussion—4 hours. Critical gender analysis of globalization as a process of interconnected cultural, social and economic transformations inflected by gender, nation, class and race/ethnicity. Critical self-reflection and social observation skills. GE credit: AH, OL, SS, WC, WE. Effective: 2016 Spring Quarter.

WMS 184—Gender in the Arab World (4)
Lecture/Discussion—4 hours. Examination of the history, culture, and social/political/economic dynamics of gender relations and gendering in the Arab world. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

WMS 185—Women and Islamic Discourses (4)
Lecture/Discussion—4 hours. Prerequisite(s): WMS 050; Or comparable course. Introduction to debate/discourses about women and Islam. Transformations in debate/discourses in colonial and postcolonial periods in the Middle East & South Asia. Comparative study of debate/discourses on family, work, law, sexuality, religion, comportment, human rights, feminist and religious movements. (Middle East/South Asia Studies 150.) GE credit: AH, SS, WC. Effective: 2016 Fall Quarter.

WMS 187—Gender and Public Policy (4)
Lecture/Discussion—3 hours; Term Paper. Role of gender in the creation of social policies, especially with respect to issues brought into the policy arena by contemporary feminism. GE credit: ACGH, DD, SS, WE. Effective: 2018 Winter Quarter.

WMS 189—Special Topics in Critical Gender Studies (4)
Lecture/Discussion—4 hours. In-depth examination of a women's studies topic related to the research interests of the instructor. May be repeated up to 1 time(s) when topic differs. GE credit: AH, SS, WE. Effective: 2016 Fall Quarter.

WMS 190—Senior Seminar (4)
Seminar—4 hours. Capstone course for senior Womens Studies majors, which focuses on current issues on feminism as they impact theory, public policy, and practice. GE credit: ACGH, AH, DD, SS. Effective: 2016 Fall Quarter.

WMS 191—Capstone Seminar (4)
Seminar—4 hours. Revision, completion, and presentation of senior research or creative project. Creating a multimedia website for publishing research and creative projects. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

WMS 192—Internship in Women's Studies (1-12)
Internship—3-36 hours; Term Paper. Prerequisite(s): Completion of a minimum of 84 units and consent of instructor; enrollment dependent on availability of intern positions with priority to Women's Studies majors. Supervised internship and study in positions/institutional settings dealing with gender-related problems or issues, as for example, a women's center, affirmative action office, advertising agency, or social welfare agency. Final written report on internship experience. (P/NP grading only.) Effective: 2016 Fall Quarter.

WMS 193—Feminist Leadership Seminar (2)
Seminar—2 hours. Use feminist methods to critically reflect on the ethical, methodological and strategic aspects of an organization, project, campaign, movement or other social change initiative. May be repeated for credit. (P/NP grading only.) GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

WMS 194HA—Senior Honors Project in Women's Studies (4-6)
Independent Study—12 hours. Prerequisite(s): Senior standing, Women's Studies major, and advisor's approval. In consultation with an advisor, students complete a substantial research paper or significant creative project on a Womens Studies topic. GE credit: AH, SS, WE. Effective: 2016 Fall Quarter.

WMS 194HB—Senior Honors Project in Women's Studies (4-6)
Independent Study—12 hours. Prerequisite(s): Senior standing, Women's Studies major, and advisor's approval. In consultation with an advisor, students complete a substantial research paper or significant creative project on a Women's Studies topic. GE credit: AH, SS, WE. Effective: 2016 Fall Quarter.

WMS 195—Thematic Seminar in Critical Gender and Women's Studies (4)
Seminar—4 hours. Group study of a topic, issue or area in feminist theory and research involving intensive reading and writing. May be repeated for credit. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Spring Quarter.

WMS 197T—Tutoring in Women's Studies (1-4)
Tutorial—3-12 hours. Prerequisite(s): Upper division standing and consent of director. Leading small, voluntary discussion groups affiliated with a Womens
Studies course. May be repeated for credit for a total of 8 units. May be repeated up to 8 unit(s). (P/NP grading only.) Effective: 2016 Fall Quarter.

WMS 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 2016 Fall Quarter.

WMS 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 2016 Fall Quarter.

WMS 200A—Current Issues in Feminist Theory (4)
Seminar—4 hours. Current issues in feminist theory; techniques employed to build feminist theory in various fields. Effective: 2016 Fall Quarter.

WMS 200B—Problems in Feminist Research (4)
Seminar—4 hours. Prerequisite(s): WMS 200A B+ or better Application of feminist theoretical perspectives to the interdisciplinary investigation of a problem or question chosen by the instructor(s). May be repeated for credit when subject area differs. May be repeated for credit. Effective: 2016 Fall Quarter.

WMS 201—Special Topics in Feminist Theory and Research (4)
Lecture/Discussion—4 hours. Limited enrollment. Explores in depth a topic in feminist theory and research related to the research interests of the instructor. May be repeated for credit when topic differs. Limited enrollment. May be repeated for credit. Effective: 2016 Fall Quarter.

WMS 250—Cultural Study of Masculinities (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Interdisciplinary approaches to understanding the social and cultural construction of masculinities; attention to the effects of biology, gender, race, class, sexual and national identities; criticism of oral, printed, visual, and mass mediated texts, and of social relations and structures. (American Studies 250) Effective: 2016 Fall Quarter.

WMS 299—Special Study for Graduate Students (1-12)
Variable. (P/NP grading only.) Effective: 2016 Fall Quarter.

WMS 299D—Dissertation Research and Writing (4)
Extensive Writing/Discussion—3 hours. Prerequisite(s): WMS 200A; WMS 200B; Fulfillment of course requirements for the DE in Feminist Theory and Research, advancement to candidacy. (S/U grading only.) Effective: 2016 Fall Quarter.

WMS 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 2016 Fall Quarter.

General Linguistics Minor; Linguistics

General Linguistics Minor; Linguistics | General Linguistics Minor

(College of Letters and Science)

Raul Aranovich, Ph.D., Chairperson of the Department

Department Office. 469 Kerr Hall; 530-752-0966; http://linguistics.ucdavis.edu

Faculty. http://linguistics.ucdavis.edu/directory-of-people/lin-faculty

Linguistics offers two minor programs:

- *General Linguistics*, which provides the student with basic knowledge of language structure and linguistic analysis.
- Linguistics for Language Teachers, which especially complements the major in English with the Teaching Area of emphasis; it is also of relevance to students interested in teaching foreign languages.

Minor Advisor. Kenji Sagae

General Linguistics **Units:** 24

LIN 001	Introduction to Linguistics	4
LIN 103A	Linguistic Analysis I: Phonetics, Phonology, Morphology	4
LIN 103B	Linguistic Analysis II: Morphology, Syntax, Semantics	4

Choose one:

LIN 111	Introduction to Phonological Theory	4
LIN 112	Phonetics	4
LIN 121	Morphology	4

LIN 131	Introduction to Syntactic Theory	4
LIN 141	Semantics	4
LIN 151	Historical Linguistics	4
LIN 152	Language Universals and Typology	4

Choose additional units from upper division Linguistics courses and other upper division courses listed in the major requirements in consultation with an advisor.

Total: 24

General Linguistics Minor; Linguistics | LIN Courses

Courses in LIN:

LIN 001—Introduction to Linguistics (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the study of language; its nature, diversity, and structure. GE credit: AH, SS. Effective: 1997 Winter Quarter.

LIN 001Y—Introduction to Linguistics (4)
Discussion—1 hour; Web Virtual Lecture—3 hours. Introduction to the study of language; its nature, diversity, and structure. Students may not take both LIN 001 and LIN 001Y for credit. GE credit: AH, SS. Effective: 2014 Spring Quarter.

LIN 003—Language and the Body (4)
Discussion—2 hours; Lecture—2 hours. Open to all students regardless of major. Enrollment will be restricted to 80-100 students. Perspectives on the role of language in issues about bodies. Language-related disabilities. Social implications of language use in discussing body-related conditions. GE credit: OL, SS. Effective: 2018 Winter Quarter.

LIN 005—Global English and Communication (4)
Discussion—2 hours; Lecture—2 hours. English as a global language and its uses in intercultural communication. Cultural, historical, and political dimensions of varieties of English spoken around the world. Experiential grounding in strategies for increasing interpretive and verbal communicative competence for a globalized world. (Communication 5.) GE credit: AH, OL, SS, WC. Effective: 2012 Spring Quarter.

LIN 006—Language and Society (4)
Discussion—1 hour; Lecture—3 hours. Language as a social phenomenon. Topics include linguistic diversity, language policy, language and identity, language and social structure, speech communities and social networks, the effect of social factors on language variation, linguistic consequences of language contact. GE credit: ACGH, DD, SS, WE. Effective: 2008 Fall Quarter.

LIN 015—Academic Oral Communication (3)
Discussion—2 hours; Lecture—1 hour. Structure of oral communication, critical thinking, and persuasion in classroom discourse in American English and in cross-cultural perspective. GE credit: AH, OL, SS. Effective: 2014 Fall Quarter.

LIN 020—Oral English for International Students (3) ***Review all entries***
Lecture/Discussion—3 hours. Open to non-native speakers of English with priority enrollment to international teaching assistants with qualifying placement exam scores. Intensive work in oral English for international students, to increase fluency, accuracy, and use of appropriate discourse strategies in academic settings (e.g., seminar, discussion, laboratory). Training in segmental features of English sounds, intonation, stress, non-verbal cues, and register. May be repeated for credit. (P/NP grading only.) Effective: 2011 Fall Quarter.

LIN 020—Oral English for International Students (3) ***Review all entries Discontinued***
Lecture/Discussion—3 hours. Open to non-native speakers of English with priority enrollment to international teaching assistants with qualifying placement exam scores. Intensive work in oral English for international students, to increase fluency, accuracy, and use of appropriate discourse strategies in academic settings (e.g., seminar, discussion, laboratory). Training in segmental features of English sounds, intonation, stress, non-verbal cues, and register. May be repeated for credit. (P/NP grading only.) Effective: 2018 Fall Quarter.

LIN 024—English Structures and Strategies in Academic Writing (4)
Lecture/Discussion—4 hours. Prerequisite(s): LIN 023 Open to students from language backgrounds other than English. Practice in academic writing designed to prepare undergraduate students from language backgrounds other than English for successful academic work. Development of academic writing, critical thinking, and reading skills. Deveopment of clear, accurate language for presenting an effective argument. Effective: 2006 Fall Quarter.

LIN 025—English for International/ESL Graduate Students (4)
Lecture/Discussion—4 hours. Prerequisite(s): Admission by placement examination or consent of coordinator; open to international and ESL graduate students and limited status international undergraduates (Education Abroad Program participants). Multi-skills ESL course designed to help international/ESL students improve their English language skills for successful academic study. Emphasis on writing, speaking, listening, reading, and academic culture. (P/NP grading only.) Effective: 2003 Fall Quarter.

LIN 026—Writing for International Graduate Students (3)
Lecture—3 hours. Prerequisite(s): Satisfactory completion of LIN 025 if held for it, or consent of instructor. Admission limited to international graduate students. Focuses on writing needed for academic work, including summaries, critiques, research and grant proposals, memos, resumes, and research papers. Includes a review of grammar needed for writing and some focus on reading skills and American vocabulary and idioms. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 096—Directed Group Study in English as a Second Language (1-5)
Variable—1.5 hours. Prerequisite(s): Consent of Instructor. Directed group study of topic in English as a Second Language (ESL). May be repeated for credit May be repeated for credit by consent of the ESL coordinator. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Intended for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Intended for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 103A—Linguistic Analysis I: Phonetics, Phonology, Morphology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 001 recommended. Introduction to fundamental methods and concepts used in linguistic analysis, focusing on phonetic, phonological, and morphological phenomena. Emphasizes development of analytical skills and appreciation of structural regularities and differences among languages. Not open for credit to students who have completed LIN 139. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 103B—Linguistic Analysis II: Morphology, Syntax, Semantics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 001 recommended. Introduction to fundamental methods and concepts used in linguistic analysis, focusing on morphological, syntactic, and semantic phenomena. Emphasizes development of analytical skills and appreciation of structural regularities and differences among languages. Not open for credit to students who have completed LIN 140. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 105—Topics in Language and Linguistics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. LIN 001 recommended. Detailed examination of a major contemporary linguistic theory, a major contemporary issue or related set of issues in linguistics, or the structure of a particular language or language family. May be repeated for credit when topic differs. May be repeated for credit. Effective: 2017 Winter Quarter.

LIN 106—English Grammar (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 001 or LIN 001Y or ENG 003 or UWP 001; or Consent of Instructor. Survey of present-day English grammar as informed by contemporary linguistic theories. The major syntactic structures of English; their variation across dialects, styles, and registers; their development; and their usefulness in describing the conventions of English. (English 106 and University Writing Program 106.) GE credit: AH. Effective: 2018 Winter Quarter.

LIN 111—Introduction to Phonological Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 103A recommended. Contemporary phonological theory with emphasis on syllable structure, metrical structure, phonology-morphology interaction, and typological variation in these areas, from the perspective of optimality-theoretic approaches. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 112—Phonetics (4)
Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): LIN 001 recommended. Detailed examination of articulatory and acoustic phonetics. GE credit: SE. Effective: 2017 Winter Quarter.

LIN 121—Morphology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 103A, 103B recommended. Introduction to the analysis of word structure and the relation of word structure to the lexicon and other grammatical components. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 127—Text Processing and Corpus Linguistics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): LIN 001, LIN 005, LIN 006, or ANT 004 recommended. Investigation of the lexical organization of human languages through corpus linguistics. Application of principles of linguistic analysis, automatic text processing, and statistical research to solving problems of textual evaluation and classification, as well as information retrieval and extraction. GE credit: AH, QL, SS. Effective: 2017 Winter Quarter.

LIN 131—Introduction to Syntactic Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 103B recommended. Introduction to syntactic theory, primarily through the examination of a major theory of syntax, emphasizing theoretical reasoning, argumentation, and problems of theory building in syntax. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 141—Semantics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 103B recommended. Linguistic study of meanings of words and phrases. Meanings expressed by lexical items and derivational and inflectional morphology. Contribution of argument structure, quantification, and coordination to meaning. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 150—Languages of the World (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 001 or ANT 004 recommended. Survey of the world's languages, their geographical distribution and classification, both genetic and typological. Illustrative descriptions of several major languages from different geographical areas; pidgins and creoles, lingua francas and other languages of widespread use. Not open for credit to students who have completed LIN 050. GE credit: AH, SS, WC. Effective: 2017 Winter Quarter.

LIN 151—Historical Linguistics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 103A recommended. Description and methods of the historical study of language, including the comparative method and internal reconstruction; sound change, morphological change, syntactic change, semantic change. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 152—Language Universals and Typology (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 103B recommended. Investigation into common features of all human languages and the classification of languages in terms of their structural features. Theories of universal grammar. Detailed discussion of non-Indo-European languages and comparison with English. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 160—American Voices (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 001 or LIN 001Y or ANT 004; Or upper division standing recommended. Explores the forms of American English: traditional notions of regional dialects and increasingly important social dialects, reflecting age, class, gender, race, ethnicity, and sexual orientation. The influence of language attitudes on perception of dialect speakers; dialect in media, education, and GE credit: SS, WE. Effective: 2018 Winter Quarter.

LIN 163—Language, Gender, and Society (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 001 or ANT 004 recommended. Investigation of real and putative (stereotyped) gender-linked differences in language structure and usage, with a consideration of some social and psychological consequences of such differences. Focus is on English, but other languages are also discussed. GE credit: ACGH, DD, SS, WE. Effective: 2017 Winter Quarter.

LIN 165—Introduction to Applied Linguistics (4)
Discussion—1 hour; Lecture—3 hours. Applications of linguistic principles and the analysis of language-related issues in the world. Exploration of a range of language-related problems including issues related to language learning and teaching to issues concerning language and gender, race, class and the media. GE credit: SS, WE. Effective: 2002 Winter Quarter.

LIN 166—The Spanish Language in the United States (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 001 or LIN 001Y or SPA 111N; SPA 023; Or equivalent to SPA 023 recommended. Linguistic features of the varieties of the Spanish language spoken throughout the United States; phonology, morphology, syntax, vocabulary. Focus on the relationship between United States Spanish and other world varieties of Spanish, within a historical framework. GE credit: SS. Effective: 2018 Spring Quarter.

LIN 171—Introduction to Psycholinguistics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (LIN 001 or LIN 001Y); LIN 103A, LIN 103B recommended. Introduction to psychological issues relating to the implementation of language and linguistic structure during speech production and comprehension and to the implications of research in psychology and related fields for linguistic theory. GE credit: SS. Effective: 2018 Spring Quarter.

LIN 173—Language Development (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (LIN 001 or LIN 001Y); or Consent of Instructor. LIN 103A, 103B recommended. Theory and research on children's acquisition of their native language, including the sound system, grammatical systems, and basic semantic categories. (Education 173.) GE credit: SS. Effective: 2018 Spring Quarter.

LIN 175—Biological Basis of Language (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. LIN 001 recommended. Overview of issues in the field of neurolinguistics and techniques used to explore representation of language in the human brain. GE credit: SE. Effective: 2017 Winter Quarter.

LIN 177—Computational Linguistics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. LIN 001 recommended. Understanding the nature of language through computer modeling of linguistic abilities. Relationships between human cognition and computer representations of cognitive processing. Not open for credit to students who have taken LIN 007. GE credit: SE. Effective: 2017 Winter Quarter.

LIN 180—Second Language Learning and Teaching (4)
Lecture/Discussion—4 hours. Prerequisite(s): LIN 001 or LIN 001Y; Or equivalent recommended. Psycholinguistic and sociolinguistic theories of second language learning. Connections between theoretical perspectives and pedagogical practices in formal and informal second language settings, with focus on tutoring. Impact of sociocontextual factors (e.g., gender, ethnicity). Fieldwork requirement. GE credit: SS, WE. Effective: 2018 Winter Quarter.

LIN 182—Multilingualism (4)
Lecture/Discussion—4 hours. Limited enrollment. Issues in multilingualism from a global perspective: e.g., multilingual communities; multilingualism and identity (gender, ethnicity, nationality); language ideologies and educational and sociopolitical policies surrounding multilingualism; acquisition of multilingualism; discursive practices of multilinguals. GE credit: SS, WC, WE. Effective: 2006 Spring Quarter.

LIN 192—Internship in Linguistics (1-12)
Internship—3-36 hours. Prerequisite(s): LIN 001 or LIN 001Y; Or equivalent course; consent of instructor. Internship applying linguistic-related skills to a fieldwork project in areas such as media, law, or industry, in approved organizations or institutions. Maximum of four units applicable toward major. (P/NP grading only.) Effective: 2018 Winter Quarter.

LIN 194H—Special Study for Honors Students (1-5)
Independent Study—1-5 hours. Prerequisite(s): Consent of Instructor. Open only to linguistics majors of senior standing who qualify for Honors Program. Guided research, under the direction of a faculty member approved by the
Program Director, leading to a senior honors thesis. May be repeated for credit for up to 6 units. May be repeated up to 6 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 197T—Tutoring in Linguistics (1-4)
Discussion—1-4 hours. Prerequisite(s): Consent of Instructor. Upper division standing and consent of department chairperson. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 200A—Foundations of Linguistics I (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing. Survey of fundamental issues raised by pre-generative linguistics in the twentieth century, with emphasis on issues crucial to applications of linguistics. Not open for credit to students who have completed LIN 203A. Effective: 2005 Spring Quarter.

LIN 200B—Foundations of Linguistics II (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing. Survey of fundamental issues raised by orthodox generative linguistics, with emphasis on issues crucial to applications of linguistics. Not open for credit to students who have completed LIN 203B. Effective: 2005 Spring Quarter.

LIN 200C—Foundations of Linguistics III (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing. Survey of fundamental issues raised by contemporary linguistic theories lying outside the generative grammar orthodoxy, with emphasis on issues crucial to applications of linguistics. Effective: 2005 Spring Quarter.

LIN 201—Proseminar (1)
Seminar—1 hour. Introduction to research activity of faculty in the Graduate Group in Linguistics and guest speakers. May be repeated up to 4 unit(s). (S/U grading only.) Effective: 2011 Fall Quarter.

LIN 205A—Topics in Linguistic Theory and Methods (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Advanced study of current problems in linguistic theory and methodology. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

LIN 205B—Topics in Linguistic Theory and Methods (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Advanced study of current problems in linguistic theory and methodology. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

LIN 205C—Topics in Linguistic Theory and Methods (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Advanced study of current problems in linguistic theory and methodology. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

LIN 205D—Topics in Linguistic Theory and Methods (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Advanced study of current problems in linguistic theory and methodology. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

LIN 211—Advanced Phonological Theory and Analysis (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 111 Critical examination of current phonological theories. Effective: 1997 Winter Quarter.

LIN 212—Advanced Phonetics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 112 Advanced investigation of the physiological basis of speech articulation and acoustic phonetics. Effective: 1997 Winter Quarter.

LIN 231—Advanced Syntactic Theory and Analysis (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 131 Critical survey of contemporary theories of syntax. Effective: 1997 Winter Quarter.

LIN 241—Advanced Syntactic Theory and Analysis (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 141; or Consent of Instructor. Advanced critical exploration of contemporary theories of linguistic
semantics. Effective: 1997 Winter Quarter.

LIN 250—Principles of Typological Linguistics (4)
Seminar—3 hours; Term Paper. Cross-linguistic comparison and typology, including word order, morphological typology, complex clauses, semantic categories and their grammaticalization, and applications of typology to language acquisition. Effective: 2011 Fall Quarter.

LIN 251—Principles of Historical Linguistics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 151 Advanced analysis of the theory and methods of historical linguistics. Effective: 1997 Winter Quarter.

LIN 252—Romance Linguistics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 151 Examination of the development of the Romance languages from Proto-Romance to the modern era. Application and critical examination of

methods of historical and comparative linguistics in particular areas of structural change in Romance. Effective: 1997 Winter Quarter.

LIN 253—Speech Perception (4)
Discussion—3 hours; Extensive Writing. Investigation into how listeners map a continuous and variable acoustic signal to a linguistic interpretation. Phonetic context, variation, linguistic knowledge, and sociolinguistics as factors in perceiving speech. Effective: 2017 Winter Quarter.

LIN 260—Variation in Speech Communities (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): LIN 281; or Consent of Instructor. Linguistic variability in time, space, and society. Theoretical issues related to social and linguistic constraints in variation; issues and methods in the quantitative analysis of variation. Speech community, quantitative analytic methods, and the scope of sociolinguistic competence. Effective: 2005 Spring Quarter.

LIN 263—Discourse Analysis: Text in Context (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing. Introduction to and application of leading theoretical approaches to the analysis of discourse. Approaches to the analysis of (spoken and written) text in context, tools for analyzing different types of texts (narration, conversation, etc.). Theme/rheme, given/new, anaphora, discourse markers, and Effective: 2005 Spring Quarter.

LIN 264—Current Issues in Language and Gender (4)
Project (Term Project); Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing; prior coursework in Linguistics, Gender Studies, or Cultural Studies is desirable; no expectation of bilingual proficiency. Exploration of the construction and performance of gender through language in cross-cultural perspective and in a variety of contexts: informal conversations, narratives, workplaces, schools, households, the mass media. Special topics may include: language acquisition; multilingualism; ecofeminism; queer theory. May be repeated up to 1 time(s) when topic differs. Effective: 2005 Fall Quarter.

LIN 265—Language, Performance, and Power (4)
Seminar—3 hours; Term Paper. Restricted to graduate standing or consent of instructor. Exploration of the intersection between linguistic and social theories in the language-state relation and the performance of identity. Ideological sources of language differentiation; nation-building and linguistic difference. Political economic, sociolinguistic, and ethnographic approaches to understanding linguistic inequality. (Anthropology 265.) Effective: 2003 Fall Quarter.

LIN 275—Neurobiology of Language (4)
Lecture/Discussion—3 hours; Term Paper. Survey of historical and modern conceptions of the neurobiology of language. Aphasia, functional neuroimaging, functional neuroanatomy of human language. Effective: 2011 Fall Quarter.

LIN 280—Theories of Second Language Acquisition (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Covers theoretical perspectives that direct or have directed research in second language acquisition; explores the relationship between linguistics and language teaching and deals with the individual variables that influence second language learning. Effective: 1998 Fall Quarter.

LIN 281—Research Methods in TESOL/SLD (4)
Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): LIN 280 Students will study a variety of research methods in second language research; evaluate research designs and methods of analyses, formulate research questions and hypotheses and design a study of their own, think about various kinds of data they can collect. Effective: 2000 Winter Quarter.

LIN 282—Individual and Social Aspects of Bilingualism (4)
Lecture—3 hours; Term Paper. Broad overview of bi-and multilingualism, with focus on theoretical and
descriptive research; topics covered range from language processing in bilinguals to code-switching to language as political issue in multilingual states. Effective: 1997 Winter Quarter.

LIN 283—Politics of Bi and Multilingual Literacies (4)
Lecture/Discussion—3 hours; Term Paper. Anthropological, psycho-social, political, and educational perspectives on bi- and multi-lingualism. Power, colonialism, "native/non-native" speakers, and varieties and the unequal distribution of social goods. Analysis of how competing factors keep peoples disenfranchised. Effective: 2005 Spring Quarter.

LIN 289—Pedagogical Applications of Second Language Acquisition Theory (4)
Seminar—3 hours; Term Paper. Prerequisite(s): LIN 280 Pedagogical implications of various theories of second language acquisition, facilitation of language acquisition in classroom settings, and techniques for conducting classroom-based research in language learning. Effective: 1999 Winter Quarter.

LIN 297T—English as a Second Language Teaching/Tutoring (1-4)
Tutorial—1-4 hours. Prerequisite(s): LIN 300 or LIN 301 or LIN 302 (can be concurrent); and Consent of Instructor. Teaching classes for ESL graduate students. Aiding the ESL undergraduate composition classes; tutoring foreign graduate student Teaching Assistants in pronunciation. Does not fulfill requirement toward the M.A. degree. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

LIN 298—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

LIN 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

LIN 300—Language Pedagogy (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing in Linguistics or consent of instructor; concurrent enrollment in LIN 297T recommended. Methods of teaching second languages to nonnative speakers, stressing particularly recent linguistic methodology and techniques, as related to teaching and tutoring in the UC Davis ESL program. Effective: 2013 Fall Quarter.

LIN 301—Teaching Academic Literacy (4)
Practice; Project (Term Project); Seminar—3 hours; Tutorial—14 hours. Prerequisite(s): LIN 300; or Consent of Instructor. Graduate standing. Methods of teaching advanced academic literacy in a second language, with a focus on ESL composition. Lesson development, teaching and tutoring in the UC Davis ESL program. Effective: 2007 Fall Quarter.

LIN 302—Recent Research and Special Projects in TESOL (4)
Lecture—4 hours. Prerequisite(s): LIN 300; LIN 301 Review of recent research in second language acquisition and the teaching of English to speakers of other languages. Continued teaching and tutoring in the UCD ESL clinic. Each student also designs and reports on a classroom research project. Effective: 1997 Winter Quarter.

LIN 305—Second Language Literacy and Technology (4)
Lecture/Discussion—1.5 hours; Web Electronic Discussion—1.5 hours. Prerequisite(s): LIN 002 or equivalent coursework/experience in second language pedagogy; consent of instructor; graduate students only. Limited enrollment. Exploration of literacy theory and critical pedagogy in relation to new instructional and communication technologies. Practicum experience in teaching second language literacy; reflection on connections between theory and practice. Fieldwork requirement. Effective: 2007 Fall Quarter.

LIN 310—Language Pedagogy for Teacher Educators (4)
Fieldwork; Project (Term Project); Seminar—3 hours; Tutorial. Prerequisite(s): Admission to Ph.D. program in Linguistics or Foreign Languages, or permission of instructor; significant language teaching experience. Current issues in second language pedagogy, with a focus on communicative methodology, participatory curriculum design, academic literacy, and the social contexts of teaching. Emphasis on reflective teaching and action research. Mentoring of new language teachers. May be repeated up to 12 unit(s). Effective: 2007 Fall Quarter.

LIN 391—Oral English for ESL Students (3)
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): Open only to non-native speakers of English with priority enrollment to international student teaching assistants; completion of any required ESL courses or consent of instructor. Course gives non-native English-speaking students, particularly international student teaching assistants, intensive work in oral
English to increase fluency, accuracy, and use of appropriate discourse strategies in academic settings(e.g., seminar, discussion, laboratory).Course may be repeated for credit with consent of coordinator. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

LIN 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Genetics & Genomics; Molecular & Cellular Biology

Genetics & Genomics; Molecular & Cellular Biology | Genetics & Genomics B.S.

(College of Biological Sciences)

Jodi Nunnari, Ph.D., Professor, Chairperson of the Department

Department Office. 149 Briggs Hall; 530-752-3611; http://www.mcb.ucdavis.edu

Faculty. http://biosci3.ucdavis.edu/Faculty/Profile/FacultyByDept/MCB

The Genetics and Genomics Major Program

The Genetics and Genomics major provides a broad background in the biological, mathematical, and physical sciences basic to the study of heredity, gene expression and evolution. The major is sufficiently flexible to accommodate students interested in the subject either as a basic discipline in the biological sciences or in terms of its applied aspects such as biotechnology, medicine, and agriculture.

The Program. The Genetics and Genomics program begins with the four-course, upper division core curriculum that provides an introduction to the principles of genetics, biochemistry, and cell biology. Students then take additional upper division courses in specialized areas of modern genetics including gene expression, evolution, development, human genetics and genomics, as well as a laboratory courses in the principles of genetics and genomics. Additional upper division courses in biological sciences, as well as internship/research coursework can be chosen to fulfill required elective units.

Career Alternatives. The Genetics and Genomics degree provides suitable preparation for a wide variety of careers, including teaching, research, work with biotechnology companies, medicine, and all the health sciences. It is also an excellent background for students wishing to continue their education in a graduate program, a teacher-training program, medical school, veterinary school, or other professional schools.

Master Advisor. Ted Powers

Advising. Biology Academic Success Center (BASC); 1023 Sciences Laboratory Building; 530-752-0410; http://www.biosci.ucdavis.edu/BASC.

Graduate Study. See Integrative Genetics and Genomics (Graduate Group).

Preparatory Subject Matter **Units:** 56-66

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
BIS 002C	Introduction to Biology: Biodiversity and the Tree of Life	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 002C	General Chemistry	5
OR		
CHE 002AH	Honors General Chemistry	5
CHE 002BH	Honors General Chemistry	5
CHE 002CH	Honors General Chemistry	5
OR		
CHE 003A	Chemistry for Life Sciences: Determining Structure and Predicting Properties	5

CHE 003B	Chemistry for Life Sciences: Predicting and Characterizing Chemical Change	5
CHE 003C	Chemistry for Life Sciences: Controlling Processes and Synthetic Pathways	5
CHE 008A	Organic Chemistry: Brief Course	2
CHE 008B	Organic Chemistry: Brief Course	4
OR		
CHE 118A	Organic Chemistry for Health and Life Sciences	4
CHE 118B	Organic Chemistry for Health and Life Sciences	4
CHE 118C	Organic Chemistry for Health and Life Sciences	4
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
MAT 017C	Calculus for Biology and Medicine	4
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021C recommended.		
PHY 007A	General Physics	4
PHY 007B	General Physics	4
PHY 007C	General Physics	4

Depth Subject Matter **Units:** 40-48

BIS 101	Genes and Gene Expression	4
BIS 102	Structure and Function of Biomolecules	3
BIS 103	Bioenergetics and Metabolism	3
OR		
BIS 105	Biomolecules and Metabolism	3
BIS 104	Cell Biology	3
MCB 121	Advanced Molecular Biology	3
MCB 182	Principles of Genomics	3
EVE 100	Introduction to Evolution	4
OR		
BIS 181	Comparative Genomics	3
MCB 164	Advanced Eukaryotic Genetics	3
OR		
BIS 183	Functional Genomics	3
MCB 160L	Principles of Genetics Laboratory	5
OR		
BIS 180L	Genomics Laboratory	5
STA 100	Applied Statistics for Biological Sciences	4
OR		
STA 130A	Mathematical Statistics: Brief Course	4
STA 130B	Mathematical Statistics: Brief Course	4

Restricted Electives

Choose at least nine additional units:

BIS 134	Systems Biology: From Biological Circuits to Biological Systems	2
BIS 181	Comparative Genomics	3
BIS 183	Functional Genomics	3
BIT 150	Applied Bioinformatics	4
ECS 124	Theory and Practice of Bioinformatics	4
EVE 100	Introduction to Evolution	4
EVE 102	Population and Quantitative Genetics	4
EVE 103	Phylogeny, Speciation and Macroevolution	4
EVE 131	Human Genetic Variation and Evolution	3
EVE 150	Evolution of Animal Development	3
EVE 161	Microbial Phylogenomics - Genomic Perspectives on the Diversity and Diversification of Microbes	3
EVE 175	Computational Genetics	3
MIC 105	Microbial Diversity	3
MIC 150	Genomes of Pathogenic Bacteria	3
MIC 170	Yeast Molecular Genetics	3
MCB 150	Developmental Biology	4
MCB 162	Human Genetics and Genomics	3
MCB 163	Developmental Genetics	3
MCB 164	Advanced Eukaryotic Genetics	3
PLB 112	Plant Growth and Development	3
PLB 113	Molecular and Cellular Biology of Plants	3
PLS 154	Introduction to Plant Breeding	4

OR

Upper division courses in genetics or other fields relevant to the student's interest chosen in consultation with the adviser. No more than four units of 192, 193, 194H, 198, or 199 may be used for credit in this category.

Total: 96-114

Genetics & Genomics; Molecular & Cellular Biology | MCB Courses

Courses in MCB:

MCB 010—Introduction to Human Heredity (4)
Discussion—1 hour; Lecture—3 hours. Topics in human heredity and human gene structure and function, including the genetic basis of human development, causes of birth defects, mental retardation, genetic diseases, sexual determination, development, and behavior. GE credit: QL, SE, SL. Effective: 2004 Spring Quarter.

MCB 023—Biography of Cancer: Past, Present and Future (3)
Lecture/Discussion—3 hours. Historical account of the progression of cancer treatment, prevention, and human understanding of the biological basis of cancer. Past, present and future social implications of cancer treatment and prevention. GE credit: ACGH, SE, SL, SS, WE. Effective: 2018 Spring Quarter.

MCB 099—Special Study (1-5)
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

MCB 110Y—iBioseminars in Cell and Molecular Biology (3)
Lecture/Discussion—2 hours; Web Electronic Discussion—1.5 hours; Web Virtual Lecture—1.5 hours. Prerequisite(s): BIS 101; BIS 102; (BIS 103 or BIS 105); BIS 104 Hybrid course in Cell and Molecular Biology for senior level (1) Biochemistry/Molecular Biology; (2) Genetics; or (3) Cell Biology majors. Face-to-face instruction combined with online lectures available at iBioseminars website delivered by leading researchers in Cell and Molecular Biology. Students who have previously taken MCB 110V cannot receive credit for MCB 110Y. GE credit: SE, SL. Effective: 2014 Fall Quarter.

MCB 120—Molecular Biology and Biochemistry Laboratory Associated Lecture (3)
Discussion/Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): BIS 102; or Consent of Instructor. Pass One restricted to upper division Biochemistry & Molecular Biology majors; concurrent enrollment in MCB 120L required; on-time attendance for first lecture is mandatory. Introduction to laboratory methods and procedures employed in studying molecular biology and biochemical processes. Lecture component for MCB 120L. GE credit: SE, SL. Effective: 2018 Winter Quarter.

MCB 120L—Molecular Biology and Biochemistry Laboratory (3)
Laboratory—10 hours. Prerequisite(s): BIS 102; or Consent of Instructor. Must be taken concurrently with MCB 120. Pass One restricted to upper division Biochemistry & Molecular Biology majors; concurrent enrollment in MCB 120 required; on-time attendance for first lab is mandatory. Introduction to laboratory methods and procedures employed in studying molecular biology and biochemical processes. Designed for students who need experience in use of molecular biology and biochemical techniques as research and analytical tools. GE credit: QL, SE, VL, WE. Effective: 2018 Winter Quarter.

MCB 121—Advanced Molecular Biology (3)
Lecture—3 hours. Prerequisite(s): BIS 101; (BIS 102 (can be concurrent) or BIS 105 (can be concurrent) or ABI 102 (can be concurrent)); BIS 102 or BIS 105 or ABI 102 can be concurrent although prior completion is recommended. Structure, expression, and regulation of eukaryotic genes. Chromosome structure and replication; gene structure, transcription, and RNA processing; protein synthesis and translation control; development, immune system, and oncogenes. Not open for credit to students who have completed MCB 161. GE credit: QL, SE, SL. Effective: 2014 Fall Quarter.

MCB 123—Behavior and Analysis of Enzyme and Receptor Systems (3)
Lecture—3 hours. Prerequisite(s): BIS 103 Introduction to the principles of enzyme kinetics and receptor-ligand interactions with emphasis on metabolic regulation and data analysis. Topics include simultaneous equilibria, chemical and steady-state kinetics, allosteric enzymes, mulitreactant systems, enzyme assays, membrane transport and computer-assisted simulations and analyses. GE credit: QL, SE. Effective: 1997 Winter Quarter.

MCB 124—Macromolecular Structure and Function (4)
Lecture—4 hours. Prerequisite(s): BIS 103; CHE 118C An in-depth investigation into protein and nucleic acid structure and thermodynamics and how these properties influence their biological functions. Key examples of important functional classes of these molecules will be examined. Not open for credit to students who have completed MCB 122 or CHE 108. GE credit: SE. Effective: 2012 Fall Quarter.

MCB 126—Plant Biochemistry (3)
Lecture—3 hours. Prerequisite(s): BIS 103 or BIS 105 The biochemistry of important plant processes and metabolic pathways. Discussion of methods used to understand plant processes, including use of transgenic plants. (Plant Biology 126.) GE credit: SE, SL. Effective: 2008 Spring Quarter.

MCB 138—Undergraduate Seminar in Biochemistry (1)
Seminar—1 hour. Prerequisite(s): BIS 103 Discussion of the historical developments of modern biochemistry or current major research problems. May be repeated twice for credit when topic differs. May be repeated up to 2 time(s). (P/NP grading only.) GE credit: OL, SE. Effective: 1997 Winter Quarter.

MCB 139—Undergraduate Seminar in Biochemistry (2)
Seminar—2 hours. Prerequisite(s): BIS 103 Discussion of the historical developments of modern biochemistry or current major research problems. May be repeated up to 2 time(s) when topic differs. (P/NP grading only.) GE credit: OL, SE. Effective: 2015 Spring Quarter.

MCB 140—Cell Biology Laboratory Associated Lecture (3)
Discussion/Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): BIS 104; or Consent of Instructor. Pass One restricted to upper division Cell Biology majors; concurrent enrollment in MCB 140L required; on-time attendance for first lecture is mandatory. Lectures illustrating the principles of cell biology with emphasis on light microscopy. Accompanies MCB 140L. GE credit: OL, SE, SL, WE. Effective: 2018 Winter Quarter.

MCB 140L—Cell Biology Laboratory (5)
Discussion—1 hour; Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): BIS 104 (can be concurrent) Exercises illustrating the principles of cell biology with emphasis on light microscopy. GE credit: OL, QL, SE, SL, VL. Effective: 2009 Winter Quarter.

MCB 142—Advanced Cell Biology: Contractile and Motile Systems (4)
Lecture—3 hours; Term Paper. Prerequisite(s): BIS 102; BIS 104 (can be concurrent); MAT 016B Advanced cell biology with emphasis on molecular, biophysical and cellular properties of contractile and motile systems. GE credit: SE. Effective: 1998 Spring Quarter.

MCB 143—Cell and Molecular Biophysics (3)
Lecture—3 hours. Prerequisite(s): BIS 101; BIS 102; BIS 103; BIS 104 Physical chemical principles by which molecules form living, moving, reproducing cells. Physical nature of cytoplasm; molecular structure/bonding in macromolecules, macromolecular assemblies and protein machines. Physical techniques and modeling of cytoskeletal polymer-motor dynamics and function during intracellular transport, mitosis and motility. GE credit: QL, SE. Effective: 2008 Fall Quarter.

MCB 144—Mechanisms of Cell Division (3)
Lecture—3 hours. Prerequisite(s): BIS 101; BIS 102; BIS 104 The molecules and mechanisms that allow eukaryotic cells to coordinate cell growth, DNA replication, segregation of chromosomes and cell division. GE credit: SE, WE. Effective: 2002 Winter Quarter.

MCB 145—Assembly and Function of Cell Signaling Machinery (3)
Lecture—3 hours. Prerequisite(s): BIS 101; BIS 102; BIS 104 Molecular basis of cell signaling, including positioning of cellular machinery, components of various signaling pathways, and downstream effects of signaling on cell adhesion, cell differentiation, and programmed cell death. GE credit: SE. Effective: 2002 Spring Quarter.

MCB 148—Undergraduate Seminar in Cell Biology (2)
Seminar—2 hours. Prerequisite(s): Upper division standing in the biological sciences or a related discipline. Student reports on current topics in cell biology with emphasis on integration of concepts, synthesis, and state-of-the-art research approaches. Reviews of literature and reports of undergraduate research may be included. May be repeated for credit. (P/NP grading only.) GE credit: OL, SE. Effective: 1997 Winter Quarter.

MCB 150—Developmental Biology (4)
Lecture—4 hours. Prerequisite(s): BIS 101 Analysis of the mechanistic basis for animal development with a focus on experimental evidence and the relevant fundamental experimental strategies. Fertilization and early development, morphogenesis and patterning, cell differentiation, regulation of cell proliferation and tissue growth. GE credit: SE, SL. Effective: 2012 Fall Quarter.

MCB 158—Undergraduate Seminar in Developmental Biology (2)
Seminar—2 hours. Prerequisite(s): Upper division standing in the biological sciences or a related discipline. Student reports on current topics in cell biology with emphasis on integration of concepts, synthesis, and state-of-the-art research approaches. Reviews of literature and reports of undergraduate research may be included. May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: OL, SE. Effective: 1997 Winter Quarter.

MCB 160—Genetics Laboratory Associated Lecture (3)
Discussion/Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): BIS 101; or Consent of Instructor. Pass One restricted to upper division Genetics and Genomics majors; concurrent enrollment in MCB 160L required; on-time attendance for first lecture is mandatory. Lecture instruction in the theoretical basis of laboratory techniques in transmission and molecular genetics, discussion of lab results and experiment interpretation. GE credit: QL, SE, WE. Effective: 2018 Winter Quarter.

MCB 160L—Principles of Genetics Laboratory (5)
Discussion/Laboratory—1 hour; Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): BIS 101 Laboratory work in basic and molecular genetics including gene mapping, isolation and characterization of mutants in eukaryotic model systems, reverse genetics, gel electrophoresis, recombinant DNA techniques, and PCR. GE credit: QL, SE, VL, WE. Effective: 2012 Fall Quarter.

MCB 162—Human Genetics and Genomics (3)
Lecture—3 hours. Prerequisite(s): BIS 101 The human genome and genetic variation in human populations, molecular and genomic approaches in the practice of human genetics, epigenetic gene regulation, personal genetics and genomic medicine. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

MCB 163—Developmental Genetics (3)
Lecture—3 hours. Prerequisite(s): MCB 121 (can be concurrent) Current aspects of developmental genetics. Historical background and current genetic approaches to the study of development of higher animals. GE credit: SE. Effective: 2017 Fall Quarter.

MCB 164—Advanced Eukaryotic Genetics (3)
Lecture—3 hours. Prerequisite(s): MCB 121 Five basic operations of genetic analysis: mutation, segregation, recombination, complementation, and regulation. Emphasis on the theory and practice of isolating and analyzing mutations, as well as understanding mechanisms underlying both Mendelian and epigenetic inheritance. GE credit: SE, SL. Effective: 2011 Fall Quarter.

MCB 178—Undergraduate Seminar in Molecular Genetics (1)
Seminar—1 hour. Prerequisite(s): BIS 101; MCB 121 (can be concurrent); Upper division standing, and completion or concurrent enrollment in MCB 121. Discussion of current topics in molecular genetics to show advanced applications of basic principles and to highlight professional career opportunities. May be repeated up to 1 time(s) when topic differs. (P/NP grading only.) GE credit: OL, SE. Effective: 2011 Fall Quarter.

MCB 182—Principles of Genomics (3)
Lecture—3 hours. Prerequisite(s): BIS 101 Fundamentals of genomics, including structural genomics, functional genomics, proteomics, and bioinformatics, focusing on the impact of these disciplines on research in the biological sciences. Social impacts of genomic research. GE credit: SE. Effective: 2017 Winter Quarter.

MCB 190C—Undergraduate Research Conference (1)
Discussion—1 hour. Prerequisite(s): MCB 193 (can be concurrent) or MCB 199 (can be concurrent); and Consent of Instructor. Upper division standing; MCB 193 or MCB 199 required concurrently. Presentation and discussion of current research by faculty and students. May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

MCB 191—Introduction to Research (1)
Seminar—1 hour. Prerequisite(s): BIS 102 (can be concurrent); or Consent of Instructor. Various topics in molecular and cellular biology including biochemistry, genetics, and cell biology will be discussed, along with ways undergraduates can participate in research projects of faculty members. May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

MCB 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Technical and/or practical experience on and off campus, supervised by a member of the Section of Molecular and Cellular Biology faculty. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

MCB 193—Advanced Research (3)
Discussion—1 hour; Laboratory—6 hours. Prerequisite(s): Consent of Instructor. Upper division standing, completion of an upper division Molecular and Cellular Biology laboratory course. Research project carried out under the supervision of a faculty sponsor.
Discussion and analysis of results and proposed experiments on a weekly basis with faculty sponsor. May include presentation of a seminar to a research group.May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

MCB 194—Thesis Research (3)
Independent Study—9 hours. Prerequisite(s): Consent of Instructor. 6 units of course 193 and/or 199 with faculty director; senior standing. Continuation of an intensive, individual laboratory research project in biochemistry, genetics, or cell biology culminating with the presentation of the work in a written thesis and in a seminar. (P/NP grading only.) GE credit: OL, SE, WE. Effective: 2015 Fall Quarter.

MCB 194H—Research Honors (3)
Independent Study—9 hours. Prerequisite(s): Consent of Instructor. 6 units of MCB 193 and/or MCB 199 with faculty director; senior standing; GPA of at least 3.250. Honors project. Continuation of an intensive, individual laboratory research project in biochemistry, genetics, or cell biology culminating with the presentation of the work in a written thesis and in a seminar. (P/NP grading only.) GE credit: OL, SE, WE. Effective: 1997 Winter Quarter.

MCB 197T—Tutoring in Molecular and Cellular Biology (1-5)
Tutorial—2-6 hours. Prerequisite(s): Consent of Instructor. Upper division standing, completion of course to be tutored. Assisting the instructor in one of the section's regular courses by tutoring individual or small groups of students in a laboratory, in voluntary discussion groups, or other voluntary course activities. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 2004 Fall Quarter.

MCB 198—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

MCB 199—Special Study for Advanced Undergraduates (1-5)
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

MCB 248—Seminar in Cell Biology (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. Discussion of recent literature on the physical and chemical aspects of organization and function of living systems, topics of current interest in ultrastructure and function of cells. Organizational and functional properties of the molecular and cellular levels of biological systems. May be repeated for credit. Effective: 1997 Winter Quarter.

MCB 258—Seminar in Development (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. Reports and discussion on embryology, morphogenesis, and developmental mechanisms. May be repeated for credit. May be repeated for credit. Effective: 1997 Winter Quarter.

MCB 259—Literature in Developmental Biology (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Critical presentation and analysis of recent journal articles in developmental biology. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

MCB 282—Biotechnology Internship (7-12)
Internship—21-36 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Open only to students participating in the Designated Emphasis in Biotechnology program. Research at a biotechnology company or interdisciplinary cross-college lab for a minimum of 3 months as part of the Designated Emphasis in Biotechnology Program. (S/U grading only.) Effective: 2004 Winter Quarter.

MCB 290C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Presentations and critical discussions of faculty and graduate student research in molecular and cellular biology including biochemistry,
genetics, and cell biology. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

MCB 291—Current Progress in Molecular and Cellular Biology (1)
Seminar—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Seminars presented by guest lecturers on subject of their own research activities. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

MCB 295—Literature in Molecular and Cellular Biology (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Critical reading and evaluation of current literature in molecular and cellular biology disciplines. Papers will be presented and discussed in detail. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

MCB 298—Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

MCB 299—Research (1-12)
Independent Study—3-36 hours. (S/U grading only.) Effective: 1997 Winter Quarter.

MCB 390—Methods of Teaching (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Practical experience in the methods and problems of teaching biochemistry/genetics/cell biology.Includes analysis of texts and
supporting material,discussion of teaching techniques, preparing for and conducting discussion and laboratory sections,formulating examinations under supervision of instructor.Participating in the teaching program required for Ph.D. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

Geographic Information Systems Minor; Biological & Agricultural Engineering

Geographic Information Systems Minor; Biological & Agricultural Engineering | Geographic Information Systems Minor

(College of Agricultural and Environmental Sciences)

The Department of Biological and Agricultural Engineering offers a minor in Geographic Information Systems with an emphasis on spatial analysis. This minor is ideal for students interested in information processing of spatial data related to remote sensing, land information systems, marine cartography, thematic mapping, surface modeling, environmental modeling resources management, public utility planning, emergency response, geomarketing, geotechnics, precision agriculture, archaeology, military exercises, and computer-aided design. Prerequisites include MAT 016A-016B, STA 013 or PLS 120 or ECI 114, and PLS 021 or ECS 015.

Minor Advisors. S. K. Upadhyaya, S.G. Vougioukas (Biological and Agricultural Engineering Department)

Geographic Information Systems **Units:** 18

ABT 150	Introduction to Geographic Information Systems	4
OR		
LDA 150	Introduction to Geographic Information Systems	4
ABT 181N	Concepts and Methods in Geographic Information Systems	4
OR		
ABT 182	Environmental Analysis using GIS	4
ESM 186	Environmental Remote Sensing	5

Choose five units:

ESM 108	Environmental Monitoring	3
ESM 185	Aerial Photo Interpretation and Remote Sensing	4
ESP 168A	Methods of Environmental Policy Evaluation	5
ESP 168B	Methods of Environmental Policy Analysis	4
ESP 171	Urban and Regional Planning	4
ESP 179	Environmental Impact Assessment	4

Choose one:

ABT 181N	Concepts and Methods in Geographic Information Systems	4
ABT 182	Environmental Analysis using GIS	4
HYD 182	Environmental Analysis using GIS	4
PLS 121	Systems Analysis in Agriculture and Resource Management (Discontinued)	4

Total: 18

Geographic Studies Minor; Environmental Design

Geographic Studies Minor; Environmental Design | Geographic Studies Minor

(College of Agricultural and Environmental Sciences)

(Department of Human Ecology)

The minor in Geographic Studies is defined by its concern with place. Geographers strive to answer spatial questions regarding the Earth's surface; to describe and explain the character of regions; to ascertain the ways in which historical and contemporary humans have used and shaped the Earth's surface; and to understand the interactions of physical, biotic, and human systems within our global environment. The minor is compatible with a variety of environmental majors in the college.

The minor is sponsored by the Department of Human Ecology, Landscape Architecture and Environmental Design Program.

Minor Advisor. S. E. Greco; see staff advisor Sharla Cheney, 135 Hunt Hall, scheney@ucdavis.edu .

Geographic Studies **Units:** 20

LDA 010	World Regional Geography	3

Choose at least one course from three areas:

Human Geography:

CRD 140	Dynamics of Regional Development	4

CRD 141	Organization of Economic Space	4
CRD 142	Rural Change in the Industrialized World	4
NUT 120BN	Nutritional Geography	4
AAS 100	Survey of Ethnicity in the US	4
AAS 107C	African Descent Communities and Culture in Asia	4
AAS 155A	African-American Dance and Culture in the United States, Brazil and the Caribbean	4
AAS 172	Diaspora and New Black Identities	4
AAS 176	The Politics of Resources	4
AAS 180	Race and Ethnicity in Latin America	4
AAS 182	Hip Hop Culture & Globalization	4

OR

Other upper division courses approved by the advisor.

Physical Geography:

ESM 120	Global Environmental Interactions	4
ESM 144	Trees and Forests	4
EVE 147	Biogeography	4
PLS 144	Trees and Forests	4
WFC 110	Biology and Conservation of Wild Mammals	3
WFC 111	Biology and Conservation of Wild Birds	3
WFC 120	Biology and Conservation of Fishes	3
WFC 156	Plant Geography	4
WFC 157	Coastal Ecosystems	4

OR

Other upper division courses approved by the advisor.

Methods in Geography:

LDA 150	Introduction to Geographic Information Systems	4

OR

ABT 150	Introduction to Geographic Information Systems	4
ESM 185	Aerial Photo Interpretation and Remote Sensing	4
ESM 186	Environmental Remote Sensing	5
ABT 181N	Concepts and Methods in Geographic Information Systems	4
ABT 182	Environmental Analysis using GIS	4
HYD 182	Environmental Analysis using GIS	4

OR

Other upper division courses approved by the advisor.

Individual Study:

Select a maximum of four units of 192 (Internship) or 199 (Research) in any appropriate department.

Total: 20

Geography (Graduate Group)

Geography (Graduate Group) | GEO Information

Robert Hijmans, Ph.D., Chairperson of the Group

Group Office. Carrie Armstrong-Ruport, Student Affairs Officer; 133 Hunt Hall 530-752-4119; caruport@ucdavis.edu; http://geography.ucdavis.edu

Faculty. http://geography.ucdavis.edu/people/faculty

Geography (Graduate Group) | GEO M.A.

Robert Hijmans, Ph.D., Chairperson of the Group

Group Office. Carrie Armstrong-Ruport, Student Affairs Officer; 133 Hunt Hall 530-752-4119; caruport@ucdavis.edu; http://geography.ucdavis.edu

Faculty. http://geography.ucdavis.edu/people/faculty

Graduate Study. The Graduate Group in Geography (GGG) offers programs of study and research leading to the M.A. and Ph.D. degrees. Faculty and students share a common interest in spatial interaction between humans and the biophysical environment. The wide faculty interests attract a diverse set of students in such areas as biogeography, urban forestry and related natural science and engineering fields, as well as human geography and related social science fields. A number of faculty members use and teach geographic information systems, remote sensing, and related geographic techniques, and most have a strong field orientation. The strengths of the Davis campus and its faculty enable the program to focus on important issues including people, place and power, community and regional identity and change, people-environment interaction, agricultural sustainability, landscape architecture, environmental change, biogeography, natural resource management, and technological innovations in computing and the use of geographic information systems. Students are mentored by faculty across the many colleges of the university.

Preparation. Most students considered for admission will have an undergraduate major in geography or in a closely related field. Generally, a student without an undergraduate degree in geography will be required to complete the equivalent of a minor in geography, consisting of one course each in human geography, physical geography and geographic methods, plus any additional undergraduate coursework required as background for the student's research emphasis, as determined by the student's guidance committee.

Graduate Advisors. Ryan Galt (Human Ecology), Robert Hijmans (Environmental Science and Policy), Jay Lund (Civil and Environmental Engineering), James Quinn (Environmental Science and Policy)

Geography (Graduate Group) | GEO Ph.D.

Robert Hijmans, Ph.D., Chairperson of the Group

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Graduate Advisors. Ryan Galt (Human Ecology), Robert Hijmans (Environmental Science and Policy), Jay Lund (Civil and Environmental Engineering), James Quinn (Environmental Science and Policy)

Geography (Graduate Group) | GEO Courses

Courses in GEO:

GEO 200A—Research Trends in Geography (1)
Seminar—1 hour. Major current research themes and trends in geography. (S/U grading only.) Effective: 1999 Fall Quarter.

GEO 200AN—Geographical Concepts (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing in Geography or consent of instructor. Concepts and thematic content of the discipline, including contemporary research questions. A brief review of the history of geographic thought and practice is done at the beginning of the course. Effective: 2011 Fall Quarter.

GEO 200BN—Theory & Practice of Geography (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing. Class size limited to 20. Development, application, and philosophical background of theory in discipline of geography and geographical knowledge production. Similarities and differences in theories employed in physical and human geography and cartography. Geographic contributions to interdisciplinary theory bridging biophysical sciences, social sciences, and humanities. Effective: 2011 Fall Quarter.

GEO 200CN—Quantitative Geography (4)
Laboratory—6 hours; Lecture—2 hours. Class size limited to 25 students. Provides an overview of quantitative approaches in spatial data analysis. Overview of different approaches used for inference, modeling, and prediction. Also learn how to write computer programs to implement these methods. Effective: 2012 Spring Quarter.

GEO 200DN—Socio-Spatial Analysis in Geography (4)
Lecture/Discussion—4 hours. Class size limited to 25. Introduction to methodologies of socio-spatial analysis in interviews, and ethnographic fieldwork. Students develop a critical understanding of different methodological and theoretical approaches, and their appropriate applications in overall research design. Effective: 2011 Fall Quarter.

GEO 200E—Advanced Research Design in Geography (2)
Lecture/Discussion—2 hours. Prerequisite(s): GEO 200AN; GEO 200BN; GEO 200CN; GEO 200DN; Graduate standing. Class size limited to 15. Helps Ph.D. students develop their research question, design their research plan and complete a full dissertation research proposal. Effective: 2011 Fall Quarter.

GEO 201—Sources and General Literature of Geography (4)
Discussion—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing in geography. Designed for students preparing for higher degrees in geography.
May be repeated for credit in one or more of the following subfields: physical, cultural, economic, urban, historical, political, conservation, and regional geography. May be repeated for credit. Effective: 1997 Winter Quarter.

GEO 210—Topics in Biogeography (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): EVE 147 or WFC 156 (can be concurrent); Or equivalent. Consent of instructor required for undergraduates. Current topics in historical and ecological biogeography, including macroecology and areography, GIS and remote sensing, phylogeography, vegetation, plant and animal community and species geography. Systematics, climate change, and conservation will be addressed. Effective: 2004 Fall Quarter.

GEO 211—Physical Geography Traditions and Methods (3)
Discussion/Laboratory—2 hours; Term Paper. Prerequisite(s): Introductory course in physical geography. Graduate-level standing in geography or related discipline. Discussion of the physical science tradition in geography, including key concepts and current research in climatology, geomorphology, soils geography, biogeography, climate change, watershed science, and coastal studies. Research paradigms, programs, and methods as used by physical geographers will be discussed. May be repeated up to 3 time(s). Effective: 2008 Fall Quarter.

GEO 212—Water Resource Management (3)
Lecture—3 hours. Prerequisite(s): GEO 114; GEO 141; GEO; 142; GEO 153 recommended. Engineering, institutional, economic, and social basis for managing local and regional water resources. Examples in the context of California's water development and management. Uses of computer modeling to improve water management. (ECI 267.) Effective: 2013 Fall Quarter.

GEO 214—Seminar in Geographical Ecology (2)
Seminar—2 hours. Prerequisite(s): EVE 100 or EVE 101; or Consent of Instructor. Recent developments in theoretical and experimental biogeography, historical biogeography and related themes in systematics, the biology of colonizing species, and related topics. May be repeated for credit. (PBG 296.) (S/U grading only.) Effective: 2013 Spring Quarter.

GEO 215—Ecologies of Infrastructure (4)
Seminar—4 hours. Open to graduate standing or consent of instructor. Focus on design practices and theory associated with ecological conceptions of infrastructure, including networked infrastructure, region, bioregion, regionalization, ecological engineering, reconciliation ecology, novel ecosystems, and theory/articulation of landscape change. (LDA 215.) Effective: 2016 Winter Quarter.

GEO 220—Topics in Human Geography (4)
Seminar—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Class size limited to 20 students. Examination of philosophy and theory in human geography with an emphasis on contemporary debates and concepts in social, cultural, humanistic, political, and economic geographies. Specific discussion of space, place, scale and landscape; material and imagined geographies. Effective: 2016 Winter Quarter.

GEO 230—Citizenship, Democracy, & Public Space (4)
Seminar—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Introduction to seminal works in political theory, philosophy, and the social sciences that focus on citizenship and the public sphere; development of critical perspective regarding restructuring of public space in a pluralistic and global culture; discussion of contemporary case studies. (LDA 200.) Effective: 2012 Fall Quarter.

GEO 233—Urban Planning and Design (4)
Discussion—2 hours; Lecture—2 hours. Limited to graduate students. Regulation, design, and development of the built landscape, planning and land development processes, zoning and subdivision regulation, site planning, urban design goals and methods, public participation strategies, creatively designing landscapes to meet community and ecological goals. (LDA 205.) Effective: 2016 Winter Quarter.

GEO 236—Transportation Planning and Policy (4)
Lecture/Discussion—4 hours. Limited enrollment. Transportation planning process at the regional level, including the role of federal policy in shaping regional transportation planning, tools and techniques used in regional transportation planning, issues facing regional transportation planning agencies, pros and cons of potential solutions and strategies. Students taking this course previously as TTP 289 cannot repeat it for credit; taking other TTP 289 offerings does not preclude taking TTP 220 for credit. (TTP 220.) Effective: 2013 Winter Quarter.

GEO 240—Community Development Theory (4)
Lecture/Discussion—4 hours. Introduction to theories of community development and different concepts of community, poverty, and development. Emphasis on building theory, linking applied development techniques to theory, evaluating development policy, and examining case studies of community development organizations and projects. (Community & Regional Development 240.) Effective: 2014 Winter Quarter.

GEO 241—The Economics of Community Development (4)
Seminar—4 hours. Prerequisite(s): Graduate standing. Economic theories and methods of planning for communities. Human resources, community services and infrastructure, industrialization and technological change, and regional growth. The community's role in the greater economy. (Community and Regional Development 241.) Effective: 2015 Spring Quarter.

GEO 245—The Political Economy of Urban and Regional Development (4)
Lecture—4 hours. Prerequisite(s): CRD 157; CRD 244; Or the equivalent. How global, political and economic restructuring and national and state policies are mediated by community politics; social production of urban form; role of the state in uneven development; dynamics of urban growth and decline; regional development in California. (Community & Regional Development 245.) Effective: 2014 Spring Quarter.

GEO 246—The Political Economy of Transnational Migration (4)
Lecture—4 hours. Prerequisite(s): Graduate standing. Theoretical perspectives and empirical research on social, cultural, political, and economic processes of transnational migration to the U.S. Discussion of conventional theories will precede contemporary comparative perspectives on class, race, ethnicity, citizenship, and the ethnic economy. (Community & Regional Development 246.) Effective: 2014 Winter Quarter.

GEO 248—Social Policy, Welfare Theories and Communities (4)
Seminar—4 hours. Prerequisite(s): Graduate standing. Theories and comparative histories of modern welfare states and social policy in relation to legal/normative, organizational, and administrative aspects. Analysis of specific social issues within the U.S./California context. Not open for credit to students having completed CRD 248A and CRD 248B. (Community & Regional Development 248.) Effective: 2011 Fall Quarter.

GEO 254—Political Ecology of Community Development (4)
Lecture—4 hours. Prerequisite(s): Graduate standing. Community development from the perspective of geographical political ecology. Social and environmental outcomes of the dynamic relationship between communities and land-based resources, and between social groups. Cases of community conservation and development in developing and industrialized countries. (Community and Regional Development 244.) Effective: 2014 Winter Quarter.

GEO 260—Global Political Ecology (4)
Seminar—3 hours; Term Paper/Discussion—1 hour. Open to graduate students only or consent of instructor. Background, genesis, current debates in political ecology. Examination of political-economic and social-cultural causes of environmental change. Introduction to development theory, globalization, history of science and power/knowledge. Cases of social movements, justice, resistance, gender, race and class. Focus outside North America. Effective: 2014 Fall Quarter.

GEO 279—Exploring Data from Built Environment Using R (4)
Laboratory—3 hours; Lecture—3 hours. Introduction to modern data science, specifically data acquisition, exploratory data, visualization, and beginning data analysis using R. Emphasizes computational reasoning and working with tabular and non-standard data. Focus will be on data generated in the built environment. (Civil and Environmental Engineering 254.) Effective: 2017 Fall Quarter.

GEO 280—Field Studies in Geography (3)
Fieldwork—6 hours; Lecture—1 hour. Prerequisite(s): Consent of Instructor. Undergraduate or graduate coursework in geography. Limited to 20 students. A topic or subdiscipline of geography will form the theme for the course in any given offering, with a focus on current research on this topic, field methodologies, and data analysis in human and physical geography May be repeated up to 2 time(s). Effective: 2005 Spring Quarter.

GEO 281—Transportation Survey Methods (4)
Lecture—4 hours. Prerequisite(s): (STA 013 or STA 013Y); ECI 251 recommended. Description of types of surveys commonly used in transportation demand modeling, including travel and activity diaries, attitudinal, panel, computer, and stated-response surveys. Discussion of sampling, experimental design, and survey design issues. Analysis methods, including factor, discriminant and cluster analysis. Not open for credit to students who have taken ECI 255. (Transportation Technology and Policy 200.) Effective: 2018 Spring Quarter.

GEO 286—Selected Topics in Environmental Remote Sensing (3)
Discussion—2 hours; Lecture—1 hour; Project (Term Project). Prerequisite(s): ERS 186; and Consent of Instructor. Or equivalent required; ERS 186L recommended. In depth investigation of advanced topics in remote sensing applications, measurements, and theory. May be repeated for credit. (Hydrologic Science 286.) Effective: 2014 Fall Quarter.

GEO 290—Seminar in Geography (1-3)
Seminar—1-3 hours. Prerequisite(s): Graduate standing or consent of instructor. Seminar focuses on specified topical areas within geography, which will vary quarter to quarter. Students expected to present an oral seminar on an aspect of the general topic under discussion. May be repeated up to 6 time(s). (S/U grading only.) Effective: 2008 Fall Quarter.

GEO 291—Seminar in Cultural Geography (4)
Seminar—3 hours. Effective: 1997 Winter Quarter.

GEO 293—Graduate Internship (1-12)
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. Individually designed, supervised internship, off campus, in community or institutional setting. Developed with advice of faculty mentor. May be repeated for credit. (S/U grading only.) Effective: 2004 Spring Quarter.

GEO 295—Seminar in Urban Geography (4)
Seminar—3 hours. Effective: 1997 Winter Quarter.

GEO 297—Graduate Group in Geography (2)
Lecture/Discussion—1 hour; Term Paper. Prerequisite(s): Graduate standing. Seminars by UC Davis faculty and prominent national and international scholars; research presentations by Graduate Group in Geography Ph.D. candidates. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

GEO 298—Group Study (1-5)
Seminar—1 hour. Prerequisite(s): Graduate standing or consent of instructor. May be repeated up to 10 unit(s). (S/U grading only.) Effective: 2000 Spring Quarter.

GEO 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

GEO 299D—Individual Study (1-12)
Variable. Prerequisite(s): and Consent of Instructor. Graduate student status in Geography. (S/U grading only.) Effective: 1997 Winter Quarter.

GEO 396—Teaching Assistant Training Practicum (1-4) ***Review all entries***
Variable. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

GEO 396—Teaching Assistant Training Practicum (1-4) ***Review all entries Discontinued***
Variable. May be repeated for credit. (P/NP grading only.) Effective: 2019 Winter Quarter.

Geology

Geology | GEL Information

Michael E. Oskin, Ph.D., Chairperson of the Department

David A. Osleger, Ph.D., Vice-Chairperson, Undergraduate Program

Sujoy Mukhopadhyay, Ph.D., Vice-Chairperson, Graduate Program

Department Office. 2119 Earth and Physical Sciences Building: 530-752-0350; http://www.geology.ucdavis.edu

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Geology | GEL A.B.

Michael E. Oskin, Ph.D., Chairperson of the Department

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"Civilization exists by geological consent—subject to change without notice."—Will Durant

Geology is the study of the Earth, and in particular its history, structure, and the processes that have molded our planet and its biosphere. Geology involves the origin of continents and ocean basins, earthquakes and volcanoes, variations in global climate, and how these physical changes impact the evolution of life. All of these planetary processes are viewed through the prism of "deep time," a perspective unique to geologists and one that distinguishes geology from most of the other physical sciences.

A significant component of geology is oriented toward the interaction between humans and the Earth. This aspect includes the study of resources such as minerals, oil, and water; identification and mitigation of Earth hazards such as earthquakes, landslides, floods, and volcanic eruptions; identification and mitigation of polluted ground water; land use planning; and the study of ancient and modern climate change.

The Program. Students interested in becoming professional geologists or continuing their geological studies at the graduate level should choose the Bachelor of Science degree program. The Bachelor of Arts program is for students interested in an interdisciplinary program of study, or who plan to go into pre-college teaching. Both programs allow students to emphasize an aspect of the field of particular interest to them. The upper division electives are not restricted to geology courses but must be chosen to provide a relevant, coherent, and in-depth program of study. Transfer students should have completed as much as possible of the preparatory subject matter listed below.

Internships and Career Alternatives. In recent years in California, the largest employers of geologists have been environmental and geotechnical consulting firms, with oil companies, research laboratories and government agencies also providing opportunities. Students graduating with a Bachelor's degree may get entry-level positions in the private sector or they may go on to attain their teaching credential to fill the growing need for science teachers at all pre-college levels. A Master's degree is the most versatile professional level degree, and a Ph.D. is generally required for research and academic positions. Internships are strongly encouraged for undergraduates and are a means of exploring potential career opportunities that can lead to positions after graduation. UC Davis students have interned at the California Division of Mines and Geology, the State Department of Water Resources, CAL-EPA, and various consulting firms. For more information, see http://geology.ucdavis.edu/students/careers/index.php.

Education Abroad Options. The department strongly encourages interested students to pursue a portion of their studies abroad. Within the constraints of the campus and College residence requirements, it is possible for students to complete significant portions of the Geology major at an international institution provided that the student consults with one of the undergraduate advisors and carefully plans a course of study abroad that will complement their coursework at Davis. In recent years, UC Davis Geology majors have spent their junior or senior years completing upper division coursework at EAP partner institutions in New Zealand, Ghana, Chile, and the United Kingdom. For more information, see http://geology.ucdavis.edu/students/undergrad/eap.php.

Major Advisors. J.M. McClain, R. Motani

Preparatory Subject Matter **Units:** 41-43

GEL 003	History of Life	3
GEL 003L	History of Life Laboratory	1
GEL 050	Physical Geology	3
GEL 050L	Physical Geology Laboratory	2
GEL 060	Earth Materials: Introduction	4
MAT 016A	Short Calculus	3
MAT 016B	Short Calculus	3
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
PHY 007A	General Physics	4
PHY 007B	General Physics	4

Choose one:

STA 013	Elementary Statistics	4
STA 032	Gateway to Statistical Data Science	4
STA 100	Applied Statistics for Biological Sciences	4

Depth Subject Matter **Units:** 36

GEL 101	Structural Geology	3
GEL 101L	Structural Geology Lab	2
GEL 103	Field Geology	3
GEL 107	Earth History: Paleobiology	3
GEL 107L	Earth History: Paleobiology Laboratory	2
GEL 108	Earth History: Paleoclimates	3
GEL 109	Earth History: Sediments and Strata	2
GEL 109L	Earth History: Sediments and Strata Laboratory	2

Choose additional upper division electives from GEL 130-194 courses (only one of GEL/EDU 181 or GEL/EDU 183 or 185A or 185B or 186 may be applied toward elective credit), HYD 144, 146 and related fields approved in advance by major adviser. No more than three units upper division elective credit for GEL 115-120 courses. Maximum of six units upper division elective credit for GEL 192 or 194A-194B or 194HA-194HB.

Total: 77-79

Geology | GEL B.S.

Michael E. Oskin, Ph.D., Chairperson of the Department

David A. Osleger, Ph.D., Vice-Chairperson, Undergraduate Program

Sujoy Mukhopadhyay, Ph.D., Vice-Chairperson, Graduate Program

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Major Advisors. J.M. McClain, R. Motani

Preparatory Subject Matter **Units:** 56-62

GEL 003	History of Life	3
GEL 003L	History of Life Laboratory	1
GEL 050	Physical Geology	3

GEL 050L	Physical Geology Laboratory	2
GEL 060	Earth Materials: Introduction	4
GEL 062	Optical Mineralogy	2
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5

Choose one of these three options:

General Geology Option:

Choose one:

CHE 002C	General Chemistry	5
GEL 132	Introductory Inorganic Geochemistry	3
HYD 134	Aqueous Geochemistry	6

STA 032	Gateway to Statistical Data Science	4
OR		
STA 100	Applied Statistics for Biological Sciences	4
PHY 007A	General Physics	4
PHY 007B	General Physics	4
PHY 007C	General Physics	4
OR		
PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5

Geochemistry/Petrology Option:

Choose one:

CHE 002C	General Chemistry	5
GEL 132	Introductory Inorganic Geochemistry	3
HYD 134	Aqueous Geochemistry	6

STA 032	Gateway to Statistical Data Science	4
OR		
STA 100	Applied Statistics for Biological Sciences	4
MAT 021D	Vector Analysis	4
PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5

Quantitative/Geophysics option:

MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3
PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5

Depth Subject Matter **Units:** 52

GEL 101	Structural Geology	3
GEL 101L	Structural Geology Lab	2
GEL 103	Field Geology	3
GEL 105	Earth Materials: Igneous Rocks	4
GEL 106	Earth Materials: Metamorphic Rocks	4
GEL 107	Earth History: Paleobiology	3
GEL 107L	Earth History: Paleobiology Laboratory	2
GEL 108	Earth History: Paleoclimates	3
GEL 109	Earth History: Sediments and Strata	2
GEL 109L	Earth History: Sediments and Strata Laboratory	2
GEL 110	Summer Field Geology	8

Choose additional upper division electives from GEL 130-194 courses (only one of GEL/EDU 181 or GEL/EDU 183 or 185A or 185B or 186 may be applied toward elective credit), HYD 144, 146 and related fields approved in advance by major adviser. No more than three units upper division elective credit for GEL 115-120 courses. Maximum of six units upper division elective credit for GEL 192 or 194A-194B or 194HA-194HB.

Total: 108-114

Geology | GEL M.S.

(College of Letters and Science)

Michael E. Oskin, Ph.D., Chairperson of the Department

David A. Osleger, Ph.D., Vice-Chairperson, Undergraduate Program

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The Earth and Planetary Sciences department offers programs of study and research leading to the M.S. and Ph.D. degrees in Geology. For more information, see http://geology.ucdavis.edu/students/grad.

Graduate Advisors. M.L. Billen, E.S. Cowgill, S. Mukhopadhyay, D.Y. Sumner

Geology | GEL Ph.D.

(College of Letters and Science)

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Graduate Advisors. M.L. Billen, E.S. Cowgill, S. Mukhopadhyay, D.Y. Sumner

Geology | GEL Minor

(College of Letters and Science)

Michael E. Oskin, Ph.D., Chairperson of the Department

David A. Osleger, Ph.D., Vice-Chairperson of the Department

Department Office. 2119 Earth and Physical Sciences Building: 530-752-0350; http://www.geology.ucdavis.edu

Faculty: http://geology.ucdavis.edu/people/faculty/index.php

Students majoring in Geology can acquire a minor in the related fields of Oceanography, Geophysics or Environmental Geology.

Minor Advisors. J.M. McClain, R. Motani; except Paleobiology emphasis: R. Motani, G. Vermeij

Geology **Units:** 19-24

Choose one of the four emphases, below:

General Geology Emphasis

GEL 050	Physical Geology	3
OR		
GEL 001	The Earth	4
GEL 050L	Physical Geology Laboratory	2
GEL 101	Structural Geology	3
GEL 107	Earth History: Paleobiology	3
GEL 108	Earth History: Paleoclimates	3
GEL 109	Earth History: Sediments and Strata	2
GEL 116N	Oceanography	3
OR		
GEL 134	Environmental Geology and Land Use Planning	3

Engineering Geology Emphasis

GEL 050	Physical Geology	3
GEL 050L	Physical Geology Laboratory	2
ECI 171	Soil Mechanics	4
ECI 171L	Soil Mechanics Laboratory	1

Choose three:

GEL 134	Environmental Geology and Land Use Planning	3
GEL 161	Geophysical Field Methods	3

GEL 162	Geophysics of the Solid Earth	3
HYD 103N	Fluid Mechanics Fundamentals	4
HYD 144	Groundwater Hydrology	4
HYD 146	Hydrogeology and Contaminant Transport	5
SSC 118	Soils in Land Use and the Environment	4
SSC 120	Soil Genesis, Morphology, and Classification	5

Geochemistry Emphasis

GEL 060	Earth Materials: Introduction	4
GEL 146	Radiogenic Isotope Geochemistry and Cosmochemistry	3
OR		
GEL 148	Stable Isotopes and Geochemical Tracers	3
CHE 110A	Physical Chemistry: Introduction to Quantum Mechanics	4
CHE 110B	Physical Chemistry: Properties of Atoms and Molecules	4

Chemistry majors may substitute one of the elective courses for Chemistry 110B.

Choose two electives:

CHE 110C	Physical Chemistry: Thermodynamics, Equilibria and Kinetics	4
GEL 108	Earth History: Paleoclimates	3
GEL 146	Radiogenic Isotope Geochemistry and Cosmochemistry	3
GEL 148	Stable Isotopes and Geochemical Tracers	3
HYD 134	Aqueous Geochemistry	6
SSC 102	Environmental Soil Chemistry	3

Chemistry 110C and Materials Science and Engineering 134 cannot both be counted toward the minor.

Paleobiology Emphasis

GEL 107	Earth History: Paleobiology	3
GEL 107L	Earth History: Paleobiology Laboratory	2
GEL 108	Earth History: Paleoclimates	3
GEL 141	Evolutionary History of Vertebrates	3
OR		
GEL 144	Historical Ecology	3

Choose at least nine units:

ANT 151	Primate Evolution	4
ANT 152	Human Evolution	5
EVE 100	Introduction to Evolution	4
EVE 101	Introduction to Ecology	4
EVE 102	Population and Quantitative Genetics	4
EVE 105	Phylogenetic Analysis of Vertebrate Structure	4
EVE 112	Biology of Invertebrates	3
EVE 112L	Biology of Invertebrates Laboratory	2
EVE 140	Paleobotany	4
EVE 149	Evolution of Ecological Systems	4
GEL 109	Earth History: Sediments and Strata	2
GEL 150C	Biological Oceanography	4

Total: 19-24

Geology | GEL Courses

Courses in GEL:

GEL 001—The Earth (4)
Discussion—1 hour; Lecture—3 hours. Intoduction to the study of the Earth. Earth's physical and chemical structure;
internal and surface processes that mold the Earth; geological hazards and resources. Not open for credit to students who have taken GEL 050; only 2 credits for students who have taken GEL 002. GE credit: SE, SL, WE. Effective: 2013 Fall Quarter.

GEL 002—Earth System Science (3)
Lecture—3 hours. Solid and fluid earth and its place in the solar system. How the solid earth interacts with the atmosphere, hydrosphere, biosphere, and extraterrestrial environment. Only 2 units credit for students who have taken GEL 050; only 2 units credit for students who have taken GEL 001. GE credit: SE, SL. Effective: 2017 Winter Quarter.

GEL 002G—The Blue Planet: Introduction to Earth Science - Discussion (1) ***Review all entries***
Discussion—1 hour. Prerequisite(s): GEL 002 (can be concurrent); GEL 002 required concurrently. Small group discussion and preparation of short papers for course 2. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 002G—Earth System Science Discussion (1) ***Review all entries***
Discussion—1 hour. Prerequisite(s): GEL 002 (can be concurrent); GEL 002 required concurrently. Small group discussion and preparation of short papers for GEL 002. GE credit: SE. Effective: 2018 Fall Quarter.

GEL 003—History of Life (3)
Lecture—3 hours. Prerequisite(s): GEL 001 recommended. The history of life during the three and onehalf billion years from its origin to the present day. Origin of life and processes of evolution; how to visualize and understand living organisms from their fossil remains. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 003G—History of Life: Discussion (1)
Discussion—1 hour. Prerequisite(s): GEL 003 (can be concurrent); GEL 003 required concurrently. Small group discussion and preparation of short papers for course 3. GE credit with concurrent enrollment in course 3: Wrt. GE credit: SE, WE. Effective: 2013 Fall Quarter.

GEL 003L—History of Life Laboratory (1)
Laboratory—3 hours. Prerequisite(s): GEL 003 (can be concurrent); GEL 003 required concurrently. Exercises in understanding fossils as the clues to interpreting ancient life, including their functional morphology, paleoecology, and evolution. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 004—Evolution: Science and World View (3)
Discussion—1 hour; Lecture—2 hours. Introduction to biological evolution. Emphasis on historical development, major lines of evidence and causes of evolution; relationships between evolution and Earth history; the impact of evolutionary thought on other disciplines. GE credit: SE, SL, WE. Effective: 2013 Fall Quarter.

GEL 009—Geology Field Experience (1)
Fieldwork—1 session. Prerequisite(s): Consent of Instructor. At least one previous GEL class, or concurrent enrollment. Pass One open to non-Geology Majors only. Exposure to geologic features and earth processes in the field. Experiential instruction in earth-science concepts, spatial visualization, landscape evolution, deep time, critical thinking skills, and integrative scientific themes. One 4-5 day field trip. May be repeated up to 1 time(s) when field trip destination differs. (P/NP grading only.) GE credit: SE. Effective: 2018 Fall Quarter.

GEL 010—Modern and Ancient Global Environmental Change (3)
Lecture—3 hours. Fundamental scientific concepts underlying issues such as global warming, pollution, and the future of nonsustainable resources presented
in the context of anthropogenic processes as well as natural forcing of paleoenvironmental change throughout Earth's history. GE credit: SE, SL, VL. Effective: 2013 Fall Quarter.

GEL 012—Evolution and Paleobiology of Dinosaurs (2)
Lecture—2 hours. Introduction to evolutionary biology, paleobiology, ecology and paleoecology, using dinosaurs as case studies. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 016—The Oceans (3)
Lecture—3 hours. Introductory survey of the marine environment. Oceanic physical phenomena, chemical constituents and chemistry of water, geological history, the seas biota and human utilization of marine resources Not open for credit to students who have taken GEL 116. GE credit: SE, SL. Effective: 2013 Fall Quarter.

GEL 016G—The Oceans: Discussion (2)
Discussion/Laboratory—2 hours; Term Paper/Discussion—4 hours. Prerequisite(s): GEL 016 (can be concurrent) Scientific method applied to discovery of the processes, biota and history of the oceans. Group discussion and preparation of term paper. Not open for credit to students who have taken GEL 116G. GE credit: SE, WE. Effective: 2016 Fall Quarter.

GEL 017—Earthquakes and Other Earth Hazards (2)
Lecture—2 hours. Impact of earthquakes, tsunami, volcanoes, landslides, and floods on humans, structures, and the environment. Discussion of the causes and effects of disasters and catastrophes, and on prediction, preparation, and mitigation of natural hazards. GE credit: SE, SL. Effective: 2013 Fall Quarter.

GEL 018—Energy and the Environment (3)
Lecture—3 hours. Conventional and alternative energy resources and their environmental impacts. Basic principles, historical development, current advantages and disadvantages, future prospects. Oil, natural gas, coal, nuclear, wind, geothermal, water, tidal, solar, hydrogen, and other sources of energy for the 21st century. GE credit: SE, SL, WE. Effective: 2013 Fall Quarter.

GEL 018V—Energy and the Environment (3)
Web Electronic Discussion—1.5 hours; Web Virtual Lecture—1.5 hours. Conventional and alternative energy resources and their environmental impacts. Basic principles, historical development, current advantages and disadvantages, future prospects. Oil, natural gas, coal, nuclear, wind, geothermal, water, tidal, solar, hydrogen, and other sources of energy for the 21st century. GE credit: SE, SL, WE. Effective: 2015 Winter Quarter.

GEL 020—Geology of California (2)
Lecture—2 hours. The geologic history of California, the origin of rocks and the environments in which they were formed, the structure of the rocks and the interpretation of their structural history, mineral resources, and appreciation of the California landscape. Offered in alternate years. GE credit: SE, SL, VL. Effective: 2013 Fall Quarter.

GEL 025—Geology of National Parks (3)
Lecture—3 hours. Appreciation of the geologic framework underlying the inherent beauty of U.S. National Parks. Relationship of individual parks to geologic processes such as mountain building, volcanism, stream erosion, glacial action and landscape evolution. GE credit: SE, SL, VL. Effective: 2014 Winter Quarter.

GEL 025V—Geology of National Parks (3)
Web Electronic Discussion—2 hours; Web Virtual Lecture—1 hour. Appreciation of the geologic framework underlying the inherent beauty of U.S. National Parks. Relationship of individual parks to geologic processes such as mountain building, volcanism, stream erosion, glacial action and landscape evolution. No credit for students who have completed GEL 025. GE credit: SE. Effective: 2015 Spring Quarter.

GEL 028—Astrobiology (3)
Lecture—3 hours. Origin, evolution and distribution of life in our solar system and the Universe. Detecting habitable worlds, Drake equations, necessities and raw materials for life, philosophical implications of the search for life elsewhere. GE credit: SE, SL. Effective: 2013 Fall Quarter.

GEL 030—Fractals, Chaos and Complexity (3)
Lecture/Discussion—3 hours. Prerequisite(s): MAT 016A or MAT 021A Modern ideas about the unifying ideas of fractal geometry, chaos and complexity. Basic theory and applications with examples from physics, earth sciences, mathematics, population dynamics, ecology, history, economics, biology, computer science, art and architecture. Offered in alternate years. (PHY 030.) GE credit: QL, SE. Effective: 2013 Fall Quarter.

GEL 032—Volcanoes (3)
Lecture—3 hours. Role of eruptions, and eruptive products of volcanoes in shaping the planet's surface, influencing its environment, and providing essential human resources. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 035—Rivers (3)
Lecture—3 hours. Introduction to geomorphology, climate and geology of rivers and watersheds, with case examples from California. Assessment of impacts of logging, agriculture, mining, urbanization and water supply on river processes. Optional river field trips. GE credit: SE, SL. Effective: 2013 Fall Quarter.

GEL 036—The Solar System (4)
Discussion—1 hour; Lecture—3 hours. Nature of the sun, moon, and planets as determined by recent manned and unmanned exploration of the solar system.Comparison of terrestrial, lunar, and planetary geological processes. Search for life on other planets. Origin and evolution of the solar system. (Former course 113-113G.) GE credit: SE, VL, WE. Effective: 2013 Fall Quarter.

GEL 050—Physical Geology (3)
Lecture—3 hours. Prerequisite(s): High school physics and chemistry. The Earth, its materials, its internal and external processes, its development through time by sea-floor spreading and global plate tectonics. Students with credit for GEL 001 or the equivalent may receive only 2 units for GEL 050. GE credit: SE, SL. Effective: 2013 Fall Quarter.

GEL 050L—Physical Geology Laboratory (2)
Laboratory—6 hours. Prerequisite(s): GEL 050 (can be concurrent) Introduction to classification and recognition of minerals and rocks and to interpretation of topographic and geologic maps and aerial photographs. Students with credit for GEL 001L or the equivalent may receive only 1 unit for GEL 050L. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 060—Earth Materials: Introduction (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 002A; (MAT 016A or MAT 017A or MAT 021A); (GEL 001 or GEL 050, GEL 050L) Physical and chemical properties of rocks, minerals and other earth materials; structure and composition of rock-forming minerals; formation of minerals by precipitation from silicate liquids and aqueous fluids and by solid state transformations. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 062—Optical Mineralogy (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): GEL 060 (can be concurrent) Optical properties of inorganic crystals; techniques of mineral identification using the polarizing microscope; strategies for studying rocks in thin section. GE credit: SE, VL. Effective: 2016 Fall Quarter.

GEL 081—Learning in Science and Mathematics (2)
Fieldwork—2 hours; Lecture/Discussion—2 hours. Limited to 26 students per section. Exploration of how students learn and develop understanding in science and mathematics classrooms. Introduction to case studies and interview techniques and their use in K-6 classrooms to illuminate factors that affect student learning. (EDU 081.) (P/NP grading only.) GE credit: SS, VL, WE. Effective: 2013 Fall Quarter.

GEL 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Work-learn experience on and off campus in all subject areas offered by the department. Internships supervised by a member of the faculty. May be repeated up to 12 unit(s). (P/NP grading only.) GE credit: SE. Effective: 2013 Fall Quarter.

GEL 098—Directed Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Directed group study. May be repeated up to 3 time(s) content changes. (P/NP grading only.) GE credit: SE. Effective: 2013 Fall Quarter.

GEL 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. Special study for undergraduates. (P/NP grading only.) GE credit: SE. Effective: 2013 Fall Quarter.

GEL 101—Structural Geology (3)
Lecture—3 hours. Prerequisite(s): GEL 050; GEL 050L; (PHY 007A or PHY 009A); (MAT 016A or MAT 017A or MAT 021A); Consent of Instructor. Class size limited to 35 students. Study of processes and products of rock deformation. Introduction to structural geology through a survey of the features and geometries of faults and folds, techniques of strain analysis, and continuum mechanics of rock deformation. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 101L—Structural Geology Lab (2)
Fieldwork—2 hours; Laboratory—6 hours. Prerequisite(s): GEL 050; GEL 050L; (PHY 007A or PHY 009A); GEL 101 (can be concurrent); Consent of Instructor. Class size limited to 15 students per session. Laboratory study of the processes and products of rock deformation. Introduction to the practice of structural geology through observations and analysis of rock deformation, including field measurement techniques and geologic mapping. GE credit: SE, VL. Effective: 2016 Fall Quarter.

GEL 103—Field Geology (3)
Fieldwork; Laboratory. Prerequisite(s): GEL 101L; GEL 101; Consent of Instructor. Field mapping projects and writing geological reports. Weekly classroom meetings devoted to preparation of maps, cross sections, stratigraphic sections, rock descriptions, and reports. Seven-eight days on weekends during quarter. GE credit: SE, VL, WE. Effective: 2016 Fall Quarter.

GEL 105—Earth Materials: Igneous Rocks (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): GEL 060; GEL 062; (MAT 016A or MAT 017A or MAT 021A); CHE 002B (can be concurrent) Origin and occurrence of igneous rocks. Laboratory exercises emphasize the study of these rocks in hand specimen and thin section. GE credit: SE, WE. Effective: 2016 Fall Quarter.

GEL 106—Earth Materials: Metamorphic Rocks (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): GEL 105 Physical and chemical properties of metamorphic rocks; interpretation of metamorphic environments. Laboratory exercises emphasize the study of these rocks in hand specimen and thin section. GE credit: SE, WE. Effective: 2016 Fall Quarter.

GEL 107—Earth History: Paleobiology (3)
Lecture—3 hours. Prerequisite(s): GEL 003 or BIS 002A or BIS 010 Evolution and ecological structure of the biosphere from the origin of life to the present. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 107L—Earth History: Paleobiology Laboratory (2)
Laboratory—6 hours. Prerequisite(s): (GEL 003, GEL 003L) or BIS 002B; GEL 107 (can be concurrent) Exercises in determining the ecological functions and evolution of individuals, populations, and communities of fossil organisms in field and laboratory. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 108—Earth History: Paleoclimates (3)
Lecture—3 hours. Prerequisite(s): (GEL 001 or GEL 050 or GEL 116N or ESP 116N); CHE 002A; Consent of Instructor. Geological and environmental factors controlling climate change, the greenhouse effect with a detailed analysis of the history of Earth's climate fluctuations over the last 600 million years. Past and present climate records are used to examine potential future climatic scenarios. GE credit: SE, SL, WE. Effective: 2016 Fall Quarter.

GEL 109—Earth History: Sediments and Strata (2)
Lecture—2 hours. Prerequisite(s): GEL 050; GEL 050L Principles of stratigraphic and sedimentologic analysis. Evaluation of historical and modern global changes in sedimentation within terrestrial and marine environments. Examination of the plate tectonic, climatic and oceanographic factors controlling the distribution and exploitation of economic fluids within sedimentary rocks. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 109L—Earth History: Sediments and Strata Laboratory (2)
Laboratory—6 hours. Prerequisite(s): GEL 109 (can be concurrent) Methods of stratigraphic and sedimentologic analysis of modern and ancient sediments. Identification of major sediment and sedimentary rock types. Outcrop and subsurface analysis of sedimentary basins. GE credit with concurrent enrollment in course 109. Includes four one-day field trips. GE credit: SE, WE. Effective: 2016 Fall Quarter.

GEL 110—Summer Field Geology (8)
Fieldwork. Prerequisite(s): GEL 060; GEL 103; GEL 109; GEL 105 recommended. Advanced application of geologic and geophysical field methods to the study of rocks. Includes development and interpretation of geologic maps and cross sections; gravity, magnetic, electrical resistivity and seismic surveys; and field analysis of plutonic and volcanic rock suites. Eight hours/day, six days/week for six weeks. GE credit: SE, VL, WE. Effective: 2017 Spring Quarter.

GEL 115—Earth Science, History, and People (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): GEL 001 or GEL 050 Study of interplay between the Earth and its human inhabitants through history, including consideration of acute events such as earthquakes and eruptions as well as the geology of resources, topography, and water. GE credit: OL, SE, WE. Effective: 2017 Winter Quarter.

GEL 116N—Oceanography (3)
Fieldwork; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): GEL 001 or GEL 002 or GEL 016 or GEL 050 Advanced oceanographic topics: Chemical, physical, geological, and biological processes; research methods and data analysis; marine resources, anthropogenic impacts, and climate change; integrated earth/ocean/atmosphere systems; weekly lab and one weekend field trip. (ESP 116N.) GE credit: SE, SL. Effective: 2017 Winter Quarter.

GEL 120—Origins: From the Big Bang to Today (3)
Lecture—3 hours. Limited enrollment. Long-term and large-scale perspectives on the origins of the universe, stars and planets, life, human evolution, the rise of civilization and the modern world. Multi-disciplinary approach to 'Big History' involving cosmology, astronomy, geology, climatology, biology, anthropology, archeology and traditional history. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 130—Non-Renewable Natural Resources (3)
Lecture—3 hours. Prerequisite(s): GEL 001 or GEL 050 Origin, occurrence, and distribution of non-renewable resources, including metallic, nonmetallic, and energy-producing materials. Problems of discovery, production, and management. Estimations and limitations of reserves, and their sociological, political, and economic effects. GE credit: SE, SL. Effective: 2016 Fall Quarter.

GEL 131—Risk: Natural Hazards and Related Phenomena (3)
Lecture—3 hours. Risk, prediction, prevention and response for earthquakes, volcanic eruptions, landslides, floods, storms, fires, impacts, global warming. GE credit: SE, SL. Effective: 2016 Fall Quarter.

GEL 132—Introductory Inorganic Geochemistry (3)
Lecture—3 hours. Prerequisite(s): GEL 060 (can be concurrent); CHE 002B Nucleosynthesis of chemical elements, physical and chemical properties of elements, ionic substitution, elemental partition, distribution and transport among planetary materials, basic thermodynamics and phase diagrams, isotopic geochronometers, stable isotope fractionation, mixing and dilution, advection and diffusion, geochemical cycles. Effective: 2016 Fall Quarter.

GEL 134—Environmental Geology and Land Use Planning (3)
Lecture—3 hours. Prerequisite(s): GEL 001 or GEL 050; Consent of Instructor. One course in Geology. Geologic aspects of land use and development planning. Geologic problems concerning volcanic and earthquake hazards, land stability, floods, erosion, coastal hazards, non-renewable resource extraction, waste disposal, water resources. GE credit: SE, WE. Effective: 2016 Fall Quarter.

GEL 136—Ecogeomorphology of Rivers and Streams (5)
Discussion/Laboratory—2 hours; Fieldwork; Lecture—1 hour; Term Paper. Prerequisite(s): Consent of Instructor. Upper division or graduate standing in any physical science, biological science, or engineering. Restricted to advanced students in the physical sciences, biological sciences, or engineering. Integrative multidisciplinary field analysis of streams. Class project examines hydrology, geomorphology, water quality and aquatic and riparian ecology of degraded and pristine stream systems. Includes cooperative two-week field survey in remote wilderness settings with students from diverse scientific backgrounds. GE credit: SE, WE. Effective: 2013 Fall Quarter.

GEL 138—Introductory Volcanology (4)
Fieldwork—6 hours; Lecture—2 hours. Prerequisite(s): GEL 060; GEL 109; Consent of Instructor. Principles of physical and chemical volcanology. Taught in a volcanically active setting (e.g., Hawaii) with a strong field component. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 139—Rivers: Form, Function and Management (4)
Fieldwork—3 hours; Lecture—3 hours. Prerequisite(s): GEL 050 or GEL 050L; MAT 016B or 021B recommended. Analysis of river form and processes, emphasis on fluvial geomorphology, and river and stream restoration; case studies to illustrate concepts and applications. Two weekend field trips required. Offered irregularly. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 140—Introduction to Process Geomorphology (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (GEL 001 or GEL 050); (MAT 016B or MAT 021B) Quantitative description and interpretation of landscapes with emphasis on the relationships between physical processes, mass conservation, and landform evolution. Topics covered include physical and chemical weathering, hillslopes, debris flows, fluvial systems, alluvial fans, pedogenesis, eolian transport, glaciation and Quaternary geochronology. Effective: 2016 Fall Quarter.

GEL 141—Evolutionary History of Vertebrates (3)
Lecture—3 hours. Prerequisite(s): GEL 003 or BIS 002A Evolutionary history of vertebrates; fossil record and phylogeny; timing of major evolutionary events; appearance of major vertebrate groups; physical constraints in vertebrate evolution; paleobiogeography of vertebrates; effect of continental movement on vertebrate evolution; dinosaurs and other strange vertebrates. Offered in alternate years. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 141L—Evolutionary History of Vertebrates Laboratory (1)
Laboratory—3 hours. Prerequisite(s): GEL 141 (can be concurrent) Augments lecture course 141 through handling of specimens enabling in-person examination of three dimensional features observed in vertebrate skeletons, both fossil and living. Offered in alternate years. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 142—Basin Analysis (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): GEL 050; GEL 050L; GEL 109 Analysis of sedimentary basins from initiation to maturity, including controls on sedimentary fill, subsidence analysis, sequence stratigraphy, core logs, and applications to petroleum exploration and hydrology. One two-day field trip. Offered irregularly. GE credit: SE, VL. Effective: 2013 Fall Quarter.

GEL 143—Advanced Igneous Petrology (5)
Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): GEL 105; (MAT 016C or MAT 021C); CHE 002C Physical and chemical properties of magmatic environments and processes of igneous rock formation. Laboratory study of representative igneous rocks. Offered irregularly. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 144—Historical Ecology (3)
Lecture—3 hours. Prerequisite(s): Upper division course in environmental science or ecology, or an introductory course in paleobiology. Ancient ecosystems and the factors that caused them to change. Species, expansion, evolution of new modes of life, geologically induced variations in resource supply, and extinction provide historical perspective on the biosphere of future. GE credit: SE, WE. Effective: 2013 Fall Quarter.

GEL 145—Advanced Metamorphic Petrology (5)
Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): GEL 106; (HYD 134 or CHE 002C); (MAT 016C or MAT 021C) Metamorphic processes and the origin of metamorphic rocks. Laboratory study of representative rock suites. Offered irregularly. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 146—Radiogenic Isotope Geochemistry and Cosmochemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 002C; PHY 007C; MAT 016C Basic principles of nuclear chemistry and physics applied to geology to determine the ages of terrestrial rocks, meteorites, archeological objects, age of the Earth, to trace geological/environmental processes, and explain formation of the chemical elements in the Universe. Offered irregularly. GE credit: QL, SE. Effective: 2013 Fall Quarter.

GEL 147—Geology of Ore Deposits (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (CHE 002C or HYD 134); GEL 060; GEL 062; GEL 105 Tectonic, lithologic and geochemical setting of major metallic ore deposit types emphasizing ore deposit genesis, water/rock interaction and the environmental effects of mining. Offered irregularly. GE credit: QL, SE. Effective: 2013 Fall Quarter.

GEL 148—Stable Isotopes and Geochemical Tracers (3)
Lecture—3 hours. Prerequisite(s): (CHE 002C or HYD 134); GEL 050; GEL 050L; GEL 060 Use of oxygen and hydrogen isotopes in defining hydrologic processes; carbon, nitrogen, and sulfur isotopes as indicators of exchange between the lithosphere, hydrosphere, atmosphere and biosphere. Radiogenic, cosmogenic, and noble gas isotope tracers. Offered irregularly. GE credit: QL, SE. Effective: 2013 Fall Quarter.

GEL 149—Geothermal Systems (3)
Fieldwork; Lecture—3 hours. Prerequisite(s): GEL 050; GEL 050L; CHE 002B Geology, geochemistry, and geophysics of geothermal systems, including electrical power generation and direct use applications. Includes one day field trip on a weekend during the quarter. Offered irregularly. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 150A—Physical and Chemical Oceanography (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ESP 116N or GEL 116N); PHY 009B; MAT 021D; CHE 002C; and Consent of Instructor. Physical and chemical properties of seawater, fluid dynamics, air-sea interaction, currents, waves, tides, mixing, major oceanic geochemical cycles. (ESO 150A.) GE credit: QL, SE. Effective: 2017 Winter Quarter.

GEL 150B—Geological Oceanography (3)
Lecture—3 hours. Prerequisite(s): GEL 050 or (GEL 116N or ESP 116N) Introduction to the origin and geologic evolution of ocean basins. Composition and structure of oceanic crust; marine volcanism; and deposition of marine sediments. Interpretation of geologic history of the ocean floor in terms of sea-floor spreading theory. (ESP 150B.) GE credit: SE. Effective: 2017 Winter Quarter.

GEL 150C—Biological Oceanography (4)
Discussion—1 hour; Fieldwork; Lecture—3 hours. Prerequisite(s): BIS 002A; Consent of Instructor. A course in general ecology. Ecology of major marine habitats, including intertidal, shelf benthic, deep-sea and plankton communities. Existing knowledge and contemporary issues in research. Segment devoted to human use. One weekend field trip required. (ESP 150C.) GE credit: SE, SL. Effective: 2017 Winter Quarter.

GEL 152—Paleobiology of Protista (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): GEL 107 or BIS 002A; Consent of Instructor. Morphology, systematics, evolution, and ecology of single-celled organisms that are preserved in the fossil record. Offered irregularly. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 156—Hydrogeology and Contaminant Transport (5)
Laboratory—3 hours; Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): HYD 145; ECI 144; Or equivalent of ECI 144. Physical and chemical processes affecting groundwater flow and contaminant transport, with emphasis on realistic hydrogeologic systems. Groundwater geology and chemistry. Fundamentals of groundwater flow and transport analysis. Laboratory includes field pumping test and work with physical and computer models. (HYD 146.) GE credit: SE. Effective: 2013 Fall Quarter.

GEL 160—Geological Data Analysis (3)
Lecture/Discussion—3 hours. Prerequisite(s): MAT 021A Introduction to quantitative methods in analyzing geological data including basic principles of statistics and probability, error analysis, hypothesis testing, inverse theory, time series analysis and directional data analyses. Use of computer in lectures and homework. GE credit: QL, SE. Effective: 2016 Fall Quarter.

GEL 161—Geophysical Field Methods (3)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): MAT 021C; (GEL 001 or GEL 050); (PHY 007C or PHY 009C) Geophysical methods applied to determining subsurface structure in tectonics, hydrogeology, geotechnical engineering, hydrocarbon and mineral exploration. Theory, survey design and interpretation of gravity, electrical resistivity, electromagnetic, reflection and refraction seismology, and ground-penetrating radar measurements. GE credit: QL, SE. Effective: 2016 Fall Quarter.

GEL 162—Geophysics of the Solid Earth (3)
Lecture—3 hours. Prerequisite(s): MAT 021C; (PHY 007C or PHY 009C); Consent of Instructor. Theory and use of physics in the study of the solid earth. Gravity, magnetism, paleomagnetism, and heat flow. Application to the interpretation of the regional and large-scale structure of the earth and to plate tectonics. Offered irregularly. GE credit: QL, SE. Effective: 2016 Fall Quarter.

GEL 163—Planetary Geology and Geophysics (3)
Lecture—3 hours. Prerequisite(s): MAT 021C; (PHY 007C or PHY 009C); (GEL 050 or GEL 036 or AST 010G or AST 010L or AST 010S); Consent of Instructor. Principles of planetary science. Planetary dynamics, including orbital mechanics, tidal interactions and ring dynamics. Theory of planetary interiors, gravitational fields, rotational dynamics. Physics of planetary atmospheres. Geological processes, landforms and theirmodification. Methods of analysis from Earth-based observations and spacecraft. GE credit: QL, SE. Effective: 2016 Fall Quarter.

GEL 175— Advanced Field Geology (3)
Discussion—3 hours; Fieldwork—6 hours. Prerequisite(s): Consent of Instructor. Advanced field studies of selected geologic terrains, interpretation and discussion of field observations. Offered irregularly. May be repeated up to 2 time(s) when instructors varies. (P/NP grading only.) GE credit: SE. Effective: 2013 Fall Quarter.

GEL 181—Teaching in Science and Mathematics (2)
Fieldwork—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Major in mathematics, science, or engineering; or completion of a one-year sequence of science or calculus. Class size limited to 40 students per section. Exploration of effective teaching practices based on examination of how middle school students learn math and science. Selected readings, discussion and field experience in middle school classrooms. (EDU 181.) (P/NP grading only.) GE credit: SS, WE. Effective: 2013 Fall Quarter.

GEL 182—Field Studies in Marine Geochemistry (2-8)
Fieldwork—6-40 hours; Laboratory—1-3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Marine geochemistry with the opportunity of going to sea or into the field on land. Techniques of sea-floor mapping using bottom photography, marine geochemical sampling, and method of data reduction and sample analysis. Analysis of data/samples collected. Offered irregularly. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 183—Teaching High School Mathematics and Science (3) ***Review all entries***
Fieldwork; Lecture/Discussion—2 hours. Prerequisite(s): Major in mathematics, science, or engineering; or consent of instructor with completion of a one-year sequence of science or calculus. Limited to 40 students per section. Exploration and creation of effective teaching practices based on examination of how high school students learn mathematics and science. Field experience in high school classrooms. (Education 183.) GE credit: OL, SS, WE. Effective: 2017 Fall Quarter.

GEL 183—Teaching High School Mathematics and Science (3) ***Review all entries***
Fieldwork; Lecture/Discussion—2 hours. Prerequisite(s): Major in mathematics, science, or engineering; or completion of a one-year sequence of science or calculus and consent of the instructor. Limited to 40 students per section. Exploration and creation of effective teaching practices based on examination of how high school students learn mathematics and science. Field experience in high school classrooms. (EDU 183.) GE credit: OL, SS, WE. Effective: 2018 Fall Quarter.

GEL 185A—Conceptual Integrated Science for Non-Science Majors: The Physical World (2)
Discussion/Laboratory—3 hours; Lecture—1 hour. Conceptual, inquiry-based integrated science course. Topics in the Next Generation Science Standards. Elementary school level teaching practice. Physics, chemistry, and science inquiry. GE credit: SE, SL. Effective: 2017 Winter Quarter.

GEL 185B—Conceptual Integrated Science for Non-Science Majors: Earth System Science (2)
Discussion/Laboratory—3 hours; Lecture—1 hour. Conceptual, inquiry-based integrated science course. Topics in the Next Generation Science Standards. Elementary school level teaching practice. Earth, space and environmental science, and science inquiry. GE credit: SE, SL. Effective: 2016 Fall Quarter.

GEL 186—Facilitating Learning in STEM Classrooms (1)
Lecture/Discussion—1 hour. STEM Learning Assistant Seminar. Theoretical and practical issues of effective teaching in discussion/labs: student-centered, active, cooperative learning environments, responsive teaching, and differentiated classroom instruction. GE credit: SS. Effective: 2016 Fall Quarter.

GEL 190—Seminar in Geology (1)
Discussion—1 hour; Seminar—1 hour. Presentation and discussion of current topics in geology by visiting lecturers, staff, and students. Written abstracts. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 2016 Fall Quarter.

GEL 192—Internship in Geology (1-12)
Internship. Prerequisite(s): Upper division standing; project approval prior to internship. Supervised work experience in geology. May be repeated for credit for a total of 10 units. May be repeated up to 10 unit(s). (P/NP grading only.) GE credit: SE. Effective: 2013 Fall Quarter.

GEL 194A—Senior Thesis (3)
Variable. Prerequisite(s): Open to Geology majors who have completed 135 units and who do not qualify for the Honors Program. Guided independent study of a selected topic, leading to the writing of a senior thesis. GE credit: SE, WE. Effective: 2013 Fall Quarter.

GEL 194B—Senior Thesis (3)
Variable. Prerequisite(s): Open to Geology majors who have completed 135 units and who do not qualify for the Honors Program. Guided independent study of a selected topic, leading to the writing of a senior thesis. GE credit: SE, WE. Effective: 2013 Fall Quarter.

GEL 194HA—Senior Honors Project (3)
Independent Study—9 hours. Prerequisite(s): Open to Geology majors who have completed 135 units and who qualify for the Honors Program. Guided independent study of a selected topic, leading to the writing of an honors thesis. GE credit: SE, WE. Effective: 2013 Fall Quarter.

GEL 194HB—Senior Honors Project (3)
Independent Study—9 hours. Prerequisite(s): Open to Geology majors who have completed 135 units and who qualify for the Honors Program. Guided independent study of a selected topic, leading to the writing of an honors thesis. GE credit: SE, WE. Effective: 2013 Fall Quarter.

GEL 198—Directed Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Senior standing in Geology or consent of instructor. Group study focused on topics in Geology. (P/NP grading only.) GE credit: SE. Effective: 2016 Spring Quarter.

GEL 199—Special Study for Advanced Undergraduates (1-5)
Variable. Special study for advanced undergraduates. (P/NP grading only.) GE credit: SE. Effective: 2013 Fall Quarter.

GEL 205—Advanced Field Stratigraphy (3)
Fieldwork—2 hours; Lecture—1 hour. Prerequisite(s): GEL 109; GEL 110; or Consent of Instructor. GEL 206 recommended. Fieldwork over spring break. Application of stratigraphic techniques to research problems. Collection, compilation, and interpretation of field data. Integration of data with models for deposition and interpretations of Earth history. Topics will vary. Offered irregularly. May be repeated for credit. Effective: 2013 Fall Quarter.

GEL 206—Stratigraphic Analysis (3)
Lecture—3 hours. Prerequisite(s): GEL 109; GEL 109L; or Consent of Instructor. GEL 144 recommended. Topics in advanced methods of stratigraphic analysis, regional stratigraphy and sedimentation, and sedimentary basin analysis. Emphasis on techniques used to interpret stratigraphic record and on current issues in stratigraphy and sedimentation. Offered irregularly. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

GEL 214—Active Tectonics (3)
Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Active deformation associated with faults, landslides, and volcanoes. Geodetic measurement techniques such as triangulation, trilateration, leveling, Global Positioning System (GPS), and radar interferometry. GPS data acquisition and analysis. Inversion of geodetic data and mechanical models of crustal deformation. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 216—Tectonics (3)
Lecture/Discussion—3 hours. Prerequisite(s): GEL 101; or Consent of Instructor. Nature and evolution of tectonic features of the Earth. Causes, consequences, and evolution of plate motion, with selected examples from the Earth's deformed belts. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 217—Topics in Geophysics (3)
Lecture—1 hour; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Discussion and evaluation of current research in a given area of geophysics. Topic will change from year to year. Offered in alternate years. May be repeated for credit. Effective: 2013 Fall Quarter.

GEL 218—Analysis of Structures in Deformed Rocks (3)
Seminar—3 hours. Prerequisite(s): GEL 100; GEL 100L; GEL 101; GEL 101L; GEL 170; or Consent of Instructor. Recent advances in the understanding and analysis of structures in brittlely and ductilely deformed rocks. Detailed investigation of the characteristics of the structures, models for their formation, and applications to inferring the kinematics of larger scale tectonics. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 219—Fracture and Flow of Rocks (3)
Lecture—3 hours. Prerequisite(s): GEL 100; GEL 101; or Consent of Instructor. Origins of those structures in rocks associated with brittle and ductile deformation. Theoretical analysis, using continuum mechanics, and experimental evidence for the origin of the structures with emphasis on deformational processes in the earth. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 220—Mechanics of Geologic Structures (3)
Lecture—3 hours. Prerequisite(s): MAT 021C; (PHY 009A; or PHY 005A); GEL 170; or Consent of Instructor; MAT 021D and MAT 022A recommended. Development in tensor notation of the balance laws of continuum mechanics, and constitutive theories of elasticity, viscosity, and plasticity and their application to understanding development of geologic structures such as fractures, faults, dikes, folds, foliations,
and boudinage. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 226—Advanced Sedimentary Petrology (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): GEL 144; or Consent of Instructor. Advanced petrography and geochemistry of sediments and sedimentary rocks. Geochemical, textural and mineralogical evolution of sedimentary rocks reflecting depositional or burial processes. Laboratory work emphasizes thin section study of rocks. Offered irregularly. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

GEL 227—Stable Isotopes Biogeochemistry (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Discussion and application of stable isotope techniques for scientific research problems. Course emphasizes carbon, oxygen, nitrogen, hydrogen and sulfur isotopes. Laboratory will develop basic skills of cryogenic gas extraction and specific techniques for individual research using stable isotopes. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 228—Topics in Paleoceanography (3)
Lecture—3 hours. Prerequisite(s): GEL 108; GEL 150A; or Consent of Instructor. Critical discussion and review of selected topics in paleoceanography and paleoclimatology relating to the history of the processes controlling and affecting climate change and ocean circulation throughout the geologic record. Topics vary. Offered irregularly. May be repeated for credit. Effective: 2013 Fall Quarter.

GEL 230—Geomorphology and River Management (3)
Seminar—3 hours. Prerequisite(s): GEL 139; Or equivalent; graduate standing. Impacts of management and land use activities on the geomorphology of rivers and streams. Evaluation and use of analytical tools for river assessment. Assessment of river and stream restoration strategies and emerging issues in river management. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

GEL 232—The Oceans and Climate Change (3)
Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Modern climate change and linkages between the ocean-atmosphere-cryosphere-terrestrial climate system. Importance of the ocean in forcing climate change, and the impacts of anthropogenic processes on the ocean. Topics vary. Offered irregularly. May be repeated up to 3 time(s). Effective: 2013 Fall Quarter.

GEL 235—Surface Processes (3)
Seminar—3 hours. Prerequisite(s): GEL 050; GEL 050L; GEL 139; MAT 021B or MAT 016B recommended. Recent advances in the analysis of landforms and their evolution. Detailed investigation of the tools used to document surface processes. Evaluation of concepts and processes that govern landscape evolution. Offered irregularly. May be repeated for credit. Effective: 2013 Fall Quarter.

GEL 236—Inverse Theory in Geology and Geophysics (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Inversion of data for model parameters. Evaluation of parameter uncertainties. Linear and nonlinear problems for discrete and continuous models. Bakus-Gilbert inversion. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 238—Theoretical Seismology (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Elastodynamic wave equation. Greens functions and source representations. Ray theory. Plane and spherical waves and boundary conditions. Elastic wave propagation in stratified media. (P/F grading only.) Effective: 2013 Fall Quarter.

GEL 240—Geophysics of the Earth (3)
Lecture—3 hours. Prerequisite(s): PHY 009B; MAT 022B Physics of the earth's crust, mantle, and core. Laplace's equation and spherical harmonic expression of gravity and magnetic fields. Elastic wave equation in geologic media. Body and surface seismic waves. Equations of state, thermal structure of the earth. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 241—Geomagnetism (3)
Lecture—3 hours. Prerequisite(s): Graduate standing. Nature and origin of the Earth's magnetic field. Present field and recent secular variation. Spherical harmonic analysis. Paleosecular variation. Polarity transitions and geomagnetic excursions. Statistics of polarity intervals. Dynamo theory. Planetary magnetism. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 242—Paleomagnetism (3)
Lecture—3 hours. Prerequisite(s): Graduate standing. Principles and applications of paleomagnetism. Physical basis of rock and mineral magnetism. Field and laboratory techniques. Instrumentation. Analysis of paleomagnetic data. Statistical methods. Rock magnetic properties. Geological and geophysical applications. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 246—Physical Chemistry of Metamorphic Processes (3)
Lecture—3 hours. Prerequisite(s): GEL 145; CHE 110A; or Consent of Instructor. Physiochemical principles of metamorphic mineral assemblages and methods of interpreting the paragenesis of metamorphic rocks. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 247—Metamorphic Petrology Seminar (3)
Seminar—3 hours. Prerequisite(s): GEL 145; or Consent of Instructor. GEL 246 recommended. Selected topics in metamorphic petrology (e.g., mass transport processes, tectonic settings, geothermometry, thermal structure of metamorphic belts, regional studies). Offered irregularly. May be repeated for credit. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 250—Advanced Geochemistry Seminar (3)
Seminar—3 hours. Prerequisite(s): GEL 146; or Consent of Instructor. Critical review of selected topics in geochemistry including: ore genesis, hydrothermal and geothermal fluids, recent and ancient sediments, isotope geology, origin and chemistry of the oceans. Subject varies yearly depending on student interest. May be repeated for credit. May be repeated for credit. Effective: 2013 Fall Quarter.

GEL 251—Advanced Topics in Isotope Geochemistry and Cosmochemistry (3)
Lecture/Discussion—2 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Astrophysical context on origin of Solar System, synthesis of chemical elements, condensation sequence, star and planet formation, cosmochronology, building blocks of planets, development on planets' layered structure, atmosphere and hydrosphere and the role of comets/asteroids for volatile delivery. Offered irregularly. May be repeated up to 3 time(s) when topics differs. Effective: 2013 Fall Quarter.

GEL 253—Current Topics in Igneous Petrology (3)
Seminar—3 hours. Prerequisite(s): GEL 143; or Consent of Instructor. Graduate standing in Geology. Topical seminar designed to help graduate students develop and maintain familiarity with current and past literature related to igneous rock petrogenesis. May be repeated for credit when topic differs. May be repeated for credit when topic differs. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 254—Physical Chemistry of Igneous Processes (3)
Lecture—3 hours. Prerequisite(s): CHE 110A; GEL 143; and Consent of Instructor. GEL 143 or consent of instructor; CHE 110B and CHE 110C recommended. Introduction of modern concepts in chemical thermodynamics and kinetics, and fluid dynamics of magmatic systems for graduate students in petrology. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 255—Experimental Petrology (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): GEL 143; or Consent of Instructor. Introduction to techniques and methods of design and executing experiments on Earth-forming minerals and rocks. Problems and examples from igneous and metamorphic petrology will be utilized. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 260—Paleontology (3)
Seminar—3 hours. Prerequisite(s): Graduate standing in geology or a biological science. Selected problems in paleontology. Subject to be studied will be decided at an organizational meeting. Offered irregularly. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

GEL 261—Paleobiology Graduate Seminar 1: Evolutionary aspects (3)
Lecture—1 hour; Seminar—2 hours. Prerequisite(s): Graduate standing in Geology or a biological science; qualified undergraduates will be accepted on an exception-only basis. This course will treat one or more of several topics in paleobiology from a phylogenetic perspective, including major patterns in evolution, building the tree of life, extinction and phylogeny, phylogeny of major phyla, and the relation between taxonomy and phylogeny. May be repeated for credit when topic varies. Effective: 2013 Fall Quarter.

GEL 262—Paleobiology Graduate Seminar: Methodological aspects (3)
Lecture—1 hour; Seminar—2 hours. One or more major methods used in the study of fossils: Morphometrics and three-dimensional reconstruction of fossils, phylogenetic methodology, the application of geochemical techniques, and electron microscopy. May be repeated up to 4 time(s) topic varies. Effective: 2013 Fall Quarter.

GEL 281N—Instrumental Techniques for Earth Scientists (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): MAT 021A; MAT 021B; MAT 021C; ((PHY 007A, PHY 007B, PHY 007C) or (PHY 009A, PHY 009B, PHY 009C)); or Consent of Instructor. Laboratory research techniques for new graduate students in Geology. Demonstration of and exposure to appropriate techniques in research. Effective: 2013 Fall Quarter.

GEL 285—Field Studies in Marine Geochemistry (2-8)
Fieldwork—6-40 hours; Laboratory—1-3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Marine geochemistry with the opportunity of going to sea or into the field on land. Techniques of seafloor mapping using bottom photography, marine geochemical sampling, and method of data reduction and sample analysis. Analysis of data/samples collected. Effective: 2013 Fall Quarter.

GEL 290—Seminar in Geology (1)
Discussion—1 hour; Seminar—1 hour. Presentation and discussion of current topics in geology by visiting lecturers, staff, and students. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 291—Geology of the Sierra Nevada (1)
Seminar. Prerequisite(s): Consent of Instructor. Short oral presentations by students and faculty concerning results of their past work and plans for future work in the Sierra. A written abstract is required following the format required at professional meetings. Offered irregularly. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 292—River Forum (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Review and discussion of latest research and fundamental issues surrounding riverine systems, with emphasis on physical processes. Topics vary. Offered irregularly. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 293—Geologic Event of the Week (1)
Discussion—0.5 hours; Seminar—0.5 hours. Prerequisite(s): Graduate standing. Seminar/discussion group to review and discuss recent earthquakes, volcanic eruptions, and other significant geologic events. The focus is on understanding the available observations, the physical processes behind each event, the geological setting, and societal consequences. Offered irregularly. May be repeated up to 3 time(s) for up to 3 units. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 294—Structure/Tectonics Forum (1)
Seminar—1 hour. Prerequisite(s): Graduate student in geology or consent of instructor. Seminar/discussion group to review and discuss latest research in structural geology and tectonics, and on-going research of participants. Topics will vary each quarter depending on the interests of the group. Occasional field trips to areas of current interest. May be repeated for credit when topic differs. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 295—Geophysics Forum (1)
Discussion—0.5 hours; Seminar—0.5 hours. Prerequisite(s): GEL 100; GEL 101; or Consent of Instructor. Seminar/discussion group to review and discuss latest research in geophysics, and on-going research of participants. Topics will change each quarter depending on the interests of the group. Offered irregularly. May be repeated for credit when topic differs. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 296—Advanced Problems in Tectonics (3)
Seminar—3 hours. Prerequisite(s): GEL 101; and Consent of Instructor. Seminar dealing with current problems in tectonics of selected regions. Topics will change from year to year. Emphasis on study of recent literature. Offered irregularly. May be repeated for credit. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 297—Geophysics Forum (1)
Discussion—0.5 hours; Seminar—0.5 hours. Prerequisite(s): Graduate student status in the Geology Department, or consent of instructor. Seminar/discussion group to review and discuss latest research in geophysics, and on-going research of participants. Topics will change each quarter depending on the interests of the group. Offered irregularly. May be repeated up to 3 time(s). (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 298—Group Study (1-5)
Variable. Group study. Effective: 2013 Fall Quarter.

GEL 299—Research (1-12)
Variable. Research. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 390—Methods of Teaching Geology (2)
Extensive Writing/Discussion—2 hours. Prerequisite(s): Graduate student standing in Geology. Introduction to graduate-level writing and undergraduate-level teaching skills in geology. Persuasive (proposal) writing workshop; discussions on campus teaching resources, presenting information, managing classroom dynamics, evaluating student performance. Participation in teaching program required for Ph.D. in Geology. (S/U grading only.) Effective: 2014 Spring Quarter.

GEL 391—Ethical Issues in Earth Science (1)
Seminar—1 hour. Prerequisite(s): Graduate standing in Geology or consent of instructor. Reading and discussion of ethical issues arising in the earth sciences. Topics include scientific misconduct, gender equity in science, authorship of scientific papers, establishing priorities in research, and related issues. Offered irregularly. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 396—Teaching Assistant Training Practicum (1-4)
Variable. Teaching assistant training. May be repeated for credit. (P/NP grading only.) Effective: 2013 Fall Quarter.

Geophysics Minor; Earth & Planetary Sciences

Geophysics Minor; Earth & Planetary Sciences | Geophysics Minor

(College of Letters and Science)

Michael E. Oskin, Ph.D., Chairperson of the Department

David A. Osleger, Ph.D., Vice-Chairperson, Undergraduate Program

Sujoy Mukhopadhyay, Ph.D., Vice-Chairperson, Graduate Program

Department Office. 2119 Earth and Physical Sciences Building; 530-752-0350; http://www.geology.ucdavis.edu

Faculty. See http://geology.ucdavis.edu/people/faculty/index.php

Geophysics is the study of the physical properties and processes within and surrounding the Earth. Many problems in the Earth Sciences require geophysical techniques for study. The interdisciplinary minor in geophysics is for students with backgrounds in the physical sciences, engineering and other fields who are interested in pursuing a graduate or professional career in geophysics, or those who desire a career in the energy, minerals, or environmental industries.

The minor is sponsored by the Department of Earth and Planetary Sciences.

Minor Advisor. See Geology major advisors.

Geophysics **Units:** 19-26

Choose one:

ENG 006	Engineering Problem Solving	4
ECS 030	Programming and Problem Solving (Discontinued)	4
EME 005	Computer Programming for Engineering Applications	4

Choose two:

GEL 160	Geological Data Analysis	3
GEL 161	Geophysical Field Methods	3
GEL 162	Geophysics of the Solid Earth	3
GEL 163	Planetary Geology and Geophysics	3
EME 115	Introduction to Numerical Analysis and Methods	4

Choose one course sequence:

(a)

ATM 120	Atmospheric Thermodynamics and Cloud Physics	4
ATM 121A	Atmospheric Dynamics	4
ATM 121B	Atmospheric Dynamics	4

(b)

GEL 101	Structural Geology	3
GEL 101L	Structural Geology Lab	2

(c)

MAT 118A	Partial Differential Equations: Elementary Methods	4
MAT 118B	Partial Differential Equations: Eigenfunction Expansions	4
MAT 118C	Partial Differential Equations: Green's Functions and Transforms	4

(d)

PHY 104A	Introductory Methods of Mathematical Physics	4
OR		
ENG 180	Engineering Analysis	4
PHY 105A	Analytical Mechanics	4
OR		
ENG 104	Mechanics of Materials	4
PHY 105C	Continuum Mechanics	4

OR		
HYD 103N	Fluid Mechanics Fundamentals	4

Total: 19-26

German

German | GER Information

(College of Letters and Science)

Sven-Erik Rose, Ph.D., Chairperson of the Department

Department Office. German and Russian; 213 Sproul Hall; 530-752-1219; http://german.ucdavis.edu

Faculty. http://german.ucdavis.edu/faculty

German | GER A.B.

(College of Letters and Science)

Sven-Erik Rose, Ph.D., Chairperson of the Department

Department Office. German and Russian; 213 Sproul Hall; 530-752-1219; http://german.ucdavis.edu

Faculty. http://german.ucdavis.edu/faculty

The Major Program

The German major explores in depth the literature and language, the culture and commerce of the German-speaking world (primarily Germany, Austria and Switzerland). The key to the major lies in the careful balance between solid core requirements and the possibility to explore German subject areas through the lens of other disciplines, such as music, art, philosophy, history, and economics.

The Program. The department offers courses that highlight literary figures, movements and themes. These courses form the core of upper-division literature electives, but we also offer courses that discuss contemporary culture and commerce in German-speaking countries. Regardless of emphasis, students will find maximum practice in spoken and written German as well as in listening comprehension in all upper-division courses offered in German.

Career Alternatives. Completion of the major prepares students for graduate study in German or for career opportunities in international fields ranging from employment in business and government to careers in the fine arts and sciences. Also, it permits admission to professional schools such as law and medicine.

Honors and Honors Program. The honors program consists of two quarters of research (194H) terminating in an honors thesis. For details consult the undergraduate major advisor. Graduation with high or highest honors requires participation in the honors program.

Graduate Study. The Department offers programs of study and research leading to the M.A. degree and to the Ph.D. degree in German Literature. Additional degree options for a designated emphasis are available through departmental affiliations with the programs in Social Theory and Comparative History, Critical Theory, Feminist Theory and Research, and Second Language Acquisition. Detailed information may be obtained by writing to the Department Chairperson or the Graduate Advisor.

Graduate Advisor. Chunjie Zhang

Prerequisite Credit. Credit normally will not be given on the lower-division level for a course that is the prerequisite of a course already successfully completed.

Major Advisor. Elisabeth Krimmer

Preparatory Subject Matter **Units:** 0-27

GER 001	Elementary German	5
GER 002	Elementary German	5
GER 003	Elementary German	5
OR		
The equivalent.		
GER 020	Intermediate German	4
GER 021	Intermediate German	4
GER 022	Intermediate German	4

Depth Subject Matter **Units:** 44

GER 101A	Survey of German Literature, 800-1800	4
GER 101B	Survey of German Literature, 1800-Present	4
GER 103	Writing Skills in German	4
GER 120	Survey of German Culture	4
OR		
GER 118E	Contemporary German Culture	4

Choose four courses from upper division offerings taught in German.

Choose three additional upper division courses from:

GER 104	Translation	4
GER 105	The Modern German Language	4
GER 109A	Business German	4
GER 109B	Advanced Business German	4
GER 121	The Medieval Period in German Literature	4
GER 122	Reformation and Baroque	4
GER 123	Literature of the Classical Age	4
GER 124	Major Movements in German Literature	4
GER 125	Short Fiction: 1880-1914	4
GER 126	Modern German Literature	4
GER 127	Major Writers in German	4
GER 129	Postwar Women Writers	4
GER 131	German Lyric Poetry	4
GER 132	The German Novelle	4
GER 133	The German Drama	4
GER 134	Topics in German Intellectual History	4
GER 141	The Holocaust and its Literary Representation	4
GER 142	New German Cinema	4
GER 143	Language Through Media	4
GER 144	Marx, Nietzsche, Freud	4
GER 160	Love in the Middle Ages	4
GER 168	Multiculturalism in German Literature	4
GER 176A	Classic Weimar Cinema	4
GER 185	The Age of Bismarck	4
GER 192	Field Work in German	1-12
GER 194HA	Honors Program	3
GER 194HB	Honors Program	3
GER 197T	Tutoring in German	1-4

GER 198	Directed Group Study	1-5
OR		
Courses in other disciplines that focus on German history, thought, and culture, upon approval of the major advisor.		

Electives include, but are not limited to:

AHI 176C	Art of the Middle Ages: Gothic	4
COM 138	Gender and Interpretation in the Renaissance	4
COM 140	Thematic and Structural Study of Literature	4
COM 141	Introduction to Critical Theoretical Approaches to Literature and Culture	4
COM 142	Critical Reading and Analysis	4
COM 147	Modern Jewish Writers	4
ECN 110B	World Economic History Since the Industrial Revolution	4
ECN 116	Comparative Economic Systems	4
ECN 160A	International Microeconomics	4
ECN 160B	International Macroeconomics	4
ECN 162	International Economic Relations	4
FMS 142	New German Cinema	4
FMS 176A	Classic Weimar Cinema	4
FMS 176B	Postwar German Cinema	4
HIS 142A	History of the Holocaust	4
AND		
HIS 142B	The Memory of the Holocaust	4
HIS 144A	History of Germany, 1450 to 1789	4
AND		
HIS 144B	History of Germany since 1789	4
MUS 110A	The Music of a Major Composer: Beethoven	4
MUS 110C	The Music of a Major Composer: Bach	4
MUS 110D	The Music of a Major Composer: Mozart	4
MUS 110E	The Music of a Major Composer: Haydn	4
PHI 170	Spinoza and Leibniz	4
PHI 175	Kant	4
POL 117	Topics in the History of Political Thought	4
POL 118C	History of Political Theory: Late Modern	4
POL 137	International Relations in Western Europe	4

Note: Many of the above electives from other disciplines have prerequisites.

The total of 44 upper division units may include units earned in the Education Abroad Program.

Total: 44-71

German | GER M.A.

(College of Letters and Science)

Sven-Erik Rose, Ph.D., Chairperson of the Department

Department Office. German and Russian; 213 Sproul Hall; 530-752-1219; http://german.ucdavis.edu

Faculty. http://german.ucdavis.edu/faculty

Graduate Study. The Department offers programs of study and research leading to the M.A. degree and to the Ph.D. degree in German Literature. Additional degree options for a designated emphasis are available through departmental affiliations with the programs in Social Theory and Comparative History, Critical Theory, Feminist Theory and Research, and Second Language Acquisition. Detailed information may be obtained by writing to the Department Chairperson or the Graduate Advisor.

Graduate Advisor. Chunjie Zhang

German | GER Ph.D.

(College of Letters and Science)

Sven-Erik Rose, Ph.D., Chairperson of the Department

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Graduate Study. The Department offers programs of study and research leading to the M.A. degree and to the Ph.D. degree in German Literature. Additional degree options for a designated emphasis are available through departmental affiliations with the programs in Social Theory and Comparative History, Critical Theory, Feminist Theory and Research, and Second Language Acquisition. Detailed information may be obtained by writing to the Department Chairperson or the Graduate Advisor.

Graduate Advisor. Chunjie Zhang

German | GER Minor

(College of Letters and Science)

Sven-Erik Rose, Ph.D., Chairperson of the Department

Department Office. German and Russian; 213 Sproul Hall; 530-752-1219; http://german.ucdavis.edu

Faculty. http://german.ucdavis.edu/faculty

The Department offers a German minor consisting of at least 20 upper-division units of courses taught in German. Students wishing to minor in German should consult the undergraduate advisor.

Prerequisite Credit. Credit normally will not be given on the lower-division level for a course that is the prerequisite of a course already successfully completed.

German **Units:** 20

Choose at least 20 upper-division units of courses taught in German.

Total: 20

German | GER Courses

Courses in GER:

GER 001—Elementary German (5)
Discussion—5 hours; Laboratory—1 hour. Not open to students who have taken course 1A. Introduction to German grammar and development of all language skills in a cultural context with special emphasis on communication. Students who have successfully completed GER 002 or GER 003 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only; although a passing grade will be charged to the student's P/NP option, no petition is required; all other students will receive a letter grade unless a P/NP petition is filed. GE credit: AH, WC. Effective: 2007 Spring Quarter.

GER 001A—Accelerated Intensive Elementary German (15) ***Review all entries***
Lecture/Discussion—15 hours. Special 12 week accelerated, intensive summer session course that combines the work of courses 1, 2, and 3. Introduction to German grammar and development of all language skills in a cultural context with emphasis on communication. Not open to students who have completed German 1, 2, or 3. Effective: 2006 Summer Special Session.

GER 001A—Accelerated Intensive Elementary German (15) ***Review all entries***
Lecture/Discussion—12.5 hours. Special 12 week accelerated, intensive summer session course that combines the work of courses 1, 2, and 3. Introduction to German grammar and development of all language skills in a cultural context with emphasis on communication. Not open to students who have completed GER 001, GER 002, or GER 003. GE credit: AH, WC. Effective: 2018 Summer Session 1.

GER 002—Elementary German (5)
Discussion—5 hours; Laboratory—1 hour. Prerequisite(s): GER 001 Not open for credit to students who have taken course 1A. Continuation of course 1 in areas of grammar and basic language skills. GE credit: AH, WC. Effective: 2007 Spring Quarter.

GER 003—Elementary German (5)
Discussion—5 hours; Laboratory—1 hour. Prerequisite(s): GER 002 Not open to students who have taken course 1A. Completion of grammar sequence and continuing practice of all language skills through cultural texts. GE credit: AH, OL, WC. Effective: 2015 Winter Quarter.

GER 010—German Fairy Tales from the Grimms to Disney (4)
Lecture/Discussion—3 hours; Term Paper. Introduction to the genre of fairy tale with a focus on the Brothers Grimm and Hans Christian Andersen in their respective political/cultural contexts. Discusses filmic adaptations by Disney, the East German DEFA and Hollywood. GE credit: AH, VL, WC, WE. Effective: 2012 Fall Quarter.

GER 011—Travel and the Modern World (4)
Extensive Writing; Lecture/Discussion—3 hours. Examination of travel as an essential human activity and experience of global modernity and cross-cultural encounters from the 18th to the 21st century with an emphasis on German-speaking culture. Travelogues, literature, art, memoirs, and films in English translation. (Comparative Literature 011.) GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

GER 020—Intermediate German (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): GER 003; can be concurrent with GER 006. Review of grammatical principles by means of written exercises; expanding of vocabulary through readings of modern texts. GE credit: AH, OL, WC, WE. Effective: 2015 Winter Quarter.

GER 021—Intermediate German (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): GER 020 Review of grammatical principles by means of written exercises; expanding of vocabulary through readings of modern texts; addresses social relations and cultural practices in Germany; discusses history of Germany. GE credit: AH, OL, WC, WE. Effective: 2016 Winter Quarter.

GER 022—Intermediate German (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): GER 021 Review of grammatical principles by means of written exercises; expanding of vocabulary through readings of modern texts. GE credit: AH, OL, WC, WE. Effective: 2015 Winter Quarter.

GER 040—Great German Short Stories (in English) (4)
Extensive Writing; Lecture/Discussion—3 hours. Major German short stories from Goethe at the end of the eighteenth century to Thomas Mann at the beginning of the twentieth century. GE credit: AH, OL, WC, WE. Effective: 2005 Fall Quarter.

GER 045—Vampires and Other Horrors in Film and Media (4)
Discussion—1 hour; Film Viewing—3 hours; Lecture—2 hours. History of representations of vampires and horror generally from the 19th through 21st centuries. Emphasis on transnational history of the horror genre; psychologies of horror effects; issues of race, gender, and class; intersections with prejudice, medicine, modernity. (Film Studies 45.) GE credit: ACGH, AH, DD, OL, VL, WC, WE. Effective: 2012 Fall Quarter.

GER 048—Myth and Saga in the Germanic Cultures (4)
Lecture—3 hours; Term Paper. Knowledge of German not required. English translation from the Norse Eddas, the Volsung and Sigurd-Siegfried cycles, and the Gudrun lays; literary mythology in German Romanticism culminating in Wagner's "total art-work" concept and The Ring of the Nibelung cycle. May not be counted toward major in German. GE credit: AH, VL, WC, WE. Effective: 2015 Winter Quarter.

GER 049—Freshman Colloquium (2)
Seminar—2 hours. Prerequisite(s): Open only to students who have completed 40 or fewer quarter units of transferable college level work. Readings, discussion and written projects treating topics such as communist-capitalist tension in German literary culture; masculine "versus" feminine authorial consciousness; disintegration and reconstitution of language reflecting cultural transformation; exorcising post-Holocaust national guilt and individual frustration-Germany's new European "mission." Effective: 1997 Winter Quarter.

GER 092—Field Work in German (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Restricted to lower-division standing. Total immersion program in Germany or a German speaking setting in the U.S. to further develop students' proficiency in the German language. (P/NP grading only.) Effective: 2001 Fall Quarter.

GER 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Primarily for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

GER 099—Special Study for Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

GER 101A—Survey of German Literature, 800-1800 (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): GER 022; or Consent of Instructor. German literature from the Middle Ages to Classicism (800-1800) with an overview of major movements and authors. GE credit: AH, OL, VL, WC, WE. Effective: 2016 Spring Quarter.

GER 101B—Survey of German Literature, 1800-Present (4)
Lecture/Discussion—3 hours. Prerequisite(s): GER 022 German literature from the Age of Romanticism (1800) to the present with an overview of major movements and authors. GE credit: AH. Effective: 2005 Winter Quarter.

GER 103—Writing Skills in German (4)
Extensive Writing—1 hour; Lecture—3 hours. Prerequisite(s): GER 022; or Consent of Instructor. Practice in different kinds of writing, such as abstracts, correspondence, lecture summaries, analysis of or response to short literary texts. GE credit: AH, OL, WC, WE. Effective: 2016 Fall Quarter.

GER 104—Translation (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): GER 022; or Consent of Instructor. Exercises in German-to-English, English-to-German translation using texts from the areas of culture and commerce. Not open for credit to students who have completed GER 104A. GE credit: AH, OL, VL, WC, WE. Effective: 2016 Spring Quarter.

GER 105—The Modern German Language (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): GER 022; or Consent of Instructor. Introduction to the linguistic analysis of contemporary German, including its phonology, morphology, syntax and semantics, as well as sociolinguistic considerations. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

GER 109A—Business German (4)
Laboratory—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): GER 022; or Consent of Instructor. Specialized language course using business-oriented information and publications as the basis for discussions, roleplay, reports, compositions and translations. Effective: 2005 Spring Quarter.

GER 109B—Advanced Business German (4)
Discussion/Laboratory—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): GER 022; or Consent of Instructor. Specialized advanced language course providing in-depth study of major business topics with the help of authentic texts and videos. Effective: 2005 Spring Quarter.

GER 112—Topics in German Literature (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Upper-division standing or consent of instructor. Knowledge of German not required. Investigation of significant themes and issues within their European context. May be repeated up to 1 time(s). GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

GER 113—Goethe's Faust (4)
Discussion—3 hours; Term Paper—1 hour. Knowledge of German not required. Intensive study of Goethe's Faust in its entirety. Discussions and readings in English; reading the text in the original is encouraged. GE credit: AH, WC, WE. Effective: 2010 Fall Quarter.

GER 114— From Marlene Dietrich to Run, Lola Run: German Women and Film (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): ANT 001 (can be concurrent) Knowledge of German not required. Women in German film from the Weimar Republic to present, with special emphasis on conceptualizations of gender, historical and political context, aesthetic and filmic innovations. GE credit: AH, OL, VL, WC, WE. Effective: 2018 Spring Quarter.

GER 115—German Literature Since 1945 (4)
Extensive Writing; Lecture—3 hours. Knowledge of German not required. Major writers of the post-war
generation of Austria, Switzerland and Germany: novelists, such as Böll, Grass, Johnson, Walser, Handke; playwrights such as Frisch, Dürrentmatt and Hochhuth; and poets, such as Celan, Enzensberger, and Aichinger. May be repeated for credit if topic differs. GE credit: AH, WC, WE. Effective: 1998 Fall Quarter.

GER 116—Readings in Jewish Writing and Thought in German Culture (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): RST 023; or Consent of Instructor. Historical tradition of Jewish thought in the German cultural context; unique contributions of Jewish writers to culture of the German-speaking world; what it means to be "other" in the mainstream culture. May be repeated up to 2 time(s) when topic differs. No credit will be given to those students who have completed HUM 121. (Jewish Studies 116.) GE credit: AH, OL, WC, WE. Effective: 2007 Spring Quarter.

GER 117—After the Catastrophe: Jews and Jewish Life in Post-1945 Germany (4)
Discussion/Laboratory—3 hours; Term Paper. Jews and Jewish culture in post-1945 Germany, with special attention given to literature, historical debates, photography, film, as well as websites and other new media. GE credit: ACGH, AH, DD, OL, VL, WC, WE. Effective: 2011 Fall Quarter.

GER 118A—Vienna at the Turn of the Twentieth Century (The End of the Habsburg Empire) (4)
Discussion—2 hours; Extensive Writing—1 hour; Lecture—1 hour. Knowledge of German not required. Cultural ferment in Vienna, capital of the multinational Habsburg empire, at the turn of the century, with consideration of innovations in literature, music, graphic arts, architecture philosophy and psychology, heralding European modernism. GE credit: AH, WC. Effective: 2001 Fall Quarter.

GER 118B—Weimar Culture: Defeat, the Roaring Twenties, the Rise of Nazism (4)
Discussion—2 hours; Extensive Writing—1 hour; Lecture—1 hour. Knowledge of German not required. Expressionism in graphic arts, literature, film, New Objectivity, Brecht, and Bauhaus considered in the context of the failure of the German experiment in democracy, the Weimar Republic of 1919-33. GE credit: AH, WC, WE. Effective: 2000 Fall Quarter.

GER 118C—Germany Under the Third Reich (4)
Lecture/Discussion—3 hours; Term Paper—1 hour. Prerequisite(s): Background in Modern European History; GER 118B recommended. No knowledge of German required. Interdisciplinary study of German society and culture during the Third Reich (1933-45); readings in aesthetics, history, and philosophy; study of Fascist culture in literature, film, architecture, and the graphic arts; focus on everyday life in Hitler's Germany. GE credit: WC, WE. Effective: 2001 Fall Quarter.

GER 118E—Contemporary German Culture (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): GER 022; or Consent of Instructor. Political, economic, social and cultural scene of Germany today. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

GER 119—From German Fiction to German Film (4)
Discussion—1 hour; Lecture—3 hours; Term Paper. Examines a number of film adaptations of major German prose works and plays to ascertain the types of changes involved in the shift in medium and the positive and negative effects achieved by such transferences. GE credit: AH, OL, VL, WC. Effective: 1997 Winter Quarter.

GER 120—Survey of German Culture (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): GER 022; or Consent of Instructor. Major developments in German arts, philosophical thought, social institutions, and political history. GE credit: AH, OL, VL, WC, WE. Effective: 2016 Spring Quarter.

GER 121—The Medieval Period in German Literature (4)
Discussion—3 hours; Extensive Writing. Prerequisite(s): GER 022; or Consent of Instructor. Literary-philosophical profile of the Mittelhochdeutsche Blütezeit in terms of the significant epics, romances, and lyric poetry. Readings in German. GE credit: AH. Effective: 2016 Spring Quarter.

GER 122—Reformation and Baroque (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): GER 022; or Consent of Instructor. Exemplary literary works of the 16th and 17th centuries tracing the principal lines of development and showing the reflection in literature of the social, as well as religious, scenes. GE credit: AH, OL, VL, WC, WE. Effective: 2016 Fall Quarter.

GER 123—Literature of the Classical Age (4)
Discussion—3 hours; Term Paper. Prerequisite(s): GER 022; or Consent of Instructor. Critical assessment of principal works of Goethe and Schiller within the historical and philosophical context of their times. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

GER 124—Major Movements in German Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): GER 022; or Consent of Instructor. Significant movements and schools in German literary history (e.g., the medieval troubadours, Storm and Stress, the romanticists, the George Circle, the expressionists), with emphasis on the broader cultural dynamics and ideologies as these apply to individual literary works. May be repeated up to 1 time(s) if topic differs. GE credit: AH, WC. Effective: 2016 Fall Quarter.

GER 125—Short Fiction: 1880-1914 (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GER 022; or Consent of Instructor. Reading of short German fiction from the fin-de-siècle period and representative of various prose styles and cultural currents. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

GER 126—Modern German Literature (4)
Discussion—3 hours; Extensive Writing. Prerequisite(s): GER 022; or Consent of Instructor. Selections from significant works of major contemporary writers, such as Hesse, Mann, Kafka, Rilke, Brecht, Grass. May be repeated up to 1 time(s) with consent of an advisor. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

GER 127— Major Writers in German (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): GER 022; or Consent of Instructor. Examination of representative works by a major writer, set in the broader cultural context of the relevant period or movement. May be repeated up to 1 time(s) when topic differs. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

GER 129—Postwar Women Writers (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): GER 022; or Consent of Instructor. Major writers in both Germanies, Austria, and Switzerland since 1945. Topics include the concept of a feminist aesthetics, East vs. West German writers, and the status of minority women writers in Germany (Jewish, Turkish-German, Afro-German). GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

GER 131—German Lyric Poetry (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GER 022; or Consent of Instructor. Study of the genre of lyric poety from the late Middle Ages through Renaissance, Baroque, Classical, Romantic, and Modern periods in correlation with other literary forms and the social climate of each period. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

GER 132—The German Novelle (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GER 022; or Consent of Instructor. Inquiry into the art of the "Novelle" through analysis of the materials and formal devices of representative authors from Goethe to Kafka. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

GER 133—The German Drama (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GER 022; or Consent of Instructor. Readings in the works of Germany's leading dramatists from the eighteenth century to the present day, such as Lessing, Goethe, Schiller, Kleist, Büchner, Hauptmann, Brecht. GE credit: AH, OL, VL, WC, WE. Effective: 2016 Spring Quarter.

GER 134—Topics in German Intellectual History (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): GER 022; or Consent of Instructor. Topics in German intellectual history with materials from a number of periods, genres, and disciplines. May be repeated up to 2 time(s) topic differs. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

GER 141—The Holocaust and its Literary Representation (4)
Discussion—1 hour; Lecture—2 hours; Term Paper. Knowledge of German not required. Aesthetic representation and metaphorical transformation of the Holocaust in its human and historical perspectives. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

GER 142—New German Cinema (4)
Extensive Writing; Lecture/Discussion—3 hours. Knowledge of German not required. German filmmakers of the 1960s-1980s such as Fassbinder, Herzog, Syberberg, Brückner, Schlöndorf, Kluge, Wenders. May be repeated for credit content changes and with consent of instructor. (Film Studies 142.) GE credit: AH, OL, VL, WC, WE. Effective: 2006 Winter Quarter.

GER 143—Language Through Media (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): GER 022; or Consent of Instructor. Study of contemporary German-language news media (press, video, film, CD-ROM, Internet) for insight into political and cultural developments in the German-speaking countries. GE credit: AH, OL, VL, WC, WE. Effective: 2016 Spring Quarter.

GER 144—Marx, Nietzsche, Freud (4)
Lecture/Discussion—3 hours; Term Paper. Study of major texts of Marx, Nietzsche, and Freud, selected with an eye to their impact on 20th-century economics, ethics, and attitudes toward eros. Particular focus on conceptions of the self and the individual's relation to society. (Humanities 144.) GE credit: AH, WC. Effective: 2011 Spring Quarter.

GER 160—Love in the Middle Ages (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): GER 022; or Consent of Instructor. Analysis of the phenomenon of love in selected medieval lyrical poems and romances of the twelfth and thirteenth century Blütezeit. Origins of courtly love, love and individualism, love and the Church, love and adultery. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

GER 168—Multiculturalism in German Literature (4)
Lecture/Discussion—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): GER 022; or Consent of Instructor. Examples of German literature from the High Middle Ages to the present that explore the "encounter with the other" (people of color, different beliefs and cultures, and inner-German minorities). GE credit: AH, OL, VL, WC, WE. Effective: 2016 Spring Quarter.

GER 176A—Classic Weimar Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): HUM 001 "German Weimar (1919-1933) cinema. Fritz Lang, F.W. Murnau, and G.W. Pabst among others. Influence on world-wide (esp. Hollywood) film genres such as film noir, horror, science fiction, and melodrama." Not open for credit to students who have completed HUM 176. (Film Studies 176A.) GE credit: AH, OL, VL, WC, WE. Effective: 2006 Fall Quarter.

GER 185—The Age of Bismarck (4)
Discussion—3 hours; Term Paper. Prerequisite(s): GER 022; or Consent of Instructor. Notable literary repercussions of the zenith of Germany's international status at the time of Bismarck's Chancellorship. The poetry of Storm, the prose of Fontane, the drama of Hauptmann. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

GER 192—Field Work in German (1-12)
Internship—3-36 hours. Prerequisite(s): GER 109A; or Consent of Instructor. Total immersion program in Germany or a German speaking setting in the U.S. to further develop student proficiency in the German language. May be repeated up to 2 time(s) or up to 12 units of credit with consent of instructor. (P/NP grading only.) Effective: 2002 Winter Quarter.

GER 194HA—Honors Program (3)
Independent Study—2 hours; Term Paper. Prerequisite(s): Open only to majors with a 3.500 minimum GPA in at least 135 graduation units. Research of an integrative nature (in either "General" or "Area Studies Emphasis" fields of major), guided by thesis advisor chosen by student. (P/NP grading only.) Effective: 1997 Winter Quarter.

GER 194HB—Honors Program (3)
Independent Study—2 hours; Term Paper. Prerequisite(s): Open only to majors with a 3.500 minimum GPA in at least 135 graduation units. Writing of Honors Thesis on topic selected by student in consultation with thesis advisor. (P/NP grading only.) Effective: 1997 Winter Quarter.

GER 197T—Tutoring in German (1-4)
Tutorial—3-12 hours. Prerequisite(s): Consent of German Program Director. Tutoring in undergraduate courses including leadership in small voluntary discussion groups affiliated with department courses. May be repeated up to 8 unit(s). (P/NP grading only.) Effective: 2004 Fall Quarter.

GER 198—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

GER 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

GER 202—Middle High German (4)
Discussion—3 hours; Lecture—1 hour. Graduate standing. Outline of grammar; selections from Middle High German epic, romance, and lyric poetry. Effective: 2016 Spring Quarter.

GER 206—Cognitive Grammar for Applied Linguists (4)
Lecture/Discussion—3 hours; Term Paper—1 hour. Prerequisite(s): Graduate standing. Analysis of grammar and application of cognitive grammar to language instruction. Syntactical problems and analyses relevant to the language which the student will teach. Effective: 2002 Spring Quarter.

GER 210—Techniques of Literary Scholarship (4)
Seminar—3 hours; Term Paper. Graduate standing. Bibliographical, organizational, and methodological tools and resources for advanced, independent research. Effective: 2016 Spring Quarter.

GER 211—Concepts in Literary Theory (4)
Seminar—3 hours. Graduate standing. Advanced course in concepts of literary theory and criticism. Discussion of the emergence of theoretical concepts and their impact on the understanding and appreciation of literary works. Discussion in German and English, readings in German. Effective: 2016 Spring Quarter.

GER 212—Contemporary Approaches to Literary Theory (4)
Seminar—3 hours; Term Paper. Graduate standing. Study of contemporary theoretical approaches such as structuralism,
deconstruction, feminism, Marxism/Frankfurt School, and reception theory in conjunction with the works of major authors. Effective: 2016 Spring Quarter.

GER 239—Narrative and Narrative Theory (4)
Seminar—3 hours; Term Paper. Graduate standing. Studies, in a theoretical and literary historical context, major elements of 19th- and 20th-century narrative, such as techniques of framing, refraction, and montage; narrative perspective; mimesis; and self-consciousness. Focuses on paradigmatic prose texts alongside a spectrum of critical approaches. Effective: 2016 Spring Quarter.

GER 240—Forms of German Verse (4)
Seminar—3 hours; Term Paper. Graduate standing. Development of German verse from the Middle Ages to the present, with special emphasis on different techniques of text analysis and interpretation. May be repeated for credit with consent of instructor. May be repeated for credit. Effective: 2016 Spring Quarter.

GER 241—The German Drama (4)
Seminar—3 hours; Term Paper. Graduate standing. Major forms of German drama from its origins to the middle of the
twentieth century. May be repeated for credit with consent of instructor. May be repeated for credit with consent of instructor. Effective: 2016 Spring Quarter.

GER 242—The German Novelle (4)
Seminar—3 hours; Term Paper. Graduate standing. The major German Novellisten, with particular emphasis on the flowering
of this genre in the nineteenth century. May be repeated for credit with consent of instructor. May be repeated for credit with consent of instructor. Effective: 2016 Spring Quarter.

GER 243—Fontane and the Rise of the Modern German Novel (4)
Seminar—3 hours; Term Paper. Graduate standing. Fontane, the father of the modern German novel and the chief German
representative of the European novel at its greatest, in the context of the nineteenth-century European political and social scene. Effective: 2016 Spring Quarter.

GER 244—Gender and Comedy (4)
Seminar—3 hours; Term Paper. Graduate standing. Studies of genre and gender in German-language comedy by male and
female writers from the 18th century to the present. Authors treated include Lessing, Kleist, Büchner, Ebner-Eschenbach, Hauptmann, Hofmannsthal, Frisch, Langner, and Jelinek. Effective: 2016 Spring Quarter.

GER 252—The Writing of Lessing (4)
Seminar—3 hours; Term Paper. Graduate standing. Study of Lessing's theory of literature with particular emphasis upon his critical attacks on French drama. Effective: 2016 Spring Quarter.

GER 253—Goethe (4)
Seminar—3 hours; Term Paper. Graduate standing. Study of the origins of Goethe's thought in German Pietism, and his principal artistic, autobiographical, scientific, and philosophical works. Effective: 2016 Spring Quarter.

GER 254—Schiller (4)
Seminar—3 hours; Term Paper. Graduate standing. Critical analysis of Schiller's major works and his impact on the intellectual climate in Germany during the late eighteenth and early nineteenth centuries. Effective: 2016 Spring Quarter.

GER 255—Aesthetics in the Age of Goethe (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Emergence of aesthetic autonomy from eighteenth century normative poetics during the Age of Goethe. The shift from a model based on the imitation of nature (and the Ancients) to a new concept grounded in the individuality of aesthetic experience. Effective: 2003 Spring Quarter.

GER 257—Heinrich von Kleist (4)
Seminar—3 hours; Term Paper. Graduate standing. Kleist's important dramatic and prose works; special attention will be
given to the peculiar hermeneutic problems in modern German, French, and Anglo-American Kleist criticism. Effective: 2016 Spring Quarter.

GER 258—The Novels of Thomas Mann (4)
Seminar—3 hours; Term Paper. Graduate standing. Reading of selected novels with emphasis on aesthetic techniques, originality, ethical and political views, and influence on the contemporary literary scene in Germany. Effective: 2016 Spring Quarter.

GER 259—Studies in Kafka (4)
Seminar—3 hours; Term Paper. Graduate standing. Study of Kafkas narrative techniques with special emphasis in the shorter works on the existential development from its roots in Expressionism. Effective: 2016 Spring Quarter.

GER 260—The Poetry of Rilke (4)
Seminar—3 hours; Term Paper. Graduate standing. Study of the principal motifs, myths, images, and problems in the poetry of Rainer Maria Rilke. Effective: 2016 Spring Quarter.

GER 261—Brecht and the Epic Theater (4)
Seminar—3 hours; Term Paper. Graduate standing. Reading of Brechts works with emphasis on the ideas which impelled the development of new literary forms and concepts. Effective: 2016 Spring Quarter.

GER 262—Studies in Turn-of-the-Century Culture (4)
Seminar—3 hours; Term Paper. Graduate standing. Investigates literary currents in turn-of-the-century Germany and Austria against the background of contemporaneous developments in psychology, the visual arts, philosophy, and music. Authors treated include Hauptmann, Holz and Schlaf, Schnitzler, T. Mann, Wedekind, Musil, Hofmannsthal. Effective: 2016 Spring Quarter.

GER 285—Middle High German Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Graduate standing. Extensive reading of Middle High German texts in the original language.
Examines linguistic and literary problems. May be repeated for credit when topic differs. May be repeated for credit. Effective: 2016 Spring Quarter.

GER 288—The Renaissance and Reformation in German Literature (4)
Seminar—3 hours; Term Paper. Restricted to graduate standing. Parabolic and didactic style in Germany's literature during the sixteenth century. May be repeated for credit with consent of instructor. Effective: 2016 Fall Quarter.

GER 289—German Literature of the Baroque (4)
Seminar—3 hours; Term Paper. Graduate standing. The "Elegantiaideal" and the varying methods used to portray it in seventeenth-century German literature. May be repeated for credit with consent of instructor. May be repeated for credit. Effective: 2016 Spring Quarter.

GER 290—The Enlightenment in German Literature (4)
Seminar—3 hours; Term Paper. Revolt against the concept of the Elegantiaideal, and evolution of a

new literature based on reason and wit. May be repeated for credit with consent of instructor. May be repeated for credit. Effective: 1997 Winter Quarter.

GER 291—Foreign Language Learning in the Classroom (4)
Project (Term Project); Seminar—3 hours. Overview of approaches to university-level foreign language instruction and the theoretical notions underlying current trends in classroom practices across commonly taught foreign languages. (French 291 and Spanish 291.) Effective: 2006 Fall Quarter.

GER 292—Sentimentality and Sturm und Drang in German Literature (4)
Seminar—3 hours. Reaction to overemphasis on Reason: theories of Hamann and Herder and works of poets such as Lenz, Leisewitz, the early Goethe and Schiller. May be repeated for credit consent of instructor. Effective: 1997 Winter Quarter.

GER 293—The Classical Age of German Literature (4)
Seminar—3 hours; Term Paper. Inquiry into the aesthetic and humanistic qualities of Germany's greatest literary epoch. May be repeated for credit with consent of instructor. May be repeated for credit. Effective: 1997 Winter Quarter.

GER 294—The Romantic Period in German Literature (4)
Seminar—3 hours; Term Paper. Survey of the works of early nineteenth-century authors in reaction
against the age of classicism. May be repeated for credit with consent of instructor. May be repeated for credit. Effective: 1997 Winter Quarter.

GER 295—Poetic Realism in German Literature (4)
Seminar—3 hours; Term Paper. Outstanding figures in German literature between 1840 and 1890. Important phases in their developments will be treated. May be repeated for credit with consent of instructor. May be repeated for credit. Effective: 1997 Winter Quarter.

GER 296—Twentieth-Century German Literature (4)
Seminar—3 hours; Term Paper. Considers the revolt of the Hauptmann generation, Symbolism, Expressionism, and the chief currents of the contemporary scene. May be repeated for credit with consent of instructor. May be repeated for credit. Effective: 1997 Winter Quarter.

GER 297—Special Topics in German Literature (4)
Seminar—3 hours; Term Paper. Various special topics in German literature, which may cut across the
more usual period and genre rubrics. May be repeated for credit when topic differs. May be repeated for credit. Effective: 1997 Winter Quarter.

GER 298—Group Study (1-5)
Variable. Effective: 1997 Winter Quarter.

GER 299—Individual Study (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

GER 299D—Special Study for the Doctoral Dissertation (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

GER 390A—The Teaching of German (2)
Lecture—2 hours. Prerequisite(s): Graduate standing or consent of instructor. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required of new teaching assistants. (S/U grading only.) Effective: 1997 Winter Quarter.

GER 390B—The Teaching of German (2)
Lecture—2 hours. Prerequisite(s): Graduate standing or consent of instructor. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required of new teaching assistants. (S/U grading only.) Effective: 1997 Winter Quarter.

GER 390C—The Teaching of German (2)
Lecture—2 hours. Prerequisite(s): Graduate standing or consent of instructor. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required of new teaching assistants. (S/U grading only.) Effective: 1997 Winter Quarter.

GER 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

GER 400—Tutorial and Instructional Internship (1-3)
Discussion—1-3 hours. Prerequisite(s): Graduate standing. Apprentice training in ongoing undergraduate literature courses taught by regular staff, with supplementary weekly critique sessions; intern leadership of discussion sections under staff supervision. May be repeated for credit. May be repeated for credit. Effective: 1997 Winter Quarter.

Global & International Studies Minor; Humanities

Global & International Studies Minor; Humanities | Global & International Studies Minor

(College of Letters and Science)

The minor is overseen by a Program Committee. For more information, see http://studyabroad.ucdavis.edu.

The interdisciplinary minor in Global and International Studies will enable students to learn about global and international issues at UC Davis, as well as gain first-hand academic experience abroad. The minor is also designed to give recognition for upper division course work while studying abroad. However, the minor can also be completed with approved course work taken at UC Davis.

Students will be expected to work closely with an academic advisor in developing an intellectually coherent program of study. Each proposal must be approved by the Faculty Directors of UC Davis Study Abroad.

Study Abroad and International Internships. The course cluster requirement may be met in one of two ways: (1) completion of a minimum of 16-17 units in the course cluster emphasis by taking approved UC Davis upper division courses in the area of global/international studies and/or approved upper division courses taken while participating in UC Study Abroad or another approved study abroad program, or (2) completion of 12 units of course work in a UC Davis accredited international internship, plus UC Davis courses sufficient to total 16-17 units. Students must meet with the GIS advisor and complete a Course Cluster Worksheet to demonstrate subject interrelatedness.

Restrictions. No more than two courses from a single UC Davis Department may be offered in satisfaction of the minor requirements.

Foreign Language Study. Students are strongly encouraged to study a foreign language, particularly the language of the country in which and about which they intend to study. However, only upper division coursework may be used to fulfill requirements for the minor.

Global and International Studies **Units:** 23-25

Arts and Humanities Emphasis:

Choose one:

ANT 004	Introduction to Anthropological Linguistics	4
ANT 020	Comparative Cultures	4
IRE 001	Global Interdependence	4
POL 003	International Relations	4
SOC 005	Global Social Change: An Introduction to Macrosociology	4

Choose one upper division UC Davis general course on global international studies. See program advisor for a list of approved courses.

Course cluster requirement

The minor requires the selection of interrelated courses totaling a minimum of 16-17 upper division units in area and regional studies or thematic course clusters in global and international studies.

Suggested course clusters include:

(1) Country or region-specific courses:

OR

Western Europe; Russian and East/Central Europe; Asia and the Pacific; Latin and South America; Africa and the Middle East; Jewish Studies; specific countries.

(2) Courses clustered around a thematic field in global and international studies:

People and nationalities; the individual and society, arts, language, literature and culture.

Total: 23-25

Global Disease Biology

Global Disease Biology | GDB Information

(College of Agricultural and Environmental Sciences)

Department of Plant Pathology

Program Office. 150 Hutchison Hall; 530-754-7277; http://gdb.ucdavis.edu/

Master Advisor. Johan H.J. Leveau, Ph.D., Professor (Plant Pathology)

Faculty. Includes members of the Departments of Plant Pathology; Veterinary Medicine, School of; Medicine, School of.

Global Disease Biology | GDB B.S.

(College of Agricultural and Environmental Sciences)

Department of Plant Pathology

Program Office. 150 Hutchison Hall; 530-754-7277; http://gdb.ucdavis.edu/

Master Advisor. Johan H.J. Leveau, Ph.D., Professor (Plant Pathology)

Faculty. Includes members of the Departments of Plant Pathology; Veterinary Medicine, School of; Medicine, School of.

The Major Program

The Global Disease Biology (GDB) major offers students the opportunity to study disease and its relationship to the health of people, animals, plants, and the environment. The program uses an integrated approach to advance student understanding of the concept(s) of disease, the societal and personal impacts of past, present and future diseases, and the science behind disease discoveries, causes, evolution, diagnosis, treatment, and prevention. The program recognizes the interconnectedness of people, animals, plants, and the environment and aims to identify and address the fundamental causes of poor health around the world. Managing global disease problems requires a multifaceted, holistic approach to address the full spectrum of human, animal, plant, and environmental health risks (also known as a One Health approach). Throughout a series of core courses, issues related to human, animal, and plant health, along with tools available to solve these problems, will be introduced to provide students with real-world scenarios in which they can apply and advance their creative and critical thinking skills. The major prepares graduates with the knowledge, leadership skills and experiences required to excel in professions associated with global health, the environment, food safety and security, biological safety and security, and health policy. For more information, see http://gdb.ucdavis.edu.

The Program. The Global Disease Biology major provides students with broad preparatory scientific course work, global disease biology core classes, flexibility in upper division electives, and a strong research experience. Global Disease Biology core classes are intended to be transdisciplinary and focus on concepts that cut across human, animal, and plant diseases offering a unifying ecological and quantitative perspective on disease.
Students plan their chosen emphasis of study as part of a required discussion course and in consultation with their advisor. Students will draw from many undergraduate courses currently offered on disease and health in a way that compliments the core courses required for the Global Disease Biology major. The major includes a senior research project, which each student designs to bridge the disciplines of the major.

Internships and Career Alternatives. The program and interests of each student in solving societal problems guides students to a range of internship and career choices. On and off-campus internship opportunities are available in research laboratories, in field situations, with governmental agencies, with private industry, and in international programs. A degree in Global Disease Biology prepares students for careers in research, teaching, governmental regulation, health care industry, or agriculture (food safety/ food security) as each relates to disease and health of people, animals, and plants. Students in the major gain research experience and may choose to continue their training at the graduate or professional level in a variety of biological disciplines. Careers in medicine, veterinary medicine, and plant pathology are open to Global Disease Biology majors.

Preparatory Subject Matter **Units:** 60-62

GDB 090	Introduction to Global Disease Biology	1
SAS 013	Disease and Society	3
BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
BIS 002C	Introduction to Biology: Biodiversity and the Tree of Life	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 002C	General Chemistry	5
AND		
CHE 008A	Organic Chemistry: Brief Course	2
CHE 008B	Organic Chemistry: Brief Course	4
OR		

CHE 118A	Organic Chemistry for Health and Life Sciences	4
CHE 118B	Organic Chemistry for Health and Life Sciences	4
PHY 007A	General Physics	4
PHY 007B	General Physics	4
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
MAT 017C	Calculus for Biology and Medicine	4

Depth Subject Matter **Units:** 47-49

BIS 101	Genes and Gene Expression	4
BIS 105	Biomolecules and Metabolism	3
EVE 100	Introduction to Evolution	4
MIC 102	Introductory Microbiology	3
MIC 103L	Introductory Microbiology Laboratory	2

Choose one:

STA 013	Elementary Statistics	4
STA 100	Applied Statistics for Biological Sciences	4
PLS 120	Applied Statistics in Agricultural Sciences	4

PMI 129Y	One Health: Human, Animal & Environment Interfaces	3
VME 158	Infectious Disease in Ecology and Conservation	3
GDB 101	Epidemiology	4
GDB 102	Disease Intervention and Policy	4
GDB 187	Global Disease Biology Seminar	3
GDB 189	Global Disease Biology Senior Research	3
GDB 189D	Global Disease Biology Research Discussion	1

Choose two:

PLP 120	Introduction to Plant Pathology	4
PMI 127	Medical Bacteria and Fungi	3
PMI 128	Biology of Animal Viruses	3
MIC 162	General Virology	4
ENT 153	Medical Entomology	3
ENT 156	Biology of Parasitism	3
GDB 103	The Microbiome of People, Animals, and Plants	3

Restricted Electives **Units:** 25

Focused specialty upper division courses as outlined in the student's major proposal (from course 187) with approval of an advisor.

Total: 132-136

Global Disease Biology | GDB Minor

(College of Agricultural and Environmental Sciences)

Department of Plant Pathology

Program Office. 150 Hutchison Hall; 530-754-7277; http://gdb.ucdavis.edu/

Faculty. Includes members of the Departments of Plant Pathology; Veterinary Medicine, School of; Medicine, School of.

A minor in Global Disease Biology may complement student's major program. Some courses have required prerequisites not included as part of the minor, and students should plan accordingly.

Minor Program Advisor. TBA

Advising Center for the minor is located in 152 Hutchison Hall; 530-754-7277.

Global Disease Biology **Units:** 20-25

SAS 013	Disease and Society	3
PMI 129Y	One Health: Human, Animal & Environment Interfaces	3
VME 158	Infectious Disease in Ecology and Conservation	3
GDB 101	Epidemiology	4
GDB 102	Disease Intervention and Policy	4

Choose one:

PLP 120	Introduction to Plant Pathology	4
PMI 127	Medical Bacteria and Fungi	3
PMI 128	Biology of Animal Viruses	3
MIC 162	General Virology	4
ENT 153	Medical Entomology	3
ENT 156 AND ENT 156L	Biology of Parasitism Biology of Parasitism Laboratory	3 1
GDB 103	The Microbiome of People, Animals, and Plants	3

Total: 20-25

Global Disease Biology | GDB Courses

Courses in GDB:

GDB 090—Introduction to Global Disease Biology (1)
Seminar—1 hour. Open to Global Disease Biology majors only. Introduction to the Global Disease Biology major, research and internship opportunities, and potential career paths in human, animal, and plant health. Communication, ethics and the nature of science. (P/NP grading only.) Effective: 2017 Fall Quarter.

GDB 101—Epidemiology (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): SAS 013; BIS 002A; BIS 002B; BIS 002C; (STA 013 or STA 013Y); (STA 100 or PLS 120) Principles and practice of epidemiology as applied to human, animal, and plant populations and the environment in which these populations co-exist. Quantitative analysis of both infectious and non-infectious disease. Inter-dependence between epidemiological analysis, decision-making and policy formulation will be highlighted. GE credit: QL, SE. Effective: 2018 Winter Quarter.

GDB 102—Disease Intervention and Policy (4)
Discussion—1 hour; Lecture—3 hours; Project (Term Project). Prerequisite(s): GDB 101; SAS 013; BIS 002A; BIS 002B; BIS 002C; PMI 129Y; VME 158 Examination of the prevention and treatment of diseases affecting humans, animals, and plants. Case studies will illustrate the merits of a unified approach to promoting health at local, regional, and global scales. GE credit: OL, SE, SL. Effective: 2014 Fall Quarter.

GDB 103—The Microbiome of People, Animals, and Plants (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B; BIS 002C Examination of the structure and function of microbial communities that live inside and on host organisms. Introduction to general concepts of the microbiome and microbiota, and their relationship to host health and disease. GE credit: SE, SL. Effective: 2015 Fall Quarter.

GDB 187—Global Disease Biology Seminar (3)
Discussion—1 hour; Seminar—1 hour; Term Paper. Prerequisite(s): GDB 090; SAS 013 Open to junior standing; Global Disease Biology majors. Seminar leading to development of the research proposal and academic plan for the Global Disease Biology major. Effective: 2015 Fall Quarter.

GDB 189—Global Disease Biology Senior Research (3)
Independent Study—3 hours. Prerequisite(s): GDB 090; GDB 189D (can be concurrent); SAS 013; GBD 189D required concurrently the first time GBD 189 is taken. Restricted to senior standing; Global Disease Biology majors only. Capstone research experience for the Global Disease Biology major. Project may be experimental, library research, or some other creative activity. May be repeated up to 1 time(s) for student research conducted over two quarters; second quarter used to finish writing the research paper. (P/NP grading only.) Effective: 2015 Fall Quarter.

GDB 189D—Global Disease Biology Research Discussion (1)
Discussion—1 hour. Prerequisite(s): GDB 090; GDB 187; SAS 013; GDB 189 (can be concurrent); GBD 189 required concurrently. Restricted to junior standing; Global Disease Biology majors only. Course helps prevent or solve problems during the students' research activity. Independent advising and assistance on research proposal. (P/NP grading only.) Effective: 2015 Fall Quarter.

Greek Minor; Classics

Greek Minor; Classics | Greek Minor

(College of Letters and Science)

Carey Seal, Ph.D., Program Director

Department Office. Classics Program; 215 Sproul Hall; 530-752-0835; http://classics.ucdavis.edu

Faculty. http://classics.ucdavis.edu/people

The Department offers minors in Arabic, Classical Civilization, Greek and Latin for those wishing to follow a shorter but formally recognized program of study in Classics.

Greek **Units:** 20

CLA 001	Ancient Near East and Early Greece: 3000-500 B.C.E.	4
OR		
CLA 002	Ancient Greece and the Near East: 500 to 146 B.C.E.	4

Three upper division courses in Greek.

One additional upper division course in Classics, Latin, or Greek.

Total: 20

Greek Minor; Classics | GRK Courses

Courses in GRK:

GRK 001—Elementary Greek (5)
Lecture—5 hours. Introduction to the basic grammar and vocabulary of Classical and New Testament Greek. Development of translation skills with emphasis on Greek-English. GE credit: AH. Effective: 1997 Winter Quarter.

GRK 002—Elementary Greek (5)
Lecture—5 hours. Prerequisite(s): GRK 001; Or the equivalent. Continuation of course 1. GE credit: AH. Effective: 2016 Spring Quarter.

GRK 002NT—Elementary New Testament Greek (1)
Lecture—1 hour. Prerequisite(s): GRK 002 (can be concurrent); Concurrent attendance required. Supplementary study of New Testament Greek. GE credit: AH. Effective: 2016 Spring Quarter.

GRK 003—Intermediate Greek (5)
Lecture—5 hours. Prerequisite(s): GRK 002; Or the equivalent. Continuation of course 2. Selected readings from Greek authors. GE credit: AH. Effective: 2016 Spring Quarter.

GRK 003NT—Elementary New Testament Greek (1)
Lecture—1 hour. Prerequisite(s): GRK 003 (can be concurrent); or Consent of Instructor. Concurrent attendance required. Supplementary study of New Testament Greek. GE credit: AH. Effective: 2016 Spring Quarter.

GRK 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

GRK 100—Readings in Greek Prose (4)
Lecture/Discussion—4 hours. Prerequisite(s): GRK 003; Or equivalent. Review of Greek morphology, syntax, and vocabulary. Readings in Greek prose authors, including Xenophon. GE credit: AH. Effective: 2015 Fall Quarter.

GRK 101—Plato (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. GE credit: AH, WE. Effective: 2016 Fall Quarter.

GRK 102—Euripides (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. GE credit: AH, WE. Effective: 2016 Spring Quarter.

GRK 103A—Homer: Iliad (4)
Recitation—3 hours; Term Paper. Prerequisite(s): GRK 003 GE credit: AH, WE. Effective: 1997 Winter Quarter.

GRK 103B—Homer: Odyssey (4)
Recitation—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. GE credit: AH, WE. Effective: 2016 Fall Quarter.

GRK 104—Menander (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. GE credit: AH, WE. Effective: 2016 Spring Quarter.

GRK 105—Attic Orators (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. Selected readings from the orators of 4th and 5th century Athens. May be repeated up to 1 time(s) if topic differs and with consent of instructor. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

GRK 106—Greek Hexameter Poetry (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): GRK 100; or Consent of Instructor. Selected readings from ancient Greek hexameter poetry. Wisdom poetry, hymns, epyllia, idylls, epic, natural history and other texts from the hexameter tradition. May be repeated for credit May be repeated for credit when topic differs. GE credit: AH, WC, WE. Effective: 2017 Fall Quarter.

GRK 110—Readings in the Greek Novel (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. Selected readings from Greek prose fiction of the late classical, Hellenistic and imperial periods. May be repeated up to 2 time(s) with consent of instructor. GE credit: AH, WE. Effective: 2016 Fall Quarter.

GRK 111—Sophocles (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. GE credit: AH, WE. Effective: 2016 Fall Quarter.

GRK 112—Aristophanes (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. GE credit: AH, WE. Effective: 2016 Fall Quarter.

GRK 113—Thucydides (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. GE credit: AH, WE. Effective: 2016 Fall Quarter.

GRK 114—Lyric Poetry (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. GE credit: AH, WE. Effective: 2016 Spring Quarter.

GRK 115—Aeschylus (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. GE credit: AH, WE. Effective: 2016 Spring Quarter.

GRK 116—Herodotus (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. GE credit: AH, WE. Effective: 2016 Spring Quarter.

GRK 121—Greek Prose Composition (4)
Lecture/Discussion—4 hours. Prerequisite(s): GRK 100; or Consent of Instructor. Intensive grammar and vocabulary review through exercises in Greek prose composition. GE credit: AH. Effective: 2016 Fall Quarter.

GRK 130—Readings in Later Greek (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. Translation and discussion of selected readings from Hellenistic to Byzantine Greek literature. GE credit: AH, WE. Effective: 2016 Fall Quarter.

GRK 131—Readings in Ancient Greek Philosophy and Science (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): GRK 100 (can be concurrent); or Consent of Instructor. Selected readings from ancient Greek philosophical and scientific writers. Texts on logical truth and empirical sense data, material and social contexts of ancient Greek philosophy and science. May be repeated for credit May be repeated for credit if topics differ. GE credit: AH, WC, WE. Effective: 2017 Fall Quarter.

GRK 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

GRK 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

Health Informatics (Graduate Group)

Health Informatics (Graduate Group) | Health Informatics M.S.

Formerly Medical Informatics (A Graduate Group)

Nicholas Anderson, Ph.D., Chair

Group Office. UC Davis Health System Health Informatics Program; 2450 48th St., Suite 2800, Sacramento, CA 95817; 916-734-8710; healthinformatics@ucdavis.edu

Faculty. http://www.ucdmc.ucdavis.edu/informatics/our_team/graduate_group_faculty/

Graduate Study. The Master's degree program seeks to train the next generation of researchers, clinicians and leaders to advance the science of Health Informatics. Successful applicants have backgrounds in health, technology or biology, and are enthused to develop new knowledge using health data and information systems.

The course of study provides research-oriented training that spans the use of computer systems in medicine today, including methods for clinical data acquisition, storage, and retrieval, the development, use and implementation of the electronic medical record, management of clinical data, and the use of medical decision support systems. A research project and thesis are mandatory degree requirements.

Preparation. The Group encourages applications from clinicians, healthcare IT professionals and researchers who have had some experience in the manipulation of healthcare data.

Clinicians (M.D., R.N., Pharm.D., others):

A. Successful completion of Clinical Education, at the Baccalaureate level or higher.

B. Working knowledge in technology, ideally computer science and programming.

Demonstrated through completed baccalaureate or higher level coursework, work experience, or clinical focus.

Healthcare Information Technology Professionals:

A. Working experience in Healthcare IT, biotech or similar experience.

B. Knowledge of Human Disease and Conditions C. Knowledge of Medical Terminology.

Demonstrated through completed coursework or professional experience.

Researchers:

A. Applied background (Baccalaureate or higher) in computer science, information science, biology or related field.

B. Domain experience in health information or biology.

Demonstrated through completed coursework, baccalaureate or higher degrees, personal research experience.

Graduate Advisor. Mark Carroll (Public Health Sciences and Pathology and Laboratory Medicine)

Health Informatics (Graduate Group) | MHI Courses

Courses in MHI:

MHI 202—Computer-Based Patient Records (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Current enrollment within the Health Informatics Graduate Program or consent of instructor. Introduction and overview of computer-based clinical record systems. Topics include data modeling, health system standards and terminologies; security, privacy and confidentiality; workflow modeling; data visualization; legal; decision support; public health; and evidence-based practice. Effective: 2009 Winter Quarter.

MHI 207—Decision Support Systems (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Explores decision support systems for medical application. Topics include medical decision making, uncertainty, review of existing decision support systems, knowledge engineering, data mining, and knowledge based systems. Effective: 2010 Winter Quarter.

MHI 208—Medical Informatics in Web-Based Enterprise Computing (4)
Discussion—2 hours; Lecture—2 hours. Introduction to the decision making processes and technologies that are involved in developing web-based distributed enterprise applications in medicine. Focus on the Informatician's role as a team member. Effective: 2010 Spring Quarter.

MHI 209—Data Acquisition and Analysis (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Examines the nature, acquisition, and analysis of medical data. Data ranges from signals of electrical potentials, sounds, text, images (still and motion), and data from nucleic acid and protein expression and sequencing instruments. Effective: 2010 Spring Quarter.

MHI 210—Introduction to Health Informatics (4)
Discussion—1 hour; Lecture—3 hours. Overview course to give the student a broad exposure to the field of Health Informatics. Topics covered include, but are not limited to, networking, information systems, coding, HL7, Security, and HIPPA. Effective: 2009 Winter Quarter.

MHI 211V—Telemedicine (4)
Web Electronic Discussion—1 hour; Web Virtual Lecture—3 hours. Issues for the development and maintenance of a successful telemedicine program with focus on strategic planning, clinical applications, project management, risk management and legal issues; reimbursement and contracting; human resources and program sustainability. Effective: 2013 Fall Quarter.

MHI 212—Computer Security in Health Informatics (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): MHI 210; MHI 202; MHI 209 Critical thinking about basic concepts in computer security and privacy. How the computer security and privacy impact health informatics, ranging from electronic health records to telemedicine to remote, virtual surgery. Effective: 2012 Fall Quarter.

MHI 215—Beginning and Intermediate Programming in M (MUMPS) (3)
Lecture—3 hours. Project-oriented approach to fundamentals of programming in ANSI Standard M (MUMPS) language. Basic syntax, Hierarchical file structure; arrays and string subscripts, indirection and extrinsic functions. (S/U grading only.) Effective: 2009 Winter Quarter.

MHI 289A—Special Topics in Medical Informatics: Data Acquisition (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Data Acquisition. May be repeated for credit when topic differs. Effective: 2010 Fall Quarter.

MHI 289B—Special Topics in Health Informatics; Seminars in Clinical Translational Informatics (1)
Seminar—1 hour. Seminars in current clinical translational informatics research topics. Guest presenters and faculty led discussions. Effective: 2015 Spring Quarter.

MHI 289E—Clinical Knowledge for the Health Informaticist (3)
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Basic clinical knowledge for health informatics students. Human systems, disease states and conditions, treatments and prognosis. Effective: 2018 Winter Quarter.

MHI 289F—Database and Knowledge Management (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Course objectives include understanding the informatics techniques for data capture, information management, and knowledge generation that a student will use throughout their career. May be repeated for credit. Effective: 2010 Winter Quarter.

MHI 289G—Special Topics in Health Informatics; Biostatistics (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Special topics in Biostatistics. Evaluation Methods and Statistics in Biomedical Informatics. Research design and analysis with special emphasis on Biomedical Informatics. Effective: 2016 Spring Quarter.

MHI 289H—Modeling Biological Systems (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Class size limited to 20 students. Create awareness of how modern computer graphics have led to VR-Sim-Rob applications, and how they are modifying the teaching of medicine and in some cases the diagnosis and treatment of patients. Effective: 2011 Winter Quarter.

MHI 289I—Programming in Health Informatics (3)
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Basics of computer programming essential to the study of informatics. Impacts on systems within healthcare, public health, nursing, research, and others. Effective: 2018 Winter Quarter.

MHI 290—Seminar in Medical Informatics (1)
Seminar—1 hour. Restricted to 20 students. Discussion of current graduate research and topics in Medical Informatics. Oral presentations of individual study. (S/U grading only.) Effective: 2009 Fall Quarter.

MHI 299—Research in Health Informatics (1-12)
Variable. Independent research in Health Informatics. (S/U grading only.) Effective: 2010 Spring Quarter.

History

History | HIS Information

(College of Letters and Science)

Department Office. 2216 Social Sciences and Humanities Building; 530-752-9241; http://history.ucdavis.edu

Faculty. http://history.ucdavis.edu/directory-of-people/his-faculty

History | HIS A.B.

(College of Letters and Science)

Department Office. 2216 Social Sciences and Humanities Building; 530-752-9241; http://history.ucdavis.edu

Faculty. http://history.ucdavis.edu/directory-of-people/his-faculty

The Major Program

The History major develops critical intelligence and fosters an understanding of ourselves and our world through the study of the past—both the "deep past" and the more recent past.

The Program. A student electing a major in History will receive a broad education in histories of several geographic areas. Students preferring more active engagement in research and writing are encouraged to complete history seminars and/or the honors program.

Career Alternatives. A degree in history is excellent preparation for a professional career such as teaching, law, journalism, public administration, or business management. Professional schools in these and related fields (including the health professions) are looking for students who can weigh conflicting evidence, evaluate alternative courses of action or divergent points of view, and express conclusions logically in everyday language. These analytical skills are stressed in history classes, and their mastery gives the history student a solid preparation for subsequent training in a specialized career.

History and Philosophy of Science. Courses from the History and Philosophy of Science program may count toward the History major. History and Philosophy of Science 130A, 130B, 150, and 180 fulfill upper division requirements in either the U.S. or Europe concentration.

Consult the History and Philosophy of Science program for a more detailed description of course offerings this area and the minor in History and Philosophy of Science.

Honors and Honors Program. A student becomes eligible for graduation with honors by meeting the minimum GPA (usually 3.500) and course requirements established by the College of Letters and Science. To qualify for high or highest honors, students must also complete the History Department honors program with a GPA of 3.500 or above and write a thesis that meets the criteria for high honors or highest honors. Students apply to participate in the department honors program during the latter part of their junior year. Admission to the program is based on GPA, a thesis proposal, examples of previous writing, and the recommendation of a faculty member who is willing to sponsor the student's project, interviews, and faculty recommendations. Students admitted into the program must complete the History 104A, 104B, 104C sequence of honors courses, which requires the completion of a senior honors thesis. Students who anticipate seeking admission to the honors program are urged to complete at least one History 102 (undergraduate seminar) before the end of their junior year. Interested students are urged to consult with faculty in their field early in their junior year. Students may follow either Plan I or Plan II described above, and may substitute History 104B and 104C for any courses in their program other than History 102.

Students who anticipate pursuing graduate work in history or a teaching credential, and who do not wish to opt for the research emphasis embodied in the honors program, are encouraged to select Plan II of the major.

Study Abroad and the History Major. The department strongly encourages interested students to pursue their studies abroad. While there are no specific required courses or prerequisites, students are urged to take at least one history course that touches upon the geographic area where they plan to study abroad before departing. To receive a history degree from UC Davis, students must complete at least 18 upper division units in the history major at UC Davis (which can also include History 101, 102, 103). The remaining major requirements can be fulfilled abroad provided that (a) the course should be evaluated as at least four UC Davis units, (b) the course should be considered upper division by the standards set forth by the UC Davis Study Abroad Program, and (c) the course should be in the field of History. Students may present copies of the course work, syllabus, and writing assignments to the department's liaison person with the Study Abroad office for approval.

Note: students who wish to receive credit for courses taken abroad under programs other than UC Davis Study Abroad may petition the Undergraduate Program Committee to do so.

Teaching Credential Subject Representative. See the Teaching Credential/M.A. Program.

Preparing for Careers in Teaching. History majors can pursue rewarding careers in teaching. To ensure your undergraduate coursework prepares you for a subject matter competency test, please contact the History Project at http://historyproject.ucdavis.edu/.

Graduate Study. The Department of History offers programs of study and research leading to the M.A. and Ph.D. degrees in history. Detailed information may be obtained by contacting the Graduate Advisor.

Graduate Advisor. See the department's website for updated information.

American History and Institutions. This University requirement can be satisfied by passing any one of the following courses in History: 17A, 17B, 72A, 72B, 170A, 170B, 170C, 171A, 171B, 172, 173, 174A, 174B, 174C, 174D, 175, 176A, 176B, 177A, 177B, 178A, 178B, 180A, 180B, 181, 183A, 183B, 184, 189. The upper division courses may be used only with the consent of the instructor; see also under University requirements.

Major Advisors. hisugadvisor@ucdavis.edu or see the department's website for updated information.

Preparatory Subject Matter **Units:** 20

Choose five lower division courses from the following seven concentrations, including at least one course in three different concentrations. Additional units to reach 20.

(a) Africa:

HIS 015A	Africa to 1900	4
HIS 015B	Africa Today	4

(b) Asia:

HIS 008	History of Indian Civilization	4
HIS 009A	History of East Asian Civilization	4
HIS 009B	History of East Asian Civilization	4

(c) Europe:

HIS 004A	History of Western Civilization	4
HIS 004B	History of Western Civilization	4
HIS 004C	History of Western Civilization	4

(d) Latin America:

HIS 007A	History of Latin America to 1700	4
HIS 007B	History of Latin America, 1700-1900	4
HIS 007C	History of Latin America 1900-present	4

(e) Middle East:

HIS 006	Introduction to the Middle East	4

(f) United States:

HIS 017A	History of the United States	4
HIS 017B	History of the United States	4
HIS 018A	Race in America to 1865	4
HIS 072A	Women and Gender in America, to 1865	4
HIS 072B	Women and Gender in America, 1865-Present	4
HIS 080	The History of the United States in the Middle East	2
HIS 080W	The History of the United States in the Middle East	2
HIS 085	Nature, Man, and the Machine in America	4

(g) World:

HIS 001	Introduction to History	2
HIS 002	Introduction to the History of Science and Technology	4
HIS 003	Cities: A Survey of World Cultures	4
HIS 010A	World History to 1350	4
HIS 010B	World History, c. 1350-1850	4
HIS 010C	World History III	4
HIS 011	History of the Jewish People in the Modern World	4
HIS 012	Food and History	4
HIS 013	Global Sexualities	4
HIS 014	History of Global Capitalism	4
HIS 020	The Vietnam War	4
HIS 090	Research in History	4

Depth Subject Matter **Units:** 40-41

History Seminar

HIS 101	Introduction to Historical Thought and Writing	5
HIS 102A	Undergraduate Proseminar in History; Ancient	5
HIS 102B	Undergraduate Proseminar in History; Medieval	5
In Field of Concentration.		
HIS 102D	Undergraduate Proseminar in History; Modern Europe to 1815	5
HIS 102E	Undergraduate Proseminar in History; Europe Since 1815	5
HIS 102F	Undergraduate Proseminar in History; Russia	5
HIS 102G	Undergraduate Proseminar in History; China to 1800	5
HIS 102H	Undergraduate Proseminar in History; China Since 1800	5
HIS 102I	Undergraduate Proseminar in History; Britain	5
HIS 102J	Undergraduate Proseminar in History; Latin America Since 1810	5
HIS 102K	Undergraduate Proseminar in History; American History to 1787	5
HIS 102L	Undergraduate Proseminar in History; United States, 1787-1896	5
HIS 102M	Undergraduate Proseminar in History; United States Since 1896	5
HIS 102N	Undergraduate Proseminar in History; Japan	5
HIS 102O	Undergraduate Proseminar in History; Africa	5

HIS 102P	Undergraduate Proseminar in History; Christianity and Culture in Europe, 50-1850	5
HIS 102Q	Undergraduate Proseminar in History; India	5
HIS 102R	Undergraduate Proseminar in History; Muslim Societies	5
HIS 102S	Undergraduate Proseminar in History; Education Abroad Program	5
HIS 102X	Undergraduate Proseminar in History; Comparative History	5
HIS 103	Topics in Historical Research	4

Choose at least three courses in a single Concentration listed below.

Choose at least two courses in a second Concentration listed below.

Choose at least one course in a third Concentration listed below.

Additional units to reach 40.

Total Units for the Major **Units:** 60-61

Fields of Concentration **Units:** 642

(a) Africa:

HIS 102O	Undergraduate Proseminar in History; Africa	5
HIS 115A	History of West Africa	4
HIS 115B	History of East Africa and the Indian Ocean	4
HIS 115C	History of Southern Africa from Exploration to the Rainbow Nation	4
HIS 115D	Postcolonial Africa	4
HIS 115E	Slavery, Africa, and the Atlantic World	4
HIS 116	African History: Special Themes	4

(b) Asia:

HIS 102G	Undergraduate Proseminar in History; China to 1800	5
HIS 102H	Undergraduate Proseminar in History; China Since 1800	5
HIS 102N	Undergraduate Proseminar in History; Japan	5
HIS 102Q	Undergraduate Proseminar in History; India	5
HIS 111A	Ancient History	4
HIS 191A	Classical China	4
HIS 191B	High Imperial China	4
HIS 191C	Late Imperial China	4
HIS 191D	Nineteenth Century China: The Empire Confronts the West	4
HIS 191E	The Chinese Revolution	4
HIS 191F	History of the People's Republic of China	4
HIS 191G	Special Topics in Chinese History to 1800	4
HIS 191H	Special Topics in Chinese History after 1800	4
HIS 191J	Sex and Society in Modern Chinese History	4
HIS 194A	Aristocratic and Feudal Japan	4
HIS 194B	Early Modern Japan	4
HIS 194C	Modern Japan	4
HIS 194D	Business and Labor in Modern Japan	4
HIS 194E	Education and Technology in Modern Japan	4
HIS 195B	History of Modern Korea	4
HIS 195C	A History of Vietnam	4
HIS 196A	Medieval India	4

HIS 196B	Modern India	4

(c) Europe:

HIS 102A	Undergraduate Proseminar in History; Ancient	5
HIS 102B	Undergraduate Proseminar in History; Medieval	5
HIS 102D	Undergraduate Proseminar in History; Modern Europe to 1815	5
HIS 102E	Undergraduate Proseminar in History; Europe Since 1815	5
HIS 102F	Undergraduate Proseminar in History; Russia	5
HIS 102I	Undergraduate Proseminar in History; Britain	5
HIS 102P	Undergraduate Proseminar in History; Christianity and Culture in Europe, 50-1850	5
HIS 111B	Ancient History	4
HIS 111C	Ancient History	4
HIS 121A	Medieval History	4
HIS 121B	Medieval History	4
HIS 121C	Medieval History	4
HIS 122	Selected Themes in Medieval History	4
HIS 125	Topics in Early Modern European History	4
HIS 126Y	The History of Human Rights in Europe	4
HIS 130A	Christianity and Culture in Europe: 50-1450	4
HIS 130B	Christianity and Culture in Europe: 1450-1600	4
HIS 130C	Christianity and Culture in Europe: 1600-1850	4
HIS 131A	Early Modern European History	4
HIS 131B	European History During the Renaissance and Reformation	4
HIS 131C	The Old Regime: Absolution, Enlightenment and Revolution in Europe	4
HIS 132	Crime and Punishment in Early Modern Europe	4
HIS 133	European Thought and Culture from the Renaissance to the Enlightenment	4
HIS 134A	The Age of Revolution	4
HIS 135A	History of Science to the 18th Century	4
HIS 135B	History of Science, 18th to 20th Centuries	4
HIS 136	Scientific Revolution	4
HIS 138A	The Rise of the Russian Empire, 1304-1825	4
HIS 138B	Reform and Revolution in Tsarist Russia, 1825-1917	4
HIS 138C	Russian History: The Rise and Fall of the Soviet Union, 1917 to the Present	4
HIS 139A	Medieval and Renaissance Medicine	4
HIS 139B	Medicine, Society, and Culture in Modern Europe	4
HIS 140	The Rise of Capitalism in Europe	4
HIS 141	France Since 1815	4
HIS 142A	History of the Holocaust	4
HIS 142B	The Memory of the Holocaust	4
HIS 143	History of Eastern Europe and the Balkans	4
HIS 144A	History of Germany, 1450 to 1789	4
HIS 144B	History of Germany since 1789	4
HIS 145	War and Revolution in Europe 1789-1918	4
HIS 146A	Europe in the Twentieth Century	4
HIS 146B	Europe in the Twentieth Century	4
HIS 147A	European Intellectual History, 1800-1870	4
HIS 147B	European Intellectual History, 1870-1920	4
HIS 147C	European Intellectual History, 1920-1970	4
HIS 148A	Women and Society in Europe: 1500-1789	4

HIS 148B	Women and Society in Europe: 1789-1920	4
HIS 148C	Women in Society in Europe: 1914-Present	4
HIS 149	Comparative Cultural History of Modern Britain and France, 1880-1914	4
HIS 151A	England: The Middle Ages	4
HIS 151B	England: The Early Modern Centuries	4
HIS 151C	Eighteenth-Century England	4
HIS 151D	Industrial England	4
HIS 160	Spain and America in the 16th century	4

(d) Latin America:

HIS 102J	Undergraduate Proseminar in History; Latin America Since 1810	5
HIS 158	Special Topics in Latin American History	4
HIS 160	Spain and America in the 16th century	4
HIS 161	Human Rights in Latin America	4
HIS 162	History of the Andean Region	4
HIS 163A	History of Brazil	4
HIS 163B	History of Brazil	4
HIS 164	History of Chile	4
HIS 165	Latin American Social Revolutions	4
HIS 166A	History of Mexico to 1848	4
HIS 166B	History of Mexico since 1848	4
HIS 167	Modern Latin American Cultural and Intellectual History	4
HIS 168	History of Inter-American Relations	4
HIS 169A	Mexican-American History	4
HIS 169B	Mexican-American History	4

(e) Middle East:

HIS 190A	Middle Eastern History I: The Rise of Islam, 600-1000	4
HIS 190B	Middle Eastern History II: The Age of the Crusades, 1001-1400	4
HIS 190C	Middle Eastern History III: The Ottomans, 1401-1730	4
HIS 190D	Middle Eastern History IV: Safavids Iran, 1300-1720	4
HIS 193A	History of the Modern Middle East, 1750-1914	4
HIS 193B	History of the Modern Middle East, From 1914	4
HIS 193C	The Middle East Environment: Historical Change and Current Challenges	4
HIS 193D	History of Modern Iran, From 1850 to Present	4

(f) United States:

HIS 102K	Undergraduate Proseminar in History; American History to 1787	5
HIS 102L	Undergraduate Proseminar in History; United States, 1787-1896	5
HIS 102M	Undergraduate Proseminar in History; United States Since 1896	5
HIS 169A	Mexican-American History	4
HIS 169B	Mexican-American History	4
HIS 170A	Colonial America	4
HIS 170B	The American Revolution	4
HIS 170C	The Early National Period, 1789-1815	4
HIS 171A	Jacksonian America	4
HIS 171B	Civil War Era	4
HIS 171D	Selected Themes in 19th Century American History	4
HIS 172	American Environmental History	4

HIS 173	Becoming an American: Immigration and American Culture	4
HIS 174A	The Gilded Age and Progressive Era: United States, 1876-1917	4
HIS 174B	War, Prosperity, and Depression: United States, 1917-1945	4
HIS 174C	The United States Since World War II, 1945 to the Present	4
HIS 174D	Selected Themes in 20th Century American History	4
HIS 175	American Intellectual History	4
HIS 176A	Cultural and Social History of United States	4
HIS 176B	Cultural and Social History of United States	4
HIS 177A	History of Black People and American Race Relations, 1450-1860	4
HIS 177B	History of Black People and American Race Relations, 1860-Present	4
HIS 179	Asian American History, 1850-Present	4
HIS 180AN	American Political History, 1789-1896	4
HIS 180BN	American Political History, 1896-present	4
HIS 180C	The Fight for the Right to Vote	4
HIS 187	History of US Foreign Relations in the Twentieth Century	4
HIS 181	Religion in American History to 1890	4
HIS 182	Gender and Justice in American History	4
HIS 183A	The Frontier Experience: Trans-Mississippi West	4
HIS 183B	The Frontier Experience: Trans-Mississippi West	4
HIS 184	History of Sexuality in America	4
HIS 185A	History of Science in America	4
HIS 185B	History of Technology in America	4
HIS 188	America in the 1960s	4
HIS 189	California History	4

(g) World:

HIS 100	Selected Topics in History	4
HIS 102R	Undergraduate Proseminar in History; Muslim Societies	5
HIS 102X	Undergraduate Proseminar in History; Comparative History	5
HIS 107	Medicine's Histories: Human and Veterinary Medicine from the Ancient World to One Health	4
HIS 108	Global Environmental History	4
HIS 109	Environmental Change, Disease and Public Health	4
HIS 110	Themes in World History	4
HIS 110A	Colonialism and the Making of the Modern World	4
HIS 112A	Topics in Pre-Modern Jewish History	4
HIS 112B	Topics in Modern Jewish History	4
HIS 112C	History of Jews in the Muslim World	4
HIS 119	World War I	4
HIS 120	World War II	4

Total: 60-62

History | HIS M.A.

(College of Letters and Science)

Department Office. 2216 Social Sciences and Humanities Building; 530-752-9241; http://history.ucdavis.edu

Faculty. http://history.ucdavis.edu/directory-of-people/his-faculty

Graduate Study. The Department of History offers programs of study and research leading to the M.A. and Ph.D. degrees in history. Detailed information may be obtained by contacting the Graduate Advisor.

The Master of Arts degree is offered only in route to the Ph.D.

Graduate Advisor. See the department's website for updated information.

History | HIS Ph.D.

(College of Letters and Science)

Department Office. 2216 Social Sciences and Humanities Building; 530-752-9241; http://history.ucdavis.edu

Faculty. http://history.ucdavis.edu/directory-of-people/his-faculty

Graduate Study. The Department of History offers programs of study and research leading to the M.A. and Ph.D. degrees in history. Detailed information may be obtained by contacting the Graduate Advisor.

Graduate Advisor. See the the department's website for updated information.

History | HIS Minor

(College of Letters and Science)

Department Office. 2216 Social Sciences and Humanities Building; 530-752-9241; http://history.ucdavis.edu

Faculty. http://history.ucdavis.edu/directory-of-people/his-faculty

The minor in History consists of five upper division courses chosen so that at least three courses are in one field and at least one course is in another field. The two fields shall be chosen from among those defined in the catalog for the major. However, students may also, in consultation with and with the authorization of a faculty advisor, define other thematic fields.

Minor Advisor. hisugadvisor@ucdavis.edu or see the department's website for updated information.

History **Units:** 20

Three courses in one concentration

Additional units to reach 20

Total: 20

History | HIS Courses

Courses in HIS:

HIS 001—Introduction to History (2)
Discussion—1 hour; Lecture—1 hour. Introduction to history, its key methodologies, writing tasks, and research practices. Examination of the development of history as an academic discipline; ethics in historical research. Topical focus changes regularly. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

HIS 002—Introduction to the History of Science and Technology (4)
Discussion—1 hour; Lecture—3 hours. Introduction to topics and methods of the history of science and technology. Emphasis on understanding the role of science and technology in the modern world through a long-term historical perspective. (Science and Technology Studies 002.) GE credit: AH, SL, SS, WC, WE. Effective: 2017 Fall Quarter.

HIS 003—Cities: A Survey of World Cultures (4)
Lecture—3 hours; Lecture/Discussion—1 hour. Survey of urban world cultures, focusing on up to ten cities selected by the instructor. GE credit: AH, SS, WC. Effective: 2017 Winter Quarter.

HIS 004A—History of Western Civilization (4)
Discussion—1 hour; Lecture—3 hours. Growth of western civilization from late antiquity to the Renaissance. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 004B—History of Western Civilization (4)
Discussion—1 hour; Lecture—3 hours. History of western civilization from the Renaissance to the Eighteenth Century. GE credit: AH, SS, VL, WC, WE. Effective: 2015 Winter Quarter.

HIS 004C—History of Western Civilization (4)
Discussion—1 hour; Lecture—3 hours. Development of Western Civilization from the Eighteenth Century to the present. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 005—Modernist Culture (2)
Lecture/Discussion—2 hours. Modernist culture in global perspective. Introduction to early 20th century- innovations in visual arts, music, literature, film, and architecture in Europe, the Americas, Asia, and Africa. GE credit: AH, VL, WC. Effective: 2018 Fall Quarter.

HIS 006—Introduction to the Middle East (4)
Discussion—1 hour; Lecture—3 hours. Survey of the major social, economic, political and cultural transformations in the Middle East from the rise of Islam (c.600A.D.) to the present, emphasizing themes in religion and culture, politics and society. GE credit: AH, SS, WC, WE. Effective: 2003 Fall Quarter.

HIS 007A—History of Latin America to 1700 (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the history of Spanish and Portuguese America from the late pre-Columbian period through the initial phase and consolidation of a colonial regime (circa 1700). Topics include conquest, colonialism, racial mixture, gender, and labor systems. GE credit: AH, SS, WC, WE. Effective: 2004 Fall Quarter.

HIS 007B—History of Latin America, 1700-1900 (4)
Discussion—1 hour; Lecture—3 hours. Latin America from colony to republic. The nature of Iberian colonialism, the causes for independence, the creation of nation states, the difficulties in consolidating these nations, and the rise of Liberalism and export economies in the nineteenth century. GE credit: AH, SS, WC, WE. Effective: 2004 Fall Quarter.

HIS 007C—History of Latin America 1900-present (4)
Discussion—1 hour; Lecture—3 hours. Latin America since the beginning of the 20th century. Themes include export economies, oligarchic rule, crises of depression and war, corporatism, populism, revolution and reform movements, cultural and ethnic issues, U.S.-Latin American relations, neo-liberal restructuring. GE credit: AH, SS, WC, WE. Effective: 2004 Fall Quarter.

HIS 008—History of Indian Civilization (4)
Discussion—1 hour; Lecture—3 hours. Survey of Indian civilization from the rise of cities (ca. 2000 B.C.) to the present, emphasizing themes in religion, social and political organization, and art and literature that reflect cultural interaction
and change. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 009A—History of East Asian Civilization (4)
Discussion—1 hour; Lecture—3 hours. Surveys traditional Chinese civilization and its modern transformation.
Emphasis is on thought and religion, political and social life, art and literature. Perspectives on contemporary China are provided. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 009B—History of East Asian Civilization (4)
Discussion—1 hour; Lecture—3 hours. Surveys traditional Japanese civilization and its modern transformation.
Emphasis is on thought and religion, political and social life, art and literature. Perspectives on contemporary Japan are provided. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 010A—World History to 1350 (4)
Discussion—1 hour; Lecture—3 hours. Historical examination of the changing relationship of human societies to one another and to their natural settings through the year 1350, with particular attention to long-term trends and to periodic crises that reshaped the links of culture and nature on a global scale. GE credit: AH, SS, WC, WE. Effective: 2003 Fall Quarter.

HIS 010B—World History, c. 1350-1850 (4)
Discussion—1 hour; Lecture—3 hours. Major topics in world history from the 14th century to the beginning of the 19th century. Topics will vary but may include: oceans as systems of human communication and conflict; the global consequences of "industrious revolutions" in Europe and Asia, etc. GE credit: AH, SS, WC, WE. Effective: 2001 Winter Quarter.

HIS 010C—World History III (4)
Discussion—1 hour; Lecture—3 hours. Major topics from world history of the 19th and 20th centuries,
emphasizing the rise and fall of Western colonial empires; Cold War and the superpowers; the spread of the nation-states; and process of globalization. GE credit: AH, SS, WC, WE. Effective: 1998 Fall Quarter.

HIS 011—History of the Jewish People in the Modern World (4)
Discussion—1 hour; Lecture—3 hours. Histories and cultures of the Jews since 1492. Topics include: the making of Jewish diasporas, roots of antisemitism, the Holocaust in images and texts, changing ideas of the self, Jews in America, contemporary visions of the Jewish past. GE credit: AH, DD, VL, WC, WE. Effective: 2014 Winter Quarter.

HIS 012—Food and History (4)
Discussion—1 hour; Lecture—3 hours. Survey of the ways humans have fed themselves from the dawn of humanity to the present. Transformation of plants and animals into food, cooking into cuisine, and ceremony into etiquette. GE credit: AH, OL, SS, VL, WC, WE. Effective: 2014 Fall Quarter.

HIS 013—Global Sexualities (4)
Discussion—1 hour; Lecture—3 hours. Global history of sexualities, including comparative study of gender, marriage, and fertility before 1800, followed by the modern history of sexualities worldwide as it intersects with imperialism, race, population control, law, and globalization. GE credit: AH, DD, SS, VL, WC. Effective: 2017 Fall Quarter.

HIS 014—History of Global Capitalism (4)
Discussion—1 hour; Lecture—3 hours. History of institutions, workers, commodity chains, and the social and cultural context of capitalism around the world from 1500-present. Emphasis on transnational and comparative histories of political economies and individual human lives. GE credit: DD, SS, WC. Effective: 2018 Spring Quarter.

HIS 015A—Africa to 1900 (4)
Discussion—1 hour; Lecture—3 hours. Introduction to African history to 1900. Origins and impact of early human history, precolonial states and societies, slavery and the slave trade, religious and cultural movements, and the foundations of European colonialism. GE credit: AH, SS, WC. Effective: 2018 Spring Quarter.

HIS 015B—Africa Today (4)
Discussion—1 hour; Lecture—3 hours. Survey of major themes in colonial and postcolonial sub-Saharan African history, including colonialism, decolonization, nationalism and politics, economic history and labor, urbanization, popular culture, gender, marriage, and family life. GE credit: AH, SS, WC. Effective: 2017 Fall Quarter.

HIS 017A—History of the United States (4)
Discussion—1 hour; Lecture—3 hours. The experience of the American people from the Colonial Era to the Civil War. GE credit: ACGH, AH, DD, SS, WE. Effective: 1997 Winter Quarter.

HIS 017B—History of the United States (4)
Discussion—1 hour; Lecture—3 hours. The experience of the American people from the Civil War to the end of the Cold War. Not open for credit to students who have completed course HIS 017C. GE credit: ACGH, AH, DD, SS, WE. Effective: 1997 Winter Quarter.

HIS 018A—Race in America to 1865 (4)
Discussion—1 hour; Lecture—3 hours. Introduction to history of race and racial formation in the United States to the Civil War through a comparative approach. Examines the experiences of African Americans, Asian Americans, Native American, Mexican Americans and other Latino/a groups. One unit of credit to students who have previously completed HIS 178A. GE credit: ACGH, AH, DD, SS. Effective: 2017 Fall Quarter.

HIS 018B—Race in the United States Since 1865 (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the history of race and racial formation in America since 1865 though a comparative approach that examines the experiences of African Americans, Asian Americans, Native American and Mexican Americans and other Latino/a groups. GE credit: ACGH, AH, DD, SS. Effective: 2018 Spring Quarter.

HIS 020—The Vietnam War (4)
Extensive Writing; Lecture—3 hours. A history of the Vietnam War, including its origins, fighting, and repercussions. GE credit: ACGH, AH, DD, SS, VL, WC, WE. Effective: 2017 Fall Quarter.

HIS 072A—Women and Gender in America, to 1865 (4)
Discussion—1 hour; Lecture—3 hours. History of women and gender in America through 1865, emphasizing intersections of gender, race, class, and sexuality. Topics include interracial marriage, slavery, witchcraft, meanings of motherhood, war, domestic labor, moral reform, women's rights, migrations, the effects of commercialization and industrialization. GE credit: ACGH, AH, DD, SS, WE. Effective: 2014 Fall Quarter.

HIS 072B—Women and Gender in America, 1865-Present (4)
Discussion—1 hour; Lecture—3 hours. History of women and gender in America since 1865, emphasizing intersections of gender, race, class, and sexuality. Covers emancipation, migration, immigration, war, media, same-sex and opposite-sex relationships, and the birth control, suffrage, labor, civil rights, feminist, and anti-feminist movements. GE credit: ACGH, AH, DD, SS, WE. Effective: 2014 Fall Quarter.

HIS 080—The History of the United States in the Middle East (2)
Lecture—2 hours. History of the United States in the Middle East from 1900 to the present. Examination of U.S. foreign relations toward the Middle East, their regional ramifications and domestic repercussions. GE credit: ACGH, AH, SS, WC. Effective: 2018 Spring Quarter.

HIS 080W—The History of the United States in the Middle East (2)
Extensive Writing; Lecture/Discussion—1 hour. Must enroll in HIS 080 concurrently. History of the United States in the Middle East from 1900 to the present. Examination of U.S. foreign relations toward the Middle East, their regional ramifications and domestic repercussions with extensive writing. GE credit: AH, SS, WE. Effective: 2018 Spring Quarter.

HIS 085—Nature, Man, and the Machine in America (4)
Seminar—4 hours; Term Paper. Limited enrollment. History of the attitudes and behavior of Americans toward their natural environment and their technology, from colonial times to the present. No final examination. GE credit: AH, SS, WE. Effective: 2016 Spring Quarter.

HIS 092—Internship in History (1-12)
Internship—1-12 hours. Prerequisite(s): Consent of Instructor. Supervised internship and study as a historian, archivist, curator, or an in another history-related capacity, in an approved organization or institution. May be repeated for credit. (P/NP grading only.) Effective: 2017 Fall Quarter.

HIS 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Primarily for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

HIS 099—Special Study for Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

HIS 101—Introduction to Historical Thought and Writing (5)
Lecture/Discussion—4 hours; Term Paper. Study of the history of historical thought and writing, analysis of critical and speculative philosophies of history and evaluation of modes of organization, interpretation, and style in historical writing. GE credit: WE. Effective: 2016 Fall Quarter.

HIS 102A—Undergraduate Proseminar in History; Ancient (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Ancient. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102B—Undergraduate Proseminar in History; Medieval (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Medieval. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102D—Undergraduate Proseminar in History; Modern Europe to 1815 (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Modern Europe to 1815. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102E—Undergraduate Proseminar in History; Europe Since 1815 (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Europe since 1815. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102F—Undergraduate Proseminar in History; Russia (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Russia. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102G—Undergraduate Proseminar in History; China to 1800 (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. China to 1800. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102H—Undergraduate Proseminar in History; China Since 1800 (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. China since 1800. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102I—Undergraduate Proseminar in History; Britain (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Britain. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102J—Undergraduate Proseminar in History; Latin America Since 1810 (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Latin America since 1810. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102K—Undergraduate Proseminar in History; American History to 1787 (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. American History to 1787. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102L—Undergraduate Proseminar in History; United States, 1787-1896 (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. United States, 1787-1896. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102M—Undergraduate Proseminar in History; United States Since 1896 (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. United States since 1896. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102N—Undergraduate Proseminar in History; Japan (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Japan. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102O—Undergraduate Proseminar in History; Africa (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Africa. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102P—Undergraduate Proseminar in History; Christianity and Culture in Europe, 50-1850 (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Christianity and Culture in Europe, 50-1850. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102Q—Undergraduate Proseminar in History; India (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. India. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102R—Undergraduate Proseminar in History; Muslim Societies (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Muslim Societies. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102S—Undergraduate Proseminar in History; Education Abroad Program (5)
Seminar—3 hours; Term Paper. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Education Abroad Program. May be repeated for credit. GE credit: AH, SS, WE. Effective: 2006 Spring Quarter.

HIS 102X—Undergraduate Proseminar in History; Comparative History (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Comparative History, selected topics in cultural, political, economic, and social history that deal comparatively with more than one geographic field. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 103—Topics in Historical Research (4)
Discussion—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Individual research resulting in a research paper on a specific topic in one of various fields of history. May be repeated for credit. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 104A—Introduction to Historical Research and Interpretation (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Acceptance into History Department Honors Program. Directed reading and research aimed at preparing students to select appropriate topics and methodologies for a senior honors essay and to situate their topics within a meaningful, broad context of historical
interpretations. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 104B—Honors Thesis (4)
Tutorial—4 hours. Prerequisite(s): HIS 104A Research in preparation of a senior honors thesis under the direction of a faculty advisor. GE credit: WE. Effective: 2002 Winter Quarter.

HIS 104C—Honors Thesis (4)
Tutorial—4 hours. Prerequisite(s): HIS 104A; HIS 104B Completion of a senior honors thesis under the direction of a faculty advisor. GE credit: WE. Effective: 2002 Spring Quarter.

HIS 105—Teaching History (4)
Lecture—3 hours; Term Paper. Teaching of American and world history at the K-12 level. Emphasis on introducing college students to the multiple ways in which history is taught, and on understanding how history education is determined. GE credit: ACGH, AH, SS, WE. Effective: 2014 Fall Quarter.

HIS 107—Medicine's Histories: Human and Veterinary Medicine from the Ancient World to One Health (4)
Lecture/Discussion—3 hours; Project (Term Project). Global, comparative study of the related histories of human and veterinary medicine from the ancient world to today's interdisciplinary One Health. Emphasis on reintegration of human and veterinary medicine to meet the biggest health challenges today GE credit: AH, SS. Effective: 2017 Spring Quarter.

HIS 108—Global Environmental History (4)
Lecture/Discussion—3 hours; Project (Term Project). Global, comparative study of how environmental change, human perceptions of nature, and manipulations of nature have changed over time. Primary focus post-1500, emphasis on critically analyzing many common ideas of environmental change. Not open for credit to students who have taken HIS 109A. GE credit: AH, SS. Effective: 2014 Fall Quarter.

HIS 109—Environmental Change, Disease and Public Health (4)
Lecture/Discussion—3 hours; Project (Term Project). Analysis of environmental changes from pre-history to the present and their influence on disease distribution, virulence and public health. Focus on critical study of many human-driven environmental changes and the accelerated transformation/spread of pathogens under globalization. Not open for credit to students who have taken HIS 109B. (Science and Society 109.) GE credit: SE, SL, SS, WC. Effective: 2016 Fall Quarter.

HIS 110—Themes in World History (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Upper division standing recommended. Topics will emphasize the interaction of diverse regions of the world as well as common patterns of historical change. May be repeated for credit topic and/or instructor differs. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 110A—Colonialism and the Making of the Modern World (4)
Lecture—3 hours; Term Paper. History of the modern world, focusing on struggles between Europeans and colonized peoples; the global formation of capitalism; the creation of nation-states; and the constitution of bourgeois bodies and racial selves in modern societies. GE credit: AH, SS, VL, WC, WE. Effective: 2014 Fall Quarter.

HIS 111A—Ancient History (4)
Lecture—3 hours. History of ancient empires of the Near East and of their historical legacy to the Western world. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 111B—Ancient History (4)
Lecture—3 hours. Political, cultural and intellectual study of the Greek world from Minoan-Mycenaean period to end of Hellenistic Age. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 111C—Ancient History (4)
Lecture—3 hours. Development of Rome from earliest times. Rise and fall of the Roman Republic; the Empire to 476 A.D. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 112A—Topics in Pre-Modern Jewish History (4)
Lecture—3 hours; Term Paper. Topics in the history of Jews from the Biblical era to the eras of Jewish emancipation. Topics can be framed chronologically (eg.,
medieval Jewry) or thematically (eg., trade and Jewish communities). May be repeated once for credit. May be repeated up to 1 time(s). GE credit: AH, SS, WC, WE. Effective: 1997 Fall Quarter.

HIS 112B—Topics in Modern Jewish History (4)
Lecture—3 hours; Term Paper. Topics in the history of Jews from the era of Jewish emancipation to the
present. Topics can be framed chronologically or thematically (eg. Zionism, assimilation, the post Holocaust Diaspora). May be repeated once for credit. May be repeated up to 1 time(s). GE credit: AH, SS, WC, WE. Effective: 1997 Fall Quarter.

HIS 112C—History of Jews in the Muslim World (4)
Lecture—3 hours; Term Paper. History of Jewish communities in the lands of Islam from the time of the Prophet Muhammad to the present day. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 113—History of Modern Israel (4)
Lecture—3 hours; Term Paper. Topics include the rise and fall of utopian Zionism, the century-long struggle between Jews and Arabs, the development of modern Hebrew culture, the conflict between religious and secular Jews, and the nature of Israel's multicultural society. GE credit: AH, SS, WC, WE. Effective: 2004 Spring Quarter.

HIS 115A—History of West Africa (4)
Lecture—3 hours; Term Paper. Prerequisite(s): HIS 015 recommended. West and Central Africa from 1500 to the present. Origins and impact of precolonial states and societies, the trans-Atlantic slave trade, colonialism, decolonization, nationalism, and changes in religions, politics, economics, gender, and culture. GE credit: AH, WC, WE. Effective: 2018 Winter Quarter.

HIS 115B—History of East Africa and the Indian Ocean (4)
Lecture—3 hours; Term Paper. Prerequisite(s): HIS 015 recommended. Eastern Africa and the Indian Ocean world from 1500 to the present. Origins and impact of precolonial states and societies, slavery, trade, colonialism, decolonization, nationalism, and changes in religions, politics, economics, gender, and culture GE credit: AH, WC, WE. Effective: 2018 Winter Quarter.

HIS 115C—History of Southern Africa from Exploration to the Rainbow Nation (4)
Lecture—3 hours; Term Paper. Prerequisite(s): HIS 015 recommended. Southern Africa from 1500 to the present. Origins and impact of precolonial states and societies, European colonization, industrialization, urbanization, nationalism, apartheid, and changes in religions, politics, economics, gender, and culture. GE credit: AH, WC, WE. Effective: 2018 Winter Quarter.

HIS 115D—Postcolonial Africa (4)
Lecture—3 hours; Term Paper. Prerequisite(s): HIS 015 recommended. Survey of social, political, cultural and economic change in African societies since the ending of European colonial rule in the twentieth century. Themes include development, health and medicine, war and conflict, urbanization, global and inter-continental migration, and family and gender. GE credit: AH, SS, WC, WE. Effective: 2017 Spring Quarter.

HIS 115E—Slavery, Africa, and the Atlantic World (4)
Lecture—3 hours; Term Paper. History of the African Slave trades, from the early Egyptian and Saharan trades in the pre-modern period to the trans-Atlantic trade (15th-19th century) and the contemporary trafficking of humans. GE credit: AH, SS, WC, WE. Effective: 2017 Fall Quarter.

HIS 115F—History of Modern North Africa, 1800 to the Present (4)
Lecture—3 hours; Term Paper. History of Morocco, Algeria, Tunisia and Libya (the Maghrib), 1800 to the present. Topics include conquest and pacification, reform movements, the rise of nationalism, decolonization, state capitalism, economic liberalization, Islamism, democratization and human rights, the interplay of history and memory. GE credit: AH, SS, WC, WE. Effective: 2011 Fall Quarter.

HIS 116—African History: Special Themes (4)
Lecture—3 hours; Term Paper. Prerequisite(s): HIS 015 recommended. Themes of African history, such as African states and empires, slave trade, relationship of Egypt to rest of Africa, Bantu origins and migrations, and French policy of Assimilation and Association. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 119—World War I (4)
Extensive Writing; Lecture—3 hours. The First World War and the settlement that followed from 1914-1919. Causes, conduct, and consequences of the war including military, political, economic, social, and cultural factors, with special emphasis on connections between the home front and the battlefield. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

HIS 120—World War II (4)
Extensive Writing; Lecture—3 hours. The Second World War from 1931 to 1945 in all of its theaters. Causes, conduct, and consequences of the war including military, political, economic, social, and cultural factors, with special emphasis on battlefield strategy and mobilization of the home front. GE credit: SS, WC, WE. Effective: 2011 Fall Quarter.

HIS 121A—Medieval History (4)
Lecture/Discussion—3 hours. European history from "the fall of the Roman Empire" to the eighth century. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 121B—Medieval History (4)
Lecture/Discussion—3 hours. European history from Charlemagne to the twelfth century. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 121C—Medieval History (4)
Lecture/Discussion—3 hours. European history from the Crusades to the Renaissance. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 122—Selected Themes in Medieval History (4)
Lecture—3 hours; Term Paper. Each offering will focus on single major theme, such as medieval agrarian history, feudalism, the family, medieval Italy, or the Crusades. Readings include original sources in English translation and modern works. May be repeated for credit. May be repeated for credit. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 125—Topics in Early Modern European History (4)
Discussion/Laboratory—3 hours; Term Paper. Social and cultural history, 1300-1800. Topics such as medieval and
Renaissance Italy, early modern Italy, Ancient Regime France, family and sexuality, and material culture and daily life. May be repeated for credit. May be repeated for credit. GE credit: AH, SS, WC, WE. Effective: 2016 Spring Quarter.

HIS 126Y—The History of Human Rights in Europe (4)
Lecture—3 hours; Web Electronic Discussion—1 hour. History of the origins, development, and state of international humanitarian law (IHL) and international human rights law (IHRL) in Europe. Emphasis on Enlightenment-era and modern theories of the source, utility, and limits of human rights. (HMR 162Y) GE credit: SS, WC. Effective: 2017 Fall Quarter.

HIS 130A—Christianity and Culture in Europe: 50-1450 (4)
Lecture—3 hours. A history of the ideas and institutions of Christianity and their impact on the late Roman Empire and medieval Europe in terms of outlook on life, art, politics and economics. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 130B—Christianity and Culture in Europe: 1450-1600 (4)
Lecture—3 hours. A history of the Lutheran, Zwinglian-Calvinist, Radical, Anglican, and Catholic Reformations as foundation stones of a new culture in Europe, with special attention to the interconnections between the revival of antiquity and the different reform movements. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 130C—Christianity and Culture in Europe: 1600-1850 (4)
Lecture—3 hours. A survey of the intellectual, cultural and political reorientation of European society in the aftermath of the Wars of Religion. "Secularization" will be discussed in the context of the Enlightenment and Romanticism. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 131A—Early Modern European History (4)
Lecture—3 hours. Western European history from about 1350 to about 1500. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 131B—European History During the Renaissance and Reformation (4)
Lecture—3 hours; Term Paper. Survey of European society, politics, and culture from the late 15th through the early 17th centuries, with particular focus on the Italian and Northern Renaissance, on the Protestant Reformation, and the Catholic Counter Reformation. GE credit: AH, SS, WC, WE. Effective: 1997 Fall Quarter.

HIS 131C—The Old Regime: Absolution, Enlightenment and Revolution in Europe (4)
Lecture—3 hours; Term Paper. Survey of European society, politics, and culture in the 17th and 18th
centuries, focusing on religious warfare, absolutism, Scientific Revolution, Enlightenment and the growth of religious tolerance, the French Revolution and the collapse of the old regime. GE credit: AH, SS, WC, WE. Effective: 1997 Fall Quarter.

HIS 132—Crime and Punishment in Early Modern Europe (4)
Lecture—3 hours; Term Paper. Deviance and crime in early modern Europe, contrasting imaginary crimes,
e.g. witchcraft, with "real" crimes such as highway robbery and infanticide. Examines impact of gender, sexual orientation, ethnicity, and class in processes of criminalization. GE credit: AH, SS, WC, WE. Effective: 1997 Fall Quarter.

HIS 133—European Thought and Culture from the Renaissance to the Enlightenment (4)
Lecture—3 hours; Term Paper. History of European thought on politics, society, science, and religion from 1400 to 1800. Cultural impact of printing press, Protestant Reformation, wars, exploration, and empire. GE credit: AH. Effective: 2018 Spring Quarter.

HIS 134A—The Age of Revolution (4)
Lecture—3 hours. Ideas and institutions during the French Revolution and the Napoleonic era. GE credit: AH, SS, WE. Effective: 1997 Winter Quarter.

HIS 135A—History of Science to the 18th Century (4)
Lecture/Discussion—3 hours; Term Paper. Survey of the historical development of science, technology, and medicine from the ancient world to the eighteenth century, with special emphasis on Isaac Newton as the culmination of the seventeenth century scientific revolution. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 135B—History of Science, 18th to 20th Centuries (4)
Lecture/Discussion—3 hours; Term Paper. Survey of the historical development of scientific thought in geology, biology, chemistry, physics, and cosmology from the eighteenth to the twentieth century, with special emphasis on emergence of broad explanatory principles that serve more than one science. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 136—Scientific Revolution (4)
Lecture/Discussion—3 hours; Term Paper. History of science in Western Europe (1400-1750). Investigates the changing definitions of science in the age of Copernicus, Versalius, Harvey, Galileo and Newton. Considers the evolution of new ideas about nature, experiment, observation, and scientific theory. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 138A—The Rise of the Russian Empire, 1304-1825 (4)
Lecture—3 hours; Term Paper. Expansion of the Russian state in Muscovite and imperial era. Emphasis on autocratic rule, the incorporation of non-Russian peoples, and emergence of Russia as a Great Power. Only two units of credit will be allowed to students who have completed former HIS 137B. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 138B—Reform and Revolution in Tsarist Russia, 1825-1917 (4)
Lecture—3 hours; Term Paper. Processes of state reform and social change in the 19th century; failure of reform and collapse of the Russian Empire; the revolutions of 1917. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 138C—Russian History: The Rise and Fall of the Soviet Union, 1917 to the Present (4)
Lecture—3 hours; Term Paper. Emergence of the Soviet Union as a socialist system and a Great Power; the decline and collapse of the Soviet Union and the formation of independent nation states in its place. Not open for credit to students who have completed former HIS 137C. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 139A—Medieval and Renaissance Medicine (4)
Discussion/Laboratory—3 hours; Term Paper. The history of medicine, circa 1000-1700. Revival of ancient medicine; role of the universities; development of anatomy, chemistry and natural history; ideas about the body; cultural understanding of disease; hospital and the public health system. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 139B—Medicine, Society, and Culture in Modern Europe (4)
Discussion—1 hour; Lecture—2 hours; Term Paper. History of European medicine, 18th to 20th centuries, by examining the development of medical knowledge in epidemiology and anatomy; function of this knowledge,how it changed with technological breakthroughs and professionalization;and role of medicine in attitudes toward poverty, women, race, disease. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 140—The Rise of Capitalism in Europe (4)
Lecture—3 hours; Term Paper. Comparative analysis of major interpretations of the rise of merchant capitalism during the Middle Ages and Renaissance; European expansion overseas, 1450-1815; the transition to modern capitalism via industrial revolution. Interplay of social, political, cultural, and economic history. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 141—France Since 1815 (4)
Lecture—3 hours; Term Paper. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 142A—History of the Holocaust (4)
Lecture—3 hours; Term Paper. Topics include comparative genocide, medieval and modern antisemitism, modern German history, the rise of Nazism, Jewish life in Europe before the Nazi period, and the fate of the Jewish communities and other persecuted groups in Europe from 1933-1945. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 142B—The Memory of the Holocaust (4)
Lecture—3 hours; Term Paper. Examination of the literary, philosophical, theological and artistic responses to the Holocaust of the European Jews. Exploration of how memory is constructed, by whom and for what purposes. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 143—History of Eastern Europe and the Balkans (4)
Lecture—3 hours. History of the Baltic, Danubian, and Balkan lands since the Middle Ages. National cultures and conflicts in the Polish Commonwealth and the Habsburg and Ottoman Empires; nationalist movements, 1789-1914; the
twentieth century, including an analysis of the contemporary scene. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 144A—History of Germany, 1450 to 1789 (4)
Extensive Writing; Lecture—3 hours. Survey of early modern Germany, 1450 to 1789, covering the theology
and social history of the Reformation, the Peasants War of 1525, religious warfare, state building and absolutism, the rise of Prussia, Austro-Prussian dualism, and the German Enlightenment. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 144B—History of Germany since 1789 (4)
Extensive Writing; Lecture/Discussion—3 hours. History of the German lands in the age of the French Revolution; 19th-century liberalism, nationalism, and industrialization; the World Wars, National Socialism, and the Holocaust; east and west Germany in the Cold War; the post-reunification scene. Not open for credit to students who have completed former HIS 144. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 145—War and Revolution in Europe 1789-1918 (4)
Lecture—3 hours; Term Paper. Survey of revolutionary movements, international crises, and wars in Europe from the French Revolution to World War I. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 146A—Europe in the Twentieth Century (4)
Lecture—3 hours; Term Paper. Survey of the history of Europe from 1919 to 1939. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 146B—Europe in the Twentieth Century (4)
Lecture—3 hours; Term Paper. Survey of the history of Europe since 1939. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 147A—European Intellectual History, 1800-1870 (4)
Lecture—3 hours; Term Paper. European thought in the early industrial era. Shifting cultural frameworks, from romanticism to scientism; liberal and socialist reactions to social change. Focus on the work of Goethe, Hegel, J.S. Mill, Marx, Darwin and Flaubert. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 147B—European Intellectual History, 1870-1920 (4)
Lecture—3 hours; Term Paper. Cultural and intellectual watershed of the late nineteenth and early twentieth centuries. Emergence of modern art and literature; psychoanalysis and the new social sciences. Focus on the work of Baudelaire, Wagner, Nietzsche, Freud, Weber and Kafka. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 147C—European Intellectual History, 1920-1970 (4)
Lecture—3 hours; Term Paper. European thought and culture since World War I. Coverage includes: literature and politics; Communism and Western Marxism; Fascism; Existentialism; Structuralism; Feminism. Particular attention to Lenin, Brecht, Hitler, Sartre, Camus, Beckett, Marcuse, Foucault, Woolf and de
Beauvoir. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 148A—Women and Society in Europe: 1500-1789 (4)
Lecture—3 hours; Term Paper. Roles and perceptions of women from the Renaissance to the French Revolution. Emphasis on social and economic factors as well as on discussions of women in the writings of political theorists and social commentators. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 148B—Women and Society in Europe: 1789-1920 (4)
Lecture—3 hours; Term Paper. Roles and perceptions of women from the French Revolution to World War I, primarily in France and England. Emphasis on social and economic developments within a loosely chronological and comparative framework. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 148C—Women in Society in Europe: 1914-Present (4)
Lecture—3 hours; Term Paper. History of 20th-century Europe from the perspective of women and the family,and of sexual and gender relations.Emphasis on the impact on women of major events and movements,such as World War I, fascism,Soviet communism,World War II,the welfare state,feminism,and mass culture. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 149—Comparative Cultural History of Modern Britain and France, 1880-1914 (4)
Lecture—3 hours; Term Paper. Cultural comparison of the histories of Britain and France during the fin de siecle. Addresses cultural debates of the period (including gender, race, class) and the practices of cultural history. GE credit: AH, SS, WC, WE. Effective: 1999 Winter Quarter.

HIS 151A—England: The Middle Ages (4)
Lecture—3 hours; Term Paper. Origins of England to the accession of the Lancastrians. Survey includes: impact of Norman Conquest on Anglo-Saxon institutions; rise of the Church, common law, parliament, and the economy; thought, arts, and literature to the age of Chaucer and Wyclif. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 151B—England: The Early Modern Centuries (4)
Lecture—3 hours; Term Paper. From Lancaster and York to the Glorious Revolution. Includes growth of the Church of England; beginnings of modern worldwide economy; rise of the gentry and parliament; thought, arts, and literature in the times
of More, Shakespeare, Hobbes, Wren, and Newton. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 151C—Eighteenth-Century England (4)
Lecture—3 hours; Term Paper. English history from the Glorious Revolution to the French Revolution.
Examination of the transformation of one of Europe's most politically unstable kingdoms into the firmly established constitutional monarchy which provided an environment fit to engender the industrial revolution. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 151D—Industrial England (4)
Lecture—3 hours; Term Paper. English history from Waterloo to the Battle of Britain; the rise and continuance of the first industrial nation, examining the transformation of landed to class society, oligarchy to democracy and bureaucracy, Bentham to Bloomsbury, empire to commonwealth. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 158—Special Topics in Latin American History (4)
Lecture—3 hours; Term Paper. Topics in the history of Latin America. Topics may be framed geographically (e.g., Central America), chronologically (e.g., The Cold War) or thematically (e.g., environmental history). May be repeated up to 3 time(s) when topic differs. GE credit: AH, WC, WE. Effective: 2017 Fall Quarter.

HIS 159—Women and Gender in Latin American History (4)
Extensive Writing; Lecture—3 hours. Roles of women and men in the history of Latin America, with an emphasis on the intersection of gender with racial and class categories. Introduction to the theoretical premises of women’s and gender history. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 160—Spain and America in the 16th century (4)
Lecture—3 hours; Term Paper. Atlantic world in the 16th century, particularly the transcultural and reciprocal social and economic relations between Spain and America in the course of colonization. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 161—Human Rights in Latin America (4)
Lecture—3 hours; Term Paper. History of the origins, denial and protection of Human Rights in Latin America. Emphasis on dictatorships, political violence, social resistance, democracy, justice, accountability, truth commissions, memory. (Human Rights 161.) GE credit: AH, SS, VL, WC, WE. Effective: 2015 Spring Quarter.

HIS 162—History of the Andean Region (4)
Lecture/Discussion—3 hours. History of the Andean region, the area that now comprises modern Peru, Bolivia, and Chile, from the beginning of human settlement to the present. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 163A—History of Brazil (4)
Lecture—3 hours. The history of colonial and imperial Brazil from 1500 to 1889. Written reports. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 163B—History of Brazil (4)
Lecture—3 hours. The history of the Brazilian republic from 1889 to the present. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 164—History of Chile (4)
Lecture—3 hours; Term Paper. Emphasis on the history of Chilean political economy from 1930 to the present. Various strategies of development (modernization, Marxism, Neo-Liberalism); the rise of mass politics; the course of foreign relations; and the richness of Chilean literature. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 165—Latin American Social Revolutions (4)
Lecture—3 hours. Major social upheavals since 1900 in selected Latin American nations; similarities and differences in cause, course, and consequence. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 166A—History of Mexico to 1848 (4)
Lecture/Discussion—3 hours. Political, economic, and social development of pre-Columbian, colonial and national Mexico to 1848. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 166B—History of Mexico since 1848 (4)
Lecture/Discussion—3 hours. History of Mexico from 1848 to the present. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 167—Modern Latin American Cultural and Intellectual History (4)
Lecture—3 hours; Term Paper. Introduce to the cultural and intellectual history of modern Latin America including architecture, cinema, painting, music and literature. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 168—History of Inter-American Relations (4)
Lecture—3 hours. Diplomatic history of Latin America since independence, intra-Latin American relations, relations with the United States, participation in international organizations, and communism in Latin America. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 169A—Mexican-American History (4)
Lecture/Discussion—3 hours. Economic, social, religious, cultural and political development of the Spanish-speaking population of the Southwestern United States from about 1800 to 1910. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 169B—Mexican-American History (4)
Lecture/Discussion—3 hours. Role of the Mexican and Mexican-American or Chicano in the economy, politics, religion, culture and society of the Southwestern United States since 1910. GE credit: ACGH, AH, DD, SS, WE. Effective: 1997 Winter Quarter.

HIS 170A—Colonial America (4)
Lecture—3 hours; Term Paper. Colonial society from 1607 to the American Revolution, with emphasis on
European expansion, political, social and economic foundations, colonial thought and culture, and imperial rivalry. GE credit: ACGH, AH, SS, WE. Effective: 1997 Winter Quarter.

HIS 170B—The American Revolution (4)
Lecture—3 hours; Term Paper. Analysis of the Revolutionary epoch with emphasis on the structure of British colonial policy, the rise of revolutionary movements, the War for Independence and its consequences, and the Confederation period. GE credit: ACGH, AH, SS, WE. Effective: 1997 Winter Quarter.

HIS 170C—The Early National Period, 1789-1815 (4)
Lecture—3 hours. Political and social history of the American republic from the adoption of the Constitution through the War of 1812 and its consequences. GE credit: ACGH, AH, DD, SS, WE. Effective: 1997 Winter Quarter.

HIS 171A—Jacksonian America (4)
Lecture—3 hours; Term Paper. Political and social history of the United States from the end of the War of 1812 to the Compromise of 1850. How the market revolution transformed American life, and led the nation towards war. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

HIS 171B—Civil War Era (4)
Lecture—3 hours; Term Paper. Examination of the political and social history of the United States from the Compromise of 1850 to the end of the Civil War in 1865. Causes of the war the war itself and the problems of reconstruction after the war. GE credit: ACGH, AH, DD, SS, WE. Effective: 2017 Spring Quarter.

HIS 171BF—The Civil War in American Film (1)
Discussion—1 hour; Film Viewing. Prerequisite(s): HIS 171B (can be concurrent); HIS 171B required concurrently. Viewing and discussion of films with short writing assignments. (P/NP grading only.) GE credit: AH, SS. Effective: 1998 Winter Quarter.

HIS 171C—Reconstruction, America's Second Founding (4)
Lecture—3 hours; Term Paper. After the U.S. Civil War, from 1865 to 1876. Emphasis on end of slavery; expansion of civil rights, voting rights, and birthright citizenship; overthrow of biracial Southern governments; segregation and disfranchisement; culture of reconciliation. GE credit: ACGH, AH. Effective: 2017 Spring Quarter.

HIS 171D—Selected Themes in 19th Century American History (4)
Lecture—3 hours; Term Paper. Interpretative overview of a single topic in the history of the United States in the 19th century. Sample topics include social history, the 1850s, and southern history. May be repeated up to 1 time(s) when the topic differs. GE credit: ACGH, AH, SS, WE. Effective: 2016 Fall Quarter.

HIS 172—American Environmental History (4) ***Review all entries***
Lecture—3 hours; Term Paper—1 hour. Examination of changing relations between people and nature in the area of the current United States from pre-Columbian times to the present. Topics include ecological change; perceptions of nature; social conflicts over "proper" uses of nature; environmental movement. GE credit: ACGH, AH, SS, WE. Effective: 2018 Winter Quarter.

HIS 172—American Environmental History (4) ***Review all entries***
Lecture—3 hours; Term Paper. American history through connections between people and nature, pre-Columbus to climate change. Native America; conquest; epidemics; extinctions; industrialization; pollution; environmentalism; climate change and global warming; ideas of nature. GE credit: ACGH, AH, SS, WE. Effective: 2018 Fall Quarter.

HIS 173—Becoming an American: Immigration and American Culture (4)
Lecture—3 hours; Term Paper. Introduction to the wide range of immigrant experiences and cycles of
nativism that have shaped American culture in the twentieth century. From novels, memoirs and films, students will explore how external and internal immigration has created a multicultural society. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

HIS 174A—The Gilded Age and Progressive Era: United States, 1876-1917 (4)
Lecture—3 hours; Term Paper. US history and the construction of modern America from the end of Reconstruction to US entry into World War I. Includes Southern redemption, Western incorporation, electoral corruption, labor movements, Populism, Progressivism, women's suffrage, US imperial expansion, and immigration restriction. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

HIS 174AD—Emergence of Modern America: Discussion (1)
Discussion—1 hour. Prerequisite(s): HIS 174A (can be concurrent); HIS 174A required concurrently. Intensive discussion of topics and readings for course 174A. (P/NP grading only.) Effective: 1997 Fall Quarter.

HIS 174B—War, Prosperity, and Depression: United States, 1917-1945 (4)
Lecture—3 hours; Term Paper. America's emergence as a world power, the business culture of the 1920s, the New Deal and World War II. Emphasis on such issues as government regulation of the economy, welfare capitalism, and class, racial, ethnic, and gender conflicts. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

HIS 174BD—America in War, Prosperity and Depression: Discussion (1)
Discussion—1 hour. Prerequisite(s): HIS 174B (can be concurrent); HIS 174B required concurrently. Intensive discussion of topics and readings for course 174B. (P/NP grading only.) Effective: 1997 Fall Quarter.

HIS 174C—The United States Since World War II, 1945 to the Present (4)
Lecture—3 hours; Term Paper. America's struggle to respond to new complexities in foreign relations, social tensions, family changes and media. Emphasis on such topics as: Cold War; anticommunist crusade; civil rights, feminist and environmentalist movement; New Left; counterculture; Vietnam; Watergate; and the moral majority. GE credit: ACGH, AH, DD, SS, WE. Effective: 1997 Winter Quarter.

HIS 174CD—The United States Since World War II: Discussion (1)
Discussion—1 hour. Prerequisite(s): HIS 174C (can be concurrent); HIS 174C required concurrently. Intensive discussion of topics and readings for course 174C. (P/NP grading only.) Effective: 1997 Fall Quarter.

HIS 174D—Selected Themes in 20th Century American History (4)
Lecture—3 hours; Term Paper. Interpretive overview of a single topic in the history of the United States in the 20th century with attention to the phases and processes of historical change. May be repeated once for credit when topic differs. May be repeated up to 1 time(s) when topic differs. GE credit: ACGH, AH, SS, WE. Effective: 2016 Fall Quarter.

HIS 174DD—Selected Themes in 20th Century American History: Discussion (1)
Discussion—1 hour. Prerequisite(s): HIS 174D (can be concurrent); HIS 174D required concurrently. Intensive discussion of topics and readings for course 174D. May be repeated for credit. (P/NP grading only.) Effective: 1997 Fall Quarter.

HIS 175—American Intellectual History (4)
Lecture—3 hours; Term Paper. Exploration of the ideas that have shaped politics and society in the United States from colonial times to the present. Topics include American liberalism, republicanism, democracy, constitutionalism, communitarianism, utopianism, pragmatism, feminism, Darwinism, nationalism, conservatism, and economics. GE credit: ACGH, AH, SS, WE. Effective: 2016 Fall Quarter.

HIS 176A—Cultural and Social History of United States (4)
Lecture—3 hours; Term Paper. Study of social and cultural forces in American society in the nineteenth century with emphasis on social structure, work and leisure, socialization and the family, social reform movements and changes in cultural values. GE credit: ACGH, AH, SS, WE. Effective: 1997 Winter Quarter.

HIS 176B—Cultural and Social History of United States (4)
Lecture—3 hours; Term Paper. Study of social and cultural forces in American society in the twentieth century with emphasis on social structure, work and leisure, socialization and the family, social reform movements and changes in cultural values. GE credit: ACGH, AH, DD, SS, WE. Effective: 1997 Winter Quarter.

HIS 177A—History of Black People and American Race Relations, 1450-1860 (4)
Lecture—3 hours; Term Paper. History of black people in the United States from the African background to Reconstruction. GE credit: ACGH, AH, DD, SS, WE. Effective: 2010 Winter Quarter.

HIS 177B—History of Black People and American Race Relations, 1860-Present (4)
Lecture—3 hours; Term Paper. History of black people and race relations from 1860-present. Emphasis on Civil War, Reconstruction, Segregation, Age of Accommodation, black nationalism, urbanization, civil rights, and changing ideology of race relations. GE credit: ACGH, AH, DD, SS, WE. Effective: 2010 Winter Quarter.

HIS 179—Asian American History, 1850-Present (4)
Lecture—3 hours; Term Paper. Historical experience of people of Asian ancestry in the United States from the mid-nineteenth century to the present. Migration, labor, community formation, race relations, women and gender, popular culture. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

HIS 180AN—American Political History, 1789-1896 (4)
Lecture—3 hours; Term Paper. Growth of American politics from the birth of the republic to the end of the nineteenth century. Development of political parties, the expanding electorate, and how social issues such as slavery shaped the political process. Not open for credit to students who have completed HIS 180A. GE credit: ACGH, AH, SS, WE. Effective: 2016 Fall Quarter.

HIS 180BN—American Political History, 1896-present (4)
Lecture—3 hours; Term Paper. Politics in the United States from 1896 to the present. Topics include race and partisan politics; communism and anti-communism; the New Deal and the centralization of government; and the rise of the imperial presidency. Not open for credit to students who have taken HIS 180A or HIS 180C. GE credit: ACGH, AH, SS, WE. Effective: 2016 Fall Quarter.

HIS 180C—The Fight for the Right to Vote (4)
Lecture—3 hours; Term Paper. History of the struggle for voting rights from the colonial period to the present. Emphasis on the struggle for inclusion by African Americans, women, Latinos, and other groups. GE credit: ACGH, AH, SS. Effective: 2017 Fall Quarter.

HIS 181—Religion in American History to 1890 (4)
Lecture—3 hours; Term Paper. American religious history from colonization through the Gilded Age. Topics include religious diversity in America; native American religion; Protestant evangelism; gender and religion; religion and bigotry; African American religion; religion in the Civil War; and religion's response to modernization. GE credit: ACGH, AH, SS, WE. Effective: 2016 Fall Quarter.

HIS 182—Gender and Justice in American History (4)
Lecture/Discussion—3 hours; Term Paper. Intersection of gender and law in North America from the colonial period
through the 20th century. Topics include witchcraft, suffrage, child
custody, protective labor laws, regulation of sexuality. Analysis of legal change, trials, and cultural influences. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

HIS 183A—The Frontier Experience: Trans-Mississippi West (4)
Lecture—3 hours. The fur trade, western exploration and transportation, the Oregon Country, the Greater Southwest and the Mexican War, the Mormons, mining discovery, and the West during the Civil War. GE credit: ACGH, AH, SS, WE. Effective: 1997 Winter Quarter.

HIS 183B—The Frontier Experience: Trans-Mississippi West (4)
Lecture—3 hours. Spread of the mining kingdom, the range cattle industry, Indian-military affairs, settlement of the Great Plains and Rocky Mountain Regions and political organization of the West. GE credit: ACGH, AH, SS, WE. Effective: 1997 Winter Quarter.

HIS 184—History of Sexuality in America (4)
Extensive Writing; Lecture—3 hours. History of sexuality in America from pre-European through the late twentieth century. Topics include birth control, marriage, sexual violence, prostitution, inter-racial relationships, heterosexuality and homosexuality, the feminist, gay, and lesbian liberation movements, AIDS, commercialization of sexuality. GE credit: ACGH, AH, DD, SS, WE. Effective: 2003 Fall Quarter.

HIS 185A—History of Science in America (4)
Lecture—3 hours. Survey of the European background. Study of American scientific institutions, ideas, personalities, creative processes in science, and of relationships between society and science from colonial times to present. GE credit: AH, SS, WE. Effective: 1997 Winter Quarter.

HIS 185B—History of Technology in America (4)
Lecture—3 hours. Study of American technology, emphasizing biographical approach to historical understanding of technological change, creative processes, institutions, ideas, and relationships between technology and society
from colonial times to present. GE credit: AH, SS, WE. Effective: 1997 Winter Quarter.

HIS 187—History of US Foreign Relations in the Twentieth Century (4)
Extensive Writing; Lecture—3 hours. Rise of the US to superpower standing during the twentieth century, from colonialism to the war on terror, including political, diplomatic, cultural, and economic activities of both US government and private American agencies beyond US borders. GE credit: SS, WE. Effective: 2017 Fall Quarter.

HIS 188—America in the 1960s (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Tumult and upheaval in American politics, culture, and society 1961-1969. Civil rights; Vietnam, the draft and the anti-war movement; rock and roll and the counterculture; modern feminism; modern conservatism; student movements; urban unrest and insurrection. GE credit: ACGH, DD, SS, WE. Effective: 2011 Fall Quarter.

HIS 189—California History (4)
Lecture—3 hours; Term Paper. California history from the pre-colonial period to the present including dispossession of California's Indians, political economy of the Spanish and Mexican periods, Gold Rush effects, industrialization, Hollywood, water politics, World War II, Proposition 13, and the emergence of Silicon Valley. Not open for credit to students who have completed two courses of HIS 189A, HIS 189B, HIS 189C. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

HIS 190A—Middle Eastern History I: The Rise of Islam, 600-1000 (4)
Extensive Writing; Lecture—3 hours. Middle Eastern history from the rise of Islam to the disintegration of the Abbasid Caliphate; the formative centuries of a civilization. Politics and religion, conquest and conversion, arts and sciences, Christians, Jews and Muslims, gender and sexuality, orthodoxy and heterodoxy. GE credit: AH, SS, WC, WE. Effective: 2009 Fall Quarter.

HIS 190B—Middle Eastern History II: The Age of the Crusades, 1001-1400 (4)
Extensive Writing; Lecture—3 hours. Middle Eastern history during the age of the Crusades and Mongol invasions. The idea of holy war, the Crusades, the Mongols as the bearers of Chinese arts, nomads and sedentary life, feudalism, mysticism, slavery, women in the medieval Middle East. GE credit: AH, SS, WC, WE. Effective: 2009 Fall Quarter.

HIS 190C—Middle Eastern History III: The Ottomans, 1401-1730 (4)
Extensive Writing; Lecture—3 hours. Middle Eastern history from the foundation of the Ottoman Empire on the borderlands of Byzantine Anatolia through its expansion into Europe, Asia, and Africa, creating a new cultural synthesis including the Arab, Greek, Islamic, Mongol, Persian, Slavic, and Turkish traditions. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 190D—Middle Eastern History IV: Safavids Iran, 1300-1720 (4)
Lecture—3 hours; Term Paper. Middle Eastern history focusing on Safavid Empire (present-day Iran, Iraq, Afghanistan, up to Georgia), beginning with the origins of the dynasty as a powerful religious family, to the establishment of the Empire, focusing on Social, Religious, Economic, and Political History. GE credit: AH, SS, WC, WE. Effective: 2012 Fall Quarter.

HIS 191A—Classical China (4)
Lecture—3 hours; Term Paper. History of Chinese civilization from its origins through the establishment of city states and the flowering of classical philosophy,
to the rise and fall of the First Empire. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 191B—High Imperial China (4)
Lecture—3 hours; Term Paper. Political disunion and the influx of Buddhism; reunification under the great dynasties of T'ang, Sung, and Ming with analysis of society, culture and thought. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 191C—Late Imperial China (4)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): HIS 009A or upper division standing recommended. Patterns and problems of Chinese life traced through the Ming and Ching dynasties (c.15001800), prior to the confrontation with the West in the Opium War. Readings include primary sources and novels portraying elite ethos as well as popular culture. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 191D—Nineteenth Century China: The Empire Confronts the West (4)
Discussion—1 hour; Lecture—2 hours; Term Paper. Prerequisite(s): HIS 009A or upper division standing recommended. Decline and fall of the Chinese Empire, with particular attention to the social and political crises of the 19th century, and the response of government officials, intellectuals, and ordinary people to the increasing pressures of Western imperialism. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 191E—The Chinese Revolution (4)
Discussion—1 hour; Extensive Writing; Lecture—2 hours. Prerequisite(s): Upper division standing recommended. Analysis of China's cultural and political transformation from Confucian empire into Communist state. Emphasis on emergence and triumph of peasant revolutionary strategy (to 1949), with some attention to its implications for post-revolutionary culture and politics. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 191F—History of the People's Republic of China (4)
Discussion—1 hour; Extensive Writing; Lecture—2 hours. Prerequisite(s): Upper division standing recommended. Comprehensive analysis of recent Chinese history, including land reform, the Cultural Revolution, the post-Mao era, and the consequences of the new economic policies of the 1980s. Not open for credit to students who have completed course 190C. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 191G—Special Topics in Chinese History to 1800 (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): HIS 009A recommended. Topics in the history of China from the beginning of the imperial period through the high Qing dynasty. Topics may be framed chronologically (e.g.,the Ming Dynasty) or thematically (e.g., Trade in early Chinese history). May be repeated up to 1 time(s) when topics differs. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

HIS 191H—Special Topics in Chinese History after 1800 (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): HIS 009A recommended. Topics in the history of China since 1800. Topics may be framed chronologically (e.g., The Republican Period (1911-1948)) or thematically (e.g., The Modern Evolution of Chinese Law). May be repeated up to 1 time(s) when topics differs. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

HIS 191J—Sex and Society in Modern Chinese History (4)
Lecture—3 hours; Term Paper. Role of sex, gender, and family relations in the development of Chinese politics, society, and personal life in the modern period, 1900-present. GE credit: AH, WC, WE. Effective: 2015 Winter Quarter.

HIS 192—Internship in History (1-12)
Variable. Prerequisite(s): Consent of Instructor. Enrollment dependant on availability of intern positions, with priority to History majors. Supervised internship and study as historian, archivist, curator, or in another history-related capacity, in an approved organization or institution. (P/NP grading only.) Effective: 1997 Winter Quarter.

HIS 193A—History of the Modern Middle East, 1750-1914 (4)
Lecture—3 hours; Term Paper. Prerequisite(s): HIS 006 recommended. State and society within the Middle East from 1750 to 1914 under pressure of the changing world economy and European imperialism. Themes: colonialism, Orientalism, intellectual renaissance, Islamic reform, state-formation, role of subaltern groups. GE credit: AH, SS, VL, WC, WE. Effective: 2017 Fall Quarter.

HIS 193B—History of the Modern Middle East, From 1914 (4)
Lecture—3 hours; Term Paper. Middle East from the turn of the 20th century to the present. Themes include the legacy of imperialism, cultural renaissance, the World Wars, nationalism, Palestine/Israel, Islamic revival, gender, revolutionary movements, politics of oil and war, cultural modernism,exile and diaspora. GE credit: AH, SS, VL, WC, WE. Effective: 2017 Winter Quarter.

HIS 193C—The Middle East Environment: Historical Change and Current Challenges (4)
Lecture/Discussion—3 hours; Project (Term Project). Examines Middle East environment and human use of nature over last 10,000 years. Introduction to desert ecology, environmental history and current environmental problems. Case Studies of Egypt, Maghreb countries, Arabian peninsula/Gulf countries, desertification, water, indigenous knowledge, and national parks. GE credit: AH, SS. Effective: 2016 Fall Quarter.

HIS 193D—History of Modern Iran, From 1850 to Present (4)
Lecture—3 hours; Term Paper. Prerequisite(s): HIS 006 recommended. Modern Iran from the mid 19th century to the present. Themes include the legacy of imperialism, cultural renaissance, the World Wars, nationalism, modernization, Islamic revival, gender, revolutionary movements, politics of oil and war. GE credit: AH, SS, VL, WC, WE. Effective: 2011 Fall Quarter.

HIS 194A—Aristocratic and Feudal Japan (4)
Discussion; Lecture—3 hours; Term Paper. Broad survey of the cultural, social, religious, and political aspects of Japanese history from mythological times through the sixteenth century emphasizing comparison of the organizations, values, and beliefs associated with the aristocratic and feudal periods. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 194B—Early Modern Japan (4)
Lecture—3 hours; Term Paper/Discussion. Survey of the cultural, social, economic,and political aspects of Japanese history from the seventeenth through the nineteenth centuries emphasizing the development of those patterns of thought and political organization with which Japan met the challenge of the nineteenth-century Western expansionism. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 194C—Modern Japan (4)
Lecture—3 hours; Term Paper/Discussion. Survey of the cultural, social, economic, and political aspects of Japanese history in the twentieth century emphasizing labor and social movements, militarism and the Pacific war, and the emergence of Japan as a major economic power. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 194D—Business and Labor in Modern Japan (4)
Lecture—3 hours; Term Paper. Survey of labor and management relations in Japan from the mid-eighteenth century to the present. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 194E—Education and Technology in Modern Japan (4)
Lecture—3 hours; Term Paper. Survey of education and technology in Japan from the mid-eighteenth
century to the present. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 195B—History of Modern Korea (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): Upper division standing recommended. History of Modern Korea, from Yi dynasty period to 1990s. Covers the political and socioeconomic changes in 19th century, modernization under Japanese colonialism, postwar economic growth and effects of the Cold War. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 195C—A History of Vietnam (4)
Lecture/Discussion—4 hours. Overview of Vietnamese history: early state formation in Southeast Asia; expansion/contention in the 17th and 18th centuries; colonial period; war with the US; and post-war developments (with an emphasis on relations with China and the US). GE credit: AH, SS, WC, WE. Effective: 2017 Fall Quarter.

HIS 196A—Medieval India (4)
Discussion—1 hour; Lecture—3 hours. Survey of history of India in the millennium preceding arrival of British in the eighteenth century, focusing on interaction of the civilizations of Hinduism and Islam and on the changing nature of the
state. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 196B—Modern India (4)
Discussion—1 hour; Lecture—3 hours. Survey of cultural, social, economic, and political aspects of South Asian history from arrival of the British in the eighteenth century to formation of new independent states-India, Bangladesh, and Pakistan-in the twentieth century. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 197T—Tutoring in History (2)
Discussion—1 hour; Laboratory—3 hours. Prerequisite(s): Enrolled as a History major with senior standing and consent of department chairperson. Tutoring of students in lower division courses. Weekly meeting with instructors in charge of courses. Written reports on methods and materials required. May be repeated once for credit. No final examination. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

HIS 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

HIS 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

HIS 201A—Sources and General Literature of History; Ancient (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. Ancient. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 201B—Sources and General Literature of History; Medieval (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. Medieval. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 201C—Sources and General Literature of History; Renaissance and Reformation (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. Renaissance and Reformation. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 201D—Sources and General Literature of History; Early Modern Europe (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. Early Modern Europe. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 201E—Sources and General Literature of History (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history.(E)Europe since 1815. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 201F—Sources and General Literature of History; China to 1880 (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. China to 1880. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 201G—Sources and General Literature of History; China Since 1880 (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. China since 1880. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 201H—Sources and General Literature of History; Britain (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. Britain. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 201I—Sources and General Literature of History; Latin America Since 1810 (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. Latin America since 1810. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 201J—Sources and General Literature of History; American History to 1787 (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. American History to 1787. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 201K—Sources and General Literature of History; United States, 1787-1896 (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. United States, 1787-1896. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 201L—Sources and General Literature of History; United States Since 1896 (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. United States since 1896. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 201M—Sources and General Literature of History; Middle East (4)
Seminar—3 hours; Term Paper. Addresses various theoretical and methodological approaches to the study of the Modern Middle East. Survey Modern Middle East historiography in light of theoretical innovations such as post-Orientalism, World Systems theory, and postcolonial theory. May be repeated for credit when subject differs. Effective: 2011 Winter Quarter.

HIS 201N—Sources and General Literature of History; Modern Japan (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. Modern Japan. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 201P—Sources and General Literature of History; African Historiography (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. African Historiography. May be repeated for credit when different subject area is studied. Effective: 2005 Winter Quarter.

HIS 201Q—Sources and General Literature of History; Cross-Cultural Women's History (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. Cross-Cultural Women's History. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 201S—Sources and General Literature of History; History of Science and Medicine (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. History of Science and Medicine. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 201T—Sources and General Literature of History; Jewish History (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. Jewish History. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 201W—Sources and General Literature of History; Advanced Topics in World History (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. Advanced Topics in World History. May be repeated for credit when different subject area is studied. Effective: 2007 Spring Quarter.

HIS 201X—Sources and General Literature of History (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history.(X)World History. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 202A—Major Issues in Historical Interpretation; Ancient (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Fundamental issues and debates in the study of history. Ancient. Readings, papers, and class reports. May be repeated for credit when a different subject area is studied. Effective: 1997 Winter Quarter.

HIS 202B—Major Issues in Historical Interpretation; Medieval Europe (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Fundamental issues and debates in the study of history. Medieval Europe. Readings, papers, and class reports. May be repeated for credit when a different subject area is studied. Effective: 1997 Winter Quarter.

HIS 202C—Major Issues in Historical Interpretation; Modern Europe (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Fundamental issues and debates in the study of history. Modern Europe. Readings, papers, and class reports. May be repeated for credit when a different subject area is studied. Effective: 1997 Winter Quarter.

HIS 202D—Major Issues in Historical Interpretation; India (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Fundamental issues and debates in the study of history. India. Readings, papers, and class reports. May be repeated for credit when a different subject area is studied. Effective: 1997 Winter Quarter.

HIS 202E—Major Issues in Historical Interpretation; India (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Fundamental issues and debates in the study of history. Africa. Readings, papers, and class reports. May be repeated for credit when a different subject area is studied. Effective: 1997 Winter Quarter.

HIS 202F—Major Issues in Historical Interpretation; China (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Fundamental issues and debates in the study of history. China. Readings, papers, and class reports. May be repeated for credit when a different subject area is studied. Effective: 1997 Winter Quarter.

HIS 202G—Major Issues in Historical Interpretation; Japan (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Fundamental issues and debates in the study of history. Japan. Readings, papers, and class reports. May be repeated for credit when a different subject area is studied. Effective: 1997 Winter Quarter.

HIS 202H—Major Issues in Historical Interpretation; United States (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Fundamental issues and debates in the study of history. United States. Readings, papers, and class reports. May be repeated for credit when a different subject area is studied. Effective: 1997 Winter Quarter.

HIS 202I—Major Issues in Historical Interpretation; Latin America (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Fundamental issues and debates in the study of history. Latin America. Readings, papers, and class reports. May be repeated for credit when a different subject area is studied. Effective: 1997 Winter Quarter.

HIS 203A—Research Seminar (4)
Seminar—3 hours; Tutorial—1 hour. Designed for students preparing for higher degrees in history.Individual research and analysis resulting in a substantial research paper of publishable quality.Completion required of all Ph.D. candidates.The three courses must be taken in a continuous sequence, ordinarily during the second year. Effective: 2003 Fall Quarter.

HIS 203B—Research Seminar (4)
Seminar—3 hours; Tutorial—1 hour. Prerequisite(s): HIS 203A Designed for students preparing for higher degrees in history. Individual research and analysis resulting in substantial research paper of publishable quality. Completion required of all Ph.D. candidates. The three courses must be taken in continuous sequence, ordinarily during second year. Effective: 2004 Winter Quarter.

HIS 203C—Research Seminar (4)
Seminar—3 hours; Tutorial—1 hour. Prerequisite(s): HIS 203A Designed for students preparing for higher degrees in History. Individual research and analysis resulting in substantial research paper of publishable quality. Completion required of all Ph.D. candidates. The three courses must be taken in continuous sequence, ordinarily during second year. Effective: 2004 Spring Quarter.

HIS 204—Historiography (4)
Seminar—3 hours; Term Paper. Major issues in the philosophy and methodology of history. Effective: 1997 Winter Quarter.

HIS 221—Medieval History (4)
Seminar—3 hours. Prerequisite(s): HIS 121A, HIS 121B, HIS 121C recommended. Topics in the history of medieval and early Renaissance Europe. Effective: 1997 Winter Quarter.

HIS 245—Modern European History (4)
Seminar—3 hours. Prerequisite(s): HIS 201E Primary sources and research methodologies in the history of modern France and Germany. May be repeated once for credit. May be repeated up to 1 time(s). Effective: 1997 Winter Quarter.

HIS 261—Latin American History (4)
Seminar—3 hours. Prerequisite(s): Two courses in Latin American history; reading knowledge of Spanish or Portuguese. Effective: 1997 Winter Quarter.

HIS 271A—United States History (4)
Seminar—3 hours; Term Paper. Prerequisite(s): (HIS 201J, HIS 201K, HIS 201L) or HIS 202H Research in literature, methods, and sources on aspects of United States history, culminating in each student completing a research paper in the field by the end of the second quarter. May be repeated for credit. Effective: 1998 Winter Quarter.

HIS 271B—United States History (4)
Seminar—3 hours; Term Paper. Prerequisite(s): (HIS 201J, HIS 201K, HIS 201L) or HIS 202H Research in literature, methods, and sources on aspects of United States history, culminating in each student completing a research paper in the field by the end of the second quarter. May be repeated for credit. Effective: 1998 Winter Quarter.

HIS 291A—Chinese History (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Research on topics to be chosen by the students for the purpose of writing article-length papers. May be repeated for credit. May be repeated for credit. Effective: 1997 Winter Quarter.

HIS 291B—Chinese History (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Completion of article-length papers on topics chosen by students. May be repeated for credit. May be repeated for credit. Effective: 1997 Winter Quarter.

HIS 291C—Methods and Issues in Chinese History (4)
Seminar—2 hours; Tutorial—1 hour. Prerequisite(s): Consent of Instructor. Reading knowledge of Chinese. Readings in Chinese historical materials. Training in the use of Chinese reference works (including on-line resources). May be repeated for credit. Effective: 2007 Fall Quarter.

HIS 292—College Teaching Internship (4)
Internship—4 hours. Prerequisite(s): HIS 300 (may be taken concurrently). Student prepares and teaches one lower division history course in a
nearby community college under the supervision of a UC Davis instructor and a community college instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

HIS 298—Group Study (1-5)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

HIS 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

HIS 299D—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

HIS 389—Introductory Seminar for Teaching Assistants (1)
Seminar—1 hour. Prerequisite(s): HIS 390 (can be concurrent); HIS 390 required concurrently. An introduction to the broad comparative and theoretical issues of teaching methods and techniques in history. (S/U grading only.) Effective: 1997 Winter Quarter.

HIS 390—Teaching History in College (2)
Discussion—2 hours. Designed for teaching assistants with emphasis on problems and procedures encountered by teachers of lower division classes at the university. (S/U grading only.) Effective: 1997 Winter Quarter.

History & Philosophy of Science Minor; Science & Technology Studies

History & Philosophy of Science Minor; Science & Technology Studies | History & Philosophy of Science Minor

(College of Letters and Science)

Colin Milburn, Ph.D., Program Director

Advising Office. 101 Young Hall; stsadvising@ucdavis.edu

Committee in Charge. http://sts.ucdavis.edu/undergraduate/minor

The interdisciplinary minor in the history and philosophy of science invites students to examine historical and contemporary problems in a variety of scientific disciplines, and to explore concepts and procedures basic to science and how they have evolved. The minor is sponsored by the Program in Science and Technology Studies.

Minor Advisor. 101 Young Hall, stsadvising@ucdavis.edu.

Faculty Advisor. The current Director of STS is also available for advising by appointment.

History and Philosophy of Science **Units:** 24

PHI 030	Introduction to Philosophy of Science	4

Choose five courses from those listed below; one course must be from each of three areas:

(a) History

HIS 135A	History of Science to the 18th Century	4
HIS 135B	History of Science, 18th to 20th Centuries	4
HIS 136	Scientific Revolution	4
HIS 139A	Medieval and Renaissance Medicine	4
HIS 139B	Medicine, Society, and Culture in Modern Europe	4
HIS 185A	History of Science in America	4
HIS 185B	History of Technology in America	4
HIS 138A	The Rise of the Russian Empire, 1304-1825	4

(b) Philosophy

PHI 107	Philosophy of the Physical Sciences	4
PHI 108	Philosophy of the Biological Sciences	4
PHI 109	Philosophy of the Social Sciences	4
PHI 111	Philosophy of Space and Time	4

(c) Science and Technology Studies

STS 020	Methods in Science, Technology and Medicine Studies	4
STS 130A	From Natural History to the History of Nature	4
STS 130B	History of Modern Biology	4
STS 131	Darwin	4
STS 150	Gender and Science	4
STS 180	Topics in Science and Technology Studies	4

Total: 24

Horticulture & Agronomy (Graduate Group)

Horticulture & Agronomy (Graduate Group) | Horticulture & Agronomy Information

Astrid Volder, Ph.D., Chairperson of the Group

Group Office. 1224 Plant and Environmental Sciences Building; 530-752-7738; http://ggha.ucdavis.edu

Faculty. http://ggha.ucdavis.edu/GGHAfaculty.htm

Horticulture & Agronomy (Graduate Group) | Horticulture & Agronomy M.S.

Astrid Volder, Ph.D., Chairperson of the Group

Group Office. 1224 Plant and Environmental Sciences Building; 530-752-7738; http://ggha.ucdavis.edu

Faculty. http://ggha.ucdavis.edu/GGHAfaculty.htm

Graduate Study. The Graduate Group in Horticulture and Agronomy offers programs of study leading to the M.S. and Ph.D. degrees for students interested in the science and management of agricultural crops, including their ecology, physiology, genetics, and post-harvest management, as well as the interaction of agricultural crops with the environment. The M.S. program is designed to focus on a cropping system, such as agronomy, environmental horticulture, pomology, vegetable crops, viticulture and weed science. Within that cropping system, the student can specialize in one of a number of areas, including agroecology, biotechnology, breeding and crop improvement, crop physiology, crop production, floriculture, landscape horticulture, mineral nutrition, modeling, nursery production, pest management, plant growth and development, postharvest physiology, revegetation/restoration, and water relations. Research may be conducted within these areas with an applied or basic focus, but in association with a cropping system.

Preparation. For both the M.S. and Ph.D. programs, a level of competence equivalent to that of a sound undergraduate program in Plant Science is required. This includes coursework in general biology, chemistry, organic chemistry, physics, statistics, genetics, plant physiology, and soil science. A few limited deficiencies in any of these areas can be made up after admission to the graduate program. Specific requirements are outlined in detail on the group's website. The graduate advisor, the major professor, and the student will design a program of advanced courses to meet individual academic needs within one of the specializations.

Graduate Advisors. Consult the Group office.

Horticulture & Agronomy (Graduate Group) | Horticulture & Agronomy Ph.D.

Astrid Volder, Ph.D., Chairperson of the Group

Group Office. 1224 Plant and Environmental Sciences Building; 530-752-7738; http://ggha.ucdavis.edu

Faculty. http://ggha.ucdavis.edu/GGHAfaculty.htm

Graduate Study. The Graduate Group in Horticulture and Agronomy offers programs of study leading to the M.S. and Ph.D. degrees for students interested in the science and management of agricultural crops, including their ecology, physiology, genetics, and post-harvest management, as well as the interaction of agricultural crops with the environment. In the Ph.D. program, students focus on one of five areas of emphasis: agroecology, crop improvement/plant breeding, crop production systems, plant physiology, and post-harvest biology/physiology. Research may be conducted within these areas with an applied or basic focus, but in association with a cropping system such as agronomy, environmental horticulture, pomology, vegetable crops, viticulture and weed science.

Preparation. For both the M.S. and Ph.D. programs, a level of competence equivalent to that of a sound undergraduate program in Plant Science is required. This includes coursework in general biology, chemistry, organic chemistry, physics, statistics, genetics, plant physiology, and soil science. A few limited deficiencies in any of these areas can be made up after admission to the graduate program. Specific requirements are outlined in detail on the group's website. The graduate advisor, the major professor, and the student will design a program of advanced courses to meet individual academic needs within one of the specializations.

Graduate Advisors. Consult the Group office.

Horticulture & Agronomy (Graduate Group) | HRT Courses

Courses in HRT:

HRT 200A—Horticulture & Agronomy: Principles (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing. Core course to introduce students to the principles that are of general importance in horticultural and agronomic research, including agroecology, plant developmental physiology, crop improvement, and biotechnology. Generally taken in the first year of the graduate program. Effective: 2016 Winter Quarter.

HRT 200B—Horticulture & Agronomy: Practices (4)
Fieldwork—3 hours; Lecture/Discussion—2 hours; Seminar—3 hours. Prerequisite(s): HRT 200A recommended; graduate standing. Introduction to horticultural and agronomic cropping systems. Covers current applied research within agroecology, crop improvement, crop production, postharvest biology. Effective: 2016 Spring Quarter.

HRT 203—Research Perspectives in Horticulture (3)
Lecture—1 hour; Lecture/Discussion—2 hours. Prerequisite(s): Graduate standing. Following lectures/discussions of scientific methodology, students develop research proposals aided by classroom discussions and individual interactions with instructors. Lectures and critiques of classical papers provide a sense of the evolution of the current concepts in perennial plant biology. Effective: 2017 Winter Quarter.

HRT 251—Modeling Horticultural Systems (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): PLS 142; or Consent of Instructor. Calculus. Development and application of models. Emphasis on physiological and ecological models, with examples from areas of interest to class participants. Applications to horticultural systems. Effective: 2008 Fall Quarter.

HRT 290—Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing at UCD. Seminars presented by invited speakers, students, or faculty on selected topics in horticulture. (S/U grading only.) Effective: 1997 Winter Quarter.

HRT 298—Group Study (1-5)
Variable. May be repeated for credit. Effective: 2007 Fall Quarter.

HRT 299—Research (1-12)
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. Research. May be repeated for credit. (S/U grading only.) Effective: 2016 Winter Quarter.

Human Development

Human Development | HDE Information

(College of Agricultural and Environmental Sciences)

Advising Office. 1303 Hart Hall; 530-752-1805, 530-752-2244, 530-752-9322; http://hcd.ucdavis.edu

Faculty. http://humanecology.ucdavis.edu/hdfs-faculty

Human Development | HDE B.S.

(College of Agricultural and Environmental Sciences)

Advising Office. 1303 Hart Hall; 530-752-1805, 530-752-2244, 530-752-9322; http://hcd.ucdavis.edu

Faculty. http://humanecology.ucdavis.edu/hdfs-faculty

The Major Program

Human development explores the developmental process in humans throughout the life cycle. Biological, cognitive, and personality/sociocultural aspects of development are studied.

The Program. Human development majors complete a group of preparatory courses in anthropology, general biology, genetics, history, philosophy, physiology, psychology, and statistics. Upper division students can design their programs in consultation with a faculty member to emphasize a particular interest. For instance, students can study the cognitive, social, and biological aspects of human development while emphasizing child or adult development.

Internships and Career Alternatives. At least one practicum course is required. A second practicum or supervised internship can be used to fulfill the restricted elective requirement for the major. In addition, students can intern in schools, early childhood education or senior centers, hospitals, rehabilitation centers, probation offices, group foster homes, mental health clinics, or as tutors for handicapped or bilingual students. Human development graduates fill a wide variety of positions in preschools, elementary and special educational settings, programs designed for parents, families, and the elderly, as well as governmental jobs related to social services for people of all ages. Students who emphasize biological aspects of human development can apply to medical school or pursue training for positions in the health sciences. Human development prepares students to pursue advanced degrees in behavioral and social sciences, education, social work, family law, or health sciences.

Preparatory Requirements. UC Davis students who wish to change their major to Human Development must be in good academic standing. Students must complete the following courses with a combined grade point average of at least 2.500. All of the following courses must be taken for a letter grade:

PSC 001
Choose one: STA 010, 013, 013V; PSC 041; SOC 046A, 046B
Choose one: ANT 001, 002, 015
Choose one: BIS 002A, 010, 010V; MIC 010; MCB 010; NPB 010, 012, 101

Students must have achieved a 2.000 GPA in any required upper-division courses taken prior to declaring the major.

All courses satisfying the Preparatory Subject Matter, Depth Subject Matter, Restricted Electives and English requirement must be taken for a letter grade.

Major Advisor. Leah Hibel

Graduate Study. Graduate study is available through a Master of Science degree in child development, and a Ph.D. degree in human development. See also Graduate Studies.

Preparatory Subject Matter **Units:** 39-49

Choose two:

ANT 001	Human Evolutionary Biology	4
OR		
ANT 001Y	Human Evolutionary Biology (Hybrid Version)	4
ANT 002	Cultural Anthropology	5
ANT 015	From Birth to Death: The Evolution of the Human Life Cycle	5

Choose one:

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 010	Everyday Biology	4
MIC 010	Natural History of Infectious Diseases	3
NPB 012	The Human Brain and Disease	3

Choose one:

MCB 010	Introduction to Human Heredity	4
BIS 101	Genes and Gene Expression	4

Biological Sciences 101 cannot be used to satisfy both the Preparatory Subject Matter and the Depth Subject Matter Requirements.

Choose one:

HIS 017A	History of the United States	4
HIS 017B	History of the United States	4
HIS 072A	Women and Gender in America, to 1865	4
HIS 072B	Women and Gender in America, 1865-Present	4
POL 001	American National Government	4

Choose two:

PHI 005	Critical Reasoning	4
PHI 015	Introduction to Bioethics	4
PHI 030	Introduction to Philosophy of Science	4
PHI 031	Appraising Scientific Reasoning	4
PHI 032	Understanding Scientific Change	4
PHI 038	Introduction to Philosophy of Biology	4

Choose one:

NPB 010	Elementary Human Physiology	3
NPB 101	Systemic Physiology	5
PSC 101	Introduction to Biological Psychology	4

PSC 001	General Psychology	4

Choose one:

PSC 041	Research Methods in Psychology	4
STA 010	Statistical Thinking	4
STA 013	Elementary Statistics	4
OR		
SOC 046A	Introduction to Social Research	4
SOC 046B	Introduction to Social Research	5

Depth Subject Matter **Units:** 50-54

Life Span:

HDE 100A	Infancy and Early Childhood	4
HDE 100B	Middle Childhood and Adolescence	4
HDE 100C	Adulthood and Aging	4

Research Methods:

HDE 120	Research Methods in Human Development	4

Biological Processes:

Choose one:

BIS 101	Genes and Gene Expression	4
	Biological Sciences 101 cannot be used to satisfy both the Preparatory Subject Matter and the Depth Subject Matter Requirements.	
HDE 117	Longevity	4
NUT 111AY	Introduction to Nutrition and Metabolism	3
PSC 121	Physiological Psychology	4

Social-Cultural Processes:

Choose one:

HDE 102	Social and Personality Development	4
HDE 110	Contemporary American Family	4
HDE 130	Developmental Psychopathology	4
HDE 160	Social Aspects of Aging	4

Cognitive Processes:

Choose one:

HDE 101	Cognitive Development	4
HDE 103	Cross-Cultural Study of Children	4
HDE 132	Individual Differences in Cognition	4
HDE 161	Applied Cognition and Aging	4
HDE 163	Cognitive Neuropsychology in Adulthood and Aging	4

Practicum:

Choose one:

HDE 140	Communication and Interaction with Young Children	2
AND		
HDE 140L	Laboratory in Early Childhood	3-5
HDE 141	Field Study With Children and Adolescents	4-6
HDE 142	Field Study with Emotionally Distressed Children and Adolescents	4-6

HDE 143	Field Studies of the Elderly	4-6

Restricted Electives

Choose five additional upper division courses (19-20 units) chosen from among Human Development courses or from a list of restricted electives in consultation with faculty advisor; may include only one practicum course.

Choose at least one of the courses from the Depth Subject groups or Restricted Electives listed above must focus on childhood/adolescence (HDE 101, 102, 103, 110, 130, 132) and one on adulthood/aging (HDE 117, 143, 160, 161, 163).

English Composition Requirement **Units:** 12

Choose three courses in English Composition:

ENL 003	Introduction to Literature	4
UWP 001	Expository Writing	4
UWP 018	Style in the Essay (Discontinued)	4
UWP 019	Writing Research Papers (Discontinued)	4
UWP 101	Advanced Composition	4
UWP 102A	Writing in the Disciplines: Special Topics	4
UWP 102B	Writing in the Disciplines: Biology	4
UWP 102C	Writing in the Disciplines: History	4
UWP 102D	Writing in the Disciplines: International Relations	4
UWP 102E	Writing in the Disciplines: Engineering	4
UWP 102F	Writing in the Disciplines: Food Science and Technology	4
UWP 102G	Writing in the Disciplines: Environmental Writing	4
UWP 102H	Writing in the Disciplines: Human Development and Psychology	4
UWP 102J	Writing in the Disciplines: Fine Arts	4
UWP 102K	Writing in the Disciplines: Sociology	4
UWP 102L	Writing in the Disciplines: Film Studies	4
UWP 104A	Writing in the Professions: Business Writing	4
UWP 104B	Writing in the Professions: Law	4
UWP 104C	Writing in the Professions: Journalism	4
UWP 104D	Writing in the Professions: Elementary and Secondary Education	4
UWP 104E	Writing in the Professions: Science	4
UWP 104F	Writing in the Professions: Health	4
UWP 104I	Writing in the Professions: Internships	4
CMN 001	Introduction to Public Speaking	4
COM 001	Major Books of Western Culture: The Ancient World	4
COM 002	Major Books of Western Culture: From the Middle Ages to the Enlightenment	4
COM 003	Major Books of Western Culture: The Modern Crisis	4
COM 004	Major Books of the Contemporary World	4
NAS 005	Introduction to Native American Literature	4

At least one must be from UWP 101, 102A-H, 104A-F.
The Upper Division Composition Exam does not satisfy the requirement.
Advanced Placement English score of 4 or 5 which satisfies ENL 003 and/or UWP 001 will satisfy one of the three required courses.

Total: 93-107

Human Development | HDE Minor

(College of Agricultural and Environmental Sciences)

Advising Office. 1303 Hart Hall; 530-752-2244, 530-752-1805; http://hcd.ucdavis.edu

Faculty. http://humanecology.ucdavis.edu//hdfs-faculty/

The Department of Human and Community Development offers two minors: Aging and Adult Development & Human Development.

Minor Advisor. S. Liu

Human Development **Units:** 20

HDE 100A	Infancy and Early Childhood	4
HDE 100B	Middle Childhood and Adolescence	4
HDE 100C	Adulthood and Aging	4
OR		
HDE 110	Contemporary American Family	4

Choose two:

HDE 101	Cognitive Development	4
HDE 102	Social and Personality Development	4
HDE 103	Cross-Cultural Study of Children	4
HDE 130	Developmental Psychopathology	4
HDE 132	Individual Differences in Cognition	4
HDE 161	Applied Cognition and Aging	4
HDE 163	Cognitive Neuropsychology in Adulthood and Aging	4

Total: 20

Human Development | HDE Courses

Courses in HDE:

HDE 012—Human Sexuality (3)
Lecture—3 hours. Vocabulary, structure/function of reproductive system; sexual response; pre-natal development; pregnancy and childbirth; development of sexuality; rape and sexual assault; birth control; sexually transmitted diseases; homosexuality; establishing/maintaining intimacy; sexual dysfunctions; communication; enhancing sexual interaction, cultural differences in attitudes towards sexuality. GE credit: ACGH, DD, SS. Effective: 2012 Fall Quarter.

HDE 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Field work experience or at least one course (e.g. HDE 100A, HDE 100B, HDE 140 or HDE 140L) related to fieldwork assignment. Supervised internship, off campus and on campus, in community and institutional setting. May be repeated up to 12 unit(s) involves progressively greater (supervised) participation in program delivery or assessment. (P/NP grading only.) Effective: 2012 Fall Quarter.

HDE 098—Directed Group Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2012 Fall Quarter.

HDE 099—Special Study for Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 2012 Fall Quarter.

HDE 100A—Infancy and Early Childhood (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); (BIS 002A or BIS 010 or BIS 001A or BIS 010V) or MCB 010 or NPB 010 or NPB 012 or MIC 010 Pass One restricted to Human Development majors. Biological, social, and cultural influences in the psychological growth and development of children, prenatal through age six. Two observations of preschool children required. Effective: 2018 Winter Quarter.

HDE 100B—Middle Childhood and Adolescence (4)
Lecture—4 hours. Prerequisite(s): (HDE 100A or PSC 140); (PSC 001 or PSC 001Y) Interplay of biological and social-cultural factors in the emotional, cognitive and social development from middle childhood through adolescence. Effective: 2018 Winter Quarter.

HDE 100C—Adulthood and Aging (4)
Lecture—4 hours. Prerequisite(s): PSC 001 or PSC 001Y Development during early, middle, and late adulthood; biological, cognitive, and psycho-social aspects of adult development. Emphasis on normative patterns of development which characterize "successful aging." Effective: 2018 Spring Quarter.

HDE 101—Cognitive Development (4)
Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): HDE 100A or HDE 100B or PSC 140 Pass One restricted to Human Development and Psychology majors. Theories, methods, evidence, and debates in the field of cognitive development, such as nature/nurture, constraints on learning, and the role of plasticity. Topics include attention, memory, concepts about the physical and social world, and language. (Psychology 141.) GE credit: WE. Effective: 2012 Fall Quarter.

HDE 102—Social and Personality Development (4)
Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): HDE 100A or HDE 100B or PSC 140 Pass One open to Human Development or Psychology majors. Social and personality development of children, infancy through adolescence. Topics include the development of personality, achievement motivation, self-understanding, sex-role identity, and antisocial behavior. Emphasis on the interface between biological and social factors. (Psychology 142.) GE credit: SS, WE. Effective: 2012 Fall Quarter.

HDE 103—Cross-Cultural Study of Children (4)
Lecture—4 hours. Prerequisite(s): HDE 100A or PSC 140; Consent of Instructor. Cross-cultural studies of children in developing countries and among minority groups in the U.S. GE credit: ACGH, DD, SS, WC. Effective: 2016 Fall Quarter.

HDE 110—Contemporary American Family (4)
Lecture—4 hours. Prerequisite(s): PSC 001 or PSC 001Y or SOC 001 or SOC 002 Factors currently influencing American families including changing economic conditions, changing sex roles, divorce, and parenthood; theories and research on family interaction. Effective: 2018 Winter Quarter.

HDE 117—Longevity (4)
Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): Upper division standing or consent of instructor. Nature, origin, determinants, and limits of longevity with particular reference to humans; emphasis on implications of findings from non-human model systems including natural history, ecology and evolution of life span; description of basic demographic techniques including life table methods. (Entomology 117.) GE credit: SE, SL, WE. Effective: 2012 Fall Quarter.

HDE 120—Research Methods in Human Development (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): STA 013 or STA 013V or STA 013Y or EDU 114 or PSC 041 or (SOC 046A, SOC 046B) Scientific process, research designs, and experimental controls; APA manuscript style and scientific writing; statistical analysis and interpretation of results. Laboratory exercises to collect data, analyze and interpret results, and write scientific papers. GE credit: SS, WE. Effective: 2018 Winter Quarter.

HDE 121—Psychological Assessment (4)
Lecture—4 hours. Prerequisite(s): (HDE 100A or HDE 100B); (STA 013 or STA 013Y or PSC 041 or (SOC 046A, SOC 046B)) Current issues and methodology related to the process of psychological assessment with children. Effective: 2018 Spring Quarter.

HDE 130—Developmental Psychopathology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (HDE 100A, HDE 100B) or PSC 140; Consent of Instructor. Foundational principles and current issues in developmental psychopathology, the study of mental health problems and disorders that originate in childhood and adolescence (e.g., disruptive behavior, mood and anxiety disorders). Effective: 2018 Winter Quarter.

HDE 132—Individual Differences in Cognition (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); (HDE 100A or HDE 100B) Individual differences in cognition, including learning disabilities and giftedness. Education implications and neurodevelopmental substrates of individual differences in cognition. Effective: 2018 Spring Quarter.

HDE 140—Communication and Interaction with Young Children (2)
Lecture—2 hours. Prerequisite(s): HDE 100A; HDE 140L (can be concurrent); and Consent of Instructor. HDE 140L required concurrently. Enrollment requires sign up for laboratory time at the Child and Family Studies Center located at 244 First Street, Davis, CA. Integration of research, theory and practice in child development, emphasizing the role of relationships in creating a growth-promoting environment for young children. Includes: peer relationships, emotional understanding and self regulation, attachment, communication and school readiness. Effective: 2012 Fall Quarter.

HDE 140L—Laboratory in Early Childhood (3-5)
Discussion/Laboratory—3 hours; Laboratory—6-15 hours. Prerequisite(s): HDE 140 (can be concurrent); and Consent of Instructor. HDE 140 must be taken concurrently for first 3 units of credit; students must contact the Center for Child and Family Studies to enroll. Limited enrollment. Application of theories of learning and development to interaction with infants, toddlers, and preschoolers at Early Childhood Laboratory. Applied skills in communication, guidance and curriculum. May be repeated up to 2 time(s). (P/NP grading only.) Effective: 2012 Fall Quarter.

HDE 141—Field Study With Children and Adolescents (4-6)
Fieldwork—6-12 hours; Lecture—2 hours. Prerequisite(s): HDE 100A or HDE 100B; and Consent of Instructor. Study of children's affective, cognitive and social development within the context of family/school environments, hospitals and foster group homes. May be repeated up to 12 unit(s). Effective: 2012 Fall Quarter.

HDE 142—Field Study with Emotionally Distressed Children and Adolescents (4-6)
Discussion—1.5 hours; Fieldwork—6-12 hours. Prerequisite(s): HDE 130 (can be concurrent); and Consent of Instructor. Field study with children who are identified as emotionally distressed, including those with internalizing and externalizing behavioral problems. May be repeated up to 12 unit(s). Effective: 2012 Fall Quarter.

HDE 143—Field Studies of the Elderly (4-6)
Discussion—2 hours; Fieldwork—6-12 hours; Variable. Prerequisite(s): HDE 100C or HDE 160 (can be concurrent); and Consent of Instructor. Apply theory and research on adult development and aging, work with older adults in a variety of settings, and develop skills relevant to that application. Develop a small research project. Effective: 2016 Fall Quarter.

HDE 160—Social Aspects of Aging (4)
Lecture—4 hours. Prerequisite(s): HDE 100C How the social context affects adult development and aging. Emphasis on demography, social policy, culture, and adaptation. Oral histories as class projects. Effective: 2016 Fall Quarter.

HDE 161—Applied Cognition and Aging (4)
Lecture/Discussion—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); HDE 100C Principles from cognition and aging and applies these to real-world concerns in areas including education, technology, job performance, and health. Considers physical and social changes in later life that impact functioning. GE credit: SS, WE. Effective: 2018 Spring Quarter.

HDE 163—Cognitive Neuropsychology in Adulthood and Aging (4)
Lecture/Discussion—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); HDE 100C recommended. Theories, methods, and findings concerning the relationship between cognitive processes and brain functioning. Readings, lectures, and in-class discussions cover research on normal younger and older adults, neuropsychological case studies, and selected patient groups (e.g., amnesia, schizophrenia, Alzheimer's disease). Effective: 2018 Spring Quarter.

HDE 190C—Introductory Research Conference (1)
Discussion—1 hour. Prerequisite(s): Involvement in ongoing research; consent of instructor. Instructors lead discussions with undergraduate students who involve themselves in a research project. Research papers are reviewed and
aspects of project proposals developed out of class are presented and evaluated. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 2016 Fall Quarter.

HDE 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Supervised internship off and on campus, in community, and institutional
settings. (P/NP grading only.) Effective: 2012 Fall Quarter.

HDE 198—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 2012 Fall Quarter.

HDE 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 2012 Fall Quarter.

HDE 200A—Early Development (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Graduate standing; basic biology or physiology; one upper division course in psychology or a related field; one upper division or graduate course in developmental psychology (can be concurrent). Theory and research on the biological, social, cognitive, and cultural aspects of development from conception to the age of five years. Effective: 2012 Fall Quarter.

HDE 200B—Middle Childhood and Adolescence (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Graduate standing; basic biology or physiology, and at least two upper division or graduate level courses in psychology or related fields. Theory and research on biological, cognitive, social, and cultural influences on behavioral development from age five years until late adolescence. Effective: 2012 Fall Quarter.

HDE 200C—Development in Adulthood (4)
Lecture/Discussion—4 hours. Theory and research focusing on social, personality, cognitive, and biological development from early to late adulthood. Emphasis is on theory development and continuity and change. Effective: 2016 Fall Quarter.

HDE 203—Adolescent Behavioral and Emotional Development (4)
Lecture/Discussion—4 hours. Prerequisite(s): HDE 200B Analysis of recent theories, research methods, and major findings on adolescent behavioral and emotional development, including contextual and genetic influences on adolescence, pubertal transitions, and social/family contexts and processes. Emphasis on multi-level mechanisms underlying adolescent behavioral and emotional development. Effective: 2012 Fall Quarter.

HDE 204—Developmental Neuroscience and Adolescent Psychopathology (4)
Lecture—4 hours. Prerequisite(s): Graduate standing in Human Development, Psychology, Education, Neuroscience or consent of instructor. Introduction to human developmental neuroscience. Understanding of adolescence and its characterization as a time of risky and unhealthy behavior and vulnerability to onset of mental disorder as well as issues around plasticity of the adolescent brain and prevention/intervention. Effective: 2012 Fall Quarter.

HDE 205—Path Analysis, Factor Analysis, and Structural Equation Modeling (4)
Lecture—4 hours. Prerequisite(s): PSC 204B; Or equivalent graduate courses in statistics or consent of instructor; familiarity with multiple regression and the basics of matrix algebra. Graduate standing in Human Development Graduate Group, Psychology, Sociology, Education, or a related social science. Introduction of basic concepts, principles, and applications of structural equation modeling including path analysis, confirmatory factor analysis, multiple-group modeling, and latent growth curve modeling. Effective: 2012 Fall Quarter.

HDE 207—Topics in Applied Cognitive Aging (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing in Human Development Graduate Group, Psychology, Education, or a related social science, or consent of instructor. Apply principles from cognitive aging to real-world concerns in areas such as education, technology, job performance, and health. Examine how physical and social changes occurring in later life impact functioning. Effective: 2012 Fall Quarter.

HDE 210—Theories of Behavioral Development (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): Graduate standing in behavioral sciences. Consideration of enduring issues in theories of behavioral development; analysis of adequacy of major theoretical schools (e.g., social learning, Piagetian) as scientific theories. Effective: 2012 Fall Quarter.

HDE 211—Physiological Correlates of Behavioral Development (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. An overview of mechanisms of organismic development and the implications of developmental biology for the analysis of behavioral ontogeny; consideration of parallels between processes of organismic development and behavioral development in children and infra-human mammals. Effective: 2012 Fall Quarter.

HDE 220—Research Methods in Human Growth and Development (4)
Lecture—4 hours. Prerequisite(s): STA 013 or STA 013Y; Or the equivalent and at least two upper division courses in Human Biology or Developmental Psychology. Overview of qualitative and quantitative approaches to empirical inquiry in the social sciences, with a focus on theory and research methods in biological growth and cognitive and social/emotional development from prenatal period to death. Effective: 2018 Winter Quarter.

HDE 232—Cognition and Aging (3)
Lecture/Discussion—3 hours. Prerequisite(s): HDE 200C The manner in which cognitive processes are affected by aging as well as an understanding of the changes in the central nervous system occurring with aging. Effective: 2012 Fall Quarter.

HDE 234—Children's Learning and Thinking (3)
Seminar—3 hours. Prerequisite(s): HDE 200A or PSC 212 recommended. Analysis of theories, research methods, and major findings of children's higher-order cognition, including origins of knowledge, development of problem-solving skills, reasoning strategies, and scientific concepts, with an emphasis on the underlying mechanism involved in children's thinking and learning processes. Effective: 2012 Fall Quarter.

HDE 238—The Context of Individual Development (3)
Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing in Human Development, Child Development, Education, Psychology, Anthropology, Sociology, or consent of instructor. Analysis of human development within the context of daily life. Contextualizing theories and methods of developmental psychology will be distinguished from contextual theories and methods. Developmental psychology models will be distinguished from child psychology models. Effective: 2012 Fall Quarter.

HDE 239—Developmental Trajectories in Typical and Atypical Children; Birth to Five (4)
Discussion/Laboratory—3 hours; Term Paper. Prerequisite(s): Graduate standing in Human Development, Psychology, Sociology, a related social science, or permission of the instructor. Discuss theories of development in typical and atypical children from birth to five from a socio-cultural perspective including parent-child interaction, peer interactions, cultural contexts of learning, as well as theoretical and empirical issues for understanding continuities and discontinuities in development. Effective: 2012 Fall Quarter.

HDE 240—Peer Relationships during Adolescence (4)
Lecture/Discussion—4 hours. Graduate standing in Human Development, Psychology, Education, or consent of instructor. Course examines the role of peer relationships in adolescent development including forms and functions at the individual, dyadic and group levels. Ethnicity and cross cultural research will be discussed. Emphasis on methodology, including surveys, peer nominations/sociometrics, experimental, and observational designs. Effective: 2012 Fall Quarter.

HDE 250—Current Research on Family Relationships (4)
Discussion/Laboratory—3 hours; Term Paper. Graduate standing in Human Development Graduate Group, Psychology, Sociology, a related social science, or consent of instructor. Discussion of theories, methods, and current research on the nature and development of sibling, romantic, and parent-child relationships across the lifespan. Emphasis on interpersonal and family processes examined in ethnic/cultural contexts. Implications for individual development will be addressed. Effective: 2012 Fall Quarter.

HDE 252—Family Research, Programs and Policy (4)
Seminar—3 hours; Term Paper. Graduate standing in Human Development, Psychology, Sociology, related social sciences, or consent of instructor. Course examines the competing interests of research, policy, and service on current issues of family functioning and individual well being. The course considers communication barriers between researchers, practitioners, and policy makers. Effective: 2012 Fall Quarter.

HDE 290—Seminar (3)
Seminar—3 hours. Discussion and evaluation of theories, research, and issues in human development. Different topics each quarter. Effective: 2012 Fall Quarter.

HDE 290C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Supervising instructors lead research discussions with their graduate students. Research papers are reviewed and project proposals are presented and evaluated. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 2012 Fall Quarter.

HDE 291—Research Issues in Human Development (4)
Seminar—4 hours. Prerequisite(s): Graduate Standing in the behavioral sciences. In-depth presentations of research issues in particular areas of behavioral development. May be repeated for credit. Effective: 2012 Fall Quarter.

HDE 292—Graduate Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of faculty (internship sponsor) and satisfactory completion of placement relevant course work, for example: EDU 213, EDU 216; HDE 222, HDE 242; LAW 272, LAW 273. Individually designed supervised internship, off campus, in community or institutional setting. Developed with advice of faculty mentor. May be repeated up to 12 unit(s) justifed skill acqusition and promise of informing evaluation research. (S/U grading only.) Effective: 2012 Fall Quarter.

HDE 298—Group Study (1-5)
Variable. Effective: 2012 Fall Quarter.

HDE 299—Human Development (1-12)
Variable. (S/U grading only.) Effective: 2012 Fall Quarter.

HDE 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 2012 Fall Quarter.

Human Development (Graduate Group)

Human Development (Graduate Group) | HDE Ph.D.

Amanda E. Guyer, Ph.D., Group Chairperson

Group Office. 1315 Hart Hall; 530-754-4109; http://humandevelopment.ucdavis.edu

Faculty. http://humanecology.ucdavis.edu/hdfs-faculty

Graduate Study. The interdisciplinary and interdepartmental Graduate Group in Human Development offers a program of study leading to the Ph.D. degree. The program provides lifespan study of human behavioral development, with a balance of emphasis on biological, cognitive, and

socio-emotional development in context. Recipients of the degree will be prepared to teach, to conduct research, and to be actively involved in public service in human behavioral development.

Applicants seeking admissions and fellowships consideration must submit all materials by our priority December 15 deadline. The final admissions deadline is March 1. For more details, see our website.

Graduate Advisor. Contact the Group office.

Human Development (Graduate Group) | HDE Courses

Courses in HDE:

HDE 012—Human Sexuality (3)
Lecture—3 hours. Vocabulary, structure/function of reproductive system; sexual response; pre-natal development; pregnancy and childbirth; development of sexuality; rape and sexual assault; birth control; sexually transmitted diseases; homosexuality; establishing/maintaining intimacy; sexual dysfunctions; communication; enhancing sexual interaction, cultural differences in attitudes towards sexuality. GE credit: ACGH, DD, SS. Effective: 2012 Fall Quarter.

HDE 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Field work experience or at least one course (e.g. HDE 100A, HDE 100B, HDE 140 or HDE 140L) related to fieldwork assignment. Supervised internship, off campus and on campus, in community and institutional setting. May be repeated up to 12 unit(s) involves progressively greater (supervised) participation in program delivery or assessment. (P/NP grading only.) Effective: 2012 Fall Quarter.

HDE 098—Directed Group Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2012 Fall Quarter.

HDE 099—Special Study for Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 2012 Fall Quarter.

HDE 100A—Infancy and Early Childhood (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); (BIS 002A or BIS 010 or BIS 001A or BIS 010V) or MCB 010 or NPB 010 or NPB 012 or MIC 010 Pass One restricted to Human Development majors. Biological, social, and cultural influences in the psychological growth and development of children, prenatal through age six. Two observations of preschool children required. Effective: 2018 Winter Quarter.

HDE 100B—Middle Childhood and Adolescence (4)
Lecture—4 hours. Prerequisite(s): (HDE 100A or PSC 140); (PSC 001 or PSC 001Y) Interplay of biological and social-cultural factors in the emotional, cognitive and social development from middle childhood through adolescence. Effective: 2018 Winter Quarter.

HDE 100C—Adulthood and Aging (4)
Lecture—4 hours. Prerequisite(s): PSC 001 or PSC 001Y Development during early, middle, and late adulthood; biological, cognitive, and psycho-social aspects of adult development. Emphasis on normative patterns of development which characterize "successful aging." Effective: 2018 Spring Quarter.

HDE 101—Cognitive Development (4)
Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): HDE 100A or HDE 100B or PSC 140 Pass One restricted to Human Development and Psychology majors. Theories, methods, evidence, and debates in the field of cognitive development, such as nature/nurture, constraints on learning, and the role of plasticity. Topics include attention, memory, concepts about the physical and social world, and language. (Psychology 141.) GE credit: WE. Effective: 2012 Fall Quarter.

HDE 102—Social and Personality Development (4)
Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): HDE 100A or HDE 100B or PSC 140 Pass One open to Human Development or Psychology majors. Social and personality development of children, infancy through adolescence. Topics include the development of personality, achievement motivation, self-understanding, sex-role identity, and antisocial behavior. Emphasis on the interface between biological and social factors. (Psychology 142.) GE credit: SS, WE. Effective: 2012 Fall Quarter.

HDE 103—Cross-Cultural Study of Children (4)
Lecture—4 hours. Prerequisite(s): HDE 100A or PSC 140; Consent of Instructor. Cross-cultural studies of children in developing countries and among minority groups in the U.S. GE credit: ACGH, DD, SS, WC. Effective: 2016 Fall Quarter.

HDE 110—Contemporary American Family (4)
Lecture—4 hours. Prerequisite(s): PSC 001 or PSC 001Y or SOC 001 or SOC 002 Factors currently influencing American families including changing economic conditions, changing sex roles, divorce, and parenthood; theories and research on family interaction. Effective: 2018 Winter Quarter.

HDE 117—Longevity (4)
Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): Upper division standing or consent of instructor. Nature, origin, determinants, and limits of longevity with particular reference to humans; emphasis on implications of findings from non-human model systems including natural history, ecology and evolution of life span; description of basic demographic techniques including life table methods. (Entomology 117.) GE credit: SE, SL, WE. Effective: 2012 Fall Quarter.

HDE 120—Research Methods in Human Development (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): STA 013 or STA 013V or STA 013Y or EDU 114 or PSC 041 or (SOC 046A, SOC 046B) Scientific process, research designs, and experimental controls; APA manuscript style and scientific writing; statistical analysis and interpretation of results. Laboratory exercises to collect data, analyze and interpret results, and write scientific papers. GE credit: SS, WE. Effective: 2018 Winter Quarter.

HDE 121—Psychological Assessment (4)
Lecture—4 hours. Prerequisite(s): (HDE 100A or HDE 100B); (STA 013 or STA 013Y or PSC 041 or (SOC 046A, SOC 046B)) Current issues and methodology related to the process of psychological assessment with children. Effective: 2018 Spring Quarter.

HDE 130—Developmental Psychopathology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (HDE 100A, HDE 100B) or PSC 140; Consent of Instructor. Foundational principles and current issues in developmental psychopathology, the study of mental health problems and disorders that originate in childhood and adolescence (e.g., disruptive behavior, mood and anxiety disorders). Effective: 2018 Winter Quarter.

HDE 132—Individual Differences in Cognition (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); (HDE 100A or HDE 100B) Individual differences in cognition, including learning disabilities and giftedness. Education implications and neurodevelopmental substrates of individual differences in cognition. Effective: 2018 Spring Quarter.

HDE 140—Communication and Interaction with Young Children (2)
Lecture—2 hours. Prerequisite(s): HDE 100A; HDE 140L (can be concurrent); and Consent of Instructor. HDE 140L required concurrently. Enrollment requires sign up for laboratory time at the Child and Family Studies Center located at 244 First Street, Davis, CA. Integration of research, theory and practice in child development, emphasizing the role of relationships in creating a growth-promoting environment for young children. Includes: peer relationships, emotional understanding and self regulation, attachment, communication and school readiness. Effective: 2012 Fall Quarter.

HDE 140L—Laboratory in Early Childhood (3-5)
Discussion/Laboratory—3 hours; Laboratory—6-15 hours. Prerequisite(s): HDE 140 (can be concurrent); and Consent of Instructor. HDE 140 must be taken concurrently for first 3 units of credit; students must contact the Center for Child and Family Studies to enroll. Limited enrollment. Application of theories of learning and development to interaction with infants, toddlers, and preschoolers at Early Childhood Laboratory. Applied skills in communication, guidance and curriculum. May be repeated up to 2 time(s). (P/NP grading only.) Effective: 2012 Fall Quarter.

HDE 141—Field Study With Children and Adolescents (4-6)
Fieldwork—6-12 hours; Lecture—2 hours. Prerequisite(s): HDE 100A or HDE 100B; and Consent of Instructor. Study of children's affective, cognitive and social development within the context of family/school environments, hospitals and foster group homes. May be repeated up to 12 unit(s). Effective: 2012 Fall Quarter.

HDE 142—Field Study with Emotionally Distressed Children and Adolescents (4-6)
Discussion—1.5 hours; Fieldwork—6-12 hours. Prerequisite(s): HDE 130 (can be concurrent); and Consent of Instructor. Field study with children who are identified as emotionally distressed, including those with internalizing and externalizing behavioral problems. May be repeated up to 12 unit(s). Effective: 2012 Fall Quarter.

HDE 143—Field Studies of the Elderly (4-6)
Discussion—2 hours; Fieldwork—6-12 hours; Variable. Prerequisite(s): HDE 100C or HDE 160 (can be concurrent); and Consent of Instructor. Apply theory and research on adult development and aging, work with older adults in a variety of settings, and develop skills relevant to that application. Develop a small research project. Effective: 2016 Fall Quarter.

HDE 160—Social Aspects of Aging (4)
Lecture—4 hours. Prerequisite(s): HDE 100C How the social context affects adult development and aging. Emphasis on demography, social policy, culture, and adaptation. Oral histories as class projects. Effective: 2016 Fall Quarter.

HDE 161—Applied Cognition and Aging (4)
Lecture/Discussion—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); HDE 100C Principles from cognition and aging and applies these to real-world concerns in areas including education, technology, job performance, and health. Considers physical and social changes in later life that impact functioning. GE credit: SS, WE. Effective: 2018 Spring Quarter.

HDE 163—Cognitive Neuropsychology in Adulthood and Aging (4)
Lecture/Discussion—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); HDE 100C recommended. Theories, methods, and findings concerning the relationship between cognitive processes and brain functioning. Readings, lectures, and in-class discussions cover research on normal younger and older adults, neuropsychological case studies, and selected patient groups (e.g., amnesia, schizophrenia, Alzheimer's disease). Effective: 2018 Spring Quarter.

HDE 190C—Introductory Research Conference (1)
Discussion—1 hour. Prerequisite(s): Involvement in ongoing research; consent of instructor. Instructors lead discussions with undergraduate students who involve themselves in a research project. Research papers are reviewed and
aspects of project proposals developed out of class are presented and evaluated. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 2016 Fall Quarter.

HDE 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Supervised internship off and on campus, in community, and institutional
settings. (P/NP grading only.) Effective: 2012 Fall Quarter.

HDE 198—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 2012 Fall Quarter.

HDE 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 2012 Fall Quarter.

HDE 200A—Early Development (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Graduate standing; basic biology or physiology; one upper division course in psychology or a related field; one upper division or graduate course in developmental psychology (can be concurrent). Theory and research on the biological, social, cognitive, and cultural aspects of development from conception to the age of five years. Effective: 2012 Fall Quarter.

HDE 200B—Middle Childhood and Adolescence (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Graduate standing; basic biology or physiology, and at least two upper division or graduate level courses in psychology or related fields. Theory and research on biological, cognitive, social, and cultural influences on behavioral development from age five years until late adolescence. Effective: 2012 Fall Quarter.

HDE 200C—Development in Adulthood (4)
Lecture/Discussion—4 hours. Theory and research focusing on social, personality, cognitive, and biological development from early to late adulthood. Emphasis is on theory development and continuity and change. Effective: 2016 Fall Quarter.

HDE 203—Adolescent Behavioral and Emotional Development (4)
Lecture/Discussion—4 hours. Prerequisite(s): HDE 200B Analysis of recent theories, research methods, and major findings on adolescent behavioral and emotional development, including contextual and genetic influences on adolescence, pubertal transitions, and social/family contexts and processes. Emphasis on multi-level mechanisms underlying adolescent behavioral and emotional development. Effective: 2012 Fall Quarter.

HDE 204—Developmental Neuroscience and Adolescent Psychopathology (4)
Lecture—4 hours. Prerequisite(s): Graduate standing in Human Development, Psychology, Education, Neuroscience or consent of instructor. Introduction to human developmental neuroscience. Understanding of adolescence and its characterization as a time of risky and unhealthy behavior and vulnerability to onset of mental disorder as well as issues around plasticity of the adolescent brain and prevention/intervention. Effective: 2012 Fall Quarter.

HDE 205—Path Analysis, Factor Analysis, and Structural Equation Modeling (4)
Lecture—4 hours. Prerequisite(s): PSC 204B; Or equivalent graduate courses in statistics or consent of instructor; familiarity with multiple regression and the basics of matrix algebra. Graduate standing in Human Development Graduate Group, Psychology, Sociology, Education, or a related social science. Introduction of basic concepts, principles, and applications of structural equation modeling including path analysis, confirmatory factor analysis, multiple-group modeling, and latent growth curve modeling. Effective: 2012 Fall Quarter.

HDE 207—Topics in Applied Cognitive Aging (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing in Human Development Graduate Group, Psychology, Education, or a related social science, or consent of instructor. Apply principles from cognitive aging to real-world concerns in areas such as education, technology, job performance, and health. Examine how physical and social changes occurring in later life impact functioning. Effective: 2012 Fall Quarter.

HDE 210—Theories of Behavioral Development (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): Graduate standing in behavioral sciences. Consideration of enduring issues in theories of behavioral development; analysis of adequacy of major theoretical schools (e.g., social learning, Piagetian) as scientific theories. Effective: 2012 Fall Quarter.

HDE 211—Physiological Correlates of Behavioral Development (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. An overview of mechanisms of organismic development and the implications of developmental biology for the analysis of behavioral ontogeny; consideration of parallels between processes of organismic development and behavioral development in children and infra-human mammals. Effective: 2012 Fall Quarter.

HDE 220—Research Methods in Human Growth and Development (4)
Lecture—4 hours. Prerequisite(s): STA 013 or STA 013Y; Or the equivalent and at least two upper division courses in Human Biology or Developmental Psychology. Overview of qualitative and quantitative approaches to empirical inquiry in the social sciences, with a focus on theory and research methods in biological growth and cognitive and social/emotional development from prenatal period to death. Effective: 2018 Winter Quarter.

HDE 232—Cognition and Aging (3)
Lecture/Discussion—3 hours. Prerequisite(s): HDE 200C The manner in which cognitive processes are affected by aging as well as an understanding of the changes in the central nervous system occurring with aging. Effective: 2012 Fall Quarter.

HDE 234—Children's Learning and Thinking (3)
Seminar—3 hours. Prerequisite(s): HDE 200A or PSC 212 recommended. Analysis of theories, research methods, and major findings of children's higher-order cognition, including origins of knowledge, development of problem-solving skills, reasoning strategies, and scientific concepts, with an emphasis on the underlying mechanism involved in children's thinking and learning processes. Effective: 2012 Fall Quarter.

HDE 238—The Context of Individual Development (3)
Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing in Human Development, Child Development, Education, Psychology, Anthropology, Sociology, or consent of instructor. Analysis of human development within the context of daily life. Contextualizing theories and methods of developmental psychology will be distinguished from contextual theories and methods. Developmental psychology models will be distinguished from child psychology models. Effective: 2012 Fall Quarter.

HDE 239—Developmental Trajectories in Typical and Atypical Children; Birth to Five (4)
Discussion/Laboratory—3 hours; Term Paper. Prerequisite(s): Graduate standing in Human Development, Psychology, Sociology, a related social science, or permission of the instructor. Discuss theories of development in typical and atypical children from birth to five from a socio-cultural perspective including parent-child interaction, peer interactions, cultural contexts of learning, as well as theoretical and empirical issues for understanding continuities and discontinuities in development. Effective: 2012 Fall Quarter.

HDE 240—Peer Relationships during Adolescence (4)
Lecture/Discussion—4 hours. Graduate standing in Human Development, Psychology, Education, or consent of instructor. Course examines the role of peer relationships in adolescent development including forms and functions at the individual, dyadic and group levels. Ethnicity and cross cultural research will be discussed. Emphasis on methodology, including surveys, peer nominations/sociometrics, experimental, and observational designs. Effective: 2012 Fall Quarter.

HDE 250—Current Research on Family Relationships (4)
Discussion/Laboratory—3 hours; Term Paper. Graduate standing in Human Development Graduate Group, Psychology, Sociology, a related social science, or consent of instructor. Discussion of theories, methods, and current research on the nature and development of sibling, romantic, and parent-child relationships across the lifespan. Emphasis on interpersonal and family processes examined in ethnic/cultural contexts. Implications for individual development will be addressed. Effective: 2012 Fall Quarter.

HDE 252—Family Research, Programs and Policy (4)
Seminar—3 hours; Term Paper. Graduate standing in Human Development, Psychology, Sociology, related social sciences, or consent of instructor. Course examines the competing interests of research, policy, and service on current issues of family functioning and individual well being. The course considers communication barriers between researchers, practitioners, and policy makers. Effective: 2012 Fall Quarter.

HDE 290—Seminar (3)
Seminar—3 hours. Discussion and evaluation of theories, research, and issues in human development. Different topics each quarter. Effective: 2012 Fall Quarter.

HDE 290C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Supervising instructors lead research discussions with their graduate students. Research papers are reviewed and project proposals are presented and evaluated. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 2012 Fall Quarter.

HDE 291—Research Issues in Human Development (4)
Seminar—4 hours. Prerequisite(s): Graduate Standing in the behavioral sciences. In-depth presentations of research issues in particular areas of behavioral development. May be repeated for credit. Effective: 2012 Fall Quarter.

HDE 292—Graduate Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of faculty (internship sponsor) and satisfactory completion of placement relevant course work, for example: EDU 213, EDU 216; HDE 222, HDE 242; LAW 272, LAW 273. Individually designed supervised internship, off campus, in community or institutional setting. Developed with advice of faculty mentor. May be repeated up to 12 unit(s) justifed skill acqusition and promise of informing evaluation research. (S/U grading only.) Effective: 2012 Fall Quarter.

HDE 298—Group Study (1-5)
Variable. Effective: 2012 Fall Quarter.

HDE 299—Human Development (1-12)
Variable. (S/U grading only.) Effective: 2012 Fall Quarter.

HDE 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 2012 Fall Quarter.

Human Ecology

Human Ecology | Human Ecology Information

(College of Agricultural and Environmental Sciences)

Formerly Human and Community Development

William B. Lacy, Ph.D., Chair Person of the Department

Luis E. Guarnizo, Ph.D., Community and Regional Development Program, Vice-Chairperson of the Department

Lisa Miller, Ph.D., Human Development and Family Studies Program, Vice-Chairperson of the Department

Department Advising Center. 1302 & 1303 Hart Hall; 530-752-1805; 530-752-2244; 530- 752-9322; http://hcd.ucdavis.edu

Faculty. http://humanecology.ucdavis.edu/

Major Programs & Courses. See Community & Regional Development & Human Development.

Human Physiology Minor; Neurobiology, Physiology, & Behavior

Human Physiology Minor; Neurobiology, Physiology, & Behavior | Human Physiology Minor

(College of Biological Sciences)

W. Martin Usrey, Ph.D., Chairperson of the Department

Department Office. 196 Briggs Hall; 530-752-0203; http://www.npb.ucdavis.edu

Faulty.
https://npb.ucdavis.edu/people?first=&last=&title=&unit=&field_sf_person_type_target_id[0]=26

Master Advisor. Dr. Hwai-Jong Cheng, M.D., Ph.D., Dr. Lee Miller, Ph.D.

Advising Center. Biology Academic Success Center (BASC); 1023 Sciences Laboratory Building; 530-752-0410; http://basc.ucdavis.edu/

Human Physiology **Units:** 20

EXB 101	Exercise Physiology	4
NPB 101	Systemic Physiology	5

Choose one:

EXB 102	Introduction to Motor Learning and the Psychology of Sport and Exercise	4
EXB 110	Exercise Metabolism	3
EXB 111	Environmental Effects on Physical Performance	3
EXB 116	Nutrition for Physically Active Persons	3
EXB 117	Exercise and Aging in Health and Disease	3
EXB 125	Neuromuscular and Behavioral Aspects of Motor Control	3
NPB 109	Kinesiology—Analysis and Control of Human Movement	4

Choose one:

NPB 113	Cardiovascular, Respiratory, and Renal Physiology	4
NPB 114	Gastrointestinal Physiology	3
NPB 122	Developmental Endocrinology	3
NPB 130	Physiology of the Endocrine Glands	4
NPB 132	Nature vs. Nurture: Physiological Interactions Among Genes, Nutrients and Health	3
NPB 157	Advanced Physiology of Animal/Human Disease	3
NPB 168	Neurobiology of Addictive Drugs	4

Choose one from two of the following areas:

Functional Anatomy:

CHA 101	Human Gross Anatomy	4

Genetics and Development:

ANT 153	Human Biological Variation	5
HDE 100C	Adulthood and Aging	4
HDE 101	Cognitive Development	4
HDE 117	Longevity	4
MCB 162	Human Genetics and Genomics	3

Immunology:

MMI 188	Human Immunology	3

Nutrition:

NUT 111B	Recommendations and Standards for Human Nutrition	2

Total: 20

Human Physiology Minor; Neurobiology, Physiology, & Behavior | EXB Courses

Courses in EXB:

EXB 010—Exercise and Fitness: Principles and Practice (3)
Lecture—3 hours. Human movement from physiological, psychological, sociological, and historical perspectives. Biology and psychology of exercise across the human lifespan. Not open for credit to students who have taken an upper division EXB course. GE credit: SE, SL. Effective: 2004 Winter Quarter.

EXB 090C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): EXB 099 (can be concurrent); Lower division standing in Exercise Biology or related biological science and consent of instructor; EXB 099 required concurrently. Research findings and methods in exercise biology. Presentation and discussion of research by faculty and students. May be repeated for credit. (P/NP grading only.) Effective: 2006 Fall Quarter.

EXB 090X—Lower Division Seminar (1-2)
Lecture—1-2 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Gives freshman or sophomore level students the opportunity to study a special topic in the general area of Exercise Biology in a small class setting. GE credit: SE. Effective: 1997 Winter Quarter.

EXB 092—Exercise Biology Internship (1-5)
Internship—3-15 hours. Prerequisite(s): Consent of Instructor. Enrollment dependent on availability of intern positions. Work experience in the application of physical activity programs to teaching, recreational, clinical or research situations under department faculty supervision. May be repeated up to 1 time(s). No internship units will be counted towards the Exercise Biology major. (P/NP grading only.) Effective: 2003 Spring Quarter.

EXB 097T—Tutoring in Exercise Biology (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Assisting the professor by tutoring students in exercise biology course-related projects. May be repeated up to 10 unit(s) including courses EXB 097TC, EXB 197T and EXB 197TC. No tutorial units will be counted towards the Exercise Biology major. (P/NP grading only.) Effective: 2004 Fall Quarter.

EXB 097TC—Tutoring Exercise Biology in the Community (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of instructor and chairperson. Tutoring in the community in exercise biology related projects under the guidance of the faculty. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 2003 Spring Quarter.

EXB 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of instructor and chairperson. (P/NP grading only.) Effective: 1997 Winter Quarter.

EXB 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

EXB 101—Exercise Physiology (4)
Lecture—4 hours. Prerequisite(s): NPB 101 or NPB 110C Physiologic responses to acute exercise, and physiologic adaptations to both chronic exercise (training) and selected environmental stresses. Emphasis is placed on the muscular, metabolic, cardiovascular, respiratory and renal responses and adaptations to exercise. Only 1 unit of credit allowed to students who have completed EXS 101; only 3 units of credit allowed to students who have completed EXS 102; not open for credit to students who have completed EXS 101 and EXS 102. GE credit: SE, SL. Effective: 2018 Winter Quarter.

EXB 102—Introduction to Motor Learning and the Psychology of Sport and Exercise (4)
Lecture—4 hours. Prerequisite(s): PSC 001 recommended. Theoretical and practical issues in motor learning, sport psychology, and exercise psychology are examined. Emphasis is placed on how motor skills are acquired and retained, and on the application of social psychology and human motivation studies to human performance. Only 2 units of credit allowed for students who have completed EXB 104; only 2 units of credit allowed for students who have completed EXB 105; not open for credit to students who have completed EXS 104 and EXS 105. GE credit: SS. Effective: 2002 Winter Quarter.

EXB 104L—Exercise Biology Laboratory (3)
Discussion—1 hour; Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): EXB 101 (can be concurrent); EXB 102 (can be concurrent); EXB 103 (can be concurrent); The last taken of the three courses may be taken concurrently. Principles and analytical procedures for assessing fundamental physiological, biomechanical, motor learning and motor control factors which underlie human movement and performance. Only 1 unit of credit allowed to students who have completed EXS 101L; only 1 unit of credit allowed to students who have completed EXS 103; not open for credit to students who have completed EXS 101L and EXS 103. (Former EXS 101L and EXS 103.). GE credit: SE, WE. Effective: 2004 Winter Quarter.

EXB 106—Human Gross Anatomy (4)
Lecture—4 hours. Prerequisite(s): BIS 002A; Concurrent enrollment in EXB 106L or CHA 101L strongly recommended. Upper division students only; Pass One open to upper division Exercise Biology or Anthropology majors only; Pass Two open to Seniors in any major; open enrollment at the start of the quarter for upper division students in any major. Detailed study of the gross anatomical structure of the human body, with emphasis on function and clinical relevance to students entering health care professions. (CHA 101.) GE credit: SE. Effective: 2010 Fall Quarter.

EXB 106L—Human Gross Anatomy Laboratory (3)
Laboratory—9 hours. Prerequisite(s): BIS 002A; EXB 106 (can be concurrent) or CHA 101 (can be concurrent); Must have completed EXB 106 or CHA 101 or required concurrently. Upper division students only; Pass One open to upper division Exercise Biology or Anthropology majors only; Pass Two open to Seniors in any major; open enrollment at the start of the quarter for upper division students in any major; mandatory attendance on first day of lab. Detailed study of prosected human cadavers in small group format with extensive hands-on experience. (CHA 101L.) GE credit: SE. Effective: 2010 Fall Quarter.

EXB 110—Exercise Metabolism (3)
Lecture—3 hours. Prerequisite(s): EXB 101 or NPB 101 or NPB 110C Exercise metabolism, with emphasis on skeletal muscle and cardiac muscle metabolism during activity and inactivity. Basics of bioenergetics, substrate utilization, and cell signaling; mechanisms that regulate these properties, and differences between skeletal muscle and cardiac muscle metabolism. GE credit: SE. Effective: 2018 Winter Quarter.

EXB 111—Environmental Effects on Physical Performance (3)
Discussion/Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): EXB 101; or Consent of Instructor. The effects of thermal, barometric and gravitational conditions on physiological function and physical performance of humans. Acute and chronic effects, emphasizing physiological adaptations and limitations, will be studied. GE credit: QL, SE. Effective: 2007 Winter Quarter.

EXB 112—Clinical Exercise Physiology (4)
Discussion/Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EXB 101; or Consent of Instructor. Physical activity as a therapeutic modality in normal and diseased populations (cardiovascular, pulmonary, diabetic). Effects of exercise and inactivity in terms of normal physiology, pathophysiology, and therapeutic benefit. Exercise fitness and disease assessment methods. GE credit: SE, SL. Effective: 2009 Spring Quarter.

EXB 115—Biomechanical Bases of Movement (3)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): EXB 103; or Consent of Instructor. Biomechanical bases of human movement investigated; topics include musculo-skeletal mechanics, tissue mechanics, electromyography,
and measurement and analysis techniques. Application made to sport, clinical, and work environments, including extensive analysis of
locomotion. GE credit: QL, SE, VL, WE. Effective: 1997 Winter Quarter.

EXB 116—Nutrition for Physically Active Persons (3)
Lecture—3 hours. Prerequisite(s): EXB 101; NPB 101 The role of nutrition and exercise in modifying metabolism, body composition, performance and health of humans. GE credit: SE. Effective: 1997 Winter Quarter.

EXB 117—Exercise and Aging in Health and Disease (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): EXB 101 or EXB 113 (can be concurrent) Etiology of and standard therapy for various diseases associated with aging (e.g., cardiovascular, pulmonary, and renal diseases, diabetes, obesity, lipemias, etc.). Exercise will then be considered as a protective and/or therapeutic modality. GE credit: SE. Effective: 2007 Spring Quarter.

EXB 120—Sport in American Society (3)
Lecture—3 hours. Sociological approaches to the study of sport and contemporary American culture, including sport interaction with politics, economics, religion, gender, race, media and ethics. Socialization factors involving youth, scholastic, collegiate, and Olympic sport. (PHE 120.) GE credit: SS. Effective: 2009 Summer Session 1.

EXB 121—Advanced Sport Psychology (3)
Lecture—3 hours. Prerequisite(s): EXB 102; PSC 001 recommended. Advanced study and consideration of major theoretical and practical issues in sport psychology. Emphasis on practical application to sport and human performance. Effective: 2010 Winter Quarter.

EXB 122—Psychological Effects of Physical Activity (3)
Lecture—3 hours. Prerequisite(s): PSC 001 or PSC 001Y Upper division standing. Physical activity is evaluated in terms of its ability to enhance the quality of life. Topics studied include: individual factors (self concept, type A); special populations (elderly, cardiovascular); and mental health changes (depression, anxiety). Effective: 2018 Spring Quarter.

EXB 124—Physiology of Maximal Human Performance (4)
Lecture—3 hours; Practice—4 hours. Prerequisite(s): EXB 101; or Consent of Instructor. BIS 101, BIS 102, and BIS 103 recommended. Molecular mechanisms underlying adaptation to training. Learn how to exercise to maximize their own performance as well as learning how the frequency, intensity and timing of exercise and nutrition affect the molecular signals that underlie performance. GE credit: SE. Effective: 2011 Winter Quarter.

EXB 125—Neuromuscular and Behavioral Aspects of Motor Control (3)
Discussion/Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): EXB 101 Factors which affect control of movement from neuropsychological, physiological, behavioral, and mechanical viewpoints. Topics include central vs. peripheral control mechanisms, open and closed loop theories, motor programming, cognitive learning strategies, and the effects of biochemical and biomechanical influences. GE credit: SE. Effective: 2006 Fall Quarter.

EXB 148—Theory and Practice of Exercise Testing (1)
Lecture/Discussion—1 hour. Prerequisite(s): EXB 112 (can be concurrent) Theory and practice of exercise testing applied to older adult populations. Physiological responses to and limitations of exercise testing. Application of exercise testing and training to healthy and diseased populations. (P/NP grading only.) GE credit: SE. Effective: 2006 Fall Quarter.

EXB 148L—Adult Fitness Testing Laboratory (1)
Laboratory—3 hours. Prerequisite(s): EXB 148 (can be concurrent); EXB 148 required concurrently. Testing symptomatic and asymptomatic older adults for functional aerobic capacity, body composition, blood lipids, pulmonary function, and cardiovascular disease risk. Counseling adults in appropriate exercise programs and lifestyle modifications. Two quarters minimum; third quarter permitted. (Former course Physical Education 148L). May be repeated up to 2 time(s). (P/NP grading only.) GE credit: QL, SE. Effective: 2006 Fall Quarter.

EXB 179—Frontiers in Exercise Biology (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): EXB 101; EXB 102; EXB 103 (can be concurrent); EXB 104L recommended. Lectures by leading authorities and discussion of the latest research in newly emerging areas in exercise biology. Offered every fourth year. GE credit: SE. Effective: 2007 Spring Quarter.

EXB 189—International Perspectives in Exercise Biology (4)
Lecture—4 hours. Prerequisite(s): EXB 010; Or upper division standing in Exercise Biology; consent of instructor: students will be accepted based upon academic merit, personal experience, and academic discipline in order to provide multidisciplinary perspectives. Restricted to 22 students. Compare and contrast exercise science issues between the US and an international location. Identify political, economic, cultural, technological and environmental issues that impact human exercise, physical activity, wellness, and sport from a global perspective. Effective: 2009 Summer Session 1.

EXB 190C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): EXB 099 (can be concurrent); Upper division standing in Exercise Biology or related biological science and consent of instructor; EXB 199 required concurrently. Restricted to upper division students. Research findings and methods in exercise biology. Presentation and discussion of research by faculty and students. May be repeated for credit. (P/NP grading only.) Effective: 2006 Fall Quarter.

EXB 192—Exercise Biology Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Enrollment dependent on availability of intern positions. Work experience in the application of physical activity programs to teaching, recreational, clinical or research situations under program faculty supervision. Written report required. May be repeated up to 15 unit(s) including course 92. (P/NP grading only.) Effective: 2003 Spring Quarter.

EXB 194H—Research Honors (2)
Independent Study—6 hours. Prerequisite(s): Senior standing, minimum of 6 units of EXB 199, 3.50 GPA or greater in major courses, consent of honors thesis advisor. Completion of individual honors research project in Exercise Biology, under the guidance of an Exercise Biology faculty advisor, culminating in written honors thesis. (P/NP grading only.) GE credit: SE. Effective: 2004 Fall Quarter.

EXB 197T—Tutoring in Exercise Biology (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Assisting the instructor by tutoring students in exercise biology course-related projects. May be repeated up to 10 unit(s) including courses EXB 097T, EXB 097TC and EXB 197TC. No tutorial units will be counted towards the Exercise Biology major. (P/NP grading only.) Effective: 2004 Fall Quarter.

EXB 197TC—Tutoring Exercise Biology in the Community (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of instructor and chairperson. Tutoring in the community in exercise biology related projects under the guidance of the faculty. May be repeated up to 10 unit(s) including courses 97T, 97TC and 197T. (P/NP grading only.) Effective: 2003 Spring Quarter.

EXB 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of instructor and chairperson. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

EXB 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of chairperson. (P/NP grading only.) Effective: 1997 Winter Quarter.

Human Physiology Minor; Neurobiology, Physiology, & Behavior | NPB Courses

Courses in NPB:

NPB 010—Elementary Human Physiology (3)
Lecture—3 hours. Introduction to physiology for non-science majors. Includes basic cell physiology and survey of major organ systems and how they function in homeostasis and human health. Not open for credit to students who have completed NPB 101. GE credit: SE. Effective: 2016 Winter Quarter.

NPB 012—The Human Brain and Disease (3)
Lecture—3 hours. Normal function and diseases of the human brain and nervous system. Diseases discussed include Parkinson's, Alzheimer's, leprosy, amnesia and schizophrenia. Intended for non-science majors. Not open for credit for students who have completed NPB 100, NPB 101, NPB 112, or PSC 121. GE credit: SL. Effective: 1997 Spring Quarter.

NPB 014—Illusions: Fooling the Brain (3)
Lecture—3 hours. Introduction to perceptual processing in the human nervous system; illusions. GE credit: QL, SE, SL. Effective: 2012 Winter Quarter.

NPB 015—The Biology and Physiology of Aging (4)
Discussion—1 hour; Lecture—3 hours. Broad examination of age-associated changes in body functions. Includes basic cell physiology, a survey of major organ systems and the age-induced alterations in system function. Some age-associated diseases will also be examined. Intended for non-science majors. Not open for credit to students who have completed NPB 15V. GE credit: SE. Effective: 2012 Fall Quarter.

NPB 015V—The Biology and Physiology of Aging (4)
Web Electronic Discussion—1 hour; Web Virtual Lecture—3 hours. Broad examination of the biological and physiological basis of aging in animals and plants. Concepts in demographic, evolutionary, genetic, and cell aging. Major human organ systems, age-related alterations in system function, and age-related diseases. Intended for non-science majors. Not open for credit to students who have completed NPB 15. GE credit: SE, SL. Effective: 2012 Fall Quarter.

NPB 017—The Path to Cyborgs: Introduction to Prostheses and Human Machine Interfaces (3)
Lecture—3 hours. Interface of biology and technology. Mind-controlled prosthetic limbs, artificial organs, and implantable devices. Emphasis on basic physiological functions and how they can be replaced by devices. Suitable for majors and non-majors. GE credit: SE, SL. Effective: 2016 Winter Quarter.

NPB 018—Biological Science for Social Justice (3)
Lecture—3 hours. Broad survey of the many ways one can use the biological sciences to better the lives of others and break down barriers that have restricted social mobility. GE credit: DD, SE, SL, SS. Effective: 2018 Spring Quarter.

NPB 068—Biology of Drug Addiction and Abuse (3)
Lecture—3 hours. Broad examination of addictive substances and their use/abuse. Topics include historical perspective, physiological effects, etiology, neurobiology of addiction and the impact of drugs on contemporary society. Intended for non-science majors. Not open for credit to students having completed NPB 168. Effective: 2008 Spring Quarter.

NPB 090A—Lower Division Seminar: Issues in Body Weight Regulation (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Limited enrollment. Critical examination of issues in body weight regulation through shared readings, discussions, written assignments, debates and oral presentations. Limited enrollment. Effective: 2000 Winter Quarter.

NPB 090B—Human Color Perception (2)
Seminar—2 hours; Term Paper. Prerequisite(s): Lower division standing. Class size limited to 15 students with lower division standing. Neural determinants of color appearance, and why we see the world in the way we do. Discussions center around demonstrations of color phenomena and what they tell us about the human brain. Effective: 2008 Spring Quarter.

NPB 090C—Current Issues in Animal Behavior (2)
Seminar—2 hours. Prerequisite(s): Lower division standing. Limited enrollment. The mechanisms and outcomes of sexual selection (mate choice and mate competition). Theory, current models and evidence that supports or refutes the models. Effective: 2003 Winter Quarter.

NPB 090D—Lower Division Seminar: Current Issues in Reproductive Endocrinology (2)
Seminar—2 hours. Prerequisite(s): Lower division standing. The integrative roles of reproductive hormones in mammalian reproduction and health. Current theory and models regarding hormone function and use in reproductive health and contraception, and evidence that supports or refutes the models. Effective: 2002 Fall Quarter.

NPB 090E—Biology of Aging (2)
Seminar—2 hours. Prerequisite(s): Freshman standing. Current theories on the biology of aging covering genetic, biochemical, and physiological aspects. Emphasis on critical evaluation of controversial and contemporary issues. Effective: 2003 Fall Quarter.

NPB 090F—Visual Impairment and Blindness: A World Wide Problem (2)
Seminar—2 hours. Prerequisite(s): Lower division standing. Examination of various abnormalities of the eye and the important geographic and cultural factors that influence the epidemiology of those abnormalities. Effective: 2007 Winter Quarter.

NPB 091C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): NPB 099 (can be concurrent); and Consent of Instructor. Lower division standing in Neurobiology, Physiology and Behavior or related biological science; NPB 099 required concurrently. Restricted to lower division students. Research findings and methods in neurobiology, physiology, and/or behavior. Presentation and discussion of research by faculty and students. May be repeated for credit. (P/NP grading only.) Effective: 2003 Fall Quarter.

NPB 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Work experience off and on campus in all subject areas offered in the
Department of Neurobiology, Physiology, and Behavior. Internships supervised by a member of the faculty. May be repeated for credit. (P/NP grading only.) Effective: 2008 Fall Quarter.

NPB 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) Effective: 2000 Winter Quarter.

NPB 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) Effective: 1999 Winter Quarter.

NPB 100—Neurobiology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 002A; PHY 009A, PHY 009B or PHY 007A, PHY 007B recommended. Brains and nervous systems, neurons and neural circuits. Coordination of movement. Development of nervous systems. Vision, hearing, and feature extraction by the central nervous system. The cell biology of learning and memory. Perception, cognition, and disorders of the brain. Not open for credit to students who have completed NPB 110B, NPB 112, NPB 160, NPB 161 or NPB 162, or NSC 221 or NSC 222. GE credit: QL, SE. Effective: 2018 Spring Quarter.

NPB 100L—Neurobiology Laboratory (3)
Extensive Writing/Discussion; Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): NPB 100 (can be concurrent) or NPB 110B (can be concurrent) Experimental basis of neurobiology principles discussed in course 100. Topics include neurophysiology, sensory systems, motor systems, cellular neuroscience, cognitive neuroscience, and quantitative data analysis and modeling techniques. GE credit: SE. Effective: 2017 Winter Quarter.

NPB 100Q—Quantitative Foundations of Neurobiology (1)
Auto Tutorial—1.5 hours; Extensive Problem Solving—1.5 hours. Prerequisite(s): NPB 100 (can be concurrent) Computational methods and mathematical models used to study phenomena in neurobiology. GE credit: QL, VL. Effective: 2010 Spring Quarter.

NPB 101—Systemic Physiology (5)
Lecture—5 hours. Prerequisite(s): BIS 001A or BIS 002A; CHE 002B; PHY 001B or PHY 007C strongly recommended. Systemic physiology with emphasis on aspects of human physiology. Functions of major organ systems, with the structure of those systems described as a basis for understanding the functions. Not open for credit to students who have completed NSC 110C. GE credit: SE. Effective: 2017 Winter Quarter.

NPB 101D—Systemic Physiology Discussion (1.5)
Discussion—1.5 hours. Prerequisite(s): NPB 101 (can be concurrent); Consent of Instructor. Discussion and problem solving related to fundamental principles of systemic physiology as presented in course 101. (P/NP grading only.) Effective: 2017 Spring Quarter.

NPB 101L—Systemic Physiology Laboratory (3)
Discussion—2 hours; Laboratory—3 hours; Term Paper. Prerequisite(s): NPB 101 or NPB 110C Selected experiments to illustrate functional characteristics of organ systems discussed in course 101. Effective: 2017 Winter Quarter.

NPB 102—Animal Behavior (3)
Lecture—3 hours. Prerequisite(s): (BIS 001A, BIS 001B, BIS 001C) or (BIS 002A, BIS 002B, BIS 002C) Basic principles of behavioral organization in vertebrate and invertebrate animals. Underlying physiological and ethological mechanisms. The evolution of behavior, with special emphasis on behavior under natural conditions. Not open for credit to students who have completed NPB 155. (Former NPB 155.). GE credit: SL. Effective: 2008 Fall Quarter.

NPB 102Q—Quantitative Topics in Animal Behavior (1)
Auto Tutorial—1.5 hours; Extensive Problem Solving—1.5 hours. Prerequisite(s): MAT 016B; NPB 102 (can be concurrent) Study of the quantitative concepts and exemplar models used in animal behavior. Effective: 2009 Spring Quarter.

NPB 103—Cellular Physiology/Neurobiology (3)
Lecture—3 hours. Prerequisite(s): (BIS 103 or BIS 105); BIS 104; PHY 007C recommended. Cellular physiology with emphasis on membrane transport processes and neuronal physiology. Fundamental physical-chemical and biological mechanisms of membrane transport will be considered in relation to
cytoplasmic homeostasis, communication between cells,and the cellular mechanisms of sensory and motor transduction. Not open for credit to students who have completed NPB 100B. (Former NPB 100B.). Effective: 2008 Spring Quarter.

NPB 104L—Cellular Physiology/Neurobiology Laboratory (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—1 hour; Term Paper/Discussion. Prerequisite(s): NPB 101L; (BIS 103 or BIS 105) Experiments in the physical and chemical processes of cells and tissues. Effective: 2018 Winter Quarter.

NPB 105—Introduction to Computer Models (4)
Lecture—3 hours; Lecture/Lab—1 hour. Prerequisite(s): CHE 002C; PHY 007C; (NPB 100 or NPB 101); MAT 016C; Or the equivalent to MAT 016C. Introduction to the ideas, mathematical techniques and computer tools required for developing models of cellular processes in physiology and neurobiology. Applications include membrane transport, ionic channels, action potentials, Ca2+ oscillations, respiration, and muscle contraction. Effective: 1997 Winter Quarter.

NPB 106—Experiments in Neurobiology, Physiology, and Behavior: Design and Execution (3)
Discussion—0.5 hours; Laboratory—7.5 hours. Prerequisite(s): (NPB 110A or NPB 100 or NPB 101 or NPB 102); NPB 199; and Consent of Instructor. Design and execution of experiments in neurobiology, physiology, and/or behavior. Students choose and design a project in consultation with the sponsoring faculty member. May be repeated once for credit to complete the project, with consent of instructor. May be repeated up to 1 time(s). (P/NP grading only.) GE credit: OL, QL, VL, WE. Effective: 2018 Winter Quarter.

NPB 107—Cell Signaling in Health and Disease (3)
Lecture—3 hours. Prerequisite(s): BIS 102 or BIS 105 Basics of cell signaling pathways, their disruption in disease, and their current utility and future potential as therapeutic targets. Focus is on signaling pathways specific to nervous, endocrine and immune systems, and those fundamental to all cells. GE credit: SL. Effective: 2009 Winter Quarter.

NPB 108Y—Animal Behavior Laboratory (3)
Lecture—3 hours; Web Electronic Discussion—12 hours. Hybrid course, consisting of limited in-person lectures and the rest laboratory exercises. The laboratory exercises will be online, and will require students to view and score videos of animal behavior in order to test behavioral hypotheses. Effective: 2016 Summer Session 2.

NPB 109—Kinesiology—Analysis and Control of Human Movement (4)
Lecture—4 hours. Prerequisite(s): PHY 007A; PHY 007B; NPB 101 or NPB 110C recommended; CHA 101 and CHA 101L (same as EXB 106 and EXB 106L) or equivalent recommended. Functional anatomy, motor control, and biomechanics of human movement understood in the context of body structures, basic principles of physics, and functional characteristics of muscle. GE credit: SE. Effective: 2018 Spring Quarter.

NPB 110A—Foundations 1: From Molecules to Individuals (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): (BIS 002A, BIS 002B); (CHE 002B or CHE 003A); PHY 007A and PHY 007B recommended; BIS 002C recommended. Pass One restricted to majors in Neurobiology, Physiology and Behavior. Major concepts in cell biology with special emphasis on connections between cell biology and behavior. Includes: cellular metabolism, cellular sensing and signaling, membrane structure-function, molecular switches, electrical and chemical signaling, endocrine signaling, cell cycle and differentiation, cytoskeleton, and integrative examples. Credit limited to 3 units for students who have taken BIS 104. GE credit: SE. Effective: 2018 Winter Quarter.

NPB 110B—Foundations 2: Neurobiology (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): NPB 110A C- or better; PHY 007A and PHY 007B recommended. Open to declared NPB majors only. Core concepts of neurobiology including single-neuron biophysics, synapses and transmitters, neuronal development, motor systems, central pattern generation, neuronal circuits, intracellular signal transduction, sensory processing, multisensory integration, autonomic nervous system, neuromodulation, learning and memory, and higher cognition and disease. Credit limited to 2 units for students who have taken NPB 100. GE credit: SE. Effective: 2017 Winter Quarter.

NPB 110C—Foundations 3: Physiology (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): NPB 110A C- or better; PHY 007A; PHY 007B and PHY 007C recommended. Open to declared NPB majors only. Focuses on the structure, function, and interactions of animal organ systems in homeostasis and reproduction, and the response to perturbations of homeostasis; neural and endocrine signaling; skeletal muscle and movement; cardiovascular and respiratory systems; renal, digestive, immune, and reproductive physiology. Credit limited to 2 units for students who have taken NPB 101. GE credit: SE. Effective: 2018 Winter Quarter.

NPB 111L—Advanced Systemic Physiology Laboratory (4)
Discussion—2 hours; Laboratory—6 hours; Lecture—1 hour; Term Paper. Prerequisite(s): NPB 101L Selected comprehensive experiments in the autonomic nervous system and the cardiovascular, respiratory, and neuromuscular systems. Emphasis on conceptual and methodological approaches in demonstrating the physiology of organ systems. Effective: 2018 Winter Quarter.

NPB 113—Cardiovascular, Respiratory, and Renal Physiology (4)
Lecture—4 hours. Prerequisite(s): (NPB 110C or NPB 101); CHE 008B, PHY 007B and PHY 007C recommended. An intense and advanced presentation of concepts in cardiovascular, respiratory, and renal physiology including discussion of acid-base balance. Effective: 2018 Winter Quarter.

NPB 114—Gastrointestinal Physiology (3)
Lecture—3 hours. Prerequisite(s): (NPB 110C or NPB 101); BIS 105 or BIS 103 recommended, BIS 105 preferred. Gastrointestinal anatomy and physiology. Digestion, secretion, absorption, motility, comparative physiology and pathology. Strong emphasis on neural and hormonal regulation and on cellular mechanisms of secretion and absorption. Effective: 2018 Winter Quarter.

NPB 117—Avian Physiology (3)
Lecture—3 hours. Prerequisite(s): (BIS 002A, BIS 002B); CHE 002B; NPB 101 or NPB 110C strongly recommended. Physiology of the various systems of birds with emphasis on digestion, respiration, excretion, and endocrine systems. Effective: 2018 Spring Quarter.

NPB 121—Physiology of Reproduction (4)
Lecture/Discussion—4 hours. Prerequisite(s): NPB 101 or NPB 110C or ANS 100 Physiological mechanisms related to reproduction, breeding efficiency and fertility, with special reference to domestic animals. GE credit: QL, SL. Effective: 2018 Spring Quarter.

NPB 121L—Physiology of Reproduction Laboratory (1)
Laboratory—3 hours. Prerequisite(s): NPB 121 (can be concurrent) Experiments on the reproductive systems of domestic animals including male and female gametes. (P/NP grading only.) Effective: 2017 Spring Quarter.

NPB 122—Developmental Endocrinology (3)
Lecture—3 hours. Prerequisite(s): NPB 101 Restricted to upper division standing. Hormonal control of development, maturation and senescence from the cellular to organismal level, with emphasis on the human. Prenatal and neonatal life, childhood and adolescence, adulthood and pregnancy, as well as the endocrinology of aging. Effective: 2003 Spring Quarter.

NPB 123—Comparative Vertebrate Organology (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (BIS 001A, BIS 001B) or (BIS 002A, BIS 002B) Functional anatomy of major organ systems in vertebrates. Each system examined from cellular to gross level in fish, birds, and mammals. Emphasis on how differentiated cell types are integrated into tissues and organs to perform diverse physiological functions. (Anatomy, Physiology and cell Biology 100.) Effective: 2008 Winter Quarter.

NPB 124—Comparative Neuroanatomy (4) ***Review all entries***
Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): PSC 101 or NPB 100 or NPB 101 Overview of the neuroanatomy of the nervous system in a variety of mammalian and non-mammalian vertebrates. Examine changes or modifications to neural structures as a result of morphological or behavioral specializations. (Psychology 124) GE credit: SL. Effective: 1997 Fall Quarter.

NPB 124—Comparative Neuroanatomy (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): NPB 101 or NPB 100 or NPB 110B or PSC 121 Overview of the neuroanatomy in mammalian vertebrates, focusing on the cerebral cortex and experimental techniques. Examine changes or modifications to neural structures as a result of morphological or behavioral specializations. (PSC 124.) Effective: 2018 Fall Quarter.

NPB 124L—Comparative Neuroanatomy Laboratory (2)
Laboratory—6 hours. Prerequisite(s): NPB 124 (can be concurrent) Pass One restricted to PSC and NPB majors; must be concurrently enrolled in NPB 124. Comparative neuroanatomy laboratory illustrating modern neuroanatomical techniques in determining neural connections within the mammalian brain. Includes experimentation and presentation of results. (PSC 124L.) Effective: 2018 Fall Quarter.

NPB 126—Comparative Physiology: Sensory Systems (3)
Lecture—3 hours. Prerequisite(s): NPB 100 or NPB 101 Basic physiological mechanisms involved in sensory systems. Comparative approach to considerations of mechanosensitive systems (audition, lateral lines, touch, echolocation, equilibrium), chemosensitive systems (olfaction, taste, pheromones), photosensitive systems (vision, infrared detection, UV detection), electroreception, and pain. Emphasis on receptors. Effective: 1997 Winter Quarter.

NPB 128—Comparative Physiology: Endrocrinology (3)
Lecture—3 hours. Prerequisite(s): NPB 101 Comparison of physiological functions in the animal kingdom: animal hormones and their functions. Effective: 1997 Winter Quarter.

NPB 130—Physiology of the Endocrine Glands (4)
Lecture—4 hours. Prerequisite(s): NPB 110C or NPB 101 Advanced presentation of concepts in endocrinology with emphasis on the role of hormones in reproduction, metabolism, and disease. GE credit: VL. Effective: 2018 Winter Quarter.

NPB 132—Nature vs. Nurture: Physiological Interactions Among Genes, Nutrients and Health (3)
Lecture—3 hours. Prerequisite(s): BIS 001A or BIS 002A; or Consent of Instructor. Biochemical, physiological, genetic, and nutritional causes of important medical problems such as obesity, anorexia, heart disease and diabetes. One unit of credit allowed to students who have completed NPB 131. Effective: 2008 Fall Quarter.

NPB 134—General Immunology for Physiologists (3)
Lecture—2 hours; Lecture/Discussion—1 hour. Prerequisite(s): NPB 101 C- or better or NPB 110C C- or better; or Consent of Instructor. Immunology for undergrads interested in physiology aimed at understanding the physiological role of immune responses. Illustrated with examples of human diseases including diabetes, allergies and asthma, and emerging diseases such as Ebola and Zika. GE credit: SE. Effective: 2017 Fall Quarter.

NPB 139—Frontiers in Physiology (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): NPB 100; NPB 101; NPB 102 (can be concurrent) Lectures by leading authorities and discussion of the latest research in newly emerging areas in physiology. Offered every fourth year. GE credit: QL, SE. Effective: 2010 Fall Quarter.

NPB 140—Principles of Environmental Physiology (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): NPB 101; BIS 102 recommended. Physiological aspects of interactions of organisms and environmental,
cellular, system, and organismal levels. Emphasis on regulatory responses/mechanisms to thermal, pressure, gravity and light environmental variables. Not open for credit to students who have completed course 148. (Former course 148.). GE credit: WE. Effective: 1997 Winter Quarter.

NPB 140—Principles of Environmental Physiology (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): NPB 101 or NPB 110C; BIS 102 recommended. Physiological aspects of interactions of organisms and environmental, cellular, system, and organismal levels. Emphasis on regulatory responses/mechanisms to thermal, pressure, gravity and light environmental variables. Not open for credit to students who have completed NPB 148. (Former NPB 148.). GE credit: WE. Effective: 2018 Fall Quarter.

NPB 141—Physiological Adaptation of Marine Organisms (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Upper division standing; residence at Bodega Marine Laboratory required. Students must submit application available at http://www.bml.ucdavis.edu. Physiological adaptation to the environment among organisms in marine and estuarine habitats. GE credit: QL, VL, WE. Effective: 2006 Summer Session 1.

NPB 141P—Physiological Adaptation of Marine Organisms/Advanced Laboratory Topics (5)
Discussion—1 hour; Laboratory—12 hours. Prerequisite(s): NPB 141 (can be concurrent); Residence at Bodega Marine Laboratory required; NPB 141 required concurrently. Students must submit application available at http://www.bml.ucdavis.edu. Training in scientific research from hypothesis to publication, including methods of library research. Research related to a topic covered in course 141. GE credit: VL, WE. Effective: 2006 Spring Quarter.

NPB 142—Environmental Endocrinology: Mechanisms for Life Cycles (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B; BIS 002C Effects of environmental factors on endocrine responses that affect vertebrate life history and fitness. Introduction to finite state machine theory and allostasis in life histories and coping strategies. Focus on life history stages including non-breeding, hibernation, reproduction, migration and moult. GE credit: SE, WE. Effective: 2015 Winter Quarter.

NPB 150—Advanced Animal Behavior (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): NPB 102 or PSC 101; or Consent of Instructor. Advanced integrative survey of biological principles of behavioral organization, emphasizing historical roots, current research directions, conceptual issues and controversies. Laboratory exercises on the description and analysis of the behavior of captive and free-living animals. (Psychology 122) Effective: 2018 Winter Quarter.

NPB 152—Hormones and Behavior (3)
Lecture—3 hours. Prerequisite(s): (NPB 101 or NPB 110C); (NPB 102 or PSC 101) Endocrine physiology with an emphasis on the principles of behavior. Fundamental relationships between hormones and various behaviors engaged in by the organism during its lifetime. Role of hormones in behavioral homeostasis, social behavior, reproductive behavior, parental behavior, adaptation to stress. (Psychology 123) Effective: 2018 Winter Quarter.

NPB 157—Advanced Physiology of Animal/Human Disease (3)
Lecture—1 hour; Lecture/Discussion—2 hours. Prerequisite(s): NPB 101 B+ or better or NPB 110C B+ or better; Consent of Instructor. Limited to 35 students initially. Centers on fundamental mechanisms and pathophysiological basis for animal and human diseases. Course is case-based and uses animal and human diseases to help exemplify the physiological consequences of organ dysfunction. (HPH 157.
) Effective: 2017 Spring Quarter.

NPB 159—Frontiers in Behavior (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): NPB 100; NPB 101; NPB 102 Lectures by leading authorities and discussion of the latest research in newly emerging areas in behavioral biology. Offered every fourth year. GE credit: QL, SE. Effective: 2010 Fall Quarter.

NPB 161—Developmental Neurobiology (3)
Lecture—3 hours. Prerequisite(s): NPB 100 or NPB 101 or NPB 110B Issues, theoretical concepts, and methodologies in developmental neurobiology. Topics include prenatal and postnatal differentiation of neurons, and plasticity in the mature and aging brain. Integration of neurochemical, structural, physiological and behavioral perspectives. GE credit: SE. Effective: 2018 Winter Quarter.

NPB 162—Neural Mechanisms of Behavior (3)
Lecture—3 hours. Prerequisite(s): NPB 100 or NPB 101 or NPB 110B Relationship between brain and behavior. Identification and analysis of the relevant neural circuits involved. Examples of systems to be considered are birdsong, locomotion, echolocation. Effective: 2018 Winter Quarter.

NPB 163—Systems Neuroscience (4)
Lecture—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): NPB 100 or NPB 110B; Or equivalent basic neuroscience training with consent of instructor. Concepts and techniques in systems neuroscience: e.g., measuring and manipulating neural activity, structure of neocortex, sensory processing, motor control, storage of information, neural codes, neural mechanisms underlying cognitive functions. GE credit: SE. Effective: 2017 Spring Quarter.

NPB 164—Mammalian Vision (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): NPB 100 or NPB 110B or PSC 101 Structure and function of the mammalian visual system, from the formation of images on the retina through visually guided behavior and perception. Emphasis on biological mechanisms underlying vision. Effective: 2017 Spring Quarter.

NPB 165—Neurobiology of Speech Perception (3)
Lecture—3 hours. Prerequisite(s): NPB 110B or NPB 100 or NPB 101; or Consent of Instructor. Interdisciplinary approach to speech perception with emphasis on functional neuroanatomy and behavior. Topics include auditory processing in time and space, intelligibility in noisy environments, visual speech, evolution of vocal communication, models of speech perception, development, and hearing impairment. GE credit: SL. Effective: 2018 Winter Quarter.

NPB 166—Math Tools for Neuroscience (4)
Lecture—4 hours. Prerequisite(s): (NPB 100 or NPB 110B); (MAT 016A, MAT 016B, MAT 016C) or (MAT 017A, MAT 017B, MAT 017C) or (MAT 021A, MAT 021B, MAT 021C); or Consent of Instructor. Introduction to mathematics techniques used in neuroscience. Applications to neuroscience of differential equations, linear algebra, Fourier transforms, correlation and convolution, and probability theory. GE credit: QL. Effective: 2018 Winter Quarter.

NPB 167—Computational Neuroscience (5)
Lecture—4 hours; Lecture/Lab—3 hours. Prerequisite(s): (NPB 100 or NPB 110B); (MAT 016A, MAT 016B, MAT 016C) or (MAT 017A, MAT 017B, MAT 017C) or (MAT 021A, MAT 021B, MAT 021C); or Consent of Instructor. PHY 007A, PHY 007B or equivalent recommended. Mathematical models and data analysis techniques used to describe computations performed by nervous systems. Lecture topics include single neuron biophysics, neural coding, network dynamics, memory, plasticity, and learning. Lab topics include programming mathematical models and data analysis techniques in MATLAB. GE credit: QL, SE. Effective: 2018 Winter Quarter.

NPB 168—Neurobiology of Addictive Drugs (4)
Lecture/Discussion—4 hours. Prerequisite(s): NPB 100 or NPB 110B or NPB 110C or NPB 101; Or equivalents. Neurobiological basis for the effects and mechanisms of action of drugs with addictive potential, including opiates (morphine, heroin, methadone), amphetamines, cocaine, nicotine, marijuana (cannabinoids), alcohol, caffeine, and mind-altering drugs such as LSD and antidepressants. GE credit: SL, VL. Effective: 2018 Winter Quarter.

NPB 169—Frontiers in Neurobiology (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): NPB 100; NPB 101; NPB 102 (can be concurrent) Lectures by leading authorities and discussion of the latest research in newly emerging areas in neurobiology. Offered every fourth year. GE credit: QL. Effective: 2010 Fall Quarter.

NPB 171—Physiology of Neuroimmune Interactions (4)
Lecture—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): BIS 002A; (NPB 012 (can be concurrent) or NPB 100 (can be concurrent) or NPB 110B (can be concurrent)); or Consent of Instructor. Completion of PMI 126 or MMI 188 recommended prior to this course. Explores the complex interactions of the nervous and immune systems, and examine how the systems function together to serve homeostasis, behavior, and disease (such as Alzheimer's, autism, and multiple sclerosis). GE credit: SL. Effective: 2017 Fall Quarter.

NPB 172—Map Formation in the Brain (3)
Lecture—3 hours. Prerequisite(s): NPB 100 C- or better or NPB 110B C- or better; or equivalent basic neuroscience training with consent of instructor. Topographic map connection is a fundamental principle for establishing neural network in the brain. This course will provide comprehensive understanding of the current concepts of map formation in various sensory and motor nervous systems. GE credit: SE. Effective: 2017 Spring Quarter.

NPB 173—Neurobiology of Brain Disorders (3)
Lecture—3 hours. Prerequisite(s): NPB 110B or NPB 100; or Consent of Instructor. Examination of brain disorders from a basic science perspective to gain insights into the mechanisms of their action. Genetic, molecular, cellular, circuit, and environmental basis of a variety of brain disorders. How insights about underlying mechanisms may lead to the development of improved therapies. Effective: 2018 Spring Quarter.

NPB 190C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): NPB 199 (can be concurrent); and Consent of Instructor. Upper division standing in Neurobiology, Physiology, and Behavior or related biological science; NPB 199 required concurrently. Research findings and methods in neurobiology, physiology, and/or behavior. Presentation and discussion of research by faculty and students. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 1999 Spring Quarter.

NPB 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Work experience off and on campus in all subject areas offered in neurobiology, physiology, & behavior. May be repeated for credit. (P/NP grading only.) Effective: 2008 Fall Quarter.

NPB 194HA—Neurobiology, Physiology, and Behavior–Honors (1)
Laboratory—12 hours. Prerequisite(s): Senior standing; minimum 3.500 GPA in courses counted toward major; approval by the master advisor. Honors project in Neurobiology, Physiology, and Behavior. Laboratory research on a specific question. The project is developed with the sponsoring faculty member and approved by the student's Honors Thesis Committee. Honors thesis to be submitted upon completion of the project. (P/NP grading only.) Effective: 1997 Winter Quarter.

NPB 194HB—Neurobiology, Physiology and Behavior–Honors (4)
Laboratory—12 hours. Prerequisite(s): Senior standing; minimum 3.500 GPA in courses counted toward major; approval by the master advisor. Honors project in Neurobiology, Physiology, and Behavior. Laboratory research on a specific question. The project is developed with the sponsoring faculty member and approved by the student's Honors Thesis Committee. Honors thesis to be submitted upon completion of the project. (P/NP grading only.) Effective: 2003 Spring Quarter.

NPB 194HC—Neurobiology, Physiology, and Behavior–Honors (2)
Laboratory—12 hours. Prerequisite(s): Senior standing; minimum 3.500 GPA in courses counted toward major; approval by the master advisor. Honors project in Neurobiology, Physiology, and Behavior. Laboratory research on a specific question. The project is developed with the sponsoring faculty member and approved by the student's Honors Thesis Committee. Honors thesis to be submitted upon completion of the project. (P/NP grading only.) Effective: 1997 Winter Quarter.

NPB 197T—Tutoring in Neurobiology, Physiology, and Behavior (1-5)
Discussion—2-6 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Assisting the instructor by tutoring students in one of the Department's regular courses. May be repeated for credit. (P/NP grading only.) Effective: 2008 Fall Quarter.

NPB 198—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

NPB 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

NPB 211—Advanced Topics in Neuroimaging (3)
Laboratory—1 hour; Seminar—2 hours. Prerequisite(s): PSC 210; or Consent of Instructor. Restricted to 16 students. Critical presentation and discussion of the most influential advanced issues in neuroimaging, emphasizing fMRI design/analysis and the integration of fMRI with EEG/MEG. May be repeated for credit Course may be repeated when topics differ. (Neuroscience 211 and Psychology 211.) (S/U grading only.) Effective: 2017 Spring Quarter.

NPB 212—Light and Fluorescence Microscopy (3)
Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Restricted to maximum 16 students. Theory and practical application of light and fluorescence microscopy in the biological sciences. Laboratory component will focus on an optics bench, where we build simple compound and confocal microscopes on an optical rail. Effective: 2017 Spring Quarter.

NPB 217—Advanced Avian Physiology (1)
Project (Term Project)—1 hour. Prerequisite(s): NPB 117; and Consent of Instructor. Graduate standing; NPB 117 required concurrently. Study in depth of a topic in avian physiology through development of a lecture with associated instructional materials such as lesson plan, readings, presentation, and evaluation aids. Effective: 2009 Summer Session 1.

NPB 221—Cellular Neuroscience (4)
Discussion—1.5 hours; Lecture—3 hours. Advanced course on cellular and subcellular organization of the nervous system. Membrane channels, sensory transduction, synaptic transmission and cellular aspects of development and learning. Effective: 2015 Winter Quarter.

NPB 222—Systems Neuroscience (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Integrative and information-processing aspects of nervous system organization. Topics include sensory systems, motor function, sensorimotor integration, the limbic system, and the neurobiology of learning and memory. (Neuroscience 222.) Effective: 2002 Winter Quarter.

NPB 245—Computational Models of Cellular Signaling (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Computational and mathematical techniques in modeling of regulatory and signaling phenomena in neurobiology and cell physiology, focusing on linear and nonlinear ordinary differential equation models. Applications include ion channel kinetics, electrical activity, signal transduction, calcium oscillations, and simple neural circuits. Effective: 1997 Winter Quarter.

NPB 247—Topics in Functional Neurogenomics (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): Graduate standing or consent of instructor. The theory, methods and principles of functional neurogenomics with emphasis on the relationship to molecular mechanisms involved in development and disease of the nervous system. (Neuroscience 247.) Effective: 2003 Spring Quarter.

NPB 261A—Topics in Vision: Eyes and Retinal Mechanisms (2)
Lecture/Discussion—2 hours. Prerequisite(s): NPB 100 or NPB 112; Or the equivalent; graduate standing. Structure and function of the visual system, with emphasis on the eye and retina, including optics, anatomy, transduction, retinal synapses, adaptation, and parallel processing. (Neuroscience 261A and Molecular, Cellular, and Integrative Physiology 261A.) (S/U grading only.) Effective: 2004 Winter Quarter.

NPB 261B—Topics in Vision: Systems, Psychophysics, Computational Models (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. NPB 261A recommended. Functions of the central visual pathways and their underlying mechanisms. Recent research on aspects of anatomy, biochemistry, electrophysiology, psychophysics, development, and genetics of the visual system. (Neuroscience 261B and Molecular, Cellular, and Integrative Physiology 261B.) (S/U grading only.) Effective: 2004 Winter Quarter.

NPB 261C—Topics in Vision: Clinical Vision Science (2)
Lecture/Discussion—2 hours. Prerequisite(s): NPB 261A; NPB 261B; or Consent of Instructor. Causes and mechanistic bases of major blinding diseases. Recent research on aspects of anatomy, biochemistry, electrophysiology, psychophysics, development, and genetics of the visual system related to disease. (Neuroscience 261C and Molecular, Cellular, and integrative Physiology 261C.) (S/U grading only.) Effective: 2005 Spring Quarter.

NPB 263—Modeling in Systems Neuroscience (4)
Lecture—3 hours; Lecture/Lab—1 hour. Prerequisite(s): Consent of Instructor. Modeling as a tool in systems neuroscience. Mathematical techniques will be introduced and used to explore advanced topics in echolocation, sound localization, electroreception, communications, and motor systems. Other topics include transforms, modeling assumptions, scales and linearity. Effective: 1997 Winter Quarter.

NPB 267—Computational Neuroscience (5)
Lecture—4 hours; Lecture/Lab—3 hours. Prerequisite(s): One course in general Neuroscience at the level of NPB 100 or NPB 110B; one year college-level Calculus at the level of MAT 016A, MAT 016B, MAT 016C or higher; one year Physics at the level of PHY 007A, PHY 007B, PHY 007C recommended; or Consent of Instructor. Mathematical models and data analysis techniques used to describe computations performed by nervous systems. Lecture topics include single-neuron biophysics, neural coding, network dynamics, memory, plasticity, and learning. Lab topics include programming mathematical models and data analysis techniques in MATLAB. (Neuroscience 267.) Effective: 2018 Winter Quarter.

NPB 270—How to Write a Fundable Grant Proposal in the Biomedical Sciences (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Restricted to members of the Neuroscience and BMCDB graduate groups; graduate students in other biomedical programs may enroll with instructor permission. Teaches the do's and don'ts of writing grants in the biomedical sciences and the mechanisms of the review process. May be repeated for credit. (Neuroscience 270.
) Effective: 2016 Spring Quarter.

NPB 285—Literature in Visual Neuroscience (2)
Seminar—2 hours. May be repeated for credit. (Neuroscience 285.) (S/U grading only.) Effective: 2008 Fall Quarter.

NPB 287A—Topics in Theoretical Neuroscience (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. In-depth exploration of topics in theoretical neuroscience. Topic varies each year. Fall quarter (287A): foundational material from books and review articles. Spring quarter (287B): continuation of year's topic through readings of seminal articles from the primary literature. May be repeated for credit. (Neuroscience 287A.) (S/U grading only.) Effective: 2017 Spring Quarter.

NPB 287B—Topics in Theoretical Neuroscience (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. In-depth exploration of topics in theoretical neuroscience. Topic varies each year. Fall quarter (287A): foundational material from books and review articles. Spring quarter (287B): continuation of year's topic through readings of seminal articles from the primary literature. May be repeated for credit. (Neuroscience 287B.) (S/U grading only.) Effective: 2009 Spring Quarter.

NPB 291—Auditory Neuroscience (1)
Discussion—0.5 hours; Seminar—0.5 hours. Prerequisite(s): NPB 100 or NPB 112 or NSC 222; Or the equivalent. Exploration of various important aspects of auditory physiology, behavior and psychophysics through review of original literature. New topic each quarter. May be repeated for credit with consent of instructor. May be repeated for credit. (S/U grading only.) Effective: 1998 Spring Quarter.

Human Rights Studies

(College of Letters and Science)

Keith Watenpaugh, Ph.D., Program Director

Program Office. 213 Sproul Hall; 530-752-1219; http://human-rights.ucdavis.edu

Human Rights Studies is the newest interdisciplinary program at UC Davis and the first of its kind in the University of California system. Our new century has brought with it a host of complex, unprecedented, and daunting challenges to basic human rights; courage, creativity, and a commitment to sustained and innovative interdisciplinary collaboration are necessary to understand, address and solve these challenges. Human Rights Studies is a place for incubating, supporting, coordinating, and promoting faculty and student research, teaching, learning, service, and engagement across the campus on Human Rights and its attendant fields: humanitarianism, environmental justice, genocide, mass sexual and gender-based violence, refugee studies, memory studies, and post-conflict transitional justice. Undergraduate Human Rights students go on to join

the Peace Corps, attend graduate school in the humanities and social sciences, and pursue professional programs and careers in public policy, law, education, nursing, and medicine.

Human Rights Studies | HMR Information

(College of Letters and Science)

Keith Watenpaugh, Ph.D., Program Director

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Human Rights Studies is the newest interdisciplinary program at UC Davis and the first of its kind in the University of California system. Our new century has brought with it a host of complex, unprecedented, and daunting challenges to basic human rights; courage, creativity, and a commitment to sustained and innovative interdisciplinary collaboration are necessary to understand, address and solve these challenges. Human Rights Studies is a place for incubating, supporting, coordinating, and promoting faculty and student research, teaching, learning, service, and engagement across the campus on Human Rights and its attendant fields: humanitarianism, environmental justice, genocide, mass sexual and gender-based violence, refugee studies, memory studies, and post-conflict transitional justice. Undergraduate Human Rights students go on to join the Peace Corps, attend graduate school in the humanities and social sciences, and pursue professional programs and careers in public policy, law, education, nursing, and medicine.

Human Rights Studies | HMR Minor

(College of Letters and Science)

http://humanrightsminor.ucdavis.edu

The interdisciplinary minor in Human Rights gives students a chance to explore human rights as both a specific issue and within larger contexts through a wide variety of disciplines and courses.

Courses in the minor provide students with an opportunity to approach human rights as a practical, as well as an intellectual problem. The minor will be of special interest to students majoring in area studies and those planning to pursue careers in public service, law and international relations. Students will take courses in which human rights problems are the central focus of the course and other courses, which while not having human rights as their central theme, include elements that address the history, theory, practice, violation, promotion and protection of human rights, or in which students have the opportunity to conduct research projects relevant to the study of human rights.

Program Objectives

In addition to completing RST 090 or 134, students must take two additional Core Courses and two from the Elective Course list. Students must select courses from at least three different departments or programs to satisfy minor requirements.

Advising. Keith Watenpaugh, kwatenpaugh@ucdavis.edu.

Human Rights **Units:** 20

RST 134	Human Rights	4

Choose two core courses:

With prior permission of the Interdisciplinary Minor in Human Rights advisor, students may substitute one course from the list of electives as a core course.

HIS 142A	History of the Holocaust	4
RST 131	Genocide (Discontinued)	4
SOC 104	The Political Economy of International Migration	4
SPA 159	Special Topics in Latin American Literature and Culture	4

When taught as "Witnessing in Latin America: Trauma, Violence and Memory."

Choose two electives:

AMS 156	Race, Culture and Society in the United States	4
ANT 126B	Women and Development	4
ANT 130A	Cultural Dimensions of Globalization	4
ANT 131	Ecology and Politics	4
CHI 131	Chicanas in Politics and Public Policy	4
OR		
CHI 131S	Chicanas in Politics and Public Policy	4
CHI 150	The Chicana and Chicano Movement	4
ENL 107	Freedom of Expression	4
HIS 142A	History of the Holocaust	4
HIS 142B	The Memory of the Holocaust	4
HIS 172	American Environmental History	4
HIS 177A	History of Black People and American Race Relations, 1450-1860	4
HIS 177B	History of Black People and American Race Relations, 1860-Present	4
HIS 183A	The Frontier Experience: Trans-Mississippi West	4
HIS 183B	The Frontier Experience: Trans-Mississippi West	4
HIS 189	California History	4
NAS 115	Native Americans in the Contemporary World	4
NAS 130B	Native American Ethno-Historical Development	4
NAS 130C	Native American Ethno-Historical Development	4
NAS 157	Native American Religion and Philosophy	4
RST 131	Genocide (Discontinued)	4
RST 167	Iraq	4
SOC 104	The Political Economy of International Migration	4
SOC 130	Race Relations	4
SOC 137	African American Society and Culture 1790 to 1990	4
SOC 157	Social Conflict	4
SOC 160	Sociology of the Environment	4
SOC 171	Sociology of Violence and Inequality	4
SPA 159	Special Topics in Latin American Literature and Culture When taught as "Witnessing in Latin America: Trauma, Violence and Memory."	4
SPA 175	Topics in Latin American Cultural Studies Only if topic is related to human rights. Prior approval from minor advisor is required.	4
WMS 102	Gender and Post Colonialism	4
WMS 140	Gender and Law	4
WMS 170	Queer Studies	4
WMS 182	Globalization, Gender and Culture	4

Total: 20

Human Rights Studies | HMR Courses

Courses in HMR:

HMR 001—Human Wrongs/Human Rights (4)
Discussion—1 hour; Lecture—3 hours. Introduction to Human Rights and the problems they seek to address. Using key episodes of inhumanity like slavery, genocide, and racism. Examines how international movements for social justice led to the emergence of the international Human Rights system. GE credit: AH, SS, WC, WE. Effective: 2015 Fall Quarter.

HMR 120A—Art, Architecture, and Human Rights (4)
Lecture/Discussion—4 hours. Study of human rights as they relate to art, architecture, and cultural heritage. Examines museums, art collections, and cultural-heritage management, their relation to the cultural prerogatives of communities and indigenous groups, and protection of cultural heritage during war and conflict. (Art History 120A.) GE credit: AH, DD, SS, VL, WC, WE. Effective: 2014 Fall Quarter.

HMR 130—Special Topics in Human Rights (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): HMR 134 or RST 134 recommended. Thematic study of human rights. Topics may include contemporary or historical issues in the promotion, protection, and violation of human rights; human rights and the arts, religion, literature are possible topical areas. May be repeated for credit when topic differs. GE credit: AH, SS, WC, WE. Effective: 2014 Spring Quarter.

HMR 134—Human Rights (4)
Lecture/Discussion—3 hours; Term Paper/Discussion—1 hour. Introduction to the interdisciplinary study of the origins, evolution, denial and protection of Human Rights. No credit for students who have completed RST 090. (Religious Studies 134.) GE credit: AH, SS, WC, WE. Effective: 2014 Spring Quarter.

HMR 136—Human Rights in the Middle East (4)
Lecture/Discussion—3 hours; Term Paper. Study of the experience of Human Rights in the modern Middle East, with special attention to the Human Rights issues raised by events of Arab Spring; Palestine-Israel conflict; history of genocide, mass killing and totalitarianism in the region. GE credit: AH, SS, WC, WE. Effective: 2015 Fall Quarter.

HMR 138—Human Rights, Gender, and Sexuality (4) ***Review all entries***
Lecture/Discussion—3 hours; Term Paper. Gender and sexuality in the context of human rights. Topics include women's participation in the public sphere, the right to change gender, the right for family privacy, and the right to marriage. (Religious Studies 138.) GE credit: AH, WC, WE. Effective: 2015 Fall Quarter.

HMR 138—Human Rights, Gender, and Sexuality (4) ***Review all entries***
Lecture/Discussion—3 hours; Term Paper. Gender and sexuality in the context of human rights. Topics include women's participation in the public sphere, the right to change gender, the right for family privacy, and the right to marriage. GE credit: AH, WC, WE. Effective: 2018 Fall Quarter.

HMR 161—Human Rights in Latin America (4)
Lecture—3 hours; Term Paper. History of the origins, denial and protection of Human Rights in Latin America. Emphasis on dictatorships, political violence, social resistance, democracy, justice, accountability, truth commissions, memory. (History 161.) GE credit: AH, SS, VL, WC, WE. Effective: 2015 Spring Quarter.

HMR 162Y—The History of Human Rights in Europe (4)
Lecture—3 hours; Web Electronic Discussion—1 hour. History of the origins, development, and state of international humanitarian law (IHL) and international human rights law (IHRL) in Europe. Emphasis on Enlightenment-era and modern theories of the source, utility, and limits of human rights. (HIS 126Y) GE credit: SS, WC. Effective: 2017 Fall Quarter.

HMR 190—Seminar (4)
Seminar—3 hours; Term Paper. Emphasis on current scholarly debate about the methods for analyzing and comparing diverse human rights issues with the intention of integrating disciplined study of the field. Effective: 2016 Fall Quarter.

HMR 198—Directed Group Study (1-4)
Variable. Prerequisite(s): Consent of Instructor. Group study on focused topics in human rights. May be repeated for credit. (P/NP grading only.) Effective: 2014 Winter Quarter.

HMR 199—Special Study for Advanced Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Opportunity for advanced undergraduate students to work with a faculty member in a focused manner on a topic or topics of human rights. May be repeated for credit. (P/NP grading only.) Effective: 2014 Winter Quarter.

HMR 200A—History, Theory and Criticism of Human Rights (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Restricted to graduate students. Introduces the advanced study of Human Rights and the theoretical and practical elaboration of the international Human Rights system. Seminar will engage with criticism of Human Rights and develop research and teaching within disciplinary and interdisciplinary frameworks. (Study of Religion 231E.) Effective: 2013 Fall Quarter.

HMR 200B—Memory, Culture, and Human Rights (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Restricted to graduate students. Explores the multiple convergences among memory, culture, and human rights. Discusses diverse approaches to how societal actors in different historical, cultural, and national settings, construct meanings of past political violence, inter-group conflicts, and human rights struggles. (Cultural Studies 210.) Effective: 2013 Fall Quarter.

HMR 298—Group Study (1-4)
Variable—1 hour. Prerequisite(s): Consent of Instructor. Restricted to graduate students. Group study on focused topics in human rights. Four-unit courses may serve as electives for the Designated Emphasis in Human Rights. May be repeated up to 16 unit(s) when topic differs. Effective: 2016 Spring Quarter.

HMR 299—Individual Study (1-12)
Variable—1-12 hours. Prerequisite(s): Consent of Instructor. Restricted to graduate students. Individual study for the designated emphasis in human rights. May be repeated for credit. (S/U grading only.) Effective: 2014 Fall Quarter.

HMR 396—Teaching Assistant Training Practicum (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Restricted to graduate students. Teaching Assistant Training Practicum. May be repeated for credit. (S/U grading only.) Effective: 2017 Fall Quarter.

Humanities

Humanities | Humanities Information

(College of Letters and Science)

Eric L. Russell, Ph.D. (French and Italian)

Program Office. 213 Sproul; 530-752-1219; http://humanities.ucdavis.edu

Faculty. http://humanities.ucdavis.edu/people

The Program of Study

The Humanities program is an undergraduate and graduate curriculum emphasizing innovative approaches to ideas that matter. Courses offered through the program are interdisciplinary in scope and aim to develop critical thinking and writing skills in three principal areas: major figures, works, and genres in world cultures; major themes in world literatures; and relationships between history, society, and culture.

Humanities | HUM Courses

Courses in HUM:

HUM 001—Humanities Forum (2)
Lecture—2 hours. Reading and discussion of a single work representative of a particular culture, historical period, or genre and significant for its ongoing cultural impact in the humanities, sciences, social sciences, technology, and popular arenas. Attention to provocative implications for contemporary society. May be repeated up to 1 time(s) if topic differs. GE credit: AH. Effective: 2001 Fall Quarter.

HUM 001D—Issues and Concepts in the Humanities (2)
Discussion—2 hours. Prerequisite(s): HUM 001 (can be concurrent); HUM 001 required concurrently. Small group discussions and preparation of short papers for course 1. May be repeated up to 1 time(s) if topic differs. GE credit: AH, WE. Effective: 2001 Fall Quarter.

HUM 002A—Global Humanities Forum (4)
Extensive Writing; Lecture—3 hours. Introduction to humanities topics and methodologies; analysis of major figures, works, and genres in world arts and literatures, with emphasis on relationships between history, society, and culture. May be repeated up to 1 time(s) topic differs. GE credit: AH, WC, WE. Effective: 2010 Fall Quarter.

HUM 002B—American Humanities Forum (4)
Extensive Writing; Lecture—3 hours. Introduction to humanities topics and methodologies; analysis of major figures, works, and genres in American arts and literatures, with emphasis on relationships between history, society, and culture. May be repeated up to 1 time(s) topic differs. GE credit: ACGH, AH, WE. Effective: 2010 Fall Quarter.

HUM 003—Medicine and Humanities (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Completion of Subject A requirement. Evolution of the "medical arts" into the "science of medicine." The culture of medicine in the context of society, medical ethics. GE credit: AH, SS, WE. Effective: 1999 Winter Quarter.

HUM 004—Animals and Human Culture (2)
Lecture—2 hours. The meaning of human relations with animals studied across a variety of historical periods and cultures and from a variety of humanistic perspectives. GE credit: AH. Effective: 2001 Spring Quarter.

HUM 004D—Animals and Human Culture: Discussion (2)
Discussion—2 hours. Prerequisite(s): HUM 004 (can be concurrent); HUM 004 required concurrently. Small group discussions and preparation of short papers for course 4. GE credit: AH, WE. Effective: 2001 Spring Quarter.

HUM 007—Travel and Travel Literature (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Subject A requirement. History of travel from the age of exploration to the modern era. Contemporary trends in travel, including mas tourism, adventure travel, and ecotravel. Social, economic, and cultural issues related to modern trends in travel. Analysis of literary representations of travel. GE credit: AH, WC, WE. Effective: 2000 Spring Quarter.

HUM 008—Introduction to Perspectives on Narrative (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Satisfaction of Subject A requirement. Interdisciplinary approach to the use of story across time, culture, and discipline. How the telling and retelling of particular stories reflect the values, concerns, and assumptions of their original audiences and genres. GE credit: AH, WE. Effective: 1999 Spring Quarter.

HUM 009—Don Quixote and the Modern World (2)
Lecture—2 hours. Reading Don Quixote as emblem of modernity in the West. Issues of reality versus illusion, heroism, freedom and self-fulfillment, racial tolerance and love. Don Quixote in other cultural and popular media:film,dance,art,musical drama,and television.GE credit with concurrent enrollment in course 9D:ArtHum,Wrt. GE credit: AH, WC. Effective: 1999 Winter Quarter.

HUM 009D—Don Quixote and the Modern World Discussion (2)
Discussion—2 hours. Prerequisite(s): HUM 009 (can be concurrent); HUM 009 required concurrently. Small group discussions and preparation of short papers for course 9. GE credit: AH, WC, WE. Effective: 1999 Winter Quarter.

HUM 010—How to be a Critic: Understanding Cultural Products and Practices (2)
Lecture—2 hours. Introduction to key topics and methodologies of interest to humanists. Series uses a variety of critical approaches to examine the cultural significance of subjects such as: fashion, film, architecture, music, food, dance. May be repeated up to 1 time(s) if topic differs. GE credit: AH. Effective: 2017 Fall Quarter.

HUM 010D—How to be a Critic: Discussion (2)
Discussion—2 hours. Concurrent enrollment in HUM 010 required. Optional discussion section can be taken concurrently with HUM 10. Small group discussions and preparation of short papers. GE credit: WE. Effective: 2017 Fall Quarter.

HUM 013—Witches: Myth and Historical Reality (4)
Extensive Writing; Lecture—3 hours. This course examines the historical construction of the witch. The four areas covered are: European pagan religions and the spread of Christianity; the "Burning' Times" in early modern Europe; 17th-century New England and the Salem witch trials; and fairytales. GE credit: AH, WC, WE. Effective: 2006 Spring Quarter.

HUM 015—Language and Identity (4)
Extensive Writing—1 hour; Lecture/Discussion—3 hours. Introduction to topics related to the construction of identity through language use, including geographical and social factors affecting language groups. Language ideology affecting linguistic groups, including bilinguals and non-native speakers of English. GE credit: AH, SS, WE. Effective: 2002 Spring Quarter.

HUM 060—Narrative and Argumentative Approaches to Major Current Issues in the Media, Culture, and Society (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): English A or the equivalent. Interdisciplinary approach to contemporary issues (abortion, AIDS,
civil rights, war and peace, welfare state) around which individuals, communities and institutions define themselves in American society, by applying principles of narrative theory to the narratives where those issues are embedded. GE credit: AH, WE. Effective: 1998 Winter Quarter.

HUM 092—Internship (1-12)
Internship—3-36 hours. Internships in fields where students can practice their skills. May be repeated for credit. (P/NP grading only.) Effective: 2004 Fall Quarter.

HUM 144—Marx, Nietzsche, Freud (4)
Lecture/Discussion—3 hours; Term Paper. Study of major texts of Marx, Nietzsche, and Freud, selected with an eye to their impact on 20th-century economics, ethics, and attitudes toward eros. Particular focus on conceptions of the self and the individual's relation to society. (German 144.) GE credit: AH, WC. Effective: 2011 Spring Quarter.

HUM 180—Topics in the Humanities (4)
Lecture/Discussion—3 hours; Term Paper. Analysis of interdisciplinary issues in the Humanities. Topics will vary. May be repeated up to 1 time(s). GE credit: AH, WE. Effective: 2005 Winter Quarter.

HUM 192—Internship (1-12)
Internship—3-36 hours. Internships in fields where students can practice their skills. May be repeated for credit. (P/NP grading only.) Effective: 2004 Fall Quarter.

HUM 198—Directed Group Study (1-4)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

HUM 199—Special Study for Advanced Undergraduates (1-4)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

HUM 250—Topics in the Humanities (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Topics in the humanities, selected by the instructor. May be repeated once for credit. May be repeated up to 1 time(s). Effective: 1997 Winter Quarter.

HUM 292—Graduate Internship (1-15)
Lecture—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Individually designed supervised internship, off campus, in community or institutional setting. Developed with advice of faculty mentor. May be repeated up to 15 unit(s). (S/U grading only.) Effective: 2005 Spring Quarter.

HUM 298—Directed Group Study (1-5)
Variable. (S/U grading only.) Effective: 2005 Spring Quarter.

HUM 299—Individual Research (1-4)
Variable. Individual research in the humanities resulting in a formal written research report. (S/U grading only.) Effective: 1997 Winter Quarter.

HUM 396—Teaching Assistant Training Practicum (1-4)
Variable—3-12 hours. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit. (S/U grading only.) Effective: 2005 Winter Quarter.

Hydrologic Sciences (Graduate Group)

Hydrologic Sciences (Graduate Group) | HYD Information

Thomas Harter, Ph.D., Chairperson of the Group

Group Office. 1152 Plant and Environmental Sciences Building; 530-752-1669; http://hsgg.ucdavis.edu/

Faculty. http://hsgg.ucdavis.edu/people/faculty/

Hydrologic Sciences (Graduate Group) | HYD M.S.

Thomas Harter, Ph.D., Chairperson of the Group

Group Office. 1152 Plant and Environmental Sciences Building; 530-752-1669; http://hsgg.ucdavis.edu/

Faculty. http://hsgg.ucdavis.edu/people/faculty/

Graduate Study. The Hydrologic Sciences Graduate Group offers M.S. and Ph.D. degrees. Hydrologic Sciences integrates numerous and diverse fields of sciences to deepen the understanding of the physical and biogeochemical dynamics of water and water resources below, on, and above the land surface. It considers the interactions between water, the natural environment, agriculture, urban areas, ecosystems, climate, and societal systems. And it investigates water management, regulations, water law, and societal conflicts around water. Students have the ability to take advantage of the breadth of earth, environmental, agricultural, and social sciences and engineering resources on campus that are related to water in the natural and built environment. Students deepen their understanding, advance their critical thinking and analysis skills, and gain in-depth knowledge of innovative, leading hydrologic science tools and techniques to employ for problem solving.

Specialization. To accommodate the diversity of preparation and interests among students, the program offers five specializations from which the student selects one for their M.S.: physical hydrology, water policy and management, hydrochemistry, hydrobiology, and earth surface processes. Two options – a thesis option (Plan I) and a comprehensive exam option (Plan II) – are available for obtaining the Master of Science.

Preparation. Applicants to the program are expected to have completed or to be completing an undergraduate degree in environmental, physical, chemical, or biological sciences, mathematics,

engineering, or related degrees. Undergraduate study must include one year of calculus and one course each in probability/statistics, computer programming, physical geology, and introductory hydrology. Additional undergraduate preparation, expected to be completed before entering the program, depend on the choice of specialization: physical hydrology and earth surface processes require one course each in linear algebra, differential equations, and fluid mechanics, one year of general physics, and two courses of general chemistry. Water policy and management requires one course each in microeconomics and in public policy. Hydrochemistry requires one year each in general biology and general chemistry, and one course in aqueous chemistry. Hydrobiology requires one year each in general biology and general chemistry, and one course in introductory ecology.

Graduate Advisors. Graham Fogg, Ph.D., Carlos Puente, Ph.D., Samuel Sandoval-Solis, Ph.D.

Graduate Admissions Advisor. Mark E. Grismer, Ph.D.

Hydrologic Sciences (Graduate Group) | HYD Ph.D.

Thomas Harter, Ph.D., Chairperson of the Group

Group Office. 1152 Plant and Environmental Sciences Building; 530-752-1669; http://hsgg.ucdavis.edu/

Faculty. http://hsgg.ucdavis.edu/people/faculty/

Graduate Study. The Hydrologic Sciences Graduate Group offers M.S. and Ph.D. degrees. Hydrologic Sciences integrates numerous and diverse fields of sciences to deepen the understanding of the physical and biogeochemical dynamics of water and water resources below, on, and above the land surface. It considers the interactions between water, the natural environment, agriculture, urban areas, ecosystems, climate, and societal systems. And it investigates water management, regulations, water law, and societal conflicts around water. Students have the ability to take advantage of the breadth of earth, environmental, agricultural, and social sciences and engineering resources on campus that are related to water in the natural and built environment. Students deepen their understanding, advance their critical thinking and analysis skills, and gain in-depth knowledge of innovative, leading hydrologic science tools and techniques to employ for problem solving.

Specialization. To accommodate the diversity of preparation and interests among students, the program offers five specializations, from which students select one for their Ph.D.: physical hydrology, water policy and management, hydrochemistry, hydrobiology, and earth surface processes.

Preparation. Applicants to the program are expected to have completed or to be completing an undergraduate degree in environmental, physical, chemical, or biological sciences, mathematics, engineering, or related degrees. Undergraduate study must include one year of calculus and one course each in probability/statistics, computer programming, physical geology, and introductory hydrology. Additional undergraduate preparation, expected to be completed before entering the program, depend on the choice of specialization: physical hydrology and earth surface processes require one course each in linear algebra, differential equations, and fluid mechanics, one year of general physics, and two courses of general chemistry. Water policy and management requires one course each in microeconomics and in public policy. Hydrochemistry requires one year each in general biology and general chemistry, and one course in aqueous chemistry. Hydrobiology requires one year each in general biology and general chemistry, and one course in introductory ecology.

Graduate Advisors. Graham Fogg, Ph.D., Carlos Puente, Ph.D., Samuel Sandoval-Solis, Ph.D.

Graduate Admissions Advisor. Mark E. Grismer, Ph.D.

Hydrologic Sciences (Graduate Group) | HYD Courses

Courses in HYD:

HYD 010—Water, Power, Society (3)
Discussion—1 hour; Lecture—2 hours. Water resources issues. How water has been used to gain and wield socio-political power. Water resources development in California as related to current and future sustainability of water quantity and quality. Roles of science and policy in solving water problems. (Science and Society 10.) GE credit: SE, SL, SS. Effective: 2005 Spring Quarter.

HYD 092—Hydrologic Science Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division student. Work experience off and on campus in Hydrologic Science. Internship supervised by a member of the faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

HYD 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2002 Spring Quarter.

HYD 103N—Fluid Mechanics Fundamentals (4)
Lecture—4 hours. Prerequisite(s): PHY 009B Fluid mechanics axioms, fluid statics, kinematics, velocity fields for one-dimensional incompressible flow and boundary layers, turbulent flow time averaging, potential flow, dimensional analysis, and macroscopic balances to solve a range of practical problems. (Biological Systems Engineering 103.) GE credit: QL, SE, VL. Effective: 2005 Spring Quarter.

HYD 110—Irrigation Principles and Practices (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): PHY 007A; SSC 100 recommended. General course for agricultural and engineering students dealing with soil and plant aspects of irrigation and drainage. Soil-water principles including water movement, plant responses to irrigation regimes, water use by crops; also irrigation systems and water quality. Not open for credit to students who have completed WSC 110. GE credit: SE, SL. Effective: 2009 Fall Quarter.

HYD 124—Plant-Water-Soil Relationships (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): One upper division course in soil science, such as SSC 100; and one upper division course in plant science or plant biology, such as PLB 111; or consent of instructor. Principles of plant interactions with soil and atmospheric water environments and practical applications to crop management (e.g., irrigation) and plant eco-physiology (e.g., drought). Not open for credit to students who have completed Water Science 104. GE credit: QL, SE, SL. Effective: 2008 Spring Quarter.

HYD 124—Plant-Water-Soil Relationships (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (SSC 100 (can be concurrent) or SSC 107 (can be concurrent)); (PLS 100A (can be concurrent) or PLB 111 (can be concurrent)); or Consent of Instructor. Principles of plant interactions with soil and atmospheric water environments and practical applications to crop management (e.g., irrigation) and plant eco-physiology (e.g., drought). Not open for credit to students who have completed WSC 104. GE credit: QL, SE, SL. Effective: 2018 Fall Quarter.

HYD 134—Aqueous Geochemistry (6)
Laboratory—3 hours; Lecture—4 hours. Prerequisite(s): CHE 002B Chemistry of natural waters; dielectric properties of water; thermodynamic and mass-action relations; metal hydrolysis; acid-base equilibria; metal-coordination chemistry; solubility calculations; electron-exchange reactions; sorptive partitioning; ion exchange; and dissolved organic matter. GE credit: QL, SE. Effective: 2009 Fall Quarter.

HYD 141—Physical Hydrology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PHY 009B; MAT 021B; HYD 100 recommended. Introduction to the processes that constitute the hydrologic cycle. Special emphasis on a quantitative description of the following processes: precipitation, infiltration, evaporation, transpiration, surface runoff, and groundwater runoff. GE credit: QL, SE, SL, VL. Effective: 1997 Fall Quarter.

HYD 142—Systems Hydrology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): HYD 141 or ECI 142 General course considering hydrologic processes from a systems or statistical model perspective. General probability concepts are applied to frequency, time series and spatial data analysis. Linear systems are also considered in conjunction with Kalman filter techniques. GE credit: OL, QL, SE. Effective: 1998 Winter Quarter.

HYD 143—Ecohydrology (4)
Extensive Problem Solving; Lecture/Discussion—3 hours. Prerequisite(s): HYD 010 or HYD 141 or ESP 001 or ESM 100 or ESM 108 or ESM 120 or GEL 001 or GEL 050 or SSC 100; or Consent of Instructor. Movement and storage of water in individual ecosystems and the integrated functioning of water and biota at the watershed scale. GE credit: OL, QL, SE, SL. Effective: 2017 Winter Quarter.

HYD 144—Groundwater Hydrology (4)
Lecture—4 hours. Prerequisite(s): MAT 016B or MAT 021A; HYD 103 or ENG 103 recommended. Fundamentals of groundwater flow and contaminant hydrology. Occurrence, distribution, and movement of groundwater. Well-flow systems. Aquifer tests. Well construction operation and maintenance. Groundwater exploration and quality assessment. Agricultural threats to groundwater quality: fertilizers, pesticides, and salts. (Biological Systems Engineering 144.) GE credit: QL, SE, SL, VL. Effective: 2006 Fall Quarter.

HYD 145—Water Science and Design (4) ***Review all entries***
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): HYD 141 or MAT 016C or MAT 017C or MAT 021C; or Consent of Instructor. Introduction to watershed engineering, storm water management, design of hydraulic systems. Topics include hydrological risk analysis, flood routing, design storms, open channel flow, pipes, culverts, spillways, and detention basins. Class project and field trips will apply theory to real-life problems. GE credit: QL, SE, SL, WE. Effective: 2016 Fall Quarter.

HYD 145—Water Science and Design (4) ***Review all entries***
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (HYD 141 or ESM 100); (MAT 016B or MAT 021B); or Consent of Instructor. Introduction to watershed engineering, storm water management, design of hydraulic systems. Topics include hydrological risk analysis, flood routing, design storms, open channel flow, pipes, culverts, spillways, and detention basins. Class project and field trips will apply theory to real-life problems. GE credit: QL, SE, SL, WE. Effective: 2018 Fall Quarter.

HYD 146—Hydrogeology and Contaminant Transport (5)
Laboratory—2 hours; Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): HYD 144 or ECI 144; Or the equivalent. Physical and chemical processes affecting groundwater flow and contaminant transport, with emphasis on realistic hydrogeologic examples. Groundwater geology and chemistry. Fundamentals of groundwater flow and transport analysis. Laboratory includes field pumping test and work with physical and computer models. (Geology 156.) GE credit: SE. Effective: 2002 Winter Quarter.

HYD 147—Runoff, Erosion and Water Quality Management (3)
Fieldwork; Lecture/Lab—3 hours. Prerequisite(s): (PHY 007B or PHY 009B); (MAT 016C or MAT 017C or MAT 021C); (ECI 142 or HYD 141 or ESM 100); or equivalent. Practical hydrology and runoff water quality management from disturbed watersheds. Development of hillslope and soils restoration concepts and practice, modeling and application. (Biological Systems Engineering 147.) GE credit: SE. Effective: 2018 Spring Quarter.

HYD 150—Water Law (3)
Lecture—3 hours. Prerequisite(s): Consent of instructor or upper division standing. Principles and issues of California Water Law.Types of water rights, groundwater rights and management, and protection of instream uses.Water projects, role of federal government and federal/state relations. Basic water quality acts, endangered species act, water transfers and current water issues. GE credit: ACGH, SS. Effective: 2016 Fall Quarter.

HYD 151—Field Methods in Hydrology (4)
Fieldwork—3 hours; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): ERS 100 or HYD 141 Measurement methods and data analysis for evaluation of water storage, movement and contamination in the field. Equipment such as data loggers, water and sediment samplers, pressure transducers, weather stations, surveying equipment, and flow meters will be used. GE credit: QL, SE, SL. Effective: 2003 Winter Quarter.

HYD 182—Environmental Analysis using GIS (4)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): ABT 150 or LDA 150; Or equivalent GIS experience and skills; general biology and/or ecology courses are recommended. Ecosystem and landscape modeling with emphasis on hydrology and solute transport. Spatial analysis of environmental risk analysis including ecological risk assessment, natural resource management. Spatial database structures, scripting, data models, and error analysis in GIS. (Applied Biological Systems Technology 182.) GE credit: QL, SE, SL, VL. Effective: 2018 Winter Quarter.

HYD 192—Hydrologic Science Internship (1-12)
Internship—3-40 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Work experience off and on campus in water science. Internship supervised by a member of the faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

HYD 198—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

HYD 199—Special Study for Advanced Undergraduate (1-5)
Variable. Prerequisite(s): Senior standing. (P/NP grading only.) Effective: 1997 Fall Quarter.

HYD 200—Survey of Hydrologic Sciences (1)
Seminar—1 hour; Term Paper. Prerequisite(s): Open to students in the Hydrologic Sciences program. Seminar course exposes students to the diversity of sciences involved in the program. Students prepare a paper and presentation in their area of research interest. May be repeated twice for credit. May be repeated up to 2 time(s). (S/U grading only.) Effective: 1997 Winter Quarter.

HYD 201A—Hydrologic Sciences Core Survey (3)
Lecture/Discussion—2 hours; Project (Term Project). Considers the primary sub-disciplines while reviewing the fundamental scientific concepts/processes of the hydrologic sciences research community, and includes a basic writing component. Effective: 2017 Fall Quarter.

HYD 201B—Hydrologic Sciences Core Seminar (1)
Seminar—2 hours. Exposes students to the research underway in the Hydrologic Sciences Graduate Group as well as provide them the opportunity to present and refine their research through interaction with other students in the Graduate Group. (P/NP grading only.) Effective: 2018 Winter Quarter.

HYD 205—Continuum Mechanics of Natural Systems (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021D; MAT 022B; PHY 009B Continuum mechanics of static and dynamic air, water, earth and biological systems using hydraulic, heat and electrical conductivity; diffusivity; dispersion; strain; stress; deformation gradient; velocity gradient; stretch and spin tensors. (Biological Systems Engineering 205.) Effective: 2002 Fall Quarter.

HYD 210—Vadose Modeling and Characterization (3)
Discussion—0.5 hours; Laboratory—3 hours; Lecture—1.5 hours. Prerequisite(s): SSC 107; or Consent of Instructor. Principles and modeling of water flow and chemical transport in the vadose zone, with specific applications to soils. Topics include hydraulic properties, finite difference application to unsaturated water flow, parameter optimization, diffusive and convective transport in gaseous and liquid phases. Effective: 2015 Spring Quarter.

HYD 243—Water Resource Planning and Management (3)
Lecture—3 hours. Prerequisite(s): HYD 141 or ECI 142 Applications of deterministic and stochastic mathematical programming
techniques to water resource planning, analysis, design and management. Water allocation, capacity expansion, and reservoir operation. Conjunctive use of surface water and groundwater. Water quality management. Irrigation planning and operation models. (Biological Systems Engineering 243.) Effective: 1997 Fall Quarter.

HYD 245—Climate Change, Water and Society (4)
Lecture—4 hours. Class size limited to 25 students. Integration of climate science and hydrology with policy to understand hydroclimatology and its impact upon natural and human systems. Assignments: readings, take-home examination on climate and hydrologic science, paper that integrates course concepts into a research prospectus or review article. (Atmospheric Science 245 and Ecology 245.) Effective: 2015 Spring Quarter.

HYD 252—Hillslope Geomorphology and Sediment Budgets (4)
Fieldwork—3 hours; Lecture—3 hours. Prerequisite(s): HYD 141 or GEL 035 or ECI 142; or Consent of Instructor. Exploration of theoretical and empirical foundations of sediment production on hillslopes using computer models and field experiments to promote an understanding of how watersheds evolve naturally and with human impacts. Effective: 2001 Spring Quarter.

HYD 254Y—Ecohydraulics (3)
Discussion—1 hour; Extensive Problem Solving; Web Virtual Lecture—1 hour. Use of 2D hydrodynamic modeling to perform instream flow assessment by exploring flow-dependent hydraulic patterns at multiple spatial scales and extrapolating results with empirical and analytical functions to evaluate geomorphic resilience and ecological functions. Effective: 2014 Fall Quarter.

HYD 256—Geomorphology of Estuaries and Deltas (4)
Fieldwork—3 hours; Lecture—3 hours. Prerequisite(s): HYD 141 or GEL 035; or ECI 042 or Consent of Instructor. Survey of the processes and landforms associated with sediment deposition in the coastal zone. Application of geomorphic principles to coastal management issues. Effective: 2002 Spring Quarter.

HYD 264—Modeling of Hydrologic Processes (3)
Lecture—3 hours. Prerequisite(s): HYD 141; STA 102; Or the equivalents. Techniques used to model the spatio-temporal structure of rainfall and runoff are introduced. Procedures studied include those based on stochastic point processes, chaos theory, fractal geometry, and fractional noises. Effective: 1997 Winter Quarter.

HYD 269—Numerical Modeling of Groundwater Systems (3)
Lecture—3 hours. Prerequisite(s): MAT 022B; (ECI 144; or HYD 145A); HYD 145B; Finite difference and finite element techniques in modeling groundwater flow and transport. Fundamentals of constructing and calibrating models with hands-on applications. Methods and limitations of numerical solution of transport equations. Model interpretation and ethics. Effective: 1997 Winter Quarter.

HYD 273—Introduction to Geostatistics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 130A; STA 130B; Or the equivalent. Statistical treatment of spatial data with hydrologic emphasis. Topics: theory of random functions, variogram analysis, Kriging/co-Kriging, indicator geostatistics, and stochastic simulation of spatial variability. Geostatistical software use. Effective: 2018 Winter Quarter.

HYD 274—Practice of Groundwater Flow and Transport Modeling (3)
Lecture—2 hours; Lecture/Discussion—0.5 hours; Lecture/Lab—0.5 hours. Prerequisite(s): HYD 269; (ECI 272B or ECI 272C) Selecting and building groundwater flow and transport models. Planning, preparation, execution, presentation, and review of modeling projects. Review of methods, assumptions, and limitations of groundwater models; practicing with MODFLOW, MT3D, associated GUI, and with other groundwater modeling software of choice. Effective: 2012 Fall Quarter.

HYD 275—Analysis of Spatial Processes (3)
Lecture—3 hours. Prerequisite(s): STA 102; Or the equivalent; HYD 273 or STA 273A recommended. Characterization of homogeneous random fields; extremes and spectral parameters; geometry of excursions, local averaging; scale of fluctuation; non-Gaussian and irregular random fields; geostatistical
applications. Effective: 1997 Winter Quarter.

HYD 286—Selected Topics in Environmental Remote Sensing (3)
Discussion—2 hours; Lecture—1 hour; Project (Term Project). Prerequisite(s): ERS 186; Consent of Instructor. Or equivalent; ERS 186L recommended. In depth investigation of advanced topics in remote sensing applications, measurements, and theory. May be repeated for credit. (Geography 286.) Effective: 2014 Fall Quarter.

HYD 290—Seminar in Hydrologic Science (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing and background in Hydrologic Science. Seminars and critical review of problems, issues, and research in hydrologic sciences. Oral presentations of research. Topics will vary. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

HYD 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

HYD 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

HYD 396—Teaching Assistant Training Practicum (1-4)
Variable. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

HYD 410—OSHA HAZWOPER Refresher Course (1)
Lecture—1 hour. Updates hazardous materials handling information for purposes of keeping certification current. Certification lapses until the refresher course is complete. (P/NP grading only.) Effective: 1998 Winter Quarter.

HYD 440—Hazardous Waste Operations Training (3)
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): Upper division standing in College of Agricultural and Environmental Sciences. Forty-hour course designed to meet the requirements of Federal OSHA
regulation CFR 1910.120. Covers the health, regulatory, processing and safe handling issues/problems associated with working with hazardous
materials. (P/NP grading only.) Effective: 1997 Spring Quarter.

Hydrology

Hydrology | HYD Information

(College of Agricultural and Environmental Sciences)

Faculty. http://lawr.ucdavis.edu/people/faculty/hydrology

Hydrology | HYD B.S.

(College of Agricultural and Environmental Sciences)

Faculty. http://lawr.ucdavis.edu/people/faculty/hydrology

The Major Program

Hydrology is the study of the occurrence, distribution, circulation, and behavior of water and water-borne materials in the environment of Earth. It includes practical measurement and technical analysis of water phenomena underground, on the Earth's surface, and in the atmosphere. Contemporary hydrologic problems include environmental restoration, sustainability of groundwater and surface water resources, water pollution, and natural disasters such as floods, droughts,

landslides, avalanches, and land subsidence. The management of these problems demands hydrologic scientists with the comprehensive, interdisciplinary education embodied in this program. Beyond its societal utility, hydrology can be an exciting science for the curious-minded. Hydrologists explore natural phenomena such as climate change, waterfalls, health of coral reefs, biogeochemical cycles, and aquifers.

The Program. A hydrologist needs a strong background across the basic sciences of physics, mathematics, chemistry, and biology. Breadth of understanding comes from exposure to ecology, geology, engineering, policy, and law. Depth of experience is provided by core hydrology courses, internship opportunities, and practical outdoor training. Students choose electives to match their interests and career goals. Transfer students should have completed as much as possible of the preparatory subject matter listed below.

Internships and Career Alternatives. Job opportunities in hydrology exceed the available supply of trained hydrologists. Students commonly obtain internships and jobs with state and federal agencies, private consulting firms, environmental interest groups, irrigation districts, and utility companies. Federal agencies hiring hydrologists include the U.S. Geological Survey, U.S. Department of Agriculture (Fish and Wildlife, Agricultural Research, Forest Service, and National Resource Conservation Service), Environmental Protection Agency, and national research laboratories (Lawrence Livermore National Laboratory, Lawrence Berkeley National Laboratory). State and local agency employers include California's Departments of Water Resources, Conservation, Fish and Game, and Toxic Substances as well as the Water Resources Control Board and Regional Water Quality Control Boards. To obtain higher levels of responsibility and salary, hydrologists often seek advanced degrees, and the hydrology major is designed to provide students with a highly competitive education to get into graduate school.

Major Advisor. Helen Dahlke (Land, Air and Water Resources)

Advising Center. 1150 PES Building

Staff Advisor. Lacole Brooks, lbrooks@ucdavis.edu

Preparatory Subject Matter **Units:** 71

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 002C	General Chemistry	5
PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3
MAT 022B	Differential Equations	3
GEL 050	Physical Geology	3
GEL 050L	Physical Geology Laboratory	2
ENG 006 OR Equivalent.	Engineering Problem Solving	4

Depth Subject Matter **Units:** 46-55

HYD 103N	Fluid Mechanics Fundamentals	4
OR		
ENG 103	Fluid Mechanics	4
OR		
Equivalent of either.		

ECI 114	Probabilistic Systems Analysis for Civil Engineers	4
OR		
STA 130A	Mathematical Statistics: Brief Course	4
STA 130B	Mathematical Statistics: Brief Course	4

HYD 134	Aqueous Geochemistry	6
HYD 141	Physical Hydrology	4
HYD 142	Systems Hydrology	4
HYD 144	Groundwater Hydrology	4
HYD 151	Field Methods in Hydrology	4
SSC 107	Soil Physics	5

Choose one:

HYD 150	Water Law	3
ARE 147	Resource and Environment Policy Analysis	3
ESP 161	Environmental Law	4
ESP 166N	Ocean and Coastal Policy (Discontinued)	3

Choose three:

HYD 110	Irrigation Principles and Practices	3
HYD 124	Plant-Water-Soil Relationships	4
HYD 143	Ecohydrology	4
HYD 146	Hydrogeology and Contaminant Transport	5
ECI 141	Engineering Hydraulics	3
ABT 165	Irrigation Practices for an Urban Environment	2

Restricted Electives **Units:** 16-26

To supplement or expand areas of student interest selected with approval of advisor

Total: 129-148

Hydrology | HYD Minor

(College of Agricultural and Environmental Sciences)

Faculty. http://lawr.ucdavis.edu/people/faculty/hydrology

The Hydrology Section of the Department of Land, Air and Water Resources offers the minor in Hydrology for environmental or natural science students who have an interest in water/environmental issues. The interested student should have completed preparatory course work in calculus (MAT 016B), chemistry (CHE 002A; CHE 002B recommended), physics (PHY 007A), and biology (BIS 002A). Course work in the minor provides fundamental skills and knowledge of the hydrologic sciences. The program is sufficiently flexible for students to pursue particular water issues or problems of interest to them.

Minor Advisor. Graham Fogg; 530-752-6810; gefogg@ucdavis.edu.

Hydrology **Units:** 20-23

HYD 103N	Fluid Mechanics Fundamentals	4
OR		
ENG 103	Fluid Mechanics	4

HYD 141	Physical Hydrology	4
OR		
ESM 100	Principles of Hydrologic Science	4
HYD 144	Groundwater Hydrology	4
SSC 107	Soil Physics	5
Choose one:		
HYD 134	Aqueous Geochemistry	6
CHE 100	Environmental Water Chemistry	3
SSC 111	Soil Microbiology	4
ESP 151	Limnology	4

Total: 20-23

Hydrology | HYD Courses

Courses in HYD:

HYD 010—Water, Power, Society (3)
Discussion—1 hour; Lecture—2 hours. Water resources issues. How water has been used to gain and wield socio-political power. Water resources development in California as related to current and future sustainability of water quantity and quality. Roles of science and policy in solving water problems. (Science and Society 10.) GE credit: SE, SL, SS. Effective: 2005 Spring Quarter.

HYD 092—Hydrologic Science Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division student. Work experience off and on campus in Hydrologic Science. Internship supervised by a member of the faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

HYD 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2002 Spring Quarter.

HYD 103N—Fluid Mechanics Fundamentals (4)
Lecture—4 hours. Prerequisite(s): PHY 009B Fluid mechanics axioms, fluid statics, kinematics, velocity fields for one-dimensional incompressible flow and boundary layers, turbulent flow time averaging, potential flow, dimensional analysis, and macroscopic balances to solve a range of practical problems. (Biological Systems Engineering 103.) GE credit: QL, SE, VL. Effective: 2005 Spring Quarter.

HYD 110—Irrigation Principles and Practices (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): PHY 007A; SSC 100 recommended. General course for agricultural and engineering students dealing with soil and plant aspects of irrigation and drainage. Soil-water principles including water movement, plant responses to irrigation regimes, water use by crops; also irrigation systems and water quality. Not open for credit to students who have completed WSC 110. GE credit: SE, SL. Effective: 2009 Fall Quarter.

HYD 124—Plant-Water-Soil Relationships (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): One upper division course in soil science, such as SSC 100; and one upper division course in plant science or plant biology, such as PLB 111; or consent of instructor. Principles of plant interactions with soil and atmospheric water environments and practical applications to crop management (e.g., irrigation) and plant eco-physiology (e.g., drought). Not open for credit to students who have completed Water Science 104. GE credit: QL, SE, SL. Effective: 2008 Spring Quarter.

HYD 124—Plant-Water-Soil Relationships (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (SSC 100 (can be concurrent) or SSC 107 (can be concurrent)); (PLS 100A (can be concurrent) or PLB 111 (can be concurrent)); or Consent of Instructor. Principles of plant interactions with soil and atmospheric water environments and practical applications to crop management (e.g., irrigation) and plant eco-physiology (e.g., drought). Not open for credit to students who have completed WSC 104. GE credit: QL, SE, SL. Effective: 2018 Fall Quarter.

HYD 134—Aqueous Geochemistry (6)
Laboratory—3 hours; Lecture—4 hours. Prerequisite(s): CHE 002B Chemistry of natural waters; dielectric properties of water; thermodynamic and mass-action relations; metal hydrolysis; acid-base equilibria; metal-coordination chemistry; solubility calculations; electron-exchange reactions; sorptive partitioning; ion exchange; and dissolved organic matter. GE credit: QL, SE. Effective: 2009 Fall Quarter.

HYD 141—Physical Hydrology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PHY 009B; MAT 021B; HYD 100 recommended. Introduction to the processes that constitute the hydrologic cycle. Special emphasis on a quantitative description of the following processes: precipitation, infiltration, evaporation, transpiration, surface runoff, and groundwater runoff. GE credit: QL, SE, SL, VL. Effective: 1997 Fall Quarter.

HYD 142—Systems Hydrology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): HYD 141 or ECI 142 General course considering hydrologic processes from a systems or statistical model perspective. General probability concepts are applied to frequency, time series and spatial data analysis. Linear systems are also considered in conjunction with Kalman filter techniques. GE credit: OL, QL, SE. Effective: 1998 Winter Quarter.

HYD 143—Ecohydrology (4)
Extensive Problem Solving; Lecture/Discussion—3 hours. Prerequisite(s): HYD 010 or HYD 141 or ESP 001 or ESM 100 or ESM 108 or ESM 120 or GEL 001 or GEL 050 or SSC 100; or Consent of Instructor. Movement and storage of water in individual ecosystems and the integrated functioning of water and biota at the watershed scale. GE credit: OL, QL, SE, SL. Effective: 2017 Winter Quarter.

HYD 144—Groundwater Hydrology (4)
Lecture—4 hours. Prerequisite(s): MAT 016B or MAT 021A; HYD 103 or ENG 103 recommended. Fundamentals of groundwater flow and contaminant hydrology. Occurrence, distribution, and movement of groundwater. Well-flow systems. Aquifer tests. Well construction operation and maintenance. Groundwater exploration and quality assessment. Agricultural threats to groundwater quality: fertilizers, pesticides, and salts. (Biological Systems Engineering 144.) GE credit: QL, SE, SL, VL. Effective: 2006 Fall Quarter.

HYD 145—Water Science and Design (4) ***Review all entries***
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): HYD 141 or MAT 016C or MAT 017C or MAT 021C; or Consent of Instructor. Introduction to watershed engineering, storm water management, design of hydraulic systems. Topics include hydrological risk analysis, flood routing, design storms, open channel flow, pipes, culverts, spillways, and detention basins. Class project and field trips will apply theory to real-life problems. GE credit: QL, SE, SL, WE. Effective: 2016 Fall Quarter.

HYD 145—Water Science and Design (4) ***Review all entries***
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (HYD 141 or ESM 100); (MAT 016B or MAT 021B); or Consent of Instructor. Introduction to watershed engineering, storm water management, design of hydraulic systems. Topics include hydrological risk analysis, flood routing, design storms, open channel flow, pipes, culverts, spillways, and detention basins. Class project and field trips will apply theory to real-life problems. GE credit: QL, SE, SL, WE. Effective: 2018 Fall Quarter.

HYD 146—Hydrogeology and Contaminant Transport (5)
Laboratory—2 hours; Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): HYD 144 or ECI 144; Or the equivalent. Physical and chemical processes affecting groundwater flow and contaminant transport, with emphasis on realistic hydrogeologic examples. Groundwater geology and chemistry. Fundamentals of groundwater flow and transport analysis. Laboratory includes field pumping test and work with physical and computer models. (Geology 156.) GE credit: SE. Effective: 2002 Winter Quarter.

HYD 147—Runoff, Erosion and Water Quality Management (3)
Fieldwork; Lecture/Lab—3 hours. Prerequisite(s): (PHY 007B or PHY 009B); (MAT 016C or MAT 017C or MAT 021C); (ECI 142 or HYD 141 or ESM 100); or equivalent. Practical hydrology and runoff water quality management from disturbed watersheds. Development of hillslope and soils restoration concepts and practice, modeling and application. (Biological Systems Engineering 147.) GE credit: SE. Effective: 2018 Spring Quarter.

HYD 150—Water Law (3)
Lecture—3 hours. Prerequisite(s): Consent of instructor or upper division standing. Principles and issues of California Water Law.Types of water rights, groundwater rights and management, and protection of instream uses.Water projects, role of federal government and federal/state relations. Basic water quality acts, endangered species act, water transfers and current water issues. GE credit: ACGH, SS. Effective: 2016 Fall Quarter.

HYD 151—Field Methods in Hydrology (4)
Fieldwork—3 hours; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): ERS 100 or HYD 141 Measurement methods and data analysis for evaluation of water storage, movement and contamination in the field. Equipment such as data loggers, water and sediment samplers, pressure transducers, weather stations, surveying equipment, and flow meters will be used. GE credit: QL, SE, SL. Effective: 2003 Winter Quarter.

HYD 182—Environmental Analysis using GIS (4)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): ABT 150 or LDA 150; Or equivalent GIS experience and skills; general biology and/or ecology courses are recommended. Ecosystem and landscape modeling with emphasis on hydrology and solute transport. Spatial analysis of environmental risk analysis including ecological risk assessment, natural resource management. Spatial database structures, scripting, data models, and error analysis in GIS. (Applied Biological Systems Technology 182.) GE credit: QL, SE, SL, VL. Effective: 2018 Winter Quarter.

HYD 192—Hydrologic Science Internship (1-12)
Internship—3-40 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Work experience off and on campus in water science. Internship supervised by a member of the faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

HYD 198—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

HYD 199—Special Study for Advanced Undergraduate (1-5)
Variable. Prerequisite(s): Senior standing. (P/NP grading only.) Effective: 1997 Fall Quarter.

HYD 200—Survey of Hydrologic Sciences (1)
Seminar—1 hour; Term Paper. Prerequisite(s): Open to students in the Hydrologic Sciences program. Seminar course exposes students to the diversity of sciences involved in the program. Students prepare a paper and presentation in their area of research interest. May be repeated twice for credit. May be repeated up to 2 time(s). (S/U grading only.) Effective: 1997 Winter Quarter.

HYD 201A—Hydrologic Sciences Core Survey (3)
Lecture/Discussion—2 hours; Project (Term Project). Considers the primary sub-disciplines while reviewing the fundamental scientific concepts/processes of the hydrologic sciences research community, and includes a basic writing component. Effective: 2017 Fall Quarter.

HYD 201B—Hydrologic Sciences Core Seminar (1)
Seminar—2 hours. Exposes students to the research underway in the Hydrologic Sciences Graduate Group as well as provide them the opportunity to present and refine their research through interaction with other students in the Graduate Group. (P/NP grading only.) Effective: 2018 Winter Quarter.

HYD 205—Continuum Mechanics of Natural Systems (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021D; MAT 022B; PHY 009B Continuum mechanics of static and dynamic air, water, earth and biological systems using hydraulic, heat and electrical conductivity; diffusivity; dispersion; strain; stress; deformation gradient; velocity gradient; stretch and spin tensors. (Biological Systems Engineering 205.) Effective: 2002 Fall Quarter.

HYD 210—Vadose Modeling and Characterization (3)
Discussion—0.5 hours; Laboratory—3 hours; Lecture—1.5 hours. Prerequisite(s): SSC 107; or Consent of Instructor. Principles and modeling of water flow and chemical transport in the vadose zone, with specific applications to soils. Topics include hydraulic properties, finite difference application to unsaturated water flow, parameter optimization, diffusive and convective transport in gaseous and liquid phases. Effective: 2015 Spring Quarter.

HYD 243—Water Resource Planning and Management (3)
Lecture—3 hours. Prerequisite(s): HYD 141 or ECI 142 Applications of deterministic and stochastic mathematical programming
techniques to water resource planning, analysis, design and management. Water allocation, capacity expansion, and reservoir operation. Conjunctive use of surface water and groundwater. Water quality management. Irrigation planning and operation models. (Biological Systems Engineering 243.) Effective: 1997 Fall Quarter.

HYD 245—Climate Change, Water and Society (4)
Lecture—4 hours. Class size limited to 25 students. Integration of climate science and hydrology with policy to understand hydroclimatology and its impact upon natural and human systems. Assignments: readings, take-home examination on climate and hydrologic science, paper that integrates course concepts into a research prospectus or review article. (Atmospheric Science 245 and Ecology 245.) Effective: 2015 Spring Quarter.

HYD 252—Hillslope Geomorphology and Sediment Budgets (4)
Fieldwork—3 hours; Lecture—3 hours. Prerequisite(s): HYD 141 or GEL 035 or ECI 142; or Consent of Instructor. Exploration of theoretical and empirical foundations of sediment production on hillslopes using computer models and field experiments to promote an understanding of how watersheds evolve naturally and with human impacts. Effective: 2001 Spring Quarter.

HYD 254Y—Ecohydraulics (3)
Discussion—1 hour; Extensive Problem Solving; Web Virtual Lecture—1 hour. Use of 2D hydrodynamic modeling to perform instream flow assessment by exploring flow-dependent hydraulic patterns at multiple spatial scales and extrapolating results with empirical and analytical functions to evaluate geomorphic resilience and ecological functions. Effective: 2014 Fall Quarter.

HYD 256—Geomorphology of Estuaries and Deltas (4)
Fieldwork—3 hours; Lecture—3 hours. Prerequisite(s): HYD 141 or GEL 035; or ECI 042 or Consent of Instructor. Survey of the processes and landforms associated with sediment deposition in the coastal zone. Application of geomorphic principles to coastal management issues. Effective: 2002 Spring Quarter.

HYD 264—Modeling of Hydrologic Processes (3)
Lecture—3 hours. Prerequisite(s): HYD 141; STA 102; Or the equivalents. Techniques used to model the spatio-temporal structure of rainfall and runoff are introduced. Procedures studied include those based on stochastic point processes, chaos theory, fractal geometry, and fractional noises. Effective: 1997 Winter Quarter.

HYD 269—Numerical Modeling of Groundwater Systems (3)
Lecture—3 hours. Prerequisite(s): MAT 022B; (ECI 144; or HYD 145A); HYD 145B; Finite difference and finite element techniques in modeling groundwater flow and transport. Fundamentals of constructing and calibrating models with hands-on applications. Methods and limitations of numerical solution of transport equations. Model interpretation and ethics. Effective: 1997 Winter Quarter.

HYD 273—Introduction to Geostatistics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 130A; STA 130B; Or the equivalent. Statistical treatment of spatial data with hydrologic emphasis. Topics: theory of random functions, variogram analysis, Kriging/co-Kriging, indicator geostatistics, and stochastic simulation of spatial variability. Geostatistical software use. Effective: 2018 Winter Quarter.

HYD 274—Practice of Groundwater Flow and Transport Modeling (3)
Lecture—2 hours; Lecture/Discussion—0.5 hours; Lecture/Lab—0.5 hours. Prerequisite(s): HYD 269; (ECI 272B or ECI 272C) Selecting and building groundwater flow and transport models. Planning, preparation, execution, presentation, and review of modeling projects. Review of methods, assumptions, and limitations of groundwater models; practicing with MODFLOW, MT3D, associated GUI, and with other groundwater modeling software of choice. Effective: 2012 Fall Quarter.

HYD 275—Analysis of Spatial Processes (3)
Lecture—3 hours. Prerequisite(s): STA 102; Or the equivalent; HYD 273 or STA 273A recommended. Characterization of homogeneous random fields; extremes and spectral parameters; geometry of excursions, local averaging; scale of fluctuation; non-Gaussian and irregular random fields; geostatistical
applications. Effective: 1997 Winter Quarter.

HYD 286—Selected Topics in Environmental Remote Sensing (3)
Discussion—2 hours; Lecture—1 hour; Project (Term Project). Prerequisite(s): ERS 186; Consent of Instructor. Or equivalent; ERS 186L recommended. In depth investigation of advanced topics in remote sensing applications, measurements, and theory. May be repeated for credit. (Geography 286.) Effective: 2014 Fall Quarter.

HYD 290—Seminar in Hydrologic Science (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing and background in Hydrologic Science. Seminars and critical review of problems, issues, and research in hydrologic sciences. Oral presentations of research. Topics will vary. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

HYD 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

HYD 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

HYD 396—Teaching Assistant Training Practicum (1-4)
Variable. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

HYD 410—OSHA HAZWOPER Refresher Course (1)
Lecture—1 hour. Updates hazardous materials handling information for purposes of keeping certification current. Certification lapses until the refresher course is complete. (P/NP grading only.) Effective: 1998 Winter Quarter.

HYD 440—Hazardous Waste Operations Training (3)
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): Upper division standing in College of Agricultural and Environmental Sciences. Forty-hour course designed to meet the requirements of Federal OSHA
regulation CFR 1910.120. Covers the health, regulatory, processing and safe handling issues/problems associated with working with hazardous
materials. (P/NP grading only.) Effective: 1997 Spring Quarter.

Immunology

Immunology | IMM Information

Charles Bevins, M.D., Ph.D., Chairperson of the Group

Group Office. 1026 Vet Med Administration Building; 530-754-0103; http://immunology.compmed.ucdavis.edu/

Faculty. http://immunology.compmed.ucdavis.edu/people/faculty.html

Immunology | IMM M.S.

Charles Bevins, M.D., Ph.D., Chairperson of the Group

Group Office. 1026 Vet Med Administration Building; 530-754-0103; http://immunology.compmed.ucdavis.edu/

Faculty. http://immunology.compmed.ucdavis.edu/people/faculty.html

Graduate Study. The Graduate Group in Immunology offers an interdisciplinary program of study in an exciting field of biology and medicine leading to the M.S. and Ph.D. degrees. Participating faculty from various Schools and Departments at UC Davis provide research opportunities in diverse areas of applied immunology. Areas of focus include infection and immunity (including host response regulation to parasites, viruses and bacteria), nutrition and immunity, autoimmunity, immune regulation, neuroimmunology, cancer therapy and immune mediators and their uses for diagnosis and treatment.

Preparation. Applicants for candidacy to these programs should have completed undergraduate preparation in mathematics, physics, chemistry, biochemistry, molecular and cellular biology or related biological and medical sciences.

For work leading to the Ph.D. degree, the requirements include cell biology, chemical immunology, cellular immunology, immunohematology, and advanced immunology. In addition to these general requirements, more specialized preparation in at least one of the following is required: (a) microbiological specialties (bacteriology, virology, parasitology, medical microbiology); (b) zoological specialties (cell biology, endocrinology, embryology, proto-zoology, histology, cytology, physiology); (c) medical specialties (pathology, anatomy, pharmacology, clinical pathology, reproduction, hematology, epidemiology); (d) biochemistry/biophysics specialties (biologically active molecules, control mechanisms); (e) genetic specialties (developmental genetics, population genetics, cytogenetics, molecular genetics).

Graduate Advisor. See the graduate program website at http://immunology.compmed.ucdavis.edu/people/.

Immunology | IMM Ph.D.

Charles Bevins, M.D., Ph.D., Chairperson of the Group

Group Office. 1026 Vet Med Administration Building; 530-754-0103; http://immunology.compmed.ucdavis.edu/

Faculty. http://immunology.compmed.ucdavis.edu/people/faculty.html

Graduate Study. The Graduate Group in Immunology offers an interdisciplinary program of study in an exciting field of biology and medicine leading to the M.S. and Ph.D. degrees. Participating faculty from various Schools and Departments at UC Davis provide research opportunities in diverse areas of applied immunology. Areas of focus include infection and immunity (including host response regulation to parasites, viruses and bacteria), nutrition and immunity, autoimmunity, immune regulation, neuroimmunology, cancer therapy and immune mediators and their uses for diagnosis and treatment.

Preparation. Applicants for candidacy to these programs should have completed undergraduate preparation in mathematics, physics, chemistry, biochemistry, molecular and cellular biology or related biological and medical sciences.

For work leading to the Ph.D. degree, the requirements include cell biology, chemical immunology, cellular immunology, immunohematology, and advanced immunology. In addition to these general requirements, more specialized preparation in at least one of the following is required: (a) microbiological specialties (bacteriology, virology, parasitology, medical microbiology); (b) zoological specialties (cell biology, endocrinology, embryology, proto-zoology, histology, cytology, physiology); (c) medical specialties (pathology, anatomy, pharmacology, clinical pathology, reproduction, hematology, epidemiology); (d) biochemistry/biophysics specialties (biologically active molecules, control mechanisms); (e) genetic specialties (developmental genetics, population genetics, cytogenetics, molecular genetics).

Graduate Advisor. See the graduate program website at http://immunology.compmed.ucdavis.edu/people/.

Immunology | IMM Courses

Courses in IMM:

IMM 201—Introductory Immunology (4)
Lecture—4 hours. Prerequisite(s): Graduate standing. Enrollment limited to 30 students. Comprehensive introduction to the principles of immunology. Effective: 2006 Fall Quarter.

IMM 201L—Advanced Immunology Laboratory Rotations (4)
Discussion/Laboratory—12 hours. Laboratory assignment in two research laboratories. Individual research problems with emphasis on methodological/procedural experience and experimental design. Student writes a project outline and gives oral presentation. May be repeated up to 2 time(s). Effective: 2011 Fall Quarter.

IMM 202L—Advanced Immunology Laboratory Rotations (5)
Discussion/Laboratory—15 hours. One four-week and one six week assignment in immunology research laboratories. Individual research problems with an emphasis on methodological/procedural experience and experimental design. May be repeated up to 2 time(s). Effective: 2011 Fall Quarter.

IMM 203—Cancer Immunology (2)
Lecture—1 hour; Term Paper—1 hour. Covers concepts in cancer biology, progression and immune evasion. It will also cover topics such as: immune surveillance, immune effector mechanisms and current concepts in immune therapy. Effective: 2011 Fall Quarter.

IMM 204—Topics in Innate Immunity (2)
Extensive Writing/Discussion—1 hour; Performance Instruction—1 hour. Prerequisite(s): IMM 201; Or equivalent; IMM 293 preferred. Restricted to first- or second-year GGI and MGG students; others with permission of instructor; enrollment limited to 18 students. Covers current topics in the field of innate immunity through student seminar presentations and critical evaluation of the literature. Concepts include: pathogen recognition, intercellular communication, specialized cellular function and effector/signaling molecules. Effective: 2010 Spring Quarter.

IMM 210—Topics on Neuroimmunology and Neuroinflammation (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Topics will include a broad range of frontiers in neuroimmunology and neuroinflammation. Research articles in current literature will serve to guide in-depth discussions of experimental approaches, technical aspects of experimental techniques, data interpretation, and other relevant aspects of each topic. May be repeated for credit. (S/U grading only.) Effective: 2016 Winter Quarter.

IMM 292—Immunotoxicology Seminar (2)
Seminar—2 hours. Prerequisite(s): Graduate standing in Pharmacology/Toxicology, Immunology, Physiology, or Biochemistry. Seminar presentations dealing with principles of xenobiotic effects on immune system functions and specific examples of drugs and environmental chemicals exerting toxic effects on the immune system. (S/U grading only.) Effective: 1997 Winter Quarter.

IMM 293—Current Concepts in Immunology (4)
Lecture/Discussion—4 hours. Prerequisite(s): PMI 126; or Consent of Instructor. Innate and acquired immunity as defense mechanisms against disease. Mechanisms regulating the distinct cell types driving these responses and current concepts in the literature. Effective: 2002 Winter Quarter.

IMM 294—Comparative Clinical Immunology (4)
Lecture/Discussion—4 hours. Prerequisite(s): PMI 126; or Consent of Instructor. Clinical immunology in animals and man. Pathogenesis of representative infectious diseases, hypersensitive reactions, and autoimmunity. Emphasis on specific and nonspecific immune effector mechanisms to combat infections or mediate pathology. Not open for credit to students who have completed IMM 294A. Effective: 2003 Winter Quarter.

IMM 295—Cytokines (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): IMM 293; or Consent of Instructor. Cytokines and their involvement in human and animal physiology/disease, molecular mechanisms and receptor signaling. Immune and non-immune actions. Overlapping/redundant functions (referred to as the "cytokine network"). Effective: 2003 Spring Quarter.

IMM 296—Advanced Topics in Immunology (2)
Seminar—2 hours. Prerequisite(s): Graduate standing or consent of instructor. Presentation, discussion, and analysis of faculty research topics in immunology. Required for Immunology Graduate Students every year until they have passed their qualifying exam. May be repeated for credit. (S/U grading only.) Effective: 2002 Winter Quarter.

IMM 297—Mucosal Immunology (2)
Discussion—1 hour; Lecture—1 hour; Term Paper. Prerequisite(s): IMM 201; Or equivalent. Basic concepts and current research topics in the field of mucosal immunology, with an emphasis on human immunology. Major emphases include innate and adaptive mucosal immunity, the gastrointestinal tract, the lung, lymphocyte trafficking, and mucosal vaccination. Effective: 2006 Summer Session 1.

Independent Study Program

Independent Study Program | Independent Study Program Information

Information. Chairperson, Committee on Courses of Instruction, c/o Academic Senate Office; 530-752-2231.

The Independent Study Program provides an opportunity for upper division students to design and pursue a full quarter (12-15 units) of individual study in an area of special interest.

A program qualifying as Independent Study will consist of one or more courses in the 190–199 series. While the theme of such a program may be reasonably broad, a recognizable common thread should unite all the academic work you undertake during an independent study quarter. Regularly offered formal courses will only be acceptable as a part of such a program if they clearly fit its theme and contribute something essential toward the realization of its objectives. The program is not to be considered a way to take more variable-unit courses than normally permitted.

The procedure for enrolling in an Independent Study Program is as follows:

1. Develop, in general terms, a plan of study;
2. Locate a faculty sponsor or panel of sponsors and with their help and approval develop a detailed plan;
3. Complete a project proposal form (obtained from the Academic Senate office) and submit it to the Academic Senate Committee on Courses of Instruction.

The deadline for applications is the tenth day of instruction of the term before; for specific dates, see the Academic Calendar.

Note that most courses in the 190-199 series are graded on a "Passed/Not Passed" basis unless the instructor has obtained approval for letter grading from both the college or school Committee on Courses of Instruction and from the Academic Senate Committee on Courses of Instruction. Requests for letter grading must be received by the Senate Committee no later than the fifteenth day of instruction in the quarter in which the course is offered.

You must report the completion or termination of the project to the Committee on Courses of Instruction.

India & South Asia Studies Minor; Middle East/South Asia Studies

India & South Asia Studies Minor; Middle East/South Asia Studies | India & South Asia Studies Minor

(College of Letters and Science)

Smriti Srinivas, Ph.D., Program Director

Program Office. 1272 Social Science & Humanities; 530-754-4926; http://mesa.ucdavis.edu

Faculty. http://mesa.ucdavis.edu/directory-of-people/affiliated-faculty-1

The minor in India & South Asia Studies covers an area of immense historical, cultural, economic, demographic, and geopolitical significance. The minor is designed to emphasize the interconnected and comparative aspect of history, culture, society, economy, religion, gender relations, media, law, political economy, international relations, urbanism, migration and diaspora, language and literatures across regional and national boundaries. It is an interdisciplinary minor open to undergraduates in all four colleges.

Minor Advisor. Consult the Middle East/South Asia Studies Program in 155 Kerr Hall 530-754-4926 or the Middle East/South Asia Studies website at http://mesa.ucdavis.edu.

India & South Asia Studies **Units:** 20-24

MSA 100	Middle East and South Asia: Comparative Perspectives	4
MSA 180	Topics in Middle East and South Asian Studies	4

Choose one:

HIS 196A	Medieval India	4
HIS 196B	Modern India	4

Choose one:

MSA 181B	Topics in Regional ME/SA Studies	4
MSA 182B	Undergraduate Proseminar in Middle East/South Asia	4

Choose additional electives from Core Course list below:

Core Course List:

MSA 112	History of South Asian Islam	4
MSA 181B	Topics in Regional ME/SA Studies	4

MSA 182B	Undergraduate Proseminar in Middle East/South Asia	4
ANT 145	Performance, Embodiment, and Space in South Asia	4
ASA 150F	South Asian American History, Culture, & Politics	4
COM 053B	Literature of South Asia	4
COM 148	Mystical Literatures of South Asia and the Middle East	4
COM 156	The Ramayana	4
HIN 001	Elementary Hindi/Urdu I	5
HIN 002	Elementary Hindi/Urdu II	5
HIN 003	Elementary Hindi/Urdu III	5
HIN 021	Intermediate Hindi/Urdu I	4
HIN 022	Intermediate Hindi/Urdu II	4
HIN 023	Intermediate Hindi/Urdu III	4
HIS 008	History of Indian Civilization	4
HIS 102Q	Undergraduate Proseminar in History; India	5
HIS 196A	Medieval India	4
HIS 196B	Modern India	4
MUS 148	Hindustani Vocal Ensemble	2
RST 030	Religions of South Asia	4
RST 068	Hinduism	4
RST 069	Introduction to Hindu Mythology	4
RST 156	Religion and the Performing Arts in India	4
RST 157	Hindu Women and Goddesses	4

With prior consultation with an advisor, students can petition in advance the Program Committee to accept:

Other elective courses toward the minor program if the content is 50% or more on the Arab World. Under no circumstances may more than one lower division course be offered in satisfaction of requirements for the minor.

More than four units of Middle East/South Asia 181C and/or Middle East/South Asia 182C towards the minor program

Total: 20-24

India & South Asia Studies Minor; Middle East/South Asia Studies | MSA Courses

Courses in MSA:

MSA 092—ME/SA 92. Internship in Middle East/South Asia Studies (3-15)
Internship. Prerequisite(s): Consent of Instructor. Work experience on and off campus in all subject areas offered as part of the ME/SA Studies program. Internship supervised by a member of the ME/SA faculty. May be repeated up to 15 unit(s). (P/NP grading only.) Effective: 2007 Fall Quarter.

MSA 098—Directed Group Study (1-5)
Variable—3-15 hours. May be repeated for credit. (P/NP grading only.) Effective: 2006 Fall Quarter.

MSA 099—Special Study for Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2006 Fall Quarter.

MSA 100—Middle East and South Asia: Comparative Perspectives (4)
Extensive Writing; Lecture—3 hours. Ethnographic and historical points of intersection and divergence in various aspects of the Middle East and South Asia in precolonial, colonial, and postcolonial societies. Anthropological, historical, and theoretical debates surrounding the region. GE credit: AH, SS, WC, WE. Effective: 2004 Summer Session 1.

MSA 111A—Great Cities of Arab Middle East and South Asia (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Some knowledge of Islamic/Middle Eastern history is very useful. In-depth examination of the great cities of North Africa, the Middle East and South Asia as cultural and historical artifacts. Topics include: the concept of the Islamic city, processes of modernity, and representations that reinforce imagination, memory and personal identity. GE credit: AH, SS, WC, WE. Effective: 2013 Fall Quarter.

MSA 112—History of South Asian Islam (4)
Discussion—1 hour; Lecture—3 hours. Comparative study of Muslim communities of South Asia. Commonalities in cultural identity and historical experience. Rise and spread of Islam, comparative history of Islamic Empires, colonial rule, and post-colonial nationalism. Effective: 2007 Fall Quarter.

MSA 121A—Shahnameh: The Persian Book of Kings (4)
Lecture/Discussion—3 hours; Term Paper. In-depth analysis of the Persian Book of Kings (Shahnameh) by Abu al-Qasim Ferdowsi (d. 1020 CE) in its historical context with a comparative perspective on the role of this work in Persian and world literature. (Comparative Literature 175.) GE credit: AH, WC, WE. Effective: 2015 Winter Quarter.

MSA 121C—A Story for a Life: The Arabian Nights (4)
Lecture/Discussion—3 hours; Term Paper. In-depth exploration of The Arabian Nights, the best-known work of pre-modern Arabic literature and a major work of world literature. Analysis of the work in its historical context and in comparison to other frame tales in world literature. (Comparative Literature 172 and Arabic 140.) GE credit: AH, WC, WE. Effective: 2016 Winter Quarter.

MSA 122A—Themes in the Arabic Novel (4)
Extensive Writing; Independent Study; Lecture/Discussion—3 hours. Class size limited to 30 students. Select modern Arabic fiction (novels and short stories) in translation. Thematically connected readings supplemented by non-fictional writings when appropriate. May be repeated up to 2 time(s) if the texts/theme of required course readings sufficiently change. GE credit: AH, OL, WC, WE. Effective: 2013 Fall Quarter.

MSA 131A—Modern Iranian Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): Upper division standing, or consent of instructor. Iranian cinema of the 20th century in the context of profound cultural and social changes in Iran especially since the Iranian Revolution. Productions by representative directors such as Kiarostami, Makhmalbaf, Bahram Beizaie are included. Knowledge of Persian not required. (Cinema & Technocultural Studies 146A.) GE credit: AH, OL, VL, WC, WE. Effective: 2013 Fall Quarter.

MSA 131B—Modern South Asia Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): Upper-division standing or consent of instructor. South Asian cinema of last 100 years in the context of cultural, social, and political changes. South Asian history, Independence, Partition, urban life, class, migration, postcolonial identity, diaspora, gender, sexuality, religion, sport, performance, etc (CTS146B/ANT147) GE credit: AH, SS, VL, WC, WE. Effective: 2017 Winter Quarter.

MSA 131C—Religion and Media in Arab World (4)
Lecture—4 hours. Exploration of the role and experience of media technologies in the Arab world. Study of digital and electronic media as well as alternative media practices. Investigation of new trends in political activism and identity formation. (Religious Studies 166.) GE credit: OL, SS, VL, WC, WE. Effective: 2014 Fall Quarter.

MSA 131D—Modern Turkish Cinema (4)
Film Viewing—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): Upper-division standing or consent of instructor. Turkish cinema of the 20th & 21st century in the context of cultural, social, & political changes. Issues covered include history, nationalism, political dissent, identity, migration, diaspora, gender, sexuality, religion, and incorporate viewpoints of Kurdish & other minority members. (CTS 146D and HIS 193E) GE credit: AH, OL, SS, VL, WC, WE. Effective: 2016 Winter Quarter.

MSA 150—Women and Islamic Discourses (4)
Lecture/Discussion—4 hours. Prerequisite(s): WMS 050; Or comparable course. Introduction to the debates/discourses about women and Islam. Transformations in debates/discourses in colonial and postcolonial periods in the Middle East & South Asia. Comparative study of debates/discourses on family, work, law, sexuality, religion, comportment, human rights, feminist and religious movements. (Women's Studies 185.) GE credit: AH, SS, WC. Effective: 2008 Fall Quarter.

MSA 151A—Iranian Society & Culture (4)
Discussion—1 hour; Lecture—2 hours; Term Paper. In-depth investigation of modern Iranian society and culture. Exploration of structures of Iranian society: family, gender, religion, minorities, economy, politics, and state. Iran's role in the globalizing world, and the role of Iranian diasporas. GE credit: AH, OL, VL, WC, WE. Effective: 2013 Spring Quarter.

MSA 180—Topics in Middle East and South Asian Studies (4)
Extensive Writing; Lecture—3 hours. Comparative perspective on the Middle East and South Asia. Topics may include: modernity, religious traditions, colonialism, subalternity and social movements, gender and sexuality, history and memory, science and development, ritual and performance, public culture, diasporas. May be repeated up to 1 time(s) topic varies. GE credit: AH, SS, WC, WE. Effective: 2004 Fall Quarter.

MSA 181A—Topics in Regional ME/SA Studies (4)
Lecture—3 hours; Term Paper. Iran & Persian topics for students specializing in region-specific Middle East and South Asia Studies. May be repeated up to 3 time(s). GE credit: AH, SS, WC, WE. Effective: 2015 Winter Quarter.

MSA 181B—Topics in Regional ME/SA Studies (4)
Lecture—3 hours; Term Paper. Indian/South Asia topics for students specializing in region-specific Middle East and South Asia Studies. May be repeated up to 3 time(s). GE credit: AH, SS, WC, WE. Effective: 2013 Fall Quarter.

MSA 181C—Topics in Regional ME/SA Studies: Arab Studies (4)
Lecture—3 hours; Term Paper. Arab Studies topics. May be repeated up to 3 time(s) when different topics and themes are studied. GE credit: AH, SS. Effective: 2013 Fall Quarter.

MSA 182A—Undergraduate Proseminar in Middle East/South Asia (4)
Seminar—3 hours; Term Paper. Prerequisite(s): MSA 100 recommended. Class size limited to 15 students. Seminar in Iran & Persian topics specializing in region-specific Middle East and South Asia studies. May be repeated up to 3 time(s). Effective: 2015 Winter Quarter.

MSA 182B—Undergraduate Proseminar in Middle East/South Asia (4)
Seminar—3 hours; Term Paper. Prerequisite(s): MSA 100 recommended. Class size limited to 15 students. Seminar in India/South Asia topics specializing in region-specific Middle East and South Asia studies. May be repeated up to 3 time(s) when different topics and themes are studied. Effective: 2012 Fall Quarter.

MSA 182C—Undergraduate Proseminar in Middle East/South Asia: Arab Studies Seminar (4)
Seminar—3 hours; Term Paper. Prerequisite(s): MSA 100 recommended. Class size limited to 15 students. Seminar in Arab Studies topics. May be repeated up to 3 time(s). GE credit: WE. Effective: 2013 Fall Quarter.

MSA 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Supervised internship on and off campus in the area of Middle East and South Asia Studies. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2018 Spring Quarter.

MSA 194H—Special Study for Honors Students (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Open only to majors of senior standing who qualify for honors program. Independent study of a problem in Middle East/South Asian studies involving the writing of an honors thesis. May be repeated up to 12 unit(s). Effective: 2009 Winter Quarter.

MSA 198—Directed Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2018 Spring Quarter.

MSA 199—Special Study for Advanced Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2018 Spring Quarter.

Individual Major

Individual Major | A&ES B.S.

(College of Agricultural and Environmental Sciences)

The Individual Major in this College has been suspended indefinitely.

Program Office. 150 Mrak Hall; 530-752-0108;
http://www.caes.ucdavis.edu/students/current/advising

Student Proposal. An Individual Major may be organized by a student having a specific academic interest not represented by an established major. Each student wishing an Individual Major should submit a proposal to the Dean's Office, prior to reaching 120 units, for review by the Student Actions and Individual Major Subcommittee. This proposal must include *(1)* an essay describing the special educational aims of the student, including a statement indicating why the educational objectives cannot be met by existing majors; *(2)* a list of planned courses; and *(3)* faculty advisor recommendations. It is critical that students contact a college counselor in the Dean's Office for consultation and development of the proposal.

Individual Major | Biological Sciences A.B.

(College of Biological Sciences)

Program Office. Biology Academic Success Center; 1023 Sciences Laboratory Building; 530-752-0410.

The Major Program

The Individual Major, an integrated program composed of courses from two or more disciplines, is designed by the student and is subject to approval by faculty advisor and appropriate college committees. This major enables a student to pursue a specific interest that cannot be accommodated within the framework of an existing major. It must clearly and specifically meet the student's educational goals as well as meet university and college academic standards.

Student Proposal. A student who wishes to propose an individual major must submit the proposal to the Committee on Undergraduate Student Petitions prior to reaching 120 units. It is important for the student to make arrangements to speak with an advisor in the Biology Academic Success Center early in the development of his/her major as no individual major will be approved after a student has completed 120 units.

Principal Advisor (selected by student). A faculty member in a department or program in the College of Biological Sciences.

Preparatory Subject Matter **Units:** 0

Lower division courses basic to the program or needed to satisfy prerequisites for upper division requirements as determined by the Committee on Undergraduate Student Petitions.

Depth Subject Matter **Units:** 28-42

Upper division course work must include:
(a) Choose at least 30 units from courses offered by departments in the College of Biological Sciences.
(b) Additional requirements as determined by the Committee on Undergraduate Student Petitions; see the Biology Academic Success Center for details.
(c) For the B.A. degree, a maximum of 80 units toward the major.

All University, General Education, and College of Biological Sciences Bachelor's degree requirements; variable units.

Total: 180

Individual Major | Biological Sciences B.S.

(College of Biological Sciences)

Program Office. Biology Academic Success Center; 1023 Sciences Laboratory Building; 530-752-0410.

The Major Program

The Individual Major, an integrated program composed of courses from two or more disciplines, is designed by the student and is subject to approval by faculty advisor and appropriate college committees. This major enables a student to pursue a specific interest that cannot be accommodated within the framework of an existing major. It must clearly and specifically meet the student's educational goals as well as meet university and college academic standards.

Student Proposal. A student who wishes to propose an individual major must submit the proposal to the Committee on Undergraduate Student Petitions prior to reaching 120 units. It is important for the student to make arrangements to speak with an advisor in the Biology Academic Success Center early in the development of his/her major as no individual major will be approved after a student has completed 120 units.

Principal Advisor (selected by student). A faculty member in a department or program in the College of Biological Sciences.

Preparatory Subject Matter **Units:** 0

Lower division courses basic to the program or needed to satisfy prerequisites for upper division requirements as determined by the Committee on Undergraduate Student Petitions.

Depth Subject Matter **Units:** 40-68

Upper division course work must include:
(a) Choose at least 30 units from courses offered by departments in the College of Biological Sciences.
(b) Additional requirements as determined by the Committee on Undergraduate Student Petitions. See the Biology Academic Success Center for details.
(c) For the B.S. degree, a maximum of 110 units toward the major.

All University, General Education, and College of Biological Sciences Bachelor's degree requirements; variable units.

Total: 180

Individual Major | L&S A.B.

(College of Letters and Science)

Program Office. 200 Social Sciences and Humanities Building (Undergraduate Education and Advising office); http://www.ls.ucdavis.edu/students

The Major Program

The Individual Major, an integrated program composed of courses from two or more disciplines, is designed by the student and is subject to approval by the faculty advisor and appropriate college committees. This major enables a student to pursue a specific interest that cannot be accommodated within the framework of an existing major. It must clearly and specifically meet the student's educational goals as well as meet university and college academic standards.

Student Proposal. A student who wishes to propose an individual major must submit the proposal to the Faculty Committee on Individual Majors in the College of Letters and Science prior to reaching 120 units. The proposal must be submitted by the end of the fourth week of the quarter. This proposal will consist of (1) an essay, identifying the specific educational and professional objectives, including an indication of why the objectives cannot be met within existing majors, (2) a list of courses planned to complete the major, and (3) faculty advisor recommendations. The proposal will be reviewed and a decision provided the quarter of submittal. It is important that you carefully review the information in the Individual Majors Handbook; available at http://ls.ucdavis.edu/advising/academic-pdfs/individual-major-handbook.pdf.

Honors Program. By the fourth week of the last quarter of the junior year, students potentially eligible for high or highest honors at graduation (see College section), may petition the Individual Majors Committee for tentative acceptance into an honors program.

Final admission will depend upon the Committee's approval of a senior thesis prospectus that has been agreed upon by the student and faculty advisor. The prospectus must be presented to the Committee by the end of the fourth full week of instruction of the first quarter of the senior year. Graduation with high or highest honors will be conditional upon both the maintenance of the required grade point average and the satisfactory completion of the senior thesis project. Students who anticipate doing a senior honors thesis should allow up to three units of independent study in the program during each of two quarters in the senior year as course options.

Major Advisor (selected by student). Principal Advisor: a faculty member in a teaching department or program in the College of Letters and Science in the major field of emphasis. Secondary Advisor: a faculty member from a secondary area of interest.

Preparatory Subject Matter **Units:** 0

Lower division courses basic to the program or needed to satisfy prerequisites for upper division requirements.

Depth Subject Matter **Units:** 45-54

Upper division units must include:

(a) Interrelated and complementary courses from two or more departments which provide a unified pattern and focus.
(b) At least 30 units from Letters and Science teaching departments or programs.
(c) No more than 10 units in courses numbered 194H, 198 and 199.

(d) For the A.B. degree, a maximum of 80 units toward the major; for the B.S. degree, a maximum of 110 units toward the major.

Total: 45-54

Individual Major | L&S B.S.

(College of Letters and Science)

Program Office. 200 Social Sciences and Humanities Building (Undergraduate Education and Advising office); http://www.ls.ucdavis.edu/students

The Major Program

The Individual Major, an integrated program composed of courses from two or more disciplines, is designed by the student and is subject to approval by the faculty advisor and appropriate college committees. This major enables a student to pursue a specific interest that cannot be accommodated within the framework of an existing major. It must clearly and specifically meet the student's educational goals as well as meet university and college academic standards.

Student Proposal. A student who wishes to propose an individual major must submit the proposal to the Faculty Committee on Individual Majors in the College of Letters and Science prior to reaching 120 units. The proposal must be submitted by the end of the fourth week of the quarter. This proposal will consist of (1) an essay, identifying the specific educational and professional objectives, including an indication of why the objectives cannot be met within existing majors, (2) a list of courses planned to complete the major, and (3) faculty advisor recommendations. The proposal will be reviewed and a decision provided the quarter of submittal. It is important that you carefully review the information in the Individual Majors Handbook; available at http://ls.ucdavis.edu/advising/academic-pdfs/individual-major-handbook.pdf.

Honors Program. By the fourth week of the last quarter of the junior year, students potentially eligible for high or highest honors at graduation (see College section), may petition the Individual Majors Committee for tentative acceptance into an honors program.

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Major Advisor (selected by student). Principal Advisor: a faculty member in a teaching department or program in the College of Letters and Science in the major field of emphasis. Secondary Advisor: a faculty member from a secondary area of interest.

Preparatory Subject Matter **Units:** 0

Lower division courses basic to the program or needed to satisfy prerequisites for upper division requirements.

Depth Subject Matter **Units:** 45-54

Upper division units must include:

(a) Interrelated and complementary courses from two or more departments which provide a unified pattern and focus.
(b) At least 30 units from Letters and Science teaching departments or programs.
(c) No more than 10 units in courses numbered 194H, 198 and 199.

(d) For the A.B. degree, a maximum of 80 units toward the major; for the B.S. degree, a maximum of 110 units toward the major.

Total: 45-54

Insect Biology Minor; Entomology & Nematology

Insect Biology Minor; Entomology & Nematology | Insect Biology Minor

Formerly the departments of Entomology and Nematology

(College of Agricultural and Environmental Sciences)

Steve Nadler, Ph.D., Chairperson of the Department

Joanna Chiu, Ph.D., Vice Chairperson of the Department

Department Office. 367 Briggs Hall; 530-752-0492; http://entomology.ucdavis.edu

Faculty. http://entomology.ucdavis.edu/Faculty/

Minor Requirements:

The Department of Entomology has five minor programs open to students in other disciplines who are interested in rounding out their academic study with a concentration in the area of entomology.

Minor Adviser. S. Lawler, S. Nadler

Insect Biology **Units:** 19-29

ENT 100	General Entomology	4
ENT 100L	General Entomology Laboratory	2

Choose at least seven units:

ENT 102	Insect Physiology	4
ENT 103	Insects Systematics	3
ENT 104	Behavioral Ecology of Insects	3
ENT 105	Insect Ecology	4
ENT 107	California Insect Diversity	5
ENT 109	Field Taxonomy and Ecology	7

Choose at least two additional upper division Entomology courses; except courses 192, 198, 199.

Total: 19-29

Insect Ecology & Evolution Minor; Entomology & Nematology

Insect Ecology & Evolution Minor; Entomology & Nematology | Insect Ecology & Evolution Minor

Formerly the departments of Entomology and Nematology

(College of Agricultural and Environmental Sciences)

Steve Nadler, Ph.D., Chairperson of the Department

Joanna Chiu, Ph.D., Vice Chairperson of the Department

Department Office. 367 Briggs Hall; 530-752-0492; http://entomology.ucdavis.edu

Faculty. http://entomology.ucdavis.edu/Faculty/

Minor Requirements:

The Department of Entomology has five minor programs open to students in other disciplines who are interested in rounding out their academic study with a concentration in the area of entomology.

Minor Adviser. S. Lawler, S. Nadler

Insect Ecology and Evolution **Units:** 20-22

ENT 100	General Entomology	4
ENT 100L	General Entomology Laboratory	2
ENT 104	Behavioral Ecology of Insects	3
OR		
ENT 105	Insect Ecology	4

Choose at least seven units:

ENT 103	Insects Systematics	3
ENT 107	California Insect Diversity	5
ENT 109	Field Taxonomy and Ecology	7
ENT 116	Freshwater Macroinvertebrates	3
ENT 158	Forensic Entomology	3

EVE 149	Evolution of Ecological Systems	4
OR		
ESP 121	Population Ecology	4

Total: 20-22

Integrated Teaching Credential (Graduate Group)

Integrated Teaching Credential (Graduate Group) | Integrated Teaching Credential M.S.

(School of Education)

School of Education Building: 530-752-0757; http://education.ucdavis.edu

Faculty: https://education.ucdavis.edu/candel-program-faculty

The Integrated Teaching Credential with Master's Degree Program offers an opportunity for qualified students to complete the requirements for both a Masters of Arts in Education degree and a Multiple Subject OR Single Subject Credential in English, mathematics, science, social science or agriculture in a 15-month, five-quarter program. A bilingual authorization in Spanish is available to credential candidates in both the elementary and secondary programs.

The Credential Program prepares students for the teaching profession by immersing them in the total environment of a public school classroom while enrolled in required coursework. The coursework incorporates a theoretical-practical approach to the teaching-learning process, encouraging close interactions among teacher candidates and teacher education faculty. Students complete requirements for the M.A. degree during two part-time quarters following the credential year. This coursework introduces the integration of research into teaching practice, making teachers more informed and pro-active practitioners.

Integrative Genetics & Genomics (Graduate Group)

Integrative Genetics & Genomics (Graduate Group) | GGG Information

Formerly Genetics

Fred Chedin, Ph.D., Chairperson of the Group

Group Office. 227A Life Sciences; 530-752-4863; http://igg.ucdavis.edu/

Faculty. http://igg.ucdavis.edu/faculty/

Integrative Genetics & Genomics (Graduate Group) | GGG M.S.

Formerly Genetics

Fred Chedin, Ph.D., Chairperson of the Group

Group Office. 227A Life Sciences; 530-752-4863; http://igg.ucdavis.edu/

Faculty. http://igg.ucdavis.edu/faculty/

Graduate Study. The Graduate Group in Integrative Genetics and Genomics (IGG) offers programs of study and research leading to M.S. and Ph.D. degrees. Students in the IGG graduate program have the opportunity to apply genomic, molecular, computational, and classical genetic approaches to study model organisms, a broad range of native and agricultural species, humans, and companion animals. The group integrates genetic research across campus and unites over 100 faculty members from more than 25 departments spanning the College of Biological Sciences, the College of Letters and Science, the College of Agricultural and Environmental Sciences, the School of Medicine, and the School of Veterinary Medicine. Students experience an unsurpassed breadth of research and instructional opportunities from the most fundamental to applied aspects of genetics. For additional information regarding the program, contact the group coordinator at 530-752-4863.

Integrative Genetics & Genomics (Graduate Group) | GGG Ph.D.

Formerly Genetics

Fred Chedin, Ph.D., Chairperson of the Group

Group Office. 227A Life Sciences; 530-752-4863; http://igg.ucdavis.edu/

Faculty. http://igg.ucdavis.edu/faculty/

Graduate Study. The Graduate Group in Integrative Genetics and Genomics (IGG) offers programs of study and research leading to M.S. and Ph.D. degrees. Students in the IGG graduate program have the opportunity to apply genomic, molecular, computational, and classical genetic approaches to study model organisms, a broad range of native and agricultural species, humans, and companion animals. The group integrates genetic research across campus and unites over 100 faculty members from more than 25 departments spanning the College of Biological Sciences, the College of Letters and Science, the College of Agricultural and Environmental Sciences, the School of Medicine, and the School of Veterinary Medicine. Students experience an unsurpassed breadth of research and instructional opportunities from the most fundamental to applied aspects of genetics. For additional information regarding the program, contact the group coordinator at 530-752-4863

Integrative Genetics & Genomics (Graduate Group) | GGG Courses

Courses in GGG:

GGG 201A—Advanced Genetic Analysis (5)
Lecture/Discussion—5 hours. Prerequisite(s): BIS 101; STA 100; Or the equivalent, graduate standing. Fundamentals of genetic analysis and chromosome structure using model organisms including mutation, transmission, complementation, suppression, and enhancement as well as epigenetic phenomena at the whole organism and molecular levels. Effective: 2002 Fall Quarter.

GGG 201B—Genomics (5)
Discussion—2 hours; Lecture—3 hours. Prerequisite(s): GGG 201A; GGG 201C; Or equivalents that provide a basic understanding of genetics and molecular biology. Class limited to 40 students; priority to Genetics Graduate Group students. Prokaryotic and eukaryotic genomes. Experimental strategies and analytical challenges of modern genomics research and the theory and mechanics of data analysis. Structural, functional, and comparative genomics. Related issues in bioinformatics. Effective: 2004 Spring Quarter.

GGG 201C—Molecular Genetic Mechanisms in Disease (4)
Lecture/Discussion—4 hours. Prerequisite(s): BIS 101; Or the equivalent. Pass One restricted to graduate students in genetics, microbiology or biochemistry and molecular biology graduate groups. Exploration of how basic mechanisms of molecular biology contribute to health and disease. Diseases related to animals, plants, and microbes will highlight fundamental concepts in the assembly, function and regulation of DNA, RNA, and protein. Effective: 2012 Fall Quarter.

GGG 201D—Quantitative and Population Genetics (5)
Lecture—5 hours. Prerequisite(s): GGG 201A; or Consent of Instructor. Basic concepts of quantitative and population genetics including gene and genotypic frequencies, multiple factor hypothesis, phenotypic and genotypic values, heritability, selection, genetic variation, the detection of quantitative trait loci and evolution in populations. Experimental and analytical methods. Effective: 2002 Fall Quarter.

GGG 205—Molecular Genetics Laboratory (5)
Laboratory—15 hours. Prerequisite(s): BIS 101 (can be concurrent); Or the equivalent, enrolled in Genetics Graduate Group. Students will conduct experiments in molecular genetics laboratories. Individual research problems will emphasize experimental design, experience with methodologies, and data interpretation. May be repeated up to three times for credit. May be repeated up to 3 time(s). (S/U grading only.) Effective: 1997 Winter Quarter.

GGG 210—Horizontal Gene Transfer (3)
Lecture/Discussion—3 hours. Prerequisite(s): Background in basic microbiology and genetics required; introductory course in molecular biology, biotechnology and microbial and animal/plant genetics recommended. Transfer of genes between unrelated organisms in nature. Dissemination of foreign DNA from genetically engineered organisms, including plants and animals. Mechanisms by which genes are transferred horizontally, and between kingdoms. Effective: 1999 Fall Quarter.

GGG 211—Concepts in Human Genetics and Genomics (3)
Lecture/Discussion—3 hours. Prerequisite(s): GGG 201A; Or equivalent; GGG 201B and GGG 201C or equivalent are recommended. Pass One restricted to graduate students enrolled in the Human Genetics Focus Group; Pass Two restricted to graduate students enrolled in Genetics Graduate Group; after that, open enrollment for graduate students up to 12 students, then undergraduates. Human genomic organization; genetic structure of populations; positional cloning, application of linkage, association, and haplotypes; quantitative trait loci analyses; integrative genetic studies of gene expression; DNA repair mechanisms in genetic disease; mutation analyses; epigenetics; mitochondrial disease; gene manipulation and therapy. Effective: 2004 Winter Quarter.

GGG 220—Genomics and Biotechnology of Plant Improvement (3)
Lecture—3 hours. Prerequisite(s): BIS 101; Or equivalent. Integration of modern biotechnology and classical plant breeding including the impact of structural, comparative and functional genomics on gene discovery, characterization and exploitation. Also covers molecular markers, plant transformation, hybrid production, disease resistance, and novel output traits. (Pland Sciences 220.) Effective: 2002 Winter Quarter.

GGG 225—Gene and Cellular Therapies (3)
Lecture/Discussion—3 hours. Gene therapy from basic concepts to clinical applications. Topics include the human genome and genetic variation, genetic diseases, methods to manipulate gene expression, viral and non-viral delivery vectors, history and progress of gene therapy, case studies, and ethical issues. (Pharmacology & Toxicology 225.) Effective: 2017 Winter Quarter.

GGG 250—Functional Genomics: From Bench to Bedside (3)
Lecture/Discussion—3 hours. Prerequisite(s): GGG 201C; MCB 214; Or equivalent. Functional genomics (how genetic variation and epigenomics affect gene expression), with an emphasis on clinical relevance and applications. Topics include genetic variation and human disease, cancer therapeutics, and biomarker discovery. (Pharmacology & Toxicology 250.) Effective: 2015 Spring Quarter.

GGG 290—Seminar in Evolutionary, Developmental and Population Genetics (1)
Seminar—1 hour. Topics of current interest in evolutionary, population, and developmental genetics. May be repeated for credit. (S/U grading only.) Effective: 2014 Fall Quarter.

GGG 290A—Graduate Student Conference in Genetics (1)
Conference—1 hour. Restricted to Genetics Graduate Group students. Student-given seminars on topics in genetics, with critiques by instructor and peers. May be repeated for credit. (S/U grading only.) Effective: 2012 Fall Quarter.

GGG 291—Seminar in History of Genetics (2)
Seminar—2 hours. Prerequisite(s): BIS 101 The development of modern genetic theories beginning with Mendel. Effective: 1997 Winter Quarter.

GGG 292—Seminar in Genomics and Epigenomics (1)
Seminar—1 hour. Topics of current interest in genomics and epigenomics. May be repeated for credit. (S/U grading only.) Effective: 2014 Winter Quarter.

GGG 293—Seminar in Animal Genetics (1-3)
Seminar—1-3 hours. Prerequisite(s): GGG 201A; or Consent of Instructor. Emphasis on recent advances in the field of animal genetics, ranging from quantitative genetics to molecular biology as it relates to animals. Effective: 1997 Winter Quarter.

GGG 294—Seminar in Human Genetics (2)
Seminar—2 hours. Prerequisite(s): GGG 201A; and Consent of Instructor. Topics of current interest in human genetics and genomics. May be repeated up to 5 time(s) topic differs. Effective: 2004 Fall Quarter.

GGG 295—Seminar in Molecular Genetics (1-3)
Seminar—1-3 hours. Prerequisite(s): GGG 201A; or Consent of Instructor. Topics of current interest related to the structure, modification and expression of genes. Effective: 1997 Winter Quarter.

GGG 296—Scientific Professionalism and Integrity (2)
Lecture—1 hour; Seminar—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Review of basic skills required of contemporary scientists. Topics include scientific conduct, manuscript preparation, grant writing, seminar presentations, and time management. Emphasis on responsibilities of scientists to factually and thoughtfully communicate results. (P/NP grading only.) Effective: 2017 Spring Quarter.

GGG 297—Seminar in Plant Genetics (1-3)
Seminar—1-3 hours. Prerequisite(s): GGG 201A; or Consent of Instructor. Current topics in plant genetics will be examined in student-conducted seminars and discussion format. The integration of molecular, organismal and population genetics to address questions in plant biology will be emphasized. Effective: 1997 Winter Quarter.

GGG 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Group study of selected topics in genetics. (S/U grading only.) Effective: 1997 Winter Quarter.

GGG 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

GGG 300—Methods in Teaching Genetics (1-3)
Lecture/Discussion; Variable. Prerequisite(s): Consent of Instructor. Graduate standing. Practical experience in the methods and problems of teaching genetics. Includes analysis of texts and supporting material, discussion of teaching techniques, preparing for and conducting discussion or laboratory sections, formulating examinations under supervision of instructor. May be repeated up to 3 time(s) or 9 units if teaching in different genetics related course. (S/U grading only.) Effective: 2001 Fall Quarter.

Integrative Pathobiology (Graduate Group)

Integrative Pathobiology (Graduate Group) | Integrative Pathobiology Information

Patricia Pesavento, D.V.M., Ph.D., Chairperson of the Group

Brian Murphy, D.V.M., Ph.D., Vice-chairperson of the Group

Group Office. 1024 Veterinary Medicine Student Services and Administrative Center; 530-752-3737; http://www.vetmed.ucdavis.edu/integrativepath/

Faculty. http://www.vetmed.ucdavis.edu/integrativepath/faculty/

Integrative Pathobiology (Graduate Group) | Integrative Pathobiology M.S.

Patricia Pesavento, D.V.M., Ph.D., Chairperson of the Group

Brian Murphy, D.V.M., Ph.D., Vice-chairperson of the Group

Group Office. 1024 Veterinary Medicine Student Services and Administrative Center; 530-752-3737; http://www.vetmed.ucdavis.edu/integrativepath/

Faculty. http://www.vetmed.ucdavis.edu/integrativepath/faculty/

Graduate Study. The Graduate Group in Integrative Pathobiology (GGIP) is the core UC Davis graduate program for students interested in disease processes and biomedical research. The diverse faculty members in the group come from the School of Veterinary Medicine, the School of Medicine, the College of Agricultural and Environmental Sciences, and the College of Biological Sciences. This diversity of faculty offers students a wide range of opportunities and expertise from the UC Davis biomedical research community.

GGIP is designed for students interested in studying mechanisms responsible for the development of disease at the organismal, cellular or subcellular level. Students interested in the interface between cell biology, biochemistry, microbiology, pharmacology, physiology, immunology, and genetics are encouraged to apply.

Preparation. This program is primarily for applicants with a strong background in basic biomedical sciences.

Graduate Advisor. Jeffrey Stott (Pathology, Microbiology, and Immunology)

Integrative Pathobiology (Graduate Group) | Integrative Pathobiology Ph.D.

Patricia Pesavento, D.V.M., Ph.D., Chairperson of the Group

Brian Murphy, D.V.M., Ph.D., Vice-chairperson of the Group

Group Office. 1024 Veterinary Medicine Student Services and Administrative Center; 530-752-3737; http://www.vetmed.ucdavis.edu/integrativepath/

Faculty. http://www.vetmed.ucdavis.edu/integrativepath/faculty/

Graduate Study. The Graduate Group in Integrative Pathobiology (GGIP) is the core UC Davis graduate program for students interested in disease processes and biomedical research. The diverse faculty members in the group come from the School of Veterinary Medicine, the School of Medicine, the College of Agricultural and Environmental Sciences, and the College of Biological Sciences. This diversity of faculty offers students a wide range of opportunities and expertise from the UC Davis biomedical research community.

GGIP is designed for students interested in studying mechanisms responsible for the development of disease at the organismal, cellular or subcellular level. Students interested in the interface between cell biology, biochemistry, microbiology, pharmacology, physiology, immunology, and genetics are encouraged to apply.

Preparation. Students applying to this program have varied backgrounds. Some hold professional degrees (i.e., DVM, MD or DDS) while others apply after completion of an undergraduate degree.

Students without a professional degree are admitted if they have exceptionally strong interests and backgrounds in basic biomedical sciences.

Graduate Advisor. Jeffrey Stott (Pathology, Microbiology, and Immunology)

International Agricultural Development

International Agricultural Development | IAD Information

(College of Agricultural and Environmental Sciences)

Faculty. Includes members from various departments across colleges.

International Agricultural Development | IAD B.S.

(College of Agricultural and Environmental Sciences)

Faculty. Includes members from various departments across colleges.

International Agricultural Development is an interdisciplinary major in the Plant Sciences department.

Advising Center for the major is located in 1238 Plant and Environmental Sciences; 530-752-4839.

Major Advisor. P. Brown in 3041 Wickson Hall (Plant Sciences)

Preparatory Subject Matter **Units:** 36-38

IAD 010	Introduction to International Agricultural Development	4
PLS 002	Botany and Physiology of Cultivated Plants	4
SSC 010	Soils in Our Environment	3
OR		
SSC 100	Principles of Soil Science	5
ECN 001A	Principles of Microeconomics	4
ECN 001B	Principles of Macroeconomics	4

Choose one:

STA 013	Elementary Statistics	4
SOC 046B	Introduction to Social Research	5
PLS 120	Applied Statistics in Agricultural Sciences	4

MAT 016A	Short Calculus	3
CRD 001	The Community	4

Choose six units:

ARE 015	Population, Environment and World Agriculture	4
ANS 041	Domestic Animal Production	2
ANS 041L	Domestic Animal Production Laboratory	2
CRD 020	Food Systems	4
NUT 010	Discoveries and Concepts in Nutrition	3
PLS 001	Agriculture, Nature and Society	3
PLS 015	Introduction to Sustainable Agriculture	4
PLS 049	Organic Crop Production Practices	3

Depth Subject Matter **Units:** 32

ARE 147	Resource and Environment Policy Analysis	3

OR

PLS 101	Agriculture and the Environment	3
ECN 115A	Economic Development	4

Choose five units:

IAD 142	Equipment and Technology for Small Farms	2
IAD 160	Agroforestry: Global and Local Perspectives	3
PLS 110	Crop Management Systems for Vegetable Production	4
PLS 111	Principles of Agronomic Crop Production Systems	4
PLS 112	Forage Crop Production	3
PLS 130	Rangelands: Ecology, Conservation and Restoration	3

IAD 103	Social Change and Agricultural Development	4
IAD 170	Program Development for International Agriculture	4

Choose four units:

SOC 170	Population	4
CRD 141	Organization of Economic Space	4
CRD 162	People, Work and Technology	5

Choose four units:

CRD 142	Rural Change in the Industrialized World	4
CRD 149	Community Development Perspectives on Environmental Justice	4
CRD 152	Community Development	4

Choose four units:

POL 123	The Politics of Interdependence	4
POL 124	The Politics of Global Inequality	4
SOC 145A	Sociology of Third World Development	4
ANT 126A	Anthropology of Development	4
ANT 126B	Women and Development	4
ANT 131	Ecology and Politics	4

Foreign Language Requirement **Units:** 0-15

Students must complete three sequenced quarters (15 units) of courses in one foreign language or its equivalent. Passing a foreign language proficiency examination, a score of 5, 4, or 3 on a foreign language Advanced Placement examination (except Latin), or a score of 550 on the SATII: Subject Test will also satisfy this requirement.

Internship Requirement **Units:** 4

Students must complete at least four units of internship. Internships can be chosen in consultation with an advisor. Internship requirement waived for students enrolled in the UC Education Abroad Program.

Areas of Specialization **Units:** 44-45

Agricultural Production Option

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
CHE 002A	General Chemistry	5

CHE 002B	General Chemistry	5

Choose 15 units:

ANS 118	Fish Production	4
ANS 124	Lactation	4
ANS 143	Pig and Poultry Care and Management	4
ANS 144	Beef Cattle and Sheep Production	4
ANS 145	Meat Processing and Marketing	4
ANS 146	Dairy Cattle Production	5
AVS 121	Avian Reproduction	2
ENT 110	Arthropod Pest Management	5
ENT 135	Introduction to Biological Control	4
ENH 100	Urban Forestry	4
ENH 133	Woody Plants in the Landscape: Growth, Ecology and Management	4
ESM 100	Principles of Hydrologic Science	4
HYD 124	Plant-Water-Soil Relationships	4
IAD 142	Equipment and Technology for Small Farms	2
IAD 160	Agroforestry: Global and Local Perspectives	3
PLP 120	Introduction to Plant Pathology	4
PLS 110	Crop Management Systems for Vegetable Production	4
PLS 111	Principles of Agronomic Crop Production Systems	4
PLS 112	Forage Crop Production	3
PLS 113	Biological Applications in Fruit Tree Management	2
PLS 114	Biological Applications in Fruit Production	2
PLS 130	Rangelands: Ecology, Conservation and Restoration	3
PLS 150	Sustainability and Agroecosystem Management	4
PLS 170A	Fruit and Nut Cropping Systems	2
PLS 170B	Fruit and Nut Cropping Systems	2
PLS 172	Postharvest Physiology and Technology	4
PLS 176	Introduction to Weed Science	4
SSC 109	Sustainable Nutrient Management	4
SSC 118	Soils in Land Use and the Environment	4

Restricted Electives:

Courses selected in consultation with an advisor.

Trade and Economic Development Option

MAT 016B	Short Calculus	3
SOC 001	Introduction to Sociology	5
OR		
ANT 002	Cultural Anthropology	5

Choose 20 units:

ARE 015	Population, Environment and World Agriculture	4
ARE 100A	Intermediate Microeconomics: Theory of Production and Consumption	4
ARE 100B	Intermediate Microeconomics: Imperfect Competition, Markets and Welfare Economics	4
ARE 115B	Economic Development	4
ARE 120	Agricultural Policy	4
ARE 121	Economics of Agricultural Sustainability	4
ARE 130	Agricultural Markets	4

ARE 136	Managerial Marketing	4
ARE 138	International Commodity and Resource Markets	4
ARE 139	Futures and Options Markets	4
ARE 175	Natural Resource Economics	4
ARE 176	Environmental Economics	4
CRD 141	Organization of Economic Space	4
ECN 160A	International Microeconomics	4
ECN 160B	International Macroeconomics	4
TXC 174	Introduction to World Trade in Textiles and Clothing	4

Restricted Electives:

Courses selected in consultation with an advisor.

Environmental Issues Option

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
AND		
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
ESP 001	Environmental Analysis	4

Choose 16 units:

ARE 147	Resource and Environment Policy Analysis	3
ARE 175	Natural Resource Economics	4
ARE 176	Environmental Economics	4
ESP 100	General Ecology	4
ESP 101	Ecology, Nature, and Society	4
ESP 105	Evolution of Societies and Cultures	4
ESP 110	Principles of Environmental Science	4
ESP 160	The Policy Process	4
ESP 161	Environmental Law	4
ESP 170	Conservation Biology Policy	4
ESP 171	Urban and Regional Planning	4
ESP 172	Public Lands Management	4
ESP 175	Natural Resource Economics	4
PLS 101	Agriculture and the Environment	3
PLS 147	California Plant Communities	3
PLS 147L	California Plant Communities Field Study	1
PLS 150	Sustainability and Agroecosystem Management	4
ENH 150	Genetics and Plant Conservation: The Biodiversity Crisis	3
ENH 160	Restoration Ecology	3
ENH 160L	Restoration Ecology Laboratory	1

Restricted Electives:

Courses selected in consultation with an advisor.

Rural Communities Option

SOC 001	Introduction to Sociology	5
ANT 002	Cultural Anthropology	5

Choose 16 units:

CRD 140	Dynamics of Regional Development	4
CRD 147	Community Youth Development	4

CRD 149	Community Development Perspectives on Environmental Justice	4
CRD 151	Community Field Research: Theory and Analysis	4
CRD 152	Community Development	4
CRD 153A	International Community Development: Asia	4
CRD 153B	International Community Development: Europe	4
CRD 154	Social Theory and Community Change	4
CRD 164	Theories of Organizations and their Role in Community Change	5
CRD 172	Social Inequality: Issues and Innovations	4
CRD 176	Comparative Ethnicity	4
CRD 180	Transnational Community Development	4

Restricted Electives:

Courses selected in consultation with an advisor.

International Agricultural Development Abroad **Units:** 0-40

Total: 116-134

International Agricultural Development | IAD Minor

(College of Agricultural and Environmental Sciences)

Faculty. Includes members from various departments across colleges.

International Agricultural Development is an interdisciplinary major in the Plant Sciences department.

Advising Center for the major is located in 1238 Plant and Environmental Sciences; 530-752-4839.

Major Advisor. P. Brown in 3041 Wickson Hall (Plant Sciences)

International Agricultural Development **Units:** 21-23

IAD 010	Introduction to International Agricultural Development	4
ARE 115A	Economic Development	4

Choose six-seven units:

PLS 101	Agriculture and the Environment	3
PLS 110	Crop Management Systems for Vegetable Production	4
PLS 111	Principles of Agronomic Crop Production Systems	4
PLS 112	Forage Crop Production	3

Choose seven-eight units:

IAD 103	Social Change and Agricultural Development	4
IAD 170	Program Development for International Agriculture	4
CRD 142	Rural Change in the Industrialized World	4

Total: 21-23

International Agricultural Development | IAD Courses

Courses in IAD:

IAD 010—Introduction to International Agricultural Development (4)
Discussion—1 hour; Lecture—3 hours. Theories, practices and institutions relating to agricultural development; the interaction of changing social, cultural and economic organization through successive stages of economic development; impact of new agricultural technology on underdeveloped regions. GE credit: SS, WC, WE. Effective: 2011 Spring Quarter.

IAD 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Supervised internship, off and on campus, in community and institutional settings. (P/NP grading only.) Effective: 2011 Spring Quarter.

IAD 103—Social Change and Agricultural Development (4)
Lecture/Discussion—4 hours. Prerequisite(s): Introductory social science course (Anthropology, Sociology, Economics, International Agricultural Development). How social and cultural factors influence technological change in agriculture; theories of diffusion of innovations; social impact analysis and technology assessment. GE credit: SS, WE. Effective: 2011 Spring Quarter.

IAD 142—Equipment and Technology for Small Farms (2)
Laboratory—3 hours; Lecture—1 hour. Types and characteristics of agricultural equipment and technologies
appropriate for small commercial farming. Adjustment and calibration of equipment. Selection of and budgeting for equipment. (Applied Biological Systems Technology 142.) GE credit: QL, SE, VL. Effective: 2011 Spring Quarter.

IAD 160—Agroforestry: Global and Local Perspectives (3)
Lecture/Discussion—3 hours. Prerequisite(s): PLS 002 or BIS 001C or BIS 002C; (PLS 142 or PLS 150 or BIS 002B); Or general ecology course in lieu of PLS 142 or PLS 150 or BIS 002B. Traditional and evolving use of trees in agricultural ecosystems; their multiple roles in environmental stabilization and production of food, fuel, and fiber; and socioeconomic barriers to the adoption and implementation of agroforestry practices. Not open for credit to students who have taken previously taken AMR 160. (Former course AMR 160.). (Plant Sciences 160.) GE credit: SE. Effective: 2011 Spring Quarter.

IAD 170—Program Development for International Agriculture (4)
Lecture/Discussion—4 hours. Prerequisite(s): IAD 010 Principles of leadership and management for international agricultural development. Organizations and organizational behavior, and the implications for planning and administering organizations involved in the global development effort. Effective: 2011 Spring Quarter.

IAD 190—Proseminar in International Agricultural Development (1)
Seminar—1 hour. Presentation and discussion of current topics in international agricultural development by visiting lecturers, staff and students. May be repeated for credit. (P/NP grading only.) Effective: 2011 Spring Quarter.

IAD 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Supervised internship, off and on campus, in community and institutional settings. May be repeated for credit. (P/NP grading only.) Effective: 2011 Spring Quarter.

IAD 198—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Directed group study. May be repeated for credit. (P/NP grading only.) Effective: 2011 Spring Quarter.

IAD 199—Special Study for Advanced Undergraduates (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special study for advanced undergraduates. May be repeated for credit. (P/NP grading only.) Effective: 2011 Spring Quarter.

IAD 200N—Philosophy and Practice of Agricultural Development (5)
Lecture/Discussion—5 hours; Term Paper. Introduces key elements of philosophy and practice of agricultural development in less developed countries; major paradigms of development; historical context within which these paradigms operate; various development techniques and initiatives emerging from agricultural production to institutional capacity building and management. Not open for credit to students who have completed former IAD 202. Effective: 2011 Spring Quarter.

IAD 201—The Economics of Small Farms and Farming Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A or ECN 100; or the equivalent. Economic perspective on small farm development. Establishes a basis for predicting farmers' responses to changes in the economic environment, and for proposing government policies to increase small farm production and improve farmer and national welfare. Effective: 2017 Winter Quarter.

IAD 202N—Analysis and Determinants of Farming Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PLS 110C or PLS 111; or the equivalent. Unifying concepts of cropping systems in temperate and tropical climatic zones; agroecosystems stability, diversity and sustainability; management strategies, resource use efficiency and their interactions; role of animals, their impact on energy use efficiency, nutrient cycling, and providing food and power.. Not open for credit to students who have completed former IAD 200. Effective: 2017 Winter Quarter.

IAD 203N—Project Planning and Evaluation (4)
Discussion—1 hour; Workshop—3 hours. Prerequisite(s): IAD 200N; or Consent of Instructor. Interdisciplinary setting for application of student skills and specialization to a "real world" development project. Focus on team-building and effective interdisciplinary problem-solving methods, with the objective of producing a project document and presentation within a specified deadline. Not open for credit to students who have completed former IAD 203. Effective: 2017 Winter Quarter.

IAD 290—Seminar in International Agricultural Development (1-2)
Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. Discussion and critical evaluation of advanced topics and issues in international agricultural development. May be repeated for credit. (S/U grading only.) Effective: 2011 Spring Quarter.

IAD 291—Topics in International Agricultural Development (1-3)
Lecture/Discussion—1-3 hours. Prerequisite(s): Consent of Instructor. Selected topics dealing with current issues in agricultural development in lesser developed nations. Variable content. May be repeated up to 1 time(s). Effective: 2011 Spring Quarter.

IAD 292—Graduate Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Participation in H. Humphrey Fellow Program or consent of instructor. Individually designed supervised internship, off or on campus, in community, business or institutional setting. Developed with advice of faculty mentor and Humphrey Coordinator. (S/U grading only.) Effective: 2011 Spring Quarter.

IAD 298—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Directed group study. May be repeated for credit. (S/U grading only.) Effective: 2011 Spring Quarter.

IAD 299—Research (1-12)
Variable—1-12 hours. Prerequisite(s): Consent of Instructor. Research. May be repeated for credit. (S/U grading only.) Effective: 2011 Spring Quarter.

IAD 396—Teaching Assistant Training Practicum (1-4)
Variable—3-12 hours. Prerequisite(s): Graduate standing. Teaching assistant training practicum. May be repeated for credit. (S/U grading only.) Effective: 2011 Spring Quarter.

International Agricultural Development (Graduate Group)

International Agricultural Development (Graduate Group) | International Agricultural Development M.S.

Kate Scow, Ph.D., Professor (Land, Air, and Water Resources) Chairperson of the Group

Group Office. 1238 Plant and Environmental Sciences Building; 530-752-4839; http://iad.ucdavis.edu

Faculty. http://iad.ucdavis.edu/people/faculty/

Graduate Study. The International Agricultural Development M.S. degree program prepares students for careers in global agricultural and rural development, espe-cially, but not exclusively, of developing and less-industrialized regions. This is an interdisciplinary program designed to provide students with knowledge and skills that will enable them to implement, facilitate, and manage programs that enhance agricultural development, resource management, and rural life.

Students are prepared to realize biological and technological improvement in agricultural and natural systems to facilitate social innovation. Training in International Agricultural Development includes both breadth and depth components. Breadth components, required of all M.S. students, aim to establish an understanding of the issues in international development as they relate to agriculture and the environment. These include the history and philosophy of development, leadership and management techniques, fundamentals of farming systems, and agricultural economics. Students acquire depth in their own areas of specialization within the agricultural and social sciences. The areas include agricultural and resource economics, agricultural engineering, agronomy, animal science, anthropology, aquaculture, avian science, community development, ecology, economics, entomology, environmental design, environmental toxicology, food science, gender, geography, horticulture, nutrition, plant pathology, plant biology, plant protection and pest management, political science, preventive veterinary medicine, range science, sociology, soil science, sustainable agriculture, vegetable crops, viticulture, and water science.

Practical and on-site experience with development issues is encouraged and facilitated by guidance from the group's faculty members, who possess a wide range of experience in international development.

Graduate Advisor. Contact the Group office.

International Agricultural Development (Graduate Group) | IAD Courses

Courses in IAD:

IAD 010—Introduction to International Agricultural Development (4)
Discussion—1 hour; Lecture—3 hours. Theories, practices and institutions relating to agricultural development; the interaction of changing social, cultural and economic organization through successive stages of economic development; impact of new agricultural technology on underdeveloped regions. GE credit: SS, WC, WE. Effective: 2011 Spring Quarter.

IAD 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Supervised internship, off and on campus, in community and institutional settings. (P/NP grading only.) Effective: 2011 Spring Quarter.

IAD 103—Social Change and Agricultural Development (4)
Lecture/Discussion—4 hours. Prerequisite(s): Introductory social science course (Anthropology, Sociology, Economics, International Agricultural Development). How social and cultural factors influence technological change in agriculture; theories of diffusion of innovations; social impact analysis and technology assessment. GE credit: SS, WE. Effective: 2011 Spring Quarter.

IAD 142—Equipment and Technology for Small Farms (2)
Laboratory—3 hours; Lecture—1 hour. Types and characteristics of agricultural equipment and technologies
appropriate for small commercial farming. Adjustment and calibration of equipment. Selection of and budgeting for equipment. (Applied Biological Systems Technology 142.) GE credit: QL, SE, VL. Effective: 2011 Spring Quarter.

IAD 160—Agroforestry: Global and Local Perspectives (3)
Lecture/Discussion—3 hours. Prerequisite(s): PLS 002 or BIS 001C or BIS 002C; (PLS 142 or PLS 150 or BIS 002B); Or general ecology course in lieu of PLS 142 or PLS 150 or BIS 002B. Traditional and evolving use of trees in agricultural ecosystems; their multiple roles in environmental stabilization and production of food, fuel, and fiber; and socioeconomic barriers to the adoption and implementation of agroforestry practices. Not open for credit to students who have taken previously taken AMR 160. (Former course AMR 160.). (Plant Sciences 160.) GE credit: SE. Effective: 2011 Spring Quarter.

IAD 170—Program Development for International Agriculture (4)
Lecture/Discussion—4 hours. Prerequisite(s): IAD 010 Principles of leadership and management for international agricultural development. Organizations and organizational behavior, and the implications for planning and administering organizations involved in the global development effort. Effective: 2011 Spring Quarter.

IAD 190—Proseminar in International Agricultural Development (1)
Seminar—1 hour. Presentation and discussion of current topics in international agricultural development by visiting lecturers, staff and students. May be repeated for credit. (P/NP grading only.) Effective: 2011 Spring Quarter.

IAD 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Supervised internship, off and on campus, in community and institutional settings. May be repeated for credit. (P/NP grading only.) Effective: 2011 Spring Quarter.

IAD 198—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Directed group study. May be repeated for credit. (P/NP grading only.) Effective: 2011 Spring Quarter.

IAD 199—Special Study for Advanced Undergraduates (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special study for advanced undergraduates. May be repeated for credit. (P/NP grading only.) Effective: 2011 Spring Quarter.

IAD 200N—Philosophy and Practice of Agricultural Development (5)
Lecture/Discussion—5 hours; Term Paper. Introduces key elements of philosophy and practice of agricultural development in less developed countries; major paradigms of development; historical context within which these paradigms operate; various development techniques and initiatives emerging from agricultural production to institutional capacity building and management. Not open for credit to students who have completed former IAD 202. Effective: 2011 Spring Quarter.

IAD 201—The Economics of Small Farms and Farming Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A or ECN 100; or the equivalent. Economic perspective on small farm development. Establishes a basis for predicting farmers' responses to changes in the economic environment, and for proposing government policies to increase small farm production and improve farmer and national welfare. Effective: 2017 Winter Quarter.

IAD 202N—Analysis and Determinants of Farming Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PLS 110C or PLS 111; or the equivalent. Unifying concepts of cropping systems in temperate and tropical climatic zones; agroecosystems stability, diversity and sustainability; management strategies, resource use efficiency and their interactions; role of animals, their impact on energy use efficiency, nutrient cycling, and providing food and power.. Not open for credit to students who have completed former IAD 200. Effective: 2017 Winter Quarter.

IAD 203N—Project Planning and Evaluation (4)
Discussion—1 hour; Workshop—3 hours. Prerequisite(s): IAD 200N; or Consent of Instructor. Interdisciplinary setting for application of student skills and specialization to a "real world" development project. Focus on team-building and effective interdisciplinary problem-solving methods, with the objective of producing a project document and presentation within a specified deadline. Not open for credit to students who have completed former IAD 203. Effective: 2017 Winter Quarter.

IAD 290—Seminar in International Agricultural Development (1-2)
Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. Discussion and critical evaluation of advanced topics and issues in international agricultural development. May be repeated for credit. (S/U grading only.) Effective: 2011 Spring Quarter.

IAD 291—Topics in International Agricultural Development (1-3)
Lecture/Discussion—1-3 hours. Prerequisite(s): Consent of Instructor. Selected topics dealing with current issues in agricultural development in lesser developed nations. Variable content. May be repeated up to 1 time(s). Effective: 2011 Spring Quarter.

IAD 292—Graduate Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Participation in H. Humphrey Fellow Program or consent of instructor. Individually designed supervised internship, off or on campus, in community, business or institutional setting. Developed with advice of faculty mentor and Humphrey Coordinator. (S/U grading only.) Effective: 2011 Spring Quarter.

IAD 298—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Directed group study. May be repeated for credit. (S/U grading only.) Effective: 2011 Spring Quarter.

IAD 299—Research (1-12)
Variable—1-12 hours. Prerequisite(s): Consent of Instructor. Research. May be repeated for credit. (S/U grading only.) Effective: 2011 Spring Quarter.

IAD 396—Teaching Assistant Training Practicum (1-4)
Variable—3-12 hours. Prerequisite(s): Graduate standing. Teaching assistant training practicum. May be repeated for credit. (S/U grading only.) Effective: 2011 Spring Quarter.

International Commercial Law (Graduate Group)

International Commercial Law (Graduate Group) | ICL Information

Suspension of Program

The International Commercial Law program is no longer admitting students.

International Commercial Law (Graduate Group) | ICL Courses

Courses in ICL:

ICL 201—Orientation in United States Law (7)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Investigation of the Common Law System of the United States. Includes structure of the U.S. government, Constitutional law, contracts, torts, real property, consumer law, securities law, intellectual property, antitrust, taxation, labor law, environmental law, ethics, remedies, legal research and trial practice. Effective: 2002 Summer Special Session.

ICL 201A—Fundamentals in United States Law (4)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Investigation of the Common Law System of the U.S. Includes the American constitutional system, the American judiciary, the American civil trial, and foundational substantive and procedural law such as real property, torts, criminal law and procedure, civil procedure, and contracts. Effective: 2013 Summer Session 1.

ICL 201B—Advanced Topics in United States Law (3)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Orientation to advanced topics in U.S. law: Intellectual Property (including copyright and trademarks), Commercial and Consumer Law, Advanced Contracts, Antitrust, Taxation, Remedies, Labor Law, Environmental Law, Dispute Resolution, Remedies and introduction to trial techniques and legal research/writing. Effective: 2013 Summer Special Session.

ICL 202—Introduction to Contracts (4)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Examines sorts of promises that are enforced and the nature of protection given promissory obligations in both commercial and noncommercial transactions. Inquiry is made into the means by which traditional doctrine adjusts to changing social demands. Effective: 2009 Fall Semester.

ICL 202A—Introduction to Contracts Formation (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Examines formation of the sorts of promises that are enforced and the nature of protection given promissory obligations in both commercial and noncommercial transactions. Inquiry is made into the means by which traditional doctrine adjusts to changing social demands. Effective: 2013 Summer Session 1.

ICL 202AS—Introduction to Contracts Formation (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Examines formation of the sorts of promises that are enforced and the nature of protection given promissory obligations in both commercial and noncommercial transactions. Inquiry is made into the means by which traditional doctrine adjusts to changing social demands. Effective: 2014 Winter Quarter.

ICL 202B—Contracts Performance (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Examines issues of performing promises that are enforceable and possible breach of promissory obligations in both commercial and noncommercial transactions. Inquiry is made into the means by which traditional doctrine adjusts to changing social demands. Effective: 2013 Fall Quarter.

ICL 202BS—Contract Performance (2)
Lecture/Discussion—20 hours. Prerequisite(s): ICL 202A; Or equivalent; Law school education or equivalent. Examines issues of performing promises that are enforceable and possible breach of promissory obligations in both commercial and noncommercial transactions. Inquiry is made into the means by which traditional doctrine adjusts to changing social demands. Effective: 2014 Winter Quarter.

ICL 203—Civil Procedure (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Study of the fundamental and recurrent problems in civil actions including the methods used by federal and state courts to resolve civil disputes. Effective: 2009 Fall Semester.

ICL 204—International Joint Ventures (3)
Lecture/Discussion—20 hours. Prerequisite(s): ICL 201; Law school education or equivalent. International and U.S. business and legal transactions. Legal planning, problem solving, decision making and negotiations related to the break-up and dissolution of a major international joint venture. U.S. laws including finance, tax, bankruptcy, labor, antitrust, environmental, corporate structures and intellectual property. Offered every three years. Effective: 2002 Summer Special Session.

ICL 205—Introduction to Constitutional Law (4)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Principles, doctrines and controversies regarding the structure and division of powers in American government. Includes judicial review, jurisdiction, standing to sue, federalism, federal and state powers and immunities, and the separation of powers among branches of the federal government. Effective: 2009 Fall Semester.

ICL 205A—Overview of US Constitutional Law (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Principles, doctrines and controversies regarding the structure and division of powers in American government. Includes judicial review, jurisdiction, standing to sue, federalism, federal and state powers and immunities, and the separation of powers among branches of the federal government. Effective: 2013 Summer Special Session.

ICL 205AS—Overview of US Constitutional Law (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Principles, doctrines and controversies regarding the structure and division of powers in American government. Includes judicial review, jurisdiction, standing to sue, federalism, federal and state powers and immunities, and the separation of powers among branches of the federal government. Effective: 2013 Fall Quarter.

ICL 205B—Constitutional Law - Protection of Individual Rights (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Principles, doctrines and controversies regarding the U.S. Constitution Bill of Rights, including due process of law, equal protection, freedom of expression, freedom of religion, state action, and congressional legislation in aid of civil rights and liberties. Effective: 2013 Summer Special Session.

ICL 211—Negotiations and Alternative Dispute Resolution (1)
Lecture/Discussion—10 hours. Prerequisite(s): ICL 201; Law school education or the equivalent. Mechanisms for resolving disputes including the alternatives to litigation such as negotiation, mediation, and arbitration. Advantages and disadvantages of each approach. Offered every three years. Effective: 2002 Summer Special Session.

ICL 212—Introduction to Negotiation (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Introduction to theoretical and empirical approaches to negotiation for the purposes of making deals and resolving legal disputes. Effective: 2009 Fall Semester.

ICL 212S—Introduction to Negotiation (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Introduction to theoretical and empirical approaches to negotiation for the purposes of making deals and resolving legal disputes. Effective: 2013 Fall Quarter.

ICL 214—Advanced Negotiation (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Principles and empirical approaches to advanced negotiations including negotiation framework, models, styles, multiple party/issue negotiations and settlements. Effective: 2009 Fall Semester.

ICL 214S—Advanced Negotiation (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Principles and empirical approaches to advanced negotiations including negotiation framework, models, styles, multiple party/issue negotiations and settlements. Effective: 2012 Spring Quarter.

ICL 215—Business Associations (4)
Lecture/Discussion—20 hours. Prerequisite(s): ICL 201; Law school education or the equivalent. Legal rules and concepts applicable to business associations including general partnerships, joint ventures, limited partnerships, limited liability entities, and sole proprietorships. Effective: 2002 Summer Special Session.

ICL 215S—Business Associations (4)
Lecture/Discussion—20 hours. Prerequisite(s): ICL 201; Law school education or the equivalent. Legal rules and concepts applicable to business associations including general partnerships, joint ventures, limited partnerships, limited liability entities, and sole proprietorships. Effective: 2012 Spring Quarter.

ICL 216—International Business Transactions (2)
Lecture/Discussion—20 hours. Prerequisite(s): ICL 201; Law school education or the equivalent. Legal problems arising from international business transactions. Focus on international sales contracts, choice of law, forum selection clauses, letters of credit, transfers of technology, regulation of bribery, development of joint ventures, repatriation of profits, foreign exchange problems, and national efforts to control imports. Effective: 2002 Summer Special Session.

ICL 217—Alternative Dispute Resolution (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Introduces students to a wide variety of alternative dispute resolution procedures, with an in-depth emphasis on negotiation, mediation and arbitration. Effective: 2009 Fall Semester.

ICL 219—Advanced Writing Project (4)
Project (Term Project). Prerequisite(s): ICL 201; Law school education or the equivalent. The completion of a written research project under the active supervision of a faculty member in satisfaction of the research-writing requirement. (S/U grading only.) Effective: 2002 Summer Special Session.

ICL 220—United States Taxation of Multinational Investments (2)
Lecture/Discussion—20 hours. Prerequisite(s): ICL 201; Law school education or the equivalent. An analysis of the United States taxation of multinational investments including jurisdiction of tax, the U.S. tax system, foreign tax credits, treaties, and transfer pricing. Effective: 2002 Summer Special Session.

ICL 227—Criminal Procedure (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Federal constitutional limits on government authority to gather evidence and investigate crime. Includes Fourth Amendment limits on search, seizure, and arrest; Fifth Amendment privilege against self-incrimination; Sixth Amendment right to counsel. Effective: 2009 Summer Quarter.

ICL 228A—Mergers and Acquisitions Law (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Practical approach to mergers and acquisitions with an in-depth look at the planning, negotiation and completion of mergers and acquisitions. Effective: 2013 Fall Quarter.

ICL 228AS—Mergers and Acquisitions Law (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Practical approach to mergers and acquisitions with an in-depth look at the planning, negotiation and completion of mergers and acquisitions. Effective: 2013 Fall Quarter.

ICL 236—United States Securities Law & Regulation (2)
Lecture/Discussion—20 hours. Prerequisite(s): ICL 201; Law school education or the equivalent. Structural and jurisdictional issues associated with securities practice. Topics include the regulation of public offerings, transactions by corporate insiders, regulation of corporate disclosure and conduct, and the liabilities of corporations and individuals under anti-fraud provisions. Effective: 2002 Summer Special Session.

ICL 239—Mediation (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Introduction to the mediation process. Development of communication skills, the ability to analyze disputes, to understand why mediations succeed or fail, and understand the advantages and limitations of mediation as a method of resolving disputes. Effective: 2009 Fall Semester.

ICL 242—Private International Law (2)
Lecture/Discussion—20 hours. Prerequisite(s): ICL 201; Law school education or the equivalent. Operating law across national borders; emphasis on methods of resolving international disputes. International aspects of jurisdiction, choice of law, judgment enforcement, forum choice, process service, taking of evidence, foreign sovereign immunity, extraterritorial regulation of antitrust, securities; other national laws. Effective: 2004 Summer Special Session.

ICL 242S—Private International Law (2)
Lecture/Discussion—20 hours. Prerequisite(s): ICL 201; Law school education or the equivalent. Operating law across national borders; emphasis on methods of resolving international disputes. International aspects of jurisdiction, choice of law, judgment enforcement, forum choice, process service, taking of evidence, foreign sovereign immunity, extraterritorial regulation of antitrust, securities; other national laws. Effective: 2011 Fall Quarter.

ICL 247—Banking Law (1)
Lecture/Discussion—10 hours. Prerequisite(s): ICL 201; Law school education or the equivalent. Institutional features of international banking transactions, the structure of a large financial deal, and the mechanics of overseeing large loans. Emphasis on negotiable instruments such as bills of lading, letters of credit, standby letters of credit, and interbank transactions. Offered every three years. Effective: 2002 Summer Special Session.

ICL 249—Comparative Law (1)
Lecture/Discussion—10 hours. Prerequisite(s): ICL 201; Law school education or the equivalent. A comparative study of the development of schools of legal thought, chiefly Common law systems and Civil law traditions. Attention to the historical reasons for their divergence, contemporary aproaches to universal problems such as succession, torts, and contracts, the cross-fertilization of laws and difficulties commonly associated with importing foreign law into new territory. Effective: 2002 Summer Special Session.

ICL 250—International Trade Law (3)
Lecture/Discussion—20 hours. Prerequisite(s): ICL 201; Law school education or the equivalent. An investigation of global trading systems including international trade in goods and services, e-commerce, international intellectual property, international tax planning and investment. Includes substantive and procedural provisions of the World Trade Organization (WTO) and the North American Free Trade Agreement (NAFTA). Offered every three years. Effective: 2002 Summer Special Session.

ICL 251—United States Litigation Issues (1)
Lecture/Discussion—10 hours. Prerequisite(s): ICL 201; Law school education or the equivalent. Prevention and resolution of disputes in international commerce. Emphasis on preparing for a trial in the United States. Includes the study of pre-trial motions, jury selection, opening statements, rules of evidence, closing arguments, and the selection of appropriate strategies. Offered every three years. Effective: 2002 Summer Special Session.

ICL 262—Antitrust (1)
Lecture/Discussion—10 hours. Prerequisite(s): ICL 201; Law school education or the equivalent. Historical and institutional background of Antitrust law in the United States. The statutory framework including price fixing, limits on distribution, monopolization and mergers, and reporting requirements. Effective: 2002 Summer Special Session.

ICL 270—Financing International Transactions (3)
Lecture/Discussion—20 hours. Prerequisite(s): ICL 201; Law school education or the equivalent. How capital is raised in international markets. Investment strategies for U.S. markets. Taxation of financial investments, international currency regulation, and assessing rates of return on international investments. Offered every three years. Effective: 2002 Summer Special Session.

ICL 274—Intellectual Property (2)
Lecture/Discussion—20 hours. Prerequisite(s): ICL 201; Law school education or the equivalent. Intensive study of intellectual property law. Including copyright, trademark and patent law and unfair competition. Effective: 2002 Summer Special Session.

ICL 274S—Intellectual Property (2)
Lecture/Discussion—20 hours. Prerequisite(s): ICL 201; Law school education or the equivalent. Intensive study of intellectual property law. Including copyright, trademark and patent law and unfair competition. Effective: 2011 Fall Quarter.

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ICL 283—Contract Remedies (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Covers a range of remedies for contract breach: remedies under common law and equity, liquidated damages clauses, remedies for mistake and unconscionability as well as breach of contract for the Sale of Goods under UCC Article II. Effective: 2014 Winter Quarter.

ICL 283S—Contract Remedies (2)
Discussion/Laboratory—20 hours. Prerequisite(s): ICL 202A; ICL 202B; Or equivalent; Law School education or equivalent. Covers a range of remedies for contract breach: remedies under common law and equity, liquidated damages clauses, remedies for mistake and unconscionability as well as breach of contract for the Sale of Goods under UCC Article II. Effective: 2014 Winter Quarter.

ICL 285—Environmental Law (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Introduction to federal and state environmental law. Historical development of environmental law; the role of courts, the legislature and the executive branch in the development and implementation of environmental policy. Review of major statutes. Effective: 2009 Fall Semester.

ICL 289—Licensing Academy in Intellectual Property & Technology Commercialization (4)
Lecture/Discussion—20 hours. Prerequisite(s): ICL 201; Law School education or equivalent. Intellectual property as it relates to current forms of legal protection and how new innovations fit into these models, including public-private technology transfer, patents, institutional objectives, technology transfer offices, startups, and licenses. Effective: 2013 Summer Special Session.

ICL 290—American Legal System Research Seminar (1)
Seminar—5 hours. Prerequisite(s): ICL 201; Law School education or equivalent. American legal system and its structure. Legal research methodologies and presentation with attention to analysis, synthesis, organization, and editing techniques common to legal writing. (S/U grading only.) Effective: 2004 Summer Special Session.

ICL 291C—International Commercial Law Seminar (4)
Seminar—20 hours. Prerequisite(s): ICL 201; Law School education or equivalent. Advanced seminar on a current topic in International Commercial Law. Offered at the University of Cologne in Cologne, Germany for two weeks each summer. May be repeated up to 3 time(s) when topic differs. Effective: 2013 Summer Special Session.

ICL 292—International Commercial Law Seminar (1-4)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Advanced seminar in a current topic in International Commercial Law. Topic will change each year the course is offered. May be repeated up to 2 time(s) when topic differs. Effective: 2013 Summer Session 1.

ICL 292S—International Commercial Law Seminar (1-4)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Advanced seminar in a current topic in International Commercial Law. Topic will change each year the course is offered. May be repeated up to 2 time(s) when topic differs. Effective: 2013 Spring Semester.

ICL 299—Advanced Research in Legal Problems (1-4)
Variable—3-40 hours. Prerequisite(s): ICL 201; Law School education or equivalent. Permission of supervising instructor. Student individualized research projects under faculty supervision. (S/U grading only.) Effective: 2002 Summer Special Session.

International & Community Nutrition

International & Community Nutrition | International & Community Nutrition (Designated Emphasis)

Kathryn G. Dewey, Ph.D., Program Director

Program Office. 3253 Meyer Hall; 530-752-1992; http://picn.ucdavis.edu/

Faculty. http://picn.ucdavis.edu/people/faculty/

Graduate Study. The Program in International and Community Nutrition, an Organized Research Unit located in the Department of Nutrition, coordinates specialized course work and research leading to the Designated Emphasis in International and Community Nutrition for students in various graduate programs. The program focuses on both theoretical and practical issues concerning the identification, treatment, and prevention of human nutritional problems in low-income countries and in disadvantaged groups in the United States. Students enrolled in the Designated Emphasis are expected to (1) complete the course requirements already established by their respective graduate programs, (2) participate in a weekly advanced seminar in international and community nutrition, (3) complete additional core courses in international nutrition (Nutrition 219A, 219B, 258) and selected courses in the related disciplines of epidemiology, statistics, and social and behavioral sciences, and (4) conduct their dissertation research on a relevant topic under the supervision of a professor who is a member of the Program in International and Community Nutrition.

Students accepted into the following doctoral programs are automatically eligible to participate in the Designated Emphasis: Nutrition, Agricultural and Resource Economics, Epidemiology, Anthropology, and Human Development. Students from other programs may also be accepted by special request to the Program Director. Upon graduation, students receive a Ph.D. in their major field, with specific recognition for the Designated Emphasis in International and Community Nutrition.

Graduate Advisor. Contact the Program office.

International Relations

International Relations | International Relations A.B.

Ethan Scheiner, Ph.D., Program Director

Program Office. 464 Kerr Hall; 530-754-809

Problems of security, development, ethnic conflict, human rights, health, and the environment are increasingly confronted at a global rather than a national level. With its theoretical models and real-world application, the study of international relations is an exciting and highly relevant interdisciplinary major.

The Program. Graduation with a major in international relations requires completion of introductory courses in political science, economics, statistics, and history. The major also requires fluency in English and a working knowledge (approximately 24 to 30 units of course credits or equivalent fluency) of one other modern language. Students choose one of four tracks that encompass major topical areas in combination with an area studies emphasis:

(1) World Trade and Development;
(2) Peace and Security;
(3) Global Environment, Health, and Natural Resources;
(4) Peoples and Nationalities. *Upper division course work for Tracks I, II and III is composed of twelve courses. Students choosing Track IV, Peoples and Nationalities, are required to study or work abroad for a minimum of one quarter; upper division course work is reduced to nine classes in recognition of the experience gained through education abroad.*

Programs, Internships, and Career Alternatives. One program of special interest to international relations majors is the Education Abroad Program, which provides insights into the life and culture of other countries. At UC Davis, the Internship and Career Center assists students in obtaining legislative, legal, and business internships. In addition, the UC Davis Washington Center and UC Center Sacramento arrange internships and run full-credit academic program in Washington, D.C. and Sacramento respectively with a full range of opportunities for International Relations majors (see also UC Washington Center (UCDC). International relations graduates are prepared for employment in government agencies (such as the Foreign Service), state agencies, international or non-governmental organizations (such as the United Nations), foundations, and companies having interests in international business, trade, or finance. The stringent language

requirement of the major program enhances career prospects in jobs which demand knowledge of the language and culture of other countries.

International Relations Abroad. International Relations strongly encourages all students to participate in the UC Education Abroad Program; those who choose to study Track IV, Peoples and Nationalities, must study or work abroad for a minimum of one quarter. A maximum of five courses taken abroad may be applied toward the 12 upper division courses in Tracks I, II, and III of the International Relations major. In Track IV, the four Area Studies courses may be done abroad. Courses are selected with the approval of an advisor for the International Relations program.

Major Advisor. Consult department office.

Preparatory Subject Matter **Units:** 28-54

ECN 001A	Principles of Microeconomics	4
OR		
ANT 002	Cultural Anthropology	5
HIS 004C	History of Western Civilization	4
OR		
HIS 010C	World History III	4
ECN 001B	Principles of Macroeconomics	4
POL 002	Introduction to Comparative Politics	4
POL 003	International Relations	4
POL 051	Scientific Study of Politics	4

Choose one:

POL 012Y	Data Visualization in the Social Sciences	4
STA 013	Elementary Statistics	4
SOC 046B	Introduction to Social Research	5

Note: Preparatory Subject Matter does not cover all potential prerequisite courses for upper division curriculum.

Foreign language **Units:** 0-30

One of the following series in a single language, or certified fluency at the highest level required below:

ARB 001	Elementary Arabic 1	5
ARB 002	Elementary Arabic 2	5
ARB 003	Elementary Arabic 3	5
ARB 021	Intermediate Arabic 21	4
ARB 022	Intermediate Arabic 22	4
ARB 023	Intermediate Arabic 23	4
CHN 001	Elementary Chinese	5
CHN 002	Elementary Chinese	5
CHN 003	Elementary Chinese	5
CHN 004	Intermediate Chinese	5
CHN 005	Intermediate Chinese	5
CHN 006	Intermediate Chinese	5
OR		
CHN 001A	Accelerated Intensive Elementary Chinese	15
CHN 004	Intermediate Chinese	5
CHN 005	Intermediate Chinese	5

CHN 006	Intermediate Chinese	5
OR		
CHN 001CN	Mandarin for Cantonese Speakers I	5
CHN 002CN	Mandarin for Cantonese Speakers II	5
CHN 003CN	Mandarin for Cantonese Speakers III	5
OR		
CHN 001BL	Accelerated Written Chinese I	5
CHN 002BL	Accelerated Written Chinese II	5
CHN 003BL	Accelerated Written Chinese III	5
FRE 001	Elementary French	5
FRE 002	Elementary French	5
FRE 003	Elementary French	5
FRE 021	Intermediate French	5
FRE 022	Intermediate French	5
GER 001	Elementary German	5
GER 002	Elementary German	5
GER 003	Elementary German	5
GER 020	Intermediate German	4
GER 021	Intermediate German	4
HEB 001	Elementary Hebrew	5
HEB 002	Elementary Hebrew	5
HEB 003	Elementary Hebrew	5
HEB 021	Intermediate Modern Hebrew I	4
HEB 022	Intermediate Modern Hebrew II	4
HEB 023	Intermediate Modern Hebrew III	4
HIN 001	Elementary Hindi/Urdu I	5
HIN 002	Elementary Hindi/Urdu II	5
HIN 003	Elementary Hindi/Urdu III	5
HIN 021	Intermediate Hindi/Urdu I	4
HIN 022	Intermediate Hindi/Urdu II	4
HIN 023	Intermediate Hindi/Urdu III	4
ITA 001	Elementary Italian	5
ITA 002	Elementary Italian	5
ITA 003	Elementary Italian	5
ITA 004	Intermediate Italian	4
ITA 005	Intermediate Italian	4
OR		
ITA 001	Elementary Italian	5
ITA 002	Elementary Italian	5
ITA 003	Elementary Italian	5
ITA 008A	Italian Conversation	3
ITA 008B	Italian Conversation	3
JPN 001	Elementary Japanese	5
JPN 002	Elementary Japanese	5
JPN 003	Elementary Japanese	5
JPN 004	Intermediate Japanese	5
JPN 005	Intermediate Japanese	5
JPN 006	Intermediate Japanese	5
OR		
JPN 001A	Accelerated Intensive Elementary Japanese	15

JPN 004	Intermediate Japanese	5
JPN 005	Intermediate Japanese	5
JPN 006	Intermediate Japanese	5
POR 001	Elementary Portuguese	5
POR 002	Elementary Portuguese	5
POR 003	Elementary Portuguese	5
POR 021	Intermediate Portuguese	5
POR 022	Intermediate Portuguese	5
RUS 001	Elementary Russian	5
RUS 002	Elementary Russian	5
RUS 003	Elementary Russian	5
RUS 004	Intermediate Russian	4
RUS 005	Intermediate Russian	4
SPA 001	Elementary Spanish	5
SPA 002	Elementary Spanish	5
SPA 003	Elementary Spanish	5
SPA 021	Intermediate Spanish	5
SPA 022	Intermediate Spanish	5
OR		
SPA 031	Intermediate Spanish for Native Speakers I	5
SPA 032	Intermediate Spanish for Native Speakers II	5
SPA 033	Intermediate Spanish for Native Speakers III	5

Note: The language curricula are subject to change; please check with an adviser for the major. A language not listed above may be substituted only with prior written approval of the International Relations Program Committee.

Depth Subject Matter **Units:** 36-48

Tracks I, II and II: Twelve upper division courses

Track IV: Nine upper division courses

Choose one track:

Track I: World Trade and Development
Emphasizes contemporary economic relations of industrialized and developing countries.

For Advanced Industrialized Focus:

ECN 100A	Intermediate Micro Theory: Consumer and Producer Theory	4
ECN 101	Intermediate Macro Theory	4
ECN 160A	International Microeconomics	4
ECN 160B	International Macroeconomics	4
POL 123	The Politics of Interdependence	4

Choose two from Group A.
Choose one from Group B.
Choose four to fulfill Area Studies Requirement.

For Developing Countries Focus:

ECN 115A	Economic Development	4
ECN 115B	Economic Development	4

ECN 162	International Economic Relations	4
POL 123	The Politics of Interdependence	4
POL 124	The Politics of Global Inequality	4

Choose one from Group A.
Choose two from Group B.
Choose four to fulfill Area Studies Requirement.

Group A; Advanced Industrialized Countries:

ARE 138	International Commodity and Resource Markets	4
ANT 127	Urban Anthropology	4
CRD 118	Technology and Society	4
CRD 141	Organization of Economic Space	4
ECN 102	Analysis of Economic Data	4
ECN 110B	World Economic History Since the Industrial Revolution	4
IRE 104	The Political Economy of International Migration	4
POL 130	Recent U.S. Foreign Policy	4
POL 140A	Comparative Political Institutions: Electoral Systems	4
POL 140B	Comparative Political Institutions: Parties	4
POL 140C	Comparative Political Institutions: Legislatures	4
POL 140D	When Institutions Fail	4
POL 140E	Policy-Making Processes	4
SOC 138	Economic Sociology	4
SOC 139	Corporations and Society	4
SOC 141	Industrialization and Social Change	4
SOC 183	Comparative Organizations	4

Group B; Developing Countries:

ANT 122A	Economic Anthropology	4
ANT 122B	Anthropology and Political Economy	4
ANT 126A	Anthropology of Development	4
ANT 126B	Women and Development	4
ANT 127	Urban Anthropology	4
CRD 153A	International Community Development: Asia	4
CRD 153B	International Community Development: Europe	4
CRD 153C	International Community Development: Africa	4
CRD 180	Transnational Community Development	4
ECN 110B	World Economic History Since the Industrial Revolution	4
IAD 103	Social Change and Agricultural Development	4
IRE 104	The Political Economy of International Migration	4
POL 124	The Politics of Global Inequality	4
POL 126	Ethnic Self-Determination and International Conflict	4
POL 142A	Comparative Development: Political Development in Modernizing Societies	4
SAS 121	Global Poverty: Critical Thinking and Taking Action	4
SOC 138	Economic Sociology	4
SOC 141	Industrialization and Social Change	4
SOC 145A	Sociology of Third World Development	4
SOC 145B	Gender and Rural Development in the Third World	4

Track II: Peace and Security

Focuses on political and security relationships among states and non-state actors, examining questions of war, peace, alliances, and diplomacy.

Choose five courses spanning two disciplines:

ECN 162	International Economic Relations	4
HIS 119	World War I	4
HIS 120	World War II	4
HIS 174B	War, Prosperity, and Depression: United States, 1917-1945	4
HIS 174C	The United States Since World War II, 1945 to the Present	4
POL 120	Theories of International Politics	4
POL 121	Scientific Study of War	4
POL 130	Recent U.S. Foreign Policy	4
POL 132	National Security Policy	4

Choose three additional courses from at least two departments:

COM 157	War and Peace in Literature	4
ECN 122	Theory of Games and Strategic Behavior	4
HIS 145	War and Revolution in Europe 1789-1918	4
HIS 146A	Europe in the Twentieth Century	4
HIS 146B	Europe in the Twentieth Century	4
PHI 118	Political Philosophy	4
POL 112	Contemporary Democratic Theory	4
POL 122	International Law	4
POL 124	The Politics of Global Inequality	4
POL 126	Ethnic Self-Determination and International Conflict	4
POL 131	Analysis of U.S. Foreign Policy	4
POL 140A	Comparative Political Institutions: Electoral Systems	4
POL 140B	Comparative Political Institutions: Parties	4
POL 140C	Comparative Political Institutions: Legislatures	4
POL 140D	When Institutions Fail	4
POL 140E	Policy-Making Processes	4
RST 131	Genocide (Discontinued)	4
RST 134	Human Rights	4
SOC 100	Origins of Modern Sociological Theory	4
SOC 118	Political Sociology	4
SOC 157	Social Conflict	4
WMS 102	Gender and Post Colonialism	4

Choose four courses to fulfill Area Studies Requirement.

Track III: Global Environment, Health, and Natural Resources

Familiarizes students with new sources of global interdependence such as biodiversity, natural resource conflicts, population growth, and world health.

Note: Some courses shown below have additional prerequisites.

ECN 162	International Economic Relations	4
POL 123	The Politics of Interdependence	4
ESP 161	Environmental Law	4
OR		
ESP 162	Environmental Policy	4

Choose one:

ANT 101	Ecology, Nature, and Society	4
ANT 131	Ecology and Politics	4
ESP 164	Ethical Issues in Environmental Policy	3
PHI 120	Environmental Ethics	4

Choose two:

ARE 147	Resource and Environment Policy Analysis	3
ARE 175	Natural Resource Economics	4
ARE 176	Environmental Economics	4
ANT 103	Indigenous Peoples and Natural Resource Conservation	4
ABT 182	Environmental Analysis using GIS	4
CRD 149	Community Development Perspectives on Environmental Justice	4
ECN 115A	Economic Development	4
ECN 125	Energy Economics	4
ESP 164	Ethical Issues in Environmental Policy	3
IAD 170	Program Development for International Agriculture	4
PHI 120	Environmental Ethics	4
PHY 160	Environmental Physics and Society	3
POL 107	Environmental Politics and Administration	4
POL 175	Science, Technology, and Policy	4
SOC 160	Sociology of the Environment	4

Choose two from one of the following groups:

Atmospheric and Marine Environments:

ATM 116	Modern Climate Change	3
ATM 149	Air Pollution	4
ESM 131	Air as a Resource	3
ESM 120	Global Environmental Interactions	4
ESM 121	Water Science and Management	3
ESP 166N	Ocean and Coastal Policy (Discontinued)	3
GEL 116N	Oceanography	3

Land Use and Energy Supply:

ANT 104N	Cultural Politics of the Environment	4
CRD 142	Rural Change in the Industrialized World	4
ESM 144	Trees and Forests	4
ESP 167	Energy Policy	4
GEL 130	Non-Renewable Natural Resources	3
GEL 134	Environmental Geology and Land Use Planning	3
PLS 101	Agriculture and the Environment	3
PLS 144	Trees and Forests	4
PLS 150	Sustainability and Agroecosystem Management	4
PLS 160	Agroforestry: Global and Local Perspectives	3
POL 171	The Politics of Energy	4

Health and Human Populations:

ANT 121	Special Topics in Medical Anthropology	4
ANT 129	Health and Medicine in a Global Context	4
ANT 131	Ecology and Politics	4
ESP 121	Population Ecology	4

ETX 101	Principles of Environmental Toxicology	4
IDI 141	Infectious Diseases of Humans	1
NUT 111AY	Introduction to Nutrition and Metabolism	3
NUT 111B	Recommendations and Standards for Human Nutrition	2
NUT 118	Community Nutrition	4
SOC 170	Population	4

Choose four courses to fulfill Area Studies Requirement.

Track IV: Peoples and Nationalities

Examines social and cultural foundations of national development and international relations.

Choose two:

ANT 123AN	Resistance, Rebellion, and Popular Movements	4
ANT 130A	Cultural Dimensions of Globalization	4
SOC 118	Political Sociology	4
SOC 156	Social Movements	4
SOC 181	Social Change Organization	4

Choose one each from three of the following four groups:

The Mixing of Peoples:

ANT 130BN	Migration and the Politics of Place and Identity	4
ANT 139AN	Race, Class, Gender Systems	4
CRD 176	Comparative Ethnicity	4
HMR 131	Genocide	4
HMR 134	Human Rights	4
IRE 104	The Political Economy of International Migration	4
POL 126	Ethnic Self-Determination and International Conflict	4

Women:

ANT 126B	Women and Development	4
ANT 139BN	Gender and Sexuality	4
HDE 103	Cross-Cultural Study of Children	4
SOC 145B	Gender and Rural Development in the Third World	4
WMS 102	Gender and Post Colonialism	4
WMS 182	Globalization, Gender and Culture	4

Religion:

ANT 124	Religion in Society and Culture	4
ANT 134	Buddhism in Global Culture	4
PHI 105	Philosophy of Religion	4
RST 106	Christianity in the Contemporary World	4
RST 161	Modern Islam	4
RST 161B	Modern Islam: Authority and Tradition In Process	4
RST 170	Buddhism	4
SOC 146	Sociology of Religion	4

Development and its Impact on Social Cleavages:

ANT 122B	Anthropology and Political Economy	4
ANT 126A	Anthropology of Development	4

ANT 126B	Women and Development	4
CRD 180	Transnational Community Development	4
POL 124	The Politics of Global Inequality	4
POL 142A	Comparative Development: Political Development in Modernizing Societies	4
SAS 121	Global Poverty: Critical Thinking and Taking Action	4
SOC 145A	Sociology of Third World Development	4
SOC 145B	Gender and Rural Development in the Third World	4

Four courses to fulfill Area Studies Requirement
Education/Internship Abroad for a minimum of one quarter

Area Studies Requirement
Choose four: Courses must incorporate at least two of three groups (History, Social Analysis, Culture and Literature); we encourage students to take all four courses from one region, but will accept a minimum of three from one region and one from a different region. Tracks I, II and III students who choose to take advantage of an Education Abroad experience may fulfill the Area Studies requirement by completing three courses instead of four; all three courses must be from one region.

Africa and the Middle East

History:

HIS 113	History of Modern Israel	4
HIS 115A	History of West Africa	4
HIS 115B	History of East Africa and the Indian Ocean	4
HIS 115C	History of Southern Africa from Exploration to the Rainbow Nation	4
HIS 115D	Postcolonial Africa	4
HIS 115F	History of Modern North Africa, 1800 to the Present	4
HIS 116	African History: Special Themes	4
HIS 193B	History of the Modern Middle East, From 1914	4
HIS 193C	The Middle East Environment: Historical Change and Current Challenges	4
HIS 193D	History of Modern Iran, From 1850 to Present	4

Social Analysis:

AAS 107C	African Descent Communities and Culture in Asia	4
AAS 107D	African Descent Communities and Cultures in Europe	4
AAS 110	West African Social Organization	4
AAS 111	Cultural Politics in Contemporary Africa	4
AAS 156	Language and Identity in Africa and the African Diaspora	4
AAS 176	The Politics of Resources	4
AAS 177	Politics of Life in Africa	4
ANT 140A	Cultures and Societies of West and Central Africa	4
ANT 140B	Cultures and Societies of East and South Africa	4

ANT 142	Peoples of the Middle East	4
CRD 153C	International Community Development: Africa	4
HMR 136	Human Rights in the Middle East	4
POL 135	International Politics of the Middle East	4
POL 136	The Arab-Israeli Conflict	4
POL 146A	Politics of Africa: Issues in Contemporary African Politics	4
POL 146B	Politics of Africa: Development in Africa	4
RST 163	Social Life of Islam	4
RST 167	Iraq	4
WMS 184	Gender in the Arab World	4
WMS 185	Women and Islamic Discourses	4

Culture and Literature:

AAS 153	African Literature	4
AAS 157	Literature and Society in South Africa	4
AAS 162	Islam in Africa and the Americas	4
AHI 150	Arts of Subsaharan Africa	4
COM 147	Modern Jewish Writers	4
COM 166	Literatures of the Modern Middle East	4
DRA 155A	African American Dance and Culture in the United States, Brazil and the Caribbean	4
FRE 124	Post-Colonial and Francophone Literature	4
JST 111	Israeli Writing Since 1960	4

East and South Asia

History:

HIS 191E	The Chinese Revolution	4
HIS 191F	History of the People's Republic of China	4
HIS 194C	Modern Japan	4
HIS 194D	Business and Labor in Modern Japan	4
HIS 194E	Education and Technology in Modern Japan	4
HIS 195B	History of Modern Korea	4
HIS 196B	Modern India	4

Social Analysis:

AAS 107C	African Descent Communities and Culture in Asia	4
ANT 143A	Ethnology of Southeast Asia	4
ANT 147	Modern South Asia Cinema	4
ANT 148A	Culture and Political Economy in Contemporary China	4
ANT 149B	Contemporary Japanese Society	4
CRD 153A	International Community Development: Asia	4
ECN 171	Economy of East Asia	4
POL 148A	Government and Politics of East Asia: China	4
POL 148B	Government and Politics in East Asia: Japan	4
POL 148C	Government and Politics in East Asia: Southeast Asia	4
RST 157	Hindu Women and Goddesses	4
RST 165	Islam in Asia	4

SOC 147	Sociological Perspectives on East Asia	4
SOC 188	Markets, Culture and Inequality in China	4

Culture and Literature:

ANT 145	Performance, Embodiment, and Space in South Asia	4
AHI 163C	Early Modern Chinese Painting	4
CHN 101	Chinese Film	4
CHN 103	Modern Chinese Drama	4
CHN 104	Modern Chinese Fiction (in English)	4
CHN 105	Western Influences on Twentieth-Century Chinese Literature (in English)	4
CHN 110	Great Writers of China: Texts and Context (in English)	4
CHN 132	Readings in Modern Chinese Poetry	4
COM 110	Hong Kong Cinema	4
DRA 154	Asian Theatre and Drama: Contexts and Forms	4
EAS 113	Cinema and Society in China	4
JPN 103	Japanese Literature in Translation: The Modern Period	4
JPN 104	Modern Japanese Literature: War and Revolution	3
JPN 105	Modern Japanese Literature: Hero and Anti-hero	4
JPN 106	Japanese Culture Through Film	4
JPN 131	Readings in Modern Japanese Literature: 1920-1945	4
JPN 132	Readings in Modern Japanese Literature: 1945-1970	4
JPN 133	Readings in Modern Japanese Literature: 1970-Present	4
JPN 135	Readings in the Humanities: The Modern Period	4
JPN 136	Readings in Newspapers and Magazines	4
RST 156	Religion and the Performing Arts in India	4

Latin America History:

HIS 159	Women and Gender in Latin American History	4
HIS 161	Human Rights in Latin America	4
HIS 162	History of the Andean Region	4
HIS 163B	History of Brazil	4
HIS 164	History of Chile	4
HIS 165	Latin American Social Revolutions	4
HIS 166B	History of Mexico since 1848	4
HIS 167	Modern Latin American Cultural and Intellectual History	4
HIS 168	History of Inter-American Relations	4

Social Analysis:

AAS 107A	African Descent Communities and Culture in the Caribbean and Latin America	4
AAS 180	Race and Ethnicity in Latin America	4

ANT 144	Contemporary Societies and Cultures of Latin America	4
CHI 130	United States-Mexican Border Relations	4
NAS 120	Ethnopolitics of South American Indians	4
NAS 133B	Ethnohistory of Native Peoples of Mexico and Central America 1500 to 2000	4
POL 143A	Latin American Politics	4
POL 143B	Mexican Politics	4
SOC 158	Women's Social Movements in Latin America	4

Culture and Literature:

AAS 163	African Religions in the Americas	4
AHI 151	Arts of the Indians of the Americas	4
CHI 160	Mexican Film and Greater Mexican Identity	4
COM 152	Literature of the Americas	4
COM 165	Caribbean Literatures	4
DRA 155A	African American Dance and Culture in the United States, Brazil and the Caribbean	4
NAS 184	Contemporary Indigenous Literature of Mexico	4
POR 163	20th C Masters in Brazilian Literature	4
SPA 149	Latin-American Literature in Translation	4
SPA 153	Latin American Short Story	4
SPA 154	Latin American Novel	4
SPA 155	Mexican Novel	4
SPA 156	Latin American Literature of the Turn of the 20th Century	4
SPA 157	Great Works of Latin American Literature/Culture	4
SPA 158	Latin American Poetry: From Vanguardism to Surrealism and Beyond	4
SPA 159	Special Topics in Latin American Literature and Culture	4
SPA 160	Latin American Women Writers in Translation	4
SPA 170	Introduction to Latin American Culture	4
SPA 172	Mexican Culture	4

Russian and East/Central Europe

History:

HIS 138B	Reform and Revolution in Tsarist Russia, 1825-1917	4
HIS 138C	Russian History: The Rise and Fall of the Soviet Union, 1917 to the Present	4
HIS 143	History of Eastern Europe and the Balkans	4

Social Analysis:

POL 144A	Politics of Post-Communist Countries: East European Politics	4
POL 144B	Politics of Post-Communist Countries: Russia	4

Culture and Literature:

RUS 124	Twentieth-Century Russian Literature	4
RUS 129	Russian Film	4

RUS 130	Contemporary Russian Culture	4
RUS 133	Post-Soviet Literature	4
RUS 142	Women in Russian Culture	4
RUS 150	Russian Culture	4

Western Europe

History:

HIS 140	The Rise of Capitalism in Europe	4
HIS 141	France Since 1815	4
HIS 142A	History of the Holocaust	4
HIS 144B	History of Germany since 1789	4
HIS 145	War and Revolution in Europe 1789-1918	4
HIS 146A	Europe in the Twentieth Century	4
HIS 146B	Europe in the Twentieth Century	4
HIS 147B	European Intellectual History, 1870-1920	4
HIS 147C	European Intellectual History, 1920-1970	4
HIS 151D	Industrial England	4

Social Analysis:

AAS 107D	African Descent Communities and Cultures in Europe	4
CRD 153B	International Community Development: Europe	4
POL 137	International Relations in Western Europe	4
POL 147A	West European Politics	4
POL 147B	West European Politics: British Politics	4
POL 147C	West European Politics: French Politics	4
POL 147D	West European Politics: German Politics	4

Culture and Literature:

FMS 121	New Italian Cinema	4
FMS 176A	Classic Weimar Cinema	4
FMS 176B	Postwar German Cinema	4
FRE 107	The Making of Modern France	4
FRE 108	Modern French Culture	4
FRE 120	Modern French Thought	4
FRE 121	Twentieth Century French Novel	4
FRE 133	Gender and Politics in French Literature and Culture	4
GER 112	Topics in German Literature	4
GER 114	From Marlene Dietrich to Run, Lola Run: German Women and Film	4
GER 115	German Literature Since 1945	4
GER 117	After the Catastrophe: Jews and Jewish Life in Post-1945 Germany	4
GER 118B	Weimar Culture: Defeat, the Roaring Twenties, the Rise of Nazism	4
GER 118C	Germany Under the Third Reich	4
GER 118E	Contemporary German Culture	4
GER 120	Survey of German Culture	4
GER 126	Modern German Literature	4
GER 129	Postwar Women Writers	4
GER 141	The Holocaust and its Literary Representation	4
GER 142	New German Cinema	4
GER 143	Language Through Media	4

GER 168	Multiculturalism in German Literature	4
GER 185	The Age of Bismarck	4
ITA 107	Survey of Italian Culture and Institutions	4
ITA 108	Contemporary Issues in Italian Culture and Society	4
ITA 120A	Italian Literature of the Twentieth Century: The Novel	4
ITA 120B	Italian Literature of the Twentieth Century: Poetry and Drama	4
SPA 137N	Twentieth-Century Spanish Fiction	4
SPA 138N	Modern and Contemporary Spanish Poetry	4
SPA 139	Modern Spanish Theater	4
SPA 140N	Modern Spanish Essay	4
SPA 141	Introduction to Spanish Culture	4
SPA 142	Special Topics in Spanish Cultural and Literary Studies	4
SPA 148	Cinema in the Spanish-Speaking World in Translation	4
SPA 157	Great Works of Latin American Literature/Culture	4
SPA 170	Introduction to Latin American Culture	4

Total: 64-102

International Relations | IRE Courses

Courses in IRE:

IRE 001—Global Interdependence (4)
Discussion—1 hour; Lecture—3 hours. Development of the concept of global interdependence along its
political, economic, demographic, cultural, technological, and environmental dimensions. Focus on the ways societies and states interact. Course provides the foundation for upper division multidisciplinary work in international relations. GE credit: SS, WE. Effective: 1997 Winter Quarter.

IRE 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

IRE 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

IRE 104—The Political Economy of International Migration (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, SOC 003, or SOC 004 recommended. Analysis of worldwide migration patterns, and social scientific theories of international and transnational migration. Focus in economical, political, and social impact of immigration and potential for international and regional cooperation. (Sociology 104.) GE credit: SS, WC. Effective: 2016 Fall Quarter.

IRE 190—Topics in International Relations (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Selected topics in international relations. Variable content. May be repeated for credit when topic differs. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

IRE 192—International Relations Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Work experience in international relations, with term paper summarizing the practical experience of the student. (P/NP grading only.) GE credit: SS, WE. Effective: 1997 Winter Quarter.

IRE 194HA—Special Study for Honors Students (4)
Seminar—2 hours; Term Paper. Prerequisite(s): Open only to majors of senior standing who qualify for Honors Program. Directed reading, research, and writing on topics selected by students and instructor culminating in preparation of a senior honors thesis under direction of a faculty advisor. GE credit: OL, SS, WE. Effective: 1997 Winter Quarter.

IRE 194HB—Special Study for Honors Students (4)
Seminar—2 hours; Term Paper. Prerequisite(s): Open only to majors of senior standing who qualify for Honors Program. Directed reading, research, and writing on topics selected by students and instructor culminating in preparation of a senior honors thesis under direction of a faculty advisor. GE credit: OL, SS, WE. Effective: 1997 Winter Quarter.

IRE 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

IRE 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

International Science Studies Minor; Land, Air & Water Resources

International Science Studies Minor; Land, Air & Water Resources | International Science Studies Minor

This interdisciplinary minor in International Science Studies will introduce College of Agricultural and Environmental Sciences students to global issues, which affect their major disciplines in the current world, and also provide an opportunity to gain first hand experience abroad when appropriate. The goal of this minor is to enable our college students to develop greater international competence and to enhance their employability.

The minor assumes that the student will have a major in the sciences, and that classes taken under one of the three tracks in the minor will contribute depth to the existing major or establish depth in a selected additional field of study. Students will be expected to work closely with an academic advisor in developing an intellectually coherent program of the study. A minimum of 18 units of upper division work is required. Only a single course can be counted toward both major and minor and no course can be used to satisfy the requirements of more than one minor.

Minor Advisor. Shu-Hua Chen (Land, Air and Water Resources); 530-752-1822; shachen@ucdavis.edu.

International Science Studies **Units:** 24

Global issue course requirement.

Focusing on broad range of global issues and their impacts on ecological and environmental resources and biodiversity, in addition to international policy and economics. Beyond the courses taken under each track, choose two out of the three courses listed below:

ATM 116	Modern Climate Change	3
PLS 150	Sustainability and Agroecosystem Management	4
ARE 115B	Economic Development	4

Choose one of the following tracks:

Education Abroad Program courses taught overseas and relevant international internship activities will count towards the minor requirement with advisor's approval. For each track, students can take a maximum of three units from EAP courses, with a valid transcript, and three units from relevant international internship activities. The international internship activities would require a pre-approved study plan with the academic advisor before the maximum of three units can be awarded. Language and culture related courses are encouraged, but not required for the minor.

(1) Ecological, Environmental, and Energy Studies Track

Choose 16-17 units:

ANT 103	Indigenous Peoples and Natural Resource Conservation	4
ARE 147	Resource and Environment Policy Analysis	3
ATM 116	Modern Climate Change	3
ATM 133	Biometeorology	4
ESM 030	World Ecosystems & Geography	3
ESM 100	Principles of Hydrologic Science	4
ESM 121	Water Science and Management	3
ESM 131	Air as a Resource	3
ESM 144	Trees and Forests	4
ESM 120	Global Environmental Interactions	4
ESP 100	General Ecology	4
ESP 116	The Oceans (Discontinued)	3
ESP 151	Limnology	4
EVE 147	Biogeography	4
SSC 109	Sustainable Nutrient Management	4
HYD 143	Ecohydrology	4

(2) Policy and Management Focus Track

Choose 16-17 units:

ARE 115A	Economic Development	4
ARE 115B	Economic Development	4
ARE 138	International Commodity and Resource Markets	4
IRE 190	Topics in International Relations	4
CRD 156	Community Economic Development	5
CRD 180	Transnational Community Development	4
IAD 160	Agroforestry: Global and Local Perspectives	3
IAD 162	Field Course in Tropical Ecology and Sustainable Agricultural Development (Discontinued)	8
IAD 170	Program Development for International Agriculture	4
ESP 102	Cultural Ecology (Discontinued)	4
ESP 175	Natural Resource Economics	4

(3) Agriculture, Food, and Fiber Systems Track

Choose 16-17 units:

ANT 103	Indigenous Peoples and Natural Resource Conservation	4
ANT 130	Gender and Sexuality (Discontinued)	4
ATM 133	Biometeorology	4
CRD 153A	International Community Development: Asia	4
CRD 153B	International Community Development: Europe	4
ESM 121	Water Science and Management	3
ESM 131	Air as a Resource	3

EVE 138	Ecology of Tropical Latitudes	5
HYD 124	Plant-Water-Soil Relationships	4
PLS 150	Sustainability and Agroecosystem Management	4
PLS 160	Agroforestry: Global and Local Perspectives	3
FST 108	Food Processing Plant Sanitation (Discontinued)	2
FST 109	Principles of Quality Assurance in Food Processing	3
NUT 119A	International, community-based nutritional assessment.	1
NUT 119B	International, Community-Based Nutritional Assessment	6
TXC 174	Introduction to World Trade in Textiles and Clothing	4

Total: 24

Internship Program

Internship Program | Internship Program

Marcie Kirk Holland, Executive Director

The Internship and Career Center; 2nd Floor, South Hall 530-752-2855 http://icc.ucdavis.edu.

Program Areas

Agricultural and Environmental Sciences, Career Recruiting Programs, Engineering and Physical Sciences, Masters, Ph.D.s and Postdocs, Health and Biological Sciences, International Programs and Liberal Arts and Business.

Internship Experience

The Internship and Career Center facilitates a campus-wide internship program. All internships, both credit and non-credit, can be taken for Transcript Notation with completion of required evaluation reports. The notation briefly describes the nature and location of the internship experience. Questions pertaining to Transcript Notation may be directed to The Internship and Career Center.

Course Credit. Internship courses (numbered 92 and 192) are available for credit on a variable-unit and Passed/Not Passed grading basis. A maximum of 12 units of 92 and/or 192 courses may be counted toward the 180-unit minimum needed for graduation. To qualify for the 192 course, students must have acquired 84 units of credit. All credited internships require approval and sponsorship by a faculty member from an appropriate discipline. Arrangements may be made through the department of the sponsoring faculty member and facilitated by The Internship and Career Center Staff.

Iran & Persian Studies Minor; Middle East/South Asia Studies

Iran & Persian Studies Minor; Middle East/South Asia Studies | Iran & Persian Studies Minor

(College of Letters and Science)

Smriti Srinivas, Ph.D., Program Director

Program Office. 155 Kerr Hall; 530-754-4926; http://mesa.ucdavis.edu

Faculty. http://mesa.ucdavis.edu/directory-of-people/affiliated-faculty-1

The Iran & Persian Studies minor offers students courses on history and culture in the Iran & Persian world during the early modern and modern periods. It is an interdisciplinary minor open to undergraduates in all four colleges.

Minor Advisor. Consult the Middle East/South Asia Studies Program in 155 Kerr Hall 530-754-4926 or the Middle East/South Asia Studies website at http://mesa.ucdavis.edu.

Iran & Persian Studies **Units:** 20-24

MSA 100	Middle East and South Asia: Comparative Perspectives	4
MSA 180	Topics in Middle East and South Asian Studies	4

Choose one:

HIS 190D	Middle Eastern History IV: Safavids Iran, 1300-1720	4
HIS 193D	History of Modern Iran, From 1850 to Present	4

Choose one:

MSA 181A	Topics in Regional ME/SA Studies	4
MSA 182A	Undergraduate Proseminar in Middle East/South Asia	4

Choose additional electives from Core Course list:

Core Course List:

MSA 131A	Modern Iranian Cinema	4
OR		
CTS 146A	Modern Iranian Cinema	4
MSA 151A	Iranian Society & Culture	4
MSA 181A	Topics in Regional ME/SA Studies	4
MSA 182A	Undergraduate Proseminar in Middle East/South Asia	4
COM 155	Classical Literatures of the Islamic World 600-1900	4
HIS 190D	Middle Eastern History IV: Safavids Iran, 1300-1720	4
HIS 193D	History of Modern Iran, From 1850 to Present	4

With prior consultation with an advisor, students can petition in advance the Program Committee to accept:

Other elective courses toward the minor program if the content is 50% or more on the Iranian and Persian World. Under no circumstances may more than one lower division course be offered in satisfaction of requirements for the minor.

More than four units of Middle East/South Asia 181A and/or Middle East/South Asia 182A towards the minor program.

Total: 20-24

Iran & Persian Studies Minor; Middle East/South Asia Studies | MSA Courses

Courses in MSA:

MSA 092—ME/SA 92. Internship in Middle East/South Asia Studies (3-15)
Internship. Prerequisite(s): Consent of Instructor. Work experience on and off campus in all subject areas offered as part of the ME/SA Studies program. Internship supervised by a member of the ME/SA faculty. May be repeated up to 15 unit(s). (P/NP grading only.) Effective: 2007 Fall Quarter.

MSA 098—Directed Group Study (1-5)
Variable—3-15 hours. May be repeated for credit. (P/NP grading only.) Effective: 2006 Fall Quarter.

MSA 099—Special Study for Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2006 Fall Quarter.

MSA 100—Middle East and South Asia: Comparative Perspectives (4)
Extensive Writing; Lecture—3 hours. Ethnographic and historical points of intersection and divergence in various aspects of the Middle East and South Asia in precolonial, colonial, and postcolonial societies. Anthropological, historical, and theoretical debates surrounding the region. GE credit: AH, SS, WC, WE. Effective: 2004 Summer Session 1.

MSA 111A—Great Cities of Arab Middle East and South Asia (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Some knowledge of Islamic/Middle Eastern history is very useful. In-depth examination of the great cities of North Africa, the Middle East and South Asia as cultural and historical artifacts. Topics include: the concept of the Islamic city, processes of modernity, and representations that reinforce imagination, memory and personal identity. GE credit: AH, SS, WC, WE. Effective: 2013 Fall Quarter.

MSA 112—History of South Asian Islam (4)
Discussion—1 hour; Lecture—3 hours. Comparative study of Muslim communities of South Asia. Commonalities in cultural identity and historical experience. Rise and spread of Islam, comparative history of Islamic Empires, colonial rule, and post-colonial nationalism. Effective: 2007 Fall Quarter.

MSA 121A—Shahnameh: The Persian Book of Kings (4)
Lecture/Discussion—3 hours; Term Paper. In-depth analysis of the Persian Book of Kings (Shahnameh) by Abu al-Qasim Ferdowsi (d. 1020 CE) in its historical context with a comparative perspective on the role of this work in Persian and world literature. (Comparative Literature 175.) GE credit: AH, WC, WE. Effective: 2015 Winter Quarter.

MSA 121C—A Story for a Life: The Arabian Nights (4)
Lecture/Discussion—3 hours; Term Paper. In-depth exploration of The Arabian Nights, the best-known work of pre-modern Arabic literature and a major work of world literature. Analysis of the work in its historical context and in comparison to other frame tales in world literature. (Comparative Literature 172 and Arabic 140.) GE credit: AH, WC, WE. Effective: 2016 Winter Quarter.

MSA 122A—Themes in the Arabic Novel (4)
Extensive Writing; Independent Study; Lecture/Discussion—3 hours. Class size limited to 30 students. Select modern Arabic fiction (novels and short stories) in translation. Thematically connected readings supplemented by non-fictional writings when appropriate. May be repeated up to 2 time(s) if the texts/theme of required course readings sufficiently change. GE credit: AH, OL, WC, WE. Effective: 2013 Fall Quarter.

MSA 131A—Modern Iranian Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): Upper division standing, or consent of instructor. Iranian cinema of the 20th century in the context of profound cultural and social changes in Iran especially since the Iranian Revolution. Productions by representative directors such as Kiarostami, Makhmalbaf, Bahram Beizaie are included. Knowledge of Persian not required. (Cinema & Technocultural Studies 146A.) GE credit: AH, OL, VL, WC, WE. Effective: 2013 Fall Quarter.

MSA 131B—Modern South Asia Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): Upper-division standing or consent of instructor. South Asian cinema of last 100 years in the context of cultural, social, and political changes. South Asian history, Independence, Partition, urban life, class, migration, postcolonial identity, diaspora, gender, sexuality, religion, sport, performance, etc (CTS146B/ANT147) GE credit: AH, SS, VL, WC, WE. Effective: 2017 Winter Quarter.

MSA 131C—Religion and Media in Arab World (4)
Lecture—4 hours. Exploration of the role and experience of media technologies in the Arab world. Study of digital and electronic media as well as alternative media practices. Investigation of new trends in political activism and identity formation. (Religious Studies 166.) GE credit: OL, SS, VL, WC, WE. Effective: 2014 Fall Quarter.

MSA 131D—Modern Turkish Cinema (4)
Film Viewing—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): Upper-division standing or consent of instructor. Turkish cinema of the 20th & 21st century in the context of cultural, social, & political changes. Issues covered include history, nationalism, political dissent, identity, migration, diaspora, gender, sexuality, religion, and incorporate viewpoints of Kurdish & other minority members. (CTS 146D and HIS 193E) GE credit: AH, OL, SS, VL, WC, WE. Effective: 2016 Winter Quarter.

MSA 150—Women and Islamic Discourses (4)
Lecture/Discussion—4 hours. Prerequisite(s): WMS 050; Or comparable course. Introduction to the debates/discourses about women and Islam. Transformations in debates/discourses in colonial and postcolonial periods in the Middle East & South Asia. Comparative study of debates/discourses on family, work, law, sexuality, religion, comportment, human rights, feminist and religious movements. (Women's Studies 185.) GE credit: AH, SS, WC. Effective: 2008 Fall Quarter.

MSA 151A—Iranian Society & Culture (4)
Discussion—1 hour; Lecture—2 hours; Term Paper. In-depth investigation of modern Iranian society and culture. Exploration of structures of Iranian society: family, gender, religion, minorities, economy, politics, and state. Iran’s role in the globalizing world, and the role of Iranian diasporas. GE credit: AH, OL, VL, WC, WE. Effective: 2013 Spring Quarter.

MSA 180—Topics in Middle East and South Asian Studies (4)
Extensive Writing; Lecture—3 hours. Comparative perspective on the Middle East and South Asia. Topics may include: modernity, religious traditions, colonialism, subalternity and social movements, gender and sexuality, history and memory, science and development, ritual and performance, public culture, diasporas. May be repeated up to 1 time(s) topic varies. GE credit: AH, SS, WC, WE. Effective: 2004 Fall Quarter.

MSA 181A—Topics in Regional ME/SA Studies (4)
Lecture—3 hours; Term Paper. Iran & Persian topics for students specializing in region-specific Middle East and South Asia Studies. May be repeated up to 3 time(s). GE credit: AH, SS, WC, WE. Effective: 2015 Winter Quarter.

MSA 181B—Topics in Regional ME/SA Studies (4)
Lecture—3 hours; Term Paper. Indian/South Asia topics for students specializing in region-specific Middle East and South Asia Studies. May be repeated up to 3 time(s). GE credit: AH, SS, WC, WE. Effective: 2013 Fall Quarter.

MSA 181C—Topics in Regional ME/SA Studies: Arab Studies (4)
Lecture—3 hours; Term Paper. Arab Studies topics. May be repeated up to 3 time(s) when different topics and themes are studied. GE credit: AH, SS. Effective: 2013 Fall Quarter.

MSA 182A—Undergraduate Proseminar in Middle East/South Asia (4)
Seminar—3 hours; Term Paper. Prerequisite(s): MSA 100 recommended. Class size limited to 15 students. Seminar in Iran & Persian topics specializing in region-specific Middle East and South Asia studies. May be repeated up to 3 time(s). Effective: 2015 Winter Quarter.

MSA 182B—Undergraduate Proseminar in Middle East/South Asia (4)
Seminar—3 hours; Term Paper. Prerequisite(s): MSA 100 recommended. Class size limited to 15 students. Seminar in India/South Asia topics specializing in region-specific Middle East and South Asia studies. May be repeated up to 3 time(s) when different topics and themes are studied. Effective: 2012 Fall Quarter.

MSA 182C—Undergraduate Proseminar in Middle East/South Asia: Arab Studies Seminar (4)
Seminar—3 hours; Term Paper. Prerequisite(s): MSA 100 recommended. Class size limited to 15 students. Seminar in Arab Studies topics. May be repeated up to 3 time(s). GE credit: WE. Effective: 2013 Fall Quarter.

MSA 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Supervised internship on and off campus in the area of Middle East and South Asia Studies. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2018 Spring Quarter.

MSA 194H—Special Study for Honors Students (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Open only to majors of senior standing who qualify for honors program. Independent study of a problem in Middle East/South Asian studies involving the writing of an honors thesis. May be repeated up to 12 unit(s). Effective: 2009 Winter Quarter.

MSA 198—Directed Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2018 Spring Quarter.

MSA 199—Special Study for Advanced Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2018 Spring Quarter.

Italian

Italian | ITA Information

(College of Letters and Science)

Noah Guynn, Ph.D., Chairperson of the Department

Department Office. 213 Sproul Hall; 530-752-1219; http://italian.ucdavis.edu

Faculty. http://frenchanditalian.ucdavis.edu/people-italian

Italian | ITA A.B.

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The Major Program

The major in Italian provides a solid language background that will enable the student to develop an appreciation for the numerous contributions Italians and Italophones have made to literature, the arts, political theory, science, and other expressions of human creativity. The major also emphasizes the influence Italian culture continues to have on our global world.

The Program. The Italian program is geared to the specific needs and interests of the students, who enjoy the advantages of a small classroom setting and the individualized mentoring of dedicated professors. While the use of Italian is stressed in language and literature courses, the program is interdisciplinary in nature. Starting at the lower-division level, students collaborate closely with academic advisors in order to design a major curriculum that includes culture, film, art history, history, food science, and other courses in related fields offered on campus or in Italy. The Italian program actively participates in the UC-wide Education Abroad Program, the Quarter Abroad Program (Florence), the International Internships Program, and the Summer Abroad Program (Rome), all of which offer opportunities for travel and study in Italy.

Career Alternatives. The Italian Program provides a solid foundation for a variety of career paths by offering training in Italian language and culture and developing skills that are vital in any professional setting: critical analysis, interpersonal skills, effective written and oral communication, and cultural sensitivity. In addition to specific career paths in foreign service and education, knowledge of the Italian language and culture enhances professional opportunities in a variety of

fields, such as viticulture and enology, food science, political science, medicine, architecture, and engineering.

Honors and Honors Program. Candidates for high or highest honors in Italian must write a senior thesis under the direction of a faculty member. For this purpose, honors candidates must enroll in ITA 194H (3 units) and ITA 195H (3 units). Normally, a student will undertake the honors project during the first two quarters of the senior year; other arrangements must be authorized by the department chair. Only students who, at the end of the junior year (135 units), have attained a cumulative grade-point average of 3.500 in courses required for the major will be eligible for the honors program.

Education Abroad Program. The department strongly encourages students to study abroad in the Summer Abroad program (Rome), the Quarter Abroad Program (Florence), or the Education Abroad Program. Applicable courses are accepted for credit in the major program.

Prerequisite Credit. Credit will not normally be given for a course if it is a prerequisite of a course already successfully completed. Exceptions can be made only by the major advisor.

Quarter Abroad Program. The UC Davis Quarter Abroad Program and the Italian Program offer an exciting Italian Language and Culture Program in Florence, Italy. While studying abroad in Florence, students will earn 23-28 UC Davis quarter units and will experience the richness and vitality of Italian and European culture.

Participants fulfill three-quarters-worth of Italian language study, enroll in culture and film courses, integrate into the Florentine community through meaningful internships (with transcript notation), and explore electives in areas such as art history, fashion, business, and food studies.

There is no language requirement, and all registered UC Davis students with 2.000 GPA and above, good academic standing, and good disciplinary standing are eligible to apply.

For more information, please contact Professor Margherita Heyer-Caput at mheyercaput@ucdavis.edu or see https://studyabroad.ucdavis.edu/programs/quarterabroad/italy.html.

Major Advisor. M. Subialka

Preparatory Subject Matter **Units:** 27

ITA 001	Elementary Italian	5
ITA 002	Elementary Italian	5
ITA 003	Elementary Italian	5
ITA 004	Intermediate Italian	4
ITA 005	Intermediate Italian	4
ITA 009	Reading Italian	4
OR		
The equivalent.		

Depth Subject Matter **Units:** 36

Four required courses:

ITA 101	Advanced Conversation, Composition, and Grammar	4
OR		
Must include at least one from two of the following literary periods (taught in Italian):		
ITA 101S	Advanced Composition, Conversation and Grammar	4
ITA 105	Introduction to Italian Literature	4

Two Italian literature courses taught in Italian from two different areas among the following:

(a) Medieval Italian:

ITA 112	Medieval and Renaissance Poetry: St. Francis to Petrarch	4
ITA 113	Dante Alighieri, Divina Commedia (Inferno, Purgatorio, Paradiso)	4
ITA 114	Boccaccio, Decameron, and the Renaissance Novella	4
ITA 145	Special Topics in Italian Literature*	4

(b) Renaissance Italian:

ITA 115A	Studies in the Cinquecento	4
ITA 115B	Italian Literature of the Renaissance and the Baroque: From Cellini to Marino	4
ITA 115C	Italian Drama from Machiavelli to the Enlightenment	4
ITA 115D	Early Modern Italian Lyric	4
ITA 145	Special Topics in Italian Literature*	4

(c) Modern Italian:

ITA 118	Italian Literature of the Eighteenth Century	4
ITA 119	Italian Literature of the Nineteenth Century	4
ITA 120A	Italian Literature of the Twentieth Century: The Novel	4
ITA 120B	Italian Literature of the Twentieth Century: Poetry and Drama	4
ITA 145	Special Topics in Italian Literature*	4

Five Elective Courses in Italian literature, cinema, or culture, to be chosen in consultation with the Italian faculty advisor, from among the following:

ITA 104	Italian Translation and Style	4
ITA 107	Survey of Italian Culture and Institutions+	4
OR		
ITA 107S	Survey of Italian Culture and Institutions+	4
ITA 108	Contemporary Issues in Italian Culture and Society+	4
OR		
ITA 108S	Contemporary Issues in Italian Culture and Society+	4
ITA 128	Topics in Italian Culture	4
ITA 131	Autobiography in Italy	4
ITA 145	Special Topics in Italian Literature+	4
OR		
ITA 145S	Special Topics in Italian Literature+	4
ITA 150	Studies in Italian Cinema+	4
ITA 121	New Italian Cinema+	4
OR		
FMS 121	New Italian Cinema	4
OR		
ITA 121S	New Italian Cinema+	4
OR		
FMS 121S	New Italian Cinema	4

ITA 141	Gender and Interpretation in the Renaissance[+]	4
OR		
COM 138	Gender and Interpretation in the Renaissance	4
ITA 194H	Special Study for Honors Students	3
ITA 195H	Honors Thesis	3

Up to two of the five electives may be selected from courses in related fields offered in other departments. These must be chosen in consultation with the Italian faculty advisor. Sample courses include:

AHI 178B	Early Italian Renaissance Art and Architecture	4
AHI 178C	High and Late Italian Renaissance Art and Architecture	4
ANT 146N	Topics in the Anthropology of Europe	4
COM 158	The Detective Story as Literature	4
COM 164A	The European Middle Ages	4
COM 164B	The Renaissance	4
COM 167	Comparative Study of Major Authors	4
FMS 120	Italian-American Cinema	4
HIS 146A	Europe in the Twentieth Century	4
HIS 146B	Europe in the Twentieth Century	4

Please note: a maximum of eight (8) units of coursework in English is allowed for the Italian major.

All upper division courses are to be chosen in consultation with the Italian faculty advisor.

Recommended

Study abroad in Italy for a period of one year, one semester, or one quarter, and/or the sutdy of Latin or another Romance Language.

[*]If applicable
[+]Taught in English

Total: 36-63

Italian | ITA Minor

(College of Letters and Science)

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For more information, please contact Professor Margherita Heyer-Caput at mheyercaput@ucdavis.edu or see https://studyabroad.ucdavis.edu/programs/quarterabroad/italy.html.

Minor Advisor. M. Subialka

Italian **Units:** 20

Three required courses:

ITA 101	Advanced Conversation, Composition, and Grammar	4
OR		
ITA 101S	Advanced Composition, Conversation and Grammar	4

ITA 105	Introduction to Italian Literature	4

Choose one Italian literature course taught in Italian:

ITA 112	Medieval and Renaissance Poetry: St. Francis to Petrarch	4
ITA 113	Dante Alighieri, Divina Commedia (Inferno, Purgatorio, Paradiso)	4
ITA 114	Boccaccio, Decameron, and the Renaissance Novella	4
ITA 115A	Studies in the Cinquecento	4
ITA 115B	Italian Literature of the Renaissance and the Baroque: From Cellini to Marino	4
ITA 115C	Italian Drama from Machiavelli to the Enlightenment	4
ITA 115D	Early Modern Italian Lyric	4
ITA 118	Italian Literature of the Eighteenth Century	4
ITA 119	Italian Literature of the Nineteenth Century	4
ITA 120A	Italian Literature of the Twentieth Century: The Novel	4
ITA 120B	Italian Literature of the Twentieth Century: Poetry and Drama	4
ITA 145	Special Topics in Italian Literature	4

If applicable.

Choose two Elective Courses in Italian literature, cinema, or culture in consultation with the Italian faculty advisor. In addition to the literature courses listed above, students may choose:

ITA 104	Italian Translation and Style	4
ITA 107	Survey of Italian Culture and Institutions+	4
OR		
ITA 107S	Survey of Italian Culture and Institutions+	4
ITA 108	Contemporary Issues in Italian Culture and Society+	4
OR		
ITA 108S	Contemporary Issues in Italian Culture and Society+	4
ITA 121	New Italian Cinema	4
OR		
FMS 121	New Italian Cinema	4
OR		
ITA 121S	New Italian Cinema+	4
OR		
FMS 121S	New Italian Cinema	4
ITA 128	Topics in Italian Culture+	4
ITA 131	Autobiography in Italy+	4
ITA 141	Gender and Interpretation in the Renaissance	4
OR		
COM 138	Gender and Interpretation in the Renaissance	4
ITA 145	Special Topics in Italian Literature+	4
OR		
ITA 145S	Special Topics in Italian Literature+	4

ITA 150	Studies in Italian Cinema	4

Please note: a maximum of four units of coursework in English is allowed for the Italian Minor.

[+]Taught in English

Total: 20

Italian | ITA Courses

Courses in ITA:

ITA 001—Elementary Italian (5)
Discussion—5 hours; Laboratory—1 hour. Introduction to Italian grammar and development of all language skills in a cultural context with special emphasis on communication. Students who have successfully completed ITA 002 or ITA 003 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only; although a passing grade will be charged to the student's P/NP option, no petition is required; all other students will receive a letter grade unless a P/NP petition is filed.; not open for credit to students who have taken ITA 001A or ITA 001S. GE credit: AH, WC. Effective: 2014 Winter Quarter.

ITA 001A—Accelerated Intensive Elementary Italian (15)
Lecture/Discussion—15 hours. Special 12-week accelerated, intensive summer session course that combines the work of courses 1, 2, and 3. Introduction to Italian grammar and development of all language skills in a cultural context with emphasis on communicative ability. Not open for credit to students who have completed ITA 001, ITA 002, or ITA 003. Effective: 2006 Summer Special Session.

ITA 001S—Elementary Italian (5)
Discussion—5 hours; Laboratory—1 hour. Introduction to Italian grammar and development of all language skills in a cultural context with special emphasis on communication. Course is taught abroad. Students who have successfully completed ITA 002 or ITA 003 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only; although a passing grade will be charged to the student's P/NP option, no petition is required; all other students will receive a letter grade unless a P/NP petition is filed; not open for credit to students who have taken ITA 001 or ITA 001A. GE credit: AH, WC. Effective: 2014 Winter Quarter.

ITA 002—Elementary Italian (5)
Discussion—5 hours; Laboratory—1 hour. Prerequisite(s): ITA 001 or ITA 001S Continuation of course 1 or 1S. Review of grammar and vocabulary, and practice of all language skills through cultural texts. Not open for credit to students who have taken ITA 001A or ITA 002S. GE credit: AH, WC. Effective: 2014 Winter Quarter.

ITA 002S—Elementary Italian (5)
Discussion—5 hours; Laboratory—1 hour. Prerequisite(s): ITA 001 or ITA 001S Continuation of course 1 or 1S. Review of grammar and vocabulary, and practice of all language skills through cultural texts. Course is taught abroad. Not open for credit to students who have completed ITA 001A or ITA 002. GE credit: AH, WC. Effective: 2014 Winter Quarter.

ITA 003—Elementary Italian (5)
Laboratory—1 hour; Lecture/Discussion—5 hours. Prerequisite(s): ITA 002 or ITA 002S Continuation of course 2 or 2S. Review of grammar and vocabulary, and practice of all language skills through cultural texts. Not open for credit to students who have taken ITA 001A or ITA 003S. GE credit: AH, WC. Effective: 2014 Winter Quarter.

ITA 003S—Elementary Italian (5)
Discussion—5 hours; Laboratory—1 hour. Prerequisite(s): ITA 002 or ITA 002S Continuation of course 2 or 2S. Review of grammar and vocabulary, and practice of all language skills through cultural texts. Course is taught abroad. Not open for credit to students who have taken ITA 001A or ITA 003. GE credit: AH, WC. Effective: 2014 Winter Quarter.

ITA 004—Intermediate Italian (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): ITA 003 or ITA 003S Review of grammar and syntax through written exercises and short prose works. Intended to develop the linguistic foundations of students who have completed the first year language classes. GE credit: WC. Effective: 2016 Spring Quarter.

ITA 004S—Intermediate Italian (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): ITA 003 or ITA 003S; Or the equivalent. Review of grammar and syntax through written exercises and readings of short prose works. Intended to develop the linguistic foundations of students who have completed the first year language classes. This course is taught abroad. Not open for credit to students who have completed ITA 004. GE credit: WC. Effective: 2012 Spring Quarter.

ITA 005—Intermediate Italian (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): ITA 004 or ITA 004S Review and study of grammar and syntax, readings of short prose works, and written exercises. Intended to prepare students to read, understand, and discuss modern Italian. GE credit: WC. Effective: 2016 Spring Quarter.

ITA 005S—Intermediate Italian (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): ITA 004 or ITA 004S Review and study of grammar and syntax, readings of short prose works, and written exercises. Intended to prepare students to read, understand, and discuss modern Italian. Course is taught abroad. Not open for credit to students who have completed ITA 005. GE credit: WC. Effective: 2013 Spring Quarter.

ITA 008A—Italian Conversation (3)
Discussion—3 hours. Prerequisite(s): ITA 003; Or the equivalent. Italian conversation with peers in classroom setting. GE credit: OL, WC. Effective: 2017 Winter Quarter.

ITA 008AS—Italian Conversation (3)
Discussion—3 hours. Prerequisite(s): ITA 003; Or the equivalent. Italian conversation in local context outside United States. GE credit: OL, WC. Effective: 2017 Winter Quarter.

ITA 008B—Italian Conversation (3)
Discussion—3 hours. Prerequisite(s): ITA 008A Italian conversation with peers in a classroom setting. GE credit: WC. Effective: 2017 Winter Quarter.

ITA 008BS—Italian Conversation (3)
Discussion—3 hours. Prerequisite(s): ITA 008A Italian conversation in local context outside United States. GE credit: OL, WC. Effective: 2017 Winter Quarter.

ITA 009—Reading Italian (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 005 or ITA 005S Reading and discussion of modern Italian prose, including selections from creative, scientific and journalistic writings. Introduction to contemporary Italian literature and culture. Strengthening the student's command of the Italian language. GE credit: AH, WC. Effective: 2014 Fall Quarter.

ITA 009S—Reading Italian (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 005 or ITA 005S Reading and discussion of modern Italian prose, including selections from creative, scientific and journalistic writings. Introduction to contemporary Italian literature and culture as well as strengthening the student's command of the Italian language. This course is taught abroad. Not open for credit to students who have completed ITA 009. GE credit: AH, WC. Effective: 2015 Winter Quarter.

ITA 031—Beginning Italian for Spanish Speakers (5)
Lecture/Discussion—5 hours. Prerequisite(s): SPA 003 or SPA 003V or SPA 003Y; Or two years of high school Spanish or native or heritage speaker of Spanish. Intensive introductory course on Italian language with emphasis on structural similarities between Italian and Spanish. Not open for credit to students who have completed ITA 001, ITA 001A, ITA 001S, ITA 002, ITA 002S. GE credit: AH, OL, WC. Effective: 2018 Winter Quarter.

ITA 031Y—Beginning Italian for Spanish Speakers (5)
Lecture/Discussion—3 hours; Web Electronic Discussion—2 hours. Prerequisite(s): SPA 003 or SPA 003V or SPA 003Y; Consent of Instructor. SPA 003 or two years of high school Spanish or native or heritage speaker of Spanish. Intensive Introductory course on Italian language with emphasis on structural similarities between Italian and Spanish. Not open for credit to students who have completed ITA 001, ITA 001A, ITA 001S, ITA 002, ITA 002S. GE credit: AH, OL, WC. Effective: 2018 Spring Quarter.

ITA 032—Beginning Italian for Spanish Speakers (5)
Lecture/Discussion—5 hours. Prerequisite(s): ITA 031 or ITA 031Y; or Consent of Instructor. Continuation of course 31. Intensive introductory course to Italian language and grammar with emphasis on oral and written communication. Highlights the structural similarities between Italian and Spanish. Not open for credit to students who have completed ITA 001A, ITA 001S, ITA 002, ITA 002S, ITA 003, ITA 003S. GE credit: AH, OL, WC. Effective: 2017 Fall Quarter.

ITA 032Y—Beginning Italian for Spanish Speakers (5)
Lecture/Discussion—3 hours; Web Electronic Discussion—2 hours. Prerequisite(s): ITA 031 or ITA 031Y; or Consent of Instructor. Continuation of course 31. Intensive introductory course to Italian language and grammar with emphasis on oral and written communication. Highlights the structural similarities between Italian and Spanish. Not open for credit to students who have taken ITA 001A, ITA 003, ITA 003S. GE credit: AH, OL, WC. Effective: 2018 Spring Quarter.

ITA 050—Studies in Italian Cinema (4)
Discussion—1 hour; Lecture—2 hours; Term Paper. Lower division standing. Introduction to Italian cinema through its genres. Focus is on cinema as a reflection of and a comment on modern Italian history. Film will be studied as an artistic medium and as a form of mass communication. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

ITA 090X—Lower Division Seminar (1-2)
Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Examination of a special topic in Italian language or culture (such as
Italian culture seen through film, Italian feminism, literature, or politics) through shared readings, discussions, written assignments, or special activities such as film screening or laboratory work. Effective: 1997 Winter Quarter.

ITA 098—Directed Group Study (1-5)
Variable. Prerequisite(s): and Consent of Instructor. Lower division standing. Primarily intended for lower division students. (P/NP grading only.) Effective: 2016 Spring Quarter.

ITA 101—Advanced Conversation, Composition, and Grammar (4)
Lecture—3 hours. Prerequisite(s): ITA 009 or ITA 009S; or Consent of Instructor. Or the equivalent. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

ITA 101S—Advanced Composition, Conversation and Grammar (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): ITA 009 or ITA 009S; Or the equivalent. Instruction and practice in expository writing in Italian, with emphasis on advanced grammar, organization, and vocabulary building. Course will be taught in Italy. Not open for credit to students who have completed ITA 101. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

ITA 104—Italian Translation and Style (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 009 or ITA 009S; Consent of Instructor. Practice in translation from Italian to English and English to Italian, using literary and nonliterary texts of different styles. Analysis of linguistic problems and elements of style contained in the translation material. Not open for credit to students who have completed ITA 104S. GE credit: AH, WC. Effective: 2016 Spring Quarter.

ITA 104S—Translation and Style (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 009 or ITA 009S Practice in translation from Italian to English and English to Italian, using literary and non-literary texts of different styles. Analysis of linguistic problems and elements of style contained in the translation material. Course will be taught abroad. No credit allowed to those who have completed ITA 104. GE credit: AH, WC. Effective: 2016 Spring Quarter.

ITA 105—Introduction to Italian Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 009 or ITA 009S; Consent of Instructor. Introduction to the study of the principal authors, works, and movements of the Medieval, Renaissance, and Early Modern periods in Italy. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

ITA 107—Survey of Italian Culture and Institutions (4)
Lecture—3 hours; Term Paper. Assessment of the impact of regional autonomy on Italian cultural life
from the Middle Ages to the present. Special emphasis will be placed upon achievements in literature, the arts, philosophy, and socio-political institutions. To be taught in English. GE credit: AH, OL, SS, VL, WC, WE. Effective: 1997 Winter Quarter.

ITA 107S—Survey of Italian Culture and Institutions (4)
Lecture/Discussion—3 hours; Term Paper. An assessment of the impact of regional autonomy on Italian cultural life from the Middle Ages to the present. Special emphasis will be placed upon achievements in literature, the arts, philosophy, and socio-political institutions. To be taught in English. Not open for credit to students who have completed ITA 107. GE credit: AH, OL, SS, VL, WC, WE. Effective: 2004 Winter Quarter.

ITA 108—Contemporary Issues in Italian Culture and Society (4)
Lecture/Discussion—3 hours; Term Paper. Analysis of cultural issues in contemporary Italy: Myth and reality of imagined Italies, Italian identities; immigration and race relations; the media and popular culture. Taught in Englsih. GE credit: AH, OL, SS, VL, WC, WE. Effective: 1998 Fall Quarter.

ITA 108S—Contemporary Issues in Italian Culture and Society (4)
Lecture/Discussion—3 hours; Term Paper. Analysis of cultural issues in contemporary Italy; myth and reality of imagined Italies; Italian identities; immigration and race relations; the media and popular culture. Taught in English. This course will be taught abroad. Not open for credit to students who have completed ITA 108. GE credit: AH, OL, SS, VL, WC, WE. Effective: 2004 Winter Quarter.

ITA 112—Medieval and Renaissance Poetry: St. Francis to Petrarch (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 009 or ITA 009S; Consent of Instructor. Or the equivalent. Study of the origins of Italian religious and secular poetry of the13th and 14th centuries. A diversified poetry is illustrated in works of St. Francis, Dante, Cavalcanti, Petrarch, the Sicilian School, the Sweet New Style Poets, and other authors. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

ITA 113—Dante Alighieri, Divina Commedia (Inferno, Purgatorio, Paradiso) (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 009 or ITA 009S; Consent of Instructor. Or equivalent. Study of Dante Alighieri's Divina Commedia, and its role in the development of Italian language and literature. Emphasis will be placed on reading the whole poem within the historical context of the Middle Ages. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

ITA 114—Boccaccio, Decameron, and the Renaissance Novella (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 009 or ITA 009S; Consent of Instructor. Or the equivalent course. Study of the development of the short story in Italy, as exemplified in Giovanni Boccaccio's Decameron, in his predecessors and Renaissance followers. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

ITA 115A—Studies in the Cinquecento (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 009 or ITA 009S; or Consent of Instructor. Or the equivalent. Analysis of key texts from the high moment of the Italian Renaissance. The political and aesthetic legacy of humanism will be foregrounded in relation to authors such as Ficino, Ariosto, Machiavelli, Aretino, Castiglione, and Tasso. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

ITA 115B—Italian Literature of the Renaissance and the Baroque: From Cellini to Marino (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 115A Continued examination into the loss of an ideal. Emphasis on the conflicts in Michelangelo and Tasso leading to Marino, with an excursus
on Galileos role in the formation of a modern literary standard. GE credit: OL. Effective: 1997 Winter Quarter.

ITA 115C—Italian Drama from Machiavelli to the Enlightenment (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 009; or Consent of Instructor. Development of comic and tragic forms as critical representations of their societal and historical contexts, i.e. Machiavelli and the logic of power, Baroque dramatists in the service of counter-reformation Italy, Goldoni's comedies and bourgeois social consciousness. GE credit: AH, OL, WC. Effective: 2016 Fall Quarter.

ITA 115D—Early Modern Italian Lyric (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 009 or ITA 009S; or Consent of Instructor. Examination of the poetic tradition influenced by Petrarch. Consideration of the relation between gender and genre in such poets as Petrarch, Bembo, della Casa, Tasso, Marino, Gaspara Stampa, Veronica Franco, Isabella di Morra. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

ITA 118—Italian Literature of the Eighteenth Century (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 009 or ITA 009S; or Consent of Instructor. Development of modern Italian literature. Emphasis on the work of Goldoni, Bettinelli, Baretti, Parini, Alfieri, and Vico. GE credit: AH, OL. Effective: 2016 Fall Quarter.

ITA 119—Italian Literature of the Nineteenth Century (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 009 or ITA 009S; or Consent of Instructor. Romanticism in Italy, including Manzoni, Verga, and Verismo. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

ITA 120A—Italian Literature of the Twentieth Century: The Novel (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 009; Consent of Instructor. Development of the novel from Svevo to the present. Emphasis on the work of Svevo, Levi, Moravia, Pavese, and Vittorini. GE credit: AH, OL, WC, WE. Effective: 2017 Spring Quarter.

ITA 120B—Italian Literature of the Twentieth Century: Poetry and Drama (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 009; or Consent of Instructor. Italian poetry with emphasis on Hermeticism; the theater of Luigi
Pirandello and its role in the development of contemporary Italian drama. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

ITA 121—New Italian Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): FMS 001; or Consent of Instructor. And upper division standing. Italian cinema of the 21st century in the context of profound cultural and social changes in Italy since World War II. Productions by representative directors such as Amelio, Giordana, Moretti, Muccino are included. Knowledge of Italian not required. (Film Studies 121) GE credit: AH, OL, VL, WC, WE. Effective: 2008 Fall Quarter.

ITA 121S—New Italian Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): FMS 001; and Consent of Instructor. And upper division standing. Italian cinema of the 21st century in the context of profound cultural and social changes in Italy since World War II. Productions by representative directors such as Amelio, Giordana, Moretti, Muccino are included. Knowledge of Italian not required. (Film Studies 121S.) GE credit: AH, OL, VL, WC, WE. Effective: 2011 Fall Quarter.

ITA 128—Topics in Italian Culture (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): ITA 009 or ITA 009S; or Consent of Instructor. In-depth study of a particular topic in Italian Culture. Topics include: Italian Cities; Church and State; the "Southern Question"; Fascism and Resistance; 1968: Counter Culture, Feminism and Terrorism; Multicultural Italy. May be repeated up to 1 time(s) when topic differs. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

ITA 131—Autobiography in Italy (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 009 or ITA 009S; or Consent of Instructor. Development of representations of selfhood with particular attention to generic conditions, the confessional tradition and the problem of women's self-representation. Authors studied may included Petrarch, Tasso, Casanova, Alfieri, Zvevok, Sibilla Aleramo and Primo Levi. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

ITA 139B—Italian Literature in English: Boccaccio, Petrarch and the Renaissance (4)
Lecture/Discussion—3 hours; Term Paper. Petrarch and Boccaccio and their relations to the Middle Ages and the Renaissance; the Renaissance, with particular attention to the works of Lorenzo de' Medici, Leonardo da Vinci, Machiavelli, Ariosto, Michelangelo, and Tasso. GE credit: AH, OL, WC, WE. Effective: 1997 Winter Quarter.

ITA 140—Italian Literature in English Translation: Dante, Divine Comedy (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Any course from the GE Literature Preparation List. Reading of Dante Alighieri's Divine Comedy, through the otherworld realms of Inferno, Purgatory, and Paradise. GE credit: AH, OL, WC, WE. Effective: 1997 Winter Quarter.

ITA 141—Gender and Interpretation in the Renaissance (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. Critical analysis of Renaissance texts with primary focus on issues such as human dignity, education and gender politics; "high" and "low" culture and its relation to literary practices. (Comparative Literature 138.) GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

ITA 142—Masterpieces of Modern Italian Narrative (4)
Discussion—1.5 hours; Lecture—1.5 hours; Term Paper. Prerequisite(s): ENG 003 or COM 002 or HIS 004C Analysis of major works of Italian narrative fiction from unification of Italy to present. Students will learn to use representative methods and concepts which guide literary scholarship. Consideration of works within European social and cultural context. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

ITA 145—Special Topics in Italian Literature (4)
Lecture/Discussion—4 hours. Prerequisite(s): ITA 009 or ITA 009S; or Consent of Instructor. Study of special topics and themes in Italian literature, such as comic literature, epic poetry, pre-twentieth century theater, fascism, futurism, women and literature, and the image of America, etc. May be repeated for credit May be repeated for credit when topic differs. GE credit: AH, OL, VL, WC, WE. Effective: 2016 Spring Quarter.

ITA 145S—Special Topics in Italian Literature (4)
Lecture/Discussion—4 hours. Prerequisite(s): ITA 009 or ITA 009S; or Consent of Instructor. Study of special topics and themes in Italian literature, such as comic literature, epic poetry, pre-twentieth-century theater, fascism, futurism, women and literature, the image of America, etc. Course is taught abroad. May be repeated for credit. Not open for credit to students who have completed ITA 145. GE credit: AH, OL, VL, WC, WE. Effective: 2016 Fall Quarter.

ITA 150—Studies in Italian Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Introduction to Italian cinema through its genres. Focus on cinema as a reflection or a comment on modern Italian history. Film as an artistic medium and as a form of mass communication. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

ITA 190X—Upper Division Seminar (1-2)
Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Limited enrollment. Examination of a special topic in Italian language or culture through shared readings, discussions, written assignments or special activities such as film screening or laboratory work. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

ITA 192—Italian Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing and consent of chairperson of Italian Department. Participation in government and business activities to gain work experience and to develop a better knowledge of Italian language and culture. (P/NP grading only.) Effective: 1997 Winter Quarter.

ITA 192S—Italian Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing, consent of instructor and UC Davis program director or chairperson of Italian Department. Participation in community service, teaching, government, and business activities to gain work experience and to develop a better knowledge of Italian language and culture. This course is offered abroad. (P/NP grading only.) Effective: 2011 Fall Quarter.

ITA 194H—Special Study for Honors Students (3)
Independent Study—3 hours. Prerequisite(s): Open only to majors of senior standing who qualify for Honors Program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in Italian literature, civilization, or language studies. (P/NP grading only.) GE credit: AH, WC. Effective: 1997 Winter Quarter.

ITA 195H—Honors Thesis (3)
Independent Study—3 hours. Prerequisite(s): ITA 194H Writing of an honors thesis on a topic in Italian literature, civilization, or language studies under the direction of a faculty member. (P/NP grading only.) GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

ITA 197T—Tutoring in Italian (1-4)
Laboratory—1-2 hours; Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Tutoring in undergraduate courses, including leadership in small voluntary discussion groups affiliated with departmental courses. May be repeated up to 6 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

ITA 197TC—Community Tutoring in Italian (1-5)
Discussion—1-2 hours; Laboratory—2-4 hours. Prerequisite(s): Consent of Instructor. Field experience as Italian tutors or teacher's aides. May be repeated up to 10 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

ITA 198—Directed Group Study (1-4)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

ITA 198S—Directed Group Study (1-4)
Variable. Prerequisite(s): Consent of Instructor. Group study on focused topics in Italian literature and culture. Varies according to instructor. This course is offered abroad. May be repeated for credit when topic differs. (P/NP grading only.) Effective: 2011 Fall Quarter.

ITA 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

ITA 199S—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Opportunity for a faculty member to work with an advanced undergraduate student in a focused manner on a topic or topics of mutual research/creative interest. This course is offered abroad. May be repeated for credit when topic differs. (P/NP grading only.) Effective: 2011 Fall Quarter.

ITA 297—Individual Study (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Effective: 1997 Winter Quarter.

ITA 298—Group Study (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Effective: 1997 Winter Quarter.

ITA 299—Research (1-12)
Variable. Prerequisite(s): Graduate standing or consent of instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

ITA 299D—Dissertation Research (1-12)
Variable. Prerequisite(s): Graduate standing or consent of instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

ITA 396—Teaching Assistant Training Practicum (1-4)
Variable—3-12 hours. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit. (S/U grading only.) Effective: 2008 Fall Quarter.

Japanese; East Asian Languages & Cultures

Japanese; East Asian Languages & Cultures | JPN Information

(College of Letters and Science)

Department Office. 211 Sproul Hall; 530-752-4999; http://japanese.ucdavis.edu

Faculty. https://ealc.ucdavis.edu/people

Japanese; East Asian Languages & Cultures | JPN A.B.

(College of Letters and Science)

Department Office. 211 Sproul Hall; 530-752-4999; http://japanese.ucdavis.edu

Faculty. https://ealc.ucdavis.edu/people

The Major Program

The department offers a core language program in Japanese, and courses in literature and culture.

The Program. Practical language skills are taught using the most modern methods so that upon entering the upper division a student will have attained substantial fluency in the spoken language (hearing and speaking) and the written language (reading and writing). Upper-division courses balance the need to further language skills with the need to understand and appreciate the cultural richness of Japanese civilization. All students are encouraged to combine their study of language and literature with courses in related fields, and to study abroad through the Education Abroad Program, the UC Davis Study Abroad Program or through internships in Japan.

Career Opportunities. UC Davis graduates have learned that a major in Japanese is a genuine, earned distinction that facilitates entrance to graduate programs and professional schools. In addition, job opportunities abound in virtually all career paths, especially for those who have completed study abroad.

Honors Program. To be eligible to receive high or highest honors in the Japanese major, students must complete a senior thesis project. A student interested in pursuing a senior thesis project must enroll in JPN 194H and complete a scholarly paper or similar research project under the direction of a senate faculty member. The thesis project will have a minimum duration of two quarters and

carry a minimum of 6 units of credit. To qualify to undertake the senior thesis project, a student must have completed at least 135 units with a minimum GPA of 3.500 in courses counted toward the major. Interested students should consult with faculty in their field of interest by the quarter before they hope to commence work on the project (in most cases this will be the Spring Quarter of their junior year). Students who complete the senior thesis project and have an overall GPA that qualifies them for honors may be recommended by the faculty for honors, high honors, or highest honors at graduation.

Education Abroad Program. The university maintains study abroad programs in Japan. They offer excellent opportunities for students to polish their language skills and experience Asian cultures firsthand. Students are encouraged to participate. Appropriate courses taken abroad can be applied toward the major or the minor. For details, see the department's undergraduate advisor, the Education Abroad Program office or the UC Davis Study Abroad Office.

Related Courses. See East Asian Studies course list.

Prerequisite Credit. No student may repeat a course if that course is a prerequisite for a course that has already been completed with a grade of C– or better.

Placement. JPN 001 is intended for beginning students with no prior knowledge of the Japanese language. Students who do have some knowledge but wish to improve their skills should meet with one of the advisors to discuss appropriate placement. Students must follow departmental guidelines for placement in all language courses and instructor approval is required for enrollment.

Backtracking. Satisfactory completion of a language course is evidence that a student's language skills are beyond the level of those expected in its prerequisite courses. Accordingly, students who have completed a language course cannot go back and take its prerequisites. If the prerequisite courses are required for the major, students may substitute other courses. Students who are not sure how this requirement applies to them should speak to the undergraduate advisor.

Waived Language Courses. Students with exceptional language ability may waive required language courses. If lower division courses have been waived, students will not have to take courses in their place. If upper division courses have been waived, students can use other appropriate courses to earn the units they need to complete the major. Consult the undergraduate advisor regarding selection of appropriate courses.

Grading. Students may take up to two and no more than two (regular, letter-graded) courses for the major on a P/NP basis. Courses which are only offered on a P/NP basis do not count toward these limits.

Preparatory Subject Matter **Units:** 0-30

JPN 001	Elementary Japanese	5
JPN 002	Elementary Japanese	5
JPN 003	Elementary Japanese	5
JPN 004	Intermediate Japanese	5
JPN 005	Intermediate Japanese	5
JPN 006	Intermediate Japanese	5

OR

Equivalent as determined by a language placement exam.

Recommended but NOT required:

JPN 010	Masterworks of Japanese Literature (in English)	4
JPN 025	Japanese Language and Culture (in English)	4
CHN 010	Modern Chinese Literature (In English)	4
CHN 011	Great Books of China (in English)	4
CHN 050	Introduction to the Literature of China and Japan	4
LIN 001	Introduction to Linguistics	4
HIS 009B	History of East Asian Civilization	4

Depth Subject Matter **Units:** 40

JPN 101	Japanese Literature in Translation: The Early Period	4
JPN 102	Japanese Literature in Translation: The Middle Period	4
JPN 103	Japanese Literature in Translation: The Modern Period	4
JPN 111	Modern Japanese: Reading and Discussion	4
JPN 112	Modern Japanese: Reading and Discussion	4
JPN 113	Modern Japanese: Reading and Discussion	4
JPN 151	Japanese Linguistics	4

Note: With prior approval of the undergraduate advisor, students already proficient in Japanese at any third-year level (111-112-113) must take other upper division Japanese courses to replace language course(s).

Choose three; at least 12 units:

JPN 104	Modern Japanese Literature: War and Revolution	3
JPN 105	Modern Japanese Literature: Hero and Anti-hero	4
JPN 106	Japanese Culture Through Film	4
JPN 107	Modern Japanese Autobiographies (in English)	4
JPN 108	Poetry of China and Japan (in English)	4
JPN 109	Japanese Popular Culture	4
JPN 114A	Spoken Japanese	2
JPN 114B	Spoken Japanese	2
JPN 114C	Spoken Japanese	2
JPN 115	Japanese Composition	2
JPN 116	Culture and History in Kyoto	8
JPN 121	Advanced Japanese I	4
JPN 122	Advanced Japanese II	4
JPN 123	Advanced Japanese III	4
JPN 130	Readings in Modern Japanese Literature to 1926	4
JPN 131	Readings in Modern Japanese Literature: 1920-1945	4
JPN 132	Readings in Modern Japanese Literature: 1945-1970	4
JPN 133	Readings in Modern Japanese Literature: 1970-Present	4
JPN 134	Readings in the Humanities: Traditional Culture	4
JPN 135	Readings in the Humanities: The Modern Period	4
JPN 136	Readings in Newspapers and Magazines	4
JPN 137	Readings in Contemporary Japanese Literature	4
JPN 138	Readings in the Humanities: Japan Today	4
JPN 141	Introduction to Classical Japanese	4
JPN 152	Traditional Japanese Drama	4
JPN 153	Love, Sexuality and the Family in Modern Japanese Literature	4
JPN 154	Tourism and Heritage in Japan	4
JPN 155	Introduction to Japanese Folklore	4
JPN 156	Japanese Literature on Film	4
JPN 157	Japanese Women Writers	4
JPN 158	The Supernatural in Japan	4
JPN 160	The Culture of Japanese Food	4
JPN 162	Japan Travelogue: Ethnographic Writing on Japanese Culture and People	4
ANT 149A	Traditional Japanese Society	4
ANT 149B	Contemporary Japanese Society	4
AHI 164	The Arts of Japan	4
CHN (up to two upper-division Chinese courses)		
COM 153	The Forms of Asian Literature	4
ECN 171	Economy of East Asia	4
HIS 194A	Aristocratic and Feudal Japan	4

HIS 194B	Early Modern Japan	4
HIS 194C	Modern Japan	4
HIS 194D	Business and Labor in Modern Japan	4
POL 148B	Government and Politics in East Asia: Japan	4
RST 170	Buddhism	4
RST 172	Ch'an (Zen) Buddhism	4

OR

Other advanced literature and culture courses selected in consultation with the undergraduate advisor.

Total: 40-70

Japanese; East Asian Languages & Cultures | JPN Minor

(College of Letters and Science)

Department Office. 211 Sproul Hall; 530-752-4999; http://japanese.ucdavis.edu

Faculty. https://ealc.ucdavis.edu/people

A minor is offered in Japanese for students wishing to follow a formally recognized program of study in Japanese language and literature. For the minor, students may take one (regular, letter-graded) course on a P/NP basis. Courses which are only offered on a P/NP basis do not count toward these limits.

Japanese **Units:** 20

All upper division courses, including both language courses and literature in translation courses, may be used to meet this requirement. One approved lower division course (JPN 010, 025, 050) may also be used. In addition, students must demonstrate their language proficiency, normally through completion of JPN 006. Only four units from 192, 197T, 198, and 199 may be applied to the minor. For details, consult the undergraduate advisor.

Total: 20

Japanese; East Asian Languages & Cultures | JPN Courses

Courses in JPN:

JPN 001—Elementary Japanese (5)
Lecture/Discussion—5 hours. Introduction to spoken and written Japanese in cultural contexts, with emphasis on communication. GE credit: AH, OL, WC. Effective: 2014 Fall Quarter.

JPN 001A—Accelerated Intensive Elementary Japanese (15)
Lecture/Discussion—15 hours. Special 12 week accelerated, intensive summer session course that combines the work of courses 1, 2 and 3. Introduction to Japanese grammar and development of all language skills in a cultural context with emphasis on communication. not open for credit to students who have completed JPN 001, JPN 002, or JPN 003. GE credit: AH, OL, WC. Effective: 2014 Summer Special Session.

JPN 001AS—Intensive Elementary Japanese (15)
Lecture/Discussion—15 hours. Intensive course taught combining the work of courses 1, 2 and 3. Introduction to Japanese grammar and development of all language skills in a cultural context with emphasis on communication. Offered in Japan. not open for credit to students who have taken JPN 001, JPN 002, or JPN 003. GE credit: AH, OL, WC. Effective: 2014 Fall Quarter.

JPN 002—Elementary Japanese (5)
Lecture/Discussion—5 hours. Prerequisite(s): JPN 001 C- or better; Or the equivalent language proficiency. Continuation of training in basic Japanese spoken and written skills. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

JPN 003—Elementary Japanese (5)
Lecture/Discussion—5 hours. Prerequisite(s): JPN 002 C- or better; Or the equivalent language proficiency. Continuation of training in basic spoken and written skills in Japanese language. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

JPN 004—Intermediate Japanese (5)
Lecture/Discussion—5 hours. Prerequisite(s): JPN 003 C- or better; Or the equivalent language proficiency. Intermediate-level training in spoken and written Japanese in cultural context, based on language skills developed in course 3. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

JPN 005—Intermediate Japanese (5)
Lecture/Discussion—5 hours. Prerequisite(s): JPN 004 C- or better; Or the equivalent language proficiency. Intermediate-level training in spoken and written Japanese in cultural context, based on language skills developed in course 4. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

JPN 006—Intermediate Japanese (5)
Lecture/Discussion—5 hours. Prerequisite(s): JPN 005 C- or better; Or the equivalent language proficiency. Intermediate-level training in spoken and written Japanese in cultural context, based on language skills developed in course 5. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

JPN 007S—Intensive Intermediate Japanese (20)
Lecture/Discussion—20 hours. Prerequisite(s): JPN 002 C- or better; or the equivalent language proficiency. Consent of Instructor. Special intensive course that combines the work of courses 3, 4, 5, and 6. Introduction to Japanese grammar and development of all language skills in a cultural context with emphasis on communication. Taught in Japan. GE credit: AH, OL, WC. Effective: 2017 Winter Quarter.

JPN 010—Masterworks of Japanese Literature (in English) (4)
Discussion—1 hour; Lecture—3 hours. Introduction to Japanese literature: readings and discussion in English of important works from earliest times to the present. GE credit: AH, WC, WE. Effective: 2011 Fall Quarter.

JPN 015S—Introduction to Japanese Culture (2)
Fieldwork; Lecture/Discussion—2 hours. Restricted to students enrolled in units for the Kyoto Quarter Abroad program. Aspects of Japanese culture: literature, history, religion, art, language, and society. Conducted in English; taught in Japan. (P/NP grading only.) GE credit: AH, WC. Effective: 2014 Fall Quarter.

JPN 025—Japanese Language and Culture (in English) (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 001 or LIN 001 or ANT 004 recommended. Classification and communication of experience in Japanese culture; principles of language use in Japanese society. Speech levels and honorific language, language and gender, minority languages, literacy. Role of Japanese in artificial intelligence and computer science. GE credit: AH, SS, WC, WE. Effective: 2014 Fall Quarter.

JPN 031—Basic Kanji (4)
Lecture—3 hours; Practice—1 hour. Prerequisite(s): JPN 001 C- or better; or Consent of Instructor. Or equivalent proficiency of basic writing system (Hiragana and Katakana). Restricted to students who have never been exposed to any form of Kanji or Chinese characters before; students who have completed schooling up to the 6th grade in the Japanese education system or equivalent or whose native languages have Chinese character orthography are not allowed to register this course. Introduction and mastery of 300 basic Kanji or Chinese characters to establish a solid foundation in the novel and complex Kanji encountered while learning Japanese. GE credit: AH, WC. Effective: 2016 Spring Quarter.

JPN 050—Introduction to the Literature of China and Japan (4)
Lecture/Discussion—4 hours. Methods of literary analysis and their application to major works from the various genres of Chinese and Japanese literature (in translation),
including film. East Asian cultural traditions will also be introduced. (Chinese 50.) GE credit: AH, WC. Effective: 2012 Fall Quarter.

JPN 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study. (P/NP grading only.) GE credit: AH. Effective: 2016 Fall Quarter.

JPN 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

JPN 101—Japanese Literature in Translation: The Early Period (4)
Discussion—1 hour; Lecture—3 hours. Study of early Japanese literature from the Nara to the end of the Heian period through a broad survey of the major literary genres such as lyric poetry, court diaries, prose narratives, poem-tales, and classical Chinese writings. GE credit: AH, WC, WE. Effective: 2012 Winter Quarter.

JPN 102—Japanese Literature in Translation: The Middle Period (4)
Discussion—1 hour; Lecture—3 hours. Study of the major literary genres from the twelfth century to the second half of the nineteenth century including poetry, linked-verse, military chronicles, no drama, Buddhist literature, haiku, haibun, kabuki, bunraku, plays and Edo prose narratives. GE credit: AH, WC, WE. Effective: 2012 Winter Quarter.

JPN 103—Japanese Literature in Translation: The Modern Period (4)
Discussion—1 hour; Lecture—3 hours. Modern Japanese literature from the 1870s to the 1970s. Surveys representative literary works and ideas against the social and intellectual background of the Meiji, Taisho, and Showa periods. GE credit: AH, WC. Effective: 1997 Winter Quarter.

JPN 104—Modern Japanese Literature: War and Revolution (3)
Lecture/Discussion—3 hours. Perspectives and sensibilities with which major modern Japanese writers have interpreted the traumatic and often poignant experiences of war and socio-political upheavals from the late nineteenth century to the 1970s. Lectures, discussions, and readings in English. GE credit: AH, WC. Effective: 1997 Winter Quarter.

JPN 105—Modern Japanese Literature: Hero and Anti-hero (4)
Lecture/Discussion—4 hours. The ways in which representative hero and anti-hero protagonists in modern Japanese literature perceive, confront, challenge, and resolve a wide array of social, political, and moral problems of their times. Course taught in English. GE credit: AH, WC. Effective: 2002 Spring Quarter.

JPN 106—Japanese Culture Through Film (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Aspects of Japanese culture such as love, sexuality, war, the military, the family, the position of women, growing up and death as portrayed in Japanese cinema. Lectures, discussion, and readings in English. Films with English subtitles. GE credit: AH, VL, WC. Effective: 2017 Spring Quarter.

JPN 107—Modern Japanese Autobiographies (in English) (4)
Discussion—1 hour; Lecture—3 hours; Term Paper. Exploring the modern and contemporary Japanese social and cultural
landscape through critical analysis of modern Japanese autobiographies by prominent and other authors in the 19th and 20th centuries. GE credit: AH, WC. Effective: 2016 Spring Quarter.

JPN 108—Poetry of China and Japan (in English) (4)
Discussion—1 hour; Lecture—3 hours. A comparative approach to Chinese and Japanese poetry, examining poetic practice in the two cultures; includes a general outline of the two traditions, plus study of poetic forms, techniques, and distinct treatments of universal themes: love, nature, war, etc. (Chinese 108.) GE credit: AH, WC. Effective: 1997 Winter Quarter.

JPN 109—Japanese Popular Culture (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Japanese popular culture, from its medieval/early modern precedents to contemporary incarnations. Emphasis on major forms of popular culture that emerged in the 20th century, including comics, animation, science fiction, and fantasy. GE credit: AH, VL, WC. Effective: 2017 Fall Quarter.

JPN 111—Modern Japanese: Reading and Discussion (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 006 C- or better; Or the equivalent language proficiency. Readings in modern Japanese short stories, newspaper articles, and essays; conversation practice based on these readings. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

JPN 112—Modern Japanese: Reading and Discussion (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 111 C- or better; Or the equivalent language proficiency. Continuation of course 111. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

JPN 113—Modern Japanese: Reading and Discussion (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 112 C- or better; Or the equivalent language proficiency. Continuation of course 112. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

JPN 114A—Spoken Japanese (2)
Discussion—2 hours. Prerequisite(s): Consent of Instructor. Training in spoken Japanese for students with a basic working knowledge of the language. (P/NP grading only.) GE credit: OL. Effective: 2017 Spring Quarter.

JPN 114B—Spoken Japanese (2)
Discussion—2 hours. Prerequisite(s): JPN 114A C- or better; or Consent of Instructor. Or equivalent language proficiency. Continuation of course 114A. Training in spoken Japanese for students with a basic working knowledge of the language. (P/NP grading only.) GE credit: OL. Effective: 2016 Fall Quarter.

JPN 114C—Spoken Japanese (2)
Discussion—2 hours. Prerequisite(s): JPN 114B C- or better; or Consent of Instructor. Or equivalent language proficiency. Continuation of course 114B. Training in spoken Japanese for students with a basic working knowledge of the language. (P/NP grading only.) GE credit: OL. Effective: 2016 Fall Quarter.

JPN 115—Japanese Composition (2)
Lecture—2 hours. Prerequisite(s): JPN 006 C- or better; or Consent of Instructor. Development of skills in the techniques of writing Japanese. Practice in short essay writing with an aim toward mastery of the vocabulary and syntax of written style Japanese. Effective: 2016 Spring Quarter.

JPN 116—Culture and History in Kyoto (8)
Fieldwork; Lecture/Discussion—3 hours. Intensive course exploring the historical and cultural riches in Kyoto and its environs. Limited to students enrolled in the corresponding Quarter Abroad program. Takes place on-site in and around Kyoto, Japan. GE credit: AH, WC. Effective: 2017 Fall Quarter.

JPN 117S—Intensive Modern Japanese: Reading and Discussion (17)
Lecture/Discussion—17 hours. Prerequisite(s): JPN 005 C- or better; or Consent of Instructor. Or the equivalent language proficiency. Introduction to basic Japanese grammar and development of more advanced reading, writing, and conversation skills in a cultural context. Combination of courses 6, 111, 112, and 113 taught intensively in Japan. Not open to students who have taken JPN 006, JPN 111, JPN 112, or JPN 113; an exception can be made for students who have taken JPN 006 or its equivalent, provided that those five units are deducted from the 19 total unit load. GE credit: AH, OL, WC. Effective: 2017 Winter Quarter.

JPN 121—Advanced Japanese I (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 113 C- or better; or Consent of Instructor. First of three courses in a series of fourth year Advanced Japanese which focuses on the levels of formality or politeness in conversation as well as socio-cultural aspects and topics in the Japanese society. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

JPN 122—Advanced Japanese II (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 121 C- or better; or Consent of Instructor. Second of three courses in a series of fourth-year Advanced Japanese which focuses on the levels of formality or politeness in conversation as well as socio-cultural aspects and topics in the Japanese society. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

JPN 123—Advanced Japanese III (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 122 C- or better; or Consent of Instructor. Third of three courses in a series of 4th year Advanced Japanese which focuses on the levels of formality or politeness in conversation as well as socio-cultural aspects and topics in the Japanese society. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

JPN 130—Readings in Modern Japanese Literature to 1926 (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): JPN 113; or equivalent language proficiency. Restricted to completion of course 113 or equivalent as determined by taking a placement exam or consent of instructor. Short stories and essays by Japanese writers of the Meiji and Taishô eras, from 1868 to 1926. Authors include Natsume Sôseki, Izumi Kyôka, Tanizaki Jun'ichirô and Akutagawa Ryûnosuke. Readings and discussion in Japanese with some emphasis on translation into English. GE credit: AH, WC. Effective: 2017 Winter Quarter.

JPN 130—Readings in Modern Japanese Literature to 1926 (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): JPN 113; or equivalent language proficiency, or consent of instructor. Restricted to completion of course 113 or equivalent as determined by taking a placement exam or consent of instructor. Short stories and essays by Japanese writers of the Meiji and Taishô eras, from 1868 to 1926. Authors include Natsume Sôseki, Izumi Kyôka, Tanizaki Jun'ichirô and Akutagawa Ryûnosuke. Readings and discussion in Japanese with some emphasis on translation into English. GE credit: AH, WC. Effective: 2018 Fall Quarter.

JPN 131—Readings in Modern Japanese Literature: 1920-1945 (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 113; Or the equivalent language proficiency. Fourth-year level reading of representative works of modern Japanese literature including short stories, novellas, diaries, memoirs, poetry and excerpts from novels and plays from 1920 through the militaristic era, to the end of the war years in 1945. GE credit: AH. Effective: 2016 Spring Quarter.

JPN 131—Readings in Modern Japanese Literature: 1920-1945 (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 113; or equivalent language proficiency, or consent of instructor. Fourth-year level reading of representative works of modern Japanese literature including short stories, novellas, diaries, memoirs, poetry and excerpts from novels and plays from 1920 through the militaristic era, to the end of the war years in 1945. GE credit: AH. Effective: 2018 Fall Quarter.

JPN 132—Readings in Modern Japanese Literature: 1945-1970 (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 113; Or the equivalent language proficiency. Continuation of course 131, but may be taken independently. Covers selected texts from the immediate post-war years beginning in 1945 down to 1970 and the post-war recovery. GE credit: AH. Effective: 2016 Spring Quarter.

JPN 132—Readings in Modern Japanese Literature: 1945-1970 (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 113; Or equivalent language proficiency, or consent of instructor. Continuation of course 131, but may be taken independently. Covers selected texts from the immediate post-war years beginning in 1945 down to 1970 and the post-war recovery. GE credit: AH. Effective: 2018 Fall Quarter.

JPN 133—Readings in Modern Japanese Literature: 1970 to Present (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 113; Or the equivalent language proficiency. Continuation of course 132, but may be taken independently. Covers selected texts from 1970 to the present. GE credit: AH, WC. Effective: 2016 Spring Quarter.

JPN 133—Readings in Modern Japanese Literature: 1970-Present (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 113; or equivalent language proficiency, or consent of instructor. Continuation of course 132, but may be taken independently. Covers selected texts from 1970 to the present. GE credit: AH, WC. Effective: 2018 Fall Quarter.

JPN 134—Readings in the Humanities: Traditional Culture (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): JPN 113; Or the equivalent language proficiency. Fourth-year level reading of modern works by major specialists on traditional Japanese culture: history, religion, thought, art, international relations, and literary history and criticism. Focus is equally on developing reading skills and learning about Japanese culture. GE credit: AH, WC. Effective: 2016 Spring Quarter.

JPN 134—Readings in the Humanities: Traditional Culture (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): JPN 113; or equivalent language proficiency, or consent of instructor. Fourth-year level reading of modern works by major specialists on traditional Japanese culture: history, religion, thought, art, international relations, and literary history and criticism. Focus is equally on developing reading skills and learning about Japanese culture. GE credit: AH, WC. Effective: 2018 Fall Quarter.

JPN 135—Readings in the Humanities: The Modern Period (4) ***Review all entries***
Lecture—3 hours; Term Paper. Prerequisite(s): JPN 113; Or the equivalent language proficiency. Fourth-year level reading of authentic modern writings on Japanese culture, history, philosophy, society, religion, law, politics, international relations, aesthetics, and comparative culture by prominent critics, commentators, and scholars. GE credit: AH, WC. Effective: 2016 Spring Quarter.

JPN 135—Readings in the Humanities: The Modern Period (4) ***Review all entries***
Lecture—3 hours; Term Paper. Prerequisite(s): JPN 113; or equivalent language proficiency, or consent of instructor. Fourth-year level reading of authentic modern writings on Japanese culture, history, philosophy, society, religion, law, politics, international relations, aesthetics, and comparative culture by prominent critics, commentators, and scholars. GE credit: AH, WC. Effective: 2018 Fall Quarter.

JPN 136—Readings in Newspapers and Magazines (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 113; Or the equivalent language proficiency. Fourth-year level reading of newspaper and magazine reports, articles, and editorials on domestic and international affairs relating to contemporary Japan. GE credit: AH, WC. Effective: 2016 Spring Quarter.

JPN 136—Readings in Newspapers and Magazines (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 113; or equivalent language proficiency, or consent of instructor. Fourth-year level reading of newspaper and magazine reports, articles, and editorials on domestic and international affairs relating to contemporary Japan. GE credit: AH, WC. Effective: 2018 Fall Quarter.

JPN 137—Readings in Contemporary Japanese Literature (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): JPN 113; Consent of Instructor. Or the equivalent language proficiency. Readings of short stories and essays by contemporary writers. Representative writers include Yoshimoto Banana, Otsuichi, Suzuki Koji, Kyogoku Natsuhiko, Ogawa Yoko, and Murakami Haruki. Readings and discussion in Japanese with some emphasis on translation into English. GE credit: AH, WC. Effective: 2016 Spring Quarter.

JPN 137—Readings in Contemporary Japanese Literature (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): JPN 113; or equivalent language proficiency, or consent of instructor. Readings of short stories and essays by contemporary writers. Representative writers include Yoshimoto Banana, Otsuichi, Suzuki Koji, Kyogoku Natsuhiko, Ogawa Yoko, and Murakami Haruki. Readings and discussion in Japanese with some emphasis on translation into English. GE credit: AH, WC. Effective: 2018 Fall Quarter.

JPN 138—Readings in the Humanities: Japan Today (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): JPN 113; or equivalent language proficiency. Restricted to completion of course 113 or equivalent as determined by taking a placement exam or consent of instructor. Topical essays focused on contemporary Japan. Themes center on defining Japan today in terms of its future and past such as through its urban society, trends in architecture, "soft power" industries, and "traditional" elements as mainstays of Japan's cultural currency. GE credit: AH, WC. Effective: 2017 Winter Quarter.

JPN 138—Readings in the Humanities: Japan Today (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): JPN 113; or equivalent language proficiency, or consent of instructor. Restricted to completion of course 113 or equivalent as determined by taking a placement exam or consent of instructor. Topical essays focused on contemporary Japan. Themes center on defining Japan today in terms of its future and past such as through its urban society, trends in architecture, "soft power" industries, and "traditional" elements as mainstays of Japan's cultural currency. GE credit: AH, WC. Effective: 2018 Fall Quarter.

JPN 141—Introduction to Classical Japanese (4)
Lecture/Discussion—4 hours. Prerequisite(s): JPN 113; Or the equivalent language proficiency. Basic features of classical Japanese grammar through careful reading of selected literary texts such as Hojoki or Tsurezuregusa. Effective: 2016 Spring Quarter.

JPN 151—Japanese Linguistics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 003; Or equivalent language proficiency. Introduction to Japanese linguistics, featuring key aspects of the Japanese language. Analysis of Japanese from the perspectives of phonology, syntax, discourse analysis, sociolinguistics and psycholinguistics. GE credit: AH, WC, WE. Effective: 2017 Winter Quarter.

JPN 152—Traditional Japanese Drama (4)
Discussion—1 hour; Lecture—3 hours. Survey in English of Japanese drama, focusing on traditional forms: noh, kyôgen, bunraku puppet theater, and kabuki, with some attention to modern theater. Texts of plays and secondary works on performance techniques and the composition of plays. GE credit: AH, VL, WC, WE. Effective: 2011 Fall Quarter.

JPN 153—Love, Sexuality and the Family in Modern Japanese Literature (4)
Discussion—1 hour; Lecture—3 hours. Modern Japanese literature from the late 19th century to the present with a focus on love and sexuality in various forms, particularly as understood through the evolving institution of the Japanese family. Lectures, readings and discussions in English. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

JPN 154—Tourism and Heritage in Japan (4)
Discussion—1 hour; Lecture—3 hours. Focus on related concepts of tourism and cultural heritage within Japan, with attention to questions of tradition, authenticity and nostalgia. Examination of cultural heritage sites on various scales, including built environment, national cultural forms, and local performances such as festivals. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

JPN 155—Introduction to Japanese Folklore (4)
Discussion—1 hour; Lecture—3 hours. Focus on narrative genres of myth, legend, and folktale, with additional attention paid to festivals, folk art, belief systems, and the development of folklore studies (minzokugaku) as an academic discipline. Examination the relationship of folklore to ethnic and national identity. GE credit: AH, WC. Effective: 2016 Fall Quarter.

JPN 156—Japanese Literature on Film (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Survey of films based on works of Japanese literature, emphasis on pre-modern and early modern texts. Introduction to major directors of Japan, with a focus on cinematic adaptation. Lectures and readings in English. Films in Japanese with English subtitles. (Cinema and Technocultural Studies 148B.) GE credit: AH, VL, WC, WE. Effective: 2016 Winter Quarter.

JPN 157—Japanese Women Writers (4)
Lecture/Discussion—4 hours. Survey of women writers from earliest times to the present. Genres include poetry, narrative fiction, diaries, short stories, novels, and film. Representative authors include Murasaki Shikibu, Sei Shônagon, Higuchi Ichiyo, Enchi Fumiko and Ogawa Yôko. Readings and discussion in English. GE credit: AH, WC, WE. Effective: 2014 Fall Quarter.

JPN 158—The Supernatural in Japan (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Depictions of the supernatural in Japanese history through the contemporary era. Overview of Japanese literary and visual arts and the socio-historical contexts of the supernatural. Lectures and readings in English. Films in Japanese with English subtitles. GE credit: AH, VL, WC. Effective: 2016 Spring Quarter.

JPN 160—The Culture of Japanese Food (4)
Discussion—2 hours; Lecture—2 hours. Study of Japanese food and the culture of eating and drinking in Japan. Attention to symbolism, historical development, aesthetics, identity and global contexts. Materials examined include critical sources as well as literary texts, art, and films. GE credit: AH, SS, WC. Effective: 2017 Fall Quarter.

JPN 162—Japan Travelogue: Ethnographic Writing on Japanese Culture and People (4)
Lecture/Discussion—4 hours. Focuses on ethnographic writing about Japan. Includes modern scholarly ethnographies, travel writing, blog posts, etc. Critical analysis of how the Japanese "other" is represented across time. GE credit: AH, WC, WE. Effective: 2017 Fall Quarter.

JPN 192—Japanese Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Work experience in Japanese language, with analytical term paper on a topic approved by instructor. (P/NP grading only.) Effective: 2016 Fall Quarter.

JPN 194H—Special Study for Honors Students (1-5) ***Review all entries***
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. Senior standing and qualification for the Japanese Honors Program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in Japanese literature, civilization, or language studies. May be repeated up to 8 unit(s). (P/NP grading only.) GE credit: AH, WC, WE. Effective: 2014 Fall Quarter.

JPN 194H—Special Thesis Honors Project (1-5) ***Review all entries***
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. Senior standing and qualification for the Japanese Senior Thesis Project. Guided research, under the direction of a senate faculty member, leading to a senior thesis project on a topic in Japanese literature, culture, linguistics, or language studies. May be repeated up to 8 unit(s). (P/NP grading only.) GE credit: AH, WC, WE. Effective: 2018 Fall Quarter.

JPN 197T—Tutoring in Japanese (1-5) ***Review all entries***
Tutorial—1-5 hours. Prerequisite(s): Consent of Department Chairperson. Leading of small voluntary discussion groups affiliated with one of the Program's regular courses. May be repeated for credit, but only 2 units may be applied to the minor. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

JPN 197T—Tutoring in Japanese (1-5) ***Review all entries***
Tutorial—1-5 hours. Prerequisite(s): Consent of Department Chairperson. Leading of small voluntary discussion groups affiliated with one of the Program's regular courses. May be repeated for credit. (P/NP grading only.) Effective: 2018 Fall Quarter.

JPN 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study. (P/NP grading only.) GE credit: AH, WC. Effective: 2016 Spring Quarter.

JPN 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: AH, WC. Effective: 1997 Winter Quarter.

JPN 291—Seminar in Modern Japanese Literature: Major Writers (4)
Seminar—4 hours. Prerequisite(s): JPN 130 or JPN 131 or JPN 132 or JPN 133 or JPN 134 or JPN 135 or JPN 136 or JPN 137 or JPN 138; Or the equivalent language proficiency. In-depth reading and critical analyses of major works by and critical literature on one or two prominent modern or contemporary writers such as Natsume Soseki, Mori Ogai, Shimazaki Toson, Akutagawa Ryunosuke, Tanizaki Junichiro, Abe Kobo and Oe Kenzaburo. Effective: 2016 Spring Quarter.

JPN 297—Directed Independent Study (4)
Conference—1 hour; Independent Study; Term Paper. Prerequisite(s): Consent of Instructor. Restricted to graduate students. Directed independent study on a topic culminating in a term paper. Independent Studies may only be arranged with consent of the instructor and when graduate seminars are unavailable. May be repeated up to 5 time(s) when no seminars are available and topic differs. Effective: 2017 Spring Quarter.

JPN 299—Research (1-12)
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 2016 Spring Quarter.

Jewish Studies Minor; Jewish Studies

Jewish Studies Minor; Jewish Studies | Jewish Studies Minor

(College of Letters and Science)

David Biale, Ph.D., Program Director

Department Office. 2216 Social Sciences and Humanities Building; 530-752-9241; http://jewishstudies.ucdavis.edu

Faculty. http://jewishstudies.ucdavis.edu/core-faculty.html

The Program in Jewish Studies offers students the opportunity to explore Jewish history, communities, literature, religion, and culture in a comparative perspective and multicultural framework. Courses include Hebrew language instruction as well as the study of classical and modern Jewish texts in translation.

The interdisciplinary minor in Jewish Studies provides an introduction to the study of Jewish culture, thought, history, and literature. Students learn a broad range of methodologies and critical concepts in these areas and gain insight into the relation between Jewish identities, histories, and representations and those of the cultures in which Jews throughout the world have lived.

The Program in Jewish Studies will be of special interest to students in History, Religious Studies, Comparative Literature and Sociology as well as other fields in the Humanities and Social Sciences.

Advising. Jewish Studies Program office; dbiale@ucdavis.edu.

Jewish Studies **Units:** 20

Choose one:		
HIS 011	History of the Jewish People in the Modern World	4
JST 010	Introduction to Jewish Cultures	4
RST 012	The Emergence of Judaism, Christianity and Islam	4
RST 021	The Bible and Its Interpreters	4
RST 023	Introduction to Judaism	4
Choose four:		
COM 147	Modern Jewish Writers	4
ENL 171A	The Bible as Literature: The Old Testament	4

GER 116	Readings in Jewish Writing and Thought in German Culture	4
GER 117	After the Catastrophe: Jews and Jewish Life in Post-1945 Germany	4
GER 127	Major Writers in German*	4
GER 141	The Holocaust and its Literary Representation	4
HIS 110	Themes in World History`	4
HIS 112A	Topics in Pre-Modern Jewish History	4
HIS 112B	Topics in Modern Jewish History	4
HIS 112C	History of Jews in the Muslim World	4
HIS 113	History of Modern Israel	4
HIS 142A	History of the Holocaust	4
HIS 142B	The Memory of the Holocaust	4
JST 101	Topics in Jewish Thought	4
JST 110	Selected Topics in Jewish Literature	4
JST 111	Israeli Writing Since 1960	4
JST 112	Readings in Jewish Writing and Thought in German Culture	4
JST 120	Cinema and the American Jewish Experience	4
JST 121	Oral History and Jewish Life	4
HIS 011	History of the Jewish People in the Modern World	4
RST 012	The Emergence of Judaism, Christianity and Islam	4
RST 102	Christian Origins	4
RST 123	Sex and Gender in the Bible	4
RST 124	Topics in Judaism	4
RST 125	Dead Sea Scrolls, Apocrypha, and Pseudepigrapha	4
RST 126	The Formation of the Rabbinic Tradition	4
RST 130	Topics in Religious Studies+	4
RST 135	The Bible and Film	4
RUS 120	Topics in Russian Literature and Culture#	4
POL 135	International Politics of the Middle East	4
POL 136	The Arab-Israeli Conflict	4
POL 179	Special Studies in Comparative Politics^	4
SOC 174	American Jewish Identities and Communities	4

*When course covers a Jewish writer.
`When topic is AntiSemitism and Islamophobia.
+When topic is Doom: The End of the World and After
#When topic is Jews in Russian Literature and Culture
^When topic is Israeli Politics

Total: 20

Jewish Studies Minor; Jewish Studies | JST Courses

Courses in JST:

JST 010—Introduction to Jewish Cultures (4)
Lecture—3 hours; Term Paper—1 hour. Diverse Jewish cultures created over the past 2,000 years using examples from less-familiar communities such as India, China, and Ethiopia. Topics include the tensions between homeland/diaspora and questions of identity (race, nationality, culture, or religion). GE credit: SS, WC, WE. Effective: 2002 Winter Quarter.

JST 101—Topics in Jewish Thought (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): JST 010 or RST 023; or Consent of Instructor. Selected themes in Jewish thought in historical and social perspective. This course traces the historical development of topics in Jewish thought such as Messianism, or focuses on one specific historical period, such as modern Jewish thought. May be repeated for credit May be repeated for credit when topic differs. GE credit: AH, WC, WE. Effective: 2004 Spring Quarter.

JST 110—Selected Topics in Jewish Literature (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One lower division literature or Jewish Studies course or consent of instructor. Literature written about the Jewish experience, treated in its historical and social context. Examines literature written in one language, such as English, Hebrew, or Yiddish, or a theme, such as gender or modern identities, as expressed in different literary traditions. May be repeated for credit May be repeated for credit when topic differs. GE credit: AH, WC, WE. Effective: 2004 Spring Quarter.

JST 111—Israeli Writing Since 1960 (4)
Extensive Writing—1 hour; Lecture/Lab—3 hours. Prerequisite(s): One course in American or European literature. Contemporary Hebrew literature, in translation, in relation to post-independence debates about religious, social, and political identity of the Jewish state; literary reflections of Israeli ethnic diversity and changing gender relations; modern Hebrew poetry and postmodern experiments in fiction. No credit will be given to students who have completed HUM 119. GE credit: AH, WC, WE. Effective: 2001 Fall Quarter.

JST 112—Readings in Jewish Writing and Thought in German Culture (4)
Lecture/Discussion—3 hours; Term Paper—1 hour. Prerequisite(s): RST 023; or Consent of Instructor. Historical tradition of Jewish thought in the German cultural context; unique contributions of Jewish writers to culture of the German speaking world; what it means to be "other" in the mainstream culture. May be repeated up to 2 time(s) when topic differs. No credit will be given to students who have completed HUM 121. GE credit: AH, WC, WE. Effective: 2001 Fall Quarter.

JST 116—Readings in Jewish Writing and Thought in German Culture (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): RST 023; or Consent of Instructor. Historical tradition of Jewish thought in the German cultural context; unique contributions of Jewish writers to culture of the German speaking world; what it means to be "other" in the mainstream culture. May be repeated up to 2 time(s) if topic differs. No credit will be given to students who have completed HUM 121. (German 116) GE credit: AH, OL, WC, WE. Effective: 2007 Spring Quarter.

JST 120—Cinema and the American Jewish Experience (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): JST 010 recommended. Examination of American cinema to reveal how Jewish identity is expressed and submerged, tracing the relations between religion, identity, race, politics, and art. Not open for credit to students who have completed HUM 122. GE credit: AH, WE. Effective: 2001 Fall Quarter.

JST 121—Oral History and Jewish Life (4)
Lecture/Discussion—3 hours; Term Paper—1 hour. Oral history methodologies and application to an in-depth oral history interview about Jewish life. Topics include oral history practices and ethics, immigration, migration, religious practice, ethnic relations, and community organization structures. No credit given to students who have completed HUM 123. GE credit: SS. Effective: 2001 Fall Quarter.

Land, Air, & Water Resources

Land, Air, & Water Resources | Land, Air, & Water Resources Information

(College of Agricultural and Environmental Sciences)

Randy Southard, Chairperson

Department Office. 1110 Plant and Environmental Sciences Building 530-752-1130; http://lawr.ucdavis.edu

Land, Air and Water Resources is a multidisciplinary department with faculty who specialize in atmospheric science, plant science, soils and biogeochemistry, hydrology, and water engineering. Teaching, research, and outreach efforts focus on agricultural and environmental aspects of these disciplines. The faculty also contributes to numerous other undergraduate and graduate programs in the Colleges of Agricultural and Environmental Sciences, Letters and Science, and Engineering.

Major Programs. Undergraduate programs in Atmospheric Science, Hydrology, Environmental Science and Management, and Sustainable Agriculture and Food Systems are centered in the department; see http://lawr.ucdavis.edu/academic_programs.htm.

Undergraduate Advising Center is located in 1150 Plant and Environmental Sciences Building; 530-752-1603.

Courses. See courses listed under Atmospheric Science, Hydrologic Sciences, Hydrology, Environmental Science and Management, and Soil Science. See also the websites listed above.

Graduate Study. Graduate programs, offering both M.S. and Ph.D. degrees, in Atmospheric Science, Soils and Biogeochemistry, and Hydrologic Sciences are administered in the department; see http://lawr.ucdavis.edu/academic_programs.htm.

Graduate Advising Center is located in 1152 Plant and Environmental Sciences Building; 530-752-1669.

Landscape Architecture

Landscape Architecture | LDA B.S.

(College of Agricultural and Environmental Sciences)

(Department of Human Ecology – Landscape Architecture and Environmental Sciences)

Department Office. Department of Human Ecology; 131 Hunt Hall; 530-752-3907; http://lda.ucdavis.edu

Faculty. http://humanecology.ucdavis.edu/lda/people/faculty.htm

Landscape architecture is the planning and design of land areas where human use requires adaptation or conservation of the environment. Students who study landscape architecture are concerned about the welfare of the environment and the people who use and shape it. They are capable of solving physical problems and are able to visualize and think in terms of spaces and three-dimensional concepts. The program is fully accredited by the Landscape Architecture Accreditation Board (LAAB) which is the only organization professionally sanctioned to grant landscape architectural accreditations in the United States. The program was last reviewed in 2012.

The Program. The curriculum balances creativity and visual and spatial skills with technological expertise and a thorough background in physical, natural, and social sciences. Students develop proficiency at problem solving relating to design of parks, public spaces, energy-efficient neighborhoods, land reclamation projects, city and regional planning, and landscape planning for wilderness and scenic regions, coastal and riparian environments, and other sensitive land areas. The program stresses a process-oriented approach to design and emphasizes environmental and community values.

Preparatory Requirements. Students are admitted to the landscape architecture major only after submitting a portfolio for review and selection by the faculty.

Career Alternatives. Graduates may find jobs in private landscape architectural firms or public agencies, non-profit organizations, and corporations employing landscape architects. The landscape architecture major provides the student with excellent preparation for graduate school or career development in a wide range of environmental and design-related fields.

Graduate Study. Graduate-level landscape architecture courses are available to students pursuing graduate programs compatible with or directed toward landscape management, planning, and design issues. A Graduate Academic Certificate in Landscape Architecture and Environmental Design is an option for any graduate student; see https://gradstudies.ucdavis.edu/programs/graduate-academic-certificates. Program faculty are active members of various graduate groups: Community Development, Geography, Transportation Technology and Policy, and Ecology. Faculty members have expertise in many areas, including landscape history, social theory, practice of public space design, historic landscape preservation, city and regional planning, community participation in urban landscape design, landscape ecology, conservation planning, resource management, bioregionalism, and regenerative landscape systems. Graduate students pursue more focused interests, expanding their professional expertise and/or conducting advanced research in landscape architecture correlated disciplines.

Advising Center. See Sharla Cheney, 135 Hunt Hall; 530-754-8628; scheney@ucdavis.edu.

Major Advisor. Steve Greco

Preparatory Subject Matter **Units:** 76-79

English Writing

CMN 001	Introduction to Public Speaking	4
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
ENH 006	Introduction to Environmental Plants	4

Choose one:

MAT 016A	Short Calculus	3
STA 013	Elementary Statistics	4
ECS 010	Introduction to Programming (Discontinued)	4

Choose one:

CHE 002A	General Chemistry	3-5
CHE 010	Concept of Chemistry	4
PHY 001A	Principles of Physics	3
PHY 010	Topics in Physics for Nonscientists	4
GEL 001	The Earth	4
SSC 010	Soils in Our Environment	3

Choose two courses satisfying Social Sciences general education requirement.

Choose two courses satisfying Arts and Humanities general education requirement.

LDA 001	Introduction to Environmental Design	4
LDA 002	Place, Culture and Community	4
LDA 003	Sustainable Development: Theory and Practice	4
LDA 021	Landscape Representation I	4
LDA 023	Landscape Representation II	3
LDA 030	History of Environmental Design	4
LDA 050	Site Ecology	4
LDA 060	Landform and Grading Studio	6
LDA 070	Introduction to Spacemaking	4

Depth Subject Matter **Units:** 58-59

LDA 102	Methods in Design and Landscape Research	3

LDA 160	Design and Build Studio	6
LDA 161	Professional Practice and Construction Documents	6
LDA 170	Site Planning and Design Studio	6
LDA 171	Urban Design and Planning Studio	6
LDA 182	Advanced Landscape Architecture Studio I	6
LDA 183	Advanced Landscape Architecture Studio II	6
LDA 184	Capstone Landscape Architecture Studio	6
LDA 120	Landscape Representation III	3
OR		
LDA 150	Introduction to Geographic Information Systems	4
LDA 190	Proseminar in Landscape Architecture	1
Two quarters.		
ENH 133	Woody Plants in the Landscape: Growth, Ecology and Management	4
ENH 105	Taxonomy and Ecology of Environmental Plant Families	4

Restricted Electives **Units:** 16

Choose 16 units of upper division courses in consultation with advisor.

Total: 150-154

Landscape Architecture | LDA Courses

Courses in LDA:

LDA 001—Introduction to Environmental Design (4)
Discussion—1 hour; Lecture—3 hours; Term Paper. Introduction to the role of design professionals in contributing to the built environment at a range of scales. Introduction to basic methods used by design professionals to evaluate, design, plan, and manage landscapes and the built environment. GE credit: AH, SE, SS, VL, WC, WE. Effective: 2012 Fall Quarter.

LDA 002—Place, Culture and Community (4)
Lecture—4 hours. Introduction to recognizing and reading cultural landscapes, and the application of cultural landscape meaning to the creation of contemporary built environments. Topics include patterns and influences relating to agriculture, military, transportation, housing, wilderness, recreation and tourism. GE credit: ACGH, SS, VL, WC, WE. Effective: 2012 Fall Quarter.

LDA 003—Sustainable Development: Theory and Practice (4)
Discussion—1 hour; Lecture—3 hours. Origins, theoretical perspectives, and practical applications of the concept of sustainable development across scales (site,
building, neighborhood, city, region, and nation) through lectures, sketch exercises, student projects, walking tours. GE credit: ACGH, SS, VL, WE. Effective: 2018 Winter Quarter.

LDA 010—World Regional Geography (3)
Lecture—3 hours. Major geographic regions of the world; physical and human geography of each region; interactions between the people and the environment; culture and landscape; major resources; physical environments; population distribution and major cities. GE credit: AH, SS, WC. Effective: 2016 Spring Quarter.

LDA 021—Landscape Representation I (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): LDA 001 (can be concurrent); or Consent of Instructor. Pass One is restricted to Pre-Landscape Architecture and Sustainable Environmental Design majors. Introduction to landscape architectural representation techniques. Fundamentals of orthographic drafting, freehand drawing, photography, and basic digital representation. GE credit: AH, OL, VL. Effective: 2017 Fall Quarter.

LDA 023—Landscape Representation II (3)
Project (Term Project); Studio—6 hours. Prerequisite(s): LDA 021; or Consent of Instructor. Restricted to Pre-Landscape Architecture and Landscape Architecture majors only. Instruction of methods to explore and communicate landscape design intentions through digital media Effective: 2017 Fall Quarter.

LDA 030—History of Environmental Design (4)
Discussion—1 hour; Lecture—3 hours. History of Environmental Design across disciplines, including landscape architecture, planning, community and urban design. GE credit: AH, VL, WE. Effective: 2016 Winter Quarter.

LDA 050—Site Ecology (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): BIS 002B Pass One restricted to Pre-Landscape Architecture and Sustainable Environmental Design majors. Introduction to ecological concepts, including nutrient dynamics, population regulation, community structure, ecosystem function. Principles will be applied to human activities such as biological conservation, ecological restoration, landscape planning, and management. Weekly lab devoted to field exercises in local ecosystems. GE credit: SE, VL, WE. Effective: 2016 Fall Quarter.

LDA 060—Landform and Grading Studio (6)
Extensive Problem Solving; Project (Term Project); Studio—8 hours. Prerequisite(s): LDA 070 Pass One restricted to Pre-Landscape Architecture majors. Introduction of landform and topography as landscape medium and utilization of grading and drainage to design meaningful and functional spaces. Intro to site analysis and site planning, with specific attention to topography. GE credit: AH, OL, SE, VL. Effective: 2017 Fall Quarter.

LDA 061—AutoCAD for Landscape Architects (4)
Laboratory—4 hours; Lecture—2 hours. Pass One restricted to Pre-Landscape Architecture, Sustainable Environmental Design, and Landscape Architecture majors. Introduction of computer-aided drafting (CAD) techniques and their application to landscape design. Drawing set-up, layer control, basic drawing and editing commands, dimensioning and text styles, symbol libraries, and display commands used in the creation of landscape architectural drawings. Effective: 2016 Summer Session 1.

LDA 070—Introduction to Spacemaking (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): LDA 021; or Consent of Instructor. Pass One restricted to Pre-Landscape Architecture and Sustainable Environmental Design majors. Introduction to basic principles of design towards the creation of space. Design methodologies and skills to define, manipulate, and represent the built environment. Workshops in 3D physical modeling for spacemaking. GE credit: AH, OL, VL. Effective: 2017 Fall Quarter.

LDA 098—Directed Group Study in Landscape Architecture (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Directed group study. (P/NP grading only.) Effective: 2012 Fall Quarter.

LDA 099—Special Study for Undergraduates in Landscape Architecture (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2012 Fall Quarter.

LDA 101—Advanced Theory in Environmental Design (3)
Lecture/Discussion—3 hours. Prerequisite(s): LDA 070 (can be concurrent); or Consent of Instructor. Open to LDA/SED majors only. Provides exploration of contemporary theories and philosophies impacting design of landscapes and the built environment. Includes exploring competing definitions of "landscape," "nature," and "culture" GE credit: AH. Effective: 2017 Spring Quarter.

LDA 102—Methods in Design and Landscape Research (3)
Lecture—3 hours. Prerequisite(s): LDA 171; or Consent of Instructor. Open to Landscape Architecture majors only. Research, design, and planning methods employed in landscape architecture. Exercises allow students to design independent landscape research. Lectures provide a historical overview of research methodology. GE credit: AH, OL, VL, WE. Effective: 2018 Winter Quarter.

LDA 120—Landscape Representation III (3)
Project (Term Project); Studio—6 hours. Prerequisite(s): LDA 023; or Consent of Instructor. Restricted to Landscape Architecture majors. Provides hands-on workshop environment to explore advanced representation and modeling skills. Digital drawing explored as an analytical research method and generative design technique for creating presentation graphics. Effective: 2017 Fall Quarter.

LDA 140—Green Building, Design, and Materials (4)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): LDA 050; LDA 070 Pass One restricted to Sustainable Environmental Design majors. Sustainable design and construction techniques at site and building scales. Emphasizes real-world case studies, analysis of opportunities for actual sites, and application of LEED and Sustainable Sites green rating systems. GE credit: AH, SE, VL. Effective: 2016 Fall Quarter.

LDA 141—Community Participation and Design (4)
Fieldwork—3 hours; Laboratory—3 hours; Lecture—1 hour; Project (Term Project)—3 hours. Prerequisite(s): LDA 021; LDA 030; LDA 050; LDA 070 Restricted to Sustainable Environmental Design and Landscape Architecture majors. Introduction to community participation and design. Incorporates social and cultural factors, public and community processes, theories and practices related to human-environment behavior; community involvement in design, social analysis, community engagement, accessibility, diversity and politics of place. GE credit: ACGH, AH, DD, SS, VL. Effective: 2015 Winter Quarter.

LDA 142—Applying Sustainable Strategies (6)
Discussion—3 hours; Lecture—3 hours. Prerequisite(s): LDA 140; LDA 141 Restricted to Sustainable Environmental Design Majors. Capstone class examines case studies and techniques of sustainable development. Student teams will develop detailed proposals for real-world sites. GE credit: AH, OL, SE, SS, VL, WE. Effective: 2016 Spring Quarter.

LDA 150—Introduction to Geographic Information Systems (4)
Laboratory—3 hours; Lecture—3 hours. Pass One restricted to Landscape Architecture and Sustainable Environmental Design majors. Basic concepts, principles, and methods of GIS are presented. Data structures, database design, GIS data creation, GPS, and spatial analysis. Not open to credit for students who have completed ABT 180, PLS 180, ABT 181N. (Applied Biological Systems Technology 150.) GE credit: SE, VL. Effective: 2018 Winter Quarter.

LDA 160—Design and Build Studio (6)
Extensive Problem Solving; Fieldwork; Studio—8 hours. Prerequisite(s): LDA 001; LDA 002; LDA 003; LDA 021; LDA 030; LDA 050; LDA 070 Restricted to Landscape Architecture majors. Introduction to the spatial design and construction of small-scale projects. Hands-on approach to learning and understanding materials (including wood, concrete, and stone) and methods in landscape construction, and the application of technical skills (including detailing, cost estimation, and specifications). GE credit: AH, OL, VL. Effective: 2013 Fall Quarter.

LDA 161—Professional Practice and Construction Documents (6)
Fieldwork; Project (Term Project); Studio—8 hours. Prerequisite(s): LDA 171 Open to Landscape Architecture majors only. Legal and professional aspects of landscape architecture, including the development of construction documents (drawings and specifications), proposal writing, fee calculations, project management, cost estimation, and insurance. Effective: 2017 Fall Quarter.

LDA 170—Site Planning and Design Studio (6)
Fieldwork; Studio—8 hours. Prerequisite(s): LDA 160 Open to Landscape Architecture majors only. Application of place-making and problem-solving skills to local landscape sites. Analysis of social and environmental conditions in the field. Lectures link design projects to contemporary theories and practices. GE credit: AH, OL, VL. Effective: 2017 Fall Quarter.

LDA 171—Urban Design and Planning Studio (6)
Studio—8 hours. Prerequisite(s): LDA 170 Restricted to Landscape Architecture majors. Studio designing large-scale landscapes at regional, sub-regional, and neighborhood scales. Focuses on understanding complex social, economic, and environmental factors, developing sustainability priorities and strategies, and applying them through design and policy. GE credit: ACGH, AH, OL, VL. Effective: 2016 Fall Quarter.

LDA 180—Advanced Design and Planning Studio (6)
Extensive Problem Solving; Fieldwork; Studio—8 hours. Prerequisite(s): LDA 060; LDA 160; LDA 170; LDA 171; LDA 172. Restricted to Landscape Architecture majors or consent of instructor. Application of advanced theories and methods of design and planning to real-world projects. May be repeated up to 18 unit(s). GE credit: AH, OL, VL. Effective: 2013 Fall Quarter.

LDA 182—Advanced Landscape Architecture Studio I (6)
Studio—8 hours. Prerequisite(s): LDA 171 Restricted to Landscape Architecture majors (ALDA) or consent of instructor. Landscape architecture studio featuring advanced studies and applications of creative work, design, technology and/or theory. One day long fieldtrip required. Effective: 2016 Fall Quarter.

LDA 183—Advanced Landscape Architecture Studio II (6)
Studio—8 hours. Prerequisite(s): LDA 182 Restricted to Landscape Architecture majors (ALDA) or consent of instructor. Landscape architecture studio featuring advanced studies and applications of creative work, design, technology and/or theory. One day long field trip required. Effective: 2016 Fall Quarter.

LDA 184—Capstone Landscape Architecture Studio (6)
Studio—8 hours. Prerequisite(s): LDA 183 Restricted to Landscape Architecture majors or consent of instructor. Capstone studio that synthesizes learning objectives within the senior-level Landscape Architecture studio sequence. Students required to apply creative problem solving, design theory, technology, and representation skills towards a design approach that addresses complex, real-world environmental design problems. Effective: 2016 Fall Quarter.

LDA 190—Proseminar in Landscape Architecture (1)
Seminar—1 hour. Lectures and discussion of critical issues in landscape architecture. May be repeated three times for credit. May be repeated up to 3 time(s). (P/NP grading only.) Effective: 2012 Fall Quarter.

LDA 191—Landscape Architecture Planning & Design Studio (2-12)
Seminar—1 hour; Workshop—3 hours. Prerequisite(s): LDA 001; LDA 070; LDA 170; or Consent of Instructor. Priority to Landscape Architecture majors. Faculty initiated workshops featuring advanced studies and applications of original work in landscape architecture. May be repeated up to 20 unit(s). Effective: 2012 Fall Quarter.

LDA 192—Internship in Landscape Architecture (1-12)
Internship. Prerequisite(s): Consent of Instructor. Senior standing in Landscape Architecture. Professional field experience in landscape architecture. May be repeated for a total of 12 units. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2012 Fall Quarter.

LDA 193A—Senior Project in Landscape Architecture (3)
Studio—6 hours. Prerequisite(s): Senior standing in Landscape Architecture. Limited enrollment. Projects will focus on a critical area of landscape architectural design, planning, planning, analysis, communication, or research. Limited enrollment. Required of all Landscape Architecture majors. (P/NP grading only.) Effective: 2012 Fall Quarter.

LDA 193B—Senior Project in Landscape Architecture (4)
Studio—8 hours. Prerequisite(s): LDA 193A; And senior standing in Landscape Architecture. Limited enrollment. Projects will focus on a critical area of landscape architectural design, planning, analysis, communication, or research. Limited enrollment. Required of all Landscape Architecture majors. (P/NP grading only.) Effective: 2012 Fall Quarter.

LDA 197T—Tutoring in Landscape Architecture (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of Instructor. Tutoring in Landscape Architecture courses. (P/NP grading only.) Effective: 2012 Fall Quarter.

LDA 198—Directed Group Study in Landscape Architecture (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study. (P/NP grading only.) Effective: 2012 Fall Quarter.

LDA 199—Special Study for Advanced Undergraduates in Landscape Architecture (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2012 Fall Quarter.

LDA 200—Citizenship, Democracy, & Public Space (4)
Seminar—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Introduction to seminal works in political theory, philosophy, and the social sciences that focus on citizenship and the public sphere; development of critical perspective regarding restructuring of public space in a pluralistic and global culture; discussion of contemporary case studies. (Geography 230.) Effective: 2012 Fall Quarter.

LDA 201—Theory and Philosophy of the Designed Environment (4)
Seminar—4 hours. Prerequisite(s): LDA 140; Or the equivalent; graduate standing or consent of instructor. Examines the major theories of environmental design. Epistemology of design serves as framework to examine modern landscape architecture, architecture, urban design and planning. Normative theories of design are reviewed along with the social and environmental sciences. Effective: 2012 Fall Quarter.

LDA 202—Methods in Design and Landscape Research (4)
Seminar—4 hours. Explores many of the research and advanced design and planning methods employed in landscape architecture. Exercises provide the student with a vehicle for designing independent landscape research and creative activities. Lectures provide an historical overview of research methodology. Effective: 2016 Spring Quarter.

LDA 204—Case Studies in Landscape Design and Research (4)
Seminar—4 hours. Prerequisite(s): Graduate standing in Landscape Architecture, Ecology, Geography or Community Development or consent of instructor. Real-world designed environment situations where creative activity and/or basic research is the primary product. May be repeated for credit for a total of 12 units. May be repeated up to 12 unit(s). Effective: 2012 Fall Quarter.

LDA 205—Urban Planning and Design (4)
Discussion—2 hours; Lecture—2 hours. Limited to graduate students. Regulation, design, and development of the built landscape, planning and land development processes, zoning and subdivision regulation, site planning, urban design goals and methods, public participation strategies, creatively designing landscapes to meet community and ecological goals. (Geography 233.) Effective: 2016 Winter Quarter.

LDA 210—Advanced Landscape Architecture Studio (4)
Laboratory—8 hours. Prerequisite(s): LDA 113 or the equivalent; graduate standing or consent of instructor. Exposes students to real-world, designed-environment situations where creative activity and/or basic research is the primary product. Advanced landscape problems will be utilized at the site, urban or rural scale. Effective: 2012 Fall Quarter.

LDA 215—Ecologies of Infrastructure (4)
Seminar—4 hours. Open to graduate standing or consent of instructor. Focus on design practices and theory associated with ecological conceptions of infrastructure, including networked infrastructure, region, bioregion, regionalization, ecological engineering, reconciliation ecology, novel ecosystems, and theory/articulation of landscape change. (Geography 215.) Effective: 2016 Winter Quarter.

LDA 270—Environment and Behavior (4)
Seminar—3 hours; Tutorial—1 hour. Prerequisite(s): Graduate standing or consent of instructor; PSC 144 recommended. Factors that influence human's interaction with their surroundings and the mechanisms used for recognizing and addressing general and specific human needs in community design and development decisions. Effective: 2012 Fall Quarter.

LDA 280—Landscape Conservation (3)
Seminar—3 hours. Prerequisite(s): Contact department for prerequisite courses; graduate standing or consent of instructor. Focus is on land planning, design, and management techniques to further the goal of resource preservation. Examines current critical theory in the establishment and management of conservation areas. Effective: 2012 Fall Quarter.

LDA 290—Graduate Seminar in Landscape Architecture (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Seminar on selected topics in landscape architecture research, analysis, planning, design, communication, or education. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 2012 Fall Quarter.

LDA 297—Practicum in Landscape Architecture (1-10)
Independent Study—1-10 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Opportunity for students to work directly in the field with academics
at other institutions or with professionals in an office setting. Gives experience beyond the confines of campus and allows direct interaction with the community. (S/U grading only.) Effective: 2012 Fall Quarter.

LDA 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 2012 Fall Quarter.

LDA 299—Directed Individual Research for Graduate Students (1-12)
Independent Study. May be repeated for credit. (S/U grading only.) Effective: 2012 Fall Quarter.

LDA 396—Teaching Assistant Training Practicum (1-4)
Variable. May be repeated for credit. (P/NP grading only.) Effective: 2012 Fall Quarter.

Landscape Restoration Minor; Plant Sciences

Landscape Restoration Minor; Plant Sciences | Landscape Restoration Minor

(College of Agricultural and Environmental Sciences)

This minor is of particular interest to students majoring in Wildlife, Fish, and Conservation Biology, Environmental Science and Management, Landscape Architecture, Biological Sciences, Evolution and Ecology, Plant Biology and Sustainable Environmental Design. BIS 002C or PLS 002 is a prerequisite to most courses in the minor. The minor is sponsored by the Department of Plant Sciences.

Minor Advisor. T.P. Young (Plant Sciences)

Advising Center is located in 1220 Plant and Environmental Sciences; 530-752-9770.

Landscape Restoration **Units:** 19-25

Choose one:

ESP 155	Wetland Ecology	4
PLB 102	California Floristics	5
PLB 117	Plant Ecology	4
PLS 147	California Plant Communities	3
PLS 144	Trees and Forests	4

Choose one:

ENH 100	Urban Forestry	4
ENH 133	Woody Plants in the Landscape: Growth, Ecology and Management	4
PLB 119	Population Biology of Invasive Plants and Weeds	3
PLS 176	Introduction to Weed Science	4
SSC 010	Soils in Our Environment	3
OR		
SSC 100	Principles of Soil Science	5

Choose one:

ENH 150	Genetics and Plant Conservation: The Biodiversity Crisis	3
ESP 155L	Wetland Ecology Laboratory	3
PLS 130	Rangelands: Ecology, Conservation and Restoration	3
WFC 155	Habitat Conservation and Restoration	3

ENH 160	Restoration Ecology	3
ENH 160L	Restoration Ecology Laboratory	1
PLS 192	Internship	1-12

Total: 19-25

Latin Minor; Classics

Latin Minor; Classics | Latin Minor

(College of Letters and Science)

Carey Seal, Ph.D., Program Director

Department Office. Classics Program; 215 Sproul Hall; 530-752-0835; http://classics.ucdavis.edu

Faculty. http://classics.ucdavis.edu/people

The Department offers minors in Arabic, Classical Civilization, Greek and Latin for those wishing to follow a shorter but formally recognized program of study in Classics.

Latin **Units:** 20

CLA 003	Rome and the Mediterranean: 800 B.C.E. to 500 C.E.	4
OR		
CLA 004	Late Antiquity	4

Choose three upper division courses in Latin.
Choose one additional upper division course in Classics, Latin, or Greek.

Total: 20

Latin Minor; Classics | LAT Courses

Courses in LAT:

LAT 001—Elementary Latin (5)
Lecture—5 hours. Introduction to basic grammar and vocabulary and development of translation skills with emphasis on Latin to English. Students who have successfully completed LAT 002 or LAT 003 in the 10th grade or higher grade in high school may receive unit credit for this course on a P/NP grading basis only; although a passing grade will be charged to the student's P/NP option, no petition is required; all other students will receive a letter grade unless a P/NP petition is filed. GE credit: AH. Effective: 1997 Winter Quarter.

LAT 002—Elementary Latin (5)
Lecture—5 hours. Prerequisite(s): LAT 001; Or equivalent. Continuation of course 1. GE credit: AH. Effective: 2016 Spring Quarter.

LAT 003—Intermediate Latin (5)
Lecture—5 hours. Prerequisite(s): LAT 002; Or equivalent. Continuation of course 2. Selected readings from Latin authors. GE credit: AH. Effective: 2016 Spring Quarter.

LAT 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

LAT 100—Readings in Latin Prose (4)
Lecture/Discussion—4 hours. Prerequisite(s): LAT 003; Or equivalent. Review of Latin morphology, grammar, and vocabulary. Readings in prose authors, including Julius Caesar. GE credit: AH. Effective: 2016 Fall Quarter.

LAT 101—Livy (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Livy GE credit: AH, WE. Effective: 2016 Spring Quarter.

LAT 102—Roman Comedy (5)
Lecture—4 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Roman comedy. GE credit: AH, WE. Effective: 2016 Spring Quarter.

LAT 103—Vergil: Aeneid (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Vergil: Aeneid. GE credit: AH, WE. Effective: 2016 Spring Quarter.

LAT 104—Sallust (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Sallust. GE credit: AH, WE. Effective: 2016 Spring Quarter.

LAT 105—Catullus (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Catullus. GE credit: AH, WE. Effective: 2016 Spring Quarter.

LAT 106—Horace: Odes and Epodes (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Horace: Odes and Epodes. GE credit: AH, WE. Effective: 2016 Spring Quarter.

LAT 108—Horace: Satires and Epistles (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Horace: Satires and Epistles. GE credit: AH, WE. Effective: 2016 Spring Quarter.

LAT 109—Roman Elegy (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Roman elegy. GE credit: AH, WE. Effective: 2016 Spring Quarter.

LAT 110—Ovid (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): LAT 100; Or equivalent. Translation and discussion of selected readings from the works of Ovid. May be repeated up to 1 time(s) when topic differs and with consent of instructor. GE credit: AH, WC, WE. Effective: 2011 Fall Quarter.

LAT 112—Cicero (4)
Recitation—3 hours; Term Paper. Prerequisite(s): LAT 100; Or equivalent. Translation and discussion of selected readings from the works of Cicero. May be repeated up to 1 time(s) if readings vary and with consent of instructor. GE credit: AH, WE. Effective: 2011 Fall Quarter.

LAT 115—Lucretius (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Lucretius. GE credit: AH, WE. Effective: 2016 Spring Quarter.

LAT 116—Vergil: Eclogues and Georgics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Vergil: Eclogues and Georgics. GE credit: AH, WE. Effective: 2016 Spring Quarter.

LAT 118—Roman Historians (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): LAT 100; Or equivalent. Readings in Latin from one or more of the major Roman historians and biographers. Authors may include Sallust, Nepos, Livy, Tacitus, Suetonius, and Ammianus Marcellinus. GE credit: AH, WC, WE. Effective: 2011 Fall Quarter.

LAT 119—Readings in Republican Latin Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): LAT 100; Or equivalent. Translation and discussion of selected readings from Republican Latin literature. May be repeated for credit when topics vary. GE credit: AH, WC, WE. Effective: 2012 Summer Session 2.

LAT 120—Readings in Imperial Latin Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): LAT 100; Or equivalent. Readings in Imperial Latin literature. May be repeated up to 2 time(s) when topic varies. GE credit: AH, WC, WE. Effective: 2014 Winter Quarter.

LAT 121—Latin Prose Composition (4)
Lecture/Discussion—4 hours. Prerequisite(s): LAT 100; Or equivalent. Intensive grammar and vocabulary review through exercises in Latin prose composition. GE credit: AH. Effective: 2015 Fall Quarter.

LAT 122—Early Christian Writers (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): LAT 100 (can be concurrent); or Consent of Instructor. Latin style of selected early Christian writers. Topics may include: Latin translations of Greek and Hebrew scriptures, Christian Latin, with focus on North Africa, Palestine, or Spain; High literary Christian Latin; Christian Latin oratorical style. GE credit: AH, WC, WE. Effective: 2017 Fall Quarter.

LAT 125—Medieval Latin (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Selected readings from the Vulgate and various medieval authors provide an introduction to the developments in the Latin Language and literature from the fourth to the fifteenth centuries. GE credit: AH, WE. Effective: 2016 Spring Quarter.

LAT 130—Readings in Late Latin (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Translation and discussion of selected readings from late imperial-early medieval Christian and pagan literature. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

LAT 135—Themes in Latin Literature (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): LAT 100 (can be concurrent); or Consent of Instructor. Readings in Latin that trace a theme across times, genres, and authors. May be repeated for credit May be repeated for credit if topics differ. GE credit: AH, WC, WE. Effective: 2017 Fall Quarter.

LAT 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study. (P/NP grading only.) Effective: 2016 Spring Quarter.

LAT 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special study for advanced undergraduates. (P/NP grading only.) Effective: 2016 Fall Quarter.

Latin American & Hemispheric Studies Minor

Latin American & Hemispheric Studies Minor | Latin American & Hemispheric Studies Minor

(College of Letters and Sciences)

Charles F. Walker, Ph.D., Program Director

Program Office. Hemispheric Institute of the Americas, 1277 Social Sciences and Humanities Building; 530-752-3046; http://hia.ucdavis.edu

Faculty. http://hia.ucdavis.edu/people

The minor in Latin American and Hemispheric Studies offers students the opportunity to explore connections throughout the Western Hemisphere from an array of perspectives across multiple academic fields.

The minor is made up of six courses, arranged in three tiers: Basic (one lower division course on the history of Latin America); Core (two introductory upper division courses chosen from a designated list of fields other than History); and Elective (three additional upper division courses from a designated list of courses that focus primarily on Latin American and/or Hemispheric issues). Students are strongly encouraged to develop proficiency in Spanish or Portuguese, either through course work (such as completion of SPA 024 or 033), or through life experience such as study abroad.

Minor Advisor. HIA program coordinator in 1277 Social Sciences and Humanities Building (530-752-3046) or Charles Walker in 1279 Social Science and Humanities Building (530-752-3046).

Latin American and Hemispheric Studies **Units:** 24

Basic Courses:

Choose one:

HIS 007A	History of Latin America to 1700	4
HIS 007B	History of Latin America, 1700-1900	4
HIS 007C	History of Latin America 1900-present	4

Core Courses **Units:** 8

Choose one each from two of the following categories:

(a)

ANT 144	Contemporary Societies and Cultures of Latin America	4

(b)

NAS 115	Native Americans in the Contemporary World	4

(c)

SPA 151	Survey of Latin American Literature 1900 to Present	4

Elective Courses **Units:** 12

Choose three:

AAS 107A	African Descent Communities and Culture in the Caribbean and Latin America	4
AAS 163	African Religions in the Americas	4
AAS 172	Diaspora and New Black Identities	4
AAS 180	Race and Ethnicity in Latin America	4
AHI 151	Arts of the Indians of the Americas	4
CHI 130	United States-Mexican Border Relations	4
CHI 160	Mexican Film and Greater Mexican Identity	4
COM 151	Colonial and Postcolonial Experience in Literature	4
COM 152	Literature of the Americas	4
COM 165	Caribbean Literatures	4
FMS 189	Special Topics in Film Studies	4

MUS 127	Music from Latin America	4
NAS 110A	Quechua Language and Society, Beginning Level 1	4
NAS 110B	Quechua Language and Society, Beginning Level 2	4
NAS 110C	Quechua Language and Society, Intermediate Level 1	4
NAS 110D	Quechua Language and Society, Intermediate Level 2	4
NAS 120	Ethnopolitics of South American Indians	4
NAS 125	Performance and Culture Among Native Americans	4
NAS 133	Ethnohistory of Native People of Mexico and Central America	4
NAS 181A	Native American Literature	4
NAS 181B	Native American Literature	4
NAS 181C	Contemporary Native American Poetry	4
NAS 184	Contemporary Indigenous Literature of Mexico	4
HIS 160	Spain and America in the 16th century	4
HIS 162	History of the Andean Region	4
HIS 163A	History of Brazil	4
HIS 163B	History of Brazil	4
HIS 164	History of Chile	4
HIS 165	Latin American Social Revolutions	4
HIS 166A	History of Mexico to 1848	4
HIS 166B	History of Mexico since 1848	4
HIS 167	Modern Latin American Cultural and Intellectual History	4
HIS 168	History of Inter-American Relations	4
HIS 169A	Mexican-American History	4
HIS 169B	Mexican-American History	4
SPA 117	Teaching Spanish as a Native Tongue in the U.S.: Praxis and Theory	4
SPA 149	Latin-American Literature in Translation	4
SPA 151	Survey of Latin American Literature 1900 to Present	4
SPA 153	Latin American Short Story	4
SPA 154	Latin American Novel	4
SPA 155	Mexican Novel	4
SPA 156	Latin American Literature of the Turn of the 20th Century	4
SPA 157	Great Works of Latin American Literature/Culture	4
SPA 158	Latin American Poetry: From Vanguardism to Surrealism and Beyond	4
SPA 159	Special Topics in Latin American Literature and Culture	4
SPA 170	Introduction to Latin American Culture	4
SPA 171	Music from Latin America	4
SPA 172	Mexican Culture	4
SPA 174	Chicano Culture	4
SPA 175	Topics in Latin American Cultural Studies	4
SPA 176	Literature in Spanish Written in the United States	4
SPA 177	California and Latin America	4
POR 100	Principles of Luso-Brazilian Literature and Criticism	4
POR 159	Special Topics in Luso-Brazilian Literature and Culture	4
POR 161	Luso-Brazilian Literature and Culture	4
POR 162	Introduction to Brazilian Literature	4
POR 163	20th C Masters in Brazilian Literature	4
WMS 080	Special Topics in Critical Gender Studies	4
WMS 102	Gender and Post Colonialism	4

Total: 24

Law, School of

Law, School of | Law J.D.

School of Law

Kevin Johnson, J.D., Dean

Madhavi Sunder, J.D., Associate Dean; Academic Affairs

Hollis L. Kulwin, J.D., Senior Assistant Dean; Student Affairs

Kristen Mercado, J.D., Assistant Dean; Admission and Financial Aid

Brett C. Burns, Senior Assistant Dean; Administration

Dean's Office. 1011 Martin Luther King, Jr. Hall; 530-752-0243; http://www.law.ucdavis.edu

Faculty. https://law.ucdavis.edu/faculty/

The University of California Davis School of Law offers a three-year professional curriculum leading to the degree of Juris Doctor. Within a uniquely supportive atmosphere, law students have access to a comprehensive modern law school curriculum taught by a nationally and internationally distinguished faculty. The School offers a full range of traditional law courses, opportunities for practical experience through clinical programs, and in-depth study of an area of law in an individualized program of classroom work, research, writing, or experience in the community. It further provides professional skills training in interviewing and counseling, negotiation and dispute resolution and trial practice. The School seeks to promote critical evaluation of law and legal institutions in a broad perspective, integrating non-legal disciplines with professional legal education.

UC Davis Law School is fully accredited by the American Bar Association, is a member of the Association of American Law Schools, and has a chapter of the Order of the Coif.

Program of Study

The professional curriculum requires six semesters for completion and extends over a period of three years. It is for full-time students only; no part-time or evening program is offered. New students are admitted only at the beginning of the fall semester.

After satisfactorily completing the professional curriculum of 88 semester units and the required period of resident study, you will receive the degree of Juris Doctor (J.D.). Students who fail to attain satisfactory grades may be required to withdraw from the School at the end of any academic year.

The first year's work is prescribed and provides the essential foundation for subsequent legal study. Satisfactory completion of the first-year courses is, in all cases, prerequisite to second- and third-year courses. The work of the second and third years is elective. The courses of the professional curriculum are listed in the Undergraduate Courses chapter.

Combined Degree Programs

Individual students may find a combined degree involving law and another discipline such as economics, business, sociology, or science advantageous. To support this kind of study, the School, in conjunction with other schools and university departments, has established Combined Degree Programs. Under these programs, a student may work toward a J.D. degree and a master's degree in another discipline at the same time. Students working toward a combined degree are required to spend their first year at the law school.

Normally, a Combined Degree Program will take at least four years. You will usually be able to earn up to 10 semester-hours of law school credit for work in the related discipline and normally can complete the combined degrees in less time than it would take to earn the two degrees separately.

The first year of the Combined Degree Program must be taken entirely in the School of Law. During the remaining years, course work may be divided between the law school and the related discipline. You must satisfy the admission requirements for both programs and file applications with both units.

Students have pursued degree programs in combination with UC Davis departments for the M.A. degree in economics, philosophy, computer science, and sociology, and with the School of Management for the M.B.A. degree. The law school will attempt to work out an additional program if you are interested in other disciplines. You may enroll in the Combined Degree Program any time before the beginning of your third year in law school. If you are interested in pursuing a Combined Degree Program, and have made a separate application to another school or department, you should notify the School of Law if that application is accepted.

Law, School of | Law L.L.M.

School of Law

Kevin Johnson, J.D., Dean

Madhavi Sunder, J.D., Associate Dean; Academic Affairs

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After satisfactorily completing the professional curriculum of 88 semester units and the required period of resident study, you will receive the degree of Juris Doctor (J.D.). Students who fail to attain satisfactory grades may be required to withdraw from the School at the end of any academic year.

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Students have pursued degree programs in combination with UC Davis departments for the M.A. degree in economics, philosophy, computer science, and sociology, and with the School of Management for the M.B.A. degree. The law school will attempt to work out an additional program if you are interested in other disciplines. You may enroll in the Combined Degree Program any time before the beginning of your third year in law school. If you are interested in pursuing a Combined Degree Program, and have made a separate application to another school or department, you should notify the School of Law if that application is accepted.

Law, School of | LAW Courses

Courses of Instruction. The courses listed below have all been taught at least once in the last three years. There is no guarantee that any given course will be taught within the next three years. The numbers in parentheses indicate the number of semester credits. For current information, see Law School Course Descriptions.

Courses in LAW:

LAW 200—Introduction to Law (1)
Discussion—1 hour. Introduction to basic concepts of the law, the historical roots of common law and equity, the precedent system in its practical operation,
the modes of reasoning used by courts and attorneys, and the fundamentals of statutory interpretation. (S/U grading only.) Effective: 1997 Winter Quarter.

LAW 200A—U S Legal System Seminar (LL.M.) (2)
Discussion—2 hours. History and fundamental principles of the United States legal system. Important current legal issues, developments and trends. Required for LL.M. students who have not attended a U.S. law school. Fall semester only. Effective: 2017 Fall Semester.

LAW 200B—U S Legal Methods I (LL.M.) (3)
Lecture. Course is only offered to LL.M. students. Designed to provide background skills necessary to succeed in both law school and legal practice. Gain an introductory working knowledge of the US legal methods which includes learning various forms of legal writing and speaking. Effective: 2017 Fall Semester.

LAW 200BT—U.S. Legal Methods A (LL.M.) (3)
Lecture/Discussion—3 hours. Course is designed to provide background skills necessary to succeed in both law school and legal practice. Students gain an introductory working knowledge of the US legal method which includes learning various forms of legal writing and speaking. Effective: 2017 Spring Semester.

LAW 200C—U S Legal Methods II (LL.M.) (3)
Lecture. Open to LL.M. students only. Designed to provide background skills necessary to succeed in both law school and legal practice. Gain an introductory working knowledge of the US legal method which includes learning various forms of legal writing and speaking. Effective: 2017 Fall Semester.

LAW 200CT—U.S. Legal Methods B (LL.M.) (3)
Lecture/Discussion—3 hours. Course is designed to provide background skills necessary to succeed in both law school and legal practice. Students gain an introductory working knowledge of the US legal method which includes learning various forms of legal writing and speaking. Effective: 2017 Spring Semester.

LAW 200D—American Legal Concepts I (LL.M.) (3)
Lecture. Prerequisite(s): Consent of Instructor. Course is only offered to LL.M. students. Designed to provide basic skills necessary to succeed in both law school and legal practice. Effective: 2017 Fall Semester.

LAW 200DT—Advanced Introduction to American Legal Concepts and Methods (LL.M.) (3)
Lecture—3 hours. Course is only offered to LL.M. students. Building on the Introduction to American Law course, this course will provide additional instruction in American law and legal methods. Students will audit selected substantive courses and will produce a series of legal memoranda. Effective: 2017 Spring Semester.

LAW 200E—American Legal Concepts II (LL.M.) (3)
Lecture. Course is only offered to LL.M. students. Designed to provide basic skills necessary to succeed in both law school and legal practice. Effective: 2017 Fall Semester.

LAW 201—Property (4)
Discussion—4 hours. Prerequisite(s): AAS 010; LAW 200A; or Consent of Instructor. text here A study of doctrines and concepts of property law with primary emphasis on real property. Course coverage includes: the estates in land system; the landlord-tenant relationship, conveyancing, and private and public land use control. Effective: 2006 Fall Semester.

LAW 202—Contracts (5)
Discussion—5 hours. Examines sorts of promises that are enforced and the nature of protection given promissory obligations in both commercial and noncommercial transactions. Inquiry is made into the means by which traditional doctrine adjusts or fails to adjust to changing social demands Effective: 2006 Fall Semester.

LAW 203—Civil Procedure (5)
Discussion—5 hours. A study of the fundamental and recurrent problems in civil actions including the methods used by federal and state courts to resolve civil disputes. Effective: 2006 Summer Special Session.

LAW 204—Torts (5)
Discussion—5 hours. Familiarizes students with legal rules, concepts and approaches pertinent to the recovery for personal injuries, property damages and harm done to intangible interests. Effective: 2006 Fall Semester.

LAW 205—Constitutional Law I (4)
Discussion—4 hours. The principles, doctrines and controversies regarding the basic structure of and division of powers in American government. Specific topics include judicial review, jurisdiction, standing to sue, federalism, federal and state powers and immunities, and the separation of powers among the Effective: 2004 Fall Semester.

LAW 206—Criminal Law (3)
Discussion—3 hours. Study of the bases and limits of criminal liability. Coverage of the constitutional, statutory, and case law rules which define, limit, and
provide defenses to individual liability for the major criminal offenses. Effective: 1997 Winter Quarter.

LAW 207—Legal Research and Writing I (2)
Discussion/Laboratory—2 hours. Fall semester course taught by Wydick Fellowship Program faculty is an integrated legal research and writing skills course. Basic legal research resources and strategies are introduced and practiced. Effective: 2016 Fall Semester.

LAW 207A—Legal Research (LL.M.) (1)
Discussion—1 hour. Restricted to LL.M. students only. Description of the evolution and use of sources of law and secondary authority. Effective: 2016 Fall Semester.

LAW 207B—Advanced Legal Research (2)
Seminar—2 hours. Restricted to 35 students. Will introduce students to advanced legal research tools and techniques used in practice, including efficient computer research techniques. Effective: 2009 Fall Semester.

LAW 208—Legal Research and Writing II (2)
Discussion—2 hours. Focuses on persuasive writing and oral advocacy. Students will complete integrated research and writing assignments, including a complaint, a strategic defense office memorandum, a motion to dismiss in federal court, and an appellate brief, with oral arguments by all students. Effective: 2007 Fall Semester.

LAW 208A—Legal Research and Writing II (LL.M.) (2)
Discussion—2 hours. Persuasive writing and oral advocacy. LL.M. students complete integrated research and writing assignments, including a complaint, a strategic defense office memorandum, a motion to dismiss in federal court, and an appellate brief with oral arguments. Effective: 2017 Spring Semester.

LAW 208E—Introduction to U.S. Legal Methods A (3)
Lecture. Prerequisite(s): Consent of Instructor. Restricted to LL.M. students. Designed to provide foreign students with background skills at a more basic level than U.S. Legal Methods A and B. Students will audit carefully selected courses in the regular curriculum and complete assignments related to those courses. Effective: 2017 Fall Semester.

LAW 208F—Introduction to U.S. Legal Methods B (LLM) (3)
Seminar. Prerequisite(s): Consent of Instructor. Restricted to LL.M. students. Designed to provide foreign students with background skills at a more basic level than U.S. Legal Methods A and B. Students will audit carefully selected courses in the regular curriculum and complete assignments related to those courses. Effective: 2017 Fall Semester.

LAW 208G—U.S. Legal Methods A (LL.M.) (3)
Lecture. Restricted to LL.M. students. Designed to provide foreign and other students with background skills necessary to succeed in both law school and legal practice. Effective: 2017 Fall Semester.

LAW 208H—U.S. Legal Methods B (LL.M.) (3)
Seminar. A description of the evolution and use of sources of law and secondary authority. Effective: 2017 Fall Semester.

LAW 209A—Patent Law (3)
Discussion—3 hours. Prerequisite(s): LAW 274; or Consent of Instructor. Covers all essential aspects of patent law: patentable subject matter, novelty, utility, nonobviousness, enablement, prosecution, infringement, and remedies. Effective: 2011 Fall Semester.

LAW 209B—Patent Prosecution and Practice (3) ***Review all entries***
Seminar. Examines core requirements and strategies for drafting and prosecuting a patent application before the U.S. Patent & Trademark Office. Students will interact with real inventors and US PTO examiners to gain the experience of getting a patent issued. Effective: 2017 Fall Semester.

LAW 209B—Patent Prosecution and Practice (2) ***Review all entries***
Seminar. Examines core requirements and strategies for drafting and prosecuting a patent application before the U.S. Patent & Trademark Office. Interact with real inventors and US PTO examiners to gain the experience of getting a patent issued. Effective: 2018 Fall Semester.

LAW 209C—Patentable Subject Matter: Genes, Methods, and Software (2)
Seminar. In-depth look at recent cases and debates behind genetic patenting, software; business models; diagnostic methods, and others. Reviews the crucial and rapidly evolving field of patent law which affects some of the most important hi-tech industries. Effective: 2018 Spring Semester.

LAW 209DT—Innovation Law (2)
Seminar—2 hours. Explores range of legal issues that innovation lawyers face, from establishing a start-up to high stakes technology mergers & acquisitions, to data protection and privacy, protecting intellectual property through strategic patent litigation. Effective: 2017 Spring Semester.

LAW 209E—Patent Litigation (1)
Lecture—1 hour. Introduces the basics of Patent Law and examines the U.S. patent enforcement system. Learn how a patent litigation proceeds, focusing on both pre- and post-trial proceedings and examines substantive patent laws. Effective: 2018 Spring Semester.

LAW 209T—Innovation and Technology Transfer Seminar (2)
Seminar—2 hours. Prerequisite(s): LAW 209A or LAW 274, recommended but not required. Restricted to 15 students. From biomedicine to cleantech, public institutions are playing leading roles in developing cutting-edge technologies. Explores the law and policy of publicly-supported innovation and technology transfer. Effective: 2010 Fall Semester.

LAW 210—Reforming the Police and Criminal Justice (2)
Seminar—2 hours. Limited to 25 students. Focus on major current issues: policing ethnic neighborhoods; use of deadly force; modernizing the work of prosecutors and defense counsel. Effective: 2016 Fall Semester.

LAW 210A—Privatization of Criminal Justice Seminar (2)
Seminar—2 hours. Prerequisite(s): Prior social theory or ciminal procedure knowledge not required; completion of LAW 227A strongly recommended. Restricted to 10 students. Analyze the legal, historical, and sociological aspects of the growing private sector provision of criminal justice services traditionally assumed by government, including prisons, policing, and adjudication. Effective: 2005 Fall Semester.

LAW 210B—Sociology of Criminal Procedure (2)
Seminar—2 hours. Limited enrollment. What are the expectations and roles of the police in a democratic society? We need order maintenance and crime control, but to assume these tasks the police sometimes intrude upon interests considered fundamental to free societies. Effective: 2014 Spring Semester.

LAW 210C—Sexual Assault and the Law (2)
Seminar—2 hours. Criminal law of sexual assault, traditional and modern offenses, and proposals for reform. Discussion of procedural developments, victim's counsel, evidentiary reform, and ADR. And the implications for civil law, tort liability, Title VI, Title IX, and civil liability of perpetrators. Effective: 2015 Fall Semester.

LAW 210DT—Wrongful Convictions (2)
Seminar—2 hours. Course will explore the magnitude and complexity of the wrongful convictions, their causes and remedies under existing law, and possible fixes (reforms). It will emphasize relevant legal rules (Criminal Procedure, Evidence, Post-Conviction Review). Effective: 2016 Fall Semester.

LAW 210ET—Race, Mass Incarceration and Policing (2)
Seminar—2 hours. Key issues in the historical development and the current state of modern American imprisonment, policing structures, and the criminal justice system in relation to race. Effective: 2017 Spring Semester.

LAW 210F—Restorative Justice (2)
Seminar. Explore both the theory and practice of restorative justice as an alternative approach to the retributive justice model of our current criminal law system and many other institutions. Effective: 2017 Fall Semester.

LAW 210G—Aoki Center Restorative Justice Practicum (1)
Fieldwork. Learn about restorative justice principles and practices, receive training in restorative justice facilitation, and participate in and lead restorative justice circles in Davis and Sacramento schools, Yolo County Juvenile Hall, and other venues. (S/U grading only.) Effective: 2018 Fall Semester.

LAW 210H—Aoki Federal Court Amicus Project (3)
Project (Term Project). Prerequisite(s): LAW 203; LAW 219; both required or consent of instructor. Work on actual federal criminal cases in the Ninth Circuit Court of Appeals and United States Supreme Court. File briefs amicus curiae on critical issues, and develop research, writing, and oral advocacy skills. Effective: 2018 Fall Semester.

LAW 211—Negotiations (2)
Discussion—2 hours. Limited enrollment. Skills course teaches theoretical and empirical approaches to negotiation strategy for the purposes of making deals and resolving disputes. Students participate in simulations to hone their negotiation skills, and write analytical papers. Effective: 2016 Fall Semester.

LAW 211A—Advanced Negotiations Strategy and Client Counseling (3)
Discussion—3 hours. Prerequisite(s): Consent of Instructor. Application course; must apply and secure professor approval to enroll; will involve participating in discussions and a series of simulations; your classmates will be counting on you to actively participate and be well prepared for every simulation; do not apply to take this course unless you are willing and able to participate fully and can accept constructive feedback; if you anticipate missing more than two class sessions, do not apply to take this course. Understand the dynamics of interviewing and counseling process. Designed to be relevant to a broad spectrum of negotiation problems that are faced by legal professionals. Effective: 2012 Fall Semester.

LAW 211BT—International Business Negotiations (3)
Discussion/Laboratory—3 hours. Course is structured around a simulated negotiation exercise with students from a similar class at Stanford Law School. Students will experience the development of a business transaction over an extended negotiation in a context that replicates actual legal practice. Effective: 2016 Fall Semester.

LAW 212A—Medical Liability Law and Policy (2)
Discussion—2 hours. This course will consider the many ways in which society seeks to establish and maintain quality in patient care. Effective: 2007 Fall Semester.

LAW 213A—Transnational Criminal Law (3)
Discussion—3 hours. Prerequisite(s): LAW 205; LAW 206 Will examine the laws responses to a particular aspect of globalization, transnational crime. The course will explore the phenomenon of transnationality and how it affects the power of nation-states, acting alone or together, to prosecute certain crimes. Effective: 2006 Fall Semester.

LAW 213T—Terrorism and International Law (2)
Seminar—2 hours. International terrorism remains a pressing concern. Devising effective remedies for responding to it within the bounds of the law is critical. Therefore, the new generation of international lawyers needs to be familiar with the relevant law and standards. Effective: 2013 Fall Semester.

LAW 214—Tax Issues Related to Estate Planning (2)
Discussion—2 hours. Prerequisite(s): LAW 221 recommended. Tax issues Related to estate planning. Effective: 2017 Fall Semester.

LAW 214A—Migration, Work, and Taxation (2)
Seminar. Explores workers' and prospective workers' choices to move from one place to another, both across and within national borders. In particular, explores how tax policy and broader economic forces shape those choices. Effective: 2018 Fall Semester.

LAW 215—Business Associations (4)
Discussion—4 hours. Legal rules and concepts applicable to business associations, both public and closely held. Corporate form of organization, partnerships and other associational forms. Effective: 2005 Fall Semester.

LAW 215A—The Law of Corporate Governance Seminar (2)
Seminar—2 hours. Prerequisite(s): LAW 215 Advanced issues in the governance of publicly held corporations. Separation of ownership and control and how the law has addressed this issue at the theoretical level and in the context of topics such as the duties of corporate directors, shareholder voting rights, and competition among states to attract corporate charters. Effective: 2003 Fall Semester.

LAW 215S—Special Session Business Associations (4)
Discussion—4 hours. Provides a broad survey of the legal rules and concepts applicable to business associations, both public and closely. Effective: 2011 Spring Semester.

LAW 216A—Law and Religion (2)
Discussion—2 hours. Restricted to 20 students. Federal constitutional law relating to religion; the interpretation and application of the Free Exercise Clause and the Establishment Clause of the First Amendment. Effective: 2014 Spring Semester.

LAW 217—Telecommunications Law (3)
Discussion—3 hours. Economic and administrative regulation of telephony, radio and television broadcasting, and video technologies such as cable and
direct broadcast satellites. Emphasis on the recently enacted Telecommunications Reform Act and the role of the Federal Communications Commission, as well as other sources of regulation such as related antitrust law and state public utility regulation. Effective: 2000 Spring Semester.

LAW 218—Constitutional Law II (4)
Discussion—4 hours. Not open to students who have completed course 218A or 218B. Principally covers the First Amendment and the Equal Protection Clause. Effective: 2011 Fall Semester.

LAW 218A—Constitutional Law II--Equal Protection (2)
Discussion—2 hours. Students who have previously taken course 218, or who plan to take course 218 for 4 units in Spring 2011, may not take this course. Students enrolled in this course will be given priority registration spring semester 2011 to enroll in course 218B. Focuses on the Equal Protection Clause of the Fourteenth Amendment. Effective: 2010 Fall Semester.

LAW 218B—Constitutional Law II -- First Amendment (2)
Discussion—2 hours. Students who have previously taken course 218 or who plan to take course 218 for 4 units in Spring 2011 may not take this course. Students not required to take course 218A in order to take this course. Principally covers the free speech clause of the First Amendment. Effective: 2010 Fall Semester.

LAW 218D—Constitutional Theory Seminar (2)
Seminar—2 hours. Provides students with a broad understanding of the shape of modern constitutional theory, and the ability to understand the implications of that theory for concrete historical and modern constitutional disputes. Effective: 2015 Fall Semester.

LAW 218ET—California Constitutional Law (2)
Discussion—2 hours. Reviews, interpretive meta-rules for constitutional construction, structure and institutions of state government, civil liberties under the Declaration of Rights, the impact of race in California society, and criminal law. Effective: 2015 Fall Semester.

LAW 218T—Selected Topics in Constitutional Law (2)
Seminar—2 hours. Examines two core themes of Constitutional Law I and Federal Jurisdiction: federalism and separation of powers. Concentrates on habeas corpus and the Eleventh Amendment as vehicles for examining the constitutional themes in greater depth. Effective: 2010 Spring Semester.

LAW 218TA—Separation of Powers (2)
Discussion—2 hours. Study of the separation of powers in our federal government by focusing on certain historical events and their impact on constitutional law. Effective: 2012 Spring Semester.

LAW 218TB—Law of War (3)
Discussion—3 hours. Surveys the law of armed conflict as it applies to today's battlefields. Effective: 2013 Fall Semester.

LAW 218TC—Antidiscrimination Law (4)
Discussion—4 hours. Course offers an overview of federal constitutional and statutory antidiscrimination law in the United States. Effective: 2014 Fall Semester.

LAW 219—Evidence (3) ***Review all entries***
Lecture/Discussion. Covers rules regarding the admissibility of proof during civil and criminal cases, including rules governing relevancy, hearsay, the examination and impeachment of witnesses, expert opinion, and constitutional and statutory privileges. Effective: 2018 Spring Semester.

LAW 219—Evidence (4) ***Review all entries***
Lecture/Discussion. Covers rules regarding the admissibility of proof during civil and criminal cases, including rules governing relevancy, hearsay, the examination and impeachment of witnesses, expert opinion, and constitutional and statutory privileges. Effective: 2018 Fall Semester.

LAW 219A—Advanced Evidence (3)
Discussion—3 hours. Prerequisite(s): LAW 219 Limited to six students; selected by professor. Interested students complete an application form; available in the Law Registrar's Office. Credit is contingent on attending all classes and participating in all exercises. Participation is crucial to the success of the course, as students will be working in teams of three. Do not take this course unless you are willing and able to participate fully and can accept criticism. Public interest lawyers often spend much time in the courtroom. Prosecution, defender, and legal aid offices usually don't have resources to train lawyers in trial work. Seeks to help remedy this deficiency by helping develop witness interrogation skills. (S/U grading only.) Effective: 2010 Fall Semester.

LAW 219B—E-Discovery and Digital Evidence (2)
Lecture. Examines the interplay between the significant e-discovery rules and case law, and the process of electronic discovery, beginning with the duty to preserve electronically stored information (ESI), to the search, identification, collection, review and production of ESI in litigation. Effective: 2018 Fall Semester.

LAW 220—Federal Income Taxation (4)
Discussion—3 hours. Surveys the federal income tax system, with consideration of the nature of income, when and to whom income is taxable, exclusions from the tax base, deductions and credits, and tax consequences of property ownership and disposition. Effective: 2012 Spring Semester.

LAW 220A—State and Local Taxation (3)
Discussion—3 hours. Introduction to fundamentals of state and local taxation. Beginning with historical and constitutional aspects, student analyze recent developments in state and local taxation and their impact on client representation. Effective: 2017 Fall Semester.

LAW 220B—Tax and Distributive Justice (3)
Discussion—3 hours. Advanced tax course designed to introduce students to issues of tax policy, with particular emphasis on tax distribution (i.e., who or what should pay taxes in society) and tax incidence (i.e., who or what ends up paying taxes in society). Effective: 2015 Spring Semester.

LAW 220BT—Law of Banking and Financial Institutions (2)
Discussion—2 hours. Guide to dual regulatory system, and an understanding of banks and other financial institutions, such as thrifts, credit unions, industrial banks, finance companies, and money transmitters, as well as large versus community banks. Effective: 2011 Spring Semester.

LAW 220S—Special Session Federal Income Taxation (2)
Discussion—2 hours. Introduction to the basic principles of federal income taxation using the American federal tax model. Topics include identification of income subject to taxation, gains and losses from property transactions, the timing of income and deductions and the identity of people subject to tax on particular items of income. Effective: 2005 Summer Special Session.

LAW 220T—State and Local Taxation (3)
Discussion—3 hours. Introduction to fundamentals of state and local taxation. Beginning with historical and constitutional aspects, students will analyze recent developments in state and local taxation and their impact on client representation. Effective: 2013 Fall Semester.

LAW 221—Trusts, Wills and Estates (3)
Discussion—3 hours. Study of the law of decedent's estates, wills, and trusts. Effective: 2016 Fall Semester.

LAW 221A—Practical Skills in Will & Trust Drafting and Administration (2)
Seminar—2 hours. Provides the skills to practice law in the area of estate planning and probate/trust administration. Follow an estate planning client and draft actual estate plan documents. A series of related topics will be explored. Effective: 2018 Spring Semester.

LAW 222—Critical Race Theory Seminar (3)
Discussion—3 hours. Examines race relations and racial discrimination in America through the perspectives of proponents of the Critical Race Theory (CRT) movement, a collection of legal scholars who challenge both conservative and liberal political orthodoxies. Effective: 2013 Spring Semester.

LAW 222A—Latinos and Latinas and the Law (2)
Seminar—2 hours. Seminar analyzes some of the legal issues of particular relevance to the Latino community in the United States, including racial identity, immigration, language regulation, national and transnational identity issues, affirmative action, and civil rights. Effective: 2006 Fall Semester.

LAW 222B—Asian Pacific Americans and Law (3)
Seminar. Examines how American Law has shaped Asian Pacific American demographics, experiences, and status in American society. Effective: 2017 Fall Semester.

LAW 222CT—Anti-Corruption Law in India (2)
Seminar—2 hours. Addresses the impact of large corruption scandals on long term social trust, in light of Indian coal block and 2G spectrum allocation scandals. Effective: 2017 Spring Semester.

LAW 223—Estate Planning Seminar (2)
Seminar—2 hours. Limited enrollment. Selected topics in the estates and trusts area. Content varies with instructor. Effective: 2017 Spring Semester.

LAW 224—Animal Law Seminar (2)
Seminar—2 hours. An introduction to legal principles affecting animals and their use. GE credit: WE. Effective: 2013 Fall Semester.

LAW 225—Marital Property (2)
Discussion—2 hours. Covers the California community property system, including the rights of marital and domestic partners during the ongoing relationship, and upon the end of the relationship by death or divorce. Effective: 2004 Fall Semester.

LAW 226—Disability Rights Law (3)
Discussion—3 hours. Examines disability law and theory. Devoted to the Americans with Disabilities Act (particularly Titles I, II, and III) as it applies to employment, education, public accommodations, and government services and programs. Effective: 2017 Fall Semester.

LAW 226ET—Mental Disability Law (3)
Lecture/Discussion—3 hours. Students will examine the civil and constitutional bases of mental disability law, as well as its history, and explore the role of mental disability in the policing and criminal trial process. Effective: 2017 Spring Semester.

LAW 227A—Crimiminal Procedure (3)
Discussion—3 hours. Federal constitutional limits on government authority to gather evidence and investigate crime. Topics include Fourth Amendment limits on search, seizure, and arrest; the Fifth Amendment privilege against self-incrimination; and the Sixth Amendment right to counsel. Effective: 2004 Fall Semester.

LAW 227B—Advanced Criminal Procedure (3)
Discussion—3 hours. Examines a range of issues, including bail, charging decisions, preliminary hearings, discovery, statute of limitations, venue, joinder and severance, pleas, plea bargaining, assistance of counsel, trial, double jeopardy, sentencing, appeal and collateral remedies. Effective: 2007 Fall Semester.

LAW 227C—Topics in California Criminal Practice (2)
Seminar. Advanced criminal law and procedure class aimed at students planning to practice criminal law in California, either as an extern or summer clerk, or after graduation. Effective: 2017 Fall Semester.

LAW 228—Startups and Venture Capital (4)
Lecture/Discussion. Prerequisite(s): LAW 215; Prerequisite will not be waived, do not register for the course unless you have completed LAW 215. Limited enrollment. Introduction to the various legal and business considerations involved in forming and operating an emerging growth business. Effective: 2017 Fall Semester.

LAW 228A—Mergers and Acquisitions (3)
Discussion—3 hours. Prerequisite(s): LAW 215 Practical approach to mergers and acquisitions, with an in-depth look at the planning, negotiation, documentation and completion of mergers and acquisitions. Effective: 2017 Fall Semester.

LAW 228B—Accounting for Lawyers (2)
Discussion—2 hours. Exposes student to basic principles of accounting, from the perspective of the practicing attorney. Effective: 2010 Fall Semester.

LAW 228C—Law and Statistics (3)
Discussion—3 hours. Introduction to fundamentals of statistical analysis and how statistical analysis is used in the law and public policy. Course goal is to help students become excellent consumers of statistical information and evidence. Effective: 2014 Spring Semester.

LAW 229—Scientific Evidence (3)
Discussion—3 hours. Prerequisite(s): LAW 219 Limited enrollment. In addition to examining the evidence law governing the admission of scientific testimony, this course considers trial advocacy in presenting and attacking such testimony. Effective: 2007 Fall Semester.

LAW 230—International Environmental Law (3)
Discussion—3 hours. Prerequisite(s): Prior course work in environmental law and/or international law is helpful. Elective Course for Environmental Law Certificate Program. May satisfy Advanced Writing Requirement with professor's permission. Provides an overview of the structure and basic principles of international environmental law and policy. Effective: 2012 Fall Semester.

LAW 230A—Wine and the Law (2)
Seminar—2 hours. Surveys the legal landscape of this multi-billion dollar industry, focusing on contemporary debates and developments in judicial, legislative, and administrative arenas. Effective: 2018 Spring Semester.

LAW 230T—Free Trade and the Environment (2)
Seminar—2 hours. Examines the relationship between legal rules relating to trade and rules for the protection of the environment. Effective: 2011 Fall Semester.

LAW 231—Sex Based Discrimination (3)
Discussion—3 hours. Issues raised by legal and social distinctions between men and women. Explores potential remedies for discrimination drawn from constitutional law, statutory enactments, and common law developments. Subject matter areas include sex-based discrimination in constitutional law, family law, reproductive rights, educational Effective: 2003 Fall Semester.

LAW 231A—Sexual Orientation, Gender Identity, and the Law (3) ***Review all entries***
Discussion—3 hours. Examines the legal and social regulation of sexual orientation and gender identity. Effective: 2015 Fall Semester.

LAW 231A—Sexual Orientation, Gender Identity, and the Law (2) ***Review all entries***
Discussion—2 hours. Examines the legal and social regulation of sexual orientation and gender identity. Effective: 2018 Fall Semester.

LAW 232—Real Estate Finance (2)
Discussion—2 hours. An examination of the problems involved in the acquisition, financing, and development of real estate, and of lender remedies and debtor protections in the event of debtor default. The course stresses the practical application of California legal doctrines. Effective: 2005 Spring Semester.

LAW 232AT—Real Estate Transactions (2)
Discussion—2 hours. Review of legal issues in the purchase, sale, financing of residential real estate in US, with non-exclusive focus on California. Roles of parties involved, mechanisms of financing and security, survey of remedies, and role of mortgage lending beginning in 2008. Effective: 2015 Spring Semester.

LAW 232T—Property Law & Race (2)
Seminar—2 hours. Seminar explores the extent to which property law (common law, federal, state, and local statutes, and administration regulations) historically impacted and currently shapes conceptions of race, racial groups, and racial relations. Effective: 2014 Fall Semester.

LAW 233—Asylum and Refugee Law (2)
Seminar—2 hours. Course surveys U.S. and international law concerning refugees and asylum-seekers. This class will question the meaning of persecution, the definition of "particular social groups" in U.S. law, protections for gender-related violence, statutory bars to asylum, and U.S. refugee policy. Effective: 2017 Spring Semester.

LAW 234—Sexual Orientation and the Law (2) ***Review all entries Discontinued***
Discussion—2 hours. Examines the legal and social regulation of sexual orientation, emphasizing both the legal subordination of lesbians and gay men and the ongoing struggles to end that subordination. Sexual orientation issues in criminal, employment, constitutional, and family law will be covered. Materials will be both doctrinal and theoretical,and will include fiction and oral history as well as cases and statutes. Effective: 2001 Fall Semester.

LAW 234—Drug Law and Policy (2) ***Review all entries***
Seminar. Engage with the wide variety of policy and legal issues presented in the area of drug law and policy with a particular focus on one of the fastest-evolving fields in drug policy: marijuana law and policy. Effective: 2018 Fall Semester.

LAW 235—Administrative Law (3)
Discussion—3 hours. Examines how the U.S. Constitution and the federal Administrative Procedure Act constrain and regulate decision making by government agencies and officials. Effective: 2007 Fall Semester.

LAW 235B—Counseling and Legal Strategy in the Digital Age (2)
Lecture. Explores the complex challenges that entrepreneurs, businesses, and other organizations face when trying to address legal issues relating to technology. The seminar's approach is both practical and multidisciplinary, and it encourages students to explore the roles of a wide range of stakeholders (including lawyers, policy advocates and policymakers, businesspersons, and technologists) in developing legal and business strategies. Effective: 2017 Fall Semester.

LAW 236—Securities Regulations (3)
Discussion—3 hours. Prerequisite(s): LAW 215 Regulation of the distribution of securities under the Securities Act of 1933 and SEC Rules adopted there under, registration and reporting provisions of the 1934 Securities Exchange Act. Effective: 2014 Spring Semester.

LAW 236A—Securities Regulation I (2)
Discussion—2 hours. Prerequisite(s): LAW 215; or Consent of Instructor. Legal rules and concepts applicable to business associations, both public and closely held. Corporate form of organization, partnerships and other associational forms. Effective: 2016 Fall Semester.

LAW 236B—Securities Regulation II (2)
Discussion—2 hours. Prerequisite(s): LAW 215; or Consent of Instructor. LAW 236A recommended. Securities Exchange Act of 1934 and the regulation of securities markets. Topics covered include regulation of securities markets and securities professionals, responsibilities of securities lawyers, continuous reporting, transnational securities fraud, and enforcement of the securities acts. Effective: 2002 Fall Semester.

LAW 236C—Securities Enforcement (3)
Lecture. Examines the civil and criminal enforcement of the securities laws by both the Securities and Exchange Commission and Justice Department. Surveys the administrative rules and investigative procedures that govern the SEC and the substantive related crimes. Effective: 2018 Fall Semester.

LAW 236CT—Securities Enforcement (3) ***Review all entries***
Lecture—3 hours. Examines civil and criminal enforcement of securities laws by both the Securities and Exchange Commission and Justice Department. Surveys administrative rules and investigative procedures that govern the SEC and the substantive related crimes. Effective: 2017 Spring Semester.

LAW 236CT—Securities Enforcement (3) ***Review all entries Discontinued***
Lecture—3 hours. Examines civil and criminal enforcement of securities laws by both the Securities and Exchange Commission and Justice Department. Surveys administrative rules and investigative procedures that govern the SEC and the substantive related crimes. Effective: 2018 Fall Semester.

LAW 237—Legal History (2)
Discussion—2 hours. Course traces the development of the common law from its origins in medieval England through the twentieth-century. Effective: 2014 Fall Semester.

LAW 237B—Special Topics in Legal Theory: Ancient Athenian Law (2)
Seminar—2 hours. Athenian legal system was different from our own and was far less formal. How did it work? Why did it work? Why have political and legal theorists misunderstood Athens for so long and what can we learn from that failure? Effective: 2016 Spring Semester.

LAW 239—Mediation (3) ***Review all entries***
Discussion/Laboratory—3 hours. Restricted to 24 students. Interactive course focuses on attorney representation of clients in mediation. Effective: 2016 Fall Semester.

LAW 239—Mediation (2) ***Review all entries***
Discussion/Laboratory—2 hours. Restricted to 24 students. Interactive course focuses on attorney representation of clients in mediation. Effective: 2018 Fall Semester.

LAW 240—Reforming Campaign Finance Law and the Initiative Process (2)
Discussion—2 hours. Limited to 25 students. The recent election exposed many campaign finance and initiative issues. Focuses on reforms as well as the current law. Effective: 2017 Spring Semester.

LAW 240A—Law of the Political Process (3)
Discussion—3 hours. Covers many of the foundational issues in the "law of democracy," as that body of statutory and constitutional law has developed in the United States. Effective: 2005 Fall Semester.

LAW 241—Voting Rights Seminar (2)
Seminar—2 hours. Seminar investigates the right to vote as a matter of constitutional and statutory law, with emphasis on the voting rights of racial and ethnic minorities. Effective: 2017 Spring Semester.

LAW 242—Conflict of Laws (2)
Discussion—3 hours. Study of how law operates across state and national borders. Topics include choice of applicable law in transactions involving multiple jurisdictions, recognition of judgments, and the exercise of jurisdiction. Effective: 2014 Spring Semester.

LAW 242S—Special Session Conflict of Laws (2)
Discussion—2 hours. Study of transactions with multi-state and international contracts. Topics include jurisdiction, recognition of foreign judgments, and choice of applicable law. Addresses problems that international lawyers encounter in a wide variety of deals with the emphasis on international commercial deals. Effective: 2005 Summer Special Session.

LAW 243—Commercial and Bankruptcy Law (4)
Discussion—4 hours. Remedies available to creditors to force payment, along with devices that creditors may use to give themselves priority against limited assets. Bankruptcy both as a means for providing funds for creditors and as a device for maximizing asset value. Effective: 2002 Fall Semester.

LAW 243A—Secured Transactions (2)
Discussion—2 hours. Covers secured transactions (where a lender takes an interest in the debtor's property as "collateral," or security, for repayment of a loan) in personal property, such as auto loans and bank loans against business inventory. Effective: 2017 Fall Semester.

LAW 243B—Bankruptcy (3)
Seminar. Introduction to essentials of U.S. law governing bankruptcy of consumers and businesses. The course will address bankruptcy under Chapter 7, Chapter 13, and Chapter 11. Effective: 2017 Fall Semester.

LAW 243C—Advanced Bankruptcy Practice: Corporate Reorganization (2)
Lecture. Corporate chapter 11 bankruptcy under the Federal Bankruptcy Code and alternatives to corporate bankruptcy. Selection of venue. Formation of strategic objectives. Analysis of different professionals' roles. Effective: 2018 Fall Semester.

LAW 243CT—Advanced Bankruptcy Practice (2) ***Review all entries***
Discussion—2 hours. Course will cover corporate chapter 11 and its alternatives and analyze different professionals' roles. Selection of venue and formation of strategic objectives will also be discussed. Effective: 2016 Fall Semester.

LAW 243CT—Advanced Bankruptcy Practice (2) ***Review all entries Discontinued***
Discussion—2 hours. Course will cover corporate chapter 11 and its alternatives and analyze different professionals' roles. Selection of venue and formation of strategic objectives will also be discussed. Effective: 2018 Fall Semester.

LAW 245—Corporate and White Collar Crime (2)
Discussion—2 hours. Covers the law of conspiracy, corporate criminal liability, mail and wire fraud, the Hobbs Act, RICO, money laundering, obstruction of justice, and other white collar crimes and their associated defenses. Effective: 2017 Fall Semester.

LAW 245B—Death Penalty Seminar (2)
Seminar—2 hours. Limited enrollment. Offers overview of the constitutional law governing the death penalty in the United States. Effective: 2005 Spring Semester.

LAW 246—Federal Jurisdiction (3)
Discussion—3 hours. Prerequisite(s): LAW 205 Study of subject-matter jurisdiction of federal courts. Effective: 2006 Fall Semester.

LAW 247—Taxation of Partnerships and LLCs (3)
Lecture/Discussion—3 hours. Prerequisite(s): LAW 220 Study of the federal income tax treatment of partnerships and partners; including entities classified as partnerships. Effective: 2017 Spring Semester.

LAW 247A—International Aspects of U. S. Taxation (3)
Discussion—3 hours. Prerequisite(s): LAW 220 (can be concurrent); Completion or current enrollment in a course covering the domestic taxation of corporations is suggested but not required; Corporate Tax can be concurrent. Examine the U.S. income tax laws and policies related to the taxation of foreign income of U.S. persons and U.S. income of foreign persons. Effective: 2008 Fall Semester.

LAW 247B—Corporate Tax (2) ***Review all entries***
Discussion/Laboratory—2 hours. Examination of the federal income tax relationship between corporations and their owners. Covers the transfer of funds into a corporation on formation and the re-transfer of money and property from the corporation to its shareholders. Effective: 2016 Spring Semester.

LAW 247B—Corporate Tax (3) ***Review all entries***
Discussion/Laboratory. Examination of the federal income tax relationship between corporations and their owners. Covers the transfer of funds into a corporation on formation and the re-transfer of money and property from the corporation to its shareholders. Effective: 2018 Fall Semester.

LAW 248—Public International Law (3)
Discussion—3 hours. Introductory course covers basic international law concepts and the law-making process. Effective: 2007 Fall Semester.

LAW 248A—Jurisdiction in Cyberspace Seminar (2)
Seminar—2 hours. Limited enrollment. Review concepts in international law, conflicts of law, cyberlaw, and federal jurisdiction to address the growing multi-jurisdictional conflicts created by the Internet. Examine European efforts at crafting intra-Europe jurisdictional rules, as well as other international jurisdiction treaty projects such as Effective: 2005 Fall Semester.

LAW 248B—International Human Rights (2)
Discussion—2 hours. Introduces international human rights legal system through an examination of its historical origins and precursors and a review of its international legal backdrop, including the character and sources of international law, the UN Charter and the UN system. Effective: 2013 Spring Semester.

LAW 248C—Business and Human Rights (2)
Seminar—2 hours. Explores the human rights responsibilities of businesses from legal, ethical, historical, and comparative perspectives. Equip students with the tools to be sensitive to human rights considerations as legal practitioners or in other fields of endeavor. Effective: 2018 Spring Semester.

LAW 248CA—United Nations Human Rights Practicum I (2-3)
Variable. Prerequisite(s): Consent of Instructor. Opportunity to work in support of the mandate of the United Nations Special Rapporteur in the field of cultural rights. Effective: 2017 Fall Semester.

LAW 248CB—United Nations Human Rights Practicum II (2-3)
Variable. Prerequisite(s): Consent of Instructor. Build on the knowledge of the workings of the United Nations human rights system they gained in Practicum I, and gain further advanced experience working with UN documents, with individual cases in the field and with thematic reports. Effective: 2017 Fall Semester.

LAW 248D—Globalization and the Law (3)
Discussion—3 hours. Globalization of people, finance, goods, services, and information puts pressure on the nation-state form. In a world of diasporas and multinational corporations, what does citizenship mean? Effective: 2010 Fall Semester.

LAW 248ET—Transitional Justice and Memory Politics in the Asia-Pacific (2)
Seminar—2 hours. Transitional justice (legal responses to wrongdoings of repressive predecessor regimes) can help resolve "memory politics" that plague the relations and societies of many Asia-Pacific states. Together we will examine relevant roles of governments, novel institutions, the judiciary, and civil society. Effective: 2016 Spring Semester.

LAW 248G—Legal Spanish for U.S. Lawyers (2)
Seminar—2 hours. Prerequisite(s): Must satisfy one of the following: undergraduate degree in Spanish; a minor in Spanish with experience living in a Spanish-speaking country; grew up in a Spanish-speaking household and achieved proficiency; able to pass an informal assessment by the instructor. Designed for law students who are native Spanish-speakers or who have achieved proficiency in Spanish through study or experiences in a Spanish-speaking country. (S/U grading only.) Effective: 2010 Fall Semester.

LAW 248T—Advanced International Law (2)
Discussion—2 hours. Review books of international law; Hugo Grotius and Judge Rosalyn Higgins. Themes include peaceful resolutions of dispute, law of war and peace, and international legal process. Effective: 2015 Spring Semester.

LAW 248TA—Human Rights in Post Soviet Central Asia: Legal Tools For Repression and Redress (2)
Discussion—2 hours. Limited enrollment. Provides a historical context for the current political and human rights situation in Central Asia. Effective: 2010 Fall Semester.

LAW 248TC—International Economics Law (3)
Discussion—3 hours. Examine the architecture of the international economic system, with a focus on both trade and investment. Effective: 2010 Fall Semester.

LAW 248TT—Theories of International Law (2)
Discussion—2 hours. International law, once critiqued as powerless and ineffective, is now challenged as a threat to American democracy. Introduction to competing theories of international law, including natural law, positivism, realism, liberalism, constructivism, fairness, legal process, and world public order. Effective: 2010 Spring Semester.

LAW 249—Comparative Law (3)
Discussion—3 hours. The uses of comparative method, principal differences between common law and civil law and the styles of legal reasoning that prevail in these two great legal cultures. Topics include the evolution of the civil law, the phenomenon of codification, the structure of European civil codes and the interpretation of their provisions, the respective roles of counsel, judges and law teachers, civil law procedure, and the analysis of selected areas of substantive law. Knowledge of a foreign language is not required. Effective: 2002 Fall Semester.

LAW 249S—Special Session Comparative Law (1)
Discussion—1 hour. This course will provide a comparative perspective for students of American law. After an initial look at the uses of the comparative
method, discussions will be centered around the main differences between common law and civil law and the different styles of legal thinking. Topics to be covered will be the evolution of the civil law and the idea of codification, the structure of European civil codes and the interpretation of their provisions, the personnel of the law and procedure in civil law countries, and the analysis of selected problems of
substantive law. Knowledge of a foreign language will not be required. Effective: 2005 Summer Special Session.

LAW 250—Jurisprudence Seminar (3)
Seminar—3 hours. Limited enrollment. Deals principally with the question of how judges should decide "hard cases," where the content of the law is in doubt and competent arguments have or could be offered for mutually inconsistent decisions in favor of either party. Effective: 2015 Spring Semester.

LAW 250A—Aoki Legal Scholarship Seminar (3)
Seminar. For students participating in the Aoki Center for Race and Nation Studies' Immigration Law Journal. Research, and write a note on a topic related to immigration. Expectation is production of papers of publishable quality. Effective: 2017 Fall Semester.

LAW 250B—Writing Requirement Workshop (2)
Seminar—2 hours. Second- and third-year students produce a piece of academic writing that satisfies the King Hall writing requirement and is of publishable quality. Receive feedback both from the instructor and from one another in a workshop setting. (S/U grading only.) Effective: 2018 Spring Semester.

LAW 250T—Asian American Jurisprudence (3)
Discussion—3 hours. Legal, social, and political discourse on race relations has traditionally been framed in Black-White terms. This course disrupts the traditional view by taking Asian Americans seriously. Effective: 2007 Fall Semester.

LAW 251—Labor Law (2)
Discussion—2 hours. Survey of the legislative, administrative, and judicial regulation of labor relations under federal law. Historical development of labor law, the scope of national legislation, unions, strikes, picketing, and collective bargaining agreements. Effective: 2017 Spring Semester.

LAW 251T—Labor Law I (2)
Discussion—2 hours. Restricted to students who previously took Labor Law in Fall 2008 may not enroll in Labor Law I. Survey of the legislative, administrative, and judicial regulation of labor relations under federal law. Effective: 2009 Fall Semester.

LAW 251TB—Labor Law II (2)
Discussion—2 hours. Prerequisite(s): LAW 251T preferred; not required. Survey of the legislative, administrative, and judicial regulation of labor relations under federal law. Effective: 2010 Spring Semester.

LAW 252—International Litigation and Arbitration (3)
Discussion—3 hours. Current developments in international law, conflict of laws, civil procedure, arbitration, and comparative law in the context of transactions and disputes that cut across national boundaries. Effective: 2004 Fall Semester.

LAW 253—Policy Advocacy (2)
Lecture. In-depth examination of the legislative process both within the California Legislature and from the advocates' perspective. Train in key policy advocacy skills by legislative leaders and social justice advocates. Effective: 2018 Spring Semester.

LAW 253A—Community Lawyering (3)
Lecture. Study the need for community lawyering including the structural inequalities and privileges embedded in the legal system and society. Skills necessary for community lawyering as well as sites and models for practice will be examined. Effective: 2017 Fall Semester.

LAW 254—Housing Law (2)
Discussion—2 hours. Survey course covers legal and policy issues related to developing, protecting and preserving affordable, safe and accessible housing and sustaining viable, diverse communities. Effective: 2009 Fall Semester.

LAW 254A—White Working Class and the Law (2) ***Review all entries***
Seminar—2 hours. Considers the social, cultural, economic, and legal situation of low-income and/or low-education whites in contemporary U.S. society. Effective: 2017 Fall Semester.

LAW 254A—White Working Class and the Law (3) ***Review all entries***
Seminar. Considers the social, cultural, economic, and legal situation of low-income and/or low-education whites in contemporary U.S. society. Effective: 2018 Fall Semester.

LAW 254B—Access to Justice (2)
Seminar. Study of a variety of barriers that impede the access of unrepresented litigants to the courts--including poverty, racial bias, limited English proficiency and the digital divide--and critically examine existing solutions. Opportunity to develop and propose student's own solution to an access barrier. Effective: 2018 Fall Semester.

LAW 254T—Practicum in Rural Community Advocacy (3)
Seminar—3 hours. Limited enrollment. Provides an opportunity to learn about Participatory Action Research (PAR) methods and community-based lawyering in the context of rural community development and advocacy. Using these skills and knowledge to serve rural California communities. Effective: 2013 Spring Semester.

LAW 255—Pension and Employee Benefits Law (3)
Discussion—3 hours. Prerequisite(s): LAW 220 Federal regulation and taxation of private pensions and employee benefits. This course will cover the Employee Retirement Income Security Act (ERISA) and Internal Revenue Code issues. Effective: 2017 Spring Semester.

LAW 256—Land Use (2)
Discussion—2 hours. Local agencies, developers, environmental interest groups, and others who regularly deal with the administrative and legislative applications of land use planning and development laws. Topics include zoning, general plans, local government land use regulation, and related areas of litigation. The expanding role of the California Environmental Quality Act. Effective: 2004 Spring Semester.

LAW 257—Legislative Process (2)
Discussion—2 hours. Fundamental elements of the legislative process, including legislative procedure; the legislature as an institution; lobbying; statutory interpretation, legislative-executive relations; and the legislature's constitutional powers and limitations. Effective: 2002 Spring Semester.

LAW 257A—Legislative Intent Seminar (2)
Seminar—2 hours. Theories and principles of statutory and constitutional interpretation. Original intent vs. living constitution; permissible kinds of evidence for determining legislative intent; canons of construction; extent to which initiatives should be interpreted similarly to legislative enactments. Effective: 2003 Fall Semester.

LAW 257B—Statutory Interpretation (3)
Discussion—3 hours. Elective course for Environmental Law Certificate Program. Provides an introduction to the theory and practice of statutory interpretation. Effective: 2012 Fall Semester.

LAW 258—Professional Responsibility (3)
Discussion—3 hours. The ABA's Model Rules of Professional Conduct and the Code of Judicial Conduct, which are tested on the MPRE, and the California Rules of Professional Conduct, which are tested on the California Bar Examination. Students who take LAW 258A Legal Ethics and Corporate Practice are not eligible to enroll in this course. Effective: 2017 Fall Semester.

LAW 258A—Legal Ethics and Corporate Practice (3)
Lecture/Discussion—3 hours. Focus on corporate practice to explore the ethical responsibilities of lawyers. Students who take LAW 258 Professional Responsibility are not eligible to enroll in this course. Effective: 2017 Spring Semester.

LAW 258BT—Mindfulness and Professional Identity (2)
Seminar—2 hours. Introduction to the practice of meditation and connect it with readings about the legal profession in three key areas. Effective: 2016 Fall Semester.

LAW 258CT—The Business of Lawyering (2)
Discussion—2 hours. Desired outcome is a thorough understanding of the business side of law practice and to promote an understanding of the relationship and balance between legal skills, business requirements of a practice, client needs and a work-life balance. Effective: 2015 Fall Semester.

LAW 258DT—Setting Up and Maintaining Solo Law Practice (1)
Lecture/Discussion—1 hour. Introduction/overview of how to start a successful solo practice. Effective: 2016 Spring Semester.

LAW 258E—Utility of Law School and Careers in the Law (1)
Lecture. Despite improvements in the economy, some observers continue to question whether law school is a viable option for college graduates. Considers the controversy and expose students to the variety of careers in the legal profession. (S/U grading only.) Effective: 2017 Fall Semester.

LAW 258F—Practice Ready Seminar (2)
Seminar. Includes a discussion and review of the role of the junior attorney within a law firm/legal department, professional goal-setting, strategies for effective communication and work within teams, delegation and resource management, organization and time management, an introduction to common junior-level assignments and how to complete them efficiently and effectively, building a professional network, and an introduction to business development, among other topics. (S/U grading only.) Effective: 2017 Fall Semester.

LAW 259—Feminist Legal Theory (3)
Discussion—3 hours. Provides an overview of feminist legal theory and considers how its various strands inform legislative and judicial law making. Satisfies Advanced Writing Requirement. Effective: 2016 Fall Semester.

LAW 259A—Women, Islam and the Law (2)
Seminar—2 hours. This course will study legal and religious reform movements for women's rights within Muslim communities in the context of current scholarly and political debates about fundamentalism, democracy, equality, secularism, universalism, and multiculturalism. This is a limited enrollment seminar. Effective: 2007 Fall Semester.

LAW 259B—Women's Human Rights (2)
Seminar—2 hours. Overview of international legal and institutional system for the protection of women's human rights from an academic perspective and the view of the practitioner. Includes the (CEDAW), violence against women, sexual and reproductive rights, economic rights, and more. Effective: 2016 Spring Semester.

LAW 259P—Women and the Law Practicum (1)
Discussion/Laboratory. Prerequisite(s): LAW 259 (can be concurrent) Complements the content of the feminist legal theory course by providing students the opportunity to consider how feminist theory may be used to inform law-making. Effective: 2007 Fall Semester.

LAW 260—Employment Discrimination (3)
Discussion—3 hours. Examine federal laws prohibiting employment discrimination, including Title VII of the Civil Rights Act of 1964, the Equal Pay Act, the Age Discrimination in Employment Act, the Americans with Disabilities Act, the Rehabilitation Act of 1973, and § 1981. Effective: 2008 Fall Semester.

LAW 260A—Employment Law (3)
Discussion—3 hours. Provides an overview of employment law, labor law and employment discrimination law and aims to serve as a foundation for understanding the law and policy (statutory and common law) that surround the employer-employee relationship. Effective: 2016 Spring Semester.

LAW 261—Judicial Process (2)
Discussion—2 hours. Examines a variety of issues concerning the judicial process. Focus is on judge's role in the legal process, the administration of justice, ethical issues, decision making, bias, and critical examination of the strengths and weaknesses in our current judicial system. Effective: 2008 Fall Semester.

LAW 262—Antitrust (3)
Discussion—3 hours. Focus on the federal antitrust laws, concentrating on basic substantive areas of the Sherman and Clayton Acts. Effective: 2009 Fall Semester.

LAW 262AT—US Antitrust Law and Indian Competition Law: A Comparative Perspective (2)
Lecture/Discussion—2 hours. Fundamental principles of Indian Competition Law and US Antitrust Law in a comparative perspective. The course will help American students, interested in future corporate law careers, to develop effective strategies for better managing cross border deals in India. Effective: 2016 Spring Semester.

LAW 262B—Regulated Industries (2)
Seminar. Examines regulation of business in sectors, traditionally described as "common carrier" and "utility" industries, where because of market failures normal competitive mechanism will not protect consumers from exercises of market power. Effective: 2017 Fall Semester.

LAW 262S—Special Session Antitrust (1)
Discussion. A study of the federal antitrust laws including price fixing, limits on distribution, tying arrangements, monopolization and mergers. Effective: 2005 Summer Special Session.

LAW 263—Criminal Trial Skills (4) ***Review all entries***
Seminar. Trial advocacy course centered on client relationship building, preparation for trial, and courtroom practice. Effective: 2017 Fall Semester.

LAW 263—Criminal Trials: Theory and Practice (4) ***Review all entries***
Seminar. Trial advocacy course centered on client relationship building, preparation for trial, and courtroom practice. Effective: 2018 Fall Semester.

LAW 263A—Trial Practice (3)
Discussion—2 hours; Laboratory—1 hour. Prerequisite(s): LAW 219 (can be concurrent) Limited enrollment. Introduction to the preparation and trial of cases, featuring lectures, videotapes, demonstrations, assigned readings and forensic drills. Laboratory held on Tuesday, Wednesday, and Thursday evening. (S/U grading only.) Effective: 2016 Fall Semester.

LAW 263B—Advanced Trial Practice (2)
Discussion—2 hours. Prerequisite(s): LAW 219; LAW 263A Class limited to 40 students. Trains students on the organization and presentation of a complex trial, including pretrial preparation, jury selection, strategy considerations, evidentiary issues, and effective handling of plaintiff and defense cases through verdict. (S/U grading only.) Effective: 2016 Fall Semester.

LAW 264—Water Law (3)
Discussion—3 hours. Property rights in surface waters, including riparian rights, prior appropriation, and public rights use of water bodies; environmental constraints on exercise of water rights; groundwater rights and management; federal allocation and control of water resources; legal aspects of interstate allocation. Effective: 2016 Spring Semester.

LAW 264A—Ocean and Coastal Law (3)
Discussion—3 hours. Introduction to the goals and challenges of coastal and ocean policy; the complicated web of public and private interests in coastal lands and ocean waters; regulation of coastal development; domestic and international fisheries management; and preservation of ocean resources. Effective: 2015 Spring Semester.

LAW 265—Natural Resources Law Seminar (2)
Seminar—2 hours. Prerequisite(s): LAW 285 or LAW 256 recommended, but not required. Restricted to 15 students. In-depth coverage of two foundational principles of natural resources law: public trust doctrine and private property rights protected under the Takings Clause of the U.S. and many state constitutions. Effective: 2011 Spring Semester.

LAW 266A—Cyberlaw (3)
Lecture/Discussion—3 hours. Emerging legal issues crucial to the conduct of business in cyberspace. Discussion of the evolution and current administration of the Internet and the World Wide Web. Effective: 2017 Spring Semester.

LAW 267—Civil Rights Law (2)
Discussion—2 hours. Civil remedies for civil rights violations under the primary United States civil rights statute. Specifically, covers actions for constitutional and statutory violations under 42 USC §1983, affirmative defenses, and abstention doctrines. Effective: 2017 Fall Semester.

LAW 267B—Civil Rights Seminar (2)
Seminar—2 hours. Limited enrollment. The social, political, legal and historical factors which led to the creation of the United States Commission on Civil Rights (USCCR) in 1957. The United States Commission on Civil Rights is a bipartisan, independent agency established by the Civil Rights Act. It is directed to investigate complaints alleging deprivations of the right to vote, and voter fraud; to study and collect information relating to discrimination and the denial of equal protection of the laws under the Constitution on the basis of race, color, religion, sex, age, disability, or national origin; and submit reports, findings and recommendations to the President and to Congress. The role that the USCCR has played and continues to play in American politics, legislative enactments and the national dialogue on equality, fairness and justice in the context of civil and human rights. Satisfies Advanced Legal Writing Requirement. Effective: 2002 Spring Semester.

LAW 268T—Suing the Government: Civil Rights, Torts, Takings, and More (2)
Discussion—2 hours. Explores the basic requirements of suing government, including sovereign immunity, particular schemes for litigating against government (Federal Tort Claims Act, APA, False Claims Act, etc.), direct constitutional claims and the procedural pitfalls and remedies available against government. Effective: 2016 Spring Semester.

LAW 269—Basic Finance for Lawyers (3)
Discussion—3 hours. Prerequisite(s): Students with a non-law basic finance course will not be admitted, except with consent of instructor. Basic techniques of analysis that are part of the core curriculum in a good business school. Gives background necessary for understanding and advising your clients and for understanding other business-related law school courses. Effective: 2017 Spring Semester.

LAW 269AT—The Financial Crisis: Law & Policy and Inequality (2)
Seminar—2 hours. Examines the regulation of financial intermediaries. The stated goal of regulation is to ensure systemic stability and to pursue consumer protection. We will ask whether there is an imbalance between systematic stability and consumer protection before the crisis of 2008. Effective: 2013 Spring Semester.

LAW 269B—Financial Regulation and Consumer Protection (3) ***Review all entries***
Lecture. Examines efforts to ensure a "fair" financial marketplace, focusing on the 2010 Dodd-Frank Act and its creation of the Consumer Financial Protection Bureau and regimes enacted to protect consumers. Effective: 2017 Fall Semester.

LAW 269B—Consumer Protection and Financial Regulation (3) ***Review all entries***
Lecture. Examines efforts to ensure a "fair" financial marketplace, focusing on the 2010 Dodd-Frank Act and its creation of the Consumer Financial Protection Bureau and regimes enacted to protect consumers. Effective: 2018 Fall Semester.

LAW 269C—Corporate Finance (3)
Discussion—3 hours. Prerequisite(s): LAW 215 or concurrent enrollment recommended. Focus on how corporations raise money, stocks and bonds, etc.; how deals are structured and why corporations use one strategy instead of another. Effective: 2010 Fall Semester.

LAW 269D—Seminar on Financial Regulation (2)
Seminar—2 hours. Introduction to the legal and regulatory issues presented by contemporary capital markets. Effective: 2011 Fall Semester.

LAW 269E—Public Finance (3)
Seminar. Introduction to the basic concepts of public finance, the underlying law governing public finance: in particular state law, federal tax law and federal securities law. Effective: 2017 Fall Semester.

LAW 270—International Business Transactions (2) ***Review all entries***
Lecture/Discussion—2 hours. Select legal problems arising from international business transactions. Effective: 2017 Fall Semester.

LAW 270—International Business Transactions (3) ***Review all entries***
Lecture/Discussion. Select legal problems arising from international business transactions. Effective: 2018 Fall Semester.

LAW 270A—Life-Cycle Transactions and Drafting (3)
Discussion—3 hours. Prerequisite(s): Business Associations and/or Trusts, Wills & Estates are recommended for enhanced comprehension. Class focuses on analysis of contract drafting design for various types of transactions and actual transactional documents typically encountered. Effective: 2016 Spring Semester.

LAW 270S—Special Session International Business Transactions (2)
Discussion—2 hours. A consideration of select legal problems arising from international business transactions. Topics include the international sales contract, letters of credit, transfers of technology, regulation of bribery, repatriation of profits, and national efforts to control imports. Effective: 2005 Summer Special Session.

LAW 271—Nonprofit Organizations and Drafting (4)
Extensive Writing/Discussion—4 hours. Prerequisite(s): LAW 215; or Consent of Instructor. Restricted to 13 students. Learn special legal rules and concepts applicable to non-profit organizations; particularly IRC 501(c)(3) nonprofits. Combination skills class and a lecture course. Effective: 2010 Fall Semester.

LAW 271A—NonProfit Organizations: State and Local Governance Issues (2)
Discussion—2 hours. Prerequisite(s): LAW 215 (can be concurrent); or Consent of Instructor. Focuses on the state and local laws applicable to nonprofit organizations; i.e., public interest, cultural, religious, educational and other not-for-profit entities. Effective: 2009 Fall Semester.

LAW 271B—Nonprofit Organizations: Tax Exemptions & Taxation Focus (2)
Discussion—2 hours. Prerequisite(s): LAW 215; or Consent of Instructor. LAW 220 recommended. Focuses on the conceptual basis and substantive law criteria for the federal and state income tax exemption of nonprofit organizations. Effective: 2009 Spring Semester.

LAW 271T—Nonprofit Organizations-Key Legal Topics (2)
Discussion—2 hours. Legal issues raised in operating and governing a nonprofit organization, primarily a public charity. Effective: 2014 Spring Semester.

LAW 272—Family Law (3)
Discussion—3 hours. An introduction to the legal regulation of the family. Effective: 2008 Fall Semester.

LAW 273A—Education Policy and the Law (3)
Discussion—3 hours. Topics include civil rights, inequality and the "right" to an education, bilingual education, school finance litigation, educational access, No Child Left Behind Act, Common Core Standards and charter schools. For students interested in educational policy and social regulatory policy. Effective: 2016 Fall Semester.

LAW 273BT—Special Education Law and Policy (2)
Lecture. Introduction to the law of special education including the Individuals with Disabilities in Education Act (IDEA), Section 504 of the Rehabilitation Act, and federal regulations governing special education law. Effective: 2017 Fall Semester.

LAW 274—Intellectual Property (3)
Discussion—3 hours. Provides a broad survey of intellectual property law. Effective: 2007 Fall Semester.

LAW 274A—International Intellectual Property and Development (3) ***Review all entries***
Discussion—3 hours. Examines international trade law, national customs law, intermediary liability rules, claims for rights in traditional knowledge and genetic resources, protections for geographical indications, technology transfer, and intellectual property piracy. Effective: 2017 Fall Semester.

LAW 274A—International Intellectual Property and Development (2) ***Review all entries***
Discussion. Examines international trade law, national customs law, intermediary liability rules, claims for rights in traditional knowledge and genetic resources, protections for geographical indications, technology transfer, and intellectual property piracy. Effective: 2018 Fall Semester.

LAW 274AS—Special Session Intellectual Property (2)
Discussion—2 hours. This course provides a broad survey of the field of intellectual property. Areas covered will include trademarks, patents, trade secrets, idea protection, unfair competition, and copyright. Effective: 2005 Summer Special Session.

LAW 274BT—Law of Trade Secrets and Restrictive Covenants (2)
Discussion—2 hours. Focus is on the law of trade secrets, including the Uniform Trade Secret Act (UTSA), restrictive covenants not to compete, and current case law developments in the areas of employee mobility and raids, and corporate espionage. Effective: 2013 Fall Semester.

LAW 274CT—Knowledge Commons, Collaborative Authorship, Open Access (2)
Seminar—2 hours. Focuses on the increasingly global diffusion and success of collaborative forms of cultural and technoscientific production rooted in copyright-based licenses. Effective: 2013 Spring Semester.

LAW 274D—Intellectual Property in Historical Context Seminar (2)
Seminar—2 hours. How the legal system has adapted to earlier periods of rapid change by creating, delimiting, and expanding intellectual property rights (IPRs). Required paper satisfies advanced writing requirement. Effective: 2015 Spring Semester.

LAW 274ET—Intellectual Property, Human Rights & Social Justice (2)
Seminar—2 hours. Course will examine the implications of copyright and patents for a broad set of social justice values, with particular emphasis on the interaction between intellectual property law and human rights law on the global stage. Effective: 2016 Fall Semester.

LAW 274FT—Censorship in the Global Age (2)
Seminar—2 hours. Course examines from a globalized perspective a broad range of censorship issues, drawing from established cases and practices. This seminar attempts to identify a globally consistent set of theories that have gained traction in relevant regional or international debates. Effective: 2016 Fall Semester.

LAW 274GT—Race, National Identity and Intellectual Properties (2)
Seminar—2 hours. Drawing upon methods taken from critical race theory, critical/cultural studies, and rhetoric this course addresses the relationships between intellectual properties and processes racial/national identity formation in the US, particularly as exemplified in legal, popular cultural, and political texts. Effective: 2016 Fall Semester.

LAW 274H—Theory and History of Intellectual Property (2)
Seminar. Seminar traces development of intellectual property law in the U.S. and Europe because it is not possible to understand the logic and shape of current Intellectual Property concepts outside of their messy history. Effective: 2017 Fall Semester.

LAW 275—Complex Litigation in a Civil Rights Context (2)
Discussion—2 hours. Study of the issues that frequently arise in large complex litigation involving multiple parties and multiple claims. Effective: 2017 Fall Semester.

LAW 275TA—Intellectual Property Agreement Drafting for Biotech & Pharma (2)
Seminar—2 hours. Prerequisite(s): Upper-division Business Law course or Intellectual Property course; priority given to students that have completed LAW 274. Covers the negotiation and drafting of intellectual property agreements common in the biotechnology and pharmaceutical arena. Effective: 2011 Fall Semester.

LAW 276—Juvenile Justice Process (2)
Lecture/Discussion—2 hours. Legal and philosophical bases of a separate juvenile justice process for crimes committed by minors. The role of counsel at each phase of the process is examined. Effective: 2017 Spring Semester.

LAW 277—Federal Indian Law (3)
Discussion—3 hours. Focuses on legal relations between Native American tribes and the federal and state governments. Effective: 2016 Fall Semester.

LAW 277A—Tribal Justice (2)
Lecture. Examines the administration of justice within tribal governments and courts and the efforts of advocates to achieve justice for tribes through litigation, policy advocacy, public education, organizing, and inter-governmental collaboration. Effective: 2017 Fall Semester.

LAW 277T—Indian Gaming Law Seminar (2)
Seminar—20 hours. Examines unique historical, political and legal context in which Indian tribes operate casinos, including impacts on tribal sovereignty, relations between tribes, states and local governments and changing relationships among the tribes themselves members, with particular reference to experience of California. Effective: 2007 Fall Semester.

LAW 278—Pretrial Skills (2)
Discussion—2 hours. Limited enrollment. This course uses role-playing exercises, videotaped simulations, and related projects to introduce students to lawyering skills basic to the practice of law, including client interviewing, witness interviewing and discovery, including depositions. Effective: 2005 Fall Semester.

LAW 279—Legal Analysis (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. Limited enrollment; for 2Ls only. Focuses on skills critical to law school success, and ultimately, bar exam success. (S/U grading only.) Effective: 2018 Spring Semester.

LAW 280—Advanced Legal Writing: Analytical & Persuasive Writing (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. Develop essay writing skills and performance test drafting typically employed on the bar examination. (S/U grading only.) Effective: 2015 Spring Semester.

LAW 280AT—Legal Analysis (2) ***Review all entries***
Discussion—2 hours. Selected enrollment by permission of professor; 2L's only. Focuses on skills critical to law school success, and ultimately, bar exam success. (S/U grading only.) Effective: 2013 Fall Semester.

LAW 280AT—Legal Analysis (2) ***Review all entries Discontinued***
Discussion—2 hours. Selected enrollment by permission of professor; 2L's only. Focuses on skills critical to law school success, and ultimately, bar exam success. (S/U grading only.) Effective: 2018 Fall Semester.

LAW 280B—Problem Solving and Analysis (2)
Lecture. Prerequisite(s): Consent of Instructor. Restricted to third-year Law students only. Skills focused on the development of legal analytical and organizational methods essential to successful completion of the Performance Test component of the California Bar Exam (and other states), and, by extension, to success in the practice of law. (S/U grading only.) Effective: 2017 Fall Semester.

LAW 281—State and Local Government Law (3)
Discussion—3 hours. Topics include: federalism, relations between states and localities, governmental liability, zoning, educational equity, and public finance. Readings will be drawn not only from case law and statues, but from history, theory and public policy. Effective: 2017 Fall Semester.

LAW 282—Energy Law Seminar (2)
Seminar—2 hours. The history, law, and public policy of energy regulation in the United States with an emphasis on economic and environmental regulation.
Competitive restructuring of the natural gas and electric utility industries emphasized. The basic regulatory schemes for other energy sources such as hydroelectric power, coal, oil, and nuclear power
explored. Recommended to anyone who has an interest in the energy sector, various models of economic regulation, or regulated industries. Effective: 2000 Fall Semester.

LAW 282A—Renewable Energy Seminar (2)
Seminar. Provides a broad overview of renewable energy law and policy with a particular focus on the California policy context. Topics include renewable electricity, California's renewable portfolio standard, and project development. Effective: 2017 Fall Semester.

LAW 283—Remedies (3)
Lecture/Discussion—3 hours. Survey of modern American civil remedies law in both private and public law contexts. Topics include equitable remedies, equitable defenses, contempt power, injunctive relief, restitution, and money damages in torts and contracts. Effective: 2017 Fall Semester.

LAW 284—Law and Economics (4)
Discussion—4 hours. Prior study of economics is not required. Introduces students to the economic analysis of law. Effective: 2013 Fall Semester.

LAW 285—Environmental Law (4)
Discussion—4 hours. Introduction to environmental law, focusing primarily on federal law. Effective: 2014 Fall Semester.

LAW 285A—California Environmental Issues (2)
Discussion—2 hours. The "Nation-state" of California has for many years been a national and global leader in environmental law and policy. Survey of key California environmental law and policy issues. Effective: 2014 Fall Semester.

LAW 285BT—Food Justice (2)
Seminar—2 hours. Focus on the law and policy of the emerging "food justice movement," which combines the goals and principles of the environmental justice movement with some of the policy initiatives involved in "ethical consumption" and "sustainable agriculture" movements. Effective: 2012 Fall Semester.

LAW 285C—Food and Agricultural Law (2)
Discussion—2 hours. Introduction to agricultural law, focusing on legal principles and issues at the forefront of contemporary debates about agriculture in society. Effective: 2016 Fall Semester.

LAW 285E—Climate Change Law and Policy (3)
Discussion—3 hours. Addresses the legal and public policy dimensions of climate change, perhaps the most important environmental issue of our time. Effective: 2011 Fall Semester.

LAW 285F—Environmental Justice (2)
Discussion—2 hours. Introduction to the field of environmental justice. Effective: 2014 Spring Semester.

LAW 285G—Environmental Law Seminar: Emerging Technologies and the Environment (2)
Seminar. Examines legal regimes that might apply to various emerging technologies and consider governance mechanisms and reforms that might enable more foresighted and participatory development and management of technology. Effective: 2016 Spring Semester.

LAW 285H—Comparative Environmental Law (2)
Discussion—2 hours. Focus on Pacific Rim, examining factors, similarities/differences in countries environmental regulation and success of environmental law. Including information and market-based regulatory approaches; compliance and enforcement gaps; citizen and community mobilization; the role of legal institutions; variations in regulatory style. Effective: 2015 Spring Semester.

LAW 285TA—Environmental Law Seminar: Emerging Technologies and the Environment (2)
Seminar—2 hours. Examines legal regimes that might apply to various emerging technologies and consider governance mechanisms and reforms that might enable more foresighted and participatory development and management of technology. Effective: 2013 Fall Semester.

LAW 286—Health Care Law (3)
Discussion—3 hours. Addresses legal issues raised in general areas: access to health care and health care financing. Course materials and discussion focus on both public and private aspects of these issue areas. Effective: 2013 Fall Semester.

LAW 286A—Topical Issues in Health Law (2)
Seminar—2 hours. Limited enrollment. The course focuses on four-six issues at the interface of law, medicine, bioethics, and health policy that are currently the subject of major litigation, legislation, and/or contentious debate in the domains of bioethics and public policy. Effective: 2006 Fall Semester.

LAW 286B—Public Health Law (2)
Discussion—2 hours. Restricted to 15 students. Public health law, seen broadly, is the government's power and responsibility to ensure the conditions for the population's health. Effective: 2010 Fall Semester.

LAW 286C—Bioethics (3) ***Review all entries***
Discussion—3 hours. Limited enrollment. Course examines the ethical and legal issues that arise from biomedical research and use of medical technologies. Effective: 2006 Fall Semester.

LAW 286C—Bioethics (2) ***Review all entries***
Discussion. Limited enrollment. Examines the ethical and legal issues that arise from biomedical research and use of medical technologies. Effective: 2018 Fall Semester.

LAW 286D—Legal Psychology Seminar (2)
Seminar—2 hours. Examines how psychological theory and research can be used to shape laws and policies to make them better reflect what we know empirically about how individuals process information, make decisions and behave. Effective: 2005 Fall Semester.

LAW 286E—Reproductive Rights, Law, and Policy (2)
Seminar—2 hours. Limited enrollment. Addresses a variety of laws and practices that affect reproductive health and procreative decision making. Effective: 2008 Fall Semester.

LAW 287—Public Land Law (2)
Discussion—2 hours. Legal aspects of federal land management, including the history of public land law, the scope of federal and state authority over the federal lands, and the allocation of public land resources among competing uses. Effective: 2017 Fall Semester.

LAW 287A—Poverty Law (2)
Seminar—2 hours. Limited enrollment. Explore the theory and practice of law pertaining to the enactment and enforcement of laws regulating or aiding the poor and other disadvantaged persons. Effective: 2015 Fall Semester.

LAW 287T—Law and Society Seminar (2)
Seminar—2 hours. Limited enrollment. Study of law and society challenges traditional legal scholarship by exploring multiple ways in which law both shapes and is shaped by societies and social interactions. Seminar will introduce students to important literature and debates in the field. Effective: 2006 Fall Semester.

LAW 288—Advanced Constitutional Law Seminar (2)
Seminar—2 hours. Prerequisite(s): LAW 218 (can be concurrent) or LAW 218A (can be concurrent) Limited enrollment. Seminar explores in-depth selected topics or problems in constitutional law and theory. The current focus will include diverse topics including abortion rights, the development of Second Amendment jurisprudence, and other subject areas. Effective: 2011 Fall Semester.

LAW 288A—Comparative Constitutional Law Seminar (2) ***Review all entries Discontinued***
Seminar—2 hours. Understanding of constitutionalism and of the Constitution of the United States. Constitutional protection of individual rights and the structure of constitutions. Effective: 2010 Spring Semester.

LAW 288A—Presidential Powers Seminar (2) ***Review all entries***
Seminar. Explores the Constitutional powers of the President in Article II and how they intersect with Congressional power. Emphasis on executive and legislative power, executive orders, appointment and removal powers, executive privilege and immunity, pardons, impeachment, Congressional investigations, independent and special counsels, and the 25th Amendment. Effective: 2018 Fall Semester.

LAW 288B—Supreme Court Simulation Seminar (3)
Seminar—3 hours. Take on the role of Justices of, and advocates before, the Supreme Court of the United States. Effective: 2017 Fall Semester.

LAW 289A—Biotechnology Law and Policy (2)
Seminar—2 hours. Limited enrollment. Coverage includes the regulation of biotechnology research, including restrictions on cloning and fetal stem cell research; regulation of the products of biotechnology to protect human health or the environment, including restrictions on use or distribution of genetically modified organisms; the Effective: 2002 Fall Semester.

LAW 290—International Trade Dispute Seminar (2)
Seminar—2 hours. The WTO and other regional trading agreements, particularly the NAFTA, provide mechanisms for resolution of trade disputes. Students are introduced to economic, political, and legal theories underlying establishment of such bodies. Effective: 2007 Fall Semester.

LAW 290AT—Privacy, Surveillance, and "Sousveillance" (3)
Discussion—3 hours. Issues of privacy and surveillance are important to businesses, governments and citizens. Surveillance raises issues of autonomy and the abuse of power. "Sousveillance," (citizen holds the camera), is a mechanism for rooting out corruption and exposing individuals to societal scrutiny. Effective: 2015 Fall Semester.

LAW 290BT—Surveillance and States (3)
Seminar—3 hours. Examines the tensions between democracy and the rise of government power entailed by the growth of state surveillance, United States surveillance law and practice, and surveillance law and practice across the world. Also considers international legal constraints on government surveillance. Effective: 2016 Summer Semester.

LAW 290C—Information Privacy Law (2)
Seminar—2 hours. Prerequisite(s): Criminal Procedure strongly recommended. Examine several topics that arise in field of information privacy law, with a special emphasis on law enforcement access to this information. Effective: 2018 Spring Semester.

LAW 290T—International Trade Law (2)
Discussion—2 hours. Review existing landscape of trade regulation from the World Trade Organizations, to regional organizations such as NAFTA, ASEAN, and the European Union. Effective: 2018 Spring Semester.

LAW 291A—International Finance (4)
Discussion—4 hours. Money makes the world go round. We will try to follow that money, learning how a framework of national and international laws and institutions regulates (or perhaps fails to regulate) its flow. Effective: 2009 Fall Semester.

LAW 291B—International Investment Dispute Seminar (2)
Seminar—2 hours. This seminar will examine the law of investor-State dispute resolution. Effective: 2005 Fall Semester.

LAW 291T—International Arbitration and Investment Law (2)
Lecture. Covers international arbitration involving States, individuals, and corporations; including: the parties; the agreement to arbitrate; the arbitrators; the arbitral proceeding; and, the arbitral award. Effective: 2017 Fall Semester.

LAW 292—Immigration Law and Procedure (3)
Discussion—3 hours. Surveys the history of U.S. immigration law and policy. Effective: 2006 Spring Semester.

LAW 292A—Advanced Topics in Immigration and Citizenship Law Seminar (2)
Lecture. Prerequisite(s): LAW 292; May be waived by the professor. Conducts a closer examination of various topics and subject matters that relate to immigration and citizenship law. Effective: 2017 Fall Semester.

LAW 293—Public Interest Law (2)
Seminar—2 hours. This class will examine the issues and problems associated with providing civil legal services to persons and interests in American society that typically have been unable to afford or otherwise obtain representation from the private bar. Effective: 2006 Fall Semester.

LAW 293AT—Contemporary Issues in Economic Justice (2)
Discussion—2 hours. Provides an introduction to the social justice critique of free markets. Effective: 2013 Spring Semester.

LAW 293T—Public Interest Lawyering, Civil Rights and Employment Law (2)
Seminar—2 hours. Prerequisite(s): LAW 260; LAW 260AT Advanced course covers employment law issues through the lens of public interest lawyers and their constituencies. Effective: 2014 Spring Semester.

LAW 294A—Law and Popular Culture (2)
Seminar—2 hours. This course examines works of popular culture, films, and legal texts. Each session will focus on a particular film and its cultural implications, particular problem or problems of law, law practice, legal ethics, traditional ethics, or public policy. Effective: 2006 Spring Semester.

LAW 295A—Trademark and Unfair Competition Law (2)
Discussion—2 hours. Prerequisite(s): LAW 274 recommended, not required. Intensive look at selected issues in Trademark Law, including the concepts of trademarks and unfair competition, acquisition and loss of trademark rights, infringement, trademarks as speech, and international aspects of trademark protection. Effective: 2016 Spring Semester.

LAW 295B—University Brands (3)
Lecture. Universities gain from developing brands, to draw donors and students and lend prestige to a range of activities – merchandise, publishing, technology transfer, continuing education, hospitals, distance learning, etc. Whether private, public, elitist, or inclusive, the university can no longer avoid to brand itself. Discusses the role of trademarks in the university and changes affecting it. Effective: 2018 Fall Semester.

LAW 295T—Brands and Trademarks (2)
Seminar—2 hours. Explores the challenges brands pose to traditional trademark
law. Taking a close, interdisciplinary look at branding: from the business schools' theories of brand management to semiotic analyses of
brand meaning to art criticism of brand advertisements. Effective: 2012 Fall Semester.

LAW 296—Copyright (3)
Discussion—3 hours. Thorough examination of the law of copyright, including its application to literature, music, films, television, art, computer programs, and the Internet. Effective: 2015 Fall Semester.

LAW 296C—Fictional Characters and Real People (2)
Discussion—2 hours. Celebrities and fictional characters both have a powerful hold on the human imagination and are important parts of our modern myths. Examines the legal protection available for each. Effective: 2011 Spring Semester.

LAW 296D—Art Law (2)
Discussion—2 hours. Selected issues in Art Law, including meaning of art, how to represent artists, copyright, publicity, first amendment rights, censorship, street art, government regulation, art markets, international protection of art and cultural property; and more. Effective: 2017 Spring Semester.

LAW 296T—Entertainment Law (2)
Discussion—2 hours. Explores the many facets of Entertainment Law. Effective: 2014 Spring Semester.

LAW 297—Alternative Dispute Resolution (3)
Discussion—3 hours. Limited enrollment. Introduces students to a wide variety of alternative dispute resolution procedures, with an emphasis on negotiation, mediation and arbitration. Effective: 2007 Fall Semester.

LAW 297A—Federal Arbitration Act Seminar (2)
Seminar—2 hours. Trace the development of commercial arbitration law, with a special emphasis on hot-button contemporary issues like consumer and employment arbitration, the separability doctrine, preemption of state law, and the arbitrability of statutory claims. Effective: 2016 Spring Semester.

LAW 297BT—International Commercial Arbitration (3)
Discussion—3 hours. International commercial arbitration, Convention on International Sale of Goods, general understanding of international arbitration provided by World Bank's International Centre for Settlement of Investor-State Disputes under Convention on Settlement of Investment Disputes between States and Nationals of Other States. Effective: 2015 Spring Semester.

LAW 298—Sociology of the Legal Profession Seminar (2)
Seminar—2 hours. Limited enrollment. Comprehensive look at the organization, operation, and ideology of the legal profession. Effective: 2006 Fall Semester.

LAW 400A—Study Abroad - University College Dublin, Ireland (12)
Independent Study. Students must apply and be accepted into the International Study Abroad Program. Semester away study abroad at the University College Dublin, Ireland. Enhance knowledge of international legal regimes and obtain a global legal educational experience. (S/U grading only.) Effective: 2008 Spring Semester.

LAW 400B—Study Abroad--University of Cophengen, Denmark (12)
Independent Study. Students must apply and be accepted into the International Study Abroad Program. Semester study abroad at the University of Copenhagen, Denmark. Enhance knowledge of international legal regimes and obtain a global legal educational experience. (S/U grading only.) Effective: 2008 Spring Semester.

LAW 400C—Study Abroad - China University of Political Science and Law (12)
Independent Study. Student must apply and be acceptance in the International Study Abroad Program. Semester-away study abroad at the China University of Political Science and Law. Enhance knowledge of international legal regimes and obtain a global legal educational experience. (S/U grading only.) Effective: 2009 Spring Semester.

LAW 400D—Study Abroad - University of Lausanne, Switzerland (12)
Independent Study. Student must apply and be accepted in the International Study Abroad Program. Semester-away study abroad at the University of Lausanne, Switzerland. Enhance knowledge of international legal regimes and obtain a global legal educational experience. (S/U grading only.) Effective: 2013 Fall Quarter.

LAW 400E—Study Abroad-Comillas Pontifical University Madrid, Spain (12)
Independent Study. Semester-away study abroad at the Comillas Pontifical University in Madrid, Spain. Enhance knowledge of international legal regimes and obtain a global legal educational experience. (S/U grading only.) Effective: 2017 Fall Semester.

LAW 400S—Critical Topics in Environmental Law in a Comparative Perspective (2)
Seminar—2 hours. Enrollment by application only. Intensive, two-week program provides an opportunity for U.S. and international law students to study environmental law by examining and comparing European Union and U.S. environmental law policies and regulatory regimes. Effective: 2014 Summer Semester.

LAW 408—Community Education Seminar (3)
Clinical Activity; Seminar—3 hours. Limited enrollment. Trains students to educate the community about basic legal rights and responsibilities. Students attend an initial four-hour orientation, followed by weekly seminars that will prepare students to teach in a local high school at least two times per week. (S/U grading only.) Effective: 1997 Winter Quarter.

LAW 409—Environmental Law Moot Court (1)
Variable. During the first eight weeks of fall semester, students research and submit briefs as appellants, respondents, or third parties on a problem of environmental law that is prepared by the National Environmental Law Moot Court Board. (S/U grading only.) Effective: 1997 Winter Quarter.

LAW 410A—Appellate Advocacy I (2)
Discussion/Laboratory. Limited enrollment. Basic appellate practice and procedure. Beginning instruction in oral advocacy skills and an opportunity to practice these skills in front of a moot court. (S/U grading only.) Effective: 2008 Fall Semester.

LAW 410B—Appellate Advocacy II (Moot Court) (2)
Practice—2 hours. Limited enrollment. Continuation of Course 410A. Focuses on the development of effective appellate brief writing skills and the refinement of oral advocacy skills. (S/U grading only.) Effective: 2008 Fall Semester.

LAW 411—Journal of International Law and Policy (1-2)
Independent Study. The Journal is a biannual journal produced by King Hall students with an interest in international law. The editor -in-chief of the journal receives 2 units of credit each semester. The managing editor receives 1 unit of credit each semester. (S/U grading only.) Effective: 2005 Fall Semester.

LAW 411A—Journal of International Law and Policy (1-2)
Variable—1-2 hours. The UC Davis Journal of International Law and Policy publishes semi-annually and strives to contribute pertinent and interesting scholarly works to the field of international law. May be repeated up to 5 time(s) Students are allowed to participate in the journal for more than one term. (S/U grading only.) Effective: 2017 Spring Semester.

LAW 411B—Journal of Juvenile Law and Policy (1-2)
Independent Study—1-2 hours. The Journal of Juvenile Law & Policy is a biannual publication of the UC Davis School of Law that addresses the unique concerns of youth in the American legal system. May be repeated up to 5 time(s) Students are allowed to participate in the journal for more than one term. (S/U grading only.) Effective: 2017 Spring Semester.

LAW 411C—UC Davis Business Law Journal (1-2)
Independent Study—1 hour. The UC Davis Business Law Journal is run by dedicated law students who are committed to providing current and valuable legal and business analysis. May be repeated up to 5 time(s) Students are allowed to participate in the journal for more than one term. (S/U grading only.) Effective: 2017 Spring Semester.

LAW 411D—Immigration and Nationality Law Review (1-2)
Independent Study. Prerequisite(s): Consent of Instructor. The Immigration and Nationality Law Review (INLR) is in part a reprint journal and serves as an anthology of seminal articles in immigration, nationality, and citizenship law. INLR has republished a number of articles authored by King Hall faculty. INLR also creates space for student Notes. The INLR also hosts a symposium or other immigration-related project each year and publishes materials from that enterprise in the year's volume. May be repeated up to 5 time(s) Students are allowed to participate in the journal for more than one term. (S/U grading only.) Effective: 2017 Fall Semester.

LAW 412—Carr Intraschool Trial Advocacy Competition (1)
Variable. Limited enrollment. Named after the late Justice Frances Carr, this competition is open to secondand third-year students. A preliminary round is followed by quarter-finals,semi-finals,and a final round. Students participate in mock trials presided over by judges and critiqued by experienced litigators. (S/U grading only.) Effective: 1997 Winter Quarter.

LAW 413—Interschool Competition (1-3)
Variable. Prerequisite(s): Consent of appropriate faculty advisor. Limited to students actually representing the School in the interschool competitions. Participation in interschool moot court and lawyering skills competitions. Competition must be authorized by the appropriate faculty advisor. Faculty advisor may condition the award of academic credit for any particular competition on the performance of such additional work as may be reasonable to justify the credit. May satisfy advanced legal writing requirement (S/U grading only.) Effective: 1997 Winter Quarter.

LAW 414—Moot Court Board (1)
Variable. Prerequisite(s): LAW 410A; LAW 410B Limited enrollment. Members of Moot Court Board may receive one credit for each semester of service on the board, up to maximum of two.Credit awarded only after certification by Moot Court Board and approval of the faculty advisors to Moot Court Board. (S/U grading only.) Effective: 1997 Winter Quarter.

LAW 414A—Negotiations Board (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Members of the King Hall Negotiations Board assist in the administration of the King Hall Negotiation Team by performing a variety of tasks under the supervision of the course instructor. One unit of credit for each semester of service on the board, up to a maximum of two units per academic year; credit is awarded only after approval by the instructor. (P/NP grading only.) Effective: 2012 Fall Semester.

LAW 415—Trial Practice Honors Board (1)
Variable. Members of the Trial Practice Honors Board administer the Frances Carr competition. Members are nominated by their individual Trial Practice I adjuncts. Students receive one credit for serving on the Board, awarded upon approval of the faculty advisor. (S/U grading only.) Effective: 1997 Winter Quarter.

LAW 416—Law Review Writer (1-2)
Variable—1-2 hours. Writing of a law review article under the editorial supervision of editors of the UC Davis Law Review. Office hours (including but not limited to Bluebooking and cite-checking) are required. 1 or 2 units. May be repeated for credit. In the spring semester, credit is obtained only upon achieving status as a member of the UC Davis Law Review, which requires that the student has made substantial progress towards completing an editorship article; credit is awarded only after certification by the editor in chief and approval of the faculty advisors; one unit of credit is earned the first semester; two units are earned the second semester upon nomination and acceptance of nomination to the Editorial Board; one unit is earned second semester if only a membership draft and office hours are completed. (S/U grading only.) Effective: 2017 Spring Semester.

LAW 417A—Law Review Editor (1-2)
Variable—1-2 hours. Prerequisite(s): Consent of Instructor. Editors must have completed an editorship article and must perform editorial duties (a substantial time commitment). Credit is awarded only after completion of both semesters. (S/U grading only.) Effective: 2015 Fall Semester.

LAW 417B—Law Review Editor (1-2)
Variable—1-2 hours. Prerequisite(s): Consent of Instructor. Editors must have completed an editorship article and must perform editorial duties (a substantial time commitment). Credit is awarded only after completion of both semesters. (S/U grading only.) Effective: 2016 Spring Semester.

LAW 418—Environmental Law and Policy Journal (1-2)
Independent Study. Environs is a biannual environmental law and policy journal that provides an open forum for the discussion of current environmental issues, particularly those pertaining to the state of California. May be repeated up to 5 time(s) Students are allowed to participate in the journal for more than one term. (S/U grading only.) Effective: 2017 Spring Semester.

LAW 419—Advanced Writing Project (1-4)
Variable. The completion of a writing requirement project under the active and regular supervision of a faculty member in satisfaction of the legal writing requirement. The writing project must be an individually authored work of rigorous intellectual effort of at least 20 typewritten double-spaced pages, excluding footnotes. The project may take any of several forms, for example, a paper, a brief, a memorandum of law, a proposed statute, a statutory scheme or set of administrative regulations (with explanatory comments), or a will or agreement (with explanatory comments). The advanced writing project may also be undertaken in connection with another course or seminar to satisfy the leagl writing requirements. The numnber of units shall be approved by the faculty supervisor and will depend upon the scope of the writing effort. (S/U grading only.) Effective: 2005 Fall Semester.

LAW 419A—Advanced Writing Project (1-4)
Variable. The completion of a writing requirement project under the active and regular supervision of a faculty member in satisfaction of the legal writing requirement. The writing project must be an individually
authored work of rigorous intellectual effort of at least 20 typewritten double-spaced pages, excluding footnotes. The project may take any of several forms, for example, a paper, a brief, a memorandum of
law, a proposed statute, a statutory scheme or set of administrative regulations (with explanatory comments), or a will or agreement (with explanatory comments). The advanced writing project may also be undertaken in connection with another course or seminar to satisfy the legal writing requirements. The number of units shall be approved by the faculty supervisor and will depend upon the scope of the writing effort. (S/U grading only.) Effective: 2005 Fall Semester.

LAW 419S—Special Session Advanced Writing Project (1-4)
Variable. The completion of a writing requirement project under the active and regular supervision of a faculty member in satisfaction of the legal writing requirement. The writing project must be an individually
authored work of rigorous intellectual effort of at least 20 typewritten double-spaced pages, excluding footnotes. The project may take any of several forms, for example, a paper, a brief, a memorandum of law, a proposed statute, a statutory scheme or set of administrative regulations (with explanatory comments), or a will or agreement (with explanatory comments). The advanced writing project may also be undertaken in connection with another course or seminar to satisfy the legal writing requirements. The number of units shall be approved by the faculty supervisor and will depend upon the scope of the writing effort. (S/U grading only.) Effective: 2005 Summer Special Session.

LAW 420—Civil Rights Clinic (2-6)
Clinical Activity—2 hours. Prerequisite(s): LAW 219 (can be concurrent); and Consent of Instructor. Priority given to students enrolled in or have taken LAW 267. Limited enrollment. Clinic provides practical experience in providing legal services to indigent clients who have filed civil rights actions in state and federal trial and appellate courts. Students work on clinic cases under the supervision of the clinic director. May be repeated for credit. Effective: 2015 Spring Semester.

LAW 425—Judicial Clinical (2-12)
Clinical Activity. Prerequisite(s): LAW 261; Required for full-time clinical students and recommended for part-time clinical students. Students may arrange judicial clerkship clinical programs with an
approved list of state and federal judges through the Clinical office and under the sponsorship of the faculty member in charge. All students must complete weekly time records and bi-weekly journals. (S/U grading only.) Effective: 1997 Winter Quarter.

LAW 430—Federal and State Taxation Externship (2-6)
Clinical Activity—2-12 hours. Prerequisite(s): LAW 220; and Consent of Instructor. Students will have the opportunity to work with the Internal Revenue Service or other governmental tax agency. Journals and attendance at group meetings are required. (S/U grading only.) Effective: 2013 Fall Semester.

LAW 435—Family Protection Clinic (4)
Clinical Activity—2 hours. Prerequisite(s): LAW 219 (can be concurrent); Full–Year Clinic: prior or concurrent enrollment in LAW 219 to qualify for state court certification; prior or concurrent enrollment in LAW 272 and LAW 263A recommended, not required; One-Semester Clinic: prior or concurrent enrollment in LAW 272 and LAW 263A recommended, not required. Full–Year Clinic: each student required to enroll for two semesters, receiving four units each semester for total of eight units; class limited to seven students; One-Semester Clinic: each student required to meet weekly for a 2-hour seminar; class limited to four students. Represent low-income persons in family law and related matters arising out of situations involving family violence. Effective: 2015 Spring Semester.

LAW 435A—Family Protection Clinic (4)
Clinical Activity—2 hours. Prerequisite(s): LAW 219 (can be concurrent); Consent of Instructor. Full-Year Clinic: LAW 219 is required to qualify for state court certification; prior or concurrent enrollment in LAW 272 and LAW 263A recommended not required. One-Semester Clinic: prior or concurrent enrollment in LAW 272 and LAW 263A recommended not required Full–Year Clinic: each student required to enroll for two semesters receiving four units each semester for total of eight units; class limited to seven students. Represent low-income persons in family law and related matters arising out of situations involving family violence. Effective: 2014 Fall Semester.

LAW 435B—Family Protection Clinic (4)
Clinical Activity—2 hours. Prerequisite(s): LAW 219 (can be concurrent); and Consent of Instructor. Full-Year Clinic: LAW 219 is required to qualify for state court certification; prior or concurrent enrollment in LAW 272 and LAW 263A recommended not required. Full–Year Clinic: each student required to enroll for two semesters receiving four units each semester for total of eight units; class limited to seven students. Represent low-income persons in family law and related matters arising out of situations involving family violence. Effective: 2015 Spring Semester.

LAW 440A—Immigration Law Clinic (4)
Clinical Activity—4 hours. Prerequisite(s): LAW 292 (can be concurrent) Each student is required to enroll for two semesters, receiving four units each semester for total of eight units. Provides legal representation to indigent non-citizens in removal proceedings before U.S. Immigration Courts, the Board of Immigration Appeals, and federal courts, including the Ninth Circuit Court of Appeals. Effective: 2015 Spring Semester.

LAW 440B—Immigration Law Clinic (4)
Clinical Activity—4 hours. Prerequisite(s): LAW 292 (can be concurrent); Consent of Instructor. Each student is required to enroll for two semesters, receiving four units each semester for total of eight units. Provides legal representation to indigent non-citizens in removal proceedings before U.S. Immigration Courts, the Board of Immigration Appeals, and federal courts, including the Ninth Circuit Court of Appeals. Effective: 2015 Spring Semester.

LAW 445—Legislative Process Externship (2-5)
Clinical Activity. Prerequisite(s): LAW 240 (can be concurrent); or Consent of Instructor. Practical experience in the operation of the office of a legislator or a legislative committee. The major thrust of the program is to enable students to become familiar with the give and take realities of making laws, as contracted with (S/U grading only.) Effective: 2001 Spring Semester.

LAW 445A—Aoki Water Justice Clinic (5)
Clinical Activity. Prerequisite(s): Consent of Instructor. Aoki Water Justice Clinic trains students to use community lawyering and transactional legal tools to ensure that low-income, California communities receive safe, clean, and affordable drinking water. Effective: 2017 Fall Semester.

LAW 445B—Advanced Aoki Water Justice Clinic (3-5)
Variable. The Advanced Aoki Water Justice Clinic allows students to leverage their legal research and practical lawyering skills to advance policies that ensure that low-income, California communities receive safe, clean, and affordable drinking water. Effective: 2017 Fall Semester.

LAW 446—UC Davis Capital Law Scholars Externship Program (2-12)
Fieldwork. Program is designed to provide students with hands-on lawyering experience in a legislative office, with a legislative committee, or with a government/nonprofit office engaged in legislative and policy work. Grading is on a S/U basis. (S/U grading only.) Effective: 2016 Fall Semester.

LAW 446A—UC Davis Capital Law Scholars Seminar (1)
Seminar—1 hour. May be required for students enrolled in Capital Law Scholars Externship. Covers issues related to lawyering in California's state capital, and help students maximize educational and professional experience in their externship placements. Effective: 2016 Fall Semester.

LAW 450—Environmental Law Externship (2-6)
Clinical Activity. Prerequisite(s): LAW 285; or Consent of Instructor. Practical experience in environmental law. Students will work in an approved government, non-profit or private law office engaged in some form of environmental law work for a minimum of 8 hours per week. Students must prepare a journal describing and (S/U grading only.) Effective: 2004 Spring Semester.

LAW 455—Employment Relations Externship (2-6)
Clinical Activity. Prerequisite(s): LAW 251 or LAW 260 (can be concurrent) Practical experience in employment relations, including employment discrimination and public sector labor law. Work under the direct supervision of a government lawyer. Opportunity to participate in a range of with emphasis on observation and participation in actual investigation, interviewing, drafting pleading, and attendance at hearings. May be repeated for credit. (S/U grading only.) Effective: 2003 Fall Semester.

LAW 460—Public Interest Law Externship (2-6)
Clinical Activity—2-6 hours. Prerequisite(s): Prior or concurrent enrollment in LAW 293 recommended. Opportunity to work with a public interest practitioner in a nonprofit organization. Journals and attendance at two group meetings required. Students must complete an evaluative final paper of approximately eight pages. Hours completed in public interest setting may be applied toward the practicum requirement for the Public interest Law Program. (S/U grading only.) Effective: 2002 Fall Semester.

LAW 465—Intellectual Property Externship (2-6)
Clinical Activity—2-6 hours. Prerequisite(s): LAW 293 and Comparative Public Services recommended. Opportunity to work for government, academic, and nonprofit entities. (S/U grading only.) Effective: 2010 Spring Semester.

LAW 470—Administration of Criminal Justice Externship (2-12)
Clinical Activity—2-12 hours. Prerequisite(s): LAW 219; and LAW 227; Completion of or concurrent enrollment in the above courses; LAW 263A recommended. Limited enrollment. Gain practical experience working full or part time in a District Attorney's or Public Defender's office in one of several surrounding counties or in a federal Public Defender or U.S. Attorney's office. Students participate in the many activities associated with May be repeated up to 12 unit(s). (S/U grading only.) Effective: 2005 Fall Semester.

LAW 475—Washington UC-DC Law Program (10)
Clinical Activity—10 hours. Open to 2L and 3L students. Uniquely collaborative externship program in Washington, D.C., combining weekly seminars with full-time field placement offering students an unparalleled opportunity to learn how federal statutes, regulations, and policies are made, changed, and understood in the nation's capital. (S/U grading only.) Effective: 2010 Spring Semester.

LAW 475A—Law Making and Law Changing in the Nation's Capital (3)
Seminar—3 hours. Companion seminar to the Washington UC-DC Externship. Designed to enhance the externship experience in three principal ways. Effective: 2010 Spring Semester.

LAW 480—Clinical Program in Prison Law (2-6)
Clinical Activity—2 hours. Prerequisite(s): Consent of Instructor. Provides practical experience in providing legal services to real clients who have various problems related to their incarceration in state prison. The services require analysis and application of Constitutional Law, state statutory law, agency regulations, and the rules of professional responsibility. Effective: 2015 Spring Semester.

LAW 485—California Supreme Court Clinic (6)
Clinical Activity—6 hours. Class size limited to 6 students. California Supreme Court Clinic provides students with an immersive experience in litigating cases before the state's highest court. Effective: 2013 Fall Semester.

LAW 490T—Aoki Federal Public Defender Clinic (4)
Clinical Activity—4 hours. Students submit applications for the course. Outgrowth of the work of the Aoki Center on Race and Nation. As part of its work, the Aoki Center provides educational opportunities to students interested in critical race perspectives in practice. Effective: 2014 Fall Semester.

LAW 495—Instruction in Legal Research and Writing Skills (1-2)
Discussion—2 hours. Prerequisite(s): Consent of Instructor. Participants assist in instructing the Legal Research and Writing programs for first-year students under the direction of the Legal Research and Writing instructors. (S/U grading only.) Effective: 2017 Spring Semester.

LAW 498—Group Study (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Class size limited to no fewer than 4 or more than 10 students. Groups of students with common interest in studying a stated legal problem may plan and conduct their own research and seminar program under the direction of faculty. (S/U grading only.) Effective: 2012 Fall Semester.

LAW 498A—Group Study (1-4)
Variable. Prerequisite(s): Consent of Instructor. Groups of students with common interest in studying a stated legal problem may plan and conduct their own research and seminar program under the direction of faculty. Effective: 2012 Fall Semester.

LAW 499—Independent Research Project (1-4)
Variable. Students may receive credit for individual projects, subject to the following regulations: (1) the project may extend over no more than two semesters; (2) each project will be under the supervision of a faculty member; (3) an outline of the project must be approved by the supervising faculty member; (4)normally, no faculty member will be permitted to supervise more than 5 students working on individual programs during any semester; and (5)each student must submit an individual paper or approved alternative to the supervising faculty member. (S/U grading only.) Effective: 2005 Fall Semester.

LAW 499A—Independent Research Project (1-4)
Variable. Students may receive credit for individual projects, subject to the following regulations: (1)the project may extend over no more than two semesters; (2)each project will be under the supervision of a faculty member; (3) an outline of the project must be approved by the supervising faculty member; (4)normally, no faculty member will be permitted to supervise more than 5 students working on individual programs during any semester; and (5)each student must submit an individual paper or approved alternative to the supervising faculty member. Grading is on a Satisfactory/Unsatisfactory basis unless a request for letter grading has been made in advance. May be repeated for credit. (S/U grading only.) Effective: 2010 Fall Semester.

LAW 499B—Law Students Study Away (10)
Independent Study. Students studying away from UC Davis, School of Law. (S/U grading only.) Effective: 2007 Fall Semester.

LAW 499C—Joint Degree Student-GSM (10)
Internship. Joint degree course for graduate School of Management students. (S/U grading only.) Effective: 2009 Spring Semester.

LAW 499S—Special Independent Research Project (1-4)
Students may receive credit for individual projects, subject to the following regulations: (1) the project may extend over no more than two semesters; (2) each project will be under the supervision of a faculty member; (3) an outline of the Effective: 2005 Summer Special Session.

LAW 499SA—Special Session Independent Research Project (1-4)
Students may receive credit for individual projects, subject to the following regulations: (1) the project may extend over no more than two semesters; (2) each project will be under the supervision of a faculty member; (3) an outline of the Effective: 2005 Summer Special Session.

LAW 499SB—Special Session Independent Research Project (1-4)
Variable. Students may receive credit for individual projects, subject to the following regulations: (1) the project may extend over no more than two semesters; (2) each project will be under the supervision of a faculty member; (3) an outline of the project must be approved by the supervising faculty member; (4) normally, no faculty member will be permitted to supervise more than 5 students working on individual programs during any semester; and (5) each student must submit an individual paper or approved alternative to the supervising faculty member. Effective: 2005 Summer Special Session.

Linguistics

Linguistics | LIN A.B.

(College of Letters and Science)

Raul Aranovich, Ph.D., Chairperson of the Department

Department Office. 469 Kerr Hall; 530-752-0966; http://linguistics.ucdavis.edu

Faculty. http://linguistics.ucdavis.edu/directory-of-people/lin-faculty

The Major Program

Linguistics is the systematic study of human language. It focuses on theories of language structure, variation, and use, description of contemporary languages, and the examination of language change through time. Because of the pervasive influence of language in our everyday lives, work in linguistics interacts in important ways with studies carried out in many other fields, including psychology, anthropology, neuroscience, philosophy, computer science, sociology, literature, language teaching, communication and education.

The Program. An introductory lower division course provides students with basic concepts and some of the methods needed to analyze language in a systematic way. Upper division courses probe more deeply into specific aspects of language structure, language use, and the relationship of language to other realms of human activity.

Career Alternatives. Majors in linguistics find practical outlets for their linguistic training in a variety of fields: the computer science industry (software development); teaching English as a second language; foreign language teaching; elementary and secondary level bilingual-bicultural programs; language-oriented missionary work; bilingual-bicultural curriculum development (e.g., for publishing houses); legal work; speech therapy; lexicography (preparation of dictionaries). All of these types of employment share an interest in persons skilled in the analysis of language, spoken and/or written. Linguistics equips students with just such skills.

Grading Recommendation. Though not required, it is recommended that all courses offered in satisfaction of the Linguistics major be taken for a letter grade.

Faculty Advisor. Kenji Sagae

Honors and Honors Program. The honors program consists of six units of 194H credit normally taken in the fall and winter quarters of the senior year. Completion of the program is a prerequisite for High or Highest Honors at graduation. Specific eligibility criteria may be obtained from the major advisor. For general information regarding graduation with honors and Dean's Honors Lists, please see Academic Information.

Graduate Study. The Linguistics Graduate Group offers study and research leading to the M.A. and Ph.D. degrees. Please see Linguistics (A Graduate Group); more detailed information may be obtained from the Graduate Advisor or from the Chairperson of the Linguistics Group.

Graduate Advisor. R. Bayley

Preparatory Subject Matter **Units:** 4-24

LIN 001	Introduction to Linguistics	4

Foreign language, one course beyond the 15-unit requirement of the College of Letters and Science in the same language used to fulfill the college requirement.

Depth Subject Matter **Units:** 44

LIN 103A	Linguistic Analysis I: Phonetics, Phonology, Morphology	4

LIN 103B	Linguistic Analysis II: Morphology, Syntax, Semantics	4
LIN 111	Introduction to Phonological Theory	4
LIN 131	Introduction to Syntactic Theory	4

Choose three:

LIN 105	Topics in Language and Linguistics	4
LIN 106	English Grammar	4
OR		
ENL 106	English Grammar	4
OR		
UWP 106	English Grammar	4
LIN 111	Introduction to Phonological Theory	4
LIN 112	Phonetics	4
LIN 121	Morphology	4
LIN 127	Text Processing and Corpus Linguistics	4
LIN 131	Introduction to Syntactic Theory	4
LIN 141	Semantics	4
LIN 150	Languages of the World	4
LIN 151	Historical Linguistics	4
LIN 152	Language Universals and Typology	4

Choose one:

LIN 160	American Voices	4
LIN 163	Language, Gender, and Society	4
LIN 165	Introduction to Applied Linguistics	4
LIN 166	The Spanish Language in the United States	4

Choose one:

LIN 171	Introduction to Psycholinguistics	4
LIN 173	Language Development	4
LIN 175	Biological Basis of Language	4
LIN 177	Computational Linguistics	4
LIN 180	Second Language Learning and Teaching	4
LIN 182	Multilingualism	4

Choose at least eight units:

Requirements listed above.

AAS 156	Language and Identity in Africa and the African Diaspora	4
ANT 110	Language and Sociocultural Anthropology	4
ANT 117	Language and Society	4
ANT 120	Language and Culture	4
EDU 151	Language Development in the Chicano Child	3
ENL 105	History of the English Language	4
ENL 106	English Grammar	4
OR		
LIN 106	English Grammar	4
OR		
UWP 106	English Grammar	4
FRE 109	French Phonetics	4

FRE 160	Linguistic Study of French-Sound and Form	4
FRE 161	Linguistic Study of French-Form and Meaning	4
FRE 162	History of the French Language	4
GER 105	The Modern German Language	4
HDE 101	Cognitive Development	4
NAS 107	Special Topics in Native American Languages	4
PHI 137A	Philosophy of Language: Theory of Reference	4
PHI 137B	Philosophy of Language: Truth and Meaning	4
PHI 137C	Philosophy of Language: Semantics and Pragmatics	4
PSC 132	Language and Cognition	4
SPA 111N	The Structure of Spanish: Sounds and Words	3
SPA 112N	The Structure of Spanish: Words and Phrases	3
SPA 113	Spanish Pronunciation	4
SPA 114N	Contrastive Analysis of English and Spanish	4
SPA 115	History of the Spanish Language	4
SPA 115S	History of the Spanish Language	4
SPA 116	Applied Spanish Linguistics	4
SPA 117	Teaching Spanish as a Native Tongue in the U.S.: Praxis and Theory	4
SPA 118	Topics in Spanish Linguistics	4

Total: 48-68

Linguistics | LIN Courses

Courses in LIN:

LIN 001—Introduction to Linguistics (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the study of language; its nature, diversity, and structure. GE credit: AH, SS. Effective: 1997 Winter Quarter.

LIN 001Y—Introduction to Linguistics (4)
Discussion—1 hour; Web Virtual Lecture—3 hours. Introduction to the study of language; its nature, diversity, and structure. Students may not take both LIN 001 and LIN 001Y for credit. GE credit: AH, SS. Effective: 2014 Spring Quarter.

LIN 003—Language and the Body (4)
Discussion—2 hours; Lecture—2 hours. Open to all students regardless of major. Enrollment will be restricted to 80-100 students. Perspectives on the role of language in issues about bodies. Language-related disabilities. Social implications of language use in discussing body-related conditions. GE credit: OL, SS. Effective: 2018 Winter Quarter.

LIN 005—Global English and Communication (4)
Discussion—2 hours; Lecture—2 hours. English as a global language and its uses in intercultural communication. Cultural, historical, and political dimensions of varieties of English spoken around the world. Experiential grounding in strategies for increasing interpretive and verbal communicative competence for a globalized world. (Communication 5.) GE credit: AH, OL, SS, WC. Effective: 2012 Spring Quarter.

LIN 006—Language and Society (4)
Discussion—1 hour; Lecture—3 hours. Language as a social phenomenon. Topics include linguistic diversity, language policy, language and identity, language and social structure, speech communities and social networks, the effect of social factors on language variation, linguistic consequences of language contact. GE credit: ACGH, DD, SS, WE. Effective: 2008 Fall Quarter.

LIN 015—Academic Oral Communication (3)
Discussion—2 hours; Lecture—1 hour. Structure of oral communication, critical thinking, and persuasion in classroom discourse in American English and in cross-cultural perspective. GE credit: AH, OL, SS. Effective: 2014 Fall Quarter.

LIN 020—Oral English for International Students (3) ***Review all entries***
Lecture/Discussion—3 hours. Open to non-native speakers of English with priority enrollment to international teaching assistants with qualifying placement exam scores. Intensive work in oral English for international students, to increase fluency, accuracy, and use of appropriate discourse strategies in academic settings (e.g., seminar, discussion, laboratory). Training in segmental features of English sounds, intonation, stress, non-verbal cues, and register. May be repeated for credit. (P/NP grading only.) Effective: 2011 Fall Quarter.

LIN 020—Oral English for International Students (3) ***Review all entries Discontinued***
Lecture/Discussion—3 hours. Open to non-native speakers of English with priority enrollment to international teaching assistants with qualifying placement exam scores. Intensive work in oral English for international students, to increase fluency, accuracy, and use of appropriate discourse strategies in academic settings (e.g., seminar, discussion, laboratory). Training in segmental features of English sounds, intonation, stress, non-verbal cues, and register. May be repeated for credit. (P/NP grading only.) Effective: 2018 Fall Quarter.

LIN 024—English Structures and Strategies in Academic Writing (4)
Lecture/Discussion—4 hours. Prerequisite(s): LIN 023 Open to students from language backgrounds other than English. Practice in academic writing designed to prepare undergraduate students from language backgrounds other than English for successful academic work. Development of academic writing, critical thinking, and reading skills. Deveopment of clear, accurate language for presenting an effective argument. Effective: 2006 Fall Quarter.

LIN 025—English for International/ESL Graduate Students (4)
Lecture/Discussion—4 hours. Prerequisite(s): Admission by placement examination or consent of coordinator; open to international and ESL graduate students and limited status international undergraduates (Education Abroad Program participants). Multi-skills ESL course designed to help international/ESL students improve their English language skills for successful academic study. Emphasis on writing, speaking, listening, reading, and academic culture. (P/NP grading only.) Effective: 2003 Fall Quarter.

LIN 026—Writing for International Graduate Students (3)
Lecture—3 hours. Prerequisite(s): Satisfactory completion of LIN 025 if held for it, or consent of instructor. Admission limited to international graduate students. Focuses on writing needed for academic work, including summaries, critiques, research and grant proposals, memos, resumes, and research papers. Includes a review of grammar needed for writing and some focus on reading skills and American vocabulary and idioms. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 096—Directed Group Study in English as a Second Language (1-5)
Variable—1.5 hours. Prerequisite(s): Consent of Instructor. Directed group study of topic in English as a Second Language (ESL). May be repeated for credit May be repeated for credit by consent of the ESL coordinator. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Intended for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Intended for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 103A—Linguistic Analysis I: Phonetics, Phonology, Morphology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 001 recommended. Introduction to fundamental methods and concepts used in linguistic analysis, focusing on phonetic, phonological, and morphological phenomena. Emphasizes development of analytical skills and appreciation of structural regularities and differences among languages. Not open for credit to students who have completed LIN 139. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 103B—Linguistic Analysis II: Morphology, Syntax, Semantics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 001 recommended. Introduction to fundamental methods and concepts used in linguistic analysis, focusing on morphological, syntactic, and semantic phenomena. Emphasizes development of analytical skills and appreciation of structural regularities and differences among languages. Not open for credit to students who have completed LIN 140. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 105—Topics in Language and Linguistics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. LIN 001 recommended. Detailed examination of a major contemporary linguistic theory, a major contemporary issue or related set of issues in linguistics, or the structure of a particular language or language family. May be repeated for credit when topic differs. May be repeated for credit. Effective: 2017 Winter Quarter.

LIN 106—English Grammar (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 001 or LIN 001Y or ENG 003 or UWP 001; or Consent of Instructor. Survey of present-day English grammar as informed by contemporary linguistic theories. The major syntactic structures of English; their variation across dialects, styles, and registers; their development; and their usefulness in describing the conventions of English. (English 106 and University Writing Program 106.) GE credit: AH. Effective: 2018 Winter Quarter.

LIN 111—Introduction to Phonological Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 103A recommended. Contemporary phonological theory with emphasis on syllable structure, metrical structure, phonology-morphology interaction, and typological variation in these areas, from the perspective of optimality-theoretic approaches. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 112—Phonetics (4)
Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): LIN 001 recommended. Detailed examination of articulatory and acoustic phonetics. GE credit: SE. Effective: 2017 Winter Quarter.

LIN 121—Morphology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 103A, 103B recommended. Introduction to the analysis of word structure and the relation of word structure to the lexicon and other grammatical components. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 127—Text Processing and Corpus Linguistics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): LIN 001, LIN 005, LIN 006, or ANT 004 recommended. Investigation of the lexical organization of human languages through corpus linguistics. Application of principles of linguistic analysis, automatic text processing, and statistical research to solving problems of textual evaluation and classification, as well as information retrieval and extraction. GE credit: AH, QL, SS. Effective: 2017 Winter Quarter.

LIN 131—Introduction to Syntactic Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 103B recommended. Introduction to syntactic theory, primarily through the examination of a major theory of syntax, emphasizing theoretical reasoning, argumentation, and problems of theory building in syntax. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 141—Semantics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 103B recommended. Linguistic study of meanings of words and phrases. Meanings expressed by lexical items and derivational and inflectional morphology. Contribution of argument structure, quantification, and coordination to meaning. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 150—Languages of the World (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 001 or ANT 004 recommended. Survey of the world's languages, their geographical distribution and classification, both genetic and typological. Illustrative descriptions of several major languages from different geographical areas; pidgins and creoles, lingua francas and other languages of widespread use. Not open for credit to students who have completed LIN 050. GE credit: AH, SS, WC. Effective: 2017 Winter Quarter.

LIN 151—Historical Linguistics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 103A recommended. Description and methods of the historical study of language, including the comparative method and internal reconstruction; sound change, morphological change, syntactic change, semantic change. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 152—Language Universals and Typology (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 103B recommended. Investigation into common features of all human languages and the classification of languages in terms of their structural features. Theories of universal grammar. Detailed discussion of non-Indo-European languages and comparison with English. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 160—American Voices (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 001 or LIN 001Y or ANT 004; Or upper division standing recommended. Explores the forms of American English: traditional notions of regional dialects and increasingly important social dialects, reflecting age, class, gender, race, ethnicity, and sexual orientation. The influence of language attitudes on perception of dialect speakers; dialect in media, education, and GE credit: SS, WE. Effective: 2018 Winter Quarter.

LIN 163—Language, Gender, and Society (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 001 or ANT 004 recommended. Investigation of real and putative (stereotyped) gender-linked differences in language structure and usage, with a consideration of some social and psychological consequences of such differences. Focus is on English, but other languages are also discussed. GE credit: ACGH, DD, SS, WE. Effective: 2017 Winter Quarter.

LIN 165—Introduction to Applied Linguistics (4)
Discussion—1 hour; Lecture—3 hours. Applications of linguistic principles and the analysis of language-related issues in the world. Exploration of a range of language-related problems including issues related to language learning and teaching to issues concerning language and gender, race, class and the media. GE credit: SS, WE. Effective: 2002 Winter Quarter.

LIN 166—The Spanish Language in the United States (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 001 or LIN 001Y or SPA 111N; SPA 023; Or equivalent to SPA 023 recommended. Linguistic features of the varieties of the Spanish language spoken throughout the United States; phonology, morphology, syntax, vocabulary. Focus on the relationship between United States Spanish and other world varieties of Spanish, within a historical framework. GE credit: SS. Effective: 2018 Spring Quarter.

LIN 171—Introduction to Psycholinguistics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (LIN 001 or LIN 001Y); LIN 103A, LIN 103B recommended. Introduction to psychological issues relating to the implementation of language and linguistic structure during speech production and comprehension and to the implications of research in psychology and related fields for linguistic theory. GE credit: SS. Effective: 2018 Spring Quarter.

LIN 173—Language Development (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (LIN 001 or LIN 001Y); or Consent of Instructor. LIN 103A, 103B recommended. Theory and research on children's acquisition of their native language, including the sound system, grammatical systems, and basic semantic categories. (Education 173.) GE credit: SS. Effective: 2018 Spring Quarter.

LIN 175—Biological Basis of Language (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. LIN 001 recommended. Overview of issues in the field of neurolinguistics and techniques used to explore representation of language in the human brain. GE credit: SE. Effective: 2017 Winter Quarter.

LIN 177—Computational Linguistics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. LIN 001 recommended. Understanding the nature of language through computer modeling of linguistic abilities. Relationships between human cognition and computer representations of cognitive processing. Not open for credit to students who have taken LIN 007. GE credit: SE. Effective: 2017 Winter Quarter.

LIN 180—Second Language Learning and Teaching (4)
Lecture/Discussion—4 hours. Prerequisite(s): LIN 001 or LIN 001Y; Or equivalent recommended. Psycholinguistic and sociolinguistic theories of second language learning. Connections between theoretical perspectives and pedagogical practices in formal and informal second language settings, with focus on tutoring. Impact of sociocontextual factors (e.g., gender, ethnicity). Fieldwork requirement. GE credit: SS, WE. Effective: 2018 Winter Quarter.

LIN 182—Multilingualism (4)
Lecture/Discussion—4 hours. Limited enrollment. Issues in multilingualism from a global perspective: e.g., multilingual communities; multilingualism and identity (gender, ethnicity, nationality); language ideologies and educational and sociopolitical policies surrounding multilingualism; acquisition of multilingualism; discursive practices of multilinguals. GE credit: SS, WC, WE. Effective: 2006 Spring Quarter.

LIN 192—Internship in Linguistics (1-12)
Internship—3-36 hours. Prerequisite(s): LIN 001 or LIN 001Y; Or equivalent course; consent of instructor. Internship applying linguistic-related skills to a fieldwork project in areas such as media, law, or industry, in approved organizations or institutions. Maximum of four units applicable toward major. (P/NP grading only.) Effective: 2018 Winter Quarter.

LIN 194H—Special Study for Honors Students (1-5)
Independent Study—1-5 hours. Prerequisite(s): Consent of Instructor. Open only to linguistics majors of senior standing who qualify for Honors Program. Guided research, under the direction of a faculty member approved by the
Program Director, leading to a senior honors thesis. May be repeated for credit for up to 6 units. May be repeated up to 6 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 197T—Tutoring in Linguistics (1-4)
Discussion—1-4 hours. Prerequisite(s): Consent of Instructor. Upper division standing and consent of department chairperson. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 200A—Foundations of Linguistics I (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing. Survey of fundamental issues raised by pre-generative linguistics in the twentieth century, with emphasis on issues crucial to applications of linguistics. Not open for credit to students who have completed LIN 203A. Effective: 2005 Spring Quarter.

LIN 200B—Foundations of Linguistics II (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing. Survey of fundamental issues raised by orthodox generative linguistics, with emphasis on issues crucial to applications of linguistics. Not open for credit to students who have completed LIN 203B. Effective: 2005 Spring Quarter.

LIN 200C—Foundations of Linguistics III (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing. Survey of fundamental issues raised by contemporary linguistic theories lying outside the generative grammar orthodoxy, with emphasis on issues crucial to applications of linguistics. Effective: 2005 Spring Quarter.

LIN 201—Proseminar (1)
Seminar—1 hour. Introduction to research activity of faculty in the Graduate Group in Linguistics and guest speakers. May be repeated up to 4 unit(s). (S/U grading only.) Effective: 2011 Fall Quarter.

LIN 205A—Topics in Linguistic Theory and Methods (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Advanced study of current problems in linguistic theory and methodology. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

LIN 205B—Topics in Linguistic Theory and Methods (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Advanced study of current problems in linguistic theory and methodology. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

LIN 205C—Topics in Linguistic Theory and Methods (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Advanced study of current problems in linguistic theory and methodology. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

LIN 205D—Topics in Linguistic Theory and Methods (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Advanced study of current problems in linguistic theory and methodology. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

LIN 211—Advanced Phonological Theory and Analysis (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 111 Critical examination of current phonological theories. Effective: 1997 Winter Quarter.

LIN 212—Advanced Phonetics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 112 Advanced investigation of the physiological basis of speech articulation and acoustic phonetics. Effective: 1997 Winter Quarter.

LIN 231—Advanced Syntactic Theory and Analysis (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 131 Critical survey of contemporary theories of syntax. Effective: 1997 Winter Quarter.

LIN 241—Advanced Syntactic Theory and Analysis (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 141; or Consent of Instructor. Advanced critical exploration of contemporary theories of linguistic
semantics. Effective: 1997 Winter Quarter.

LIN 250—Principles of Typological Linguistics (4)
Seminar—3 hours; Term Paper. Cross-linguistic comparison and typology, including word order, morphological typology, complex clauses, semantic categories and their grammaticalization, and applications of typology to language acquisition. Effective: 2011 Fall Quarter.

LIN 251—Principles of Historical Linguistics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 151 Advanced analysis of the theory and methods of historical linguistics. Effective: 1997 Winter Quarter.

LIN 252—Romance Linguistics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 151 Examination of the development of the Romance languages from Proto-Romance to the modern era. Application and critical examination of

methods of historical and comparative linguistics in particular areas of structural change in Romance. Effective: 1997 Winter Quarter.

LIN 253—Speech Perception (4)
Discussion—3 hours; Extensive Writing. Investigation into how listeners map a continuous and variable acoustic signal to a linguistic interpretation. Phonetic context, variation, linguistic knowledge, and sociolinguistics as factors in perceiving speech. Effective: 2017 Winter Quarter.

LIN 260—Variation in Speech Communities (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): LIN 281; or Consent of Instructor. Linguistic variability in time, space, and society. Theoretical issues related to social and linguistic constraints in variation; issues and methods in the quantitative analysis of variation. Speech community, quantitative analytic methods, and the scope of sociolinguistic competence. Effective: 2005 Spring Quarter.

LIN 263—Discourse Analysis: Text in Context (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing. Introduction to and application of leading theoretical approaches to the analysis of discourse. Approaches to the analysis of (spoken and written) text in context, tools for analyzing different types of texts (narration, conversation, etc.). Theme/rheme, given/new, anaphora, discourse markers, and Effective: 2005 Spring Quarter.

LIN 264—Current Issues in Language and Gender (4)
Project (Term Project); Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing; prior coursework in Linguistics, Gender Studies, or Cultural Studies is desirable; no expectation of bilingual proficiency. Exploration of the construction and performance of gender through language in cross-cultural perspective and in a variety of contexts: informal conversations, narratives, workplaces, schools, households, the mass media. Special topics may include: language acquisition; multilingualism; ecofeminism; queer theory. May be repeated up to 1 time(s) when topic differs. Effective: 2005 Fall Quarter.

LIN 265—Language, Performance, and Power (4)
Seminar—3 hours; Term Paper. Restricted to graduate standing or consent of instructor. Exploration of the intersection between linguistic and social theories in the language-state relation and the performance of identity. Ideological sources of language differentiation; nation-building and linguistic difference. Political economic, sociolinguistic, and ethnographic approaches to understanding linguistic inequality. (Anthropology 265.) Effective: 2003 Fall Quarter.

LIN 275—Neurobiology of Language (4)
Lecture/Discussion—3 hours; Term Paper. Survey of historical and modern conceptions of the neurobiology of language. Aphasia, functional neuroimaging, functional neuroanatomy of human language. Effective: 2011 Fall Quarter.

LIN 280—Theories of Second Language Acquisition (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Covers theoretical perspectives that direct or have directed research in second language acquisition; explores the relationship between linguistics and language teaching and deals with the individual variables that influence second language learning. Effective: 1998 Fall Quarter.

LIN 281—Research Methods in TESOL/SLD (4)
Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): LIN 280 Students will study a variety of research methods in second language research; evaluate research designs and methods of analyses, formulate research questions and hypotheses and design a study of their own, think about various kinds of data they can collect. Effective: 2000 Winter Quarter.

LIN 282—Individual and Social Aspects of Bilingualism (4)
Lecture—3 hours; Term Paper. Broad overview of bi-and multilingualism, with focus on theoretical and
descriptive research; topics covered range from language processing in bilinguals to code-switching to language as political issue in multilingual states. Effective: 1997 Winter Quarter.

LIN 283—Politics of Bi and Multilingual Literacies (4)
Lecture/Discussion—3 hours; Term Paper. Anthropological, psycho-social, political, and educational perspectives on bi- and multi-lingualism. Power, colonialism, "native/non-native" speakers, and varieties and the unequal distribution of social goods. Analysis of how competing factors keep peoples disenfranchised. Effective: 2005 Spring Quarter.

LIN 289—Pedagogical Applications of Second Language Acquisition Theory (4)
Seminar—3 hours; Term Paper. Prerequisite(s): LIN 280 Pedagogical implications of various theories of second language acquisition, facilitation of language acquisition in classroom settings, and techniques for conducting classroom-based research in language learning. Effective: 1999 Winter Quarter.

LIN 297T—English as a Second Language Teaching/Tutoring (1-4)
Tutorial—1-4 hours. Prerequisite(s): LIN 300 or LIN 301 or LIN 302 (can be concurrent); and Consent of Instructor. Teaching classes for ESL graduate students. Aiding the ESL undergraduate composition classes; tutoring foreign graduate student Teaching Assistants in pronunciation. Does not fulfill requirement toward the M.A. degree. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

LIN 298—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

LIN 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

LIN 300—Language Pedagogy (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing in Linguistics or consent of instructor; concurrent enrollment in LIN 297T recommended. Methods of teaching second languages to nonnative speakers, stressing particularly recent linguistic methodology and techniques, as related to teaching and tutoring in the UC Davis ESL program. Effective: 2013 Fall Quarter.

LIN 301—Teaching Academic Literacy (4)
Practice; Project (Term Project); Seminar—3 hours; Tutorial—14 hours. Prerequisite(s): LIN 300; or Consent of Instructor. Graduate standing. Methods of teaching advanced academic literacy in a second language, with a focus on ESL composition. Lesson development, teaching and tutoring in the UC Davis ESL program. Effective: 2007 Fall Quarter.

LIN 302—Recent Research and Special Projects in TESOL (4)
Lecture—4 hours. Prerequisite(s): LIN 300; LIN 301 Review of recent research in second language acquisition and the teaching of English to speakers of other languages. Continued teaching and tutoring in the UCD ESL clinic. Each student also designs and reports on a classroom research project. Effective: 1997 Winter Quarter.

LIN 305—Second Language Literacy and Technology (4)
Lecture/Discussion—1.5 hours; Web Electronic Discussion—1.5 hours. Prerequisite(s): LIN 002 or equivalent coursework/experience in second language pedagogy; consent of instructor; graduate students only. Limited enrollment. Exploration of literacy theory and critical pedagogy in relation to new instructional and communication technologies. Practicum experience in teaching second language literacy; reflection on connections between theory and practice. Fieldwork requirement. Effective: 2007 Fall Quarter.

LIN 310—Language Pedagogy for Teacher Educators (4)
Fieldwork; Project (Term Project); Seminar—3 hours; Tutorial. Prerequisite(s): Admission to Ph.D. program in Linguistics or Foreign Languages, or permission of instructor; significant language teaching experience. Current issues in second language pedagogy, with a focus on communicative methodology, participatory curriculum design, academic literacy, and the social contexts of teaching. Emphasis on reflective teaching and action research. Mentoring of new language teachers. May be repeated up to 12 unit(s). Effective: 2007 Fall Quarter.

LIN 391—Oral English for ESL Students (3)
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): Open only to non-native speakers of English with priority enrollment to international student teaching assistants; completion of any required ESL courses or consent of instructor. Course gives non-native English-speaking students, particularly international student teaching assistants, intensive work in oral
English to increase fluency, accuracy, and use of appropriate discourse strategies in academic settings(e.g., seminar, discussion, laboratory).Course may be repeated for credit with consent of coordinator. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

LIN 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Linguistics (Graduate Group)

Linguistics (Graduate Group) | LIN M.A.

(College of Letters and Science)

Robert J. Bayley, Chairperson of the Group

Department Office. 469 Kerr Hall; 530-752-0966; http://linguistics.ucdavis.edu

Faculty. http://linguistics.ucdavis.edu/directory-of-people/lin-faculty#c4=all&b_start=0

Graduate Study. The Graduate Group in Linguistics offers a program of study leading to the M.A. and the Ph.D. degree.

The M.A. program follows PLAN II. 36-38 units of coursework are required, at least 18 of which must be graduate level courses in the major field. A comprehensive final examination in the major subject is required of each candidate. No thesis is required.

Graduate Advisors. Santiago Barreda-Castanon (Linguistics), Julia Menard-Warwick (Linguistics)

Linguistics (Graduate Group) | LIN Ph.D.

(College of Letters and Science)

Robert J. Bayley, Chairperson of the Group

Department Office. 469 Kerr Hall; 530-752-0966; http://linguistics.ucdavis.edu

Faculty. http://linguistics.ucdavis.edu/directory-of-people/lin-faculty#c4=all&b_start=0

Graduate Study. The Graduate Group in Linguistics offers a program of study leading to the M.A. and the Ph.D. degree.

The Ph.D. degree offers advanced training and research in linguistic theories and methods. Second language acquisition and development is a particular emphasis of the program. Detailed information on both the M.A. and the Ph.D. degrees can be obtained from the graduate advisors, from the chair of the Graduate Group or the departmental chairs.

Graduate Advisors. Santiago Barreda-Castanon (Linguistics), Julia Menard-Warwick (Linguistics)

Linguistics (Graduate Group) | LIN Courses

Courses in LIN:

LIN 001—Introduction to Linguistics (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the study of language; its nature, diversity, and structure. GE credit: AH, SS. Effective: 1997 Winter Quarter.

LIN 001Y—Introduction to Linguistics (4)
Discussion—1 hour; Web Virtual Lecture—3 hours. Introduction to the study of language; its nature, diversity, and structure. Students may not take both LIN 001 and LIN 001Y for credit. GE credit: AH, SS. Effective: 2014 Spring Quarter.

LIN 003—Language and the Body (4)
Discussion—2 hours; Lecture—2 hours. Open to all students regardless of major. Enrollment will be restricted to 80-100 students. Perspectives on the role of language in issues about bodies. Language-related disabilities. Social implications of language use in discussing body-related conditions. GE credit: OL, SS. Effective: 2018 Winter Quarter.

LIN 005—Global English and Communication (4)
Discussion—2 hours; Lecture—2 hours. English as a global language and its uses in intercultural communication. Cultural, historical, and political dimensions of varieties of English spoken around the world. Experiential grounding in strategies for increasing interpretive and verbal communicative competence for a globalized world. (Communication 5.) GE credit: AH, OL, SS, WC. Effective: 2012 Spring Quarter.

LIN 006—Language and Society (4)
Discussion—1 hour; Lecture—3 hours. Language as a social phenomenon. Topics include linguistic diversity, language policy, language and identity, language and social structure, speech communities and social networks, the effect of social factors on language variation, linguistic consequences of language contact. GE credit: ACGH, DD, SS, WE. Effective: 2008 Fall Quarter.

LIN 015—Academic Oral Communication (3)
Discussion—2 hours; Lecture—1 hour. Structure of oral communication, critical thinking, and persuasion in classroom discourse in American English and in cross-cultural perspective. GE credit: AH, OL, SS. Effective: 2014 Fall Quarter.

LIN 020—Oral English for International Students (3) ***Review all entries***
Lecture/Discussion—3 hours. Open to non-native speakers of English with priority enrollment to international teaching assistants with qualifying placement exam scores. Intensive work in oral English for international students, to increase fluency, accuracy, and use of appropriate discourse strategies in academic settings (e.g., seminar, discussion, laboratory). Training in segmental features of English sounds, intonation, stress, non-verbal cues, and register. May be repeated for credit. (P/NP grading only.) Effective: 2011 Fall Quarter.

LIN 020—Oral English for International Students (3) ***Review all entries Discontinued***
Lecture/Discussion—3 hours. Open to non-native speakers of English with priority enrollment to international teaching assistants with qualifying placement exam scores. Intensive work in oral English for international students, to increase fluency, accuracy, and use of appropriate discourse strategies in academic settings (e.g., seminar, discussion, laboratory). Training in segmental features of English sounds, intonation, stress, non-verbal cues, and register. May be repeated for credit. (P/NP grading only.) Effective: 2018 Fall Quarter.

LIN 024—English Structures and Strategies in Academic Writing (4)
Lecture/Discussion—4 hours. Prerequisite(s): LIN 023 Open to students from language backgrounds other than English. Practice in academic writing designed to prepare undergraduate students from language backgrounds other than English for successful academic work. Development of academic writing, critical thinking, and reading skills. Deveopment of clear, accurate language for presenting an effective argument. Effective: 2006 Fall Quarter.

LIN 025—English for International/ESL Graduate Students (4)
Lecture/Discussion—4 hours. Prerequisite(s): Admission by placement examination or consent of coordinator; open to international and ESL graduate students and limited status international undergraduates (Education Abroad Program participants). Multi-skills ESL course designed to help international/ESL students improve their English language skills for successful academic study. Emphasis on writing, speaking, listening, reading, and academic culture. (P/NP grading only.) Effective: 2003 Fall Quarter.

LIN 026—Writing for International Graduate Students (3)
Lecture—3 hours. Prerequisite(s): Satisfactory completion of LIN 025 if held for it, or consent of instructor. Admission limited to international graduate students. Focuses on writing needed for academic work, including summaries, critiques, research and grant proposals, memos, resumes, and research papers. Includes a review of grammar needed for writing and some focus on reading skills and American vocabulary and idioms. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 096—Directed Group Study in English as a Second Language (1-5)
Variable—1.5 hours. Prerequisite(s): Consent of Instructor. Directed group study of topic in English as a Second Language (ESL). May be repeated for credit May be repeated for credit by consent of the ESL coordinator. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Intended for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Intended for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 103A—Linguistic Analysis I: Phonetics, Phonology, Morphology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 001 recommended. Introduction to fundamental methods and concepts used in linguistic analysis, focusing on phonetic, phonological, and morphological phenomena. Emphasizes development of analytical skills and appreciation of structural regularities and differences among languages. Not open for credit to students who have completed LIN 139. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 103B—Linguistic Analysis II: Morphology, Syntax, Semantics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 001 recommended. Introduction to fundamental methods and concepts used in linguistic analysis, focusing on morphological, syntactic, and semantic phenomena. Emphasizes development of analytical skills and appreciation of structural regularities and differences among languages. Not open for credit to students who have completed LIN 140. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 105—Topics in Language and Linguistics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. LIN 001 recommended. Detailed examination of a major contemporary linguistic theory, a major contemporary issue or related set of issues in linguistics, or the structure of a particular language or language family. May be repeated for credit when topic differs. May be repeated for credit. Effective: 2017 Winter Quarter.

LIN 106—English Grammar (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 001 or LIN 001Y or ENG 003 or UWP 001; or Consent of Instructor. Survey of present-day English grammar as informed by contemporary linguistic theories. The major syntactic structures of English; their variation across dialects, styles, and registers; their development; and their usefulness in describing the conventions of English. (English 106 and University Writing Program 106.) GE credit: AH. Effective: 2018 Winter Quarter.

LIN 111—Introduction to Phonological Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 103A recommended. Contemporary phonological theory with emphasis on syllable structure, metrical structure, phonology-morphology interaction, and typological variation in these areas, from the perspective of optimality-theoretic approaches. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 112—Phonetics (4)
Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): LIN 001 recommended. Detailed examination of articulatory and acoustic phonetics. GE credit: SE. Effective: 2017 Winter Quarter.

LIN 121—Morphology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 103A, 103B recommended. Introduction to the analysis of word structure and the relation of word structure to the lexicon and other grammatical components. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 127—Text Processing and Corpus Linguistics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): LIN 001, LIN 005, LIN 006, or ANT 004 recommended. Investigation of the lexical organization of human languages through corpus linguistics. Application of principles of linguistic analysis, automatic text processing, and statistical research to solving problems of textual evaluation and classification, as well as information retrieval and extraction. GE credit: AH, QL, SS. Effective: 2017 Winter Quarter.

LIN 131—Introduction to Syntactic Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 103B recommended. Introduction to syntactic theory, primarily through the examination of a major theory of syntax, emphasizing theoretical reasoning, argumentation, and problems of theory building in syntax. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 141—Semantics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 103B recommended. Linguistic study of meanings of words and phrases. Meanings expressed by lexical items and derivational and inflectional morphology. Contribution of argument structure, quantification, and coordination to meaning. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 150—Languages of the World (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 001 or ANT 004 recommended. Survey of the world's languages, their geographical distribution and classification, both genetic and typological. Illustrative descriptions of several major languages from different geographical areas; pidgins and creoles, lingua francas and other languages of widespread use. Not open for credit to students who have completed LIN 050. GE credit: AH, SS, WC. Effective: 2017 Winter Quarter.

LIN 151—Historical Linguistics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 103A recommended. Description and methods of the historical study of language, including the comparative method and internal reconstruction; sound change, morphological change, syntactic change, semantic change. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 152—Language Universals and Typology (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 103B recommended. Investigation into common features of all human languages and the classification of languages in terms of their structural features. Theories of universal grammar. Detailed discussion of non-Indo-European languages and comparison with English. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 160—American Voices (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 001 or LIN 001Y or ANT 004; Or upper division standing recommended. Explores the forms of American English: traditional notions of regional dialects and increasingly important social dialects, reflecting age, class, gender, race, ethnicity, and sexual orientation. The influence of language attitudes on perception of dialect speakers; dialect in media, education, and GE credit: SS, WE. Effective: 2018 Winter Quarter.

LIN 163—Language, Gender, and Society (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 001 or ANT 004 recommended. Investigation of real and putative (stereotyped) gender-linked differences in language structure and usage, with a consideration of some social and psychological consequences of such differences. Focus is on English, but other languages are also discussed. GE credit: ACGH, DD, SS, WE. Effective: 2017 Winter Quarter.

LIN 165—Introduction to Applied Linguistics (4)
Discussion—1 hour; Lecture—3 hours. Applications of linguistic principles and the analysis of language-related issues in the world. Exploration of a range of language-related problems including issues related to language learning and teaching to issues concerning language and gender, race, class and the media. GE credit: SS, WE. Effective: 2002 Winter Quarter.

LIN 166—The Spanish Language in the United States (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 001 or LIN 001Y or SPA 111N; SPA 023; Or equivalent to SPA 023 recommended. Linguistic features of the varieties of the Spanish language spoken throughout the United States; phonology, morphology, syntax, vocabulary. Focus on the relationship between United States Spanish and other world varieties of Spanish, within a historical framework. GE credit: SS. Effective: 2018 Spring Quarter.

LIN 171—Introduction to Psycholinguistics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (LIN 001 or LIN 001Y); LIN 103A, LIN 103B recommended. Introduction to psychological issues relating to the implementation of language and linguistic structure during speech production and comprehension and to the implications of research in psychology and related fields for linguistic theory. GE credit: SS. Effective: 2018 Spring Quarter.

LIN 173—Language Development (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (LIN 001 or LIN 001Y); or Consent of Instructor. LIN 103A, 103B recommended. Theory and research on children's acquisition of their native language, including the sound system, grammatical systems, and basic semantic categories. (Education 173.) GE credit: SS. Effective: 2018 Spring Quarter.

LIN 175—Biological Basis of Language (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. LIN 001 recommended. Overview of issues in the field of neurolinguistics and techniques used to explore representation of language in the human brain. GE credit: SE. Effective: 2017 Winter Quarter.

LIN 177—Computational Linguistics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. LIN 001 recommended. Understanding the nature of language through computer modeling of linguistic abilities. Relationships between human cognition and computer representations of cognitive processing. Not open for credit to students who have taken LIN 007. GE credit: SE. Effective: 2017 Winter Quarter.

LIN 180—Second Language Learning and Teaching (4)
Lecture/Discussion—4 hours. Prerequisite(s): LIN 001 or LIN 001Y; Or equivalent recommended. Psycholinguistic and sociolinguistic theories of second language learning. Connections between theoretical perspectives and pedagogical practices in formal and informal second language settings, with focus on tutoring. Impact of sociocontextual factors (e.g., gender, ethnicity). Fieldwork requirement. GE credit: SS, WE. Effective: 2018 Winter Quarter.

LIN 182—Multilingualism (4)
Lecture/Discussion—4 hours. Limited enrollment. Issues in multilingualism from a global perspective: e.g., multilingual communities; multilingualism and identity (gender, ethnicity, nationality); language ideologies and educational and sociopolitical policies surrounding multilingualism; acquisition of multilingualism; discursive practices of multilinguals. GE credit: SS, WC, WE. Effective: 2006 Spring Quarter.

LIN 192—Internship in Linguistics (1-12)
Internship—3-36 hours. Prerequisite(s): LIN 001 or LIN 001Y; Or equivalent course; consent of instructor. Internship applying linguistic-related skills to a fieldwork project in areas such as media, law, or industry, in approved organizations or institutions. Maximum of four units applicable toward major. (P/NP grading only.) Effective: 2018 Winter Quarter.

LIN 194H—Special Study for Honors Students (1-5)
Independent Study—1-5 hours. Prerequisite(s): Consent of Instructor. Open only to linguistics majors of senior standing who qualify for Honors Program. Guided research, under the direction of a faculty member approved by the
Program Director, leading to a senior honors thesis. May be repeated for credit for up to 6 units. May be repeated up to 6 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 197T—Tutoring in Linguistics (1-4)
Discussion—1-4 hours. Prerequisite(s): Consent of Instructor. Upper division standing and consent of department chairperson. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 200A—Foundations of Linguistics I (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing. Survey of fundamental issues raised by pre-generative linguistics in the twentieth century, with emphasis on issues crucial to applications of linguistics. Not open for credit to students who have completed LIN 203A. Effective: 2005 Spring Quarter.

LIN 200B—Foundations of Linguistics II (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing. Survey of fundamental issues raised by orthodox generative linguistics, with emphasis on issues crucial to applications of linguistics. Not open for credit to students who have completed LIN 203B. Effective: 2005 Spring Quarter.

LIN 200C—Foundations of Linguistics III (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing. Survey of fundamental issues raised by contemporary linguistic theories lying outside the generative grammar orthodoxy, with emphasis on issues crucial to applications of linguistics. Effective: 2005 Spring Quarter.

LIN 201—Proseminar (1)
Seminar—1 hour. Introduction to research activity of faculty in the Graduate Group in Linguistics and guest speakers. May be repeated up to 4 unit(s). (S/U grading only.) Effective: 2011 Fall Quarter.

LIN 205A—Topics in Linguistic Theory and Methods (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Advanced study of current problems in linguistic theory and methodology. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

LIN 205B—Topics in Linguistic Theory and Methods (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Advanced study of current problems in linguistic theory and methodology. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

LIN 205C—Topics in Linguistic Theory and Methods (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Advanced study of current problems in linguistic theory and methodology. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

LIN 205D—Topics in Linguistic Theory and Methods (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Advanced study of current problems in linguistic theory and methodology. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

LIN 211—Advanced Phonological Theory and Analysis (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 111 Critical examination of current phonological theories. Effective: 1997 Winter Quarter.

LIN 212—Advanced Phonetics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 112 Advanced investigation of the physiological basis of speech articulation and acoustic phonetics. Effective: 1997 Winter Quarter.

LIN 231—Advanced Syntactic Theory and Analysis (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 131 Critical survey of contemporary theories of syntax. Effective: 1997 Winter Quarter.

LIN 241—Advanced Syntactic Theory and Analysis (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 141; or Consent of Instructor. Advanced critical exploration of contemporary theories of linguistic
semantics. Effective: 1997 Winter Quarter.

LIN 250—Principles of Typological Linguistics (4)
Seminar—3 hours; Term Paper. Cross-linguistic comparison and typology, including word order, morphological typology, complex clauses, semantic categories and their grammaticalization, and applications of typology to language acquisition. Effective: 2011 Fall Quarter.

LIN 251—Principles of Historical Linguistics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 151 Advanced analysis of the theory and methods of historical linguistics. Effective: 1997 Winter Quarter.

LIN 252—Romance Linguistics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 151 Examination of the development of the Romance languages from Proto-Romance to the modern era. Application and critical examination of

methods of historical and comparative linguistics in particular areas of structural change in Romance. Effective: 1997 Winter Quarter.

LIN 253—Speech Perception (4)
Discussion—3 hours; Extensive Writing. Investigation into how listeners map a continuous and variable acoustic signal to a linguistic interpretation. Phonetic context, variation, linguistic knowledge, and sociolinguistics as factors in perceiving speech. Effective: 2017 Winter Quarter.

LIN 260—Variation in Speech Communities (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): LIN 281; or Consent of Instructor. Linguistic variability in time, space, and society. Theoretical issues related to social and linguistic constraints in variation; issues and methods in the quantitative analysis of variation. Speech community, quantitative analytic methods, and the scope of sociolinguistic competence. Effective: 2005 Spring Quarter.

LIN 263—Discourse Analysis: Text in Context (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing. Introduction to and application of leading theoretical approaches to the analysis of discourse. Approaches to the analysis of (spoken and written) text in context, tools for analyzing different types of texts (narration, conversation, etc.). Theme/rheme, given/new, anaphora, discourse markers, and Effective: 2005 Spring Quarter.

LIN 264—Current Issues in Language and Gender (4)
Project (Term Project); Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing; prior coursework in Linguistics, Gender Studies, or Cultural Studies is desirable; no expectation of bilingual proficiency. Exploration of the construction and performance of gender through language in cross-cultural perspective and in a variety of contexts: informal conversations, narratives, workplaces, schools, households, the mass media. Special topics may include: language acquisition; multilingualism; ecofeminism; queer theory. May be repeated up to 1 time(s) when topic differs. Effective: 2005 Fall Quarter.

LIN 265—Language, Performance, and Power (4)
Seminar—3 hours; Term Paper. Restricted to graduate standing or consent of instructor. Exploration of the intersection between linguistic and social theories in the language-state relation and the performance of identity. Ideological sources of language differentiation; nation-building and linguistic difference. Political economic, sociolinguistic, and ethnographic approaches to understanding linguistic inequality. (Anthropology 265.) Effective: 2003 Fall Quarter.

LIN 275—Neurobiology of Language (4)
Lecture/Discussion—3 hours; Term Paper. Survey of historical and modern conceptions of the neurobiology of language. Aphasia, functional neuroimaging, functional neuroanatomy of human language. Effective: 2011 Fall Quarter.

LIN 280—Theories of Second Language Acquisition (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Covers theoretical perspectives that direct or have directed research in second language acquisition; explores the relationship between linguistics and language teaching and deals with the individual variables that influence second language learning. Effective: 1998 Fall Quarter.

LIN 281—Research Methods in TESOL/SLD (4)
Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): LIN 280 Students will study a variety of research methods in second language research; evaluate research designs and methods of analyses, formulate research questions and hypotheses and design a study of their own, think about various kinds of data they can collect. Effective: 2000 Winter Quarter.

LIN 282—Individual and Social Aspects of Bilingualism (4)
Lecture—3 hours; Term Paper. Broad overview of bi-and multilingualism, with focus on theoretical and
descriptive research; topics covered range from language processing in bilinguals to code-switching to language as political issue in multilingual states. Effective: 1997 Winter Quarter.

LIN 283—Politics of Bi and Multilingual Literacies (4)
Lecture/Discussion—3 hours; Term Paper. Anthropological, psycho-social, political, and educational perspectives on bi- and multi-lingualism. Power, colonialism, "native/non-native" speakers, and varieties and the unequal distribution of social goods. Analysis of how competing factors keep peoples disenfranchised. Effective: 2005 Spring Quarter.

LIN 289—Pedagogical Applications of Second Language Acquisition Theory (4)
Seminar—3 hours; Term Paper. Prerequisite(s): LIN 280 Pedagogical implications of various theories of second language acquisition, facilitation of language acquisition in classroom settings, and techniques for conducting classroom-based research in language learning. Effective: 1999 Winter Quarter.

LIN 297T—English as a Second Language Teaching/Tutoring (1-4)
Tutorial—1-4 hours. Prerequisite(s): LIN 300 or LIN 301 or LIN 302 (can be concurrent); and Consent of Instructor. Teaching classes for ESL graduate students. Aiding the ESL undergraduate composition classes; tutoring foreign graduate student Teaching Assistants in pronunciation. Does not fulfill requirement toward the M.A. degree. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

LIN 298—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

LIN 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

LIN 300—Language Pedagogy (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing in Linguistics or consent of instructor; concurrent enrollment in LIN 297T recommended. Methods of teaching second languages to nonnative speakers, stressing particularly recent linguistic methodology and techniques, as related to teaching and tutoring in the UC Davis ESL program. Effective: 2013 Fall Quarter.

LIN 301—Teaching Academic Literacy (4)
Practice; Project (Term Project); Seminar—3 hours; Tutorial—14 hours. Prerequisite(s): LIN 300; or Consent of Instructor. Graduate standing. Methods of teaching advanced academic literacy in a second language, with a focus on ESL composition. Lesson development, teaching and tutoring in the UC Davis ESL program. Effective: 2007 Fall Quarter.

LIN 302—Recent Research and Special Projects in TESOL (4)
Lecture—4 hours. Prerequisite(s): LIN 300; LIN 301 Review of recent research in second language acquisition and the teaching of English to speakers of other languages. Continued teaching and tutoring in the UCD ESL clinic. Each student also designs and reports on a classroom research project. Effective: 1997 Winter Quarter.

LIN 305—Second Language Literacy and Technology (4)
Lecture/Discussion—1.5 hours; Web Electronic Discussion—1.5 hours. Prerequisite(s): LIN 002 or equivalent coursework/experience in second language pedagogy; consent of instructor; graduate students only. Limited enrollment. Exploration of literacy theory and critical pedagogy in relation to new instructional and communication technologies. Practicum experience in teaching second language literacy; reflection on connections between theory and practice. Fieldwork requirement. Effective: 2007 Fall Quarter.

LIN 310—Language Pedagogy for Teacher Educators (4)
Fieldwork; Project (Term Project); Seminar—3 hours; Tutorial. Prerequisite(s): Admission to Ph.D. program in Linguistics or Foreign Languages, or permission of instructor; significant language teaching experience. Current issues in second language pedagogy, with a focus on communicative methodology, participatory curriculum design, academic literacy, and the social contexts of teaching. Emphasis on reflective teaching and action research. Mentoring of new language teachers. May be repeated up to 12 unit(s). Effective: 2007 Fall Quarter.

LIN 391—Oral English for ESL Students (3)
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): Open only to non-native speakers of English with priority enrollment to international student teaching assistants; completion of any required ESL courses or consent of instructor. Course gives non-native English-speaking students, particularly international student teaching assistants, intensive work in oral
English to increase fluency, accuracy, and use of appropriate discourse strategies in academic settings(e.g., seminar, discussion, laboratory).Course may be repeated for credit with consent of coordinator. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

LIN 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Linguistics for Language Teachers Minor; Linguistics

Linguistics for Language Teachers Minor; Linguistics | LIN for Language Teachers Minor

(College of Letters and Science)

Raul Aranovich, Ph.D., Chairperson of the Department

Department Office. 469 Kerr Hall; 530-752-0966; http://linguistics.ucdavis.edu

Faculty. http://linguistics.ucdavis.edu/directory-of-people/lin-faculty

Linguistics offers two minor programs:

- General Linguistics, which provides the student with basic knowledge of language structure and linguistic analysis.
- *Linguistics for Language Teachers*, which especially complements the major in English with the Teaching Area of emphasis; it is also of relevance to students interested in teaching foreign languages.

Minor Advisor. G. Zellou

Linguistics for Language Teachers **Units:** 24

LIN 001	Introduction to Linguistics	4
LIN 106	English Grammar	4
LIN 165	Introduction to Applied Linguistics	4
ENL 105	History of the English Language	4
LIN 160	American Voices	4
OR		
LIN 163	Language, Gender, and Society	4
LIN 173	Language Development	4
OR		
EDU 151	Language Development in the Chicano Child	3

Total: 24

Linguistics for Language Teachers Minor; Linguistics | LIN Courses

Courses in LIN:

LIN 001—Introduction to Linguistics (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the study of language; its nature, diversity, and structure. GE credit: AH, SS. Effective: 1997 Winter Quarter.

LIN 001Y—Introduction to Linguistics (4)
Discussion—1 hour; Web Virtual Lecture—3 hours. Introduction to the study of language; its nature, diversity, and structure. Students may not take both LIN 001 and LIN 001Y for credit. GE credit: AH, SS. Effective: 2014 Spring Quarter.

LIN 003—Language and the Body (4)
Discussion—2 hours; Lecture—2 hours. Open to all students regardless of major. Enrollment will be restricted to 80-100 students. Perspectives on the role of language in issues about bodies. Language-related disabilities. Social implications of language use in discussing body-related conditions. GE credit: OL, SS. Effective: 2018 Winter Quarter.

LIN 005—Global English and Communication (4)
Discussion—2 hours; Lecture—2 hours. English as a global language and its uses in intercultural communication. Cultural, historical, and political dimensions of varieties of English spoken around the world. Experiential grounding in strategies for increasing interpretive and verbal communicative competence for a globalized world. (Communication 5.) GE credit: AH, OL, SS, WC. Effective: 2012 Spring Quarter.

LIN 006—Language and Society (4)
Discussion—1 hour; Lecture—3 hours. Language as a social phenomenon. Topics include linguistic diversity, language policy, language and identity, language and social structure, speech communities and social networks, the effect of social factors on language variation, linguistic consequences of language contact. GE credit: ACGH, DD, SS, WE. Effective: 2008 Fall Quarter.

LIN 015—Academic Oral Communication (3)
Discussion—2 hours; Lecture—1 hour. Structure of oral communication, critical thinking, and persuasion in classroom discourse in American English and in cross-cultural perspective. GE credit: AH, OL, SS. Effective: 2014 Fall Quarter.

LIN 020—Oral English for International Students (3) ***Review all entries***
Lecture/Discussion—3 hours. Open to non-native speakers of English with priority enrollment to international teaching assistants with qualifying placement exam scores. Intensive work in oral English for international students, to increase fluency, accuracy, and use of appropriate discourse strategies in academic settings (e.g., seminar, discussion, laboratory). Training in segmental features of English sounds, intonation, stress, non-verbal cues, and register. May be repeated for credit. (P/NP grading only.) Effective: 2011 Fall Quarter.

LIN 020—Oral English for International Students (3) ***Review all entries Discontinued***
Lecture/Discussion—3 hours. Open to non-native speakers of English with priority enrollment to international teaching assistants with qualifying placement exam scores. Intensive work in oral English for international students, to increase fluency, accuracy, and use of appropriate discourse strategies in academic settings (e.g., seminar, discussion, laboratory). Training in segmental features of English sounds, intonation, stress, non-verbal cues, and register. May be repeated for credit. (P/NP grading only.) Effective: 2018 Fall Quarter.

LIN 024—English Structures and Strategies in Academic Writing (4)
Lecture/Discussion—4 hours. Prerequisite(s): LIN 023 Open to students from language backgrounds other than English. Practice in academic writing designed to prepare undergraduate students from language backgrounds other than English for successful academic work. Development of academic writing, critical thinking, and reading skills. Deveopment of clear, accurate language for presenting an effective argument. Effective: 2006 Fall Quarter.

LIN 025—English for International/ESL Graduate Students (4)
Lecture/Discussion—4 hours. Prerequisite(s): Admission by placement examination or consent of coordinator; open to international and ESL graduate students and limited status international undergraduates (Education Abroad Program participants). Multi-skills ESL course designed to help international/ESL students improve their English language skills for successful academic study. Emphasis on writing, speaking, listening, reading, and academic culture. (P/NP grading only.) Effective: 2003 Fall Quarter.

LIN 026—Writing for International Graduate Students (3)
Lecture—3 hours. Prerequisite(s): Satisfactory completion of LIN 025 if held for it, or consent of instructor. Admission limited to international graduate students. Focuses on writing needed for academic work, including summaries, critiques, research and grant proposals, memos, resumes, and research papers. Includes a review of grammar needed for writing and some focus on reading skills and American vocabulary and idioms. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 096—Directed Group Study in English as a Second Language (1-5)
Variable—1.5 hours. Prerequisite(s): Consent of Instructor. Directed group study of topic in English as a Second Language (ESL). May be repeated for credit May be repeated for credit by consent of the ESL coordinator. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Intended for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Intended for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 103A—Linguistic Analysis I: Phonetics, Phonology, Morphology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 001 recommended. Introduction to fundamental methods and concepts used in linguistic analysis, focusing on phonetic, phonological, and morphological phenomena. Emphasizes development of analytical skills and appreciation of structural regularities and differences among languages. Not open for credit to students who have completed LIN 139. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 103B—Linguistic Analysis II: Morphology, Syntax, Semantics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 001 recommended. Introduction to fundamental methods and concepts used in linguistic analysis, focusing on morphological, syntactic, and semantic phenomena. Emphasizes development of analytical skills and appreciation of structural regularities and differences among languages. Not open for credit to students who have completed LIN 140. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 105—Topics in Language and Linguistics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. LIN 001 recommended. Detailed examination of a major contemporary linguistic theory, a major contemporary issue or related set of issues in linguistics, or the structure of a particular language or language family. May be repeated for credit when topic differs. May be repeated for credit. Effective: 2017 Winter Quarter.

LIN 106—English Grammar (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 001 or LIN 001Y or ENG 003 or UWP 001; or Consent of Instructor. Survey of present-day English grammar as informed by contemporary linguistic theories. The major syntactic structures of English; their variation across dialects, styles, and registers; their development; and their usefulness in describing the conventions of English. (English 106 and University Writing Program 106.) GE credit: AH. Effective: 2018 Winter Quarter.

LIN 111—Introduction to Phonological Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 103A recommended. Contemporary phonological theory with emphasis on syllable structure, metrical structure, phonology-morphology interaction, and typological variation in these areas, from the perspective of optimality-theoretic approaches. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 112—Phonetics (4)
Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): LIN 001 recommended. Detailed examination of articulatory and acoustic phonetics. GE credit: SE. Effective: 2017 Winter Quarter.

LIN 121—Morphology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 103A, 103B recommended. Introduction to the analysis of word structure and the relation of word structure to the lexicon and other grammatical components. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 127—Text Processing and Corpus Linguistics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): LIN 001, LIN 005, LIN 006, or ANT 004 recommended. Investigation of the lexical organization of human languages through corpus linguistics. Application of principles of linguistic analysis, automatic text processing, and statistical research to solving problems of textual evaluation and classification, as well as information retrieval and extraction. GE credit: AH, QL, SS. Effective: 2017 Winter Quarter.

LIN 131—Introduction to Syntactic Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 103B recommended. Introduction to syntactic theory, primarily through the examination of a major theory of syntax, emphasizing theoretical reasoning, argumentation, and problems of theory building in syntax. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 141—Semantics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 103B recommended. Linguistic study of meanings of words and phrases. Meanings expressed by lexical items and derivational and inflectional morphology. Contribution of argument structure, quantification, and coordination to meaning. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 150—Languages of the World (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 001 or ANT 004 recommended. Survey of the world's languages, their geographical distribution and classification, both genetic and typological. Illustrative descriptions of several major languages from different geographical areas; pidgins and creoles, lingua francas and other languages of widespread use. Not open for credit to students who have completed LIN 050. GE credit: AH, SS, WC. Effective: 2017 Winter Quarter.

LIN 151—Historical Linguistics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 103A recommended. Description and methods of the historical study of language, including the comparative method and internal reconstruction; sound change, morphological change, syntactic change, semantic change. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 152—Language Universals and Typology (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 103B recommended. Investigation into common features of all human languages and the classification of languages in terms of their structural features. Theories of universal grammar. Detailed discussion of non-Indo-European languages and comparison with English. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 160—American Voices (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 001 or LIN 001Y or ANT 004; Or upper division standing recommended. Explores the forms of American English: traditional notions of regional dialects and increasingly important social dialects, reflecting age, class, gender, race, ethnicity, and sexual orientation. The influence of language attitudes on perception of dialect speakers; dialect in media, education, and GE credit: SS, WE. Effective: 2018 Winter Quarter.

LIN 163—Language, Gender, and Society (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 001 or ANT 004 recommended. Investigation of real and putative (stereotyped) gender-linked differences in language structure and usage, with a consideration of some social and psychological consequences of such differences. Focus is on English, but other languages are also discussed. GE credit: ACGH, DD, SS, WE. Effective: 2017 Winter Quarter.

LIN 165—Introduction to Applied Linguistics (4)
Discussion—1 hour; Lecture—3 hours. Applications of linguistic principles and the analysis of language-related issues in the world. Exploration of a range of language-related problems including issues related to language learning and teaching to issues concerning language and gender, race, class and the media. GE credit: SS, WE. Effective: 2002 Winter Quarter.

LIN 166—The Spanish Language in the United States (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 001 or LIN 001Y or SPA 111N; SPA 023; Or equivalent to SPA 023 recommended. Linguistic features of the varieties of the Spanish language spoken throughout the United States; phonology, morphology, syntax, vocabulary. Focus on the relationship between United States Spanish and other world varieties of Spanish, within a historical framework. GE credit: SS. Effective: 2018 Spring Quarter.

LIN 171—Introduction to Psycholinguistics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (LIN 001 or LIN 001Y); LIN 103A, LIN 103B recommended. Introduction to psychological issues relating to the implementation of language and linguistic structure during speech production and comprehension and to the implications of research in psychology and related fields for linguistic theory. GE credit: SS. Effective: 2018 Spring Quarter.

LIN 173—Language Development (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (LIN 001 or LIN 001Y); or Consent of Instructor. LIN 103A, 103B recommended. Theory and research on children's acquisition of their native language, including the sound system, grammatical systems, and basic semantic categories. (Education 173.) GE credit: SS. Effective: 2018 Spring Quarter.

LIN 175—Biological Basis of Language (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. LIN 001 recommended. Overview of issues in the field of neurolinguistics and techniques used to explore representation of language in the human brain. GE credit: SE. Effective: 2017 Winter Quarter.

LIN 177—Computational Linguistics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. LIN 001 recommended. Understanding the nature of language through computer modeling of linguistic abilities. Relationships between human cognition and computer representations of cognitive processing. Not open for credit to students who have taken LIN 007. GE credit: SE. Effective: 2017 Winter Quarter.

LIN 180—Second Language Learning and Teaching (4)
Lecture/Discussion—4 hours. Prerequisite(s): LIN 001 or LIN 001Y; Or equivalent recommended. Psycholinguistic and sociolinguistic theories of second language learning. Connections between theoretical perspectives and pedagogical practices in formal and informal second language settings, with focus on tutoring. Impact of sociocontextual factors (e.g., gender, ethnicity). Fieldwork requirement. GE credit: SS, WE. Effective: 2018 Winter Quarter.

LIN 182—Multilingualism (4)
Lecture/Discussion—4 hours. Limited enrollment. Issues in multilingualism from a global perspective: e.g., multilingual communities; multilingualism and identity (gender, ethnicity, nationality); language ideologies and educational and sociopolitical policies surrounding multilingualism; acquisition of multilingualism; discursive practices of multilinguals. GE credit: SS, WC, WE. Effective: 2006 Spring Quarter.

LIN 192—Internship in Linguistics (1-12)
Internship—3-36 hours. Prerequisite(s): LIN 001 or LIN 001Y; Or equivalent course; consent of instructor. Internship applying linguistic-related skills to a fieldwork project in areas such as media, law, or industry, in approved organizations or institutions. Maximum of four units applicable toward major. (P/NP grading only.) Effective: 2018 Winter Quarter.

LIN 194H—Special Study for Honors Students (1-5)
Independent Study—1-5 hours. Prerequisite(s): Consent of Instructor. Open only to linguistics majors of senior standing who qualify for Honors Program. Guided research, under the direction of a faculty member approved by the
Program Director, leading to a senior honors thesis. May be repeated for credit for up to 6 units. May be repeated up to 6 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 197T—Tutoring in Linguistics (1-4)
Discussion—1-4 hours. Prerequisite(s): Consent of Instructor. Upper division standing and consent of department chairperson. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 200A—Foundations of Linguistics I (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing. Survey of fundamental issues raised by pre-generative linguistics in the twentieth century, with emphasis on issues crucial to applications of linguistics. Not open for credit to students who have completed LIN 203A. Effective: 2005 Spring Quarter.

LIN 200B—Foundations of Linguistics II (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing. Survey of fundamental issues raised by orthodox generative linguistics, with emphasis on issues crucial to applications of linguistics. Not open for credit to students who have completed LIN 203B. Effective: 2005 Spring Quarter.

LIN 200C—Foundations of Linguistics III (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing. Survey of fundamental issues raised by contemporary linguistic theories lying outside the generative grammar orthodoxy, with emphasis on issues crucial to applications of linguistics. Effective: 2005 Spring Quarter.

LIN 201—Proseminar (1)
Seminar—1 hour. Introduction to research activity of faculty in the Graduate Group in Linguistics and guest speakers. May be repeated up to 4 unit(s). (S/U grading only.) Effective: 2011 Fall Quarter.

LIN 205A—Topics in Linguistic Theory and Methods (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Advanced study of current problems in linguistic theory and methodology. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

LIN 205B—Topics in Linguistic Theory and Methods (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Advanced study of current problems in linguistic theory and methodology. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

LIN 205C—Topics in Linguistic Theory and Methods (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Advanced study of current problems in linguistic theory and methodology. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

LIN 205D—Topics in Linguistic Theory and Methods (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Advanced study of current problems in linguistic theory and methodology. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

LIN 211—Advanced Phonological Theory and Analysis (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 111 Critical examination of current phonological theories. Effective: 1997 Winter Quarter.

LIN 212—Advanced Phonetics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 112 Advanced investigation of the physiological basis of speech articulation and acoustic phonetics. Effective: 1997 Winter Quarter.

LIN 231—Advanced Syntactic Theory and Analysis (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 131 Critical survey of contemporary theories of syntax. Effective: 1997 Winter Quarter.

LIN 241—Advanced Syntactic Theory and Analysis (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 141; or Consent of Instructor. Advanced critical exploration of contemporary theories of linguistic
semantics. Effective: 1997 Winter Quarter.

LIN 250—Principles of Typological Linguistics (4)
Seminar—3 hours; Term Paper. Cross-linguistic comparison and typology, including word order, morphological typology, complex clauses, semantic categories and their grammaticalization, and applications of typology to language acquisition. Effective: 2011 Fall Quarter.

LIN 251—Principles of Historical Linguistics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 151 Advanced analysis of the theory and methods of historical linguistics. Effective: 1997 Winter Quarter.

LIN 252—Romance Linguistics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 151 Examination of the development of the Romance languages from Proto-Romance to the modern era. Application and critical examination of

methods of historical and comparative linguistics in particular areas of structural change in Romance. Effective: 1997 Winter Quarter.

LIN 253—Speech Perception (4)
Discussion—3 hours; Extensive Writing. Investigation into how listeners map a continuous and variable acoustic signal to a linguistic interpretation. Phonetic context, variation, linguistic knowledge, and sociolinguistics as factors in perceiving speech. Effective: 2017 Winter Quarter.

LIN 260—Variation in Speech Communities (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): LIN 281; or Consent of Instructor. Linguistic variability in time, space, and society. Theoretical issues related to social and linguistic constraints in variation; issues and methods in the quantitative analysis of variation. Speech community, quantitative analytic methods, and the scope of sociolinguistic competence. Effective: 2005 Spring Quarter.

LIN 263—Discourse Analysis: Text in Context (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing. Introduction to and application of leading theoretical approaches to the analysis of discourse. Approaches to the analysis of (spoken and written) text in context, tools for analyzing different types of texts (narration, conversation, etc.). Theme/rheme, given/new, anaphora, discourse markers, and Effective: 2005 Spring Quarter.

LIN 264—Current Issues in Language and Gender (4)
Project (Term Project); Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing; prior coursework in Linguistics, Gender Studies, or Cultural Studies is desirable; no expectation of bilingual proficiency. Exploration of the construction and performance of gender through language in cross-cultural perspective and in a variety of contexts: informal conversations, narratives, workplaces, schools, households, the mass media. Special topics may include: language acquisition; multilingualism; ecofeminism; queer theory. May be repeated up to 1 time(s) when topic differs. Effective: 2005 Fall Quarter.

LIN 265—Language, Performance, and Power (4)
Seminar—3 hours; Term Paper. Restricted to graduate standing or consent of instructor. Exploration of the intersection between linguistic and social theories in the language-state relation and the performance of identity. Ideological sources of language differentiation; nation-building and linguistic difference. Political economic, sociolinguistic, and ethnographic approaches to understanding linguistic inequality. (Anthropology 265.) Effective: 2003 Fall Quarter.

LIN 275—Neurobiology of Language (4)
Lecture/Discussion—3 hours; Term Paper. Survey of historical and modern conceptions of the neurobiology of language. Aphasia, functional neuroimaging, functional neuroanatomy of human language. Effective: 2011 Fall Quarter.

LIN 280—Theories of Second Language Acquisition (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Covers theoretical perspectives that direct or have directed research in second language acquisition; explores the relationship between linguistics and language teaching and deals with the individual variables that influence second language learning. Effective: 1998 Fall Quarter.

LIN 281—Research Methods in TESOL/SLD (4)
Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): LIN 280 Students will study a variety of research methods in second language research; evaluate research designs and methods of analyses, formulate research questions and hypotheses and design a study of their own, think about various kinds of data they can collect. Effective: 2000 Winter Quarter.

LIN 282—Individual and Social Aspects of Bilingualism (4)
Lecture—3 hours; Term Paper. Broad overview of bi-and multilingualism, with focus on theoretical and
descriptive research; topics covered range from language processing in bilinguals to code-switching to language as political issue in multilingual states. Effective: 1997 Winter Quarter.

LIN 283—Politics of Bi and Multilingual Literacies (4)
Lecture/Discussion—3 hours; Term Paper. Anthropological, psycho-social, political, and educational perspectives on bi- and multi-lingualism. Power, colonialism, "native/non-native" speakers, and varieties and the unequal distribution of social goods. Analysis of how competing factors keep peoples disenfranchised. Effective: 2005 Spring Quarter.

LIN 289—Pedagogical Applications of Second Language Acquisition Theory (4)
Seminar—3 hours; Term Paper. Prerequisite(s): LIN 280 Pedagogical implications of various theories of second language acquisition, facilitation of language acquisition in classroom settings, and techniques for conducting classroom-based research in language learning. Effective: 1999 Winter Quarter.

LIN 297T—English as a Second Language Teaching/Tutoring (1-4)
Tutorial—1-4 hours. Prerequisite(s): LIN 300 or LIN 301 or LIN 302 (can be concurrent); and Consent of Instructor. Teaching classes for ESL graduate students. Aiding the ESL undergraduate composition classes; tutoring foreign graduate student Teaching Assistants in pronunciation. Does not fulfill requirement toward the M.A. degree. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

LIN 298—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

LIN 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

LIN 300—Language Pedagogy (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing in Linguistics or consent of instructor; concurrent enrollment in LIN 297T recommended. Methods of teaching second languages to nonnative speakers, stressing particularly recent linguistic methodology and techniques, as related to teaching and tutoring in the UC Davis ESL program. Effective: 2013 Fall Quarter.

LIN 301—Teaching Academic Literacy (4)
Practice; Project (Term Project); Seminar—3 hours; Tutorial—14 hours. Prerequisite(s): LIN 300; or Consent of Instructor. Graduate standing. Methods of teaching advanced academic literacy in a second language, with a focus on ESL composition. Lesson development, teaching and tutoring in the UC Davis ESL program. Effective: 2007 Fall Quarter.

LIN 302—Recent Research and Special Projects in TESOL (4)
Lecture—4 hours. Prerequisite(s): LIN 300; LIN 301 Review of recent research in second language acquisition and the teaching of English to speakers of other languages. Continued teaching and tutoring in the UCD ESL clinic. Each student also designs and reports on a classroom research project. Effective: 1997 Winter Quarter.

LIN 305—Second Language Literacy and Technology (4)
Lecture/Discussion—1.5 hours; Web Electronic Discussion—1.5 hours. Prerequisite(s): LIN 002 or equivalent coursework/experience in second language pedagogy; consent of instructor; graduate students only. Limited enrollment. Exploration of literacy theory and critical pedagogy in relation to new instructional and communication technologies. Practicum experience in teaching second language literacy; reflection on connections between theory and practice. Fieldwork requirement. Effective: 2007 Fall Quarter.

LIN 310—Language Pedagogy for Teacher Educators (4)
Fieldwork; Project (Term Project); Seminar—3 hours; Tutorial. Prerequisite(s): Admission to Ph.D. program in Linguistics or Foreign Languages, or permission of instructor; significant language teaching experience. Current issues in second language pedagogy, with a focus on communicative methodology, participatory curriculum design, academic literacy, and the social contexts of teaching. Emphasis on reflective teaching and action research. Mentoring of new language teachers. May be repeated up to 12 unit(s). Effective: 2007 Fall Quarter.

LIN 391—Oral English for ESL Students (3)
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): Open only to non-native speakers of English with priority enrollment to international student teaching assistants; completion of any required ESL courses or consent of instructor. Course gives non-native English-speaking students, particularly international student teaching assistants, intensive work in oral
English to increase fluency, accuracy, and use of appropriate discourse strategies in academic settings(e.g., seminar, discussion, laboratory).Course may be repeated for credit with consent of coordinator. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

LIN 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Luso-Brazilian Studies Minor; Spanish

Luso-Brazilian Studies Minor; Spanish | Luso-Brazilian Studies Minor

(College of Letters and Science)

Department Office. https://spanish.ucdavis.edu/en/undergraduate/minor-luso-brazilian-studies

The Department of Spanish and Portuguese sponsors the minor in Luso-Brazilian Studies, which offers students the opportunity to engage with the Portuguese-speaking world as a global space, as well as gain in-depth knowledge of Brazilian literature, culture and society. The minor is structured to facilitate engagement with Latin American, peninsular, and transatlantic topics, while ensuring that students master the essential skills of linguistic competence, and literary and cultural knowledge.

Education Abroad Program Options. We highly recommend that students participate in study abroad; see http://studyabroad.ucdavis.edu. Courses taken abroad may count toward the Luso-Brazilian Studies minor.

Minor Advisor. L. Bernucci, R. Newcomb

Luso-Brazilian Studies **Units:** 23-24

POR 100	Principles of Luso-Brazilian Literature and Criticism	4
POR 161	Luso-Brazilian Literature and Culture	4

Choose one course in each of the following categories:

Spanish

SPA 111N	The Structure of Spanish: Sounds and Words	3
SPA 115	History of the Spanish Language	4
SPA 116	Applied Spanish Linguistics	4

Portuguese

POR 162	Introduction to Brazilian Literature	4
POR 163	20th C Masters in Brazilian Literature	4

Choose one elective course in each of the following categories:

Portuguese

POR 159	Special Topics in Luso-Brazilian Literature and Culture	4
POR 162	Introduction to Brazilian Literature	4
POR 163	20th C Masters in Brazilian Literature	4

History

HIS 159	Women and Gender in Latin American History	4
HIS 163A	History of Brazil	4
HIS 163B	History of Brazil	4

Note: Consult a departmental advisor if any of these courses are to be taken abroad.

Note: Additional courses may count toward the minor with prior approval by a departmental advisor.

Total: 23-24

Management, Graduate School of

Management, Graduate School of | Management, Graduate School of, M.B.A.

H. Rao Unnava, Ph.D., Dean

Victor Stango, Ph.D., Academic Director

Brad M. Barber, Ph.D., Associate Dean

James T. Kelly, M.B.A., Assistant Dean

James Stevens, M.B.A., Senior Assistant Dean

School Office. Gallagher Hall; 530-752-7658; http://gsm.ucdavis.edu/

Faculty. http://gsm.ucdavis.edu/faculty-and-research-0

Program of Study

The hallmark of the UC Davis MBA program is its flexibility. Students are required to take ten core courses, 30 units, and 42 units of elective coursework for the 72 units required for the degree. The required core curriculum is designed to provide students foundation in the functional areas of business-accounting, economics, finance, marketing, organizational behavior, statistics, and strategy. These management disciplines are examined through the use of case studies, lectures and the analysis of a few select companies on which to base illustrations and spark discussions. As early as the first year of study, students are able to integrate elective courses into their personal curriculum.

Elective courses at the Graduate School of Management place an emphasis on real-world application of management principles through the use of executive guest speakers who present "live" case study analyses and actual "client" businesses for student projects. Many courses require

team projects and emphasize managing by innovation and entrepreneurialism. These team projects develop your independent research abilities and hone your presentation skills.

Most students choose functional concentrations such as:

- Business Analytics and Technologies
- Entrepreneurship
- Finance/Accounting
- Marketing
- Management
- Strategy

Management, Graduate School of | MGB Courses

Students must complete the Management core course requirement before enrolling in any of the following elective courses, or petition with consent of the instructor. The core courses include: 200A, 201A, 201B, 202A, 203A, 204, 205, 252, 268, 440, 440A, 440B, 440C. For a list of elective courses, see https://webapps.gsm.ucdavis.edu/Raps/courses/curriculumOverviewByProgram?program=SMBA.

Courses in MGB:

MGB 200A—Financial Accounting (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management. Introduction to the concepts and objectives underlying the preparation of financial statements. Topics include understanding the accounting cycle, measurement and valuation problems associated with financial statement components, consideration of the usefulness of financial statements in the analysis of a corporation's operations. Effective: 2009 Fall Quarter.

MGB 200B—Managerial Accounting (3)
Lecture—3 hours. Prerequisite(s): MGT 200A or MGB 200A or MGP 200A Information managers should know to be effective, including: product costing, motivating people, and differential analysis for decision making. Includes team projects and written and oral presentations. Effective: 2017 Fall Quarter.

MGB 201A—The Individual and Group Dynamics (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management. Examines basic psychological and social psychological processes shaping human behavior and applies knowledge of these processes to the following organizational problems: motivation, job design, commitment, socialization, culture, individual and group decision making, and team building. Effective: 2009 Fall Quarter.

MGB 201B—Organizational Strategy and Structure (3)
Lecture/Discussion—3 hours. Prerequisite(s): Completion of first year courses in Graduate School of Management or the equivalent. Open to MBA students only. Strategic management of organizations, including analysis of industries, firm resources and capabilities and corporate strategy. Strategy formulation, implementation and strategic decision-making. Firm and industry life cycles and change. Analysis of organizational design and structure including differentiation and integration. Effective: 2011 Fall Quarter.

MGB 202A—Markets and the Firm (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management. Examines the interaction of consumers, firms and government, and the effect this interaction has on the use of resources and firm profitability. Fundamental economic concepts such as marginal analysis, opportunity cost, pricing, and externalities are introduced and applied. Effective: 2009 Fall Quarter.

MGB 202B—Business, Government, and the International Economy (3)
Lecture—3 hours. Prerequisite(s): MGB 202A or MGT 202A or MGP 202A Examines the influence of government and international factors on business. Topics include distribution of income, business cycles, inflation and interest rates, the federal debt, monetary policy and international trade and finance. Effective: 2017 Fall Quarter.

MGB 203A—Data Analysis for Managers (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management MBA program or consent of instructor. Introduction to statistics and data analysis for managerial decision making. Descriptive statistics, principles of data collection, sampling, quality control, statistical inference. Application of data analytic methods to problems in marketing, finance, accounting, production, operations, and public policy. Effective: 2009 Fall Quarter.

MGB 203B—Forecasting and Managerial Research Methods (3)
Lecture—3 hours. Prerequisite(s): MGT 203A or MGP 203A or MGB 203A Practical statistical methods for managerial decision making covers regression analysis, time series analysis and forecasting, design and analysis of experiments in managerial research and contingency table analysis. Application of these methods to marketing, finance, accounting, production, operations, and public policy. Effective: 2017 Fall Quarter.

MGB 204—Marketing Management (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management. Analysis of market opportunities, elements of market research, development of marketing strategies, market planning and implementations, and control systems. Consumer and industrial markets, market segmentation, pricing strategies, distribution channels, promotion, and sales. Effective: 2009 Fall Quarter.

MGB 205—Financial Theory and Policy (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management. Corporate financial policy and investment management. Covers capital budgeting, optimal financial structure, cost-of-capital determination, risk measurement. Develops basic valuation principles for investments with long-lived and risky cash-flows, and extends these to derivative securities, asset portfolios, investment management and hedging. Effective: 2010 Spring Quarter.

MGB 206—Decision Making and Management Science (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management MBA program or consent of instructor. Develops decision-making and problem-solving skills in conjunction with a quantitative model-building approach. Emphasizes how structured modeling techniques, probability forecasts, simulations, and computer optimization models are used in the overall process of making decisions in an uncertain environment. Effective: 2009 Fall Quarter.

MGB 207—Management Information Systems (3)
Lecture—3 hours. Prerequisite(s): Graduate Student or consent of instructor. Introduction to computer programming and data handling skills. Use of computer in organizations, emphasis on managerial aspects of computing. Standard and nonstandard uses of data files, centralization versus decentralization of computing, office automation, computer security. Effective: 2009 Fall Quarter.

MGB 215—Business Law (3)
Lecture—3 hours. Prerequisite(s): Completion of administration core requirements or petition with consent of instructor. Introduction to law and legal process in the United States. Sources of law. Structure and operation of courts, federal-state relationships, fundamentals of administrative law, fundamentals of business law. Effective: 2009 Fall Quarter.

MGB 216—Managing Professionals, Budgets, Controls and Ethics (3)
Lecture—3 hours. Prerequisite(s): Graduate standing. Performance measures, budgetary controls and ethical pressures which occur at middle management levels in service-type operations. Addresses such organizations as engineering, medical groups, law offices, management consultants. Effective: 2009 Fall Quarter.

MGB 220—Management of Social Networks (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGB 201A Open to MBA students only. Principles and applications of social network theory: coordinating divergent interests to create value for individuals and organizations. Emphasis on conceptual models, web-based diagnostic tools, and practical applications. Effective: 2009 Fall Quarter.

MGB 223—Power and Influence in Management (3)
Seminar—3 hours. Prerequisite(s): MGT 201A or MGB 201A or MGP 201A; Consent of Instructor. Investigation of the bases of power in organizations and the tactics used to translate power into influence. Topics include the control of resources (including information), social psychological processes (including commitment), the construction of meaning, and ethics. Effective: 2017 Fall Quarter.

MGB 224—Managing People in High-Performance Organizations (3)
Lecture—3 hours. Prerequisite(s): MGT 201A or MGB 201A or MGP 201A Restricted to students in the MBA program. Strategic approach to the management of people within organization. Analyze employment systems' fit with firms' environments and strategies. Explore consequences of choices firms make in managing people—decisions as to selection, performance evaluation, compensation, and other management policies and practices. Not open to students who have taken MGT 224 or MGP 224. Effective: 2017 Fall Quarter.

MGB 234—Pricing (3)
Lecture/Discussion—3 hours. Prerequisite(s): (MGT 202A or MGB 202A or MGP 202A); (MGP 203B or MGB 203B or MGT 203B); (MGT 204 or MGB 204 or MGP 204) Restricted to students in the MBA program. Combines lectures, cases and homework to teach students tools and skills necessary to analyze pricing situations, make pricing decisions, and implement them, in a systematic manner. Effective: 2017 Fall Quarter.

MGB 239—Digital Marketing (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGB 204 or MGT 204 or MGP 204 Course equips students for a career in digital marketing and social media. Topics include online advertising, search engine optimization, interactive mktg, online privacy issues, e-commerce, social influence, social network theory, measurement of social influence, integrating social and traditional media. Effective: 2017 Fall Quarter.

MGB 240—Management Policy and Strategy (3)
Lecture—3 hours. Prerequisite(s): First-year core courses of M.B.A. program. Examines the scope of missions, objectives strategies, policies, structures, measurements and incentives which bear on the management of an organization. Real client organizations, in the private and public sectors, are assigned to student teams as the subjects of study. Effective: 2009 Fall Quarter.

MGB 241—New Product Development (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 204 or MGB 204 or MGP 204 Open to graduate students in the Graduate School of Management. State-of-the-art concepts and methods to enhance the effectiveness of new product development activities. Focuses on the understanding of managerial issues and acquiring the ability to solve problems. Effective: 2017 Fall Quarter.

MGB 242—Marketing Communications (3)
Lecture—3 hours. Issues in designing a marketing communications strategy. Topics include mass and direct communications, institutional aspects of advertising, consumer behavior, evaluating ad effectiveness, determining ad budget, creative strategy, and use and abuse of promotions. Effective: 2009 Fall Quarter.

MGB 243—Customer Relationship Management (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 204 or MGB 204 or MGP 204 Restricted to MBA students only. Customer Relationship Management (CRM) is a management approach under which marketing activities are organized and measured around customers (rather than around brands.) This approach is appealing because customers, not brands, are those who make buying decisions. Effective: 2017 Fall Quarter.

MGB 244—New and Small Business Ventures (3)
Lecture—3 hours. Prerequisite(s): MGT 204 or MGP 204 or MGB 204 Student teams develop complete business plans for their own start-up ventures. Process includes: elevator pitch, business strategy, comprehensive bottoms-up financial projections, capital requirements, product differentiation, competitive, alliance, and go-to-market strategy development, investor presentation, and comprehensive written business plan. Effective: 2017 Fall Quarter.

MGB 245—Business Writing (3)
Lecture/Discussion—3 hours. Prerequisite(s): Completion of first-year core courses at the Graduate School of Management or the equivalent. Restricted to MBA students only. Techniques for sharpening writing skills are introduced, along with grammatical structure, word choice, and punctuation. Learn to develop styles that are pitch-perfect for given situations and to think strategically about each communication challenge in a management setting. Effective: 2011 Fall Quarter.

MGB 246—Negotiation and Team Building (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGB 205; MGB 202. Basic theory of negotiation; applies theory to process of building teams to achieve business purposes. Covers integrative and distributive strategies of claiming value, how to recognize bargaining tricks, uncovering hidden agendas, brainstorming to extend Pareto frontier. Effective: 2011 Fall Quarter.

MGB 247—Customer Service as a Marketing Tool (3)
Lecture—3 hours. Understanding the distinct features of services, how to create value through service, methods of building strong relationships with customers, methods of measuring and building customer satisfaction, and measuring the financial impact of service improvement. Effective: 2009 Fall Quarter.

MGB 248—Marketing Strategies (3)
Lecture—3 hours. Prerequisite(s): (MGT 202A or MGB 202A or MGP 202A); (MGP 204 or MGT 204 or MGB 204) Examines process by which organizations develop strategic marketing plans. Includes definition of activities and products, marketing audits, appraising market opportunities, design of new activities and products, and organizing marketing planning function. Applications to problems in private and public sector marketing. Effective: 2017 Fall Quarter.

MGB 249—Marketing Research (3)
Lecture—3 hours. Prerequisite(s): (MGT 202A or MGB 202A or MGP 202A); (MGP 203A or MGB 203A or MGT 203A); (MGT 204 or MGB 204 or MGP 204) Course addresses the managerial issues and problems of systematically gathering and analyzing information for making private and public marketing decisions. Covers the cost and value of information, research design, information collection, measuring instruments, data analysis, and marketing research applications. Effective: 2017 Fall Quarter.

MGB 250—Technology Competition and Strategy (3)
Lecture—3 hours. Prerequisite(s): (MGT 202A or MGB 202A or MGP 202A); (MGP 203A or MGB 203A or MGT 203A) Restricted to students in the MBA program. Why is software typically so defective? Why do many firms in the IT industry give away their best products free? This course helps you analyze questions like these by modeling competition and strategy in the network, technology and information industries. Effective: 2017 Fall Quarter.

MGB 251—Management of Innovation (3)
Lecture—3 hours. Prerequisite(s): MGT 201A or MGB 201A or MGP 201A Managing innovative enterprise in changing and uncertain environments. Covers technology forecasting and assessment, program selection and control, financial management, regulation, and ethics. Effective: 2017 Fall Quarter.

MGB 252—Managing for Operational Excellence (3)
Lecture—3 hours. Prerequisite(s): MGB 203A or MGP 203A or MGT 203A Open to students in the Graduate School of Management. Explores the management of operations as applied to manufacturing as well as services provided both inside and outside the organization. Develop an understanding of how uncertainty affects planning and delivery by looking at fundamental models of operations. Effective: 2018 Spring Quarter.

MGB 253—Corporate Social Responsibility (3)
Lecture—3 hours. Goal in this course will be to develop a thought process and approach to corporate social responsibility that students will be able to build on during their post-school leadership roles, whether as corporate executives, entrepreneurs, or NGO leaders. Effective: 2016 Spring Quarter.

MGB 255—Entrepreneurship and Venture Investment Clinic (3)
Lecture—3 hours. Class size limited to 30 students. Provides the necessary analytical and design tools to create business ideas and refine business models based on emerging technologies. Students learn to work closely in small teams to synthesize technical, strategic, and marketing needs into designs for new ventures. Effective: 2016 Spring Quarter.

MGB 258—Mergers and Acquisitions (3)
Lecture—3 hours. Prerequisite(s): MGB 205 Course focuses on the market for corporate acquisitions and restructuring activity. Topics include: sources of value creation; takeovers; anti-takeover provisions; bidding strategies; use of leverage in buyouts; regulatory risk and hurdles; and, valuation approaches for highly leveraged transactions. Effective: 2015 Spring Quarter.

MGB 259—Banking and the Financial System (3)
Lecture—3 hours. Prerequisite(s): MGP 205 or MGT 205; Consent of Instructor. Analyzes the role of financial markets and institutions in allocating capital. Focuses on: bank lending; debt securities; financial market innovations; regulation; functions of commercial banks and other financial intermediaries. Utilizes case studies. Effective: 2016 Spring Quarter.

MGB 260—Corporate Finance (3)
Lecture—3 hours. Prerequisite(s): (MGT 200A or MGB 200A or MGP 200A); (MGP 202A or MGB 202A or MGT 202A); (MGT 205 or MGB 205 or MGP 205) Focuses on planning, acquiring, and managing a company's financial resources. Includes discussion of financial aspects of mergers and other forms of reorganization; analysis of investment, financial, and dividend policy; and theories of optimal capital structure. Effective: 2017 Fall Quarter.

MGB 261—Investment Analysis (3)
Lecture—3 hours. Prerequisite(s): (MGT 203A or MGB 203A or MGP 203A); (MGP 205 or MGT 205 or MGB 205) Examines asset pricing theories and relevant evidence, including the investment performance of stocks and bonds. Topics include the efficiency of markets, domestic and international portfolio diversification, factors influencing the value of stocks and other investments, and portfolio management and performance. Effective: 2017 Fall Quarter.

MGB 262—Money and Security Markets (3)
Lecture—3 hours. Examines how money and securities markets are organized; how public agencies, businesses, others obtain and invest funds in those markets. Relationship between interest rates, monetary policy, government's role in improving capital markets, approaches to assessing changes in regulation of specific markets. Effective: 2009 Fall Quarter.

MGB 263—Derivative Securities (3)
Lecture/Discussion—3 hours. Prerequisite(s): (MGT 203A or MGB 203A or MGP 203A); (MGP 205 or MGT 205 or MGB 205) Open to students enrolled in the MBA program. Behavior of options, futures, and other derivative securities markets and how public agencies, business and others use those markets. Trading strategies involving options, swaps, and financial futures contracts. Pricing of derivative securities, primarily by arbitrage methods. Effective: 2017 Fall Quarter.

MGB 264—Business Taxation (3)
Lecture—3 hours. Analysis of the impact of business taxation on investment, production, and finance decisions. Discussion of the relationship between business organization and tax liability. Course is not intended for tax specialists. Effective: 2009 Fall Quarter.

MGB 265—Venture Capital and the Finance of Innovation (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 205 or MGB 205 or MGP 205 Restricted to students in the MBA program. Examines venture capital finance and the related practice of R&D finance. Goal is to apply finance tools and framework to the world of venture capital and financing of projects in high-growth industries. Effective: 2017 Fall Quarter.

MGB 266—International Finance (3)
Lecture—3 hours. Prerequisite(s): MGT 205 or MGB 205 or MGP 205; Or the equivalent. Studies fixed and floating exchange-rate systems. Topics include determinants of a nation's balance of international payments; macroeconomic interdependence of nations under various exchange-rate regimes and its implications for domestic stabilization policies; and the international coordination of monetary and stabilization policies. Effective: 2017 Fall Quarter.

MGB 267—Teams and Technology (3)
Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Restricted to working professional MBA students. Theory and practice of managing teams with primary goals of: providing conceptual guidelines for analyzing and diagnosing group dynamics and determining strategic options as a manager; imparting interpersonal skills for implementing effective strategies; understanding how technological change affects team processes. Effective: 2010 Fall Quarter.

MGB 268—Articulation and Critical Thinking (3)
Lecture/Discussion—3 hours. With commitment to this course, students will become competent public speakers, write well at a level expected in business, think efficiently and critically about business challenges and have a useful personal code of ethics to shape their actions and decisions. No student may repeat course for credit. Effective: 2014 Winter Quarter.

MGB 269—Business Intelligence Technologies-Data Mining (3)
Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Restricted to students in the MBA program. Descriptive and Predictive Data mining methods covering association rules, clustering, classification, text mining, etc. Big data Technologies. Business applications. Hands-on data mining skills. Business intelligence for managerial decision making. Effective: 2016 Spring Quarter.

MGB 270—Corporate Financial Reporting (3)
Lecture—3 hours. Prerequisite(s): MGT 200A or MGP 200A or MGB 200A Analyzes and evaluates contemporary issues in financial reporting and develops implications of those issues for business decision makers, investment managers, and accounting policymakers. Effective: 2017 Fall Quarter.

MGB 271—Strategic Cost Management (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 202A or MGP 202A or MGB 202A Restricted to students in the MBA program. Theoretical frameworks and associated techniques for using organizational design and cost management to achieve a sustainable, profitable cost structure. Topics include: target costing, process design for low cost, total cost of ownership, cost of customers, implementing structural change, and incentives. Effective: 2017 Fall Quarter.

MGB 272—Evaluation of Financial Information (3)
Lecture—3 hours. Prerequisite(s): MGT 200A or MGP 200A or MGB 200A Studies how investors, creditors, others use accounting and other information in making rational investment, lending decisions. Emphasis is placed on the analysis of financial information in a variety of contexts. Where applicable, recent research in finance and economics is discussed. Effective: 2017 Fall Quarter.

MGB 273—Accounting and Reporting for Government Nonprofit Entities (3)
Lecture—3 hours. Concepts, methods, and uses of accounting and financial reporting by governmental and nonprofit entities. Introduction to budgeting and performance evaluation, and accounting for entities such as hospitals, universities, and welfare agencies. Effective: 2009 Fall Quarter.

MGB 274—Corporate Governance (3)
Lecture—3 hours. Prerequisite(s): Full-time MBA students or consent of instructor. Discusses how corporations can better operate in the interests of shareholders and public. Directly relevant to managers, consultants in compensation and incentives, staff working on mergers and acquisitions, corporate regulators, shareholder rights activists, and board members. Effective: 2009 Fall Quarter.

MGB 276—Real Estate, Finance and Development (3)
Lecture—3 hours. Prerequisite(s): (MGT 205 or MGP 205 or MGB 205); (MGT 201A or MGB 201A or MGP 201A) Focus on single family, attached, detached, multi-family, and light commercial development. Students will study factors which make up successful real estate developments. Course will consider financial aspects involved in land acquisition, land development, construction, and project lending. Effective: 2017 Fall Quarter.

MGB 281—Systems Analysis and Design (3)
Lecture—3 hours. Design and specification of computer-based information systems. Applications systems development life cycle, use requirements and feasibility assessment, logical and physical design, program development and testing, conversion and implementation. Effective: 2015 Spring Quarter.

MGB 282—Supply Chain Management (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 203A or MGB 203A or MGP 203A Restricted to students in the MBA program. Matching supply with demand is a primary challenge for a firm: excess supply is too costly, inadequate supply irritates customers. Matching supply to demand is easiest when a firm has a flexible supply process, but flexibility is generally expensive. Effective: 2017 Fall Quarter.

MGB 284—Applied Linear Models for Management (3)
Lecture—3 hours. Covers regression, analysis of variance, and multivariate analysis. Topics will focus on applications to management and policy problems. Effective: 2015 Spring Quarter.

MGB 285—Time Series Analysis and Forecasting (3)
Lecture—3 hours. Prerequisite(s): MGB 203B or MGT 203B or MGP 203B Considers application of time series methods to evaluation and forecasting problems. Covers univariate and multivariate ARIMA models and transfer function models. Applications will be in such areas as economics, finance, budgeting, program evaluation, and industrial process control. Effective: 2016 Spring Quarter.

MGB 286—Telecommunications and Computer Networks (3)
Lecture—3 hours. Prerequisite(s): MGB 280. Communication system components; common carrier services; design and control of communications networks; network management and distributed environment; local area networks; data security in computer networks. Effective: 2015 Spring Quarter.

MGB 287—Business Database and Database Marketing (3)
Lecture—3 hours. Practical introduction to fundamental principles of database management systems and database marketing. Database design. SQL queries. Concepts of database marketing, data warehouse, data visualization and big data analytics. Effective: 2016 Spring Quarter.

MGB 290—Topics in General Management (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Advanced topics in general management. Varied topics to cover more extensively issues discussed in courses 201A and 201B, or current business interest topics in fields of business writing, business communications, development, or workplace processes. May be repeated for credit. Effective: 2009 Spring Quarter.

MGB 291—Topics in Organizational Behavior (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Advanced topics in social psychology and sociology of organizations. Varied topics to cover more extensively issues discussed in courses 201A and 201B, or current business interest topics in fields of organization design, strategy, development, or workplace processes. May be repeated for credit. Effective: 2009 Fall Quarter.

MGB 292—Topics in Finance (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Contemporary and emerging issues in finance. Application of modern techniques of finance to business problems. Use of appropriate electronic database and research techniques. May be repeated for credit. Effective: 2009 Fall Quarter.

MGB 293—Topics in Marketing (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Advanced topics in marketing, which may include marketing research, new product development, brand management, pricing, distribution management, service marketing, hitech marketing, advertising, sales promotions, marketing through the Web. May be repeated for credit. Effective: 2009 Fall Quarter.

MGB 294—Topics in Accounting (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Contemporary and emerging issues in financial management accounting. Application of modern techniques of evaluation and analysis of financial information. Use of appropriate electronic database and research techniques. May be repeated for credit. Effective: 2009 Fall Quarter.

MGB 295—Topics in Information Technology (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Applications of information technology to management and management of information technology. Adaptation to the dynamic nature of the field. May be repeated for credit. Effective: 2009 Fall Quarter.

MGB 296—Topics in Technology Management (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Cyclical nature of innovation and technological change, features of innovative firms and industries, national innovation systems, and impact of information technologies on innovation processes. May be repeated for credit. Effective: 2009 Fall Quarter.

MGB 297—Topics in International Management (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Broader environment in which U.S. firms and their foreign competitors operate. Integration of material from other topics courses (marketing, strategy, finance, accounting, information technology, technology management) into the international setting. May be repeated for credit. Effective: 2010 Fall Quarter.

MGB 298—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 2009 Fall Quarter.

MGB 299—Individual Study (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 2009 Fall Quarter.

MGB 401—Crisis Management (1)
Discussion/Laboratory—1 hour. Establishes and explores the defining characteristics of crises. Will learn to anchor crisis management firmly within overall strategic management and also acquire a set of useful tools and techniques for planning for and handling actual crises. Effective: 2017 Winter Quarter.

MGB 402—Crisis Communications and Reputation Management (1)
Discussion/Laboratory—1 hour. Intended to provide you with an understanding of the framework and tools necessary to successfully address communications and reputation management tasks in a variety of crisis situations. Effective: 2016 Summer Quarter.

MGB 403—Business Statistics Practicum (1)
Project (Term Project)—1 hour. Prerequisite(s): (MGT 203A or MGP 203A or MGB 203A); (MGT 203B (can be concurrent) or MGP 203B (can be concurrent) or MGB 203B (can be concurrent)); MGT 203B, MGP 203B, or MGB 203B completed or required concurrently. Restricted to students in the MBA program. Applies techniques and concepts in business statistics to real case studies. Effective: 2011 Fall Quarter.

MGB 404—Organizational Change Management (1)
Lecture/Discussion—1 hour. Challenges in getting significant changes made in organizations. Learn Organization Change Management (OCM) techniques and discuss case situations where OCM techniques play a role. Effective: 2016 Fall Quarter.

MGB 405—Business Literature (1)
Lecture/Discussion—1 hour. Will examine Business history – historical trends that might influence contemporary business. Some argue that the recent collapse of our financial system might have been averted if business leaders had a better sense of history. Effective: 2017 Winter Quarter.

MGB 406—Ethical Issues in Management (1)
Lecture/Discussion—1 hour. Explores the philosophical foundation of ethical theory and its recent applications to business situations. Professional codes of ethics, such as those promulgated by educational, managerial, engineering, scientific, medical and legal professional societies, are presented. Effective: 2017 Winter Quarter.

MGB 407—Storytelling for Leadership (1)
Lecture/Discussion—1 hour. Internalize the fundamental principles behind stories that educate, influence, motivate, inspire, persuade and connect. Effective: 2016 Fall Quarter.

MGB 408—The Business of the Media (1)
Lecture/Discussion—1 hour. Focuses on the media industries and how emerging digital technologies are disrupting the way media consumption, distribution and business models work. Will highlight the economics of several media, both news and entertainment. Effective: 2016 Summer Quarter.

MGB 409—Managing Multi-Asset Class Investment Portfolios (1)
Lecture/Discussion—1 hour. Prerequisite(s): MGB 202A; MGB 203A; MGB 205 Examines top down management of multi-asset class portfolios. Topics include bonds, hedge funds, private equity, real estate, commodities, endowments, return generation, performance analysis, credit cycles, financial crises, manager selection, investment policy, and investment careers. Student teams present endowment portfolio recommendations. Effective: 2015 Spring Quarter.

MGB 410—Corporate Governance (1)
Lecture/Discussion—1 hour. Covers recent and not-so-recent business and accounting scandals, discuss how corporations can better operate in the interests of shareholders and the public, and learn from people who rely on corporate governance in making investment decisions. Effective: 2017 Winter Quarter.

MGB 411—Turnaround Management (1)
Lecture/Discussion—1 hour. Evaluate the financial performance of a company, identify opportunities for improvement, propose real solutions to enhance performance, and most important inspire action in staff. Effective: 2017 Winter Quarter.

MGB 412—International Marketing (1)
Lecture/Discussion—1 hour. Basic concepts of international marketing. Understanding and managing heterogeneous, dynamic, and interdependent environments across countries. How to develop and implement an international marketing strategy: where and how to compete, how to adapt your marketing mix. Effective: 2016 Fall Quarter.

MGB 413—Sustainable Business Ventures: Business and Energy (1)
Lecture/Discussion—1 hour. Introduction to sustainability goals, indicators, values, measurement techniques, and practice how it applies to large and small enterprise. Effective: 2013 Spring Quarter.

MGB 414—Multi-Channel Marketing (1)
Lecture/Discussion—1 hour. Multi-channel marketing strategies empower managers to create value for different customer segments. Covers the necessary concepts to evaluate and select go-to market strategies in order to capitalize on the ubiquity of modern customers. Effective: 2017 Winter Quarter.

MGB 415—Climate Risks and Opportunities (1)
Lecture/Discussion—1 hour. Provide a working knowledge of the risks and opportunities arising from climate change and climate policy for businesses. Effective: 2016 Summer Quarter.

MGB 416—Topics in Private Equity (1)
Lecture—1 hour. Prerequisite(s): MGB 205 or MGP 205 or MGT 205 Restricted to students in the MBA program. Focuses on the finance principles related to the risk and return of the private equity (PE) industry, valuation of PE target companies, the structuring of leveraged buyouts (LBOs), and the management of portfolio companies. Effective: 2017 Fall Quarter.

MGB 417—Incentives and Controls (1)
Lecture/Discussion—1 hour. Understand how organizations use financial and nonfinancial performance management and incentive systems to motivate people and manage resources. Effective: 2017 Winter Quarter.

MGB 418—Scientific Discovery and Business Innovation at Scale in the Food and Agriculture Sector (1)
Lecture—3 hours. Restricted to students in the MBA program. Scientific discovery and business innovation within the food and agriculture sector profoundly influences the sustainability of society and enterprise competitiveness. Students will learn how business innovation models co-exist antagonistically or synergistically with scientific discovery and its influence on enterprise competitiveness. Effective: 2017 Winter Quarter.

MGB 419—Business Strategy Consulting Skills (1)
Lecture—5 hours. Restricted to students enrolled in the MBA program. Students will learn practical business consulting skills which will help apply strategy theories in the workplace. Students will learn and practice tools to frame and analyze problems, conduct research, communicate findings and navigate client relationships. Effective: 2017 Winter Quarter.

MGB 420—Advanced Optimization in a Python-based Modeling Language (1)
Web Virtual Lecture—1 hour. Prerequisite(s): (MGB 252 or MGT 252 or MGP 252); (MGB 206 or MGT 206 or MGP 206) Restricted to students enrolled in the MBA program. Covers advanced optimization modeling techniques and practical application of modern, scalable modeling language. Techniques will be developed using examples from production planning in a supply chain, but students may explore other areas of application of optimization for their final project. Effective: 2017 Winter Quarter.

MGB 421—Monte Carlo Simulation for Managerial Analysis (1)
Lecture—1 hour. Students create Excel-based simulation models across business domains, from finance to hypothesis testing and inventory management. By course-end, students are experts at recognizing this decision-making fallacy and fixing it. Effective: 2017 Spring Quarter.

MGB 422—Behavioral Finance and Valuation (1)
Lecture—1 hour. Prerequisite(s): (MGT 260 or MGP 260 or MGB 260); (MGT 261 or MGP 261 or MGB 261) Restricted to students enrolled in the MBA program. Investor psychology and market frictions can cause asset prices to deviate from fundamental values, creating profit opportunities for sophisticated investors. The course will cover techniques of financial analysis with the goal of learning how to value assets and identify mispricing. Effective: 2017 Winter Quarter.

MGB 423—Leader as Coach: An Introduction to Coaching Skills for Leaders (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program. Course introduces the fundamental coaching skills and coaching models that leaders can apply in everyday interactions with their team and colleagues in order to build trust, overcome challenges and help others discover their own full potential. Effective: 2017 Winter Quarter.

MGB 424—Practicum for Managing People in Modern Organizations (1)
Project (Term Project)—1 hour. Prerequisite(s): MGB 224 Restricted to students in the MBA program. Provides solid grounding in the management of work and the employment relationship. Examines firms' interrelated policies and practices for managing people. Effective: 2011 Winter Quarter.

MGB 425—Digital Marketing Techniques (1)
Lecture—1 hour. Course provides students with an introduction to digital marketing. The course introduces MBA students to the fundamental aspects and tools of online marketing communication, i.e., how organizations use digital channels to effectively communicate their value propositions to the target customers. Effective: 2017 Winter Quarter.

MGB 426—The Business of Healthcare (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program (Business Administration—Working Professional, Business Administration—Bay Area, Business Administration—Full-Time). Course is intended to provide students with an overall understanding of the unique business aspects of the healthcare industry. Effective: 2017 Winter Quarter.

MGB 427—Implementing International Strategy (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program (Business Administration—Working Professional, Business Administration—Bay Area, Business Administration—Full-Time). Course looks at the pitfalls of implementing international strategies, and suggest several accessible, yet powerful frameworks to help international managers implement strategies successfully and completely. Effective: 2017 Winter Quarter.

MGB 428—Renewable Energy Ventures: Planning, Funding and Regulatory Risk Assessment for Entrepreneurs and Investors (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program. Advanced innovation lab will introduce students to issues addressed by entrepreneurs and investors in renewable ventures. Lectures, simulations, case studies and practical experience of the presenters will be delivered. Effective: 2016 Summer Quarter.

MGB 429—Detection and Prevention of Asset Misappropriation Fraud in the Workplace (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program. Course will discuss the fundamentals of fraud detection and prevention in the workplace. Students will learn the major schemes involving workplace fraud, how management can detect fraud and what policies and procedures can be implemented to prevent fraud. Effective: 2016 Fall Quarter.

MGB 430—Learning From Catastrophes: Lessons for Managers (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program. Catastrophes unfold in surprisingly similar ways. In this course, students will analyze catastrophes to understand these common patterns and investigate how they can be prevented and mitigated. Students will then apply these lessons to management to gain unconventional insights. Effective: 2016 Summer Quarter.

MGB 431—Project Management (1)
Lecture—10 hours. Open to students enrolled in the MBA program. Students learn project management; including project scope, project planning, milestones and project closing. Important themes include leadership, team dynamics, storytelling/creating a narrative, communication, and conflict management. Effective: 2016 Fall Quarter.

MGB 432—Project Management with Applications in Healthcare (1)
Lecture—1 hour. Course will focus on the heart of healthcare administration and how project management can be applied as a key lever to increase efficiency, decrease costs and improve the patient experience. Effective: 2017 Spring Quarter.

MGB 433—Corporate Social Responsibility (1)
Lecture—1 hour. Learn practical information that will help students understand the basics of designing, managing and evaluating an effective CSR program. Expose students to a basic set of CSR issues in the context of cross-purpose business challenges and then focus on the analysis and critical decisions that managers must make to move their business and their social agenda forward. Effective: 2018 Spring Quarter.

MGB 434—Practicum for Pricing (1)
Project (Term Project)—1 hour. Prerequisite(s): MGB 234 Restricted to students in the MBA program. Enhance understanding of the principles and concepts learned in Pricing by (1) teaching the necessary statistical and mathematical skills, and (2) requiring a report for a real Pricing case. Effective: 2011 Winter Quarter.

MGB 440—Integrated Management Project (5)
Project (Term Project)—3 hours. Prerequisite(s): First-year core courses of MBA program. Applies classroom learning to solve complex business challenges for real world clients. Student teams learn practical consulting skills while their clients benefit from the student's experience, insights, and work product. Effective: 2016 Fall Quarter.

MGB 440A—Integrated Management Project (3)
Lecture/Discussion—3 hours. Prerequisite(s): First-year core courses of MBA program. Restricted to full-time MBA students. Applies classroom learning to solve complex business challenges for real world clients. Student teams learn practical consulting skills while their clients benefit from the student's experience, insights, and work product. Effective: 2015 Spring Quarter.

MGB 440B—Integrated Management Project (3)
Project (Term Project)—3 hours. Prerequisite(s): First-year core courses of MBA program. Restricted to full-time MBA students. Applies classroom learning to solve complex business challenges for real world clients. Student teams learn practical consulting skills while their clients benefit from the student's experience, insights, and work product. Effective: 2015 Spring Quarter.

MGB 440C—Integrated Management Project Lead (1)
Project (Term Project)—1 hour. Integrated Management Project Team leader. Effective: 2016 Fall Quarter.

MGB 442—Practicum for Marketing Communication (1)
Project (Term Project)—1 hour. Prerequisite(s): MGB 242 Restricted to students in the MBA program. Provides experience applying concepts learned in Marketing Communications to a realistic advertising or communication problem faced by firms. Effective: 2011 Spring Quarter.

MGB 443—Practicum for Customer Relationship Management (1)
Project (Term Project)—1 hour. Prerequisite(s): MGB 243 Restricted to students in the MBA program. Hands-on training in applying Customer Relationship Management concepts and metrics to secondary data. Enhances ability to interpret results and decide the right type of marketing actions by requiring an executive report at the end of the quarter. Effective: 2010 Fall Quarter.

MGB 448—Practicum for Marketing Strategies (1)
Project (Term Project)—1 hour. Prerequisite(s): MGB 248 Restricted to students in the MBA program. Provides opportunities to apply the concepts covered in the Marketing Strategies class through a group project involving the analysis of strategic marketing decisions based on business-related issues, simulation and modeling. Effective: 2010 Fall Quarter.

MGB 449—Marketing Research Practicum (1)
Project (Term Project)—1 hour. Prerequisite(s): MGB 249 Restricted to students in the MBA program, or in some cases with permission of instructor. Provides opportunities to apply the concepts and methods covered in the Marketing Research class. Hands-on and project-based, work could be either individual or in groups depending on enrollments and/or interests of students. Effective: 2011 Spring Quarter.

MGB 450—Practicum for Technology Strategy and Competition (1)
Project (Term Project)—1 hour. Prerequisite(s): MGB 250 Restricted to students in the MBA program. In-depth practicum project course. Apply theories, concepts, and models, learned in course 250 to a real-world business problem, through data collection, data analysis, simulation, modeling and post-model interpretation. Effective: 2011 Winter Quarter.

MGB 460—Practicum for Corporate Finance and Real Estate (1)
Project (Term Project)—1 hour. Prerequisite(s): MGB 260 Restricted to students in the MBA program. Work in groups to select and value a financial entity. It could be a firm, a sports player, a building, a project, or a patent. Grade based on an in-class presentation and a write-up. Effective: 2011 Spring Quarter.

MGB 461—Practicum for Investment Analysis (1)
Project (Term Project)—1 hour. Prerequisite(s): MGB 261 Restricted to students in the MBA program. Provides practical experience applying concepts learned in Investment Analysis to a realistic portfolio management setting via a hypothetical exercise. Produce a realistic executive summary and presentation of an investment proposal for a hypothetical client. Effective: 2010 Fall Quarter.

MGB 464—Practicum for Taxes and Business Strategy (1)
Project (Term Project)—1 hour. Prerequisite(s): MGB 264 Restricted to students in the MBA program. Practical application project drawing from the tax planning theory contained in course 264. Project consists of a business formation and operation, change in organization (incorporation), and movement into multi-national and multi-jurisdictional tax. Effective: 2010 Fall Quarter.

MGB 465—Practicum for Venture Capital (1)
Project (Term Project)—1 hour. Prerequisite(s): MGB 265 Restricted to students in the MBA program. Provides an opportunity to apply concepts learned in Venture Capital in a realistic setting. Complete project analyzing a potential investment in a hypothetical venture and prepare an deal term sheet/investment agreement. Effective: 2011 Winter Quarter.

MGB 467—Practicum for Teams and Technology (1)
Project (Term Project)—1 hour. Prerequisite(s): MGB 267 Restricted to students in the MBA program. Groups investigate the performance, creativity, conflict, information sharing, and leadership behaviors of a real world team. Provide consulting advice to the team, which not only gives analytic skills, but also builds presentation skills. Effective: 2011 Spring Quarter.

MGB 469—Practicum for Business Intelligence Technologies (1)
Project (Term Project)—1 hour. Prerequisite(s): MGB 269 Restricted to students in the MBA program. Projects applying concepts learned in Business Intelligence Technologies to real business problems. Effective: 2011 Winter Quarter.

MGB 482—Practicum for Supply Chain Management (1)
Project (Term Project)—1 hour. Prerequisite(s): MGT 282 (can be concurrent) or MGP 282 (can be concurrent) or MGB 282 (can be concurrent); Course is a pre-requisite or co-requisite. Restricted to students in the MBA program. Provides experience applying concepts learned in Supply Chain Management to a realistic management setting via a project. Effective: 2011 Spring Quarter.

MGB 490—Directed Group Study Management Practicum (3)
Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Sponsorship of a GSM Academic Senate faculty member; approval of graduate advisor. Provides opportunity for students to gain experience in applying business methodologies previously acquired in other GSM courses. May be repeated for credit. Effective: 2015 Spring Quarter.

MGB 498—Directed Group Study Management Practicum (1-12)
Project (Term Project). Prerequisite(s): Consent of Instructor. Sponsorship of a GSM Academic Senate faculty member, and approval of graduate advisor. Provides the opportunity for students to gain experience in applying business methodologies previously acquired in other GSM courses. May be repeated up to 6 unit(s). (S/U grading only.) Effective: 2011 Summer Quarter.

MGB 499—Directed Individual Study Management Practicum (1-12)
Project (Term Project). Prerequisite(s): Consent of Instructor. Sponsorship of a Graduate School of Management Academic Senate faculty member and approval of graduate advisor. Provides the opportunity for students to gain experience in applying business methodologies previously acquired in other Graduate School of Management courses. May be repeated for credit. (S/U grading only.) Effective: 2011 Summer Quarter.

Management, Graduate School of | MGP Courses

Students must complete the Management core course requirement before enrolling in any of the following elective courses, or petition with consent of the instructor. The core courses include: 200A, 201A, 201B, 202A, 203A, 204, 205, 252, 268, 440, 440A, 440B, 440C. For a list of elective courses, see https://webapps.gsm.ucdavis.edu/Raps/courses/curriculumOverviewByProgram?program=SMBA.

Courses in MGP:

MGP 200A—Financial Accounting (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management. Introduction to the concepts and objectives underlying the preparation of financial statements. Topics include understanding the accounting cycle, measurement and valuation problems associated with financial statement components, consideration of the usefulness of financial statements in the analysis of a corporation's operations. Effective: 1994 Fall Quarter.

MGP 200B—Managerial Accounting (3)
Lecture—3 hours. Prerequisite(s): MGT 200A or MGB 200A or MGP 200A Information managers should know to be effective, including: product costing, motivating people, and differential analysis for decision making. Includes team projects and written and oral presentations. Effective: 2017 Fall Quarter.

MGP 201A—The Individual and Group Dynamics (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management. Examines basic psychological and social psychological processes shaping human behavior and applies knowledge of these processes to the following organizational problems: motivation, job design, commitment, socialization, culture, individual and group decision making, and team building. Effective: 1994 Fall Quarter.

MGP 201B—Organizational Strategy and Structure (3)
Lecture/Discussion—3 hours. Prerequisite(s): Completion of first year courses in Graduate School of Management or equivalent. Open to MBA students only. Strategic management of organizations, including analysis of industries, firm resources and capabilities and corporate strategy. Strategy formulation, implementation and strategic decision-making. Firm and industry life cycles and change. Analysis of organizational design and structure including differentiation and integration. Effective: 2011 Fall Quarter.

MGP 202A—Markets and the Firm (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management. Examines the interaction of consumers, firms and government, and the effect this interaction has on the use of resources and firm profitability. Fundamental economic concepts such as marginal analysis, opportunity cost, pricing, and externalities are introduced and applied. Effective: 1994 Fall Quarter.

MGP 202B—Business, Government, and the International Economy (3)
Lecture—3 hours. Prerequisite(s): MGP 202A or MGT 202A or MGB 202A Examines the influence of government and international factors on business. Topics include distribution of income, business cycles, inflation and interest rates, the federal debt, monetary policy and international trade and finance. Effective: 2017 Fall Quarter.

MGP 203A—Data Analysis for Managers (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management MBA program or consent of instructor. Introduction to statistics and data analysis for managerial decision making. Descriptive statistics, principles of data collection, sampling, quality control, statistical inference. Application of data analytic methods to problems in marketing, finance, accounting, production, operations, and public policy. Effective: 1994 Fall Quarter.

MGP 203B—Forecasting and Managerial Research Methods (3)
Lecture—3 hours. Prerequisite(s): MGP 203A or MGT 203A or MGB 203A Practical statistical methods for managerial decision making covers regression analysis, time series analysis and forecasting, design and analysis of experiments in managerial research and contingency table analysis. Application of these methods to marketing, finance, accounting, production, operations, and public policy. Effective: 2017 Fall Quarter.

MGP 204—Marketing Management (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management. Analysis of market opportunities, elements of market research, development of marketing strategies, market planning and implementations, and control systems. Consumer and industrial markets, market segmentation, pricing strategies, distribution channels, promotion, and sales. Effective: 1997 Fall Quarter.

MGP 205—Financial Theory and Policy (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management. Corporate financial policy and investment management. Covers capital budgeting, optimal financial structure, cost-of-capital determination, risk measurement. Develops basic valuation principles for investments with long-lived and risky cash-flows, and extends these to derivative securities, asset portfolios, investment management and hedging. Effective: 1994 Fall Quarter.

MGP 206—Decision Making and Management Science (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management MBA program or consent of instructor. Develops decision-making and problem-solving skills in conjunction with a quantitative model-building approach. Emphasizes how structured modeling techniques, probability forecasts, simulations, and computer optimization models are used in the overall process of making decisions in an uncertain environment. Effective: 1994 Fall Quarter.

MGP 207—Management Information Systems (3)
Lecture—3 hours. Prerequisite(s): Graduate student or consent of instructor. Introduction to computer programming and data handling skills. Use of computer in organizations, emphasis on managerial aspects of computing. Standard and nonstandard uses of data files, centralization versus decentralization of computing, office automation, computer security. Effective: 1994 Fall Quarter.

MGP 215—Business Law (3)
Lecture—3 hours. Prerequisite(s): Completion of administration core requirements or petition with consent of instructor. Introduction to law and legal process in the United States. Sources of law. Structure and operation of courts, federal-state relationships, fundamentals of administrative law, fundamentals of business law. Effective: 1997 Winter Quarter.

MGP 216—Managing Professionals, Budgets, Controls and Ethics (3)
Lecture—3 hours. Prerequisite(s): Graduate standing. Performance measures, budgetary controls and ethical pressures which occur at middle management levels in service-type operations. Addresses such organizations as engineering, medical groups, law offices, management consultants. Effective: 1997 Winter Quarter.

MGP 220—Management of Social Networks (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGP 201A Open to MBA students only. Principles and applications of social network theory: coordinating divergent interests to create value for individuals and organizations. Emphasis on conceptual models, web-based diagnostic tools, and practical applications. Effective: 2004 Winter Quarter.

MGP 223—Power and Influence in Management (3)
Seminar—3 hours. Prerequisite(s): MGT 201A or MGB 201A or MGP 201A; Consent of Instructor. Investigation of the bases of power in organizations and the tactics used to translate power into influence. Topics include the control of resources (including information), social psychological processes (including commitment), the construction of meaning, and ethics. Effective: 2017 Fall Quarter.

MGP 224—Managing People in High-Performance Organizations (3)
Lecture—3 hours. Prerequisite(s): MGT 201A or MGB 201A or MGP 201A Restricted to students in the MBA program. Strategic approach to the management of people within organization. Analyze employment systems' fit with firms' environments and strategies. Explore consequences of choices firms make in managing people—decisions as to selection, performance evaluation, compensation, and other management policies and practices. Not open to students who have taken MGB 224 or MGT 224. Effective: 2017 Fall Quarter.

MGP 234—Pricing (3)
Lecture/Discussion—3 hours. Prerequisite(s): (MGT 202A or MGB 202A or MGP 202A); (MGP 203B or MGB 203B or MGT 203B); (MGT 204 or MGB 204 or MGP 204) Restricted to students in the MBA Program. Combines lectures, cases and homework to teach students tools and skills necessary to analyze pricing situations, make pricing decisions, and implement them, in a systematic manner. Effective: 2017 Fall Quarter.

MGP 239—Digital Marketing (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGP 204 or MGT 204 or MGB 204 Course equips students for a career in digital marketing and social media. Topics include online advertising, search engine optimization, interactive mktg, online privacy issues, e-commerce, social influence, social network theory, measurement of social influence, integrating social and traditional media. Effective: 2017 Fall Quarter.

MGP 240—Management Policy and Strategy (3)
Lecture—3 hours. Prerequisite(s): First-year core courses of M.B.A. program. Examines the scope of missions, objectives strategies, policies, structures, measurements and incentives which bear on the management of an organization. Real client organizations, in the private and public sectors, are assigned to student teams as the subjects of study. Effective: 1994 Fall Quarter.

MGP 241—New Product Development (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 204 or MGB 204 or MGP 204 Open to students in the MBA Program for Working Professionals. State-of-the-art concepts and methods to enhance the effectiveness of new product development activities. Focuses on the understanding of managerial issues and acquiring the ability to solve problems. Effective: 2017 Fall Quarter.

MGP 242—Marketing Communications (3)
Lecture—3 hours. Issues in designing a marketing communications strategy. Topics include mass and direct communications, institutional aspects of advertising, consumer behavior, evaluating ad effectiveness, determining ad budget, creative strategy, and use and abuse of promotions. Effective: 2000 Fall Quarter.

MGP 243—Customer Relationship Management (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 204 or MGP 204 or MGB 204 Restricted to MBA students only. Customer Relationship Management (CRM) is a management approach under which marketing activities are organized and measured around customers (rather than around brands.) This approach is appealing because customers, not brands, are those who make buying decisions. Effective: 2017 Fall Quarter.

MGP 244—New and Small Business Ventures (3)
Lecture—3 hours. Prerequisite(s): MGT 204 or MGB 204 or MGP 204 Student teams develop complete business plans for their own start-up ventures. Process includes: elevator pitch, business strategy, comprehensive bottoms-up financial projections, capital requirements, product differentiation, competitive, alliance, and go-to-market strategy development, investor presentation, and comprehensive written business plan. Effective: 2017 Fall Quarter.

MGP 245—Business Writing (3)
Lecture/Discussion—3 hours. Prerequisite(s): Completion of first-year core courses at the Graduate School of Management or the equivalent. Restricted to MBA students only. Techniques for sharpening writing skills are introduced, along with grammatical structure, word choice, and punctuation. Learn to develop styles that are pitch-perfect for given situations and to think strategically about each communication challenge in a management setting. Effective: 2011 Fall Quarter.

MGP 246—Negotiation and Team Building (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGP 205; MGP 202. Basic theory of negotiation; applies theory to process of building teams to achieve business purposes. Covers integrative and distributive strategies of claiming value, how to recognize bargaining tricks, uncovering hidden agendas, brainstorming to extend Pareto frontier. Effective: 2011 Fall Quarter.

MGP 247—Customer Service as a Marketing Tool (3)
Lecture—3 hours. Understanding the distinct features of services, how to create value through service, methods of building strong relationships with customers, methods of measuring and building customer satisfaction, and measuring the financial impact of service improvement. Effective: 1998 Spring Quarter.

MGP 248—Marketing Strategies (3)
Lecture—3 hours. Prerequisite(s): (MGT 202A or MGB 202A or MGP 202A); (MGP 204 or MGB 204 or MGT 204) Examines process by which organizations develop strategic marketing plans. Includes definition of activities and products, marketing audits, appraising market opportunities, design of new activities and products, and organizing marketing planning function. Applications to problems in private and public sector marketing. Effective: 2017 Fall Quarter.

MGP 249—Marketing Research (3)
Lecture—3 hours. Prerequisite(s): (MGT 202A or MGB 202A or MGP 202A); (MGP 203A or MGB 203A or MGT 203A); (MGT 204 or MGB 204 or MGP 204) Course addresses the managerial issues and problems of systematically gathering and analyzing information for making private and public marketing decisions. Covers the cost and value of information, research design, information collection, measuring instruments, data analysis, and marketing research applications. Effective: 2017 Fall Quarter.

MGP 250—Technology, Competition and Strategy (3)
Lecture—3 hours. Prerequisite(s): (MGT 202A or MGB 202A or MGP 202A); (MGP 203A or MGB 203A or MGT 203A) Restricted to students in the MBA program. Why is software typically so defective? Why do many firms in the IT industry give away their best products free? This course helps you analyze questions like these by modeling competition and strategy in the network, technology and information industries. Effective: 2017 Fall Quarter.

MGP 251—Management of Innovation (3)
Lecture—3 hours. Prerequisite(s): MGT 201A or MGB 201A or MGP 201A Managing innovative enterprise in changing and uncertain environments. Covers technology forecasting and assessment, program selection and control, financial management, regulation, and ethics. Effective: 2017 Fall Quarter.

MGP 252—Managing for Operational Excellence (3)
Lecture—3 hours. Prerequisite(s): MGP 203A or MGB 203A or MGT 203A Open to students in the Graduate School of Management. Explores the management of operations as applied to manufacturing as well as services provided both inside and outside the organization. Develop an understanding of how uncertainty affects planning and delivery by looking at fundamental models of operations. Effective: 2018 Spring Quarter.

MGP 253—Corporate Social Responsibility (3)
Lecture—3 hours. Goal in this course will be to develop a thought process and approach to corporate social responsibility that students will be able to build on during their post-school leadership roles, whether as corporate executives, entrepreneurs, or NGO leaders. Effective: 2016 Spring Quarter.

MGP 255—Entrepreneurship and Venture Investment Clinic (3)
Lecture—3 hours. Class size limited to 30 students. Provides the necessary analytical and design tools to create business ideas and refine business models based on emerging technologies. Students learn to work closely in small teams to synthesize technical, strategic, and marketing needs into designs for new ventures. Effective: 2016 Spring Quarter.

MGP 258—Mergers and Acquisitions (3)
Lecture—3 hours. Prerequisite(s): MGP 205 or MGT 205 or MGB 205 Course focuses on the market for corporate acquisitions and restructuring activity. Topics include: sources of value creation; takeovers; anti-takeover provisions; bidding strategies; use of leverage in buyouts; regulatory risk and hurdles; and, valuation approaches for highly leveraged transactions. Effective: 2015 Spring Quarter.

MGP 259—Banking and the Financial System (3)
Lecture—3 hours. Prerequisite(s): MGB 205 or MGT 205; Consent of Instructor. Analyzes the role of financial markets and institutions in allocating capital. Focuses on: bank lending; debt securities; financial market innovations; regulation; functions of commercial banks and other financial intermediaries. Utilizes case studies. Effective: 2016 Spring Quarter.

MGP 260—Corporate Finance (3)
Lecture—3 hours. Prerequisite(s): (MGT 200A or MGB 200A or MGP 200A); (MGP 202A or MGB 202A or MGT 202A); (MGT 205 or MGB 205 or MGP 205) Focuses on planning, acquiring, and managing a company's financial resources. Includes discussion of financial aspects of mergers and other forms of reorganization; analysis of investment, financial, and dividend policy; and theories of optimal capital structure. Effective: 2017 Fall Quarter.

MGP 261—Investment Analysis (3)
Lecture—3 hours. Prerequisite(s): (MGT 203A or MGP 203A or MGB 203A); (MGB 205 or MGT 205 or MGP 205) Examines asset pricing theories and relevant evidence, including the investment performance of stocks and bonds. Topics include the efficiency of markets, domestic and international portfolio diversification, factors influencing the value of stocks and other investments, and portfolio management and performance. (P/NP grading only.) Effective: 2017 Fall Quarter.

MGP 262—Money and Security Markets (3)
Lecture—3 hours. Examines how money and securities markets are organized; how public agencies, businesses, others obtain and invest funds in those markets. Relationship between interest rates, monetary policy, government's role in improving capital markets, approaches to assessing changes in regulation of specific markets. Effective: 1994 Fall Quarter.

MGP 263—Derivative Securities (3)
Lecture/Discussion—3 hours. Prerequisite(s): (MGT 205 or MGP 205 or MGB 205); (MGT 203A or MGP 203A or MGB 203A) Open to students enrolled in the MBA program. Behavior of options, futures, and other derivative securities markets and how public agencies, business and others use those markets. Trading strategies involving options, swaps, and financial futures contracts. Pricing of derivative securities, primarily by arbitrage methods. Effective: 2017 Fall Quarter.

MGP 264—Business Taxation (3)
Lecture—3 hours. Analysis of the impact of business taxation on investment, production, and finance decisions. Discussion of the relationship between business organization and tax liability. Course is not intended for tax specialists. Effective: 1994 Fall Quarter.

MGP 265—Venture Capital and the Finance of Innovation (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGB 205 or MGP 205 or MGT 205 Restricted to students in the MBA program. Examines venture capital finance and the related practice of R&D finance. Goal is to apply finance tools and framework to the world of venture capital and financing of projects in high-growth industries. Effective: 2017 Fall Quarter.

MGP 266—International Finance (3)
Lecture—3 hours. Prerequisite(s): MGT 205 or MGB 205 or MGP 205; Or the equivalent. Studies fixed and floating exchange-rate systems. Topics include determinants of a nation's balance of international payments; macroeconomic interdependence of nations under various exchange-rate regimes and its implications for domestic stabilization policies; and the international coordination of monetary and stabilization policies. Effective: 2017 Fall Quarter.

MGP 267—Teams and Technology (3)
Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Restricted to working professional MBA students. Theory and practice of managing teams with primary goals of: providing conceptual guidelines for analyzing and diagnosing group dynamics and determining strategic options as a manager; imparting interpersonal skills for implementing effective strategies; understanding how technological changae affects team processes. Effective: 2009 Spring Quarter.

MGP 268—Articulation and Critical Thinking (3)
Lecture/Discussion—3 hours. With commitment to this course, students will become competent public speakers, write well at a level expected in business, think efficiently and critically about business challenges and have a useful personal code of ethics to shape their actions and decisions. No student may repeat course for credit. Effective: 2013 Fall Quarter.

MGP 269—Business Intelligence Technologies-Data Mining (3)
Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Restricted to students in the MBA program. Descriptive and Predictive Data mining methods covering association rules, clustering, classification, text mining, etc. Big data Technologies. Business applications. Hands-on data mining skills. Business intelligence for managerial decision making. Effective: 2016 Spring Quarter.

MGP 270—Corporate Financial Reporting (3)
Lecture—3 hours. Prerequisite(s): MGT 200A or MGP 200A or MGB 200A Analyzes and evaluates contemporary issues in financial reporting and develops implications of those issues for business decision makers, investment managers, and accounting policymakers. Effective: 2017 Fall Quarter.

MGP 271—Strategic Cost Management (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 202A or MGP 202A or MGB 202A Restricted to students in the MBA program. Theoretical frameworks and associated techniques for using organizational design and cost management to achieve a sustainable, profitable cost structure. Topics include: target costing, process design for low cost, total cost of ownership, cost of customers, implementing structural change, and incentives. Effective: 2017 Fall Quarter.

MGP 272—Evaluation of Financial Information (3)
Lecture—3 hours. Prerequisite(s): MGT 200A or MGB 200A or MGP 200A Studies how investors, creditors, others use accounting and other information in making rational investment, lending decisions. Emphasis is placed on the analysis of financial information in a variety of contexts. Where applicable, recent research in finance and economics is discussed. Effective: 2017 Fall Quarter.

MGP 273—Accounting and Reporting for Government Nonprofit Entities (3)
Lecture—3 hours. Concepts, methods, and uses of accounting and financial reporting by governmental and nonprofit entities. Introduction to budgeting and performance evaluation, and accounting for entities such as hospitals, universities, and welfare agencies. Effective: 1994 Fall Quarter.

MGP 274—Corporate Governance (3)
Lecture—3 hours. Prerequisite(s): Full-time MBA students or consent of instructor. Discusses how corporations can better operate in the interests of shareholders and public. Directly relevant to managers, consultants in compensation and incentives, staff working on mergers and acquisitions, corporate regulators, shareholders rights activists, and board members. Effective: 2009 Winter Quarter.

MGP 276—Real Estate, Finance and Development (3)
Lecture—3 hours. Prerequisite(s): (MGT 205 or MGB 205 or MGP 205); (MGP 201A or MGB 201A or MGT 201A) Focus on single family, attached, detached, multi-family, and light commercial development. Students will study factors which make up successful real estate developments. Course will consider financial aspects involved in land acquisition, land development, construction, and project lending. Effective: 2017 Fall Quarter.

MGP 281—Systems Analysis and Design (3)
Lecture—3 hours. Design and specification of computer-based information systems. Applications systems development life cycle, use requirements and feasibility assessment, logical and physical design, program development and testing, conversion and implementation. Effective: 1994 Fall Quarter.

MGP 282—Supply Chain Management (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 203A or MGB 203A or MGP 203A Restricted to students in the MBA program. Matching supply with demand is a primary challenge for a firm: excess supply is too costly, inadequate supply irritates customers. Matching supply to demand is easiest when a firm has a flexible supply process, but flexibility is generally expensive. Effective: 2017 Fall Quarter.

MGP 284—Applied Linear Models for Management (3)
Lecture—3 hours. Covers regression, analysis of variance, and multivariate analysis. Topics will focus on applications to management and policy problems. Effective: 2015 Spring Quarter.

MGP 285—Time Series Analysis and Forecasting (3)
Lecture—3 hours. Prerequisite(s): MGP 203B or MGT 203B or MGB 203B Considers application of time series methods to evaluation and forecasting problems. Covers univariate and multivariate ARIMA models and transfer function models. Applications will be in such areas as economics, finance, budgeting, program evaluation, and industrial process control. Effective: 2016 Spring Quarter.

MGP 286—Telecommunications and Computer Networks (3)
Lecture—3 hours. Prerequisite(s): MGP 280. Communication system components; common carrier services; design and control of communications networks; network management and distributed environment; local area networks; data security in computer networks. Effective: 1995 Spring Quarter.

MGP 287—Business Database and Database Marketing (3)
Lecture—3 hours. Practical introduction to fundamental principles of database management systems and database marketing. Database design. SQL queries. Concepts of database marketing, data warehouse, data visualization and big data analytics. Effective: 2016 Spring Quarter.

MGP 290—Topics in General Management (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Advanced topics in general management. Varied topics to cover more extensively issues discussed in courses 201A and 201B, or current business interest topics in fields of business writing, business communications, development, or workplace processes. May be repeated for credit. Effective: 2009 Fall Quarter.

MGP 291—Topics in Organizational Behavior (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of
Management or the equivalent. Advanced topics in social psychology and sociology of organizations. Varied topics to cover more extensively issues discussed in courses 201A and 201B, or current business interest topics in fields of organization design, strategy, development, or workplace processes. May be repeated for credit. Effective: 1999 Fall Quarter.

MGP 292—Topics in Finance (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Contemporary and emerging issues in finance. Application of modern techniques of finance to business problems. Use of appropriate electronic database and research techniques. May be repeated for credit. Effective: 1999 Fall Quarter.

MGP 293—Topics in Marketing (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Advanced topics in marketing, which may include marketing research, new product development, brand management, pricing, distribution management, service marketing, hitech marketing, advertising, sales promotions, marketing through the Web. May be repeated for credit. Effective: 1999 Fall Quarter.

MGP 294—Topics in Accounting (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of
Management or the equivalent. Contemporary and emerging issues in financial management accounting. Application of modern techniques of evaluation and analysis of financial information. Use of appropriate electronic database and research techniques. May be repeated for credit. Effective: 1999 Fall Quarter.

MGP 295—Topics in Information Technology (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Applications of information technology to management and management of information technology. Adaptation to the dynamic nature of the field. May be repeated for credit. Effective: 1999 Fall Quarter.

MGP 296—Topics in Technology Management (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Cyclical nature of innovation and technological change, features of innovative firms and industries, national innovation systems, and impact of information technologies on innovation processes. May be repeated for credit. Effective: 1999 Fall Quarter.

MGP 297—Topics in International Management (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Broader environment in which U.S. firms and their foreign competitors operate. Integration of material from other topics courses (marketing, strategy, finance, accounting, information technology, technology management) into the international setting. May be repeated for credit. May be repeated for credit. Effective: 1999 Fall Quarter.

MGP 298—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1994 Fall Quarter.

MGP 299—Individual Study (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 2000 Spring Quarter.

MGP 401—Crisis Management (1)
Discussion/Laboratory—1 hour. Establishes and explores the defining characteristics of crises. Will learn to anchor crisis management firmly within overall strategic management and also acquire a set of useful tools and techniques for planning for and handling actual crises. Effective: 2017 Winter Quarter.

MGP 402—Crisis Communications and Reputation Management (1)
Discussion/Laboratory—1 hour. Intended to provide you with an understanding of the framework and tools necessary to successfully address communications and reputation management tasks in a variety of crisis situations. Effective: 2016 Summer Quarter.

MGP 403—Business Statistics Practicum (1)
Project (Term Project)—1 hour. Prerequisite(s): (MGT 203A or MGP 203A or MGB 203A); (MGT 203B (can be concurrent) or MGP 203B (can be concurrent) or MGB 203B (can be concurrent)); MGT 203B, MGP 203B, or MGB 203B completed or required concurrently. Restricted to students in the MBA program. Applies techniques and concepts in business statistics to real case studies. Effective: 2011 Fall Quarter.

MGP 404—Organizational Change Management (1)
Lecture/Discussion—1 hour. Challenges in getting significant changes made in organizations. Learn Organization Change Management (OCM) techniques and discuss case situations where OCM techniques play a role. Effective: 2016 Fall Quarter.

MGP 405—Business Literature (1)
Lecture/Discussion—1 hour. Will examine Business history – historical trends that might influence contemporary business. Some argue that the recent collapse of our financial system might have been averted if business leaders had a better sense of history. Effective: 2017 Winter Quarter.

MGP 406—Ethical Issues in Management (1)
Lecture/Discussion—1 hour. Explores the philosophical foundation of ethical theory and its recent applications to business situations. Professional codes of ethics, such as those promulgated by educational, managerial, engineering, scientific, medical and legal professional societies, are presented. Effective: 2017 Winter Quarter.

MGP 407—Storytelling for Leadership (1)
Lecture/Discussion—1 hour. Internalize the fundamental principles behind stories that educate, influence, motivate, inspire, persuade and connect. Effective: 2016 Fall Quarter.

MGP 408—The Business of the Media (1)
Lecture/Discussion—1 hour. Focuses on the media industries and how emerging digital technologies are disrupting the way media consumption, distribution and business models work. Will highlight the economics of several media, both news and entertainment. Effective: 2016 Summer Quarter.

MGP 409—Managing Multi-Asset Class Investment Portfolios (1)
Lecture/Discussion—1 hour. Prerequisite(s): MGP 202A; MGP 203A; MGP 205 Examines top down management of multi-asset class portfolios. Topics include bonds, hedge funds, private equity, real estate, commodities, endowments, return generation, performance analysis, credit cycles, financial crises, manager selection, investment policy, and investment careers. Student teams present endowment portfolio recommendations. Effective: 2015 Spring Quarter.

MGP 410—Corporate Governance (1)
Lecture/Discussion—1 hour. Covers recent and not-so-recent business and accounting scandals, discuss how corporations can better operate in the interests of shareholders, and the public and learn from people who rely on corporate governance in making investment decisions. Effective: 2017 Winter Quarter.

MGP 411—Turnaround Management (1)
Lecture/Discussion—1 hour. Evaluate the financial performance of a company, identify opportunities for improvement, propose real solutions to enhance performance, and most important inspire action in staff. Effective: 2017 Winter Quarter.

MGP 412—International Marketing (1)
Lecture/Discussion—1 hour. Basic concepts of international marketing. Understanding and managing heterogeneous, dynamic, and interdependent environments across countries. How to develop and implement an international marketing strategy: where and how to compete, how to adapt to your marketing mix. Effective: 2016 Fall Quarter.

MGP 413—Sustainable Business Ventures: Business and Energy (1)
Lecture/Discussion—1 hour. Introduction to sustainability goals, indicators, values, measurement techniques, and practice how it applies to large and small enterprise. Effective: 2013 Spring Quarter.

MGP 414—Multi-Channel Marketing (1)
Lecture/Discussion—1 hour. Multi-channel marketing strategies empower managers to create value for different customer segments. Covers the necessary concepts to evaluate and select go-to market strategies in order to capitalize on the ubiquity of modern customers. Effective: 2017 Winter Quarter.

MGP 415—Climate Risks and Opportunities (1)
Lecture/Discussion—1 hour. Provide a working knowledge of the risks and opportunities arising from climate change and climate policy for businesses. Effective: 2016 Summer Quarter.

MGP 416—Topics in Private Equity (1)
Lecture—1 hour. Prerequisite(s): MGP 205 or MGT 205 or MGB 205 Restricted to students in the MBA program. Focuses on the finance principles related to the risk and return of the private equity (PE) industry, valuation of PE target companies, the structuring of leveraged buyouts (LBOs), and the management of portfolio companies. Effective: 2017 Fall Quarter.

MGP 417—Incentives and Controls (1)
Lecture/Discussion—1 hour. Understand how organizations use financial and nonfinancial performance management and incentive systems to motivate people and manage resources. Effective: 2017 Winter Quarter.

MGP 418—Scientific Discovery and Business Innovation at Scale in the Food and Agriculture Sector (1)
Lecture—3 hours. Restricted to students in the MBA program. Scientific discovery and business innovation within the food and agriculture sector profoundly influences the sustainability of society and enterprise competitiveness. Students will learn how business innovation models co-exist antagonistically or synergistically with scientific discovery and its influence on enterprise competitiveness. Effective: 2017 Winter Quarter.

MGP 419—Business Strategy Consulting Skills (1)
Lecture—5 hours. Restricted to students enrolled in the MBA program. Students will learn practical business consulting skills which will help apply strategy theories in the workplace. Students will learn and practice tools to frame and analyze problems, conduct research, communicate findings and navigate client relationships. Effective: 2017 Winter Quarter.

MGP 420—Advanced Optimization in a Python-based Modeling Language (1)
Web Virtual Lecture—1 hour. Prerequisite(s): (MGP 252 or MGB 252 or MGT 252); (MGP 206 or MGB 206 or MGT 206) Restricted to students enrolled in the MBA program. Covers advanced optimization modeling techniques and practical application of modern, scalable modeling language. Techniques will be developed using examples from production planning in a supply chain, but students may explore other areas of application of optimization for their final project. Effective: 2017 Winter Quarter.

MGP 421—Monte Carlo Simulation for Managerial Analysis (1)
Lecture—1 hour. Students create Excel-based simulation models across business domains, from finance to hypothesis testing and inventory management. By course-end, students are experts at recognizing this decision-making fallacy and fixing it. Effective: 2017 Spring Quarter.

MGP 422—Behavioral Finance and Valuation (1)
Lecture—1 hour. Prerequisite(s): (MGT 260 or MGP 260 or MGB 260); (MGT 261 or MGP 261 or MGB 261) Restricted to students enrolled in the MBA program. Investor psychology and market frictions can cause asset prices to deviate from fundamental values, creating profit opportunities for sophisticated investors. The course will cover techniques of financial analysis with the goal of learning how to value assets and identify mispricing. Effective: 2017 Winter Quarter.

MGP 423—Leader as Coach: An Introduction to Coaching Skills for Leaders (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program. Course introduces the fundamental coaching skills and coaching models that leaders can apply in everyday interactions with their team and colleagues in order to build trust, overcome challenges and help others discover their own full potential. Effective: 2017 Winter Quarter.

MGP 424—Practicum for Managing People in Modern Organizations (1)
Project (Term Project)—1 hour. Prerequisite(s): MGP 224 Restricted to students in the MBA program. Provides solid grounding in the management of work and the employment relationship. Examines firms' interrelated policies and practices for managing people. Effective: 2011 Winter Quarter.

MGP 425—Digital Marketing Techniques (1)
Lecture—1 hour. Course provides students with an introduction to digital marketing. The course introduces MBA students to the fundamental aspects and tools of online marketing communication, i.e., how organizations use digital channels to effectively communicate their value propositions to the target customers. Effective: 2017 Spring Quarter.

MGP 426—The Business of Healthcare (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program (Business Administration—Working Professional, Business Administration—Bay Area, Business Administration—Full-Time). Course is intended to provide students with an overall understanding of the unique business aspects of the healthcare industry. Effective: 2017 Winter Quarter.

MGP 427—Implementing International Strategy (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program (Business Administration—Working Professional, Business Administration—Bay Area, Business Administration—Full-Time). Course looks at the pitfalls of implementing international strategies, and suggest several accessible, yet powerful frameworks to help international managers implement strategies successfully and completely. Effective: 2017 Winter Quarter.

MGP 428—Renewable Energy Ventures: Planning, Funding and Regulatory Risk Assessment for Entrepreneurs and Investors (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program. Advanced innovation lab will introduce students to issues addressed by entrepreneurs and investors in renewable ventures. Lectures, simulations, case studies and practical experience of the presenters will be delivered. Effective: 2016 Summer Quarter.

MGP 429—Detection and Prevention of Asset Misappropriation Fraud in the Workplace (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program. Course will discuss the fundamentals of fraud detection and prevention in the workplace. Students will learn the major schemes involving workplace fraud, how management can detect fraud and what policies and procedures can be implemented to prevent fraud. Effective: 2016 Fall Quarter.

MGP 430—Learning From Catastrophes: Lessons for Managers (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program. Catastrophes unfold in surprisingly similar ways. In this course, students will analyze catastrophes to understand these common patterns and investigate how they can be prevented and mitigated. Students will then apply these lessons to management to gain unconventional insights. Effective: 2016 Summer Quarter.

MGP 431—Project Management (1)
Lecture—10 hours. Open to students enrolled in the MBA program. Students learn project management; including project scope, project planning, milestones and project closing. Important themes include leadership, team dynamics, storytelling/creating a narrative, communication, and conflict management. Effective: 2016 Fall Quarter.

MGP 432—Project Management with Applications in Healthcare (1)
Lecture—1 hour. Course will focus on the heart of healthcare administration and how project management can be applied as a key lever to increase efficiency, decrease costs and improve the patient experience. Effective: 2017 Spring Quarter.

MGP 433—Corporate Social Responsibility (1)
Lecture—1 hour. Learn practical information that will help students understand the basics of designing, managing and evaluating an effective CSR program. Expose students to a basic set of CSR issues in the context of cross-purpose business challenges and then focus on the analysis and critical decisions that managers must make to move their business and their social agenda forward. Effective: 2018 Spring Quarter.

MGP 434—Practicum for Pricing (1)
Project (Term Project)—1 hour. Prerequisite(s): MGP 234 Restricted to students in the MBA program. Enhance understanding of the principles and concepts learned in Pricing by (1) teaching the necessary statistical and mathematical skills, and (2) requiring a report for a real Pricing case. Effective: 2011 Winter Quarter.

MGP 440—Integrated Management Project (5)
Project (Term Project)—3 hours. Prerequisite(s): First-year core courses of MBA program. Applies classroom learning to solve complex business challenges for real world clients. Student teams learn practical consulting skills while their clients benefit from the student's experience, insights, and work product. Effective: 2016 Fall Quarter.

MGP 440A—Integrated Management Project (3)
Lecture/Discussion—3 hours. Prerequisite(s): First-year core courses of MBA program. Restricted to full-time MBA students. Applies classroom learning to solve complex business challenges for real world clients. Student teams learn practical consulting skills while their clients benefit from the student's experience, insights, and work product. Effective: 2015 Spring Quarter.

MGP 440B—Integrated Management Project (3)
Project (Term Project)—3 hours. Prerequisite(s): First-year core courses of MBA program. Restricted to full-time MBA students. Applies classroom learning to solve complex business challenges for real world clients. Student teams learn practical consulting skills while their clients benefit from the student's experience, insights, and work product. Effective: 2015 Spring Quarter.

MGP 440C—Integrated Management Project Lead (1)
Project (Term Project)—1 hour. Integrated Management Project Team leader. Effective: 2016 Fall Quarter.

MGP 442—Practicum for Marketing Communication (1)
Project (Term Project)—1 hour. Prerequisite(s): MGP 242 Restricted to students in the MBA program. Provides experience applying concepts learned in Marketing Communications to a realistic advertising or communication problem faced by firms. Effective: 2011 Spring Quarter.

MGP 443—Practicum for Customer Relationship Management (1)
Project (Term Project)—1 hour. Prerequisite(s): MGP 243 Restricted to students in the MBA program. Hands-on training in applying Customer Relationship Management concepts and metrics to secondary data. Enhances ability to interpret results and decide the right type of marketing actions by requiring an executive report at the end of the quarter. Effective: 2010 Fall Quarter.

MGP 448—Practicum for Marketing Strategies (1)
Project (Term Project)—1 hour. Prerequisite(s): MGP 248 Restricted to students in the MBA program. Provides opportunities to apply the concepts covered in the Marketing Strategies class through a group project involving the analysis of strategic marketing decisions based on business-related issues, simulation and modeling. Effective: 2010 Fall Quarter.

MGP 449—Marketing Research Practicum (1)
Project (Term Project)—1 hour. Prerequisite(s): MGP 249 Restricted to students in the MBA program, or in some cases with permission of instructor. Provides opportunities to apply the concepts and methods covered in the Marketing Research class. Hands-on and project-based, work could be either individual or in groups depending on enrollments and/or interests of students. Effective: 2011 Spring Quarter.

MGP 450—Practicum for Technology Strategy and Competition (1)
Project (Term Project)—1 hour. Prerequisite(s): MGP 250 Restricted to students in the MBA program. In-depth practicum project course. Apply theories, concepts, and models, learned in course 250 to a real-world business problem, through data collection, data analysis, simulation, modeling and post-model interpretation. Effective: 2011 Winter Quarter.

MGP 460—Practicum for Corporate Finance and Real Estate (1)
Project (Term Project)—1 hour. Prerequisite(s): MGP 260 Restricted to students in the MBA Program. Work in groups to select and value a financial entity. It could be a firm, a sports player, a building, a project, or a patent. Grade based on an in-class presentation and a write-up. Effective: 2011 Spring Quarter.

MGP 461—Practicum for Investment Analysis (1)
Project (Term Project)—1 hour. Prerequisite(s): MGP 261 Restricted to students in the MBA program. Provides practical experience applying concepts learned in Investment Analysis to a realistic portfolio management setting via a hypothetical exercise. Produce a realistic executive summary and presentation of an investment proposal for a hypothetical client. Effective: 2010 Fall Quarter.

MGP 464—Practicum for Taxes and Business Strategy (1)
Project (Term Project)—1 hour. Prerequisite(s): MGP 264 Restricted to students in the MBA program. Practical application project drawing from the tax planning theory contained in course 264. Project consists of a business formation and operation, change in organization (incorporation), and movement into multi-national and multi-jurisdictional tax. Effective: 2010 Fall Quarter.

MGP 465—Practicum for Venture Capital (1)
Project (Term Project)—1 hour. Prerequisite(s): MGP 265 Restricted to students in the MBA program. Provides an opportunity to apply concepts learned in Venture Capital in a realistic setting. Complete project analyzing a potential investment in a hypothetical venture and prepare an deal term sheet/investment agreement. Effective: 2011 Winter Quarter.

MGP 467—Practicum for Teams and Technology (1)
Project (Term Project)—1 hour. Prerequisite(s): MGP 267 Restricted to students in the MBA program. Groups investigate the performance, creativity, conflict, information sharing, and leadership behaviors of a real world team. Provide consulting advice to the team, which not only gives analytic skills, but also builds presentation skills. Effective: 2011 Spring Quarter.

MGP 469—Practicum for Business Intelligence Technologies (1)
Project (Term Project)—1 hour. Prerequisite(s): MGP 269 Restricted to students in the MBA program. Projects applying concepts learned in Business Intelligence Technologies to real business problems. Effective: 2011 Winter Quarter.

MGP 482—Practicum for Supply Chain Management (1)
Project (Term Project)—1 hour. Prerequisite(s): MGT 282 (can be concurrent) or MGP 282 (can be concurrent) or MGB 282 (can be concurrent); Course is a pre-requisite or co-requisite. Restricted to students in the MBA program. Provides experience applying concepts learned in Supply Chain Management to a realistic management setting via a project. Effective: 2011 Spring Quarter.

MGP 490—Directed Group Study Management Practicum (3)
Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Sponsorship of a GSM Academic Senate faculty member; approval of graduate advisor. Provides opportunity for students to gain experience in applying business methodologies previously acquired in other GSM courses. May be repeated for credit. Effective: 2012 Summer Quarter.

MGP 498—Directed Group Study Management Practicum (1-12)
Project (Term Project). Prerequisite(s): Consent of Instructor. Sponsorship of a GSM Academic Senate faculty member; approval of graduate advisor. Provides the opportunity for students to gain experience in applying business methodologies previously acquired in other GSM courses. May be repeated up to 6 unit(s). (S/U grading only.) Effective: 2011 Summer Quarter.

MGP 499—Directed Individual Study Management Practicum (1-12)
Project (Term Project). Prerequisite(s): Consent of Instructor. Sponsorship of a Graduate School of Management Academic Senate faculty member; approval of graduate advisor. Provides the opportunity for students to gain experience in applying business methodologies previously acquired in other Graduate School of Management courses. May be repeated for credit. (S/U grading only.) Effective: 2011 Summer Quarter.

Management, Graduate School of | MGT Courses

Students must complete the Management core course requirement before enrolling in any of the following elective courses, or petition with consent of the instructor. The core courses include: 200A, 201A, 201B, 202A, 203A, 204, 205, 252, 268, 440, 440A, 440B, 440C. For a list of elective courses, see https://webapps.gsm.ucdavis.edu/Raps/courses/curriculumOverviewByProgram?program=SMBA.

Courses in MGT:

MGT 011A—Elementary Accounting (4)
Discussion—1 hour; Lecture—3 hours. Basic concepts of accounting; interpreting and using financial statements; understanding accounting principles. GE credit: SS. Effective: 2017 Summer Session 1.

MGT 011B—Elementary Accounting (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MGT 011A Theory of product costing; Analyzing the role and impact of accounting information on decision making; planning and performance evaluation. GE credit: SS. Effective: 2017 Spring Quarter.

MGT 012Y—Navigating Life's Financial Decisions (3)
Lecture—2 hours; Web Virtual Lecture—1 hour. Survey of major life financial decisions (e.g., career choice, consumption v. saving, investments, mortgages, insurance) and how decision-making biases (e.g., overconfidence, present bias, limited attention) can lead to suboptimal choice. The course draws on research from economics, psychology, and sociology. GE credit: QL, SS. Effective: 2016 Winter Quarter.

MGT 098—Directed Group Study (1-5)
Seminar—3-15 hours. Open to all undergraduates, but is primarily intended for lower division students. May be repeated for credit. (P/NP grading only.) Effective: 2016 Fall Quarter.

MGT 100—Introduction to Financial Accounting (3)
Lecture—3 hours. Prerequisite(s): MGT 011A Course is open to all upper division undergraduate and graduate students, except those in the Graduate School of Management. Introduction to the concepts, methods, and uses of accounting and financial reporting. Effective: 2016 Summer Session 1.

MGT 101—Sources and Uses of Accounting Information (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MGT 011A; MGT 011B Develops an understanding of the supply and demand of accounting information. Topics include the generation and processing of accounting information, the examination of accounting information by auditors, and the use of accounting information by capital markets and tax authorities. Effective: 2017 Fall Quarter.

MGT 103—Intermediate Financial Accounting I (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MGT 011A; MGT 011B Course begins to develop expertise in the accounting for assets and introduces students to the analysis of financial statements. Effective: 2017 Fall Quarter.

MGT 105—Intermediate Financial Accounting II (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MGT 103 Course continues to develop expertise in the preparation of financial statements by studying the accounting for liabilities and stockholders' equity. Course also examines the accounting for contracts that can have significant effects on firms' financial statements. Effective: 2017 Fall Quarter.

MGT 107—Intermediate Financial Accounting III (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MGT 105 Course finishes the Intermediate Financial Accounting series by examining in depth the accounting for contracts related to pensions and leases. Course teaches the preparation of the statement of cash flows and footnote disclosures. Effective: 2017 Spring Quarter.

MGT 120—Managing and Using Information Technology (4)
Discussion—1 hour; Lecture—3 hours. Develop an analytical framework to manage and monitor business systems concerned with operational, human, and organizational interactions. Introduction to computer hardware, systems software, and information systems. Management of information technology and the impact of information systems on modern management. GE credit: SS. Effective: 2016 Summer Session 1.

MGT 140—Marketing for the Technology-Based Enterprise (4)
Discussion—1 hour; Lecture—3 hours. Quantitative analysis of needs in a product (technology-based) economy, with emphasis on how scientists, engineers, and business people interact to develop and market products and services. GE credit: SS. Effective: 2017 Winter Quarter.

MGT 150—Technology Management (4)
Discussion—1 hour; Lecture—3 hours. Management of firms in high technology industries such as software development and biotechnology research. Motivating and managing workers, organizing for innovation, and making decisions. GE credit: SS. Effective: 2016 Fall Quarter.

MGT 160—Financing New Business Ventures (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MGT 011A; (MAT 016B or MAT 017B or MAT 021B); STA 013 Concepts/methods used to structure and finance new business ventures. Topics include evaluating the net social (financial) benefit of new investment projects; raising venture capital; the role of the venture capitalist; and the choice of organizational structure in new ventures. GE credit: SS. Effective: 2016 Fall Quarter.

MGT 170—Managing Costs and Quality (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MGT 011B; or Consent of Instructor. Designing cost systems in high technology organizations and managing operations to maximize quality and minimize costs. Topics include activity based costing and management, managing quality and time to create value, ethical issues in cost assignment, and differential costing for decision. GE credit: SS. Effective: 2017 Fall Quarter.

MGT 170—Managing Costs and Quality (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MGT 011B; MGT 011A; or Consent of Instructor. Designing cost systems in high technology organizations and managing operations to maximize quality and minimize costs. Topics include activity based costing and management, managing quality and time to create value, ethical issues in cost assignment, and differential costing for decision. GE credit: SS. Effective: 2018 Summer Session 1.

MGT 180—Supply Chain Planning and Management (4)
Discussion—1 hour; Lecture—3 hours. Course develops key concepts and relationships between supply chain design and business models and strategies. Much of the focus is on quantitative techniques for analysis and management of the production and delivery of goods and services by an organization. GE credit: SS. Effective: 2017 Winter Quarter.

MGT 190—Special Topics in Accounting (4)
Seminar—4 hours. Prerequisite(s): MGT 011A; MGT 011B; MGT 101 Seminar in the theory and practice of advanced or emerging areas related to the practice of professional accountancy. Specific topics will vary according to the interests of the instructor or students. Effective: 2017 Spring Quarter.

MGT 200A—Financial Accounting (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management. Introduction to the concepts and objectives underlying the preparation
of financial statements. Topics include understanding the accounting cycle, measurement and valuation problems associated with financial statement components,consideration of the usefulness of financial statements in the analysis of a corporation's operations. Effective: 1997 Fall Quarter.

MGT 200B—Managerial Accounting (3)
Lecture—3 hours. Prerequisite(s): MGT 200A or MGB 200A or MGP 200A Information managers should know to be effective, including: product costing, motivating people, and differential analysis for decision making. Includes team projects and written and oral presentations. Effective: 2017 Fall Quarter.

MGT 201A—The Individual and Group Dynamics (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management. Examines basic psychological and social psychological processes shaping human behavior and applies knowledge of these processes to the following
organizational problems: motivation, job design, commitment, socialization, culture, individual and group decision making, and team building. Effective: 1997 Fall Quarter.

MGT 201B—Organizational Strategy and Structure (3)
Lecture/Discussion—3 hours. Prerequisite(s): Completion of first year courses in Graduate School of Management or the equivalent. Open to MBA students only. Strategic management of organizations, including analysis of industries, firm resources and capabilities and corporate strategy. Strategy formulation, implementation and strategic decision-making. Firm and industry life cycles and change. Analysis of organizational design and structure including differentiation and integration. Effective: 2010 Fall Quarter.

MGT 202A—Markets and the Firm (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management. Examines the interaction of consumers, firms and government, and the effect this interaction has on the use of resources and firm profitability. Fundamental economic concepts such as marginal analysis, opportunity cost, pricing, and externalities are introduced and applied. Effective: 1997 Fall Quarter.

MGT 202B—Business, Government, and the International Economy (3)
Lecture—3 hours. Prerequisite(s): MGT 202A or MGB 202A or MGP 202A Examines the influence of government and international factors on business. Topics include distribution of income, business cycles, inflation and interest rates, the federal debt, monetary policy and international trade and finance. Effective: 2017 Fall Quarter.

MGT 203A—Data Analysis for Managers (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management MBA program or consent of instructor. Introduction to statistics and data analysis for managerial decision making. Descriptive statistics, principles of data collection, sampling, quality control, statistical inference. Application of data analytic methods to problems in marketing, finance, accounting, production, operations, and public policy. Effective: 1997 Winter Quarter.

MGT 203B—Forecasting and Managerial Research Methods (3)
Lecture—3 hours. Prerequisite(s): MGT 203A or MGB 203A or MGP 203A Practical statistical methods for managerial decision making covers regression analysis, time series analysis and forecasting, design and analysis of experiments in managerial research and contingency table analysis. Application of these methods to marketing, finance, accounting, production, operations, and public policy. Effective: 2017 Fall Quarter.

MGT 204—Marketing Management (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management. Analysis of market opportunities, elements of market research, development of marketing strategies, market planning and implementations, and control systems. Consumer and industrial markets, market segmentation, pricing strategies, distribution channels, promotion, and sales. Effective: 1997 Fall Quarter.

MGT 205—Financial Theory and Policy (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management. Corporate financial policy and investment management. Covers capital budgeting, optimal financial structure, cost-of-capital determination, risk measurement. Develops basic valuation principles for investments
with long-lived and risky cash-flows, and extends these to derivative securities, asset portfolios, investment management and hedging. Effective: 2009 Fall Quarter.

MGT 206—Decision Making and Management Science (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management MBA program or consent of instructor. Develops decision-making and problem-solving skills in conjunction with a quantitative model-building approach. Emphasizes how structured modeling techniques, probability forecasts, simulations, and computer optimization models are used in the overall process of making decisions in an uncertain environment. Effective: 1997 Winter Quarter.

MGT 207—Management Information Systems (3)
Lecture—3 hours. Prerequisite(s): Graduate student or consent of instructor. Introduction to computer programming and data handling skills. Use of computer in organizations, emphasis on managerial aspects of computing. Standard and nonstandard uses of data files, centralization versus decentralization of computing, office automation, computer security. Effective: 1997 Winter Quarter.

MGT 215—Business Law (3)
Lecture—3 hours. Prerequisite(s): Completion of administration core requirements or petition with consent of instructor. Introduction to law and legal process in the United States. Sources of law. Structure and operation of courts, federal-state relationships, fundamentals of administrative law, fundamentals of business law. Effective: 1997 Winter Quarter.

MGT 216—Managing Professionals, Budgets, Controls and Ethics (3)
Lecture—3 hours. Prerequisite(s): Graduate standing. Performance measures, budgetary controls and ethical pressures which occur at middle management levels in service-type operations. Addresses such organizations as engineering, medical groups, law offices, management consultants. Effective: 1997 Winter Quarter.

MGT 220—Management of Social Networks (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 201A Open to MBA students only. Principles and applications of social network theory: coordinating divergent interests to create value for individuals and organizations. Emphasis on conceptual models, web-based diagnostic tools, and practical applications. Effective: 2004 Winter Quarter.

MGT 223—Power and Influence in Management (3)
Seminar—3 hours. Prerequisite(s): MGT 201A or MGB 201A or MGP 201A; Consent of Instructor. Investigation of the bases of power in organizations and the tactics used to translate power into influence. Topics include the control of resources (including information), social psychological processes (including commitment), the construction of meaning, and ethics. Effective: 2017 Fall Quarter.

MGT 224—Managing People in High-Performance Organizations (3)
Lecture—3 hours. Prerequisite(s): MGT 201A or MGB 201A or MGP 201A Restricted to students in the MBA program. Strategic approach to the management of people within organization. Analyze employment systems' fit with firms' environments and strategies. Explore consequences of choices firms make in managing people—decisions as to selection, performance evaluation, compensation, and other management policies and practices. Not open to students who have taken MGB 224 or MGP 224. Effective: 2017 Fall Quarter.

MGT 234—Pricing (3)
Lecture/Discussion—3 hours. Prerequisite(s): (MGT 202A or MGB 202A or MGP 202A); (MGT 203B or MGB 203B or MGP 203B); (MGB 204 or MGP 204 or MGT 204) Restricted to students in the MBA program. Combines lectures, cases and homework to teach students tools and skills necessary to analyze pricing situations, make pricing decisions, and implement them, in a systematic manner. Effective: 2017 Fall Quarter.

MGT 239—Digital Marketing (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 204 or MGB 204 or MGP 204 Course equips students for a career in digital marketing and social media. Topics include online advertising, search engine optimization, interactive mktg, online privacy issues, e-commerce, social influence, social network theory, measurement of social influence and integrating social and traditional media. Effective: 2017 Fall Quarter.

MGT 240—Management Policy and Strategy (3)
Lecture—3 hours. Prerequisite(s): First-year core courses of M.B.A. program. Examines the scope of missions, objectives strategies, policies, structures, measurements and incentives which bear on the management of an organization. Real client organizations, in the private and public sectors, are assigned to student teams as the subjects of study. Effective: 1997 Winter Quarter.

MGT 240A—Intergrated Management Project (3)
Lecture/Discussion—3 hours. Prerequisite(s): First-year core courses of MBA program. Restricted to full-time MBA students. Applies classroom learning to solve complex business challenges for real world clients. Student teams learn practical consulting skills while their clients benefit from the student's experience, insights, and work product. Effective: 2013 Spring Quarter.

MGT 241—New Product Development (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 204 or MGB 204 or MGP 204 Open to graduate students in the Graduate School of Management. State-of-the-art concepts and methods to enhance the effectiveness of new product development activities. Focuses on the understanding of managerial issues and acquiring the ability to solve problems. Effective: 2017 Fall Quarter.

MGT 242—Marketing Communications (3)
Lecture—3 hours. Issues in designing a marketing communications strategy. Topics include mass and direct communications, institutional aspects of advertising, consumer behavior, evaluating ad effectiveness, determining ad budget, creative strategy, and use and abuse of promotions. Effective: 2000 Fall Quarter.

MGT 243—Customer Relationship Management (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 204 or MGB 204 or MGP 204 Restricted to MBA students only. Customer Relationship Management (CRM) is a management approach under which marketing activities are organized and measured around customers (rather than around brands.) This approach is appealing because customers, not brands, are those who make buying decisions. Effective: 2017 Fall Quarter.

MGT 244—New and Small Business Ventures (3)
Lecture—3 hours. Prerequisite(s): MGT 204 or MGB 204 or MGP 204 Student teams develop complete business plans for their own start-up ventures. Process includes: elevator pitch, business strategy, comprehensive bottoms-up financial projections, capital requirements, product differentiation, competitive, alliance, and go-to-market strategy development, investor presentation, and comprehensive written business plan. Effective: 2017 Fall Quarter.

MGT 245—Business Writing (3)
Lecture/Discussion—3 hours. Prerequisite(s): Completion of first-year core courses at the Graduate School of Management or the equivalent. Restricted to MBA students only. Techniques for sharpening writing skills are introduced, along with grammatical structure, word choice, and punctuation. Learn to develop styles that are pitch-perfect for given situations and to think strategically about each communication challenge in a management setting. Effective: 2011 Fall Quarter.

MGT 246—Negotiation and Team Building (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 205; MGT 202. Basic theory of negotiation; applies theory to process of building teams to achieve business purposes. Covers integrative and distributive strategies of claiming value, how to recognize bargaining tricks, uncovering hidden agendas, brainstorming to extend Pareto frontier. Effective: 2011 Fall Quarter.

MGT 247—Customer Service as a Marketing Tool (3)
Lecture—3 hours. Understanding the distinct features of services, how to create value through service, methods of building strong relationships with customers, methods of measuring and building customer satisfaction, and measuring the financial impact of service improvement. Effective: 1998 Spring Quarter.

MGT 248—Marketing Strategies (3)
Lecture—3 hours. Prerequisite(s): (MGT 202A or MGB 202A or MGP 202A); (MGP 204 or MGB 204 or MGT 204) Examines process by which organizations develop strategic marketing plans. Includes definition of activities and products, marketing audits, appraising market opportunities, design of new activities and products, and organizing marketing planning function. Applications to problems in private and public sector marketing. Effective: 2017 Fall Quarter.

MGT 249—Marketing Research (3)
Lecture—3 hours. Prerequisite(s): (MGT 202A or MGB 202A or MGP 202A); (MGP 203A or MGB 203A or MGT 203A); (MGT 204 or MGB 204 or MGP 204) Course addresses the managerial issues and problems of systematically gathering and analyzing information for making private and public marketing decisions. Covers the cost and value of information, research design, information collection, measuring instruments, data analysis, and marketing research applications. Effective: 2017 Fall Quarter.

MGT 250—Technology, Competition and Strategy (3)
Lecture—3 hours. Prerequisite(s): (MGT 202A or MGB 202A or MGP 202A); (MGP 203A or MGT 203A or MGB 203A) Restricted to students in the MBA program. Why is software typically so defective? Why do many firms in the IT industry give away their best products free? This course helps you analyze questions like these by modeling competition and strategy in the network, technology and information industries. Effective: 2017 Fall Quarter.

MGT 251—Management of Innovation (3)
Lecture—3 hours. Prerequisite(s): MGT 201A or MGB 201A or MGP 201A Managing innovative enterprise in changing and uncertain environments. Covers technology forecasting and assessment, program selection and control, financial management, regulation, and ethics. Effective: 2017 Fall Quarter.

MGT 252—Managing for Operational Excellence (3)
Lecture—3 hours. Prerequisite(s): MGT 203A or MGB 203A or MGP 203A Open to students in the Graduate School of Management. Explores the management of operations as applied to manufacturing as well as services provided both inside and outside the organization. Develop an understanding of how uncertainty affects planning and delivery by looking at fundamental models of operations. Effective: 2018 Spring Quarter.

MGT 253—Corporate Social Responsibility (3)
Lecture—3 hours. Goal in this course will be to develop a thought process and approach to corporate social responsibility that students will be able to build on during their post-school leadership roles, whether as corporate executives, entrepreneurs, or NGO leaders. Effective: 2016 Spring Quarter.

MGT 255—Entrepreneurship and Venture Investment Clinic (3)
Lecture—3 hours. Class size limited to 30 students. Provides the necessary analytical and design tools to create business ideas and refine business models based on emerging technologies. Students learn to work closely in small teams to synthesize technical, strategic, and marketing needs into designs for new ventures. Effective: 2016 Spring Quarter.

MGT 258—Mergers and Acquisitions (3)
Lecture—3 hours. Prerequisite(s): MGT 205 Course focuses on the market for corporate acquisitions and restructuring activity. Topics include: sources of value creation; takeovers; anti-takeover provisions; bidding strategies; use of leverage in buyouts; regulatory risk and hurdles; and, valuation approaches for highly leveraged transactions. Effective: 2015 Spring Quarter.

MGT 259—Banking and the Financial System (3)
Lecture—3 hours. Prerequisite(s): MGB 205 or MGP 205; Consent of Instructor. Analyzes the role of financial markets and institutions in allocating capital. Focuses on: bank lending; debt securities; financial market innovations; regulation; functions of commercial banks and other financial intermediaries. Utilizes case studies. Effective: 2016 Spring Quarter.

MGT 260—Corporate Finance (3)
Lecture—3 hours. Prerequisite(s): (MGT 200A or MGB 200A or MGP 200A); (MGP 202A or MGB 202A or MGT 202A); (MGT 205 or MGP 205 or MGB 205) Focuses on planning, acquiring, and managing a company's financial resources. Includes discussion of financial aspects of mergers and other forms of reorganization; analysis of investment, financial, and dividend policy; and theories of optimal capital structure. Effective: 2017 Fall Quarter.

MGT 261—Investment Analysis (3)
Lecture—3 hours. Prerequisite(s): (MGT 203A or MGB 203A or MGP 203A); (MGP 205 or MGT 205 or MGB 205) Examines asset pricing theories and relevant evidence, including the investment performance of stocks and bonds. Topics include the efficiency of markets, domestic and international portfolio diversification, factors influencing the value of stocks and other investments, and portfolio management and performance. Effective: 2017 Fall Quarter.

MGT 262—Money and Security Markets (3)
Lecture—3 hours. Examines how money and securities markets are organized; how public agencies, businesses, others obtain and invest funds in those markets. Relationship between interest rates, monetary policy, government's role in improving capital markets, approaches to assessing changes in regulation of specific markets. Effective: 1997 Fall Quarter.

MGT 263—Derivative Securities (3)
Lecture/Discussion—3 hours. Prerequisite(s): (MGT 203A or MGB 203A or MGP 203A); (MGP 205 or MGT 205 or MGB 205) Open to students enrolled in the MBA program. Behavior of options, futures, and other derivative securities markets and how public agencies, business and others use those markets. Trading strategies involving options, swaps, and financial futures contracts. Pricing of derivative securities, primarily by arbitrage methods. Effective: 2017 Fall Quarter.

MGT 264—Business Taxation (3)
Lecture—3 hours. Analysis of the impact of business taxation on investment, production, and finance decisions. Discussion of the relationship between business organization and tax liability. Course is not intended for tax specialists. Effective: 1997 Winter Quarter.

MGT 265—Venture Capital and the Finance of Innovation (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 205 or MGP 205 or MGB 205 Restricted to students in the MBA program. Examines venture capital finance and the related practice of R&D finance. Goal is to apply finance tools and framework to the world of venture capital and financing of projects in high-growth industries. Effective: 2017 Fall Quarter.

MGT 266—International Finance (3)
Lecture—3 hours. Prerequisite(s): MGB 205 or MGT 205 or MGP 205; Or the equivalent. Studies fixed and floating exchange-rate systems. Topics include determinants of a nation's balance of international payments; macroeconomic interdependence of nations under various exchange-rate regimes and its implications for domestic stabilization policies; and the international coordination of monetary and stabilization policies. Effective: 2017 Fall Quarter.

MGT 267—Teams and Technology (3)
Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Restricted to working professional MBA students. Theory and practice of managing teams with primary goals of: providing conceptual guidelines for analyzing and diagnosing group dynamics and determining strategic options as a manager; imparting interpersonal skills for implementing effective strategies; understanding how technological change affects team processes. Effective: 2009 Spring Quarter.

MGT 268—Articulation and Critical Thinking (3)
Lecture/Discussion—3 hours. Commitment to this course, become competent public speakers, write well at a level expected in business, think efficiently and critically about business challenges and have a useful personal code of ethics to shape their actions and decisions. No student may repeat course for credit. Effective: 2013 Fall Quarter.

MGT 269—Business Intelligence Technologies-Data Mining (3)
Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Restricted to students in the MBA program. Descriptive and Predictive Data mining methods covering association rules, clustering, classification, text mining, etc. Big data Technologies. Business applications. Hands-on data mining skills. Business intelligence for managerial decision making. Effective: 2016 Spring Quarter.

MGT 270—Corporate Financial Reporting (3)
Lecture—3 hours. Prerequisite(s): MGT 200A or MGP 200A or MGB 200A Analyzes and evaluates contemporary issues in financial reporting and develops implications of those issues for business decision makers, investment managers, and accounting policymakers. Effective: 2017 Fall Quarter.

MGT 271—Strategic Cost Management (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 202A or MGP 202A or MGB 202A Restricted to students in the MBA program. Theoretical frameworks and associated techniques for using organizational design and cost management to achieve a sustainable, profitable cost structure. Topics include: target costing, process design for low cost, total cost of ownership, cost of customers, implementing structural change, and incentives. Effective: 2017 Fall Quarter.

MGT 272—Evaluation of Financial Information (3)
Lecture—3 hours. Prerequisite(s): MGT 200A or MGP 200A or MGB 200A Studies how investors, creditors, others use accounting and other information in making rational investment, lending decisions. Emphasis is placed on the analysis of financial information in a variety of contexts. Where applicable, recent research in finance and economics is discussed. Effective: 2017 Fall Quarter.

MGT 273—Accounting and Reporting for Government Nonprofit Entities (3)
Lecture—3 hours. Concepts, methods, and uses of accounting and financial reporting by governmental and nonprofit entities. Introduction to budgeting and performance evaluation, and accounting for entities such as hospitals, universities, and welfare agencies. Effective: 1997 Winter Quarter.

MGT 274—Corporate Governance (3)
Lecture—3 hours. Prerequisite(s): Full-time MBA students or consent of instructor. Discusses how corporations can better operate in the interests of shareholders and public. Directly relevant to managers, consultants in compensation and incentives, staff working on mergers and acquisitions, corporate regulators, shareholder rights activists, and board members. Effective: 2009 Fall Quarter.

MGT 276—Real Estate, Finance and Development (3)
Lecture—3 hours. Prerequisite(s): (MGP 205 or MGT 205 or MGB 205); (MGP 201A or MGB 201A or MGT 201A) Focus on single family, attached, detached, multi-family, and light commercial development. Students will study factors which make up successful real estate developments. Course will consider financial aspects involved in land acquisition, land development, construction, and project lending. Effective: 2017 Fall Quarter.

MGT 281—Systems Analysis and Design (3)
Lecture—3 hours. Design and specification of computer-based information systems. Applications systems development life cycle, use requirements and feasibility assessment, logical and physical design, program development and testing, conversion and implementation. Effective: 1997 Winter Quarter.

MGT 282—Supply Chain Management (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 203A or MGP 203A or MGB 203A Restricted to students in the MBA program. Matching supply with demand is a primary challenge for a firm: excess supply is too costly, inadequate supply irritates customers. Matching supply to demand is easiest when a firm has a flexible supply process, but flexibility is generally expensive. Effective: 2017 Fall Quarter.

MGT 284—Applied Linear Models for Management (3)
Lecture—3 hours. Covers regression, analysis of variance, and multivariate analysis. Topics will focus on applications to management and policy problems. Effective: 1997 Winter Quarter.

MGT 285—Time Series Analysis and Forecasting (3)
Lecture—3 hours. Prerequisite(s): MGT 203B or MGP 203B or MGP 203B Considers application of time series methods to evaluation and forecasting problems. Covers univariate and multivariate ARIMA models and transfer function models. Applications will be in such areas as economics, finance, budgeting, program evaluation, and industrial process control. Effective: 2016 Spring Quarter.

MGT 286—Telecommunications and Computer Networks (3)
Lecture—3 hours. Prerequisite(s): MGT 280. Communication system components; common carrier services; design and control of communications networks; network management and distributed environment; local area networks; data security in computer networks. Effective: 1997 Winter Quarter.

MGT 287—Business Database and Database Marketing (3)
Lecture—3 hours. Practical introduction to fundamental principles of database management systems and database marketing. Database design. SQL queries. Concepts of database marketing, data warehouse, data visualization and big data analytics. Effective: 2016 Spring Quarter.

MGT 288—Special Topics in Management of Information Systems (3)
Lecture—3 hours. Managerial aspects of information systems. Topics stressing applications in organizations chosen from: economics of computers and information systems, decision support systems, management of computer-based information systems, office automation. Effective: 1997 Winter Quarter.

MGT 290—Topics in General Management (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Advanced topics in general management. Varied topics to cover more extensively issues discussed in courses 201A and 201B, or current business interest topics in fields of business writing, business communications, development, or workplace processes. May be repeated for credit. Effective: 2009 Fall Quarter.

MGT 291—Topics in Organizational Behavior (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Advanced topics in social psychology and sociology of organizations. Varied topics to cover more extensively issues discussed in courses 201A and 201B, or current business interest topics in fields of organization design, strategy, development, or workplace processes. May be repeated for credit. Effective: 2009 Fall Quarter.

MGT 292—Topics in Finance (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Contemporary and emerging issues in finance. Application of modern techniques of finance to business problems. Use of appropriate electronic database and research techniques. May be repeated for credit. Effective: 1999 Fall Quarter.

MGT 293—Topics in Marketing (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Advanced topics in marketing, which may include marketing research, new product development, brand management, pricing, distribution management, service marketing, hitech marketing, advertising, sales promotions, marketing through the Web. May be repeated for credit. Effective: 2009 Fall Quarter.

MGT 294—Topics in Accounting (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Contemporary and emerging issues in financial management accounting. Application of modern techniques of evaluation and analysis of financial information. Use of appropriate electronic database and research techniques. May be repeated for credit. Effective: 1999 Fall Quarter.

MGT 295—Topics in Information Technology (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Applications of information technology to management and management of information technology. Adaptation to the dynamic nature of the field. May be repeated for credit. Effective: 1999 Fall Quarter.

MGT 296—Topics in Technology Management (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Cyclical nature of innovation and technological change, features of innovative firms and industries, national innovation systems, and impact of information technologies on innovation processes. May be repeated for credit. Effective: 1999 Fall Quarter.

MGT 297—Topics in International Management (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Broader environment in which U.S. firms and their foreign competitors operate. Integration of material from other topics courses (marketing, strategy, finance, accounting, information technology, technology management) into the international setting. May be repeated for credit. May be repeated for credit. Effective: 1999 Fall Quarter.

MGT 298—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

MGT 299—Individual Study (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

MGT 401—Crisis Management (1)
Discussion/Laboratory—1 hour. Establishes and explores the defining characteristics of crises. Will learn to anchor crisis management firmly within overall strategic management and also acquire a set of useful tools and techniques for planning for and handling actual crises. Effective: 2017 Winter Quarter.

MGT 402—Crisis Communications and Reputation Management (1)
Discussion/Laboratory—1 hour. Intended to provide you with an understanding of the framework and tools necessary to successfully address communications and reputation management tasks in a variety of crisis situations. Effective: 2016 Summer Quarter.

MGT 403—Business Statistics Practicum (1)
Project (Term Project)—1 hour. Prerequisite(s): (MGT 203A or MGP 203A or MGB 203A); (MGT 203B (can be concurrent) or MGP 203B (can be concurrent) or MGB 203B (can be concurrent)); MGT 203B, MGP 203B, or MGB 203B completed or required concurrently. Restricted to students in the MBA program. Applies techniques and concepts in business statistics to real case studies. Effective: 2011 Fall Quarter.

MGT 404—Organizational Change Management (1)
Lecture/Discussion—1 hour. Challenges in getting significant changes made in organizations. Learn Organization Change Management (OCM) techniques and discuss case situations where OCM techniques play a role. Effective: 2016 Fall Quarter.

MGT 405—Business Literature (1)
Lecture/Discussion—1 hour. Will examine Business history – historical trends that might influence contemporary business. Some argue that the recent collapse of our financial system might have been averted if business leaders had a better sense of history. Effective: 2017 Winter Quarter.

MGT 406—Ethical Issues in Management (1)
Lecture/Discussion—1 hour. Explores the philosophical foundation of ethical theory and its recent applications to business situations. Professional codes of ethics, such as those promulgated by educational, managerial, engineering, scientific, medical and legal professional societies, are presented. Effective: 2017 Winter Quarter.

MGT 407—Storytelling for Leadership (1)
Lecture/Discussion—1 hour. Internalize the fundamental principles behind stories that educate, influence, motivate, inspire, persuade and connect. Effective: 2016 Fall Quarter.

MGT 408—The Business of the Media (1)
Lecture/Discussion—1 hour. Focuses on the media industries and how emerging digital technologies are disrupting the way media consumption, distribution and business models work. Will highlight the economics of several media, both news and entertainment. Effective: 2016 Summer Quarter.

MGT 409—Managing Multi-Asset Class Investment Portfolios (1)
Lecture/Discussion—1 hour. Prerequisite(s): MGT 202A; MGT 203A; MGT 205 Examines top down management of multi-asset class portfolios. Topics include bonds, hedge funds, private equity, real estate, commodities, endowments, return generation, performance analysis, credit cycles, financial crises, manager selection, investment policy, and investment careers. Student teams present endowment portfolio recommendations. Effective: 2015 Spring Quarter.

MGT 410—Corporate Governance (1)
Lecture/Discussion—1 hour. Covers recent and not-so-recent business and accounting scandals, discuss how corporations can better operate in the interests of shareholders and the public, and learn from people who rely on corporate governance in making investment decisions. Effective: 2017 Winter Quarter.

MGT 411—Turnaround Management (1)
Lecture/Discussion—1 hour. Evaluate the financial performance of a company, identify opportunities for improvement, propose real solutions to enhance performance, and most important inspire action in staff. Effective: 2017 Winter Quarter.

MGT 412—International Marketing (1)
Lecture/Discussion—1 hour. Basic concepts of international marketing. Understanding and managing heterogeneous, dynamic, and interdependent environments across countries. How to develop and implement an international marketing strategy: where and how to compete, how to adapt your marketing mix. Effective: 2016 Fall Quarter.

MGT 413—Sustainable Business Ventures: Business and Energy (1)
Lecture/Discussion—1 hour. Introduction to sustainability goals, indicators, values, measurement techniques, and practice how it applies to large and small enterprise. Effective: 2013 Winter Quarter.

MGT 414—Multi-Channel Marketing (1)
Lecture/Discussion—1 hour. Multi-channel marketing strategies empower managers to create value for different customer segments. Covers the necessary concepts to evaluate and select go-to market strategies in order to capitalize on the ubiquity of modern customers. Effective: 2017 Winter Quarter.

MGT 415—Climate Risks and Opportunities (1)
Lecture/Discussion—1 hour. Provide a working knowledge of the risks and opportunities arising from climate change and climate policy for businesses. Effective: 2016 Summer Quarter.

MGT 417—Incentives and Controls (1)
Lecture/Discussion—1 hour. Understand how organizations use financial and nonfinancial performance management and incentive systems to motivate people and manage resources. Effective: 2017 Winter Quarter.

MGT 418—Scientific Discovery and Business Innovation at Scale in the Food and Agriculture Sector (1)
Lecture—3 hours. Restricted to students in the MBA program. Scientific discovery and business innovation within the food and agriculture sector profoundly influences the sustainability of society and enterprise competitiveness. Students will learn how business innovation models co-exist antagonistically or synergistically with scientific discovery and its influence on enterprise competitiveness. Effective: 2017 Winter Quarter.

MGT 419—Business Strategy Consulting Skills (1)
Lecture—5 hours. Restricted to students enrolled in the MBA program. Students will learn practical business consulting skills which will help apply strategy theories in the workplace. Students will learn and practice tools to frame and analyze problems, conduct research, communicate findings and navigate client relationships. Effective: 2017 Winter Quarter.

MGT 420—Advanced Optimization in a Python-based Modeling Language (1)
Web Virtual Lecture—1 hour. Prerequisite(s): (MGT 252 or MGB 252 or MGP 252); (MGT 206 or MGB 206 or MGP 206) Restricted to students enrolled in the MBA program. Covers advanced optimization modeling techniques and practical application of modern, scalable modeling language. Techniques will be developed using examples from production planning in a supply chain, but students may explore other areas of application of optimization for their final project. Effective: 2017 Winter Quarter.

MGT 421—Monte Carlo Simulation for Managerial Analysis (1)
Lecture—1 hour. Students create Excel-based simulation models across business domains, from finance to hypothesis testing and inventory management. By course-end, students are experts at recognizing this decision-making fallacy and fixing it. Effective: 2017 Spring Quarter.

MGT 422—Behavioral Finance and Valuation (1)
Lecture—1 hour. Prerequisite(s): (MGT 260 or MGP 260 or MGB 260); (MGT 261 or MGP 261 or MGB 261) Restricted to students enrolled in the MBA program. Investor psychology and market frictions can cause asset prices to deviate from fundamental values, creating profit opportunities for sophisticated investors. The course will cover techniques of financial analysis with the goal of learning how to value assets and identify mispricing. Effective: 2017 Winter Quarter.

MGT 423—Leader as Coach: An Introduction to Coaching Skills for Leaders (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program. Course introduces the fundamental coaching skills and coaching models that leaders can apply in everyday interactions with their team and colleagues in order to build trust, overcome challenges and help others discover their own full potential. Effective: 2017 Winter Quarter.

MGT 424—Practicum for Managing People in Modern Organizations (1)
Project (Term Project)—1 hour. Prerequisite(s): MGT 224 Restricted to students in the MBA program. Provides solid grounding in the management of work and the employment relationship. Examines firms' interrelated policies and practices for managing people. Effective: 2011 Winter Quarter.

MGT 425—Digital Marketing Techniques (1)
Lecture—1 hour. Course provides students with an introduction to digital marketing. The course introduces MBA students to the fundamental aspects and tools of online marketing communication, i.e., how organizations use digital channels to effectively communicate their value propositions to the target customers. Effective: 2017 Winter Quarter.

MGT 426—The Business of Healthcare (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program (Business Administration—Working Professional, Business Administration—Bay Area, Business Administration—Full-Time). Course is intended to provide students with an overall understanding of the unique business aspects of the healthcare industry. Effective: 2017 Winter Quarter.

MGT 427—Implementing International Strategy (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program (Business Administration—Working Professional, Business Administration—Bay Area, Business Administration—Full-Time). Course looks at the pitfalls of implementing international strategies, and suggest several accessible, yet powerful frameworks to help international managers implement strategies successfully and completely. Effective: 2017 Winter Quarter.

MGT 428—Renewable Energy Ventures: Planning, Funding and Regulatory Risk Assessment for Entrepreneurs and Investors (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program. Advanced innovation lab will introduce students to issues addressed by entrepreneurs and investors in renewable ventures. Lectures, simulations, case studies and practical experience of the presenters will be delivered. Effective: 2016 Summer Quarter.

MGT 429—Detection and Prevention of Asset Misappropriation Fraud in the Workplace (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program. Course will discuss the fundamentals of fraud detection and prevention in the workplace. Students will learn the major schemes involving workplace fraud, how management can detect fraud and what policies and procedures can be implemented to prevent fraud. Effective: 2016 Fall Quarter.

MGT 430—Learning From Catastrophes: Lessons for Managers (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program. Catastrophes unfold in surprisingly similar ways. In this course, students will analyze catastrophes to understand these common patterns and investigate how they can be prevented and mitigated. Students will then apply these lessons to management to gain unconventional insights. Effective: 2016 Summer Quarter.

MGT 431—Project Management (1)
Lecture—10 hours. Open to students enrolled in the MBA program. Students learn project management; including project scope, project planning, milestones and project closing. Important themes include leadership, team dynamics, storytelling/creating a narrative, communication, and conflict management. Effective: 2016 Fall Quarter.

MGT 432—Project Management with Applications in Healthcare (1)
Lecture—1 hour. Course will focus on the heart of healthcare administration and how project management can be applied as a key lever to increase efficiency, decrease costs and improve the patient experience. Effective: 2017 Spring Quarter.

MGT 433—Corporate Social Responsibility (1)
Lecture—1 hour. Learn practical information that will help students understand the basics of designing, managing and evaluating an effective CSR program. Expose students to a basic set of CSR issues in the context of cross-purpose business challenges and then focus on the analysis and critical decisions that managers must make to move their business and their social agenda forward. Effective: 2018 Spring Quarter.

MGT 434—Practicum for Pricing (1)
Project (Term Project)—1 hour. Prerequisite(s): MGT 234 Restricted to students in the MBA program. Enhance understanding of the principles and concepts learned in Pricing by (1) teaching the necessary statistical and mathematical skills, and (2) requiring a report for a real Pricing case. Effective: 2011 Winter Quarter.

MGT 440—Integrated Management Project (5)
Project (Term Project)—3 hours. Prerequisite(s): First-year core courses of MBA program. Applies classroom learning to solve complex business challenges for real world clients. Student teams learn practical consulting skills while their clients benefit from the student's experience, insights, and work product. Effective: 2016 Fall Quarter.

MGT 440A—Integrated Management Project (3)
Lecture/Discussion—3 hours. Prerequisite(s): First-year core courses of MBA program. Restricted to full-time (day) MBA students. Applies classroom learning to solve complex business challenges for real world clients. Student teams learn practical consulting skills while their clients benefit from the student's experience, insights, and work product. Effective: 2012 Fall Quarter.

MGT 440B—Integrated Management Project (3)
Project (Term Project)—3 hours. Prerequisite(s): First-year core courses of MBA program. Restricted to full-time (day) MBA students. Applies classroom learning to solve complex business challenges for real world clients. Student teams learn practical consulting skills while their clients benefit from the student's experience, insights, and work product. Effective: 2013 Winter Quarter.

MGT 440C—Integrated Management Project Team Lead (1)
Project (Term Project)—1 hour. Integrated Management Project Team leader. Effective: 2016 Fall Quarter.

MGT 442—Practicum for Marketing Communication (1)
Project (Term Project)—1 hour. Prerequisite(s): MGT 242 Restricted to students in the MBA program. Provides experience applying concepts learned in Marketing Communications to a realistic advertising or communication problem faced by firms. Effective: 2011 Spring Quarter.

MGT 443—Practicum for Customer Relationship Management (1)
Project (Term Project)—1 hour. Prerequisite(s): MGT 243 Restricted to students in the MBA program. Hands-on training in applying Customer Relationship Management concepts and metrics to secondary data. Enhances ability to interpret results and decide the right type of marketing actions by requiring an executive report at the end of the quarter. Effective: 2010 Fall Quarter.

MGT 448—Practicum for Marketing Strategies (1)
Project (Term Project)—1 hour. Prerequisite(s): MGT 248 Restricted to students in the MBA program. Provides opportunities to apply the concepts covered in the Marketing Strategies class through a group project involving the analysis of strategic marketing decisions based on business-related issues, simulation and modeling. Effective: 2010 Fall Quarter.

MGT 449—Marketing Research Practicum (1)
Project (Term Project)—1 hour. Prerequisite(s): MGT 249 Restricted to students in the MBA program, or in some cases with permission of instructor. Provides opportunities to apply the concepts and methods covered in the Marketing Research class. Hands-on and project-based, work could be either individual or in groups depending on enrollments and/or interests of students. Effective: 2011 Spring Quarter.

MGT 450—Practicum for Technology Strategy and Competition (1)
Project (Term Project)—1 hour. Prerequisite(s): MGT 250 Restricted to students in the MBA program. In-depth practicum project course. Apply theories, concepts, and models, learned in course 250 to a real-world business problem, through data collection, data analysis, simulation, modeling and post-model interpretation. Effective: 2011 Winter Quarter.

MGT 460—Practicum for Corporate Finance and Real Estate (1)
Project (Term Project)—1 hour. Prerequisite(s): MGT 260 Restricted to students in the MBA Program. Work in groups to select and value a financial entity. It could be a firm, a sports player, a building, a project, or a patent. Grade based on an in-class presentation and a write-up. Effective: 2011 Spring Quarter.

MGT 461—Practicum for Investment Analysis (1)
Project (Term Project)—1 hour. Prerequisite(s): MGT 261 Restricted to students in the MBA program. Provides practical experience applying concepts learned in Investment Analysis to a realistic portfolio management setting via a hypothetical exercise. Produce a realistic executive summary and presentation of an investment proposal for a hypothetical client. Effective: 2010 Fall Quarter.

MGT 464—Practicum for Taxes and Business Strategy (1)
Project (Term Project)—1 hour. Prerequisite(s): MGT 264 Restricted to students in the MBA program. Practical application project drawing from the tax planning theory contained in course 264. Project consists of a business formation and operation, change in organization (incorporation), and movement into multi-national and multi-jurisdictional tax. Effective: 2010 Fall Quarter.

MGT 465—Practicum for Venture Capital (1)
Project (Term Project)—1 hour. Prerequisite(s): MGT 265 Restricted to students in the MBA program. Provides an opportunity to apply concepts learned in Venture Capital in a realistic setting. Complete project analyzing a potential investment in a hypothetical venture and prepare an deal term sheet/investment agreement. Effective: 2011 Winter Quarter.

MGT 467—Practicum for Teams and Technology (1)
Project (Term Project)—1 hour. Prerequisite(s): MGT 267 Restricted to students in the MBA program. Groups investigate the performance, creativity, conflict, information sharing, and leadership behaviors of a real world team. Provide consulting advice to the team, which not only gives analytic skills, but also builds presentation skills. Effective: 2011 Spring Quarter.

MGT 469—Practicum for Business Intelligence Technologies (1)
Project (Term Project)—1 hour. Prerequisite(s): MGT 269 Restricted to students in the MBA program. Projects applying concepts learned in Business Intelligence Technologies to real business problems. Effective: 2011 Winter Quarter.

MGT 482—Practicum for Supply Chain Management (1)
Project (Term Project)—1 hour. Prerequisite(s): MGT 282 (can be concurrent) or MGP 282 (can be concurrent) or MGB 282 (can be concurrent); Course is a pre-requisite or co-requisite. Restricted to students in the MBA program. Provides experience applying concepts learned in Supply Chain Management to a realistic management setting via a project. Effective: 2011 Spring Quarter.

MGT 490—Directed Group Study Management Practicum (3)
Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Sponsorship of a GSM Academic Senate faculty member; approval of graduate advisor. Provides opportunity for students to gain experience in applying business methodologies previously acquired in other GSM courses. May be repeated for credit. Effective: 2015 Spring Quarter.

MGT 498—Directed Group Study Management Practicum (1-12)
Project (Term Project). Prerequisite(s): Consent of Instructor. Sponsorship of a GSM Academic Senate faculty member, and approval of graduate advisor. Provides the opportunity for students to gain experience in applying business methodologies previously acquired in other GSM courses. May be repeated up to 6 unit(s). (S/U grading only.) Effective: 2012 Winter Quarter.

MGT 499—Directed Individual Study Management Practicum (1-12)
Project (Term Project). Prerequisite(s): Consent of Instructor. Sponsorship of a Graduate School of Management Academic Senate faculty member and approval of graduate advisor. Provides the opportunity for students to gain experience in applying business methodologies previously acquired in other Graduate School of Management courses. May be repeated for credit. (S/U grading only.) Effective: 2011 Summer Quarter.

Managerial Economics

Managerial Economics | Managerial Economics Information

(College of Agricultural and Environmental Sciences)

Advising Office. 1176 Social Sciences and Humanities Building; 530-754-9536; http://manecon.ucdavis.edu

Faculty. https://are.ucdavis.edu/people/faculty/

Managerial Economics | Managerial Economics B.S.

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The Major Program

The Managerial Economics major at UC Davis is a disciplinary program combining strong preparation in microeconomic theory and quantitative methods. It prepares students for the analysis of management and policy issues in business, finance, marketing, production, agriculture, food distribution, natural resources, the environment, resource allocation, and international trade and development. Students specialize in one or more emphases selected from the following:

1. Business Economics focuses on the economic aspects of managerial decision-making essential for solving problems in business, management, marketing, and finance.
2. International Business Economics explores the economic drivers and policy challenges in the major emerging markets and focuses on how these markets are impacting the world economy.
3. Environmental and Resource Economics concentrates on issues related to the use of resources and environmental quality.
4. Agribusiness Economics focuses on the economic and policy aspects of production and marketing of foods and fibers.

Students in the Managerial Economics program develop valuable skills and strengths that lead to careers in business and government.

Major Advisor. Contact undergraduate advisors at manecon@primal.ucdavis.edu.

Internships and Career Alternatives. Internships for students in Managerial Economics provide additional career experience, information, and preparation in a variety of business enterprises and governmental agencies. For more information, see http://icc.ucdavis.edu/. Managerial Economics majors have established careers in every area of business and industry, including marketing, analysis, consulting, financial services, accounting, entrepreneurship, real estate and government. Many graduates have entered advanced degree programs in business management, accounting, finance, agricultural and resource economics, economics, public policy, and law.

Study Abroad. The Agricultural and Resource Economics department encourages students to complement their Managerial Economics degree with a study abroad experience. Students must seek pre-approval from a Managerial Economics staff advisor for major-related courses. A total of two upper-division courses (maximum four units each) may be applied to major requirements. However, core courses (ARE 100A, 100B, 106, 155, and ECN 101) are excluded. Students are expected to complete ARE 100A and STA 103 prior to taking upper-division classes abroad for the major.

Domestic Institutions. Upper-division coursework taken at other four-year institutions for credit in the major must be reviewed by a Managerial Economics staff advisor.

Graduate Study. Students who meet the admission requirements of Graduate Studies and the Department of Agricultural and Resource Economics may pursue studies leading to the M.S. and Ph.D. degrees. For information on admission to graduate study and degree requirements, consult the Graduate Program Coordinator in the Department of Agricultural and Resource Economics; also see http://agecon.ucdavis.edu.

Preparatory Subject Matter **Units:** 39-41

ARE 018	Business Law	4
PLS 021	Application of Computers in Technology	3
OR		
ECS 015	Introduction to Computers	4
MGT 011A	Elementary Accounting	4
MGT 011B	Elementary Accounting	4

The following must be completed with a grade of C- (or P) or better:

ECN 001A	Principles of Microeconomics	4
OR		
ECN 001AV	Principles of Microeconomics	4

ECN 001B	Principles of Macroeconomics	4
MAT 016A	Short Calculus	3
MAT 016B	Short Calculus	3
MAT 016C	Short Calculus	3
OR		
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
STA 013	Elementary Statistics	4
OR		
STA 013Y	Elementary Statistics	4
STA 103	Applied Statistics for Business and Economics	4

Major English Requirement **Units:** 8

The following must be completed with a grade of C- (or P) or better:

CMN 001	Introduction to Public Speaking	4
OR		
CMN 003	Interpersonal Communication Competence	4
OR		
CMN 003Y	Interpersonal Communication Competence	4
UWP 104A	Writing in the Professions: Business Writing	4

The upper-division composition exam will not satisfy this requirement.

Depth Subject Matter **Units:** 52-55

Core

It is strongly recommended that students complete core courses during their third year.

ARE 100A	Intermediate Microeconomics: Theory of Production and Consumption	4
	Must be completed with a grade of C- or better. NOTE: ECN 100A is not accepted.	
ARE 100B	Intermediate Microeconomics: Imperfect Competition, Markets and Welfare Economics	4
	NOTE: ECN 100B is not accepted.	
ARE 106	Econometric Theory and Applications	4
ARE 155	Operations Research and Management Science	4
ECN 101	Intermediate Macro Theory	4

Restricted Electives

Choose at least one of the emphases below:

Business Economics

Choose 16 units:

ARE 107	Econometrics for Business Decisions	4

ARE 112	Fundamentals of Organization Management	4
ARE 118	Tax Accounting	4
ARE 119	Intermediate Managerial Accounting	4
ARE 136	Managerial Marketing	4
ARE 157	Analysis for Operations and Production Management	4
ARE 171A	Financial Management of the Firm (Discontinued)	4
ARE 171B	Financial Management of the Firm (Discontinued)	4

Choose remaining 16 units from the above list or from:

ARE 115A	Economic Development	4
ARE 115B	Economic Development	4
ARE 120	Agricultural Policy	4
ARE 121	Economics of Agricultural Sustainability	4
ARE 130	Agricultural Markets	4
ARE 132	Cooperative Business Enterprises	4
ARE 138	International Commodity and Resource Markets	4
ARE 139	Futures and Options Markets	4
ARE 140	Farm Management	4
ARE 143	Investments	4
ARE 144	Real Estate Economics	4
ARE 145	Farm and Rural Resources Appraisal	4
ARE 146	Business, Government Regulation, and Society	4
ARE 150	Agricultural Labor	4
ARE 156	Introduction to Mathematical Economics	4
ARE 165	Emerging Economies and Globalization	4
ARE 175	Natural Resource Economics	4
ARE 176	Environmental Economics	4
ARE 194HA	Special Study for Honors Students	4
ARE 194HB	Special Study for Honors Students	4
ECN 115A	Economic Development	4
ECN 115B	Economic Development	4
ECN 121A	Industrial Organization	4
ECN 121B	Industrial Organization	4
ECN 151A	Economics of the Labor Market	4
ECN 151B	Economics of Human Resources	4
ECN 160A	International Microeconomics	4
ECN 160B	International Macroeconomics	4
ESP 175	Natural Resource Economics	4

International Business Economics

Choose 20 units:

ARE 107	Econometrics for Business Decisions	4
ARE 115A	Economic Development	4
ARE 115B	Economic Development	4
ARE 138	International Commodity and Resource Markets	4
ARE 139	Futures and Options Markets	4
ARE 146	Business, Government Regulation, and Society	4
ARE 165	Emerging Economies and Globalization	4

ECN 115A	Economic Development	4
ECN 115B	Economic Development	4
ECN 160A	International Microeconomics	4
ECN 160B	International Macroeconomics	4
ECN 171	Economy of East Asia	4

Choose the remaining 12 units from the above list or from:

ARE 130	Agricultural Markets	4
ARE 171A	Financial Management of the Firm (Discontinued)	4
ARE 171B	Financial Management of the Firm (Discontinued)	4
ARE 175	Natural Resource Economics	4
ARE 176	Environmental Economics	4
ECN 121A	Industrial Organization	4
ECN 121B	Industrial Organization	4
ESP 175	Natural Resource Economics	4
POL 130	Recent U.S. Foreign Policy	4

Environmental and Resource Economics

Choose 8 units:

ARE 175	Natural Resource Economics	4
ARE 176	Environmental Economics	4
ESP 175	Natural Resource Economics	4

Choose 20 units:

ARE 107	Econometrics for Business Decisions	4
ARE 120	Agricultural Policy	4
ARE 132	Cooperative Business Enterprises	4
ARE 138	International Commodity and Resource Markets	4
ARE 140	Farm Management	4
ARE 145	Farm and Rural Resources Appraisal	4
ARE 146	Business, Government Regulation, and Society	4
ARE 150	Agricultural Labor	4
ARE 156	Introduction to Mathematical Economics	4
ECN 125	Energy Economics	4
ECN 130	Public Microeconomics	4
ESP 168A	Methods of Environmental Policy Evaluation	5
ESP 168B	Methods of Environmental Policy Analysis	4
ESP 178	Applied Research Methods	4

Choose the remaining 4 units from the above list or from:

Upper division in Agricultural and Resource Economics.
Upper division in Economics.

ESP 160	The Policy Process	4
ESP 161	Environmental Law	4
ESP 163	Energy and Environmental Aspects of Transportation	4
ESP 167	Energy Policy	4
ESP 171	Urban and Regional Planning	4
ESP 172	Public Lands Management	4
ESP 173	Land Use and Growth Controls	4
ETX 138	Legal Aspects of Environmental Toxicology	3

Agribusiness Economics

Choose 16 units:

ARE 107	Econometrics for Business Decisions	4
ARE 120	Agricultural Policy	4
ARE 121	Economics of Agricultural Sustainability	4
ARE 130	Agricultural Markets	4
ARE 132	Cooperative Business Enterprises	4
ARE 138	International Commodity and Resource Markets	4
ARE 139	Futures and Options Markets	4
ARE 140	Farm Management	4
ARE 145	Farm and Rural Resources Appraisal	4
ARE 150	Agricultural Labor	4

Choose the remaining 16 units from the above list or from:

Upper division in Agricultural and Resource Economics.
Upper division in Economics.

Exceptions to all emphases. The following courses do not apply toward any emphasis: ARE 113, 135, 142, 147, 147M, ECN 102, 134, 140, 162.

Completing more than one emphasis. Courses may overlap between emphases. Requirements must be fulfilled as outlined in each emphasis with a minimum of 32 units.

Students must attain a major GPA of at least a C average (2.000) in courses taken for depth subject matter (core and restricted electives). These courses must be taken for a letter grade. All restricted elective courses taken will be calculated as part of the major GPA, including courses with F grades that have not been repeated.

Total: 99-104

Managerial Economics | Managerial Economics Minor

(College of Agricultural and Environmental Sciences)

Advising Office. 1176 Social Sciences and Humanities Building; 530-754-9536; http://manecon.ucdavis.edu

Faculty. https://are.ucdavis.edu/people/faculty/

Preparation for the minor includes ECN 001A or 001AV, and 001B; MAT 016A- 016B-016C or 017A-017B or 021A-021B; STA 013 or 013Y, and 103, with grades of C- (or P) or better.

One upper-division class to satisfy the minor may be taken for passed/not passed grading. A total of two upper-division courses (maximum four units each) may be taken through UC Study Abroad, all other courses must be taken in residence. Students must seek pre-approval from a Managerial Economics staff advisor for any international courses.

Students must attain a minor GPA of at least a *C* average (2.000) in courses taken for the minor. All upper-division courses taken toward minor requirements will be calculated as part of the minor GPA, including courses with *F* grades that have not been repeated.

Managerial Economics Minor **Units:** 24

ARE 100A	Intermediate Microeconomics: Theory of Production and Consumption	4

Must be completed with a grade of C- or better.

ARE 100B	Intermediate Microeconomics: Imperfect Competition, Markets and Welfare Economics	4
ARE 106	Econometric Theory and Applications	4

Choose 12 units:

ARE 107	Econometrics for Business Decisions	4
ARE 112	Fundamentals of Organization Management	4
ARE 130	Agricultural Markets	4
ARE 136	Managerial Marketing	4
ARE 138	International Commodity and Resource Markets	4
ARE 139	Futures and Options Markets	4
ARE 143	Investments	4
ARE 145	Farm and Rural Resources Appraisal	4
ARE 146	Business, Government Regulation, and Society	4
ARE 150	Agricultural Labor	4
ARE 155	Operations Research and Management Science	4
ARE 156	Introduction to Mathematical Economics	4
ARE 157	Analysis for Operations and Production Management	4
ARE 165	Emerging Economies and Globalization	4
ARE 175	Natural Resource Economics	4
ARE 171A	Financial Management of the Firm (Discontinued)	4
ARE 171B	Financial Management of the Firm (Discontinued)	4
ARE 176	Environmental Economics	4

Total: 24

Marine & Coastal Science

Marine & Coastal Science | Marine & Coastal Science B.S.

(College of Letters & Sciences, College of Agricultural and Environmental Sciences, and College of Biological Sciences)

Michael E. Oskin, Ph.D., Chairperson of the Department

David A. Osleger, Ph.D., Vice-Chairperson, Undergraduate Program

Sujoy Mukhopadhyay, Ph.D., Vice-Chairperson, Graduate Program

Department Office. Earth and Planetary Sciences; 2119 Earth and Physical Sciences; 530-752-0350; http://geology.ucdavis.edu/

Faculty. http://geology.ucdavis.edu/people/faculty/index.php

The major in Marine and Coastal Science focuses on the interdisciplinary nature of marine sciences by exposing students to core, breadth, and focus area courses in the discipline, in addition to a strong foundation of science preparatory material. The major builds upon UC Davis strengths in marine and coastal sciences, including field-based courses offered at Bodega Marine Laboratory to provide students a unique, interdisciplinary, "hands on" education. Advising is provided by the Department of Earth and Planetary Sciences for interested students.

The Program. The major begins with introductory courses in mathematics, chemistry, physics, biology, and earth sciences. These are followed by core courses in Marine Science. The major requirements provide focus and breadth, so that each student gains mastery in one area and broad exposure to many facets of Marine and Coastal Science. Focus areas are: (i) Coastal Environmental

Processes, (ii) Marine Ecology and Organismal Biology, (iii) Marine Environmental Chemistry, and (iv) Oceans and the Earth System.

In this major, students will be exposed to the foundation disciplines within marine science (biology, chemistry, geology, physics) as well as modern issues facing marine and coastal environments; e.g., climate change, pollution, carbon cycling, conservation. The major requires field experience, independent research or internship, and concludes with a capstone course featuring current research in marine science. These integrative experiences will require students to synthesize the interdisciplinary topics that they have encountered through this degree program. The mastery achieved provides a strong foundation for future careers in academic science, government, policy, and the private sector. For more information, see http://marinescience.ucdavis.edu/programs/mcsci/index.html.

Internships and Career Alternatives. A B.S. in Marine and Coastal Science will provide students with knowledge and practical experience needed to pursue careers in marine science (government, private sector, research) and/or advanced degree programs. The major program includes both research and internship experiences to help prepare students for these career paths. For more information, see http://marinescience.ucdavis.edu/programs/mcsci/internships.html.

Advising. Students majoring in Marine and Coastal Science are strongly encouraged to meet with their faculty advisor (assigned, based upon Focus Area choice) once per year to review their coursework plans. Staff advising is available through the Department of Earth and Planetary Sciences, and student peer advisors are available. Faculty advisors include: Tessa Hill (College of Letters and Science), Anne Todgham and John Largier (College of Agricultural and Environmental Sciences), and Brian Gaylord (College of Biological Sciences). For more information, see http://marinescience.ucdavis.edu/programs/mcsci/advising.html.

The student's chosen Focus Area will determine the college into which the student is admitted, the college where the degree is awarded, and the associated department:

- **Coastal Environmental Processes.** College of Agricultural and Environmental Sciences; Environmental Science & Policy
- **Marine Ecology & Organismal Biology.** College of Biological Sciences; Evolution & Ecology
- **Marine Environmental Chemistry.** College of Agricultural and Environmental Sciences; Environmental Toxicology
- **Oceans and the Earth System.** College of Letters and Science; Earth and Planetary Sciences

Preparatory Subject Matter **Units:** 51-63

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
BIS 002C	Introduction to Biology: Biodiversity and the Tree of Life	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 002C	General Chemistry	5
OR		
CHE 003A	Chemistry for Life Sciences: Determining Structure and Predicting Properties	5
CHE 003B	Chemistry for Life Sciences: Predicting and Characterizing Chemical Change	5
CHE 003C	Chemistry for Life Sciences: Controlling Processes and Synthetic Pathways	5

Students in the College of Agricultural and Environmental Sciences and the College of Letters and Science must take the CHE 002 series. Students in the College of Biological Science may take the CHE 002 or 003 series.

MAT 016A	Short Calculus	3
MAT 016B	Short Calculus	3
MAT 016C	Short Calculus	3
OR		
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
MAT 017C	Calculus for Biology and Medicine	4
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4

Students in Marine Ecology & Organismal Biology focus area must take MAT 017A-017B-017C or Mathematics 021A-021B.

PHY 007A	General Physics	4
PHY 007B	General Physics	4
PHY 007C	General Physics	4
OR		
PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5

CHE 008A	Organic Chemistry: Brief Course	2
CHE 008B	Organic Chemistry: Brief Course	4

CHE 008A & CHE 008B are only required for students in Marine Ecology & Organismal Biology focus area.

Strongly recommended:

EVE 012	Life in the Sea	3
GEL 016	The Oceans	3

Depth Subject Matter **Units:** 45-74

GEL 116N	Oceanography	3
OR		
ESP 116N	Oceanography	3

STA 100	Applied Statistics for Biological Sciences	4

Choose two:

GEL 150A	Physical and Chemical Oceanography	4
OR		
ESP 150A	Physical and Chemical Oceanography	4
GEL 150B	Geological Oceanography	3
OR		
ESP 150B	Geological Oceanography	3
GEL 150C	Biological Oceanography	4
OR		
ESP 150C	Biological Oceanography	4

Choose two:

ATM 120	Atmospheric Thermodynamics and Cloud Physics	4
ESP 100	General Ecology	4

ESP 110	Principles of Environmental Science	4
ETX 101	Principles of Environmental Toxicology	4
EVE 100	Introduction to Evolution	4
EVE 101	Introduction to Ecology	4
EVE 112	Biology of Invertebrates	3
AND		
EVE 112L	Biology of Invertebrates Laboratory	2
HYD 103N	Fluid Mechanics Fundamentals	4

EVE 111	Marine Environmental Issues	1
OR		
ESP 111	Marine Environmental Issues	1

Marine Ecology & Organismal Biology focus area:

BIS 101	Genes and Gene Expression	4
BIS 102	Structure and Function of Biomolecules	3
AND		
BIS 103	Bioenergetics and Metabolism	3
OR		
BIS 105	Biomolecules and Metabolism	3
BIS 104	Cell Biology	3

Courses cannot be utilized to fulfill multiple requirements, with the exception that any Bodega Marine Laboratory course simultaneously fulfills the field requirement below.

Focus Area Requirement **Units:** 12

Complete at least four courses from one category below, totaling at least 12 units.

Coastal Environmental Processes. College of Agricultural and Environmental Sciences; Environmental Science & Policy

Emphasis on processes and environments of the coastal zone, and the strong physical-biological connection that exists here. Courses highlight the critical terrestrial-marine interface and fundamental physical processes in the coastal zone.

This focus area requirement can be fulfilled using:

ATM 121A	Atmospheric Dynamics[+]	4
ATM 121B	Atmospheric Dynamics[+]	4
ATM 158	Boundary-Layer Meteorology	4
ETX 102A	Environmental Fate of Toxicants[+]	4
ESP 152	Coastal Oceanography[†]	3
ESP 155	Wetland Ecology	4
ESP 155L	Wetland Ecology Laboratory	3
ESP 166	Ocean and Coastal Policy	3
GEL 156	Hydrogeology and Contaminant Transport[+]	5
GEL 182	Field Studies in Marine Geochemistry	2-8
HYD 103N	Fluid Mechanics Fundamentals	4
HYD 134	Aqueous Geochemistry	6

HYD 143	Ecohydrology[+]	4
HYD 144	Groundwater Hydrology[+]	4
WFC 157	Coastal Ecosystems[+]	4

Marine Ecology and Organismal Biology. College of Biological Sciences; Evolution & Ecology

Focus on physiological adaptations to the marine environment, and the biology of marine species from the molecular to population levels. Courses include emphasis on the ecological processes that determine the distribution and abundance of marine organisms, and the patterns and mechanisms of evolution in the ocean.

The focus area requirement can be fulfilled using:

ANS 131	Reproduction and Early Development in Aquatic Animals[~]	4
BIS 122	Population Biology and Ecology[†]	3
BIS 122P	Population Biology and Ecology/Advanced Laboratory Topics[†]	5
ESP 100	General Ecology	4
ESP 121	Population Ecology	4
ESP 124	Marine and Coastal Field Ecology[†]	3
ESP 155	Wetland Ecology[~]	4
ESP 155L	Wetland Ecology Laboratory	3
EVE 100	Introduction to Evolution	4
EVE 101	Introduction to Ecology	4
EVE 106	Mechanical Design in Organisms[~†]	3
EVE 112	Biology of Invertebrates	3
EVE 112L	Biology of Invertebrates Laboratory	2
EVE 114	Experimental Invertebrate Biology[~†]	3
EVE 115	Marine Ecology	4
EVE 120	Global Change Ecology	3
ETX 127	Environmental Stress and Development in Marine Organisms[~†]	10
NPB 141	Physiological Adaptation of Marine Organisms[†]	3
NPB 141P	Physiological Adaptation of Marine Organisms/Advanced Laboratory Topics[†]	5
WFC 120	Biology and Conservation of Fishes	3
WFC 120L	Laboratory in Biology and Conservation of Fishes	2
WFC 121	Physiology of Fishes	4
WFC 122	Population Dynamics and Estimation	4
WFC 130	Physiological Ecology of Wildlife	4

Marine Environmental Chemistry. College of Agricultural and Environmental Sciences; Environmental Toxicology

Emphasis on major themes in marine chemistry, geochemistry, the carbon cycle, and contaminant fate and transport.

The focus area requirement can be fulfilled using:

CHE 100	Environmental Water Chemistry	3
ETX 101	Principles of Environmental Toxicology[#]	4
ETX 102A	Environmental Fate of Toxicants[#]	4
ETX 120	Perspectives in Aquatic Toxicology[#]	4
ETX 127	Environmental Stress and Development in Marine Organisms[#†]	10
ECI 140A	Environmental Analysis of Aqueous Systems	4
GEL 148	Stable Isotopes and Geochemical Tracers[#]	3

GEL 182	Field Studies in Marine Geochemistry	2-8
HYD 134	Aqueous Geochemistry	6
HYD 141	Physical Hydrology	4
WFC 153	Wildlife Ecotoxicology	4

Oceans and the Earth System. College of Letters and Science; Earth and Planetary Sciences

A study of our changing oceans in the context of earth system history, including climate change, paleoceanography, ecological shifts, conservation, and marine policy.

The focus area requirement can be fulfilled using:

ATM 116	Modern Climate Change	3
ESM 120	Global Environmental Interactions	4
ESM 121	Water Science and Management	3
ESP 110	Principles of Environmental Science[@]	4
ESP 161	Environmental Law	4
ESP 162	Environmental Policy	4
ESP 166	Ocean and Coastal Policy	3
ESP 169	Water Policy and Politics[@]	3
ESP 198	Directed Group Study	1-5
EVE 120	Global Change Ecology[@]	3
GEL 107L	Earth History: Paleobiology Laboratory	2
GEL 107	Earth History: Paleobiology	3
GEL 108	Earth History: Paleoclimates	3
GEL 109	Earth History: Sediments and Strata	2
GEL 109L	Earth History: Sediments and Strata Laboratory	2
GEL 144	Historical Ecology	3
SAS 120	Science and Contemporary Societal Issues	3
WFC 144	Marine Conservation Science	4
WFC 154	Conservation Biology	4

[+]Some courses may require additional prerequisites, such as: ATM 120, MAT 021D, CHE 008B, ESP 100, HYD 103N, 141, 145, ECI 144.
[†]Only offered at Bodega Marine Laboratory.
[~]Some of these courses may require additional prerequisites, such as: ESP 100, EVE 112, WFC 120, ETX 101
[~†]Some of these courses may require additional prerequisites, such as: ESP 100, EVE 112, WFC 120, ETX 101. Only offered at Bodega Marine Laboratory.
[#]Some courses may require additional prerequisites, such as: CHE 008B, GEL 050, 060, HYD 145, ECI 144.
[#†]Some courses may require additional prerequisites, such as: CHE 008B, GEL 050, 060, HYD 145, ECI 144. Only offered at Bodega Marine Laboratory.
[@]Some courses may require additional prerequisites, such as: ATM 060, CHE 008A, 008B, GEL 001, ECN 00 1A, HYD 145, ERS 100, IRE 001.

Breadth Requirement **Units:** 8

Complete one course from each category below, that is not the student's chosen Focus Area, totaling at least eight units.

Coastal Environmental Processes.

The breadth requirement can be fulfilled using the following courses:

ATM 158	Boundary-Layer Meteorology	4
ESP 152	Coastal Oceanography[†]	3
ESP 155	Wetland Ecology[=]	4

GEL 182	Field Studies in Marine Geochemistry	2-8
WFC 157	Coastal Ecosystems[=]	4

Marine Ecology and Organismal Biology.

The breadth requirement can be fulfilled using the following courses:

ESP 124	Marine and Coastal Field Ecology	3
ESP 155	Wetland Ecology[=]	4
EVE 106	Mechanical Design in Organisms[=†]	3
EVE 114	Experimental Invertebrate Biology[=†]	3
EVE 115	Marine Ecology	4
EVE 120	Global Change Ecology	3
ETX 127	Environmental Stress and Development in Marine Organisms[=†]	10
NPB 141	Physiological Adaptation of Marine Organisms[†]	3
NPB 141P	Physiological Adaptation of Marine Organisms/Advanced Laboratory Topics[†]	5

Marine Environmental Chemistry.

The breadth requirement can be fulfilled using the following courses:

ETX 120	Perspectives in Aquatic Toxicology[=]	4
ETX 127	Environmental Stress and Development in Marine Organisms	10
CHE 100	Environmental Water Chemistry	3
GEL 182	Field Studies in Marine Geochemistry	2-8
HYD 134	Aqueous Geochemistry	6
HYD 141	Physical Hydrology	4

Oceans and the Earth System.

The breadth requirement can be fulfilled using the following courses:

ATM 116	Modern Climate Change[=]	3
ESP 166	Ocean and Coastal Policy	3
EVE 120	Global Change Ecology[=]	3
GEL 107	Earth History: Paleobiology	3
GEL 108	Earth History: Paleoclimates	3
WFC 144	Marine Conservation Science	4
WFC 154	Conservation Biology	4

[†]Only offered at Bodega Marine Laboratory.
[=]Some courses may require additional prerequisites; see above.
[=†]Some courses may require additional prerequisites; see above. Only offered at Bodega Marine Laboratory.

Field Requirement **Units:** 35-51

The Field Requirement provides exposure to field techniques, experimental design, and the marine environment itself. It is highly recommended that students fulfill this requirement by residence at Bodega Marine Laboratory for one or more courses; see courses denoted with †. Bodega Marine Laboratory courses may simultaneously fulfill an additional requirement in categories above
OR

Alternatively, students may fulfill the Field Requirement by taking two of the following courses; these courses cannot fulfill multiple requirements:

GEL 109L	Earth History: Sediments and Strata Laboratory	2
EVE 112L	Biology of Invertebrates Laboratory	2
EVE 115	Marine Ecology	4
ESP 123	Introduction to Field and Laboratory Methods in Ecology	4
ESP 151L	Limnology Laboratory	3
GEL 182	Field Studies in Marine Geochemistry	2-8
WFC 100	Field Methods in Wildlife, Fish, & Conservation Biology	4
WFC 102L	Field Studies in Fish Biology: Laboratory	6
WFC 157	Coastal Ecosystems	4

Internship/Research **Units:** 3

BIS 124	Coastal Marine Research	6
GEL 192	Internship in Geology	1-12
ESP 192	Internship	1-12
EVE 192	Internship	1-12
EVE 199	Special Study for Advanced Undergraduates	1-5

OR
The equivalent.

Total Units for the Major by chosen Focus Area:

Coastal Environmental Processes (Agricultural and Environmental Sciences)

Marine Ecology & Organismal Biology (Biological Sciences)

Marine Environmental Chemistry (Agricultural and Environmental Sciences)

Oceans and the Earth System (Letters and Science)

Total: 96-137

Departments, Programs, & Degrees | Master of Health Services; Nursing

Master of Health Services; Nursing | Master of Health Services

Heather M. Young, Ph.D., R.N., F.A.A.N.; Associate Vice Chancellor for Nursing, UC Davis; Dean and Professor, Betty Irene Moore School of Nursing

Theresa A. Harvath, Ph.D., R.N., F.A.A.N.; Executive Associate Dean

Elizabeth Rice, Ph.D., P.M.H.N.P.-B.C., R.N.; Associate Dean for Clinical Education and Practice, Director for the Master of Science—Family Nurse Practitioner Degree Program

Betty Irene Moore Hall
2570 48th St., Sacramento, CA 95817
916-734-2145
http://nursing.ucdavis.edu

Faculty. http://nursing.ucdavis.edu

Mission Statement

The Betty Irene Moore School of Nursing at UC Davis cultivates academic excellence through immersive, interprofessional and interdisciplinary education and research in partnership with the communities serves. Faculty, staff, and students discover and disseminate knowledge to advance health, improve quality of care and shape policy.

Nursing Science and Health-Care Leadership Graduate Degree Program

Hosted by the Betty Irene Moore School of Nursing at UC Davis, the Nursing Science and Health-Care Leadership Graduate Degree Programs prepare nurse leaders, physician assistants, nurse practitioners, researchers and faculty in a unique interdisciplinary and interprofessional environment. The full-time, academic, doctoral program prepares graduates as leaders in health care, health policy and nurse faculty/researchers at the university level. The master's degree Physician Assistant Studies program prepares graduates to deliver care as physician assistants. Graduates of the professional master's degree leadership program are prepared for health-care leadership roles in a variety of organizations and as nurse faculty at the community college and prelicensure education levels. Graduates of the master's degree Nurse Practitioner Program are prepared to deliver care as nurse practitioners.

Faculty

The UC Davis Nursing Science and Health-Care Leadership Graduate Group includes a wide cross-section of academic disciplines with faculty from the Betty Irene Moore School of Nursing as well as UC Davis Health System and other UC Davis schools, colleges, and departments. Within the graduate group faculty are experts in nursing, medicine, health informatics, nutrition, biostatistics, public health and other fields.

Master of Health Services; Nursing | NRS Courses

Courses in NRS:

NRS 201—Health Status and Care Systems (4)
Discussion/Laboratory; Lecture/Discussion—3 hours; Project (Term Project). Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Comparative health status data, major current health issues globally, nationally, regionally. Theoretical perspectives on social, political, economic determinants of health. Health-care systems examined, linked to data, and evaluated in regards to outcomes. Aging, rural, ethnic minority populations highlighted. Effective: 2010 Fall Quarter.

NRS 202—Implementation Science (4)
Lecture/Discussion—4 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Change processes in health care from political, historic, economic and sociologic frameworks. Historic and current examples of transformative change in the health-care system. Skills for system transformation through health policy, practice, research and education are emphasized. Effective: 2010 Winter Quarter.

NRS 203—Leadership in Health Care (4)
Fieldwork; Lecture/Discussion—3 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Critical examination of leadership from a variety of theoretical and philosophical perspectives and focuses on specific challenges in health care and leadership at various levels, e.g., patient, organizational, and policy levels. Effective: 2010 Fall Quarter.

NRS 204—Research Skills for Nursing Science and Health-Care Leadership (4)
Discussion/Laboratory—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Foundation for analyzing research, health, and systems data to answer clinical, systems, or policy questions. Use and examine multiple sources of data and information as a basis for planned change and transformation in health care. Effective: 2014 Winter Quarter.

NRS 205—Research Design in Nursing and Health Care (4)
Lecture/Discussion—4 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Major types of quantitative and qualitative research design and their application to nursing and health-care research. Implications of choosing alternative research designs and critical analysis of philosophical underpinnings. Evaluation of control and validity, sampling, instruments to measure health concepts. Effective: 2010 Fall Quarter.

NRS 205A—Overview of Research in Nursing Science and Health Care (2)
Lecture—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Provides an overview of quantitative and qualitative paradigms in scientific inquiry and the major designs related to each paradigm. First of a three-course series on research design and methods in nursing science and healthcare research. Effective: 2015 Fall Quarter.

NRS 205B—Quantitative Research in Nursing Science and Health Care (4)
Lecture—4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Introduces principles of quantitative data collection and analysis as applied to major study designs in nursing and health-care research. Provides a basic foundation for producing, interpreting, and applying quantitative research findings to answer clinical, system, and policy questions. Effective: 2015 Fall Quarter.

NRS 205C—Qualitative Research in Nursing Science and Health Care (4)
Lecture—4 hours. Prerequisite(s): Consent of Instructor. Restricted to current Ph.D. students in NSHL program or consent of instructor. Introduces principles of qualitative data collection and analysis as applied to major study designs in nursing and health-care research. Provides a basic foundation for producing, interpreting, and applying qualitative research findings to answer clinical, system, and policy questions. Effective: 2015 Fall Quarter.

NRS 206—Community Connections (2-5)
Variable—6 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Open to NSHL MS students only. Community-based learning and experiences including community participation, assessment, data collection and analysis using multiple approaches, community health improvement projects, collaborative leadership practice, all with the guidance of community members and nursing faculty. May be repeated for credit. (S/U grading only.) Effective: 2010 Fall Quarter.

NRS 210Y—Applied Health Informatics (4)
Lecture/Discussion—1 hour; Web Virtual Lecture—3 hours. Prerequisite(s): Consent of Instructor. Open to current student in NSHL graduate programs or consent of instructor. Within the conceptual framework of the Foundation of Knowledge model, this course integrates nursing science, information science, computer science and cognitive science to acquire, process, generate and disseminate knowledge. Effective: 2014 Winter Quarter.

NRS 211Y—Rural Health (2-3)
Fieldwork—1 hour; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Interprofessional graduate course provides an introduction to rural health theory, research, policy, and practice, with an emphasis on rural health assets and disparities. Effective: 2015 Spring Quarter.

NRS 212—Technology & Innovations in Health Care (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Multidisciplinary approach to stimulate new thinking in the practice, process, and delivery of health care. Focus on improving overall health outcomes. Effective: 2017 Winter Quarter.

NRS 220—Social, Cultural, and Behavioral Determinants of Health (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Effects of globalization, political systems, local and global economies, culture, race, class, gender, and sexuality on population health. Effective: 2016 Summer Quarter.

NRS 221—Biophysical Concepts in Nursing (3)
Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Pathophysiological processes that contribute to different disease states across the lifespan; case studies; selective clinical decisions using current, reliable sources of pathophysiology information. Effective: 2016 Summer Quarter.

NRS 222A—Research Quality Improvement and Evidence Based Practice (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Introduction to providing safe, competent and compassionate care in a highly technical and digital environment. Emphasis on safety, quality and research to clinical practice. Accessing and analyzing reliable sources of evidence for integration in care-plan. Effective: 2016 Summer Quarter.

NRS 222B—Research Quality Improvement and Evidence Based Practice (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Introduction to providing safe, competent and compassionate care in a highly technical and digital environment. Emphasis on safety, quality and research to clinical practice. Accessing and analyzing reliable sources of evidence for integration in care-plan. Effective: 2016 Fall Quarter.

NRS 223—Quality and Safety Education in Health Care (2)
Lecture/Discussion—2 hours. Prerequisite(s): NRS 221; NRS 272; NRS 420; NRS 421; NRS 273; NRS 422; NRS 423; NRS 425; Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Implementing best practices alongside technological tools and focusing on continuous quality improvement. Emphasis on providing safe, competent care in a highly technical and digital environment. Building capacity to apply concepts related to safety, quality and research to clinical practice. Effective: 2017 Spring Quarter.

NRS 224—Developing Future Nurse Leaders (2)
Lecture/Discussion—2 hours. Prerequisite(s): NRS 221; NRS 272; NRS 420; NRS 421; NRS 273; NRS 422; NRS 423; NRS 425; NRS 223; NRS 426; Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Develop skills around effective decision making, fiscal and environmental stewardship, initiating and maintaining effective working relationships, using mutually respectful communication and collaboration, care coordination, delegation and supervision. Emphasis on conflict resolution, leadership and interprofessional teamwork. Effective: 2017 Summer Quarter.

NRS 225—Professional Nursing Role Formation (3)
Lecture/Discussion—3 hours. Prerequisite(s): NRS 220; NRS 221; NRS 222A; NRS 272; NRS 420; NRS 421; NRS 429A; NRS 222B; NRS 273; NRS 422; NRS 423; NRS 429B; NRS 203; NRS 212; NRS 425; NRS 429C; NRS 202; NRS 223; NRS 426; NRS 429D; NRS 224; NRS 424; NRS 427; NRS 429E; Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Transition from nursing student to professional nurse. Focus on ethical comportment, professional values of social justice, autonomy, advocacy, altruism, human dignity, and integrity. Students must pass a mastery exit examination and complete a capstone project. Effective: 2017 Fall Quarter.

NRS 242A—Implementation Science for Clinicians (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course focuses on identification of relevant research or improvement questions specific to patient care and evaluating the pertinent research literature related to the implementation of evidence based care. The course is 1st of a 3-course series. Effective: 2014 Summer Quarter.

NRS 242B—Implementation Science for Clinicians (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course is a continuation of course 242A, Implementation Science for Clinicians, with a focus on implementing and evaluating a change. Effective: 2014 Summer Quarter.

NRS 242C—Implementation Science for Clinicians (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Advanced skills in application of implementation science into systems based practice and incorporating quality improvement and patient safety knowledge with particular focus on prevention of medical errors. Effective: 2014 Spring Quarter.

NRS 243A—Leadership in Professional Practice (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course is a critical examination of leadership using theoretical and philosophical perspectives with an applied approach applicable to clinical practice. The 3 course series is conducted across three quarters in the 1st, 3rd and 8th quarters. Effective: 2013 Summer Quarter.

NRS 243B—Leadership in Professional Practice (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course introduces professional role topics including history of the profession, the role in interprofessional teams and the health care system, transitioning to the role from other health professions, scope of practice, certification and licensure and professional organizations. Effective: 2014 Winter Quarter.

NRS 243C—Leadership in Professional Practice (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course expands upon the leadership role as it relates to their clinical practice and professional role. Professional role topics including: transitioning from student to practicing professional, scope of practice, the physician relationship, and more advanced concepts in ethics. Effective: 2014 Spring Quarter.

NRS 250—Foundations of Primary Health Care (7)
Laboratory—3 hours; Lecture/Discussion—6 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course is designed to promote the understanding and clinical application of human anatomy, physiology, histology, immunology and pathology. Effective: 2013 Summer Quarter.

NRS 251A—Primary Health Care (8)
Lecture/Discussion—8 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course introduces primary health care concepts essential to the care of common medical problems seen in primary care settings. Module content will focus on various organ systems and specialty areas. Effective: 2013 Fall Quarter.

NRS 251B—Foundations of Primary Health Care (8)
Lecture/Discussion—8 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course introduces primary health care concepts essential to the care of common medical problems seen in primary care settings. Effective: 2014 Winter Quarter.

NRS 251C—Primary Heath Care (8)
Lecture/Discussion—8 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course introduces primary health care concepts essential to the care of common medical problems seen in primary care settings. Effective: 2014 Spring Quarter.

NRS 251D—Primary Heath Care (6)
Lecture/Discussion—6 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course introduces primary health care concepts essential to the care of common medical problems seen in primary care settings. Effective: 2014 Summer Quarter.

NRS 260—Foundations of Behavioral Health (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course focuses on the spectrum of normal psychological development over the lifespan for children, adults and elders. Theories of stress and coping mechanism are presented as a framework for the assessment of individuals. Effective: 2013 Summer Quarter.

NRS 270—Foundations of Pharmacology (2)
Laboratory—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course introduces the student to the major concepts in pharmacology and relevant human physiology related to pharmacotherapeutics and toxicology. Effective: 2013 Summer Quarter.

NRS 271A—Pharmacology (2)
Laboratory—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Systems based pharmacology focused on classes of drugs used to treat disorders in specialty systems. Effective: 2013 Fall Quarter.

NRS 271B—Pharmacology (2)
Laboratory—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Systems based pharmacology focused on classes of drugs used to treat disorders in specialty systems. Effective: 2013 Fall Quarter.

NRS 271C—Pharmacology (2)
Laboratory—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Systems based pharmacology focused on classes of drugs used to treat disorders in specialty systems. Effective: 2014 Spring Quarter.

NRS 272—Foundations of Pharmacology (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Theoretical background to providing safe and effective care related to drugs and natural products. Effective: 2016 Summer Quarter.

NRS 273—Pharmacology Concepts in Nursing (2)
Lecture/Discussion—2 hours. Prerequisite(s): NRS 221; NRS 272; NRS 420; NRS 421; Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Application of principles for safe and effective use of medications and natural products; use of current, reliable information to make clinical decisions. Effective: 2016 Fall Quarter.

NRS 290—Master's Seminar (2)
Discussion—2 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Open to NSHL MS students only or by consent of course instructor. Subject varies from quarter to quarter. Current knowledge and issues relevant to one of two fields of emphasis: population health or health systems. May be repeated up to 10 time(s). Effective: 2010 Fall Quarter.

NRS 291—Doctoral Seminar (2)
Discussion—2 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Focus on the theory, research and knowledge relevant to one of two fields of emphasis: population health or health systems. Emphasis placed on reading, critique and synthesis of classic and cutting-edge research in nursing and health care. May be repeated up to 10 time(s). Effective: 2010 Fall Quarter.

NRS 291D—Doctoral Seminar (2)
Discussion—2 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Focus on the theory, research and knowledge relevant to one of two fields of emphasis: population health or health systems. Emphasis placed on reading, critique and synthesis of classic and cutting-edge research in nursing and health care. May be repeated up to 10 time(s). (S/U grading only.) Effective: 2014 Winter Quarter.

NRS 298—Special Topics in Nursing Science and Health-Care Leadership (1-4)
Lecture/Discussion—1-2 hours; Variable—1-3 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. In-depth study of topics in Nursing Science and Health-Care Leadership, selected from: policy and politics in health care, health-care disparities, current issues in health care, approaches to the conduct of science, or other related areas, with year to year variation. May be repeated for credit. Effective: 2014 Spring Quarter.

NRS 298V—Online Special Topics in Nursing Science and Health-Care Leadership (1-4)
Web Electronic Discussion—1-4 hours; Web Virtual Lecture—1-4 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. In-depth study of topics in Nursing Science and Health-Care Leadership, selected from: policy and politics in health care, health-care disparities, current issues in health care, approaches to the conduct of science, or other related areas, with year to year variation. May be repeated for credit. Effective: 2014 Winter Quarter.

NRS 299—Research and Writing (1-12)
Extensive Writing/Discussion—3-36 hours. Prerequisite(s): Consent of Instructor. Students in the Nursing Science and Health-Care Leadership graduate programs conduct research and writing under the supervision of a faculty member. May be repeated for credit. (S/U grading only.) Effective: 2011 Winter Quarter.

NRS 299D—Dissertation Research and Writing (1-12)
Extensive Writing/Discussion—3-36 hours. Prerequisite(s): Consent of Instructor. Students in the Nursing Science and Health-Care Leadership graduate programs conduct dissertation research and writing under the supervision of a faculty member. May be repeated for credit. (S/U grading only.) Effective: 2011 Winter Quarter.

NRS 301—Learner Centered Teaching (3-4)
Lecture/Discussion—3 hours; Practice—1 hour. Prerequisite(s): Consent of Instructor. Open to current students in the Nursing Science and Health-care Leadership graduate programs; outside students with prior educational or work experience in education may register for this class with the consent of instructor. Students will explore best practices in learner-centered teaching, performance-based curriculum models, instructional design, and assessing/evaluating student learning. Students will have experience in planning learner-centered activities that are engaging and effective in achieving desired student performance. Effective: 2016 Spring Quarter.

NRS 302—Teaching Methods - Use of Emerging Technologies to Improve Student Learning (4)
Lecture/Discussion—3 hours; Practice—1 hour. Prerequisite(s): Consent of Instructor. Open to current students in the Nursing Science and Health-care Leadership graduate programs; outside students with prior educational or work experience in education may register for this class with the consent of instructor. Students will examine, design and develop instructional strategies that use innovative and emerging technologies to promote motivation, performance and learning in health professions education. Research findings associated with use of various emerging technologies will be examined. Effective: 2016 Fall Quarter.

NRS 303—Professional Role Formation (2-4)
Laboratory—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to current students in the Nursing Science and Health-care Leadership graduate programs; outside students with prior educational or work experience in education may register for this class with the consent of instructor. Exploration of the educator role. Topics include Role Expectations, Legal and Regulatory Issues, Professional Ethics, Educational Scholarship, Individual Differences, Learning Environments, and Lifelong Learning. Placements for the optional practicum are arranged in a wide variety of settings. Effective: 2017 Winter Quarter.

NRS 400—Basic Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Instruction and practice of the fundamental clinical skills necessary for patient care comprise this course with a primary focus on principles of effective communication in establishing the therapeutic provider-patient relationship. Effective: 2013 Summer Quarter.

NRS 401—Basic Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content. Effective: 2013 Fall Quarter.

NRS 410A—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content. Effective: 2014 Winter Quarter.

NRS 410B—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related specified systems. Effective: 2014 Spring Quarter.

NRS 410C—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related specified systems. Effective: 2014 Summer Quarter.

NRS 410D—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related to specified systems. Effective: 2013 Fall Quarter.

NRS 410E—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related to specified systems. Effective: 2013 Fall Quarter.

NRS 410F—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related to specified specialty systems. Effective: 2014 Spring Quarter.

NRS 410G—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related to specified specialty systems. Effective: 2015 Fall Quarter.

NRS 420—Foundations of Clinical Nursing Practice (3)
Clinical Activity—9 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Foundational course introduces students to core concepts of clinical nursing, including clinical reasoning, professional ethics, therapeutic communication and activities of daily living. Develop skills for the provision of safe, high quality, culturally-sensitive, person-centered care across the lifespan. Effective: 2016 Summer Quarter.

NRS 421—Health Assessment Across the Lifespan (3)
Clinical Activity—6 hours; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Prepares students to conduct a health history assessment using developmentally and culturally appropriate approaches for individuals across the lifespan. Acquire the knowledge, understanding, and skills needed to perform, interpret and communicate a health history. Effective: 2016 Summer Quarter.

NRS 422—Care of Adults with Chronic Conditions (6)
Clinical Activity—9 hours; Lecture/Discussion—3 hours. Prerequisite(s): NRS 221; NRS 272; NRS 420; NRS 421; Consent of Instructor. This course is open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Learn concepts central to the effective management of a variety of common chronic illness and disabling conditions across the lifespan in a variety of different settings. Practice conducting in-depth health assessments of individuals with chronic conditions. Effective: 2016 Fall Quarter.

NRS 423—Psychosocial Wellness & Illness (5)
Clinical Activity—6 hours; Lecture/Discussion—3 hours. Prerequisite(s): NRS 221; NRS 272; NRS 420; NRS 421; Consent of Instructor. This course is open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Explore the biological, psychological, cultural, societal, and environmental factors that affect psychological wellness and illness. Practice providing care to individuals and families experiencing disruptions in mental health secondary to physical or psychiatric illness, trauma or loss. Effective: 2016 Fall Quarter.

NRS 424—Nursing Care of Older Adults (3)
Clinical Activity—3 hours; Lecture/Discussion—2 hours. Prerequisite(s): NRS 221; NRS 272; NRS 420; NRS 421; NRS 273; NRS 422; NRS 423; NRS 425; NRS 223; NRS 426; Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Build skills for situations involving older adults, such as in the management of complex clinical and administering and interpreting standardized assessment tools. Develop plans of care for older adults experiencing a variety of geriatric syndromes. Effective: 2017 Summer Quarter.

NRS 425—Family Focused Nursing (9)
Clinical Activity—12 hours; Lecture/Discussion—5 hours. Prerequisite(s): NRS 221; NRS 272; NRS 420; NRS 421; NRS 273; NRS 422; NRS 423; Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Focuses on family as the unit of nursing and interprofessional care. Includes influences of family on health and illness, reproductive and gender/sexuality issues, pregnancy, birth and child-rearing, and the health and illness in children and youth. Effective: 2017 Winter Quarter.

NRS 426—Nursing Care of Adults with Complex Illness or Injury (8)
Clinical Activity—12 hours; Lecture/Discussion—4 hours. Prerequisite(s): NRS 221; NRS 272; NRS 420; NRS 421; NRS 273; NRS 422; NRS 423; NRS 425; Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Prepares students to provide comprehensive, patient-centered nursing care for patients with acute or complex illness and injury. Theory portion focuses on concepts associated with complex physiological alterations. Effective: 2017 Spring Quarter.

NRS 427—Fostering Healthy Communities (7)
Clinical Activity—9 hours; Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Focuses on populations & communities, and emphasizes working with diverse communities in providing health promotion, chronic disease management, transitional support and crisis intervention. Develop skills to critically analyze and shape health policy and develop accessible community resources. Effective: 2017 Summer Quarter.

NRS 428—Capstone Clinical Nursing Practicum (8)
Clinical Activity—24 hours. Prerequisite(s): NRS 220; NRS 221; NRS 222A; NRS 272; NRS 420; NRS 421; NRS 429A; NRS 222B; NRS 273; NRS 422; NRS 423; NRS 429B; NRS 203; NRS 212; NRS 425; NRS 429C; NRS 202; NRS 223; NRS 426; NRS 429D; NRS 224; NRS 424; NRS 427; NRS 429E; Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Practicum experience is designed to facilitate transition to professional practice. Opportunity to choose a clinical practice area of interest and to work with a preceptor with expertise in that area. Effective: 2017 Fall Quarter.

NRS 429A—Collaborative Practice A (1)
Clinical Activity—3 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Interprofessional course uses experiential learning activities including simulation, role play, and case studies. Concepts include but are not limited to; communication, person-centered care, ethical decision making, end-of-life decisions, culturally appropriate care, quality and safety, social justice, and professionalism. Effective: 2016 Summer Quarter.

NRS 429B—Collaborative Practice B (1)
Clinical Activity—3 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Interprofessional course uses experiential learning activities including simulation, role play, and case studies. Concepts include but are not limited to; communication, person-centered care, ethical decision making, end-of-life decisions, culturally appropriate care, quality and safety, social justice, and professionalism. Effective: 2016 Fall Quarter.

NRS 429C—Collaborative Practice C (1)
Clinical Activity—3 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Interprofessional course uses experiential learning activities including simulation, role play, and case studies. Concepts include but are not limited to; communication, person-centered care, ethical decision making, end-of-life decisions, culturally appropriate care, quality and safety, social justice, and professionalism. Effective: 2017 Winter Quarter.

NRS 429D—Collaborative Practice D (1)
Clinical Activity—3 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Interprofessional course uses experiential learning activities including simulation, role play, and case studies. Concepts include but are not limited to; communication, person-centered care, ethical decision making, end-of-life decisions, culturally appropriate care, quality and safety, social justice, and professionalism. Effective: 2017 Spring Quarter.

NRS 429E—Collaborative Practice E (1)
Clinical Activity—3 hours. Prerequisite(s): Consent of Instructor. This course is open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Interprofessional course uses experiential learning activities including simulation, role play, and case studies. Concepts include but are not limited to; communication, person-centered care, ethical decision making, end-of-life decisions, culturally appropriate care, quality and safety, social justice, and professionalism. Effective: 2017 Summer Quarter.

NRS 429F—Collaborative Practice F (1)
Clinical Activity—3 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Interprofessional course uses experiential learning activities including simulation, role play, and case studies. Concepts include but are not limited to; communication, person-centered care, ethical decision making, end-of-life decisions, culturally appropriate care, quality and safety, social justice, and professionalism. Effective: 2017 Fall Quarter.

NRS 440—Preparation for Clinical Practice (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Students are placed in clinical settings and/or clinical simulation laboratories to observe and practice the integration of clinical skills with direct supervision by faculty. Effective: 2016 Winter Quarter.

NRS 450A—Supervised Clinical Practice-Primary Health Care (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Each of the required primary care rotations is a four-week supervised clinical practice experience in primary care, under the supervision of an appropriate community-based primary care provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 450B—Supervised Clinical Practice-Primary Health Care (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Each of the required primary care rotations is a four-week supervised clinical practice experience in primary care, under the supervision of an appropriate community-based primary care provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 450C—Supervised Clinical Practice-Primary Health Care (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Each of the required primary care rotations is a four-week supervised clinical practice experience in primary care, under the supervision of an appropriate community-based primary care provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 450D—Supervised Clinical Practice-Primary Health Care (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Each of the required primary care rotations is a four-week supervised clinical practice experience in primary care, under the supervision of an appropriate community-based primary care provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 450E—Supervised Clinical Practice-Primary Health Care (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Each of the required primary care rotations is a four-week supervised clinical practice experience in primary care, under the supervision of an appropriate community-based primary care provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 451—Supervised Clinical Practice-Pediatrics (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical rotation under the supervision of an appropriate community-based Pediatric Medicine provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 452—Supervised Clinical Practice-Women's Health (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical rotation under the supervision of an appropriate community-based women’s health and prenatal care provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 453—Supervised Clinical Practice-Mental Health (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical rotation under the supervision of an appropriate community-based psychiatrist, psychiatric/mental health provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 454—Supervised Clinical Practice-Emergency Medicine (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical rotation under the supervision of an appropriate Emergency Medicine provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 455—Supervised Clinical Practice-Inpatient Surgery (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical experience under the supervision of an appropriate surgical provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 456—Supervised Clinical Practice-Inpatient Medicine (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical rotation under the supervision of an appropriate inpatient provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 459—Supervised Clinical Practice-Other Specialties (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Two four-week selective rotations are available to accommodate student interest and/or accommodate a student's clinical deficits identified by the program. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 470—Health Care Ethics (3-9)
Discussion/Laboratory—1 hour; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Guided independent study of issues in biomedical ethics, with discussion of readings that are based on student interests and needs. Participation in ethics rounds. (General Medicine 470.) (S/U grading only.) Effective: 2012 Spring Quarter.

NRS 471—Supervised Clinical Practice-Geriatrics (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical rotation under the supervision of an appropriate community-based Geriatric Medicine provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 475—Supervised Clinical Practice-Acute Care (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Two- to four-week rotation focus on providing acute care in inpatient settings. Students will work directly with specific inpatient units. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 480—Supervised Clinical Practice-Rural Health (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Rural health rotations focus on providing care in medically underserved rural sites. Students will experience care across the continuum in ambulatory, inpatient, and community based settings. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 490—Supervised Clinical Practice-Quality and Safety (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Clinical rotation that allow students to work directly with patient safety and quality improvement committees in various organizations. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 493A—Improving Quality in Health Care (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Open to Nursing Science and Health-Care Leadership Students. Working in interdisciplinary teams, will explore the theory and practical methods being employed to make improvement in health care systems while providing an opportunity for interprofessional educational experience. Effective: 2017 Fall Quarter.

NRS 493B—Improving Quality in Health Care (4)
Lecture/Discussion—4 hours. Prerequisite(s): NRS 493A; Consent of Instructor. Open to Nursing Science and Health-Care Leadership Students. Working in interdisciplinary teams, will explore advanced theory and practical methods being employed to make improvement in health care systems while providing an opportunity for interprofessional educational experience. Effective: 2018 Winter Quarter.

NRS 493C—Enhancing Patient Safety in Health Care (3)
Clinical Activity—1 hour; Discussion—1 hour; Seminar—1 hour. Prerequisite(s): Consent of Instructor. Nursing Science and Health-Care Leadership graduate students. Inter-professional module is designed to explore the theory and practical methods being employed to improve patient safety in health care while providing an opportunity for inter-professional educational experience. Effective: 2017 Spring Quarter.

Master of Preventive Veterinary Medicine

Master of Preventive Veterinary Medicine | Master of Preventive Veterinary Medicine M.P.V.M.

(School of Veterinary Medicine)

Ashley Hill, D.V.M., M.P.V.M., Ph.D., Chairperson of the Group

Group Office. Veterinary Medicine Administrative Building, Rm 1022; 530-752-2657; Fax 530-754-9161; http://www.vetmed.ucdavis.edu/mpvm/index.cfm

Faculty. http://www.vetmed.ucdavis.edu/mpvm/faculty/

Graduate Advisor. Contact the Group office.

Master of Preventive Veterinary Medicine | MPM Courses

Courses in MPM:

MPM 200—Introduction to Information Management for Epidemiologists (1)
Laboratory—1 hour. Restricted to students in the Master of Preventive Veterinary Medicine program. Introduction to practical application of epidemiological methods to solve problems involving population health data. Emphasis on using worksheet/database software tools for organizing, analyzing, reporting, and interpreting data. Ten, three-hour sessions. Effective: 2016 Summer Session 2.

MPM 201—Emerging Issues at the Interface of Animal, Human, and Ecosystem Health (2.5)
Discussion—1.5 hours; Lecture—1 hour. Class size limited to 35 students. Introduce one health topics emphasizing relationships between environmental, animal and human health. Topics include ecosystem change and impacts on animals and humans, cross-species disease transmission and approaches for addressing critical data gaps to inform ecosystem health and disease prevention. Effective: 2016 Fall Quarter.

MPM 202—Medical Statistics I (4)
Laboratory—10 hours; Lecture—15 hours. Prerequisite(s): MPVM or MPH standing or consent of instructor. Restricted to 80 students. Basic statistics in clinical, laboratory and population medicine: descriptive statistics; probability; binomial, Poisson, normal, t-, F-, and Chi-square distributions; sampling distributions; parameter estimation; hypothesis testing; elementary nonparametric methods, simple linear regression and correlation; life table construction and analysis. Effective: 2015 Summer Session 2.

MPM 203—Medical Statistics II (4)
Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): MPM 202; or Consent of Instructor. Or equivalent. Continuation of course 202. Analysis of variance in biomedical sciences; nonparametric methods; multiple regression; unconditional logistic regression; biomedical applications of statistical methods. Microcomputer applications in population medicine to reinforce principles that are taught in lecture. Required for students in the Preventive Veterinary Program Graduate Group (PVM) and the Masters of Public Health Program (MPH). Effective: 2015 Fall Quarter.

MPM 204—Medical Statistics III (4)
Laboratory—2 hours; Lecture—3 hours. Continuation of course 203. Selecting the best regression equation, conditional logistic regression, Poisson regression, survival analysis, analysis of time dependent variation and trends. Microcomputer applications in population medicine to reinforce principles that are taught in lecture. Effective: 2016 Fall Quarter.

MPM 205—Principles of Epidemiology (4)
Lecture—4 hours. Prerequisite(s): MPM 202; or Consent of Instructor. An introductory statistics course. Basic epidemiologic concepts and approaches to epidemiologic research, with examples from veterinary and human medicine, including outbreak investigation, infectious disease epidemiology, properties of tests, and an introduction to epidemiologic study design and surveillance. (Epidemiology 205.) Effective: 2017 Winter Quarter.

MPM 206—Epidemiologic Study Design (4)
Discussion—9 hours; Laboratory—2 hours; Lecture—30 hours. Prerequisite(s): MPM 205; or Consent of Instructor. Builds on concepts presented in course 205. Concepts of epidemiologic study design—clinical trials, observational cohort studies, case control studies—introduced in course 205A are covered in more depth, using a problem-based format. Discussion of published epidemiologic studies (Epidemiology 206.) Effective: 2015 Winter Quarter.

MPM 207—Applied Epidemiologic Problem Solving (1)
Discussion/Laboratory—2 hours. Integration of epidemiologic and statistical methodology in a problem-solving approach to contemporary animal population health issues. Data validation and manipulation. Effective: 2014 Fall Quarter.

MPM 208—Research Planning and Reporting I (2)
Lecture/Discussion—2 hours. MPVM standing or consent of instructor Identify and implement research questions through hypothesis construction, articulation of aims, acquiring permits, working as a team, and all other techniques needed to develop a successful research program. Not open for credit to students who have previously taken MPM 408B. Effective: 2017 Winter Quarter.

MPM 209—Research Planning and Reporting II (1)
Lecture/Discussion. Prerequisite(s): MPM 208 Concepts and skills in effective scientific writing for publication in a peer-reviewed journal in animal health or biomedicine. Includes developing an argument, organizing and writing a manuscript, improving readability, and responding to peer review. Effective: 2016 Fall Quarter.

MPM 210—Advanced Health Leadership (1.5)
Discussion; Lecture. Class size limited to 35 students. Develop skills for effective scientific leadership, including: project management and collaboration, conflict resolution, communication with the public, dynamic distribution of health information, and evidence-based policy influence. Effective: 2017 Winter Quarter.

MPM 212—Concepts and Methods in Infectious Disease Surveillance and Control (3)
Discussion/Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Basic and advanced level of conceptual and methodological foundations in infectious disease epidemiology necessary for veterinarians to develop and evaluate programs for detection, prevention, and control of infectious diseases in animal populations. Effective: 2016 Fall Quarter.

Master of Professional Accountancy

Master of Professional Accountancy | Master of Professional Accountancy M.P.Ac.

Robert Yetman, Ph.D., Chairperson of the Group

Group Office. Gallagher Hall; 530-752-7658; Fax 530-754-9355;
https://gsm.ucdavis.edu/master-professional-accountancy-mpac

Faculty. http://gsm.ucdavis.edu/faculty-and-research-0

Graduate Advisor. Contact the Group office.

Master's Entry Program in Nursing; Nursing

Master's Entry Program in Nursing; Nursing | Master's Entry Program in Nursing M.S.N.

Heather M. Young, Ph.D., R.N., F.A.A.N.; Associate Vice Chancellor for Nursing, UC Davis; Dean and Professor, Betty Irene Moore School of Nursing

Theresa A. Harvath, Ph.D., R.N., F.A.A.N.; Executive Associate Dean

Elizabeth Rice, Ph.D., P.M.H.N.P.-B.C., R.N.; Associate Dean for Clinical Education and Practice, Director for the Master of Science—Family Nurse Practitioner Degree Program

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Mission Statement

The Betty Irene Moore School of Nursing at UC Davis cultivates academic excellence through immersive, interprofessional and interdisciplinary education and research in partnership with the communities serves. Faculty, staff and students discover and disseminate knowledge to advance health, improve quality of care and shape policy.

Nursing Science and Health-Care Leadership Graduate Degree Program

Hosted by the Betty Irene Moore School of Nursing at UC Davis, the Nursing Science and Health-Care Leadership Graduate Degree Programs prepare nurse leaders, physician assistants, nurse practitioners, researchers and faculty in a unique interdisciplinary and interprofessional environment. The full-time, academic, doctoral program prepares graduates as leaders in health care, health policy and nurse faculty/researchers at the university level. The master's degree Physician Assistant Studies program prepares graduates to deliver care as physician assistants. Graduates of the professional master's degree leadership program are prepared for health-care leadership roles in a variety of organizations and as nurse faculty at the community college and prelicensure education levels. Graduates of the master's degree Nurse Practitioner Program are prepared to deliver care as nurse practitioners.

Faculty

The UC Davis Nursing Science and Health-Care Leadership Graduate Group includes a wide cross-section of academic disciplines with faculty from the Betty Irene Moore School of Nursing as well as UC Davis Health System and other UC Davis schools, colleges, and departments. Within the graduate group faculty are experts in nursing, medicine, health informatics, nutrition, biostatistics, public health and other fields.

The Master's Entry Program in Nursing prepares new nurses as leaders in quality and safety, advocates for diverse patient populations and agents of change for healthier communities. Graduates of the program are qualified to take the national licensing examination (NCLEX) for registered nurses, eligible for certification as a Public Health Nurse and earn a Master of Science in Nursing Degree.

Master's Entry Program in Nursing; Nursing | NRS Courses

Courses in NRS:

NRS 201—Health Status and Care Systems (4)
Discussion/Laboratory; Lecture/Discussion—3 hours; Project (Term Project). Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Comparative health status data, major current health issues globally, nationally, regionally. Theoretical perspectives on social, political, economic determinants of health. Health-care systems examined, linked to data, and evaluated in regards to outcomes. Aging, rural, ethnic minority populations highlighted. Effective: 2010 Fall Quarter.

NRS 202—Implementation Science (4)
Lecture/Discussion—4 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Change processes in health care from political, historic, economic and sociologic frameworks. Historic and current examples of transformative change in the health-care system. Skills for system transformation through health policy, practice, research and education are emphasized. Effective: 2010 Winter Quarter.

NRS 203—Leadership in Health Care (4)
Fieldwork; Lecture/Discussion—3 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Critical examination of leadership from a variety of theoretical and philosophical perspectives and focuses on specific challenges in health care and leadership at various levels, e.g., patient, organizational, and policy levels. Effective: 2010 Fall Quarter.

NRS 204—Research Skills for Nursing Science and Health-Care Leadership (4)
Discussion/Laboratory—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Foundation for analyzing research, health, and systems data to answer clinical, systems, or policy questions. Use and examine multiple sources of data and information as a basis for planned change and transformation in health care. Effective: 2014 Winter Quarter.

NRS 205—Research Design in Nursing and Health Care (4)
Lecture/Discussion—4 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Major types of quantitative and qualitative research design and their application to nursing and health-care research. Implications of choosing alternative research designs and critical analysis of philosophical underpinnings. Evaluation of control and validity, sampling, instruments to measure health concepts. Effective: 2010 Fall Quarter.

NRS 205A—Overview of Research in Nursing Science and Health Care (2)
Lecture—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Provides an overview of quantitative and qualitative paradigms in scientific inquiry and the major designs related to each paradigm. First of a three-course series on research design and methods in nursing science and healthcare research. Effective: 2015 Fall Quarter.

NRS 205B—Quantitative Research in Nursing Science and Health Care (4)
Lecture—4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Introduces principles of quantitative data collection and analysis as applied to major study designs in nursing and health-care research. Provides a basic foundation for producing, interpreting, and applying quantitative research findings to answer clinical, system, and policy questions. Effective: 2015 Fall Quarter.

NRS 205C—Qualitative Research in Nursing Science and Health Care (4)
Lecture—4 hours. Prerequisite(s): Consent of Instructor. Restricted to current Ph.D. students in NSHL program or consent of instructor. Introduces principles of qualitative data collection and analysis as applied to major study designs in nursing and health-care research. Provides a basic foundation for producing, interpreting, and applying qualitative research findings to answer clinical, system, and policy questions. Effective: 2015 Fall Quarter.

NRS 206—Community Connections (2-5)
Variable—6 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Open to NSHL MS students only. Community-based learning and experiences including community participation, assessment, data collection and analysis using multiple approaches, community health improvement projects, collaborative leadership practice, all with the guidance of community members and nursing faculty. May be repeated for credit. (S/U grading only.) Effective: 2010 Fall Quarter.

NRS 210Y—Applied Health Informatics (4)
Lecture/Discussion—1 hour; Web Virtual Lecture—3 hours. Prerequisite(s): Consent of Instructor. Open to current student in NSHL graduate programs or consent of instructor. Within the conceptual framework of the Foundation of Knowledge model, this course integrates nursing science, information science, computer science and cognitive science to acquire, process, generate and disseminate knowledge. Effective: 2014 Winter Quarter.

NRS 211Y—Rural Health (2-3)
Fieldwork—1 hour; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Interprofessional graduate course provides an introduction to rural health theory, research, policy, and practice, with an emphasis on rural health assets and disparities. Effective: 2015 Spring Quarter.

NRS 212—Technology & Innovations in Health Care (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Multidisciplinary approach to stimulate new thinking in the practice, process, and delivery of health care. Focus on improving overall health outcomes. Effective: 2017 Winter Quarter.

NRS 220—Social, Cultural, and Behavioral Determinants of Health (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Effects of globalization, political systems, local and global economies, culture, race, class, gender, and sexuality on population health. Effective: 2016 Summer Quarter.

NRS 221—Biophysical Concepts in Nursing (3)
Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Pathophysiological processes that contribute to different disease states across the lifespan; case studies; selective clinical decisions using current, reliable sources of pathophysiology information. Effective: 2016 Summer Quarter.

NRS 222A—Research Quality Improvement and Evidence Based Practice (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Introduction to providing safe, competent and compassionate care in a highly technical and digital environment. Emphasis on safety, quality and research to clinical practice. Accessing and analyzing reliable sources of evidence for integration in care-plan. Effective: 2016 Summer Quarter.

NRS 222B—Research Quality Improvement and Evidence Based Practice (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Introduction to providing safe, competent and compassionate care in a highly technical and digital environment. Emphasis on safety, quality and research to clinical practice. Accessing and analyzing reliable sources of evidence for integration in care-plan. Effective: 2016 Fall Quarter.

NRS 223—Quality and Safety Education in Health Care (2)
Lecture/Discussion—2 hours. Prerequisite(s): NRS 221; NRS 272; NRS 420; NRS 421; NRS 273; NRS 422; NRS 423; NRS 425; Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Implementing best practices alongside technological tools and focusing on continuous quality improvement. Emphasis on providing safe, competent care in a highly technical and digital environment. Building capacity to apply concepts related to safety, quality and research to clinical practice. Effective: 2017 Spring Quarter.

NRS 224—Developing Future Nurse Leaders (2)
Lecture/Discussion—2 hours. Prerequisite(s): NRS 221; NRS 272; NRS 420; NRS 421; NRS 273; NRS 422; NRS 423; NRS 425; NRS 223; NRS 426; Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Develop skills around effective decision making, fiscal and environmental stewardship, initiating and maintaining effective working relationships, using mutually respectful communication and collaboration, care coordination, delegation and supervision. Emphasis on conflict resolution, leadership and interprofessional teamwork. Effective: 2017 Summer Quarter.

NRS 225—Professional Nursing Role Formation (3)
Lecture/Discussion—3 hours. Prerequisite(s): NRS 220; NRS 221; NRS 222A; NRS 272; NRS 420; NRS 421; NRS 429A; NRS 222B; NRS 273; NRS 422; NRS 423; NRS 429B; NRS 203; NRS 212; NRS 425; NRS 429C; NRS 202; NRS 223; NRS 426; NRS 429D; NRS 224; NRS 424; NRS 427; NRS 429E; Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Transition from nursing student to professional nurse. Focus on ethical comportment, professional values of social justice, autonomy, advocacy, altruism, human dignity, and integrity. Students must pass a mastery exit examination and complete a capstone project. Effective: 2017 Fall Quarter.

NRS 242A—Implementation Science for Clinicians (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course focuses on identification of relevant research or improvement questions specific to patient care and evaluating the pertinent research literature related to the implementation of evidence based care. The course is 1st of a 3-course series. Effective: 2014 Summer Quarter.

NRS 242B—Implementation Science for Clinicians (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course is a continuation of course 242A, Implementation Science for Clinicians, with a focus on implementing and evaluating a change. Effective: 2014 Summer Quarter.

NRS 242C—Implementation Science for Clinicians (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Advanced skills in application of implementation science into systems based practice and incorporating quality improvement and patient safety knowledge with particular focus on prevention of medical errors. Effective: 2014 Spring Quarter.

NRS 243A—Leadership in Professional Practice (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course is a critical examination of leadership using theoretical and philosophical perspectives with an applied approach applicable to clinical practice. The 3 course series is conducted across three quarters in the 1st, 3rd and 8th quarters. Effective: 2013 Summer Quarter.

NRS 243B—Leadership in Professional Practice (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course introduces professional role topics including history of the profession, the role in interprofessional teams and the health care system, transitioning to the role from other health professions, scope of practice, certification and licensure and professional organizations. Effective: 2014 Winter Quarter.

NRS 243C—Leadership in Professional Practice (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course expands upon the leadership role as it relates to their clinical practice and professional role. Professional role topics including: transitioning from student to practicing professional, scope of practice, the physician relationship, and more advanced concepts in ethics. Effective: 2014 Spring Quarter.

NRS 250—Foundations of Primary Health Care (7)
Laboratory—3 hours; Lecture/Discussion—6 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course is designed to promote the understanding and clinical application of human anatomy, physiology, histology, immunology and pathology. Effective: 2013 Summer Quarter.

NRS 251A—Primary Health Care (8)
Lecture/Discussion—8 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course introduces primary health care concepts essential to the care of common medical problems seen in primary care settings. Module content will focus on various organ systems and specialty areas. Effective: 2013 Fall Quarter.

NRS 251B—Foundations of Primary Health Care (8)
Lecture/Discussion—8 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course introduces primary health care concepts essential to the care of common medical problems seen in primary care settings. Effective: 2014 Winter Quarter.

NRS 251C—Primary Heath Care (8)
Lecture/Discussion—8 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course introduces primary health care concepts essential to the care of common medical problems seen in primary care settings. Effective: 2014 Spring Quarter.

NRS 251D—Primary Heath Care (6)
Lecture/Discussion—6 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course introduces primary health care concepts essential to the care of common medical problems seen in primary care settings. Effective: 2014 Summer Quarter.

NRS 260—Foundations of Behavioral Health (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course focuses on the spectrum of normal psychological development over the lifespan for children, adults and elders. Theories of stress and coping mechanism are presented as a framework for the assessment of individuals. Effective: 2013 Summer Quarter.

NRS 270—Foundations of Pharmacology (2)
Laboratory—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course introduces the student to the major concepts in pharmacology and relevant human physiology related to pharmacotherapeutics and toxicology. Effective: 2013 Summer Quarter.

NRS 271A—Pharmacology (2)
Laboratory—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Systems based pharmacology focused on classes of drugs used to treat disorders in specialty systems. Effective: 2013 Fall Quarter.

NRS 271B—Pharmacology (2)
Laboratory—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Systems based pharmacology focused on classes of drugs used to treat disorders in specialty systems. Effective: 2013 Fall Quarter.

NRS 271C—Pharmacology (2)
Laboratory—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Systems based pharmacology focused on classes of drugs used to treat disorders in specialty systems. Effective: 2014 Spring Quarter.

NRS 272—Foundations of Pharmacology (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Theoretical background to providing safe and effective care related to drugs and natural products. Effective: 2016 Summer Quarter.

NRS 273—Pharmacology Concepts in Nursing (2)
Lecture/Discussion—2 hours. Prerequisite(s): NRS 221; NRS 272; NRS 420; NRS 421; Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Application of principles for safe and effective use of medications and natural products; use of current, reliable information to make clinical decisions. Effective: 2016 Fall Quarter.

NRS 290—Master's Seminar (2)
Discussion—2 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Open to NSHL MS students only or by consent of course instructor. Subject varies from quarter to quarter. Current knowledge and issues relevant to one of two fields of emphasis: population health or health systems. May be repeated up to 10 time(s). Effective: 2010 Fall Quarter.

NRS 291—Doctoral Seminar (2)
Discussion—2 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Focus on the theory, research and knowledge relevant to one of two fields of emphasis: population health or health systems. Emphasis placed on reading, critique and synthesis of classic and cutting-edge research in nursing and health care. May be repeated up to 10 time(s). Effective: 2010 Fall Quarter.

NRS 291D—Doctoral Seminar (2)
Discussion—2 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Focus on the theory, research and knowledge relevant to one of two fields of emphasis: population health or health systems. Emphasis placed on reading, critique and synthesis of classic and cutting-edge research in nursing and health care. May be repeated up to 10 time(s). (S/U grading only.) Effective: 2014 Winter Quarter.

NRS 298—Special Topics in Nursing Science and Health-Care Leadership (1-4)
Lecture/Discussion—1-2 hours; Variable—1-3 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. In-depth study of topics in Nursing Science and Health-Care Leadership, selected from: policy and politics in health care, health-care disparities, current issues in health care, approaches to the conduct of science, or other related areas, with year to year variation. May be repeated for credit. Effective: 2014 Spring Quarter.

NRS 298V—Online Special Topics in Nursing Science and Health-Care Leadership (1-4)
Web Electronic Discussion—1-4 hours; Web Virtual Lecture—1-4 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. In-depth study of topics in Nursing Science and Health-Care Leadership, selected from: policy and politics in health care, health-care disparities, current issues in health care, approaches to the conduct of science, or other related areas, with year to year variation. May be repeated for credit. Effective: 2014 Winter Quarter.

NRS 299—Research and Writing (1-12)
Extensive Writing/Discussion—3-36 hours. Prerequisite(s): Consent of Instructor. Students in the Nursing Science and Health-Care Leadership graduate programs conduct research and writing under the supervision of a faculty member. May be repeated for credit. (S/U grading only.) Effective: 2011 Winter Quarter.

NRS 299D—Dissertation Research and Writing (1-12)
Extensive Writing/Discussion—3-36 hours. Prerequisite(s): Consent of Instructor. Students in the Nursing Science and Health-Care Leadership graduate programs conduct dissertation research and writing under the supervision of a faculty member. May be repeated for credit. (S/U grading only.) Effective: 2011 Winter Quarter.

NRS 301—Learner Centered Teaching (3-4)
Lecture/Discussion—3 hours; Practice—1 hour. Prerequisite(s): Consent of Instructor. Open to current students in the Nursing Science and Health-care Leadership graduate programs; outside students with prior educational or work experience in education may register for this class with the consent of instructor. Students will explore best practices in learner-centered teaching, performance-based curriculum models, instructional design, and assessing/evaluating student learning. Students will have experience in planning learner-centered activities that are engaging and effective in achieving desired student performance. Effective: 2016 Spring Quarter.

NRS 302—Teaching Methods - Use of Emerging Technologies to Improve Student Learning (4)
Lecture/Discussion—3 hours; Practice—1 hour. Prerequisite(s): Consent of Instructor. Open to current students in the Nursing Science and Health-care Leadership graduate programs; outside students with prior educational or work experience in education may register for this class with the consent of instructor. Students will examine, design and develop instructional strategies that use innovative and emerging technologies to promote motivation, performance and learning in health professions education. Research findings associated with use of various emerging technologies will be examined. Effective: 2016 Fall Quarter.

NRS 303—Professional Role Formation (2-4)
Laboratory—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to current students in the Nursing Science and Health-care Leadership graduate programs; outside students with prior educational or work experience in education may register for this class with the consent of instructor. Exploration of the educator role. Topics include Role Expectations, Legal and Regulatory Issues, Professional Ethics, Educational Scholarship, Individual Differences, Learning Environments, and Lifelong Learning. Placements for the optional practicum are arranged in a wide variety of settings. Effective: 2017 Winter Quarter.

NRS 400—Basic Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Instruction and practice of the fundamental clinical skills necessary for patient care comprise this course with a primary focus on principles of effective communication in establishing the therapeutic provider-patient relationship. Effective: 2013 Summer Quarter.

NRS 401—Basic Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content. Effective: 2013 Fall Quarter.

NRS 410A—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content. Effective: 2014 Winter Quarter.

NRS 410B—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related specified systems. Effective: 2014 Spring Quarter.

NRS 410C—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related specified systems. Effective: 2014 Summer Quarter.

NRS 410D—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related to specified systems. Effective: 2013 Fall Quarter.

NRS 410E—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related to specified systems. Effective: 2013 Fall Quarter.

NRS 410F—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related to specified specialty systems. Effective: 2014 Spring Quarter.

NRS 410G—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related to specified specialty systems. Effective: 2015 Fall Quarter.

NRS 420—Foundations of Clinical Nursing Practice (3)
Clinical Activity—9 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Foundational course introduces students to core concepts of clinical nursing, including clinical reasoning, professional ethics, therapeutic communication and activities of daily living. Develop skills for the provision of safe, high quality, culturally-sensitive, person-centered care across the lifespan. Effective: 2016 Summer Quarter.

NRS 421—Health Assessment Across the Lifespan (3)
Clinical Activity—6 hours; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Prepares students to conduct a health history assessment using developmentally and culturally appropriate approaches for individuals across the lifespan. Acquire the knowledge, understanding, and skills needed to perform, interpret and communicate a health history. Effective: 2016 Summer Quarter.

NRS 422—Care of Adults with Chronic Conditions (6)
Clinical Activity—9 hours; Lecture/Discussion—3 hours. Prerequisite(s): NRS 221; NRS 272; NRS 420; NRS 421; Consent of Instructor. This course is open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Learn concepts central to the effective management of a variety of common chronic illness and disabling conditions across the lifespan in a variety of different settings. Practice conducting in-depth health assessments of individuals with chronic conditions. Effective: 2016 Fall Quarter.

NRS 423—Psychosocial Wellness & Illness (5)
Clinical Activity—6 hours; Lecture/Discussion—3 hours. Prerequisite(s): NRS 221; NRS 272; NRS 420; NRS 421; Consent of Instructor. This course is open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Explore the biological, psychological, cultural, societal, and environmental factors that affect psychological wellness and illness. Practice providing care to individuals and families experiencing disruptions in mental health secondary to physical or psychiatric illness, trauma or loss. Effective: 2016 Fall Quarter.

NRS 424—Nursing Care of Older Adults (3)
Clinical Activity—3 hours; Lecture/Discussion—2 hours. Prerequisite(s): NRS 221; NRS 272; NRS 420; NRS 421; NRS 273; NRS 422; NRS 423; NRS 425; NRS 223; NRS 426; Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Build skills for situations involving older adults, such as in the management of complex clinical and administering and interpreting standardized assessment tools. Develop plans of care for older adults experiencing a variety of geriatric syndromes. Effective: 2017 Summer Quarter.

NRS 425—Family Focused Nursing (9)
Clinical Activity—12 hours; Lecture/Discussion—5 hours. Prerequisite(s): NRS 221; NRS 272; NRS 420; NRS 421; NRS 273; NRS 422; NRS 423; Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Focuses on family as the unit of nursing and interprofessional care. Includes influences of family on health and illness, reproductive and gender/sexuality issues, pregnancy, birth and child-rearing, and the health and illness in children and youth. Effective: 2017 Winter Quarter.

NRS 426—Nursing Care of Adults with Complex Illness or Injury (8)
Clinical Activity—12 hours; Lecture/Discussion—4 hours. Prerequisite(s): NRS 221; NRS 272; NRS 420; NRS 421; NRS 273; NRS 422; NRS 423; NRS 425; Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Prepares students to provide comprehensive, patient-centered nursing care for patients with acute or complex illness and injury. Theory portion focuses on concepts associated with complex physiological alterations. Effective: 2017 Spring Quarter.

NRS 427—Fostering Healthy Communities (7)
Clinical Activity—9 hours; Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Focuses on populations & communities, and emphasizes working with diverse communities in providing health promotion, chronic disease management, transitional support and crisis intervention. Develop skills to critically analyze and shape health policy and develop accessible community resources. Effective: 2017 Summer Quarter.

NRS 428—Capstone Clinical Nursing Practicum (8)
Clinical Activity—24 hours. Prerequisite(s): NRS 220; NRS 221; NRS 222A; NRS 272; NRS 420; NRS 421; NRS 429A; NRS 222B; NRS 273; NRS 422; NRS 423; NRS 429B; NRS 203; NRS 212; NRS 425; NRS 429C; NRS 202; NRS 223; NRS 426; NRS 429D; NRS 224; NRS 424; NRS 427; NRS 429E; Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Practicum experience is designed to facilitate transition to professional practice. Opportunity to choose a clinical practice area of interest and to work with a preceptor with expertise in that area. Effective: 2017 Fall Quarter.

NRS 429A—Collaborative Practice A (1)
Clinical Activity—3 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Interprofessional course uses experiential learning activities including simulation, role play, and case studies. Concepts include but are not limited to; communication, person-centered care, ethical decision making, end-of-life decisions, culturally appropriate care, quality and safety, social justice, and professionalism. Effective: 2016 Summer Quarter.

NRS 429B—Collaborative Practice B (1)
Clinical Activity—3 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Interprofessional course uses experiential learning activities including simulation, role play, and case studies. Concepts include but are not limited to; communication, person-centered care, ethical decision making, end-of-life decisions, culturally appropriate care, quality and safety, social justice, and professionalism. Effective: 2016 Fall Quarter.

NRS 429C—Collaborative Practice C (1)
Clinical Activity—3 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Interprofessional course uses experiential learning activities including simulation, role play, and case studies. Concepts include but are not limited to; communication, person-centered care, ethical decision making, end-of-life decisions, culturally appropriate care, quality and safety, social justice, and professionalism. Effective: 2017 Winter Quarter.

NRS 429D—Collaborative Practice D (1)
Clinical Activity—3 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Interprofessional course uses experiential learning activities including simulation, role play, and case studies. Concepts include but are not limited to; communication, person-centered care, ethical decision making, end-of-life decisions, culturally appropriate care, quality and safety, social justice, and professionalism. Effective: 2017 Spring Quarter.

NRS 429E—Collaborative Practice E (1)
Clinical Activity—3 hours. Prerequisite(s): Consent of Instructor. This course is open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Interprofessional course uses experiential learning activities including simulation, role play, and case studies. Concepts include but are not limited to; communication, person-centered care, ethical decision making, end-of-life decisions, culturally appropriate care, quality and safety, social justice, and professionalism. Effective: 2017 Summer Quarter.

NRS 429F—Collaborative Practice F (1)
Clinical Activity—3 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Interprofessional course uses experiential learning activities including simulation, role play, and case studies. Concepts include but are not limited to; communication, person-centered care, ethical decision making, end-of-life decisions, culturally appropriate care, quality and safety, social justice, and professionalism. Effective: 2017 Fall Quarter.

NRS 440—Preparation for Clinical Practice (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Students are placed in clinical settings and/or clinical simulation laboratories to observe and practice the integration of clinical skills with direct supervision by faculty. Effective: 2016 Winter Quarter.

NRS 450A—Supervised Clinical Practice-Primary Health Care (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Each of the required primary care rotations is a four-week supervised clinical practice experience in primary care, under the supervision of an appropriate community-based primary care provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 450B—Supervised Clinical Practice-Primary Health Care (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Each of the required primary care rotations is a four-week supervised clinical practice experience in primary care, under the supervision of an appropriate community-based primary care provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 450C—Supervised Clinical Practice-Primary Health Care (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Each of the required primary care rotations is a four-week supervised clinical practice experience in primary care, under the supervision of an appropriate community-based primary care provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 450D—Supervised Clinical Practice-Primary Health Care (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Each of the required primary care rotations is a four-week supervised clinical practice experience in primary care, under the supervision of an appropriate community-based primary care provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 450E—Supervised Clinical Practice-Primary Health Care (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Each of the required primary care rotations is a four-week supervised clinical practice experience in primary care, under the supervision of an appropriate community-based primary care provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 451—Supervised Clinical Practice-Pediatrics (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical rotation under the supervision of an appropriate community-based Pediatric Medicine provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 452—Supervised Clinical Practice-Women's Health (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical rotation under the supervision of an appropriate community-based women’s health and prenatal care provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 453—Supervised Clinical Practice-Mental Health (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical rotation under the supervision of an appropriate community-based psychiatrist, psychiatric/mental health provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 454—Supervised Clinical Practice-Emergency Medicine (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical rotation under the supervision of an appropriate Emergency Medicine provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 455—Supervised Clinical Practice-Inpatient Surgery (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical experience under the supervision of an appropriate surgical provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 456—Supervised Clinical Practice-Inpatient Medicine (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical rotation under the supervision of an appropriate inpatient provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 459—Supervised Clinical Practice-Other Specialties (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Two four-week selective rotations are available to accommodate student interest and/or accommodate a student's clinical deficits identified by the program. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 470—Health Care Ethics (3-9)
Discussion/Laboratory—1 hour; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Guided independent study of issues in biomedical ethics, with discussion of readings that are based on student interests and needs. Participation in ethics rounds. (General Medicine 470.) (S/U grading only.) Effective: 2012 Spring Quarter.

NRS 471—Supervised Clinical Practice-Geriatrics (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical rotation under the supervision of an appropriate community-based Geriatric Medicine provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 475—Supervised Clinical Practice-Acute Care (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Two- to four-week rotation focus on providing acute care in inpatient settings. Students will work directly with specific inpatient units. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 480—Supervised Clinical Practice-Rural Health (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Rural health rotations focus on providing care in medically underserved rural sites. Students will experience care across the continuum in ambulatory, inpatient, and community based settings. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 490—Supervised Clinical Practice-Quality and Safety (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Clinical rotation that allow students to work directly with patient safety and quality improvement committees in various organizations. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 493A—Improving Quality in Health Care (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Open to Nursing Science and Health-Care Leadership Students. Working in interdisciplinary teams, will explore the theory and practical methods being employed to make improvement in health care systems while providing an opportunity for interprofessional educational experience. Effective: 2017 Fall Quarter.

NRS 493B—Improving Quality in Health Care (4)
Lecture/Discussion—4 hours. Prerequisite(s): NRS 493A; Consent of Instructor. Open to Nursing Science and Health-Care Leadership Students. Working in interdisciplinary teams, will explore advanced theory and practical methods being employed to make improvement in health care systems while providing an opportunity for interprofessional educational experience. Effective: 2018 Winter Quarter.

NRS 493C—Enhancing Patient Safety in Health Care (3)
Clinical Activity—1 hour; Discussion—1 hour; Seminar—1 hour. Prerequisite(s): Consent of Instructor. Nursing Science and Health-Care Leadership graduate students. Inter-professional module is designed to explore the theory and practical methods being employed to improve patient safety in health care while providing an opportunity for inter-professional educational experience. Effective: 2017 Spring Quarter.

Materials Science & Engineering; Engineering

Materials Science & Engineering; Engineering | EMS Information

(College of Engineering)

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The Department of Materials Science and Engineering offers one undergraduate program in Materials Science and Engineering and a minor in Materials Science.

Mission Statement. The mission of the Department of Materials Science and Engineering is to promote excellence in innovative cross-disciplinary materials education and research within an inclusive culture of students, staff, and faculty committed to creating a climate that respect and embraces racial, gender, and ethnic diversity at every level.

Honors Program. An Honors Program is available to qualified students in Materials Science and Engineering. It is a two-year program designed to challenge the most talented students in the major. Students invited to participate will complete either an honors thesis or a project that might involve local industry. Students must maintain a grade point average of 3.500 to continue in the program. Successful completion of the Honors Program will be acknowledged on the student's transcript.

Materials Science and Engineering Undergraduate Program

The Materials Science and Engineering program is accredited by the Engineering Accreditation Commission of ABET; see http://www.abet.org.

Materials science and engineering is directed toward an understanding of the structure, properties, and processing of materials. Society demands new and improved materials with capabilities far superior to common metals, polymers, and ceramics. New materials are needed for high-speed transportation systems, surgical and dental implants, new generations of power plants, renewable energy sources, and solid-state electronic and photonics devices in computer and communication technology. Both the development of new materials and the understanding of present-day materials demand a thorough knowledge of basic engineering and scientific principles, including crystal structure, elastic and plastic behavior, thermodynamics, phase equilibria and reaction rates, and structural and physical and chemical behavior of engineering materials.

Materials engineers study phenomena found in many different engineering operations, from fracture behavior in automobiles to fatigue behavior in aircraft frames, from corrosion behavior in petro-chemical refineries to radiation-induced damage in nuclear power plants, and from the fabrication of steel to the design of semiconductors. Materials engineers are also increasingly involved in developing the new materials needed to attain higher efficiencies in existing and proposed energy conversion schemes and will play a central role in the development of new technologies based on composites and high-temperature superconductivity.

The undergraduate materials science and engineering program provides the background for activities in research, processing, and the design of materials. The curriculum is based on a common core of courses basic to engineering; courses taken during your first two years provide a strong foundation in fundamental engineering concepts.

Objectives. We educate students in the fundamentals of materials science and engineering, balanced with the application of these principles to practical problems; educate students as independent, critical thinkers who can also function effectively in a team; educate students with a sense of community, ethical responsibility, and professionalism; educate students for careers in industry, government, and academia; teach students the necessity for continuing education and self-learning; and foster proficiency in written and oral communications.

Students are encouraged to adhere carefully to all prerequisite requirements. The instructor is authorized to drop students from a course for which stated prerequisites have not been completed.

Exclusive of General Education units, the minimum number of units required for the Materials Science and Engineering major is 154.

Lower Division Required Courses **Units:** 79

MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3
MAT 022B	Differential Equations	3
PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5
PHY 009D	Modern Physics	4
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 002C	General Chemistry	5
OR		
CHE 002AH	Honors General Chemistry	5
CHE 002BH	Honors General Chemistry	5
CHE 002CH	Honors General Chemistry	5

ENG 017	Circuits I	4
AND		
ENG 045	Properties of Materials	4
OR		
ENG 045Y	Properties of Materials	4
EMS 002	Materials Marvels: The Science of Superheroes	3
ECH 060	Engineering Problem Solving Using MATLAB	4

Choose one; a grade of C- or better is required:

ENL 003	Introduction to Literature	4
UWP 001	Expository Writing	4
COM 001	Major Books of Western Culture: The Ancient World	4
COM 002	Major Books of Western Culture: From the Middle Ages to the Enlightenment	4
COM 003	Major Books of Western Culture: The Modern Crisis	4
COM 004	Major Books of the Contemporary World	4
NAS 005	Introduction to Native American Literature	4

CMN 001	Introduction to Public Speaking	4
OR		
CMN 003	Interpersonal Communication Competence	4

Upper Division Required Courses **Units:** 75-83

ENG 190	Professional Responsibilities of Engineers	3
EMS 160	Thermodynamics of Materials Processes and Phase Stability	4
EMS 162	Structure and Characterization of Engineering Materials	4
EMS 162L	Structure and Characterization of Materials Laboratory	2
EMS 164	Rate Processes in Materials Science	4
EMS 172	Electronic, Optical and Magnetic Properties of Materials	4
EMS 172L	Electronic, Optical and Magnetic Properties Laboratory	2
EMS 174	Mechanical Behavior of Materials	4
EMS 174L	Mechanical Behavior Laboratory	2
EMS 180	Materials in Engineering Design	4
EMS 181	Materials Processing	4
EMS 188A	Materials Design Project	4
EMS 188B	Materials Design Project	4

Choose one:

ENG 180	Engineering Analysis	4
MAT 135A	Probability	4
STA 120	Probability and Random Variables for Engineers (Discontinued)	4
STA 131A	Introduction to Probability Theory	4
ECI 114	Probabilistic Systems Analysis for Civil Engineers	4
ECH 140	Mathematical Methods in Biochemical and Chemical Engineering	4
EME 115	Introduction to Numerical Analysis and Methods	4
PHY 104A	Introductory Methods of Mathematical Physics	4

Choose one:

CHE 110A	Physical Chemistry: Introduction to Quantum Mechanics	4
CHE 124A	Inorganic Chemistry: Fundamentals	3
CHE 128A	Organic Chemistry	3

PHY 108	Optics	3
AND		
PHY 108L	Optics Laboratory	1
PHY 110A	Electricity and Magnetism	4
PHY 122A	Advanced Laboratory in Condensed Matter Physics	4
PHY 151	Stellar Structure and Evolution	4
PHY 160	Environmental Physics and Society	3

Choose one:

ECH 158A	Process Economics and Green Design	4
EMS 170	Sustainable Energy Technologies: Batteries, Fuel Cells, and Photovoltaic Cells	4
ENG 106	Engineering Economics	3
ENG 160	Environmental Physics and Society	3
ENG 188	Science and Technology of Sustainable Power Generation	4
ECI 123	Urban Systems and Sustainability	4
ECI 125	Building Energy Performance	4
ECI 143	Green Engineering Design and Sustainability	4

Choose a minimum of 14 units from one of the following focus areas:

Biomedical Engineering:

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIM 020	Fundamentals of Bioengineering	4
BIM 106	Biotransport Phenomena	4
	Students would need to take Neurobiology, Physiology, and Behavior 101 as an elective to enroll in Biomedical Engineering 106.	
BIM 109	Biomaterials	4

Biosystems Engineering:

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
ENG 100	Electronic Circuits and Systems	3
EBS 075	Properties of Materials in Biological Systems	4
EBS 165	Bioinstrumentation and Control	4

Chemical Engineering:

ECH 051	Material Balances	4
ECH 140	Mathematical Methods in Biochemical and Chemical Engineering	4
ECH 141	Fluid Mechanics for Biochemical and Chemical Engineers	4
ECH 142	Heat Transfer for Biochemical and Chemical Engineers	4

Civil Engineering:

ENG 035	Statics	4
ENG 104	Mechanics of Materials	4
ECI 130	Structural Analysis	4
ECI 132	Structural Design: Metallic Elements	4

Electrical Engineering:

ENG 100	Electronic Circuits and Systems	3

EEC 140A	Principles of Device Physics I	4
EEC 140B	Principles of Device Physics II	4
EEC 146A	Integrated Circuits Fabrication	4

Mechanical Engineering:

ENG 035	Statics	4
ENG 102	Dynamics	4
ENG 103	Fluid Mechanics	4
ENG 104	Mechanics of Materials	4

Depending on area of focus, 6-9 units of upper division electives

Students may receive up to a maximum of four units of credit for engineering 199 courses, when these courses are approved by the departmental undergraduate studies committee. To receive credit, students must submit a summary of their research to the committee. A letter of support from the faculty mentor is also required to verify that you have conducted substantial research activity.

Upper Division Composition Requirement

Choose one; grade of C- or better is required:

UWP 102E	Writing in the Disciplines: Engineering	4
UWP 102F	Writing in the Disciplines: Food Science and Technology	4
UWP 104A	Writing in the Professions: Business Writing	4
UWP 104E	Writing in the Professions: Science	4
UWP 104T	Writing in the Professions: Technical Writing	4

Passing the Upper Division Composition Exam.

Total: 156

Materials Science & Engineering; Engineering | EMS M.Engr.

(College of Engineering)

Jeffery Gibeling, Ph.D., Chairperson of the Department 530-752-6496; Fax 530-752-1031

Department Office. 3001 Ghausi Hall; 530-752-0400; Fax 530-752-1031; http://mse.engineering.ucdavis.edu

Faculty. https://mse.engineering.ucdavis.edu/people/faculty/

Graduate Programs in the Department of Materials Science and Engineering

The Department of Materials Science and Engineering is home to a top-20 ranked graduate programs in Materials Science & Engineering. We offer a unique interdisciplinary environment for graduate studies, with renowned faculty and state-of-the-art research facilities.

The Graduate Program in Materials Science and Engineering

M.Eng., M.S., and Ph.D.
Ph.D. designated emphases are available as specializations in biotechnology, biophysics, and nuclear science.

The Materials Science and Engineering Graduate Program provides students with a strong background in advanced materials synthesis, processing, and characterization, both from an experimental and theoretical standpoint.

Doctoral students are typically offered competitive four-year financial offers of fellowships and research/teaching assistantships which include tuition, fees, and a stipend.

Financial offers are subject to satisfactory progress towards completion of degree requirements.

Research areas include biomaterials, catalysts, ceramics, electronic and electrochemical properties and devices, glasses, green engineering and design, interfaces, magnetic materials and devices, materials microstructure and/or processing, mathematical modeling, mechanical properties and synthesis, metals, microscopy, molecular modeling, nanomaterials, optical properties and devices, polymers, renewable energy, sintering, structural materials, thermochemistry, and thin films.

Research Facilities and Partnerships:

- Interdisciplinary Center for Electron Microscopy
- Center for Northern California Nanotechnology
- Center for Nanomaterials in the Environment, Agriculture and Technology

Complete Information is available on our website.

Materials Science & Engineering; Engineering | EMS M.S.

(College of Engineering)

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Research Facilities and Partnerships:

- Interdisciplinary Center for Electron Microscopy
- Center for Northern California Nanotechnology
- Center for Nanomaterials in the Environment, Agriculture and Technology

Complete Information is available on our website.

Materials Science & Engineering; Engineering | EMS Ph.D.

(College of Engineering)

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Research Facilities and Partnerships:

- Interdisciplinary Center for Electron Microscopy
- Center for Northern California Nanotechnology
- Center for Nanomaterials in the Environment, Agriculture and Technology

Complete Information is available on our website.

Materials Science & Engineering; Engineering | EMS Minor

(College of Engineering)

Jeffery Gibeling, Ph.D., Chairperson of the Department 530-752-6496; Fax 530-752-1031

Department Office. 3001 Ghausi Hall; 530-752-0400; Fax 530-752-1031; http://mse.engineering.ucdavis.edu

Faculty. https://mse.engineering.ucdavis.edu/people/faculty/

Materials Science Minor

There is a constant need for professionals with more knowledge and experience in understanding the behavior of materials from which products such as electronics, sensors, biological implants, transportation vehicles, medical devices and infrastructure are made. The goal of this minor is to prepare students for careers that require training in materials science, including the fundamentals of thermodynamics and kinetics and their effects on phase composition and structure, as well as the complex relationships between composition, structure, processing and behavior/performance. Topics covered include material thermodynamics and kinetics, materials structural analysis, and structure-property relationships for electronic, optical, magnetic and mechanical behavior. The minor is expected to accommodate persons of diverse backgrounds, such as those majoring in engineering, physical sciences, biological sciences, and mathematics.

All courses must be taken for a letter grade. A grade of C- or better is required for all courses used to satisfy minor requirements, with an overall GPA in minor requirement courses of 2.000 or better.

Minor Advisor. S. Gentry (Department of Materials Science and Engineering)

Materials Science **Units:** 20

EMS 160	Thermodynamics of Materials Processes and Phase Stability	4
EMS 162	Structure and Characterization of Engineering Materials	4
EMS 164	Rate Processes in Materials Science	4
EMS 172	Electronic, Optical and Magnetic Properties of Materials	4
OR		
EMS 174	Mechanical Behavior of Materials	4

Choose an additional four units from the following, if not used above:

EMS 147	Principles of Polymer Materials Science	3
EMS 162L	Structure and Characterization of Materials Laboratory	2
EMS 172	Electronic, Optical and Magnetic Properties of Materials	4
EMS 172L	Electronic, Optical and Magnetic Properties Laboratory	2
EMS 174	Mechanical Behavior of Materials	4
EMS 174L	Mechanical Behavior Laboratory	2
EMS 180	Materials in Engineering Design	4
EMS 181	Materials Processing	4
EMS 182	Failure Analysis	4

Total: 20

Materials Science & Engineering; Engineering | EMS Courses

Courses in EMS:

EMS 002—Materials Marvels: The Science of Superheroes (3)
Discussion—1 hour; Lecture—2 hours. Introduction to science and technology of materials as key engineering ingredients. Explores the relationship between art and materials, and how superheroes are both products and resources of ideas for new materials' technologies. GE credit: SE, SL, WE. Effective: 2018 Winter Quarter.

EMS 006H—Honors Materials Science Computer Applications (1)
Discussion—1 hour. Prerequisite(s): ENG 006 (can be concurrent); Enrollment in the Materials Science and Engineering Honors Program; ENG 006 required concurrently. Restricted to students in the Materials Science and Engineering Honors Program. Examination of materials science computer applications through additional readings, discussions, collaborative work, or special activities which may include projects or computer simulations. Effective: 2017 Winter Quarter.

EMS 009H—Honors Solid-State Materials Science (1)
Discussion—1 hour. Prerequisite(s): PHY 009D (can be concurrent); Enrollment in the Materials Science and Engineering Honors Program; PHY 009D required concurrently. Restricted to students in the Materials Science and Engineering Honors Program. Examination of solid-state materials science and modern physics topics through additional readings, discussions, collaborative work, or special activities which may include projects, laboratory experience or computer simulations. Effective: 2017 Winter Quarter.

EMS 147—Principles of Polymer Materials Science (3)
Lecture—3 hours. Prerequisite(s): CHE 002A; CHE 002B; ((CHE 008A, CHE 008B) or (ENG 045 or ENG 045Y)); introductory physics. Basic principles of polymer science presented including polymer structure and synthesis; polymerization mechanisms, polymer classes, properties, and reactions; polymer morphology, rheology, and characterization; polymer processing. (FPS 100.) GE credit: QL, SE. Effective: 2018 Spring Quarter.

EMS 160—Thermodynamics of Materials Processes and Phase Stability (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 045 C- or better; PHY 009B C- or better; MAT 022B C- or better; CHE 002C recommended. Review of thermodynamic principles of interest to materials scientists and engineers. Application of thermodynamics to material processing, phase stability, corrosion. GE credit: QL, SE, SL, VL. Effective: 2017 Winter Quarter.

EMS 160—Thermodynamics of Materials Processes and Phase Stability (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ENG 045 C- or better or ENG 045Y C- or better); PHY 009B C- or better; MAT 022B C- or better; CHE 002C recommended. Review of thermodynamic principles of interest to materials scientists and engineers. Application of thermodynamics to material processing, phase stability, corrosion. GE credit: QL, SE, SL, VL. Effective: 2018 Fall Quarter.

EMS 162—Structure and Characterization of Engineering Materials (4)
Lecture—4 hours. Prerequisite(s): (ENG 045 C- or better or ENG 045Y C- or better); MAT 022A C- or better; PHY 009B C- or better Description of the structure of engineering materials on the atomic scale by exploring the fundamentals of crystallography. The importance of this structure to materials' properties. Description of experimental determination using x-ray diffraction techniques. GE credit: QL, SE. Effective: 2018 Winter Quarter.

EMS 162L—Structure and Characterization of Materials Laboratory (2)
Discussion—1 hour; Laboratory—3 hours. Prerequisite(s): EMS 162 (can be concurrent); Concurrent enrollment recommended. Experimental investigations of structure of solid materials are combined with techniques for characterization of materials. Laboratory exercises emphasize methods used to study structure of solids at the atomic and microstructural levels. Methods focus on optical, x-ray and electron techniques. Not open for credit to those who have completed EMS 132; can be taken for 2 units of credit by those who have completed EMS 134L; not open for credit to those who have completed both EMS 132L and EMS 134L. GE credit: QL, SE, SL, VL, WE. Effective: 2017 Winter Quarter.

EMS 164—Rate Processes in Materials Science (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ENG 045 C- or better or ENG 045Y C- or better); EMS 160 Basic kinetic laws and the principles governing phase transformations. Applications in diffusion, oxidation, nucleation, growth and spinodal transformations. GE credit: QL, SE, SL, VL. Effective: 2018 Winter Quarter.

EMS 170—Sustainable Energy Technologies: Batteries, Fuel Cells, and Photovoltaic Cells (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 045 or ENG 045Y Open to students in Engineering or related fields. Basic principles of future energy devices such as lithium batteries, fuel cells, and photovoltaic cells. Examines the current status of these energy technologies and analyze challenges that still must be overcome. GE credit: SE. Effective: 2018 Winter Quarter.

EMS 172—Electronic, Optical and Magnetic Properties of Materials (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 110A or PHY 009D; ENG 006 or ECM 006 or equivalent recommended. Electronic, optical, and magnetic properties of materials as related to structure and processing of solid state materials. Physical principles for understanding the properties of metals, semiconductors, ceramics, and amorphous solids and the applications of these materials in engineering. GE credit: QL, SE, SL, VL. Effective: 2017 Winter Quarter.

EMS 172L—Electronic, Optical and Magnetic Properties Laboratory (2)
Laboratory—3 hours; Lecture/Lab—1 hour. Prerequisite(s): EMS 172 (can be concurrent); Concurrent enrollment recommended. Experimental investigation of electronic, optical and magnetic properties of engineering materials, emphasizing the fundamental relationship between microstructure and properties as well as the influence of rate processes on the evolution of the microstructure and properties. GE credit: QL, SE, SL, VL, WE. Effective: 2017 Winter Quarter.

EMS 174—Mechanical Behavior of Materials (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ENG 045 C- or better or ENG 045Y C- or better); EMS 162 recommended. Microscopic and macroscopic aspects of the mechanical behavior of engineering materials, with emphasis on recent development in materials characterization by nondestructive testing. Fundamental aspects of plasticity in engineering materials, strengthening mechanisms and mechanical failure modes of materials systems. GE credit: QL, SE, SL, VL. Effective: 2018 Spring Quarter.

EMS 174L—Mechanical Behavior Laboratory (2)
Laboratory—3 hours; Lecture/Lab—1 hour. Prerequisite(s): EMS 174 (can be concurrent); Concurrent enrollment recommended. Experimental investigation of mechanical behavior of engineering materials. Laboratory exercises emphasize the fundamental relationship between microstructure and mechanical properties, and the evolution of the microstructure as a consequence of rate process. Not open for credit to those who have taken EMS 138L; not open for credit to those who have taken both EMS 134L and EMS 138L. GE credit: QL, SE, SL, VL, WE. Effective: 2016 Winter Quarter.

EMS 180—Materials in Engineering Design (4)
Lecture—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): ENG 045 C- or better or ENG 045Y C- or better Restricted to students with upper division standing. Quantitative treatment of materials selection for engineering applications. Discussion of design and material selection strategy; process and process selection strategy; process economics; life-cycle thinking and eco-design. Use of materials selection software. GE credit: OL, SE, SL, VL, WE. Effective: 2018 Spring Quarter.

EMS 181—Materials Processing (4)
Lecture—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): (ENG 045 C- or better or ENG 045Y C- or better); (ENG 105 or ECH 152B or EEC 140A or EMS 164) Principles of phase equilibria, thermodynamics and reaction kinetics applied to materials processing. Effects of processing variables on the structure-property relationship. Fundamentals of the manufacturing processes for electronic, optical, functional and structural materials. GE credit: OL, SE, VL, WE. Effective: 2018 Spring Quarter.

EMS 182—Failure Analysis (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 045 C- or better or ENG 045Y C- or better; EMS 174 recommended. Analysis of the way materials fail. Effects of temperature, mechanical deformation and corrosion on the properties of materials. forensics and methodologies for investigating failures of materials including optical microscopy, x-ray analysis and scanning electron microscopy. Investigation of practical problems. GE credit: QL, SE, VL, WE. Effective: 2018 Spring Quarter.

EMS 188A—Materials Design Project (4)
Discussion—1 hour; Laboratory—4 hours. Prerequisite(s): EMS 160; EMS 162; EMS 164; EMS 172; EMS 174 Major materials design experience involving analysis of real materials synthesis/processing/fabrication and technological applications including critical assessments of economic, manufacturing, and ethical constraints. Various principles of materials science are integrated into a culminating team design project. GE credit: OL, SE, SL, VL, WE. Effective: 2017 Winter Quarter.

EMS 188AH—Honors Materials Design (1)
Discussion—1 hour. Prerequisite(s): Enrollment in the Materials Science and Engineering Honors Program. Open only to students in the Materials Science and Engineering Honors Program. Examination of special topics covered in the materials design course through additional readings, discussions, collaborative work, or special activities which may include projects, laboratory experience or computer simulations. Effective: 2017 Winter Quarter.

EMS 188B—Materials Design Project (4)
Discussion—1 hour; Laboratory—4 hours. Prerequisite(s): EMS 188A Major materials design experience involving analysis of real materials synthesis/processing/fabrication and technological applications including critical assessments of economic, manufacturing, and ethical constraints. Various principles of materials science are integrated into a culminating team design project. GE credit: OL, SE, SL, VL, WE. Effective: 2017 Winter Quarter.

EMS 188BH—Honors Materials Design (1)
Discussion—1 hour. Prerequisite(s): Enrollment in the Materials Science and Engineering Honors Program. Open only to students in the Materials Science and Engineering Honors Program. Examination of special topics covered in the materials design course through additional readings, discussions, collaborative work, or special activities which may include projects, laboratory experience or computer simulations. Effective: 2017 Winter Quarter.

EMS 190C—Research Group Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing. Individual and/or group conference on problems, progress and techniques in materials research. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 2017 Winter Quarter.

EMS 198—Directed Group Study (1-5)
Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Group study of selected topics. (P/NP grading only.) Effective: 2017 Winter Quarter.

EMS 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special study for advanced undergraduates. (P/NP grading only.) Effective: 2017 Winter Quarter.

EMS 230—Fundamentals of Electron Microscopy (3)
Lecture—2 hours; Lecture/Discussion—1 hour. Prerequisite(s): EMS 162 Principles and techniques of scanning and transmission of electron microscopy used in the study of materials will be described. Emphasis upon practical applications. Effective: 2017 Winter Quarter.

EMS 230L—Laboratory for Electron Microscopy (2)
Laboratory—6 hours. Prerequisite(s): EMS 230 (can be concurrent); EMS 230 required concurrently. Practical application of techniques of electron scanning and transmission microscopy including x-ray microanalysis. Effective: 2017 Winter Quarter.

EMS 232—Advanced Topics in Transmission Electron Microscopy (3)
Discussion—2 hours; Lecture—1 hour. Prerequisite(s): EMS 230 Advanced course in the techniques of electron microscopy including analytical techniques, probe diffraction methods, and high resolution imaging. Effective: 2017 Winter Quarter.

EMS 232L—Laboratory for Advanced Transmission Electron Microscopy (2)
Discussion—1 hour; Laboratory—3 hours. Prerequisite(s): EMS 230L Laboratory in advanced transmission electron microscopy techniques relevant to specific graduate research projects in materials science. Effective: 2017 Winter Quarter.

EMS 241—Principles and Applications of Dislocation Mechanics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing in Engineering. Concepts in dislocation theory are applied to explain plasticity of crystalline solids. Glide and climb of dislocations, strain hardening, recrystallization, theories of creep processes and interaction of dislocation with solute atoms, precipitates and impurity clouds are discussed. Effective: 2017 Winter Quarter.

EMS 243—Kinetics of Phase Transformation in Engineering Materials (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing in Engineering; EMS 160 recommended. Theory of alloying, kinetics of phase changes, homogenous and heterogeneous transformation, transformation by shear, order-disorder reactions. Effective: 2017 Winter Quarter.

EMS 244—Interaction of Materials and their Environment (3)
Lecture—3 hours. Prerequisite(s): (ENG 045 or ENG 045Y); ENG 105A recommended; or consent of instructor. Thermodynamic and kinetic foundations of the corrosion and oxidation processes. Practical aspects of corrosion control and prevention. Stress-corrosion and gas-embrittlement phenomena. Special topics in corrosion; microbiological and atmospheric corrosion. Effective: 2018 Spring Quarter.

EMS 245—Micro- and Nano-Technology in Life Sciences (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Survey of biomedical device design from the engineering and biological perspectives; micro-/nano-fabrication and characterization techniques; surface chemistry and mass transfer; essential biological processes and models; proposal development skills to merge aforementioned themes in a multidisciplinary project. (EEC 245 and ECH 245.) Effective: 2017 Winter Quarter.

EMS 246—Photovoltaics and Solar Cells (3)
Lecture—3 hours. Prerequisite(s): EEC 140B; or Consent of Instructor. Or equivalent. Physics and application of photovoltaics and solar cells, including design, fabrication technology, and grid incorporation. Mono and microcrystalline silicon devices; thin-film technologies, heterojunction and organic-semiconductor technologies. Collectors, electrical inverters and infrastructure issues. Challenges and concerns. (EEC 248.) Effective: 2017 Winter Quarter.

EMS 248—Fracture of Engineering Materials (3)
Lecture—3 hours. Prerequisite(s): EMS 174 Description of the failure of materials by crack propagation. Topics include the stress fields about elastic cracks, the Griffith-Irwin analysis, descriptions of plastic zones, fracture toughness testing, microstructural aspects of fracture and failure at elevated temperatures. Effective: 2017 Winter Quarter.

EMS 249—Mechanisms of Fatigue (3)
Lecture—3 hours. Prerequisite(s): EMS 174; or Consent of Instructor. EMS 248 recommended. Microstructural description of the mechanisms of fatigue in metals. Topics include a phenomenological treatment of cyclic deformation, dislocation processes in cyclic deformation, fatigue crack nucleation, Stage I growth, threshold effects and high temperature cyclic deformation. Effective: 2017 Winter Quarter.

EMS 250A—Special Topics in Polymer and Fiber Science (3)
Lecture—3 hours. Prerequisite(s): EMS 147; or Consent of Instructor. Selected topics of current interest in polymer and fiber sciences. Topics will vary each time the course is offered. (FPS 250A.) Effective: 2017 Winter Quarter.

EMS 250B—Special Topics in Polymer and Fiber Science (3)
Lecture—3 hours. Prerequisite(s): EMS 147; or Consent of Instructor. Selected topics of current interest in polymer and fiber sciences. Topics will vary each time the course is offered. (FPS 250B.) Effective: 2017 Winter Quarter.

EMS 250C—Special Topics in Polymer and Fiber Science (3)
Lecture—3 hours. Prerequisite(s): EMS 147; or Consent of Instructor. Selected topics of current interest in polymer and fiber sciences. Topics will vary each time the course is offered. (FPS 250C.) Effective: 2017 Winter Quarter.

EMS 250D—Special Topics in Polymer and Fiber Science (3)
Lecture—3 hours. Prerequisite(s): EMS 147; or Consent of Instructor. Selected topics of current interest in polymer and fiber sciences. Topics will vary each time the course is offered. (FPS 250D.) Effective: 2017 Winter Quarter.

EMS 250E—Special Topics in Polymer and Fiber Science (3)
Lecture—3 hours. Prerequisite(s): EMS 147; or Consent of Instructor. Selected topics of current interest in polymer and fiber sciences. Topics will vary each time the course is offered. (FPS 250E.) Effective: 2017 Winter Quarter.

EMS 250F—Special Topics in Polymer and Fiber Science (3)
Lecture—3 hours. Prerequisite(s): EMS 147; or Consent of Instructor. Selected topics of current interest in polymer and fiber sciences. Topics will vary each time the course is offered. (FPS 250F.) Effective: 2017 Winter Quarter.

EMS 251—Applications of Solid State Nuclear Magnetic Resonance Spectroscopy (3)
Lecture—3 hours. Prerequisite(s): Graduate standing in chemistry, physics or engineering, or consent of instructor. Fundamentals of solid state NMR spectroscopy and principles of advanced NMR techniques for analyzing structure of solid materials. Effective: 2017 Winter Quarter.

EMS 260—Advanced Thermodynamics of Solids (4)
Lecture/Discussion—4 hours. Prerequisite(s): EMS 160 Thermodynamic principles, formalism and their application to solid materials. Specific examples from ceramic and solid state systems. Use of thermodynamic approach in developing understanding of and constraints for processes in real systems. Effective: 2017 Winter Quarter.

EMS 262—Advanced Topics in Structure of Materials (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EMS 162; EMS 174 recommended; graduate standing in Engineering or consent of instructor. Nature of microstructure in engineering materials. Crystalline and non-crystalline structures, with special emphasis on grain boundary segregation in the development of polycrystalline microstructure and the radial distribution function of amorphous materials. Not open for credit to students who previously completed (cancelled) EMS 245. Effective: 2017 Winter Quarter.

EMS 264—Transport Phenomena in Materials Processes (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing in Engineering. Thermodynamic driving forces and atomic-scale mechanisms underlying diffusive mass transport and interface motion in materials. Nucleation, growth and coarsening dynamics of phase transformations. Not open for credit to students who previously completed EMS 240. Effective: 2017 Winter Quarter.

EMS 272—Advanced Functional Properties of Materials (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing in Physics, Chemistry, and Engineering. Fundamental physical properties of solid materials important to solid state devices, specifically electronic, magnetic, and optical properties. Topics include band structures, metals, superconductors, semiconductors, dielectrics, optical properties, and magnetic properties and implementation of these properties into devices. Effective: 2017 Winter Quarter.

EMS 274—Advanced Mechanical Properties of Materials (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EMS 174 Comprehensive study of mechanical properties of materials, with special attention to dislocations and deformation and fracture control mechanisms. Mechanical properties of conventional engineering materials as well as advanced materials such as nanocrystalline solids and thin films are considered. Effective: 2017 Winter Quarter.

EMS 282—Glass: Science and Technology (3)
Extensive Writing—1 hour; Lecture—2 hours. Prerequisite(s): Graduate standing in Chemistry, Physics or Engineering, or consent of instructor. Modern paradigms in glass science and their applications to technologies. Relation of macroscopic properties of glasses and glass-forming liquids to atomic-level structures, including principles of formation, relaxation, transport phenomena, nucleation, crystallization and phase separation in glasses. Effective: 2017 Winter Quarter.

EMS 288—Living Matter: Physical Biology of the Cell (3)
Lecture—3 hours. Open to any student possessing general background in any disciplines of physical or biological sciences and engineering. Introduction to the origin, maintenance, and regulation of the dynamic architecture of the cell, including cellular modes of organization, dynamics and energy dissipation, molecular transport, motility, regulation, and adaptability. (BIM 288 and BPH 288.) Effective: 2016 Fall Quarter.

EMS 289A—Special Topics in Materials Science; Electronic Materials (1-5)
Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Electronic Materials. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

EMS 289B—Special Topics in Materials Science; Ceramics and Minerals (1-5)
Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Ceramics and Minerals. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

EMS 289C—Special Topics in Materials Science; Physics and Chemistry of Materials (1-5)
Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Physics and Chemistry of Materials. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

EMS 289D—Special Topics in Materials Science; Materials Processing (1-5)
Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Materials Processing. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

EMS 289E—Special Topics in Materials Science; Materials Science and Forensics (1-5)
Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Materials Science and Forensics. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

EMS 289F—Special Topics in Materials Science; Biomaterials (1-5)
Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Biomaterials. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

EMS 289G—Special Topics in Materials Science; Surface Chemistry of Metal Oxides (1-5)
Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Surface Chemistry of Metal Oxides. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

EMS 290—Materials Science and Engineering Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Selected topics of current interest in Materials Science and Engineering. The subjects covered will vary from year to year and will be announced at the beginning of each quarter. May be repeated for credit. (S/U grading only.) Effective: 2017 Fall Quarter.

EMS 290C—Graduate Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Individual and/or group conference on problems, progress, and techniques in materials science and engineering research. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 2017 Winter Quarter.

EMS 294—Materials Science Seminar (1)
Seminar—1 hour. Current literature and developments in materials science with presentations by individual students. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 2017 Winter Quarter.

EMS 298—Group Study (1-5)
Variable. Group study. Effective: 2017 Winter Quarter.

EMS 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Research. (S/U grading only.) Effective: 2017 Winter Quarter.

EMS 390—The Teaching of Materials Science (1)
Discussion—1 hour. Prerequisite(s): Meet qualifications for teaching assistant and/or associate-in in materials science and engineering. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit. (S/U grading only.) Effective: 2017 Winter Quarter.

Materials Science & Engineering; Engineering | ECH Courses

Courses in ECH:

ECH 001—Design of Coffee–An Introduction to Chemical Engineering (3)
Laboratory—2 hours; Lecture—1 hour; Project (Term Project)—1 hour. Non-mathematical introduction to how chemical engineers think, illustrated by elucidation of the process of roasting and brewing coffee. Qualitative overview of the basic principles of engineering analysis and design. Corresponding experiments testing design choices on the sensory qualities of coffee. Not open for credit to students who have completed ECM 1, ECM 5, or ECH 5. GE credit: SE, SL, VL. Effective: 2017 Spring Quarter.

ECH 005—Introduction to Analysis and Design in Chemical Engineering (3)
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): MAT 021A; MAT 021B (can be concurrent) Quantitative introduction to the engineering principles of analysis and design. Applications of differential and integral calculus. Laboratory experiments using coffee to illustrate chemical engineering concepts and to conduct an engineering design competition. Only two units of credit to students who have completed ECM 001 or ECH 001; not open for credit to students who have completed ECM 005. GE credit: QL, SE. Effective: 2017 Winter Quarter.

ECH 051—Material Balances (4)
Lecture—4 hours. Prerequisite(s): MAT 021C C- or better; MAT 021D (can be concurrent) Application of the principle of conservation of mass to single and multicomponent systems in chemical process calculations. Studies of batch, semi-batch, and continuous processes involving mass transfer, phase change, and reaction stoichiometry. Not open for credit to students who have completed ECH 151. GE credit: SE. Effective: 2017 Fall Quarter.

ECH 060—Engineering Problem Solving Using MATLAB (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021C Problem solving in chemical, biochemical and materials engineering using MATLAB. Programming styles, data structures, working with lists, functions and rules. Applications drawn from material balances, statistics, numerical methods, bioinformatics, transport phenomena, kinetics, and computational analysis. GE credit: QL, SE. Effective: 2017 Spring Quarter.

ECH 080—Chemical Engineering Profession (1)
Lecture/Discussion—1 hour; Term Paper. Professional opportunities and professional responsibilities of chemical engineers. Opportunities and needs for post-baccalaureate education. Relationship of chemical engineering to contemporary issues. GE credit: SE, SS. Effective: 2017 Winter Quarter.

ECH 090X—Honors Discussion Section (1)
Discussion—1 hour. Open only to students in the Chemical Engineering or Biochemical Engineering Honors Programs. Examination of special topics covered in selected lower-division courses through additional readings, discussions, collaborative work, or special activities which may include projects, laboratory experience or computer simulations. Repeat credit allowed if topic differs. May be repeated for credit When topic differs. Effective: 2017 Fall Quarter.

ECH 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. Directed Group Study. (P/NP grading only.) GE credit: SE. Effective: 2017 Winter Quarter.

ECH 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special Study for Undergraduates (P/NP grading only.) GE credit: SE. Effective: 2017 Winter Quarter.

ECH 140—Mathematical Methods in Biochemical and Chemical Engineering (4)
Laboratory—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): MAT 022B; (ECH 060 or ENG 006); or equivalents of ECH 060 or ENG 006. Mathematical methods for solving problems in chemical and biochemical engineering, with emphasis on transport phenomena. Fourier series and separation of variables. Sturm-Liouville eigenvalue problems. Similarity transformations. Tensor analysis. Finite difference methods for solving time-dependent diffusion problems. Not open for credit to students who have completed ECH 159. GE credit: SE. Effective: 2017 Spring Quarter.

ECH 141—Fluid Mechanics for Biochemical and Chemical Engineers (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): ECH 140; ECH 051 (can be concurrent) Principles and applications of fluid mechanics in chemical and biochemical engineering. Hydrostatics. The stress tensor and Newton's law of viscosity. Not open for credit to students who have completed course 150B. GE credit: QL, SE. Effective: 2017 Winter Quarter.

ECH 141—Fluid Mechanics for Biochemical and Chemical Engineers (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): ECH 051 C- or better; ECH 140 Principles and applications of fluid mechanics in chemical and biochemical engineering. Hydrostatics. The stress tensor and Newton's law of viscosity. Not open for credit to students who have completed ECH 150B. GE credit: QL, SE. Effective: 2019 Winter Quarter.

ECH 142—Heat Transfer for Biochemical and Chemical Engineers (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): ECH 051 C- or better; ECH 141 Conduction, convection, and radiation of thermal energy in applications to chemical and biochemical engineering. Derivation of thermal and mechanical energy equations. Thermal boundary layers. Macroscopic balances. Applications: heat transfer in tubes, channels, and integrated circuits, and analysis of heat exchangers. Not open for credit to students who have completed course 153. GE credit: QL, SE. Effective: 2017 Winter Quarter.

ECH 142—Heat Transfer for Biochemical and Chemical Engineers (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): ECH 141 Conduction, convection, and radiation of thermal energy in applications to chemical and biochemical engineering. Derivation of thermal and mechanical energy equations. Thermal boundary layers. Macroscopic balances. Applications: heat transfer in tubes, channels, and integrated circuits, and analysis of heat exchangers. Not open for credit to students who have completed ECH 153. GE credit: QL, SE. Effective: 2019 Spring Quarter.

ECH 143—Mass Transfer for Biochemical and Chemical Engineers (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): ECH 051 C- or better; ECH 141 Derivation of species conservation equations describing convective and diffusive mass transfer. Fick's law and the Stefan-Maxwell constitutive equations. Mass transfer coefficients. Multicomponent mass transfer across gas/liquid interfaces. Applications include drying, heterogeneous chemical reactions, and membrane separations. GE credit: SE. Effective: 2017 Winter Quarter.

ECH 143—Mass Transfer for Biochemical and Chemical Engineers (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): ECH 141 Derivation of species conservation equations describing convective and diffusive mass transfer. Fick's law and the Stefan-Maxwell constitutive equations. Mass transfer coefficients. Multicomponent mass transfer across gas/liquid interfaces. Applications include drying, heterogeneous chemical reactions, and membrane separations. GE credit: SE. Effective: 2019 Spring Quarter.

ECH 144—Rheology and Polymer Processing (3)
Lecture/Discussion—3 hours. Prerequisite(s): ECH 141 Deformation in steady shear, unsteady shear, and elongational flows. Linear and non-linear viscoelastic constitutive models. The principle of material indifference and admissibility of constitutive equations. Introduction to the unit operations of polymer processing. Not open for credit to students who have completed ECH 150C. GE credit: SE. Effective: 2017 Winter Quarter.

ECH 145A—Chemical Engineering Thermodynamics Laboratory (3)
Discussion—2 hours; Extensive Writing; Laboratory—2 hours. Prerequisite(s): ECH 152A; ECH 152B (can be concurrent) Open to majors in Chemical Engineering, Chemical Engineering/Materials Science, & Biochemical Engineering. Laboratory experiments in chemical engineering thermodynamics. GE credit: SE, WE. Effective: 2017 Winter Quarter.

ECH 145B—Chemical Engineering Transport Lab (3)
Discussion—2 hours; Extensive Writing; Laboratory—2 hours. Prerequisite(s): ECH 141; ECH 145A Open to majors in Chemical Engineering, Chemical Engineering/Materials Science, & Biochemical Engineering. Laboratory experiments in chemical engineering transport phenomena. GE credit: SE, WE. Effective: 2017 Spring Quarter.

ECH 148A—Chemical Kinetics and Reaction Engineering (3)
Lecture—3 hours. Prerequisite(s): ECH 143; ECH 152B Ideal chemical reactors. Rate laws and stoichiometry. Design and
analysis of isothermal reactors with multiple reactions. Not open for credit to students who have taken ECH 146. GE credit: SE. Effective: 2017 Winter Quarter.

ECH 148B—Chemical Kinetics and Reaction Engineering (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECH 148A Design and analysis of non-isothermal reactors. Reactions in packed beds with pressure drop. Adsorption and heterogeneous catalysis. Transport limitations. Not open for credit to students who have taken ECH 146. GE credit: SE. Effective: 2017 Winter Quarter.

ECH 152A—Chemical Engineering Thermodynamics (3)
Lecture—3 hours. Prerequisite(s): ECH 060 or ENG 006; or equivalents. Application of principles of thermodynamics to chemical processes. Not open for credit to students who have completed ENG 105 or ENG 105A. GE credit: SE. Effective: 2017 Spring Quarter.

ECH 152B—Chemical Engineering Thermodynamics (4)
Lecture/Discussion—4 hours. Prerequisite(s): ECH 152A Continuation of course 152A. GE credit: SE. Effective: 2017 Spring Quarter.

ECH 155—Chemical Engineering Kinetics and Reactor Design Laboratory (4)
Discussion—1 hour; Laboratory—6 hours; Term Paper. Prerequisite(s): ECH 145B; ECH 148A; ECH 148B (can be concurrent); ECH 157 (can be concurrent); Upper division English composition requirement (can be concurrent). Open to majors in Chemical Engineering, Chemical Engineering/Materials Science, and Biochemical Engineering. Laboratory experiments in chemical kinetics, reactor design and process control. Not open for credit to students who have taken ECH 155B. GE credit: OL, SE, VL, WE. Effective: 2017 Spring Quarter.

ECH 155A—Chemical Engineering Laboratory (4)
Discussion—1 hour; Laboratory—6 hours; Term Paper. Prerequisite(s): ECH 141 (can be concurrent); ECH 142 (can be concurrent); ECH 143 (can be concurrent); Satisfaction of the upper division English composition requirement. Open to majors in Chemical Engineering, Chemical Engineering/Materials Science, Biochemical Engineering, Biomedical Engineering, and Biological Systems Engineering. Laboratory experiments in transport phenomena, chemical kinetics, and thermodynamics. GE credit: OL, QL, SE, VL, WE. Effective: 2017 Winter Quarter.

ECH 155B—Chemical Engineering Laboratory (4)
Discussion—1 hour; Extensive Writing—1 hour; Laboratory—6 hours. Prerequisite(s): ECH 143 (can be concurrent); ECH 155A; Satisfaction of the upper division English composition requirement. Open to majors in Chemical Engineering, Chemical Engineering/Materials Science, Biochemical Engineering, Biomedical Engineering, Food Engineering, and Biosystems Engineering. Continuation of course 155A. Laboratory experiments in transport phenomena, chemical kinetics, and thermodynamics. GE credit: QL, SE, VL, WE. Effective: 2017 Winter Quarter.

ECH 157—Process Dynamics and Control (4)
Lecture/Discussion—4 hours. Prerequisite(s): ECH 140 Fundamentals of dynamics and modeling of chemical processes. Design and analysis of feedback control of chemical processes. GE credit: QL, SE. Effective: 2017 Winter Quarter.

ECH 158A—Process Economics and Green Design (4)
Lecture/Discussion—4 hours. Prerequisite(s): ECH 142; ECH 143 Senior design experience in process and product creation and design with multiple realistic constraints. Cost accounting and capital investment estimation. Profitability analysis techniques. Green chemistry, health risk assessment and life cycle assessment concepts. GE credit: SE, SL, SS, VL. Effective: 2017 Winter Quarter.

ECH 158B—Separations and Unit Operations (4)
Lecture—4 hours. Prerequisite(s): ECH 158A Senior design experience with multiple realistic constraints. Heuristic and rigorous design of chemical process equipment. Separation by filtration, distillation and extraction. Synthesis of reactor and separation networks, heat and power integration. GE credit: QL, SE. Effective: 2017 Winter Quarter.

ECH 158C—Plant Design Project (4)
Discussion/Laboratory—2 hours; Project (Term Project)—2 hours. Prerequisite(s): ECH 158B or ECH 161C Senior design experience for chemical and biochemical processes. Impact of multiple realistic constraints. Design, costing and profitability analysis of complete plants. Use of computer-aided design techniques. GE credit: SE, SS, VL. Effective: 2018 Winter Quarter.

ECH 160—Fundamentals of Biomanufacturing (3)
Lecture—3 hours. Prerequisite(s): MIC 102 or BIS 102 or ABI 102 Principles of large scale bioreactor production of metabolites, enzymes, and recombinant proteins including the development of strains/cell lines, fermentor/bioreactor design, monitoring and operation, product recovery and purification, and biomanufacturing economics. Not open for credit to students who have completed ECH 161C or both ECH 161A and ECH 161B; only two units of credit to students who have completed either ECH 161A or ECH 161B. GE credit: QL, SE, VL. Effective: 2017 Winter Quarter.

ECH 161A—Biochemical Engineering Fundamentals (4)
Lecture/Discussion—4 hours. Prerequisite(s): ECH 148A Biokinetics; bioreactor design and operation; transport phenomena in bioreactors; microbial, plant, and animal cell cultures. GE credit: QL, SE, VL. Effective: 2017 Winter Quarter.

ECH 161B—Bioseparations (4)
Lecture/Discussion—4 hours. Prerequisite(s): ECH 143 Product recovery and purification of biochemicals. Cell disruption, centrifugation, filtration, membrane separations, extraction, and chromatographic separation. GE credit: QL, SE. Effective: 2017 Winter Quarter.

ECH 161C—Biotechnology Facility Design and Regulatory Compliance (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECH 161A (can be concurrent), ECH 161B (can be concurrent)) or MCB 263 (can be concurrent); Course(s) required concurrently. Design of biotechnology manufacturing facilities. Fermentation and purification equipment, and utility systems. Introduction to current good manufacturing practices, regulatory compliance, and documentation. GE credit: QL, SE, SL, SS, VL. Effective: 2017 Winter Quarter.

ECH 161L—Bioprocess Engineering Laboratory (4)
Discussion—1 hour; Laboratory—9 hours; Term Paper. Prerequisite(s): (ECH 161A, ECH 161B) or VEN 186 or (BIS 103, MCB 120L) Pass One restricted to chemical/biochemical engineering majors. Laboratory experiments in the operation and analysis of bioreactors; determination of oxygen mass transfer coefficients in bioreactors and ion exchange chromatography. GE credit: QL, SE, VL, WE. Effective: 2017 Winter Quarter.

ECH 166—Catalysis (3)
Lecture—3 hours. Prerequisite(s): ECH 148A; and Consent of Instructor. Principles of catalysis based on an integration of principles of physical, organic, and inorganic chemistry and chemical kinetics and chemical reaction engineering. Catalysis in solution; catalysis by enzymes; catalysis in swellable polymers; catalysis in microscopic cages (zeolites); catalysis on surfaces. GE credit: SE. Effective: 2017 Winter Quarter.

ECH 169—The Design of Cocktails: Applied Thermodynamics and Transport Phenomena in Mixed Drinks (1)
Discussion/Laboratory—1 hour. Prerequisite(s): ECH 145B; ECH 152B; and Consent of Instructor. Enrollment by permission of instructors only; limited to students over 21 years old. Scientific and engineering principles underlying the preparation of mixed drinks. Thermodynamics and kinetics of ice crystallization; phase diagram of ethanol-water-ice mixtures; mass transfer of aromatics; solubility of sucrose and carbon dioxide; colloidal behavior of dispersed solids and emulsified oils. Corresponding laboratory experiments testing the effect of design choices on the sensory quality of cocktails. (P/NP grading only.) GE credit: SE. Effective: 2018 Spring Quarter.

ECH 170—Introduction to Colloid and Surface Phenomena (3)
Lecture—3 hours. Prerequisite(s): CHE 110A Introduction to the behavior of surfaces and disperse systems. Fundamentals will be applied to the solution of practical problems in colloid science. Course should be of value to engineers, chemists, biologists, soil scientists, and related disciplines. GE credit: SE. Effective: 2017 Winter Quarter.

ECH 190C—Research Group Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing in Chemical Engineering. Research group conferences. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 2017 Winter Quarter.

ECH 190X—Honors Discussion Section (1)
Discussion—1 hour. Open only to students in the Chemical Engineering or Biochemical Engineering Honors Programs. Examination of special topics covered in selected upper division courses through additional readings, discussions, collaborative work, or special activities which may include projects, laboratory experience or computer simulations. May be repeated for credit when topic differs. Effective: 2017 Fall Quarter.

ECH 192—Internship in Chemical or Biochemical Engineering (1-5)
Internship—3-15 hours. Prerequisite(s): Consent of Instructor. Completion of a minimum of 84 units; project approval before period of internship. Supervised work experience in Chemical or Biochemical Engineering. May be repeated for credit when project differs. (P/NP grading only.) GE credit: SE. Effective: 2017 Winter Quarter.

ECH 198—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Group study. (P/NP grading only.) GE credit: SE. Effective: 2017 Winter Quarter.

ECH 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special study. (P/NP grading only.) GE credit: SE. Effective: 2017 Winter Quarter.

ECH 206—Biochemical Engineering (3)
Lecture—3 hours. Prerequisite(s): MIC 102; MIC 102L; BIS 101; BIS 102; BIS 103; MCB 120L; MCB 200A; or Consent of Instructor. FST 205 recommended. Interaction of chemical engineering, biochemistry, and microbiology. Mathematical representations of microbial systems. Kinetics of growth, death, and metabolism. Continuous fermentation, agitation, mass transfer and scale-up in fermentation systems, product recovery, enzyme technology. Effective: 2017 Winter Quarter.

ECH 226—Enzyme Engineering (3)
Lecture—3 hours. Prerequisite(s): MIC 102; MIC 102L; BIS 102; BIS 103; MCB 122; MCB 120L; MCB 200A; or Consent of Instructor. Application of basic biochemical and engineering principles of practical enzymatic processes. Lectures cover large scale production and separation of enzymes, immobilized enzyme systems, enzyme related biotechnology, reactor design and optimization, and new application of enzymes in genetic engineering. Effective: 2017 Winter Quarter.

ECH 245—Micro- and Nano-Technology in Life Sciences (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Survey of biomedical device design from the engineering and biological perspectives; micro-/nano-fabrication and characterization techniques; surface chemistry and mass transfer; essential biological processes and models; proposal development skills to merge aforementioned themes in a multidisciplinary project. (EEC 245 and EMS 245.) Effective: 2017 Winter Quarter.

ECH 246—Advanced Biochemical Engineering (2)
Lecture—2 hours. Prerequisite(s): ECH 206; or Consent of Instructor. Advances in the field of biotechnology including genetic engineering, enzyme engineering, fermentation science, and renewable resources development. The important results of original research will be evaluated for understanding of the fundamental principles and for potential practical application. Effective: 2017 Winter Quarter.

ECH 252—Statistical Thermodynamics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECH 152B; ENG 105B or the equivalent. A treatment of the statistical basis of thermodynamics;introduction to statistical mechanics; discussion of the laws of thermodynamics; application of thermodynamic relationships to phase and chemical reaction equilibrium; introduction to molecular simulations and the evaluation of thermodynamic properties from molecular simulations. Effective: 2017 Winter Quarter.

ECH 253A—Advanced Fluid Mechanics (4)
Lecture—4 hours. Prerequisite(s): ECH 141; ECH 259 Kinematics and basic principles of fluid flow. Principles of constitutive equations. Navier-Stokes equations for Newtonian fluids. Survey of rectilinear creeping flow, lubrication flow and boundary layer theory. Effective: 2017 Winter Quarter.

ECH 253B—Advanced Heat Transport (4)
Lecture—4 hours. Prerequisite(s): ECH 142; ECH 259; Or the equivalent. Fundamental energy postulates and derivation of microscopic and macroscopic energy equations. Mechanisms of conduction. Isotropic, thermoelastic and anisotropic materials solution problems using Greens functions and perturbation theory. Effective: 2017 Winter Quarter.

ECH 253C—Advanced Mass Transfer (4)
Lecture—4 hours. Prerequisite(s): ECH 253A; Or the equivalent. Kinematics and basic conservation principles for multicomponent systems. Constitutive equations for momentum, heat and mass transfer, applications to binary and ternary systems. Details of diffusion with reaction, and the effects of concentration. Effective: 2017 Winter Quarter.

ECH 254—Colloid and Surface Phenomena (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Graduate standing in science or engineering or consent of instructor. Thermodynamics and rate processes at interfaces. These fundamental processes will be applied to determine the collective properties
of thin films and membranes, self-assembled systems, liquid crystals and colloidal systems. Experimental techniques in surface analysis. Effective: 2017 Winter Quarter.

ECH 256—Chemical Kinetics and Reaction Engineering (4)
Lecture—4 hours. Prerequisite(s): ECH 146; Or the equivalent. Analysis of the performance of chemical reactors and design of chemical reactors based on the principles of chemical kinetics and transport phenomena. Consideration of noncatalytic/catalytic reactions in single fluid phases and emphasis on reactions in multiphase mixtures, especially gas-solid reactors. Effective: 2017 Winter Quarter.

ECH 259—Advanced Engineering Mathematics (4)
Lecture—4 hours. Prerequisite(s): MAT 021D; MAT 022A; MAT 022B Applications of methods of applied mathematics to the analytical and numerical solution of linear and nonlinear ordinary and partial differential equations arising in the study of transport phenomena. Effective: 2017 Winter Quarter.

ECH 261—Molecular Modelling of Soft and Biological Matter (4)
Lecture/Discussion—4 hours. Prerequisite(s): EMS 247 or ECH 252; or equivalent course in advanced thermodynamics/statistical mechanics. Modern molecular simulation techniques with a focus on soft matter like polymers, biologically relevant systems, and glasses. Effective: 2017 Winter Quarter.

ECH 262—Transport Phenomena in Multiphase Systems (3)
Discussion/Laboratory—3 hours. Prerequisite(s): ECH 253C Heat, mass and momentum transfer in multiphase, multicomponent systems with special emphasis on transport processes in porous media. Derivation of the averaging theorem and application of the method of volume averaging to multicomponent, reacting systems. Effective: 2017 Winter Quarter.

ECH 263—Rheology and Mechanics of Non-Newtonian Fluids (3)
Lecture—3 hours. Prerequisite(s): ECH 253A; ECH 259; or Consent of Instructor. Mechanics of polymer solutions and suspension, especially the development of properly invariant constitutive equations. Topics include: viscometry, linear and nonlinear viscoelasticity, continuum mechanics, kinetic theory. Effective: 2017 Winter Quarter.

ECH 265—Emulsions, Microemulsions and Bilayers (3)
Lecture—3 hours. Prerequisite(s): An undergraduate course in physical chemistry. Thermodynamic and mechanical descriptions of surfactant-laden interfaces. Forces between and within interfaces. Physics of micelle and microemulsion formation. Structure and stability of emulsions. Properties of phospholipid bilayers, with emphasis on vesicles. Effective: 2017 Winter Quarter.

ECH 267—Advanced Process Control (3)
Lecture—3 hours. Prerequisite(s): ECH 157; Or the equivalent. Advanced course in analysis and synthesis of linear multivariable systems. Emphasis on frequency domain techniques and applications to chemical processes. Topics include singular value analysis, internal model control, robust controller design methods as well as self-tuning control techniques. Effective: 2017 Winter Quarter.

ECH 268—Polysaccharides Surface Interactions (3)
Lecture—3 hours. Prerequisite(s): Graduate students in science or engineering. Study of fundamental surface science theories as applied to physical and chemical interactions of carbohydrates and polysaccharides. (EBS 268.) Effective: 2017 Winter Quarter.

ECH 269—Cell and Molecular Biophysics for Bioengineers (4)
Lecture—4 hours. Prerequisite(s): BIM 284; or equivalent; graduate standing; undergraduate students by consent of instructor. Introduction to fundamental mechanisms governing the structure, function, and assembly of bio-macromolecules. Emphasis is on a quantitative understanding of the nano-to-microscale interactions between and within individual molecules, as well as of their assemblies, in particular membranes. Not open for credit to students who have completed BIM 162. (BIM 262.) Effective: 2017 Winter Quarter.

ECH 289A—Special Topics in Chemical Engineering; Fluid Mechanics (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Fluid Mechanics. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289B—Special Topics in Chemical Engineering; Nonlinear Analysis and Numerical Methods (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Nonlinear Analysis and Numerical Methods. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289C—Special Topics in Chemical Engineering; Process Control (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Process Control. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289D—Special Topics in Chemical Engineering; Chemistry of Catalytic Processes (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Chemistry of Catalytic Processes. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289E—Special Topics in Chemical Engineering; Biotechnology (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Biotechnology. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289F—Special Topics in Chemical Engineering; Interfacial Engineering (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Interfacial Engineering. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289G—Special Topics in Chemical Engineering; Molecular Thermodynamics (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Molecular Thermodynamics. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289H—Special Topics in Chemical Engineering; Membrane Separations (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Membrane Separations. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289I—Special Topics in Chemical Engineering; Advanced Materials Processing (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Advanced Materials Processing. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289J—Special Topics in Chemical Engineering; Novel Experimental Methods (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Novel Experimental Methods. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289K—Special Topics in Chemical Engineering; Advanced Transport Phenomena (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Advanced Transport Phenomena. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289L—Special Topics in Chemical Engineering; Biomolecular Engineering (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Biomolecular Engineering. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 290—Seminar (1)
Seminar—1 hour. Seminar. (S/U grading only.) Effective: 2017 Winter Quarter.

ECH 290C—Graduate Research Group Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Research problems, progress and techniques in chemical engineering. May be repeated for credit. (S/U grading only.) Effective: 2017 Winter Quarter.

ECH 294—Current Progress in Biotechnology (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Seminars presented by guest lecturers on subjects of their own research activities. May be repeated for credit. (BIT 294.) (S/U grading only.) Effective: 2018 Winter Quarter.

ECH 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Group study. (S/U grading only.) Effective: 2017 Winter Quarter.

ECH 299—Research (1-12)
Variable. Research. (S/U grading only.) Effective: 2017 Winter Quarter.

ECH 390—Teaching of Chemical Engineering (1) ***Review all entries***
Discussion—1 hour. Prerequisite(s): Qualifications and acceptance as teaching assistant and/or associate-in in chemical engineering. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated up to 2 time(s). (S/U grading only.) Effective: 2017 Winter Quarter.

ECH 390—Teaching of Chemical Engineering (1) ***Review all entries***
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Qualifications and acceptance as teaching assistant and/or associate-in in chemical engineering. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit. (S/U grading only.) Effective: 2018 Fall Quarter.

Maternal & Child Nutrition; Nutrition

Maternal & Child Nutrition; Nutrition | Maternal & Child Nutrition M.A.S.

(Department of Nutrition)

Francene M. Steinberg, Ph.D., Chairperson of the Department

Department Office. 3135 Meyer Hall; 530-752-4630; https://extension.ucdavis.edu/maternal-and-child-nutrition

Faculty. https://extension.ucdavis.edu/maternal-and-child-nutrition

Graduate Study. The Nutrition Department offers the degree of M.A.S. in Maternal and Child Nutrition. This program consists of three required six-unit core courses (Nutrition During Pregnancy, Lactation and Infant Nutrition, and Child and Adolescent Nutrition), six to eight units of special topics seminars, two units of electives, and a six-unit student project (produced in consultation with a three-member guidance committee) for a total of 36 units. Each of the core courses will comprise 10 weeks of in-class instruction twice per week for two-and-a-half hours per meeting. Classes will also include online discussion of related material and readings.

Each student will be assigned a three-member guidance committee consisting of two members of the teaching faculty and an additional qualified faculty member to advise the student in identifying a student project.

Preparation. Admission to the program requires a bachelor's degree with prior course work that includes (or is comparable to): one year of general chemistry, two quarters of organic chemistry, a course in statistics, one course in general physiology, and two quarters of the biochemistry of nutrition.

Courses in Maternal and Child Nutrition. See courses under Nutrition.

Graduate Advisors. Reina Engle-Stone, Ph.D., Asst. Professor (Nutrition), Jane Heinig, Ph.D., Academic Administrator (Nutrition)

Mathematical Analytics & Operations Research; Mathematics

Mathematical Analytics & Operations Research; Mathematics | Mathematical Analytics & Operations Research B.S.

(College of Letters and Science)

Abigail Thompson, Ph.D., Chairperson

Department Office. 1130 Mathematical Sciences Bldg.; 530-752-0827; studentservices@math.ucdavis.edu; http://www.math.ucdavis.edu

Faculty. https://www.math.ucdavis.edu/people/faculty/

The Major Programs

Mathematics is the study of abstract structures, space, change, and the interrelations of these concepts. It also is the language of the exact sciences.

The Program. Students majoring in mathematics may follow a program leading to either the Bachelor of Arts or the Bachelor of Science degree. After completing basic introductory courses such as calculus and linear algebra, students plan an upper division program in consultation with a faculty advisor. Upper division courses include real analysis, probability, modern algebra, as well as a variety of other courses that allow students to further mathematical knowledge and skills that

feature their research or career interests. This individualized program can lead to graduate study in pure or applied mathematics, elementary or secondary level teaching, or to other professional goals. It can also reflect a special interest such as computational and applied mathematics, computer science, or statistics, or may be combined with a major in some other field.

Career Alternatives. A degree in mathematics provides entry to many careers in industry in addition to teaching. For instance, operations research, data analysis, systems analysis, computing, actuarial work, insurance, and financial services are only a few such careers. Mathematics is also a sound basis for graduate work in a variety of fields, such as law, engineering, and economics.

Recommended Language Preparation. Bachelor of Science degree candidates are advised, but not required, to satisfy the same language requirement as that for a Bachelor of Arts degree candidate, and to fulfill it in French, German, or Russian.

Major Advisors. For a current list of faculty and staff advisors, see https://www.math.ucdavis.edu/undergrad/advising/advisers/ or contact the Student Services office at studentservices@math.ucdavis.edu.

Depth Subject Matter Requirements. The upper division course offering is grouped into core and enrichment courses. The core classes are intended to provide basic mathematical techniques, whereas the enrichment choices allow students to further mathematical knowledge and skills that feature their research or career interests. Certain mathematically oriented courses given by other departments are admissible in partial satisfaction of the depth subject matter requirements with prior departmental approval. Before graduating, students also complete a mathematics capstone, which can be satisfied by completing an undergraduate thesis, an approved internship, or one of the approved capstone courses.

Statement of Objectives. As early as possible, but no later than the last quarter of the sophomore year or no later than the beginning of the first quarter of the junior year for transfer students, each prospective mathematics major, in consultation with an advisor, should file a formal program of study in one of the majors offered in mathematics. Forms to be used for this are available on OASIS (students.ucdavis.edu), our website or from the Department office. Failure to file a formal program could lead to a delay in graduation.

Information for Undergraduates. Assistance in planning an undergraduate major program in mathematics is available on our website, as well as by consulting an advisor. Information about the Department's advisors can be found on our website: https://www.math.ucdavis.edu/undergrad/advising/advisers/.

Mathematics Placement Requirement. Students who wish to enroll in MAT 12, 16A, 17A, 21A, 21AH, and 21M must satisfy the mathematics placement requirement by taking an online exam. Students who do not satisfy the requirement will be administratively dropped from these courses. For more information, including preparation tips and how to access the online exam, please see the Department of Mathematics' website, at http://www.math.ucdavis.edu/undergrad/math_placement , well in advance of enrolling.

Department Honors. Students who have completed at least 135 units with a minimum GPA of 3.500 in courses counted towards their major will be considered for Department Honors.

Students who meet the minimum GPA requirement for honors at graduation for the College of Letters and Science and who complete a senior project as part of MAT 194 or 199 units in consultation with their faculty adviser may also be recommended by the department for graduation with High Honors or Highest Honors. Recommendations will be based on evaluations of students' academic achievements in their major and the quality of their senior project. For complete details, see our website at https://www.math.ucdavis.edu/undergrad/honors/.

Teaching Credential Subject Representative. Dr. Ali Dad-del

Graduate Study. The Department offers programs of study and research leading to the M.A. and

Ph.D. degrees in Mathematics. Information regarding graduate study may be obtained by consulting our website, and by sending an email to studentservices@math.ucdavis.edu.

Preparatory Subject Matter **Units:** 39-43

MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022B	Differential Equations	3

Choose one option:

(a)

MAT 022A	Linear Algebra	3
MAT 108	Introduction to Abstract Mathematics	4

(b)

MAT 067	Modern Linear Algebra	4

MAT 022AL	Linear Algebra Computer Laboratory	1

OR

Equivalent MATLAB knowledge.

ECS 032A	Introduction to Programming	4

OR

ENG 006	Engineering Problem Solving	4

ECN 001A	Principles of Microeconomics	4
ECN 001B	Principles of Macroeconomics	4

STA 032	Gateway to Statistical Data Science	4

OR

STA 100	Applied Statistics for Biological Sciences	4

NOTE: Basic knowledge of MATLAB is required for both MAT 0022A and MAT 067. Students can learn it on their own, enroll in ENG 006, EME 005, or in the one unit course MAT 022AL (can be taken concurrently).

Depth Subject Matter **Units:** 55

A. Core

MAT 127A	Real Analysis	4
MAT 127B	Real Analysis	4
MAT 127C	Real Analysis	4

Choose one:

MAT 128A	Numerical Analysis	4
MAT 128B	Numerical Analysis in Solution of Equations	4
MAT 128C	Numerical Analysis in Differential Equations	4

MAT 135A	Probability	4
MAT 135B	Stochastic Processes	4
MAT 150A	Modern Algebra	4
MAT 160	Mathematics for Data Analytics and Decision Making	4
MAT 168	Optimization	4

B. Enrichment Courses

1. Enrichment A; choose two:

MAT111-MAT185B; excluding MAT 180.

STA 131B	Introduction to Mathematical Statistics	4
STA 131C	Introduction to Mathematical Statistics	4
STA 137	Applied Time Series Analysis	4

2. Enrichment B; choose two:

ECN 100	Intermediate Micro Theory	4
ECN 121A	Industrial Organization	4
ECN 121B	Industrial Organization	4
ECN 122	Theory of Games and Strategic Behavior	4
ECN 134	Financial Economics	4
ECN 140	Econometrics	4
ECN 145	Transportation Economics	4
ARE 155	Operations Research and Management Science	4
ARE 156	Introduction to Mathematical Economics	4
ARE 157	Analysis for Operations and Production Management	4

C. Capstone Course

Choose one:

MAT 189	Advanced Problem Solving	3
MAT 192	Internship in Applied Mathematics	1-3
MAT 194	Undergraduate Thesis	3
MAT 180	Special Topics	3

Total: 94-98

Mathematical Analytics & Operations Research; Mathematics | MAT Courses

Note: Mathematics 016A, 016B, and 016C are intended for students who will take no more Mathematics courses. Mathematics 017A, 017B, and 017C have the same level of rigor as 016A, 016B, and 016C, yet are much more broad mathematically (containing algebra, differential equations and probability, besides traditional calculus), and are intended for biology.

Courses in MAT:

MAT 000B—Elementary Algebra (no credit) (0)
Lecture—3 hours. Not open to Concurrent student enrollment. Basic concepts of algebra, including polynomials, factoring, equations, graphs, and inequalities. Offered only if sufficient number of students enroll. (P/NP grading only.) Effective: 1997 Winter Quarter.

MAT 000C—Trigonometry (no credit) (0)
Lecture—2 hours. Not open to Concurrent student enrollment. Basic concepts of trigonometry, including trigonometric functions, identities, inverse functions, and applications. Offered only if sufficient number of students enroll. (P/NP grading only.) Effective: 1997 Winter Quarter.

MAT 000D—Intermediate Algebra (no credit) (0)
Lecture—3 hours. Not open to Concurrent student enrollment. Basic concepts of algebra, prepares student for college work in mathematics, such as course 16A or 21A. Functions, equations, graphs, logarithms, and systems of equations. Offered only if sufficient number of students enroll. (P/NP grading only.) Effective: 1997 Winter Quarter.

MAT 012—Precalculus (3)
Lecture—3 hours. Prerequisite(s): Two years of high school algebra, plane geometry, plane trigonometry; and obtaining required score on the Precalculus Diagnostic Examination. Topics selected for their use in calculus, including functions and their graphs, slope, zeroes of polynomials, exponential, logarithmic and trigonometric functions, sketching surfaces and solids. Not open for credit to students who have completed any of courses MAT 016A, MAT 016B, MAT 016C, MAT 017A, MAT 017B, MAT 017C, MAT 021A, MAT 021B, or MAT 021C with a C- or better. GE credit: QL, SE, SL. Effective: 2012 Winter Quarter.

MAT 016A—Short Calculus (3)
Lecture—3 hours. Prerequisite(s): Two years of high school algebra, plane geometry, plane trigonometry, and satisfying the Mathematics Placement Requirement. Limits; differentiation of algebraic functions; analytic geometry; applications, in particular to maxima and minima problems. Not open for credit to students who have completed MAT 017B, MAT 017C, MAT 021A, MAT 021B, or MAT 021C; only 2 units of credit to students who have completed MAT 17A. GE credit: QL, SE, SL. Effective: 2012 Winter Quarter.

MAT 016B—Short Calculus (3)
Lecture—3 hours. Prerequisite(s): MAT 016A C- or better or MAT 017A C- or better or MAT 021A C- or better or MAT 021AH C- or better Integration; calculus for trigonometric, exponential, and logarithmic functions; applications. Not open for credit to students who have completed MAT 017C, MAT 021B, or MAT 021C; only 2 units of credit to students who have completed MAT 017B. GE credit: QL, SE, SL. Effective: 2017 Winter Quarter.

MAT 016C—Short Calculus (3)
Lecture—3 hours. Prerequisite(s): MAT 016B C- or better or MAT 017B C- or better or MAT 021B C- or better or MAT 021BH C- or better Differential equations; partial derivatives; double integrals; applications; series. Not open for credit to students who have completed MAT 021C; only 2 units of credit to students who have completed MAT 017C. GE credit: QL, SE, SL. Effective: 2017 Winter Quarter.

MAT 017A—Calculus for Biology and Medicine (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Two years of high school algebra, plane geometry, plane trigonometry, and analytical geometry, and satisfying the Mathematics Placement Requirement. Introduction to differential calculus via applications in biology and medicine. Limits, derivatives of polynomials, trigonometric, and exponential functions, graphing, applications of the derivative to biology and medicine. Not open for credit to students who have completed MAT 016B, MAT 016C, MAT 021A, MAT 021B, or MAT 021C; only 2 units of credit to students who have completed MAT 016A. GE credit: QL, SE, SL. Effective: 2014 Fall Quarter.

MAT 017B—Calculus for Biology and Medicine (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016A C- or better or MAT 017A C- or better or MAT 021A C- or better or MAT 021AH C- or better Introduction to integral calculus and elementary differential equations via applications to biology and medicine. Fundamental theorem of calculus, techniques of integration including integral tables and numerical methods, improper integrals, elementary first order differential equations, applications in biology and medicine. Not open for credit to students who have completed MAT 016C, MAT 021B, or MAT 021C; only 2 units of credit for students who have completed MAT 016B. GE credit: QL, SE, SL. Effective: 2017 Winter Quarter.

MAT 017C—Calculus for Biology and Medicine (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 017B C- or better Matrix algebra, functions of several variables, partial derivatives, systems of differential equations, and applications to biology and medicine. Not open for credit to students who have completed MAT 21C; only 2 units of credit to students who have completed MAT 16C. GE credit: SE, SL. Effective: 2016 Fall Quarter.

MAT 021A—Calculus (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Two years of high school algebra, plane geometry, plane trigonometry, and analytical geometry, and satisfying the Mathematics Placement Requirement. Functions, limits, continuity. Slope and derivative. Differentiation of algebraic and transcendental functions. Applications to motion, natural growth, graphing, extrema of a function. Differentials. L'Hopital's rule. Not open for credit to students who have completed MAT 016B, MAT 016C, MAT 017B, or MAT 017C; only 2 units of credit to students who have completed MAT 016A or MAT 017A. GE credit: QL, SE, SL. Effective: 2012 Winter Quarter.

MAT 021AH—Honors Calculus (4)
Lecture/Discussion—4 hours. Prerequisite(s): A Precalculus Diagnostic Examination score significantly higher than the minimum for MAT 021A is required. More intensive treatment of material covered in course 21A. GE credit: QL, SE. Effective: 1997 Winter Quarter.

MAT 021AL—Emerging Scholars Program Calculus Workshop (2)
Workshop—6 hours. Prerequisite(s): MAT 021A (can be concurrent); MAT 021A required concurrently. Functions, limits, continuity. Slope and derivative. Same course content as course 21A. Enrollment for students in the Emerging Scholars Program by instructor's invitation only. (P/NP grading only.) GE credit: SE. Effective: 2006 Fall Quarter.

MAT 021B—Calculus (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (MAT 021A C- or better or MAT 021AH C- or better) or MAT 017A B or better Continuation of course 21A. Definition of definite integral, fundamental theorem of calculus, techniques of integration. Application to area, volume, arc length, average of a function, improper integral, surface of revolution. Only 2 units of credit to students who have completed MAT 016B, MAT 016C, MAT 017B, or MAT 017C. GE credit: QL, SE. Effective: 2017 Winter Quarter.

MAT 021BH—Honors Calculus (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021A B or better or MAT 021AH B or better More intensive treatment of material covered in course 21B. Students completing 21BH can continue with course 21CH or the regular 21C. GE credit: SE. Effective: 1997 Winter Quarter.

MAT 021BL—Emerging Scholars Program Calculus Workshop (2)
Workshop—6 hours. Prerequisite(s): MAT 021B (can be concurrent); Concurrent enrollment in MAT 021B. Continuation of course 21A. Same course content as 21B. Enrollment for students in the Emerging Scholars Program by instructor's invitation only. (P/NP grading only.) GE credit: SE. Effective: 2016 Fall Quarter.

MAT 021C—Calculus (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016C C- or better or MAT 017C C- or better or MAT 021B C- or better or MAT 021BH C- or better or MAT 017B B or better; Continuation of course 21B. Sequences, series, tests for convergence, Taylor expansions. Vector algebra, vector calculus, scalar and vector fields. Partial derivatives, total differentials. Applications to maximum and minimum problems in two or more variables. Applications to physical systems. GE credit: QL, SE. Effective: 2017 Winter Quarter.

MAT 021CH—Honors Calculus (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021B B or better or MAT 021BH B or better More intensive treatment of material covered in course 21C. GE credit: SE. Effective: 1997 Winter Quarter.

MAT 021CL—Emerging Scholars Program Calculus Workshop (2)
Workshop—6 hours. Prerequisite(s): MAT 021C (can be concurrent); Concurrent enrollment in MAT 021C. Continuation of course 21B. Same course content as course 21C. Enrollment for students in the Emerging Scholars Program by instructor's invitation only. (P/NP grading only.) GE credit: SE. Effective: 2016 Fall Quarter.

MAT 021D—Vector Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (MAT 021C C- or better or MAT 021CH C- or better) or MAT 017C B or better Continuation of course 21C. Definite integrals over plane and solid regions in various coordinate systems. Line and surface integrals. Green's theorem, Stoke's theorem, divergence theorem. GE credit: QL, SE. Effective: 2017 Winter Quarter.

MAT 021M—Accelerated Calculus (5)
Discussion/Laboratory—1 hour; Lecture/Discussion—4 hours. Prerequisite(s): Grade of B or higher in both semesters of high school calculus or a score of 4 or higher on the Advanced Placement Calculus AB exam, and obtaining the required score on the Precalculus Diagnostic Examination and its trigonometric component. Accelerated treatment of material from courses 21A and 21B, with detailed presentation of theory, definitions, and proofs, and treatment of computational aspects of calculus at a condensed but sophisticated level. Not open for credit to students who have completed MAT 021A or MAT 021B. GE credit: SE. Effective: 1997 Winter Quarter.

MAT 022A—Linear Algebra (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): MAT 016C C- or better or MAT 017C C- or better or MAT 021C C- or better or MAT 021CH C- or better; (ENG 006 or EME 005 or MAT 022AL (can be concurrent)) Matrices and linear transformations, determinants, eigenvalues, eigenvectors, diagonalization, factorization. Not open for credit to students who have completed course 67. GE credit: QL, SE. Effective: 2017 Winter Quarter.

MAT 022A—Linear Algebra (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): (MAT 016C C- or better or MAT 017C C- or better or MAT 021C C- or better or MAT 021CH C- or better); (ENG 006 or EME 005 or ECH 060 or MAT 022AL (can be concurrent)) Matrices and linear transformations, determinants, eigenvalues, eigenvectors, diagonalization, factorization. Not open for credit to students who have completed course 67. GE credit: QL, SE. Effective: 2018 Summer Session 1.

MAT 022AL—Linear Algebra Computer Laboratory (1)
Laboratory—3 hours. Prerequisite(s): MAT 016C or MAT 017C or MAT 021C or MAT 021CH Introduction to Matlab and its use in linear algebra. (P/NP grading only.) GE credit: QL, SE. Effective: 2017 Winter Quarter.

MAT 022B—Differential Equations (3)
Lecture—3 hours. Prerequisite(s): (MAT 022A C- or better or MAT 067 C- or better) Solutions of elementary differential equations. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 025—Advanced Calculus (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021C C- or better or MAT 021CH C- or better Introduction to the rigorous treatment of abstract mathematical analysis. Proofs in mathematics, induction, sets, cardinality; real number system, theory of convergence of sequences. Not open for credit to students who have completed former MAT 127A. GE credit: SE. Effective: 2017 Spring Quarter.

MAT 036—Fundamentals of Mathematics (3)
Lecture—3 hours. Prerequisite(s): Satisfaction of the Mathematics Placement Requirement. Introduction to fundamental mathematical ideas selected from the principal areas of modern mathematics. Properties of the primes, the fundamental theorems of arithmetic, properties of the rationals and irrationals, binary and other number systems. Not open for credit to students who have taken MAT 108. Effective: 2001 Winter Quarter.

MAT 067—Modern Linear Algebra (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021C C- or better or MAT 021CH C- or better Rigorous treatment of linear algebra; topics include vector spaces, bases and dimensions, orthogonal projections, eigenvalues and eigenvectors, similarity transformations, singular value decomposition and positive definiteness. Only one unit of credit to students who have completed MAT 022A. GE credit: SE. Effective: 2017 Winter Quarter.

MAT 071A—Explorations in Elementary Mathematics (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Two years of high school mathematics. Weekly explorations of mathematical ideas related to the elementary school curriculum will be carried out by cooperative learning groups. Lectures will provide background and synthesize the results of group exploration. Effective: 1997 Winter Quarter.

MAT 071B—Explorations in Elementary Mathematics (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Two years of high school mathematics. Weekly explorations of mathematical ideas related to the elementary school curriculum will be carried out by cooperative learning groups. Lectures will provide background and synthesize the results of group exploration. Effective: 1997 Winter Quarter.

MAT 089—Elementary Problem Solving (1)
Lecture—1 hour. Prerequisite(s): High school mathematics through precalculus. Solve and present solutions to challenging and interesting problems in elementary mathematics. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 2001 Winter Quarter.

MAT 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

MAT 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

MAT 108—Introduction to Abstract Mathematics (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021B A rigorous treatment of mathematical concepts with emphasis on developing the ability to understand abstract mathematical ideas, to read and write mathematical concepts, and to prove theorems. Designed to serve as preparation for the more rigorous upper division courses. GE credit: SE. Effective: 2008 Spring Quarter.

MAT 111—History of Mathematics (4) ***Review all entries***
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 025 or MAT 067 or MAT 108 or MAT 114 or MAT 115A or MAT 141 or MAT 145; One of the courses mentioned; eight units of upper division Mathematics. History of mathematics from ancient times through the development of calculus. Mathematics from Arab, Hindu, Chinese and other cultures. Selected topics from the history of modern mathematics. GE credit: SE. Effective: 2010 Fall Quarter.

MAT 111—History of Mathematics (4) ***Review all entries***
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 025 or MAT 127A or MAT 067 or MAT 108 or MAT 114 or MAT 115A or MAT 141 or MAT 145; Eight units of upper division Mathematics. History of mathematics from ancient times through the development of calculus. Mathematics from Arab, Hindu, Chinese and other cultures. Selected topics from the history of modern mathematics. GE credit: SE. Effective: 2018 Fall Quarter.

MAT 114—Convex Geometry (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021C; (MAT 022A or MAT 067) Topics selected from the theory of convex bodies, convex functions, geometric inequalities, combinatorial geometry, and integral geometry. Designed to serve as preparation for the more rigorous upper-division courses. GE credit: SE. Effective: 2007 Winter Quarter.

MAT 115A—Number Theory (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021B Divisibility and related topics, diophantine equations, selected topics from the theory of prime numbers. Designed to serve as preparation for the more rigorous upper division courses. GE credit: QL, SE. Effective: 2006 Fall Quarter.

MAT 115B—Number Theory (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 115A; (MAT 022A or MAT 067) Euler function, Moebius function, congruences, primitive roots, quadratic reciprocity law. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

MAT 116—Differential Geometry (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 021D; MAT 022B; (MAT 022A or MAT 067) Vector analysis, curves, and surfaces in three dimensions. GE credit: SE. Effective: 2017 Winter Quarter.

MAT 118A—Partial Differential Equations: Elementary Methods (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 021D; MAT 022B; (MAT 022A or MAT 067) Derivation of partial differential equations; separation of variables; equilibrium solutions and Laplace's equation; Fourier series; method of characteristics for the one dimensional wave equation. Solution of nonhomogeneous equations. GE credit: QL, SE. Effective: 2006 Fall Quarter.

MAT 118B—Partial Differential Equations: Eigenfunction Expansions (4)
Lecture—3 hours. Prerequisite(s): MAT 118A Sturm-Liouville Theory; selfadjoint operators; mixed boundary conditions; partial differential equations in two and three dimensions;
Eigenvalue problems in circular domains; nonhomogeneous problems and the method of eigenfunction expansions; Poisson's Equations. GE credit: QL, SE. Effective: 2000 Fall Quarter.

MAT 118C—Partial Differential Equations: Green's Functions and Transforms (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 118B Green's functions for one-dimensional problems and Poisson's equation; Fourier transforms; Green's Functions for time dependent problems; Laplace transform and solution of partial differential equations. GE credit: QL, SE. Effective: 2000 Fall Quarter.

MAT 119A—Ordinary Differential Equations (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 021D; MAT 022B; (MAT 022A or MAT 067) Scalar and planar autonomous systems; nonlinear systems and linearization; existence and uniqueness of solutions; matrix solution of linear systems; phase plane analysis; stability analysis; bifurcation theory; Liapunov's method; limit cycles; Poincare Bendixon theory. GE credit: QL, SE. Effective: 2007 Winter Quarter.

MAT 119B—Ordinary Differential Equations (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 119A Lorentz equations; Poincare maps; center manifolds and normal forms; scalar and planar maps; phase space analysis for iterated maps; period-doubling bifurcation; Lyapunov exponent; chaos and symbolic dynamics; strange attractors; fractals. GE credit: QL, SE. Effective: 2007 Spring Quarter.

MAT 124—Mathematical Biology (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): MAT 022B; (MAT 022A or MAT 067) Methods of mathematical modeling of biological systems including difference equations, ordinary differential equations, stochastic and dynamic programming models. Computer simulation methods applied to biological systems. Applications to population growth, cell biology, physiology, evolutionary ecology and protein clustering. MATLAB programming required. GE credit: QL, SE. Effective: 2007 Spring Quarter.

MAT 125A—Real Analysis (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 025 Functions, limits of functions, continuity and uniform continuity, sequences of functions, series of real numbers, series of functions, power series. Not open for credit to students who have completed former MAT 127B. GE credit: SE. Effective: 2006 Fall Quarter.

MAT 125B—Real Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 125A; (MAT 067 or (MAT 022A, MAT 108)) Theory of the derivative, Taylor series, integration, partial derivatives, Implicit Function Theorem. Not open for credit to students who have completed former MAT 127C. GE credit: SE. Effective: 2017 Winter Quarter.

MAT 127A—Real Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021C or MAT 021CH; MAT 067 or (MAT 022A, MAT 108) Real numbers, sequences, series, and continuous functions. Effective: 2017 Fall Quarter.

MAT 127B—Real Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 127A Derivatives, integrals, sequences of functions, and power series. Effective: 2017 Fall Quarter.

MAT 127C—Real Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 127B Metric spaces and multi-variable calculus. Effective: 2017 Fall Quarter.

MAT 128A—Numerical Analysis (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): MAT 021C; ECS 030 Error analysis, approximation, interpolation, numerical differentiation and integration. Programming in language such as Pascal, Fortran, or BASIC required. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 128B—Numerical Analysis in Solution of Equations (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): MAT 021C; (MAT 022A or MAT 067); ECS 030 Solution of nonlinear equations and nonlinear systems. Minimization of functions of several variables. Simultaneous linear equations. Eigenvalue problems. Linear programming. Programming in language such as Pascal, Fortran, or BASIC required. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 128C—Numerical Analysis in Differential Equations (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): MAT 022B; (MAT 022A or MAT 067); ECS 030 Difference equations, operators, numerical solutions of ordinary and partial differential equations. Programming in language such as Pascal, Fortran, or BASIC required. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 129—Fourier Analysis (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 021D; MAT 022B; (MAT 022A or MAT 067); MAT 025 Fourier series and integrals, orthogonal sets of functions. Topics selected from trigonometric approximation, orthogonal polynomials, applications to signal and image processing, numerical analysis, and differential equations. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 133—Mathematical Finance (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): (MAT 067 or (MAT 022A, MAT 108)), MAT 135A Analysis and evaluation of deterministic and random cash flow streams, yield and pricing of basic financial instruments, interest rate theory, mean-variance portfolio theory, capital asset pricing models, utility functions and general principles. MATLAB programming required. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

MAT 135A—Probability (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021C; (MAT 108 or MAT 025) Probability space; discrete probability, combinatorial analysis; independence, conditional probability; random variables, discrete and continuous distributions, probability mass function, joint and marginal density functions; expectation, moments, variance, Chebyshev inequality; sums of random variables, random walk, large number law, central limit theorem. Not open for credit to students who have completed former MAT 131. GE credit: SE. Effective: 2018 Spring Quarter.

MAT 135B—Stochastic Processes (4)
Discussion/Laboratory—4 hours. Prerequisite(s): MAT 135A; (MAT 022A or MAT 067) Generating functions, branching processes, characteristic function; Markov chains; convergence of random variables, law of iterated logarithm; random processes, Brownian motion, stationary processes, renewal processes, queueing theory, martingales. Not open for credit to students who have completed former MAT 132A. GE credit: QL, SE. Effective: 2009 Spring Quarter.

MAT 141—Euclidean Geometry (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021B; (MAT 022A or MAT 067) Axiomatic and analytic examination of Euclidean geometry from an advanced point of view. In particular, a discussion of its relation to other geometries. Designed to serve as preparation for the more rigorous upper division courses. GE credit: SE. Effective: 2018 Winter Quarter.

MAT 145—Combinatorics (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021C Combinatorial methods using basic graph theory, counting methods, generating functions, and recurrence relations. Designed to serve as preparation for the more rigorous upper division courses. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 146—Algebraic Combinatorics (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): MAT 145; MAT 025; (MAT 022A or MAT 067) Enumeration, Polya theory, generating functions, current topics in algebraic combinatorics. Not open for credit to students who have completed former course 149A. GE credit: SE. Effective: 2007 Spring Quarter.

MAT 146—Algebraic Combinatorics (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): ((MAT 022A, MAT 108) or MAT 067)); MAT 145 Enumeration, Polya theory, generating functions, current topics in algebraic combinatorics. Not open for credit to students who have completed former MAT 149A. GE credit: SE. Effective: 2018 Fall Quarter.

MAT 147—Topology (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 025 Basic notions of point-set and combinatorial topology. GE credit: SE. Effective: 2016 Fall Quarter.

MAT 148—Discrete Mathematics (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 067 or (MAT 022A, MAT 108) Coding theory, error correcting codes, finite fields and the algebraic concepts needed in their development. Not open for credit to students who have completed former MAT 149B. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 150A—Modern Algebra (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 067 or (MAT 022A, MAT 108) Basic concepts of groups, symmetries of the plane. Emphasis on the techniques used in the proof of the ideas (Lemmas, Theorems, etc.) developing these concepts. Precise thinking, proof writing, and the ability to deal with abstraction. GE credit: SE. Effective: 2016 Fall Quarter.

MAT 150B—Modern Algebra (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 150A Bilinear forms, rings, factorization, modules. GE credit: SE. Effective: 2007 Winter Quarter.

MAT 150C—Modern Algebra (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 150B Group representations, fields, Galois theory. GE credit: SE. Effective: 2007 Spring Quarter.

MAT 160—Mathematics for Data Analytics and Decision Making (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): MAT 167 Relational model; relational algebra, relational calculus, normal forms, functional and multivalued dependencies, separability. Cost benefit analysis of physical database design and reorganization. Performance via analytical modeling, simulation, and queueing theory. Block accesses; buffering; operating system contention; CPU intensive operations. GE credit: SE. Effective: 2018 Spring Quarter.

MAT 165—Mathematics and Computers (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): MAT 022A or MAT 067; (MAT 025 or MAT 108 or MAT 114 or MAT 115A or MAT 145) Introduction to computational mathematics, symbolic computation, and computer generated/verified proofs in algebra, analysis and geometry. Investigation of rigorous new mathematics developed in conjunction with modern computational questions and the role that computers play in mathematical conjecture and experimentation. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 167—Applied Linear Algebra (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 022A or MAT 067 Applications of linear algebra; LU and QR matrix factorizations, eigenvalue and singular value matrix decompositions. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 168—Optimization (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 021C; ((MAT 022A, MAT 108) or MAT 067) Linear programming, simplex method. Basic properties of unconstrained nonlinear problems, descent methods, conjugate direction method. Constrained minimization. Programming language required. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 180—Special Topics (3)
Lecture—3 hours. Prerequisite(s): MAT 025; (MAT 067 or (MAT 022A, MAT 108)) Special topics from various fields of modern, pure, and applied mathematics. Some recent topics include Knot Theory, General Relativity, and Fuzzy Sets. May be repeated for credit when topics differs. GE credit: SE. Effective: 2016 Fall Quarter.

MAT 185A—Complex Analysis (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): (MAT 067 or (MAT 022A, MAT 108)), MAT 125A Complex number system, analyticity and the Cauchy-Riemann equations, elementary functions, complex integration, power and Laurent series expansions, residue theory. GE credit: SE. Effective: 2016 Fall Quarter.

MAT 185B—Complex Analysis (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 185A Analytical functions, elementary functions and their mapping properties, applications of Cauchy's integral theorem, conformal mapping and applications to heat flow and fluid mechanics. GE credit: SE. Effective: 2007 Spring Quarter.

MAT 189—Advanced Problem Solving (3)
Lecture—3 hours. Prerequisite(s): MAT 025; ((MAT 022A, MAT 108) or MAT 067) Solution and presentation of advanced problem solving techniques. Solve and present interesting and challenging problems of all areas of mathematics. GE credit: OL, QL, SE, WE. Effective: 2016 Fall Quarter.

MAT 192—Internship in Applied Mathematics (1-3)
Internship. Prerequisite(s): Consent of Instructor. Supervised work experience in applied mathematics. Final report. May be repeated up to 10 unit(s). (P/NP grading only.) Effective: 2016 Fall Quarter.

MAT 194—Undergraduate Thesis (3)
Independent Study. Prerequisite(s): Consent of Instructor. Independent research under supervision of a faculty member. Student will submit written report in thesis form. May be repeated for credit with consent of Vice Chairperson. (P/NP grading only.) GE credit: SE. Effective: 2016 Fall Quarter.

MAT 197TC—Tutoring Mathematics in the Community (1-5)
Laboratory—2-6 hours; Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. Special projects in mathematical education developing techniques for mathematics instruction and tutoring on an individual or small group basis. May be repeated once for credit. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 2016 Fall Quarter.

MAT 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2016 Fall Quarter.

MAT 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

MAT 200A—Problem-Solving in Analysis (1)
Extensive Problem Solving; Lecture—1 hour. Prerequisite(s): MAT 201A; MAT 201B; MAT 201C Problem-solving in graduate analysis: continuous functions, metric spaces, Banach and Hilbert spaces, bounded linear operators, the spectral theorem, distributions, Fourier series and transforms, Lp spaces, Sobolev spaces. May be repeated up to 2 time(s). Effective: 2010 Spring Quarter.

MAT 200B—Problem-Solving in Analysis (2)
Extensive Problem Solving; Lecture—1 hour. Prerequisite(s): MAT 201A; MAT 201B; MAT 201C Problem-solving in graduate analysis: continuous functions, metric spaces, Banach and Hilbert spaces, bounded linear operators, the spectral theorem, distributions, Fourier series and transforms, Lp spaces, Sobolev spaces. May be repeated up to 2 time(s). Effective: 2010 Fall Quarter.

MAT 201A—Analysis (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing in Mathematics or Applied Mathematics, or consent of instructor. Metric and normed spaces. Continuous functions. Topological, Hilbert, and Banach spaces. Fourier series. Spectrum of bounded and compact linear operators. Linear differential operators and Green's functions. Distributions. Fourier transform. Measure theory. Lp and Sobolev spaces. Differential calculus and variational methods. Effective: 2004 Fall Quarter.

MAT 201B—Analysis (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing in Mathematics or Applied Mathematics, or consent of instructor. Metric and normed spaces. Continuous functions. Topological, Hilbert, and Banach spaces. Fourier series. Spectrum of bounded and compact linear operators. Linear differential operators and Green's functions. Distributions. Fourier transform. Measure theory. Lp and Sobolev spaces. Differential calculus and variational methods. Effective: 2005 Winter Quarter.

MAT 201C—Analysis (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing in Mathematics or Applied Mathematics, or consent of instructor. Metric and normed spaces. Continuous functions. Topological, Hilbert, and Banach spaces. Fourier series. Spectrum of bounded and compact linear operators. Linear differential operators and Green's functions. Distributions. Fourier transform. Measure theory. Lp and Sobolev spaces. Differential calculus and variational methods. Effective: 2005 Spring Quarter.

MAT 202—Functional Analysis (4)
Lecture—3 hours; Term Paper. Prerequisite(s): MAT 201A; MAT 201B Hahn-Banach, Open mapping, Closed graph, Banach-Steinhaus, and Krein-Milman. Subspaces and quotient spaces. Projections. Weak and weak-star topologies. Compact and adjoint operators in Banach spaces. Fredholm theory. Functions of operators. Spectral theory of self-adjoint operators. Effective: 2009 Winter Quarter.

MAT 205—Complex Analysis (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 185A; Or equivalent to MAT 185A, or consent of instructor. Analytic continuation, Riemann surfaces, conformal mappings, Riemann mapping theorem, entire functions, special functions, elliptic functions. Effective: 2009 Spring Quarter.

MAT 205A—Complex Analysis (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 185A; Or equivalent to MAT 185A, or consent of instructor. Cauchy's theorem, Cauchy's integral formulas, meromorphic functions, complex logarithm, entire functions, Weierstrass infinite product formula, the gamma and zeta functions, and prime number theorem. No credit given to students who have completed MAT 205. Effective: 2011 Fall Quarter.

MAT 205B—Complex Analysis (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 205A; or Consent of Instructor. Conformal mappings, the Schwarz lemma, analytic automorphisms, the Riemann mapping theorem, elliptic functions, Eisenstein series, the Jacobi theta functions, asymptotics, Bessel functions, the Airy function, topics on special functions and Riemann surfaces. May be repeated up to 2 time(s) if topic varies. Effective: 2011 Spring Quarter.

MAT 206—Measure Theory (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 125B Introduction to measure theory. The study of lengths, surface areas, and volumes in general spaces, as related to integration theory. Effective: 2007 Spring Quarter.

MAT 207A—Methods of Applied Mathematics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Ordinary differential equations and dynamical systems. Variational principles. Eigenfunctions, integral equations and Green's functions. Complex analysis and contour integration. Laplace's equation. Diffusion equations. Wave phenomena. Dimensional analysis and scaling. Asymptotic expansions and perturbation theory. Stochastic processes and Brownian motion. Effective: 2010 Fall Quarter.

MAT 207B—Methods of Applied Mathematics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Ordinary differential equations and dynamical systems. Variational principles. Eigenfunctions, integral equations and Green's functions. Complex analysis and contour integration. Laplace's equation. Diffusion equations. Wave phenomena. Dimensional analysis and scaling. Asymptotic expansions and perturbation theory. Stochastic processes and Brownian motion. Effective: 2011 Winter Quarter.

MAT 207C—Methods of Applied Mathematics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Ordinary differential equations and dynamical systems. Variational principles. Eigenfunctions, integral equations and Green's functions. Complex analysis and contour integration. Laplace's equation. Diffusion equations. Wave phenomena. Dimensional analysis and scaling. Asymptotic expansions and perturbation theory. Stochastic processes and Brownian motion. Effective: 2011 Spring Quarter.

MAT 215A—Topology (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Fundamental group and covering space theory. Homology and cohomology. Manifolds and duality. CW complexes. Fixed point theorems. Effective: 2002 Fall Quarter.

MAT 215B—Topology (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Fundamental group and covering space theory. Homology and cohomology. Manifolds and duality. CW complexes. Fixed point theorems. Effective: 2002 Fall Quarter.

MAT 215C—Topology (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Fundamental group and covering space theory. Homology and cohomology. Manifolds and duality. CW complexes. Fixed point theorems. Effective: 2002 Fall Quarter.

MAT 216—Geometric Topology (4)
Extensive Problem Solving—1 hour; Lecture—3 hours. Prerequisite(s): MAT 215A Topology of two- and three-dimensional manifolds. Surfaces and their diffeomorphisms. Dehn twists. Heegaard surfaces. Theory of 3-dimensional manifolds. Knots and knot theory. Hyperbolic manifolds and geometric structures. <p> May be repeated up to 1 time(s). Effective: 2010 Spring Quarter.

MAT 218A—Partial Differential Equations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 201A; MAT 201B; MAT 201C; or Consent of Instructor. Year-long sequence on PDEs which covers linear transport, Laplace, heat, and wave equations, maximum principles, method of characteristics, Sobelev and Hölder space theory, weak derivatives, semilinear, quasilinear, and fully nonlinear elliptic/parabolic equations, nonlinear hyperbolic equations, and compensated compactness. Effective: 2009 Fall Quarter.

MAT 218B—Partial Differential Equations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 218A; or Consent of Instructor. Year-long sequence on PDEs which covers linear transport, Laplace, heat, and wave equations, maximum principles, method of characteristics, Sobelev and Hölder space theory, weak derivatives, semilinear, quasilinear, and fully nonlinear elliptic/parabolic equations, nonlinear hyperbolic equations, and compensated compactness. Effective: 2010 Winter Quarter.

MAT 218C—Partial Differential Equations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 218B; or Consent of Instructor. Year-long sequence on PDEs which covers linear transport, Laplace, heat, and wave equations, maximum principles, method of characteristics, Sobelev and Hölder space theory, weak derivatives, semilinear, quasilinear, and fully nonlinear elliptic/parabolic equations, nonlinear hyperbolic equations, and compensated compactness. Effective: 2010 Spring Quarter.

MAT 221A—Mathematical Fluid Dynamics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 118B; or Consent of Instructor. Kinematics and dynamics of fluids. The Euler and Navier-Stokes equations. Vorticity dynamics. Irrotational flow. Low Reynolds number flows and the Stokes equations. High Reynolds number flows and boundary layers. Compressible fluids. Shock waves. Effective: 2002 Fall Quarter.

MAT 221B—Mathematical Fluid Dynamics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 118B; or Consent of Instructor. Kinematics and dynamics of fluids. The Euler and Navier-Stokes equations. Vorticity dynamics. Irrotational flow. Low Reynolds number flows and the Stokes equations. High Reynolds number flows and boundary layers. Compressible fluids. Shock waves. Effective: 2003 Winter Quarter.

MAT 226A—Numerical Methods: Fundamentals (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 128A; MAT 128B; Or equivalent, or consent of instructor; familiarity with some programming language. Fundamental principles and methods in numerical analysis, including the concepts of stability of algorithms and conditioning of numerical problems, numerical methods for interpolation and integration, eigenvalue problems, singular value decomposition and its applications. Effective: 2009 Fall Quarter.

MAT 226B—Numerical Methods: Large-Scale Matrix Computations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 167; Or equivalent, or consent of instructor; familiarity with some programming language. Numerical methods for large-scale matrix computations, including direct and iterative methods for the solution of linear systems, the computation of eigenvalues and singular values, the solution of least-squares problems, matrix compression, methods for the solution of linear programs. Effective: 2010 Winter Quarter.

MAT 226C—Numerical Methods: Ordinary Differential Equations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 022B; Or equivalent, or consent of instructor; familiarity with some programming language. Numerical methods for the solution of ordinary differential equations, including methods for initial-value problems and two-point boundary-value problems, theory of and methods for differential algebraic equations, dimension reduction of large-scale dynamical systems. Effective: 2010 Spring Quarter.

MAT 227—Mathematical Biology (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Nonlinear ordinary and partial differential equations and stochastic processes of cell and molecular biology. Scaling, qualitative, and numerical analysis of mathematical models. Applications to nerve impulse, chemotaxis, muscle contraction, and morphogenesis. Effective: 2002 Fall Quarter.

MAT 228A—Numerical Solution of Differential Equations (4)
Discussion; Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 128C Numerical solutions of initial-value, eigenvalue and boundary-value problems for ordinary differential equations. Numerical solution of parabolic and hyperbolic partial differential equations. Effective: 1998 Fall Quarter.

MAT 228B—Numerical Solution of Differential Equations (4)
Discussion; Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 128C Numerical solutions of initial-value, eigenvalue and boundary-value problems for ordinary differential equations. Numerical solution of parabolic and hyperbolic partial differential equations. Effective: 1998 Fall Quarter.

MAT 228C—Numerical Solution of Differential Equations (4)
Discussion; Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 128C Numerical solutions of initial-value, eigenvalue and boundary-value problems for ordinary differential equations. Numerical solution of parabolic and hyperbolic partial differential equations. Effective: 1998 Fall Quarter.

MAT 235A—Probability Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 125B; (MAT 135A or STA 131A); or Consent of Instructor. Measure-theoretic foundations, abstract integration, independence, laws of large numbers, characteristic functions, central limit theorems. Weak convergence in metric spaces, Brownian motion, invariance principle. Conditional expectation. Topics selected from: martingales, Markov chains, ergodic theory. (Statistics 235A.) Effective: 2007 Fall Quarter.

MAT 235B—Probability Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 235A or STA 235A; or Consent of Instructor. Measure-theoretic foundations, abstract integration, independence, laws of large numbers, characteristic functions, central limit theorems. Weak convergence in metric spaces, Brownian motion, invariance principle. Conditional expectation. Topics selected from: martingales, Markov chains, ergodic theory. (Statistics 235B.) Effective: 2008 Spring Quarter.

MAT 235C—Probability Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 235B or STA 235B; or Consent of Instructor. Measure-theoretic foundations, abstract integration, independence, laws of large numbers, characteristic functions, central limit theorems. Weak convergence in metric spaces, Brownian motion, invariance principle. Conditional expectation. Topics selected from: martingales, Markov chains, ergodic theory. (Statistics 235C.) Effective: 2008 Spring Quarter.

MAT 236A—Stochastic Dynamics and Applications (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 201C or (MAT 235B or STA 235B); MAT 235A, MAT 235B, MAT 235C/ STA 235A, STA 235B, STA 235C recommended. Stochastic processes, Brownian motion, Stochastic integration, martingales, stochastic differential equations. Diffusions, connections with partial differential equations, mathematical finance. Effective: 2002 Fall Quarter.

MAT 236B—Stochastic Dynamics and Applications (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 201C or (MAT 235B or STA 235B); MAT 235A, MAT 235B, MAT 235C/ STA 235A, STA 235B, STA 235C recommended. Stochastic processes, Brownian motion, Stochastic integration, martingales, stochastic differential equations. Diffusions, connections with partial differential equations, mathematical finance. Effective: 2002 Fall Quarter.

MAT 239—Differential Topology (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 201A; or Consent of Instructor. Vector calculus, point-set topology; MAT 250A and MAT 250B is highly recommended. Topics include: differentiable manifolds, vector fields, transversality, Sard's theorem, examples of differentiable manifolds; orientation, intersection theory, index of vector fields; differential forms, integration, Stokes' theorm, deRham cohomology; Morse functions, Morse lemma, index of critical points. Effective: 2007 Spring Quarter.

MAT 240A—Differential Geometry (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 201A; MAT 239; MAT 250A and MAT 250B highly recommended; intended primarily for second-year graduate students. Riemannian metrics, connections, geodesics, Gauss lemma, convex neighborhoods, curvature tensor, Ricci and scalar curvature, connections and curvature on vector bundles. Effective: 2008 Fall Quarter.

MAT 240B—Differential Geometry (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 240A; Intended primarily for second-year graduate students. Jacobi fields, conjugate points, completeness, Hopf-Rinow theorem, Cartan-Hadamard theorem, energy, variation theorems and their applications, Rauch comparison theorem and its applications. Effective: 2009 Winter Quarter.

MAT 245—Enumerative Combinatorics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 145; MAT 150; or the equivalent, or consent of instructor. Introduction to modern combinatorics and its applications. Emphasis on enumerative aspects of combinatorial theory. Effective: 2004 Fall Quarter.

MAT 246—Algebraic Combinatorics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 245; or Consent of Instructor. Algebraic and geometric aspects of combinatorics. The use of structures such as groups, polytopes, rings, and simplicial complexes to solve combinatorial problems. Effective: 2005 Winter Quarter.

MAT 248A—Algebraic Geometry (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 250A; MAT 250B; MAT 250C Affine varieties and radical ideals. Projective varieties. Abstract varieties. Morphisms and rational maps. Smoothness. Algebraic curves and the Riemann-Roch theorem. Special topics. Effective: 2009 Fall Quarter.

MAT 248B—Algebraic Geometry (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 248A Complex varieties and the analytic topology. Sheaves and schemes.
Fiber products. Separatedness and properness. Applications of scheme
theory. Effective: 2010 Winter Quarter.

MAT 249A—Problem-Solving in Algebra (1)
Extensive Problem Solving; Lecture—1 hour. Prerequisite(s): MAT 250A; MAT 250B Problem-solving in graduate algebra: groups, rings, modules, matrices, tensor products, representations, Galois theory, ring extensions, commutative algebra and homological algebra. May be repeated up to 2 time(s). Effective: 2011 Spring Quarter.

MAT 249B—Problem-Solving in Algebra (2)
Extensive Problem Solving; Lecture—1 hour. Prerequisite(s): MAT 250A; MAT 250B Problem-solving in graduate algebra: groups, rings, modules, matrices, tensor products, representations, Galois theory, ring extensions, commutative algebra and homological algebra. May be repeated up to 2 time(s). Effective: 2011 Fall Quarter.

MAT 250A—Algebra (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing in mathematics or consent of instructor. Group and rings. Sylow theorems, abelian groups, Jordan-Holder theorem. Rings, unique factorization. Algebras, and modules. Fields and vector spaces over fields. Field extensions. Commutative rings. Representation theory and its applications. Effective: 2002 Fall Quarter.

MAT 250B—Algebra (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing in mathematics or consent of instructor. Group and rings. Sylow theorems, abelian groups, Jordan-Holder theorem. Rings, unique factorization. Algebras, and modules. Fields and vector spaces over fields. Field extensions. Commutative rings. Representation theory and its applications. Effective: 2002 Fall Quarter.

MAT 250C—Algebra (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing in mathematics or consent of instructor. Group and rings. Sylow theorems, abelian groups, Jordan-Holder theorem. Rings, unique factorization. Algebras, and modules. Fields and vector spaces over fields. Field extensions. Commutative rings. Representation theory and its applications. Effective: 2002 Fall Quarter.

MAT 258A—Numerical Optimization (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 025; MAT 167 Numerical methods for infinite dimensional optimization problems. Newton and Quasi-Newton methods, linear and sequential quadratic programming, barrier methods; large-scale optimization; theory of approximations; infinite and semi-infinite programming; applications to optimal control, stochastic optimization and distributed systems. Effective: 2007 Fall Quarter.

MAT 258B—Discrete and Mixed-Integer Optimization (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 025; MAT 167; or Consent of Instructor. Combinatorial, integer, and mixed-integer linear optimization problems. Ideal and strong formulations, cutting planes, branch and cut, decomposition methods. Effective: 2014 Fall Quarter.

MAT 261A—Lie groups and their representations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 215A; MAT 240A; MAT 250A; MAT 250B; Or the equivalent, or consent of instructor. Lie groups and Lie algebras. Classification of semi-simple Lie groups. Classical and compact Lie groups. Representations of Lie groups and Lie algebras. Root systems, weights, Weil character formula. Kac-Moody and Virasoro algebras. Applications. Effective: 2002 Fall Quarter.

MAT 261B—Lie groups and their representations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 215A; MAT 240A; MAT 250A; MAT 250B; Or the equivalent, or consent of instructor. Lie groups and Lie algebras. Classification of semi-simple Lie groups. Classical and compact Lie groups. Representations of Lie groups and Lie algebras. Root systems, weights, Weil character formula. Kac-Moody and Virasoro algebras. Applications. Effective: 2002 Fall Quarter.

MAT 265—Mathematical Quantum Mechanics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 201; or Consent of Instructor. Mathematical foundations of quantum mechanics: the Hilbert space and Operator Algebra formulations; the Schrödinger and Heisenberg equations, symmetry in quantum mechanics, basics of spectral theory and perturbation theory. Applications to atoms and molecules. The Dirac equation. Effective: 2003 Fall Quarter.

MAT 266—Mathematical Statistical Mechanics and Quantum Field Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 265; or Consent of Instructor. Mathematical principles of statistical mechanics and quantum field theory. Topics include classical and quantum lattice systems, variational principles, spontaneous symmetry breaking and phase transitions, second quantization and Fock space, and fundamentals of quantum field theory. May be repeated up to 1 time(s). Effective: 2010 Spring Quarter.

MAT 271—Applied and Computational Harmonic Analysis (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): (MAT 125B or MAT 201C); (MAT 128B or MAT 167); MAT 129; Or the equivalent, or consent of instructor. Introduction to mathematical basic building blocks (wavelets, local Fourier basis, and their relatives) useful for diverse fields (signal and image processing, numerical analysis, and statistics). Emphasis on the connection between the continuum and the discrete worlds. Effective: 2007 Fall Quarter.

MAT 280—Topics in Pure and Applied Mathematics (3)
Lecture—3 hours. Prerequisite(s): Graduate standing. Special topics in various fields of pure and applied mathematics. Topics selected based on the mutual interests of students and faculty. May be repeated for credit when topic differs. May be repeated for credit May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

MAT 290—Seminar (1-6)
Seminar—1-6 hours. Advanced study in various fields of mathematics, including analysis, applied mathematics, discrete mathematics, geometry, mathematical biology, mathematical physics, optimization, partial differential equations, probability, and topology. May be repeated for credit. (S/U grading only.) Effective: 2003 Spring Quarter.

MAT 298—Group Study (1-5)
Variable. Effective: 1997 Winter Quarter.

MAT 299—Individual Study (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

MAT 299D—Dissertation Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

MAT 301A—Mathematics Teaching Practicum (3)
Discussion—1 hour; Fieldwork—5 hours. Prerequisite(s): MAT 302A (can be concurrent); MAT 303A (can be concurrent); MAT 302A and MAT 303A required concurrently or consent of instructor. Specialist training in mathematics teaching. Teaching, training, and cross observing classes taught using large group Socratic techniques, small group guided inquiry experiences, and/or other approaches to teaching at various grade levels. Required for advanced degrees in mathematics education. May be repeated up to 1 time(s). Effective: 2001 Fall Quarter.

MAT 301B—Mathematics Teaching Practicum (3)
Discussion—1 hour; Fieldwork—5 hours. Prerequisite(s): MAT 302B (can be concurrent); MAT 303B (can be concurrent); MAT 302B and MAT 303B required concurrently or consent of instructor. Specialist training in mathematics teaching. Teaching, training, and cross observing classes taught using large group Socratic techniques, small group guided inquiry experiences, and/or other approaches to teaching at various grade levels. Required for advanced degrees in mathematics education. May be repeated up to 1 time(s). Effective: 2002 Winter Quarter.

MAT 301C—Mathematics Teaching Practicum (3)
Discussion—1 hour; Fieldwork—5 hours. Prerequisite(s): MAT 302C (can be concurrent); MAT 303B (can be concurrent); MAT 302C and MAT 303C required concurrently or consent of instructor. Specialist training in mathematics teaching. Teaching, training, and cross observing classes taught using large group Socratic techniques, small group guided inquiry experiences, and/or other approaches to teaching at various grade levels. Required for advanced degrees in mathematics education. May be repeated up to 1 time(s). Effective: 2002 Spring Quarter.

MAT 302A—Curriculum Development in Mathematics (1)
Lecture/Discussion—1 hour. Prerequisite(s): MAT 303A (can be concurrent); MAT 303A required concurrently or consent of instructor. Mathematics curriculum development for all grade levels. Required for advanced degrees in mathematics education. May be repeated up to 1 time(s). Effective: 2001 Fall Quarter.

MAT 302B—Curriculum Development in Mathematics (1)
Lecture/Discussion—1 hour. Prerequisite(s): MAT 303B (can be concurrent); MAT 303B required concurrently or consent of instructor. Mathematics curriculum development for all grade levels. Required for advanced degrees in mathematics education. May be repeated up to 1 time(s). Effective: 2002 Winter Quarter.

MAT 302C—Curriculum Development in Mathematics (1)
Lecture/Discussion—1 hour. Prerequisite(s): MAT 303C (can be concurrent); MAT 303C required concurrently or consent of instructor. Mathematics curriculum development for all grade levels. Required for advanced degrees in mathematics education. May be repeated for credit. Effective: 2002 Spring Quarter.

MAT 303A—Mathematics Pedagogy (1)
Lecture/Discussion—1 hour. Prerequisite(s): MAT 302A (can be concurrent) or MAT 210AL (can be concurrent); MAT 302A or MAT 210AL required concurrently or consent of instructor. An investigation of the interplay of mathematical pedagogy and mathematical content, including a historical survey of past and present methods in view of some of the influences that shaped their development. May be repeated up to 1 time(s). Effective: 2001 Fall Quarter.

MAT 303B—Mathematics Pedagogy (1)
Lecture/Discussion—1 hour. Prerequisite(s): MAT 302B (can be concurrent) or MAT 210BL (can be concurrent); MAT 302A or MAT 210AL required concurrently or consent of instructor. An investigation of the interplay of mathematical pedagogy and mathematical content, including a historical survey of past and present methods in view of some of the influences that shaped their development. May be repeated up to 1 time(s). Effective: 2002 Winter Quarter.

MAT 303C—Mathematics Pedagogy (1)
Lecture/Discussion—1 hour. Prerequisite(s): MAT 302C (can be concurrent) or MAT 210CL (can be concurrent); MAT 302C or MAT 210CL required concurrently or consent of instructor. An investigation of the interplay of mathematical pedagogy and mathematical content, including a historical survey of past and present methods in view of some of the influences that shaped their development. May be repeated up to 1 time(s). Effective: 2002 Spring Quarter.

MAT 390—Teaching Assistantship Training (3)
Lecture—3 hours. Prerequisite(s): Graduate standing in the Department of Mathematics. Experience in methods of assisting and teaching of mathematics at the university level. Includes discussion of lecturing techniques, running discussion sessions, holding office hours, preparing and grading of examinations, student-teacher interaction, and related topics. Required of departmental teaching assistants. (S/U grading only.) Effective: 2008 Fall Quarter.

MAT 399—Individual Study (2-4)
Discussion—1 hour; Independent Study—2-3 hours. Individual study of some aspect of mathematics education or a focused work on a curriculum design project under supervision of a faculty member in mathematics. May be repeated up to 1 time(s). (S/U grading only.) Effective: 2002 Spring Quarter.

Mathematical & Physical Sciences

Mathematical & Physical Sciences | Mathematical & Physical Sciences

(College of Letters and Science)

Program Office. 1207 Social Science and Humanities

The Program of Study

Mathematical and Physical Sciences teach students to use experimental studies and theoretical analyses to find solutions to real world problems. Students learn to address issues such as cleaning up the environment, preserving natural resources and creating innovative materials for the future. From the study of atoms to the examination of distant galaxies, from abstract number theory to the development of new chemical compounds, these disciplines provide students with the skills to build the world of tomorrow.

Mathematical & Physical Sciences | MPS Courses

Courses in MPS:

MPS 001—General Science: Science in the News (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): Lower division standing. Basic principles in science including numeracy, scale, energy, and time; the scientific method; good and bad science. Emphasis on science topics recently in the news. Effective: 2002 Spring Quarter.

MPS 011A—Mathematical and Physical Sciences Seminar (2)
Lecture—2 hours. Prerequisite(s): Mentorship for undergraduate research participants in the physical and mathematical sciences. Research and writing in the mathematical and physical sciences. Presentations by various science faculty members. Effective: 1997 Fall Quarter.

MPS 011B—Mathematical and Physical Sciences Seminar (2)
Lecture—2 hours. Prerequisite(s): Mentorship for undergraduate research participants in the physical and mathematical sciences. Research and writing in the mathematical and physical sciences. Presentations by various science faculty members. Effective: 1997 Fall Quarter.

Mathematical & Scientific Computation; Mathematics

Mathematical & Scientific Computation; Mathematics | Mathematical & Scientific Computation B.S

(College of Letters and Science)

Abigail Thompson, Ph.D., Chairperson

Department Office. 1130 Mathematical Sciences Bldg.; 530-752-0827; studentservices@math.ucdavis.edu; http://www.math.ucdavis.edu

Faculty. https://www.math.ucdavis.edu/people/faculty/

The Major Programs

Mathematics is the study of abstract structures, space, change, and the interrelations of these concepts. It also is the **language of the exact sciences.**

The Program. Students majoring in mathematics may follow a program leading to either the Bachelor of Arts or the Bachelor of Science degree. After completing basic introductory courses such as calculus and linear algebra, students plan an upper division program in consultation with a faculty advisor. Upper division courses include real analysis, probability, modern algebra, as well as a variety of other courses that allow students to further mathematical knowledge and skills that feature their research or career interests. This individualized program can lead to graduate study in pure or applied mathematics, elementary or secondary level teaching, or to other professional goals. It can also reflect a special interest such as computational and applied mathematics, computer science, or statistics, or may be combined with a major in some other field.

Career Alternatives. A degree in mathematics provides entry to many careers in industry in addition to teaching. For instance, operations research, data analysis, systems analysis, computing, actuarial work, insurance, and financial services are only a few such careers. Mathematics is also a sound basis for graduate work in a variety of fields, such as law, engineering, and economics.

Recommended Language Preparation. Bachelor of Science degree candidates are advised, but not required, to satisfy the same language requirement as that for a Bachelor of Arts degree candidate, and to fulfill it in French, German, or Russian.

Major Advisors. For a current list of faculty and staff advisors, see https://www.math.ucdavis.edu/undergrad/advising/advisers/ or contact the Student Services office at studentservices@math.ucdavis.edu.

Depth Subject Matter Requirements. The upper division course offering is grouped into core and enrichment courses. The core classes are intended to provide basic mathematical techniques, whereas the enrichment choices allow students to further mathematical knowledge and skills that feature their research or career interests. Certain mathematically oriented courses given by other departments are admissible in partial satisfaction of the depth subject matter requirements with prior departmental approval. Before graduating, students also complete a mathematics capstone, which can be satisfied by completing an undergraduate thesis, an approved internship, or one of the approved capstone courses.

Statement of Objectives. As early as possible, but no later than the last quarter of the sophomore year or no later than the beginning of the first quarter of the junior year for transfer students, each prospective mathematics major, in consultation with an advisor, should file a formal program of study in one of the majors offered in mathematics. Forms to be used for this are available on OASIS (students.ucdavis.edu), our website or from the Department office. Failure to file a formal program could lead to a delay in graduation.

Information for Undergraduates. Assistance in planning an undergraduate major program in mathematics is available on our website, as well as by consulting an advisor. Information about the Department's advisors can be found on our website:
https://www.math.ucdavis.edu/undergrad/advising/advisers/

Mathematics Placement Requirement. Students who wish to enroll in MAT 012, 016A, 017A, 021A, 021AH, and 021M must satisfy the mathematics placement requirement by taking an online exam. Students who do not satisfy the requirement will be administratively dropped from these courses. For more information, including preparation tips and how to access the online exam, please see the Department of Mathematics' website, at
http://www.math.ucdavis.edu/undergrad/math_placement, well in advance of enrolling.

Department Honors. Students who have completed at least 135 units with a minimum GPA of 3.500 in courses counted towards their major will be considered for Department Honors.

Students who meet the minimum GPA requirement for honors at graduation for the College of Letters and Science and who complete a senior project as part of MAT 194 or 199 units in consultation with their faculty adviser may also be recommended by the department for graduation with High Honors or Highest
Honors. Recommendations will be based on evaluations of students' academic achievements in their major and the quality of their senior project. For complete details, see our website at https://www.math.ucdavis.edu/undergrad/honors/.

Teaching Credential Subject Representative. Dr. Ali Dad-del

Graduate Study. The Department offers programs of study and research leading to the M.A. and Ph.D. degrees in Mathematics. Information regarding graduate study may be obtained by consulting our website, and by sending an email to studentservices@math.ucdavis.edu.

Preparatory Subject Matter **Units:** 31-35

MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
OR		
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
MAT 017C	Calculus for Biology and Medicine	4
MAT 021D	Vector Analysis	4
MAT 022B	Differential Equations	3

Choose one option:

(a)

MAT 022A	Linear Algebra	3
MAT 108	Introduction to Abstract Mathematics	4

(b)

MAT 067	Modern Linear Algebra	4

MAT 022AL	Linear Algebra Computer Laboratory	1
OR		

Equivalent MATLAB knowledge

ECS 032A	Introduction to Programming	4
ENG 006	Engineering Problem Solving	4

NOTE: Basic knowledge of MATLAB is required for both MAT 0022A and MAT 067. Students can learn it on their own, enroll in ENG 006, EME 005, or in the one unit course MAT 022AL (can be taken concurrently).

Depth Subject Matter **Units:** 51

A. Core

MAT 127A	Real Analysis	4
MAT 127B	Real Analysis	4
MAT 127C	Real Analysis	4
MAT 128A	Numerical Analysis	4
MAT 128B	Numerical Analysis in Solution of Equations	4
MAT 128C	Numerical Analysis in Differential Equations	4
MAT 135A	Probability	4
MAT 150A	Modern Algebra	4

B. Enrichment

Choose two:

MAT 111- MAT185B, excluding MAT 180, worth at least four units each.

C. Choose one Emphasis:

Computational and Mathematical Biology Emphasis

MAT 124	Mathematical Biology	4

One approved upper division course in Biology.

Computational and Mathematics Emphasis

MAT 168	Optimization	4

One approved upper division course involving extensive computation or theory of computation.

D. Capstone Course

Choose one:

MAT 189	Advanced Problem Solving	3
(Internship in Applied Mathematics		
MAT 192	Internship in Applied Mathematics	1-3
MAT 194	Undergraduate Thesis	3
(Special Topics)		
MAT 180	Special Topics	3

Total: 82-86

Mathematical & Scientific Computation; Mathematics | MAT Courses

Note: Mathematics 016A, 016B, and 016C are intended for students who will take no more Mathematics courses. Mathematics 017A, 017B, and 017C have the same level of rigor as 016A, 016B, and 016C, yet are much more broad mathematically (containing algebra, differential equations and probability, besides traditional calculus), and are intended for biology.

Courses in MAT:

MAT 000B—Elementary Algebra (no credit) (0)
Lecture—3 hours. Not open to Concurrent student enrollment. Basic concepts of algebra, including polynomials, factoring, equations, graphs, and inequalities. Offered only if sufficient number of students enroll. (P/NP grading only.) Effective: 1997 Winter Quarter.

MAT 000C—Trigonometry (no credit) (0)
Lecture—2 hours. Not open to Concurrent student enrollment. Basic concepts of trigonometry, including trigonometric functions, identities, inverse functions, and applications. Offered only if sufficient number of students enroll. (P/NP grading only.) Effective: 1997 Winter Quarter.

MAT 000D—Intermediate Algebra (no credit) (0)
Lecture—3 hours. Not open to Concurrent student enrollment. Basic concepts of algebra, prepares student for college work in mathematics, such as course 16A or 21A. Functions, equations, graphs, logarithms, and systems of equations. Offered only if sufficient number of students enroll. (P/NP grading only.) Effective: 1997 Winter Quarter.

MAT 012—Precalculus (3)
Lecture—3 hours. Prerequisite(s): Two years of high school algebra, plane geometry, plane trigonometry; and obtaining required score on the Precalculus Diagnostic Examination. Topics selected for their use in calculus, including functions and their graphs, slope, zeroes of polynomials, exponential, logarithmic and trigonometric functions, sketching surfaces and solids. Not open for credit to students who have completed any of courses MAT 016A, MAT 016B, MAT 016C, MAT 017A, MAT 017B, MAT 017C, MAT 021A, MAT 021B, or MAT 021C with a C- or better. GE credit: QL, SE, SL. Effective: 2012 Winter Quarter.

MAT 016A—Short Calculus (3)
Lecture—3 hours. Prerequisite(s): Two years of high school algebra, plane geometry, plane trigonometry, and satisfying the Mathematics Placement Requirement. Limits; differentiation of algebraic functions; analytic geometry; applications, in particular to maxima and minima problems. Not open for credit to students who have completed MAT 017B, MAT 017C, MAT 021A, MAT 021B, or MAT 021C; only 2 units of credit to students who have completed MAT 17A. GE credit: QL, SE, SL. Effective: 2012 Winter Quarter.

MAT 016B—Short Calculus (3)
Lecture—3 hours. Prerequisite(s): MAT 016A C- or better or MAT 017A C- or better or MAT 021A C- or better or MAT 021AH C- or better Integration; calculus for trigonometric, exponential, and logarithmic functions; applications. Not open for credit to students who have completed MAT 017C, MAT 021B, or MAT 021C; only 2 units of credit to students who have completed MAT 017B. GE credit: QL, SE, SL. Effective: 2017 Winter Quarter.

MAT 016C—Short Calculus (3)
Lecture—3 hours. Prerequisite(s): MAT 016B C- or better or MAT 017B C- or better or MAT 021B C- or better or MAT 021BH C- or better Differential equations; partial derivatives; double integrals; applications; series. Not open for credit to students who have completed MAT 021C; only 2 units of credit to students who have completed MAT 017C. GE credit: QL, SE, SL. Effective: 2017 Winter Quarter.

MAT 017A—Calculus for Biology and Medicine (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Two years of high school algebra, plane geometry, plane trigonometry, and analytical geometry, and satisfying the Mathematics Placement Requirement. Introduction to differential calculus via applications in biology and medicine. Limits, derivatives of polynomials, trigonometric, and exponential functions, graphing, applications of the derivative to biology and medicine. Not open for credit to students who have completed MAT 016B, MAT 016C, MAT 021A, MAT 021B, or MAT 021C; only 2 units of credit to students who have completed MAT 016A. GE credit: QL, SE, SL. Effective: 2014 Fall Quarter.

MAT 017B—Calculus for Biology and Medicine (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016A C- or better or MAT 017A C- or better or MAT 021A C- or better or MAT 021AH C- or better Introduction to integral calculus and elementary differential equations via applications to biology and medicine. Fundamental theorem of calculus, techniques of integration including integral tables and numerical methods, improper integrals, elementary first order differential equations, applications in biology and medicine. Not open for credit to students who have completed MAT 016C, MAT 021B, or MAT 021C; only 2 units of credit for students who have completed MAT 016B. GE credit: QL, SE, SL. Effective: 2017 Winter Quarter.

MAT 017C—Calculus for Biology and Medicine (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 017B C- or better Matrix algebra, functions of several variables, partial derivatives, systems of differential equations, and applications to biology and medicine. Not open for credit to students who have completed MAT 21C; only 2 units of credit to students who have completed MAT 16C. GE credit: SE, SL. Effective: 2016 Fall Quarter.

MAT 021A—Calculus (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Two years of high school algebra, plane geometry, plane trigonometry, and analytical geometry, and satisfying the Mathematics Placement Requirement. Functions, limits, continuity. Slope and derivative. Differentiation of algebraic and transcendental functions. Applications to motion, natural growth, graphing, extrema of a function. Differentials. L'Hopital's rule. Not open for credit to students who have completed MAT 016B, MAT 016C, MAT 017B, or MAT 017C; only 2 units of credit to students who have completed MAT 016A or MAT 017A. GE credit: QL, SE, SL. Effective: 2012 Winter Quarter.

MAT 021AH—Honors Calculus (4)
Lecture/Discussion—4 hours. Prerequisite(s): A Precalculus Diagnostic Examination score significantly higher than the minimum for MAT 021A is required. More intensive treatment of material covered in course 21A. GE credit: QL, SE. Effective: 1997 Winter Quarter.

MAT 021AL—Emerging Scholars Program Calculus Workshop (2)
Workshop—6 hours. Prerequisite(s): MAT 021A (can be concurrent); MAT 021A required concurrently. Functions, limits, continuity. Slope and derivative. Same course content as course 21A. Enrollment for students in the Emerging Scholars Program by instructor's invitation only. (P/NP grading only.) GE credit: SE. Effective: 2006 Fall Quarter.

MAT 021B—Calculus (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (MAT 021A C- or better or MAT 021AH C- or better) or MAT 017A B or better Continuation of course 21A. Definition of definite integral, fundamental theorem of calculus, techniques of integration. Application to area, volume, arc length, average of a function, improper integral, surface of revolution. Only 2 units of credit to students who have completed MAT 016B, MAT 016C, MAT 017B, or MAT 017C. GE credit: QL, SE. Effective: 2017 Winter Quarter.

MAT 021BH—Honors Calculus (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021A B or better or MAT 021AH B or better More intensive treatment of material covered in course 21B. Students completing 21BH can continue with course 21CH or the regular 21C. GE credit: SE. Effective: 1997 Winter Quarter.

MAT 021BL—Emerging Scholars Program Calculus Workshop (2)
Workshop—6 hours. Prerequisite(s): MAT 021B (can be concurrent); Concurrent enrollment in MAT 021B. Continuation of course 21A. Same course content as 21B. Enrollment for students in the Emerging Scholars Program by instructor's invitation only. (P/NP grading only.) GE credit: SE. Effective: 2016 Fall Quarter.

MAT 021C—Calculus (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016C C- or better or MAT 017C C- or better or MAT 021B C- or better or MAT 021BH C- or better or MAT 017B B or better; Continuation of course 21B. Sequences, series, tests for convergence, Taylor expansions. Vector algebra, vector calculus, scalar and vector fields. Partial derivatives, total differentials. Applications to maximum and minimum problems in two or more variables. Applications to physical systems. GE credit: QL, SE. Effective: 2017 Winter Quarter.

MAT 021CH—Honors Calculus (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021B B or better or MAT 021BH B or better More intensive treatment of material covered in course 21C. GE credit: SE. Effective: 1997 Winter Quarter.

MAT 021CL—Emerging Scholars Program Calculus Workshop (2)
Workshop—6 hours. Prerequisite(s): MAT 021C (can be concurrent); Concurrent enrollment in MAT 021C. Continuation of course 21B. Same course content as course 21C. Enrollment for students in the Emerging Scholars Program by instructor's invitation only. (P/NP grading only.) GE credit: SE. Effective: 2016 Fall Quarter.

MAT 021D—Vector Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (MAT 021C C- or better or MAT 021CH C- or better) or MAT 017C B or better Continuation of course 21C. Definite integrals over plane and solid regions in various coordinate systems. Line and surface integrals. Green's theorem, Stoke's theorem, divergence theorem. GE credit: QL, SE. Effective: 2017 Winter Quarter.

MAT 021M—Accelerated Calculus (5)
Discussion/Laboratory—1 hour; Lecture/Discussion—4 hours. Prerequisite(s): Grade of B or higher in both semesters of high school calculus or a score of 4 or higher on the Advanced Placement Calculus AB exam, and obtaining the required score on the Precalculus Diagnostic Examination and its trigonometric component. Accelerated treatment of material from courses 21A and 21B, with detailed presentation of theory, definitions, and proofs, and treatment of computational aspects of calculus at a condensed but sophisticated level. Not open for credit to students who have completed MAT 021A or MAT 021B. GE credit: SE. Effective: 1997 Winter Quarter.

MAT 022A—Linear Algebra (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): MAT 016C C- or better or MAT 017C C- or better or MAT 021C C- or better or MAT 021CH C- or better; (ENG 006 or EME 005 or MAT 022AL (can be concurrent)) Matrices and linear transformations, determinants, eigenvalues, eigenvectors, diagonalization, factorization. Not open for credit to students who have completed course 67. GE credit: QL, SE. Effective: 2017 Winter Quarter.

MAT 022A—Linear Algebra (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): (MAT 016C C- or better or MAT 017C C- or better or MAT 021C C- or better or MAT 021CH C- or better); (ENG 006 or EME 005 or ECH 060 or MAT 022AL (can be concurrent)) Matrices and linear transformations, determinants, eigenvalues, eigenvectors, diagonalization, factorization. Not open for credit to students who have completed course 67. GE credit: QL, SE. Effective: 2018 Summer Session 1.

MAT 022AL—Linear Algebra Computer Laboratory (1)
Laboratory—3 hours. Prerequisite(s): MAT 016C or MAT 017C or MAT 021C or MAT 021CH Introduction to Matlab and its use in linear algebra. (P/NP grading only.) GE credit: QL, SE. Effective: 2017 Winter Quarter.

MAT 022B—Differential Equations (3)
Lecture—3 hours. Prerequisite(s): (MAT 022A C- or better or MAT 067 C- or better) Solutions of elementary differential equations. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 025—Advanced Calculus (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021C C- or better or MAT 021CH C- or better Introduction to the rigorous treatment of abstract mathematical analysis. Proofs in mathematics, induction, sets, cardinality; real number system, theory of convergence of sequences. Not open for credit to students who have completed former MAT 127A. GE credit: SE. Effective: 2017 Spring Quarter.

MAT 036—Fundamentals of Mathematics (3)
Lecture—3 hours. Prerequisite(s): Satisfaction of the Mathematics Placement Requirement. Introduction to fundamental mathematical ideas selected from the principal areas of modern mathematics. Properties of the primes, the fundamental theorems of arithmetic, properties of the rationals and irrationals, binary and other number systems. Not open for credit to students who have taken MAT 108. Effective: 2001 Winter Quarter.

MAT 067—Modern Linear Algebra (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021C C- or better or MAT 021CH C- or better Rigorous treatment of linear algebra; topics include vector spaces, bases and dimensions, orthogonal projections, eigenvalues and eigenvectors, similarity transformations, singular value decomposition and positive definiteness. Only one unit of credit to students who have completed MAT 022A. GE credit: SE. Effective: 2017 Winter Quarter.

MAT 071A—Explorations in Elementary Mathematics (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Two years of high school mathematics. Weekly explorations of mathematical ideas related to the elementary school curriculum will be carried out by cooperative learning groups. Lectures will provide background and synthesize the results of group exploration. Effective: 1997 Winter Quarter.

MAT 071B—Explorations in Elementary Mathematics (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Two years of high school mathematics. Weekly explorations of mathematical ideas related to the elementary school curriculum will be carried out by cooperative learning groups. Lectures will provide background and synthesize the results of group exploration. Effective: 1997 Winter Quarter.

MAT 089—Elementary Problem Solving (1)
Lecture—1 hour. Prerequisite(s): High school mathematics through precalculus. Solve and present solutions to challenging and interesting problems in elementary mathematics. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 2001 Winter Quarter.

MAT 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

MAT 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

MAT 108—Introduction to Abstract Mathematics (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021B A rigorous treatment of mathematical concepts with emphasis on developing the ability to understand abstract mathematical ideas, to read and write mathematical concepts, and to prove theorems. Designed to serve as preparation for the more rigorous upper division courses. GE credit: SE. Effective: 2008 Spring Quarter.

MAT 111—History of Mathematics (4) ***Review all entries***
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 025 or MAT 067 or MAT 108 or MAT 114 or MAT 115A or MAT 141 or MAT 145; One of the courses mentioned; eight units of upper division Mathematics. History of mathematics from ancient times through the development of calculus. Mathematics from Arab, Hindu, Chinese and other cultures. Selected topics from the history of modern mathematics. GE credit: SE. Effective: 2010 Fall Quarter.

MAT 111—History of Mathematics (4) ***Review all entries***
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 025 or MAT 127A or MAT 067 or MAT 108 or MAT 114 or MAT 115A or MAT 141 or MAT 145; Eight units of upper division Mathematics. History of mathematics from ancient times through the development of calculus. Mathematics from Arab, Hindu, Chinese and other cultures. Selected topics from the history of modern mathematics. GE credit: SE. Effective: 2018 Fall Quarter.

MAT 114—Convex Geometry (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021C; (MAT 022A or MAT 067) Topics selected from the theory of convex bodies, convex functions, geometric inequalities, combinatorial geometry, and integral geometry. Designed to serve as preparation for the more rigorous upper-division courses. GE credit: SE. Effective: 2007 Winter Quarter.

MAT 115A—Number Theory (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021B Divisibility and related topics, diophantine equations, selected topics from the theory of prime numbers. Designed to serve as preparation for the more rigorous upper division courses. GE credit: QL, SE. Effective: 2006 Fall Quarter.

MAT 115B—Number Theory (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 115A; (MAT 022A or MAT 067) Euler function, Moebius function, congruences, primitive roots, quadratic reciprocity law. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

MAT 116—Differential Geometry (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 021D; MAT 022B; (MAT 022A or MAT 067) Vector analysis, curves, and surfaces in three dimensions. GE credit: SE. Effective: 2017 Winter Quarter.

MAT 118A—Partial Differential Equations: Elementary Methods (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 021D; MAT 022B; (MAT 022A or MAT 067) Derivation of partial differential equations; separation of variables; equilibrium solutions and Laplace's equation; Fourier series; method of characteristics for the one dimensional wave equation. Solution of nonhomogeneous equations. GE credit: QL, SE. Effective: 2006 Fall Quarter.

MAT 118B—Partial Differential Equations: Eigenfunction Expansions (4)
Lecture—3 hours. Prerequisite(s): MAT 118A Sturm-Liouville Theory; selfadjoint operators; mixed boundary conditions; partial differential equations in two and three dimensions;
Eigenvalue problems in circular domains; nonhomogeneous problems and the method of eigenfunction expansions; Poisson's Equations. GE credit: QL, SE. Effective: 2000 Fall Quarter.

MAT 118C—Partial Differential Equations: Green's Functions and Transforms (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 118B Green's functions for one-dimensional problems and Poisson's equation; Fourier transforms; Green's Functions for time dependent problems; Laplace transform and solution of partial differential equations. GE credit: QL, SE. Effective: 2000 Fall Quarter.

MAT 119A—Ordinary Differential Equations (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 021D; MAT 022B; (MAT 022A or MAT 067) Scalar and planar autonomous systems; nonlinear systems and linearization; existence and uniqueness of solutions; matrix solution of linear systems; phase plane analysis; stability analysis; bifurcation theory; Liapunov's method; limit cycles; Poincare Bendixon theory. GE credit: QL, SE. Effective: 2007 Winter Quarter.

MAT 119B—Ordinary Differential Equations (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 119A Lorentz equations; Poincare maps; center manifolds and normal forms; scalar and planar maps; phase space analysis for iterated maps; period-doubling bifurcation; Lyapunov exponent; chaos and symbolic dynamics; strange attractors; fractals. GE credit: QL, SE. Effective: 2007 Spring Quarter.

MAT 124—Mathematical Biology (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): MAT 022B; (MAT 022A or MAT 067) Methods of mathematical modeling of biological systems including difference equations, ordinary differential equations, stochastic and dynamic programming models. Computer simulation methods applied to biological systems. Applications to population growth, cell biology, physiology, evolutionary ecology and protein clustering. MATLAB programming required. GE credit: QL, SE. Effective: 2007 Spring Quarter.

MAT 125A—Real Analysis (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 025 Functions, limits of functions, continuity and uniform continuity, sequences of functions, series of real numbers, series of functions, power series. Not open for credit to students who have completed former MAT 127B. GE credit: SE. Effective: 2006 Fall Quarter.

MAT 125B—Real Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 125A; (MAT 067 or (MAT 022A, MAT 108)) Theory of the derivative, Taylor series, integration, partial derivatives, Implicit Function Theorem. Not open for credit to students who have completed former MAT 127C. GE credit: SE. Effective: 2017 Winter Quarter.

MAT 127A—Real Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021C or MAT 021CH; MAT 067 or (MAT 022A, MAT 108) Real numbers, sequences, series, and continuous functions. Effective: 2017 Fall Quarter.

MAT 127B—Real Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 127A Derivatives, integrals, sequences of functions, and power series. Effective: 2017 Fall Quarter.

MAT 127C—Real Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 127B Metric spaces and multi-variable calculus. Effective: 2017 Fall Quarter.

MAT 128A—Numerical Analysis (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): MAT 021C; ECS 030 Error analysis, approximation, interpolation, numerical differentiation and integration. Programming in language such as Pascal, Fortran, or BASIC required. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 128B—Numerical Analysis in Solution of Equations (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): MAT 021C; (MAT 022A or MAT 067); ECS 030 Solution of nonlinear equations and nonlinear systems. Minimization of functions of several variables. Simultaneous linear equations. Eigenvalue problems. Linear programming. Programming in language such as Pascal, Fortran, or BASIC required. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 128C—Numerical Analysis in Differential Equations (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): MAT 022B; (MAT 022A or MAT 067); ECS 030 Difference equations, operators, numerical solutions of ordinary and partial differential equations. Programming in language such as Pascal, Fortran, or BASIC required. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 129—Fourier Analysis (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 021D; MAT 022B; (MAT 022A or MAT 067); MAT 025 Fourier series and integrals, orthogonal sets of functions. Topics selected from trigonometric approximation, orthogonal polynomials, applications to signal and image processing, numerical analysis, and differential equations. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 133—Mathematical Finance (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): (MAT 067 or (MAT 022A, MAT 108)), MAT 135A Analysis and evaluation of deterministic and random cash flow streams, yield and pricing of basic financial instruments, interest rate theory, mean-variance portfolio theory, capital asset pricing models, utility functions and general principles. MATLAB programming required. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

MAT 135A—Probability (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021C; (MAT 108 or MAT 025) Probability space; discrete probability, combinatorial analysis; independence, conditional probability; random variables, discrete and continuous distributions, probability mass function, joint and marginal density functions; expectation, moments, variance, Chebyshev inequality; sums of random variables, random walk, large number law, central limit theorem. Not open for credit to students who have completed former MAT 131. GE credit: SE. Effective: 2018 Spring Quarter.

MAT 135B—Stochastic Processes (4)
Discussion/Laboratory—4 hours. Prerequisite(s): MAT 135A; (MAT 022A or MAT 067) Generating functions, branching processes, characteristic function; Markov chains; convergence of random variables, law of iterated logarithm; random processes, Brownian motion, stationary processes, renewal processes, queueing theory, martingales. Not open for credit to students who have completed former MAT 132A. GE credit: QL, SE. Effective: 2009 Spring Quarter.

MAT 141—Euclidean Geometry (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021B; (MAT 022A or MAT 067) Axiomatic and analytic examination of Euclidean geometry from an advanced point of view. In particular, a discussion of its relation to other geometries. Designed to serve as preparation for the more rigorous upper division courses. GE credit: SE. Effective: 2018 Winter Quarter.

MAT 145—Combinatorics (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021C Combinatorial methods using basic graph theory, counting methods, generating functions, and recurrence relations. Designed to serve as preparation for the more rigorous upper division courses. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 146—Algebraic Combinatorics (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): MAT 145; MAT 025; (MAT 022A or MAT 067) Enumeration, Polya theory, generating functions, current topics in algebraic combinatorics. Not open for credit to students who have completed former course 149A. GE credit: SE. Effective: 2007 Spring Quarter.

MAT 146—Algebraic Combinatorics (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): ((MAT 022A, MAT 108) or MAT 067)); MAT 145 Enumeration, Polya theory, generating functions, current topics in algebraic combinatorics. Not open for credit to students who have completed former MAT 149A. GE credit: SE. Effective: 2018 Fall Quarter.

MAT 147—Topology (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 025 Basic notions of point-set and combinatorial topology. GE credit: SE. Effective: 2016 Fall Quarter.

MAT 148—Discrete Mathematics (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 067 or (MAT 022A, MAT 108) Coding theory, error correcting codes, finite fields and the algebraic concepts needed in their development. Not open for credit to students who have completed former MAT 149B. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 150A—Modern Algebra (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 067 or (MAT 022A, MAT 108) Basic concepts of groups, symmetries of the plane. Emphasis on the techniques used in the proof of the ideas (Lemmas, Theorems, etc.) developing these concepts. Precise thinking, proof writing, and the ability to deal with abstraction. GE credit: SE. Effective: 2016 Fall Quarter.

MAT 150B—Modern Algebra (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 150A Bilinear forms, rings, factorization, modules. GE credit: SE. Effective: 2007 Winter Quarter.

MAT 150C—Modern Algebra (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 150B Group representations, fields, Galois theory. GE credit: SE. Effective: 2007 Spring Quarter.

MAT 160—Mathematics for Data Analytics and Decision Making (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): MAT 167 Relational model; relational algebra, relational calculus, normal forms, functional and multivalued dependencies, separability. Cost benefit analysis of physical database design and reorganization. Performance via analytical modeling, simulation, and queueing theory. Block accesses; buffering; operating system contention; CPU intensive operations. GE credit: SE. Effective: 2018 Spring Quarter.

MAT 165—Mathematics and Computers (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): MAT 022A or MAT 067; (MAT 025 or MAT 108 or MAT 114 or MAT 115A or MAT 145) Introduction to computational mathematics, symbolic computation, and computer generated/verified proofs in algebra, analysis and geometry. Investigation of rigorous new mathematics developed in conjunction with modern computational questions and the role that computers play in mathematical conjecture and experimentation. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 167—Applied Linear Algebra (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 022A or MAT 067 Applications of linear algebra; LU and QR matrix factorizations, eigenvalue and singular value matrix decompositions. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 168—Optimization (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 021C; ((MAT 022A, MAT 108) or MAT 067) Linear programming, simplex method. Basic properties of unconstrained nonlinear problems, descent methods, conjugate direction method. Constrained minimization. Programming language required. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 180—Special Topics (3)
Lecture—3 hours. Prerequisite(s): MAT 025; (MAT 067 or (MAT 022A, MAT 108)) Special topics from various fields of modern, pure, and applied mathematics. Some recent topics include Knot Theory, General Relativity, and Fuzzy Sets. May be repeated for credit when topics differs. GE credit: SE. Effective: 2016 Fall Quarter.

MAT 185A—Complex Analysis (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): (MAT 067 or (MAT 022A, MAT 108)), MAT 125A Complex number system, analyticity and the Cauchy-Riemann equations, elementary functions, complex integration, power and Laurent series expansions, residue theory. GE credit: SE. Effective: 2016 Fall Quarter.

MAT 185B—Complex Analysis (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 185A Analytical functions, elementary functions and their mapping properties, applications of Cauchy's integral theorem, conformal mapping and applications to heat flow and fluid mechanics. GE credit: SE. Effective: 2007 Spring Quarter.

MAT 189—Advanced Problem Solving (3)
Lecture—3 hours. Prerequisite(s): MAT 025; ((MAT 022A, MAT 108) or MAT 067) Solution and presentation of advanced problem solving techniques. Solve and present interesting and challenging problems of all areas of mathematics. GE credit: OL, QL, SE, WE. Effective: 2016 Fall Quarter.

MAT 192—Internship in Applied Mathematics (1-3)
Internship. Prerequisite(s): Consent of Instructor. Supervised work experience in applied mathematics. Final report. May be repeated up to 10 unit(s). (P/NP grading only.) Effective: 2016 Fall Quarter.

MAT 194—Undergraduate Thesis (3)
Independent Study. Prerequisite(s): Consent of Instructor. Independent research under supervision of a faculty member. Student will submit written report in thesis form. May be repeated for credit with consent of Vice Chairperson. (P/NP grading only.) GE credit: SE. Effective: 2016 Fall Quarter.

MAT 197TC—Tutoring Mathematics in the Community (1-5)
Laboratory—2-6 hours; Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. Special projects in mathematical education developing techniques for mathematics instruction and tutoring on an individual or small group basis. May be repeated once for credit. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 2016 Fall Quarter.

MAT 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2016 Fall Quarter.

MAT 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

MAT 200A—Problem-Solving in Analysis (1)
Extensive Problem Solving; Lecture—1 hour. Prerequisite(s): MAT 201A; MAT 201B; MAT 201C Problem-solving in graduate analysis: continuous functions, metric spaces, Banach and Hilbert spaces, bounded linear operators, the spectral theorem, distributions, Fourier series and transforms, Lp spaces, Sobolev spaces. May be repeated up to 2 time(s). Effective: 2010 Spring Quarter.

MAT 200B—Problem-Solving in Analysis (2)
Extensive Problem Solving; Lecture—1 hour. Prerequisite(s): MAT 201A; MAT 201B; MAT 201C Problem-solving in graduate analysis: continuous functions, metric spaces, Banach and Hilbert spaces, bounded linear operators, the spectral theorem, distributions, Fourier series and transforms, Lp spaces, Sobolev spaces. May be repeated up to 2 time(s). Effective: 2010 Fall Quarter.

MAT 201A—Analysis (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing in Mathematics or Applied Mathematics, or consent of instructor. Metric and normed spaces. Continuous functions. Topological, Hilbert, and Banach spaces. Fourier series. Spectrum of bounded and compact linear operators. Linear differential operators and Green's functions. Distributions. Fourier transform. Measure theory. Lp and Sobolev spaces. Differential calculus and variational methods. Effective: 2004 Fall Quarter.

MAT 201B—Analysis (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing in Mathematics or Applied Mathematics, or consent of instructor. Metric and normed spaces. Continuous functions. Topological, Hilbert, and Banach spaces. Fourier series. Spectrum of bounded and compact linear operators. Linear differential operators and Green's functions. Distributions. Fourier transform. Measure theory. Lp and Sobolev spaces. Differential calculus and variational methods. Effective: 2005 Winter Quarter.

MAT 201C—Analysis (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing in Mathematics or Applied Mathematics, or consent of instructor. Metric and normed spaces. Continuous functions. Topological, Hilbert, and Banach spaces. Fourier series. Spectrum of bounded and compact linear operators. Linear differential operators and Green's functions. Distributions. Fourier transform. Measure theory. Lp and Sobolev spaces. Differential calculus and variational methods. Effective: 2005 Spring Quarter.

MAT 202—Functional Analysis (4)
Lecture—3 hours; Term Paper. Prerequisite(s): MAT 201A; MAT 201B Hahn-Banach, Open mapping, Closed graph, Banach-Steinhaus, and Krein-Milman. Subspaces and quotient spaces. Projections. Weak and weak-star topologies. Compact and adjoint operators in Banach spaces. Fredholm theory. Functions of operators. Spectral theory of self-adjoint operators. Effective: 2009 Winter Quarter.

MAT 205—Complex Analysis (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 185A; Or equivalent to MAT 185A, or consent of instructor. Analytic continuation, Riemann surfaces, conformal mappings, Riemann mapping theorem, entire functions, special functions, elliptic functions. Effective: 2009 Spring Quarter.

MAT 205A—Complex Analysis (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 185A; Or equivalent to MAT 185A, or consent of instructor. Cauchy's theorem, Cauchy's integral formulas, meromorphic functions, complex logarithm, entire functions, Weierstrass infinite product formula, the gamma and zeta functions, and prime number theorem. No credit given to students who have completed MAT 205. Effective: 2011 Fall Quarter.

MAT 205B—Complex Analysis (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 205A; or Consent of Instructor. Conformal mappings, the Schwarz lemma, analytic automorphisms, the Riemann mapping theorem, elliptic functions, Eisenstein series, the Jacobi theta functions, asymptotics, Bessel functions, the Airy function, topics on special functions and Riemann surfaces. May be repeated up to 2 time(s) if topic varies. Effective: 2011 Spring Quarter.

MAT 206—Measure Theory (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 125B Introduction to measure theory. The study of lengths, surface areas, and volumes in general spaces, as related to integration theory. Effective: 2007 Spring Quarter.

MAT 207A—Methods of Applied Mathematics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Ordinary differential equations and dynamical systems. Variational principles. Eigenfunctions, integral equations and Green's functions. Complex analysis and contour integration. Laplace's equation. Diffusion equations. Wave phenomena. Dimensional analysis and scaling. Asymptotic expansions and perturbation theory. Stochastic processes and Brownian motion. Effective: 2010 Fall Quarter.

MAT 207B—Methods of Applied Mathematics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Ordinary differential equations and dynamical systems. Variational principles. Eigenfunctions, integral equations and Green's functions. Complex analysis and contour integration. Laplace's equation. Diffusion equations. Wave phenomena. Dimensional analysis and scaling. Asymptotic expansions and perturbation theory. Stochastic processes and Brownian motion. Effective: 2011 Winter Quarter.

MAT 207C—Methods of Applied Mathematics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Ordinary differential equations and dynamical systems. Variational principles. Eigenfunctions, integral equations and Green's functions. Complex analysis and contour integration. Laplace's equation. Diffusion equations. Wave phenomena. Dimensional analysis and scaling. Asymptotic expansions and perturbation theory. Stochastic processes and Brownian motion. Effective: 2011 Spring Quarter.

MAT 215A—Topology (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Fundamental group and covering space theory. Homology and cohomology. Manifolds and duality. CW complexes. Fixed point theorems. Effective: 2002 Fall Quarter.

MAT 215B—Topology (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Fundamental group and covering space theory. Homology and cohomology. Manifolds and duality. CW complexes. Fixed point theorems. Effective: 2002 Fall Quarter.

MAT 215C—Topology (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Fundamental group and covering space theory. Homology and cohomology. Manifolds and duality. CW complexes. Fixed point theorems. Effective: 2002 Fall Quarter.

MAT 216—Geometric Topology (4)
Extensive Problem Solving—1 hour; Lecture—3 hours. Prerequisite(s): MAT 215A Topology of two- and three-dimensional manifolds. Surfaces and their diffeomorphisms. Dehn twists. Heegaard surfaces. Theory of 3-dimensional manifolds. Knots and knot theory. Hyperbolic manifolds and geometric structures. <p> May be repeated up to 1 time(s). Effective: 2010 Spring Quarter.

MAT 218A—Partial Differential Equations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 201A; MAT 201B; MAT 201C; or Consent of Instructor. Year-long sequence on PDEs which covers linear transport, Laplace, heat, and wave equations, maximum principles, method of characteristics, Sobelev and Hölder space theory, weak derivatives, semilinear, quasilinear, and fully nonlinear elliptic/parabolic equations, nonlinear hyperbolic equations, and compensated compactness. Effective: 2009 Fall Quarter.

MAT 218B—Partial Differential Equations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 218A; or Consent of Instructor. Year-long sequence on PDEs which covers linear transport, Laplace, heat, and wave equations, maximum principles, method of characteristics, Sobelev and Hölder space theory, weak derivatives, semilinear, quasilinear, and fully nonlinear elliptic/parabolic equations, nonlinear hyperbolic equations, and compensated compactness. Effective: 2010 Winter Quarter.

MAT 218C—Partial Differential Equations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 218B; or Consent of Instructor. Year-long sequence on PDEs which covers linear transport, Laplace, heat, and wave equations, maximum principles, method of characteristics, Sobelev and Hölder space theory, weak derivatives, semilinear, quasilinear, and fully nonlinear elliptic/parabolic equations, nonlinear hyperbolic equations, and compensated compactness. Effective: 2010 Spring Quarter.

MAT 221A—Mathematical Fluid Dynamics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 118B; or Consent of Instructor. Kinematics and dynamics of fluids. The Euler and Navier-Stokes equations. Vorticity dynamics. Irrotational flow. Low Reynolds number flows and the Stokes equations. High Reynolds number flows and boundary layers. Compressible fluids. Shock waves. Effective: 2002 Fall Quarter.

MAT 221B—Mathematical Fluid Dynamics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 118B; or Consent of Instructor. Kinematics and dynamics of fluids. The Euler and Navier-Stokes equations. Vorticity dynamics. Irrotational flow. Low Reynolds number flows and the Stokes equations. High Reynolds number flows and boundary layers. Compressible fluids. Shock waves. Effective: 2003 Winter Quarter.

MAT 226A—Numerical Methods: Fundamentals (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 128A; MAT 128B; Or equivalent, or consent of instructor; familiarity with some programming language. Fundamental principles and methods in numerical analysis, including the concepts of stability of algorithms and conditioning of numerical problems, numerical methods for interpolation and integration, eigenvalue problems, singular value decomposition and its applications. Effective: 2009 Fall Quarter.

MAT 226B—Numerical Methods: Large-Scale Matrix Computations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 167; Or equivalent, or consent of instructor; familiarity with some programming language. Numerical methods for large-scale matrix computations, including direct and iterative methods for the solution of linear systems, the computation of eigenvalues and singular values, the solution of least-squares problems, matrix compression, methods for the solution of linear programs. Effective: 2010 Winter Quarter.

MAT 226C—Numerical Methods: Ordinary Differential Equations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 022B; Or equivalent, or consent of instructor; familiarity with some programming language. Numerical methods for the solution of ordinary differential equations, including methods for initial-value problems and two-point boundary-value problems, theory of and methods for differential algebraic equations, dimension reduction of large-scale dynamical systems. Effective: 2010 Spring Quarter.

MAT 227—Mathematical Biology (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Nonlinear ordinary and partial differential equations and stochastic processes of cell and molecular biology. Scaling, qualitative, and numerical analysis of mathematical models. Applications to nerve impulse, chemotaxis, muscle contraction, and morphogenesis. Effective: 2002 Fall Quarter.

MAT 228A—Numerical Solution of Differential Equations (4)
Discussion; Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 128C Numerical solutions of initial-value, eigenvalue and boundary-value problems for ordinary differential equations. Numerical solution of parabolic and hyperbolic partial differential equations. Effective: 1998 Fall Quarter.

MAT 228B—Numerical Solution of Differential Equations (4)
Discussion; Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 128C Numerical solutions of initial-value, eigenvalue and boundary-value problems for ordinary differential equations. Numerical solution of parabolic and hyperbolic partial differential equations. Effective: 1998 Fall Quarter.

MAT 228C—Numerical Solution of Differential Equations (4)
Discussion; Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 128C Numerical solutions of initial-value, eigenvalue and boundary-value problems for ordinary differential equations. Numerical solution of parabolic and hyperbolic partial differential equations. Effective: 1998 Fall Quarter.

MAT 235A—Probability Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 125B; (MAT 135A or STA 131A); or Consent of Instructor. Measure-theoretic foundations, abstract integration, independence, laws of large numbers, characteristic functions, central limit theorems. Weak convergence in metric spaces, Brownian motion, invariance principle. Conditional expectation. Topics selected from: martingales, Markov chains, ergodic theory. (Statistics 235A.) Effective: 2007 Fall Quarter.

MAT 235B—Probability Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 235A or STA 235A; or Consent of Instructor. Measure-theoretic foundations, abstract integration, independence, laws of large numbers, characteristic functions, central limit theorems. Weak convergence in metric spaces, Brownian motion, invariance principle. Conditional expectation. Topics selected from: martingales, Markov chains, ergodic theory. (Statistics 235B.) Effective: 2008 Spring Quarter.

MAT 235C—Probability Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 235B or STA 235B; or Consent of Instructor. Measure-theoretic foundations, abstract integration, independence, laws of large numbers, characteristic functions, central limit theorems. Weak convergence in metric spaces, Brownian motion, invariance principle. Conditional expectation. Topics selected from: martingales, Markov chains, ergodic theory. (Statistics 235C.) Effective: 2008 Spring Quarter.

MAT 236A—Stochastic Dynamics and Applications (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 201C or (MAT 235B or STA 235B); MAT 235A, MAT 235B, MAT 235C/ STA 235A, STA 235B, STA 235C recommended. Stochastic processes, Brownian motion, Stochastic integration, martingales, stochastic differential equations. Diffusions, connections with partial differential equations, mathematical finance. Effective: 2002 Fall Quarter.

MAT 236B—Stochastic Dynamics and Applications (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 201C or (MAT 235B or STA 235B); MAT 235A, MAT 235B, MAT 235C/ STA 235A, STA 235B, STA 235C recommended. Stochastic processes, Brownian motion, Stochastic integration, martingales, stochastic differential equations. Diffusions, connections with partial differential equations, mathematical finance. Effective: 2002 Fall Quarter.

MAT 239—Differential Topology (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 201A; or Consent of Instructor. Vector calculus, point-set topology; MAT 250A and MAT 250B is highly recommended. Topics include: differentiable manifolds, vector fields, transversality, Sard's theorem, examples of differentiable manifolds; orientation, intersection theory, index of vector fields; differential forms, integration, Stokes' theorm, deRham cohomology; Morse functions, Morse lemma, index of critical points. Effective: 2007 Spring Quarter.

MAT 240A—Differential Geometry (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 201A; MAT 239; MAT 250A and MAT 250B highly recommended; intended primarily for second-year graduate students. Riemannian metrics, connections, geodesics, Gauss lemma, convex neighborhoods, curvature tensor, Ricci and scalar curvature, connections and curvature on vector bundles. Effective: 2008 Fall Quarter.

MAT 240B—Differential Geometry (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 240A; Intended primarily for second-year graduate students. Jacobi fields, conjugate points, completeness, Hopf-Rinow theorem, Cartan-Hadamard theorem, energy, variation theorems and their applications, Rauch comparison theorem and its applications. Effective: 2009 Winter Quarter.

MAT 245—Enumerative Combinatorics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 145; MAT 150; or the equivalent, or consent of instructor. Introduction to modern combinatorics and its applications. Emphasis on enumerative aspects of combinatorial theory. Effective: 2004 Fall Quarter.

MAT 246—Algebraic Combinatorics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 245; or Consent of Instructor. Algebraic and geometric aspects of combinatorics. The use of structures such as groups, polytopes, rings, and simplicial complexes to solve combinatorial problems. Effective: 2005 Winter Quarter.

MAT 248A—Algebraic Geometry (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 250A; MAT 250B; MAT 250C Affine varieties and radical ideals. Projective varieties. Abstract varieties. Morphisms and rational maps. Smoothness. Algebraic curves and the Riemann-Roch theorem. Special topics. Effective: 2009 Fall Quarter.

MAT 248B—Algebraic Geometry (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 248A Complex varieties and the analytic topology. Sheaves and schemes.
Fiber products. Separatedness and properness. Applications of scheme
theory. Effective: 2010 Winter Quarter.

MAT 249A—Problem-Solving in Algebra (1)
Extensive Problem Solving; Lecture—1 hour. Prerequisite(s): MAT 250A; MAT 250B Problem-solving in graduate algebra: groups, rings, modules, matrices, tensor products, representations, Galois theory, ring extensions, commutative algebra and homological algebra. May be repeated up to 2 time(s). Effective: 2011 Spring Quarter.

MAT 249B—Problem-Solving in Algebra (2)
Extensive Problem Solving; Lecture—1 hour. Prerequisite(s): MAT 250A; MAT 250B Problem-solving in graduate algebra: groups, rings, modules, matrices, tensor products, representations, Galois theory, ring extensions, commutative algebra and homological algebra. May be repeated up to 2 time(s). Effective: 2011 Fall Quarter.

MAT 250A—Algebra (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing in mathematics or consent of instructor. Group and rings. Sylow theorems, abelian groups, Jordan-Holder theorem. Rings, unique factorization. Algebras, and modules. Fields and vector spaces over fields. Field extensions. Commutative rings. Representation theory and its applications. Effective: 2002 Fall Quarter.

MAT 250B—Algebra (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing in mathematics or consent of instructor. Group and rings. Sylow theorems, abelian groups, Jordan-Holder theorem. Rings, unique factorization. Algebras, and modules. Fields and vector spaces over fields. Field extensions. Commutative rings. Representation theory and its applications. Effective: 2002 Fall Quarter.

MAT 250C—Algebra (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing in mathematics or consent of instructor. Group and rings. Sylow theorems, abelian groups, Jordan-Holder theorem. Rings, unique factorization. Algebras, and modules. Fields and vector spaces over fields. Field extensions. Commutative rings. Representation theory and its applications. Effective: 2002 Fall Quarter.

MAT 258A—Numerical Optimization (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 025; MAT 167 Numerical methods for infinite dimensional optimization problems. Newton and Quasi-Newton methods, linear and sequential quadratic programming, barrier methods; large-scale optimization; theory of approximations; infinite and semi-infinite programming; applications to optimal control, stochastic optimization and distributed systems. Effective: 2007 Fall Quarter.

MAT 258B—Discrete and Mixed-Integer Optimization (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 025; MAT 167; or Consent of Instructor. Combinatorial, integer, and mixed-integer linear optimization problems. Ideal and strong formulations, cutting planes, branch and cut, decomposition methods. Effective: 2014 Fall Quarter.

MAT 261A—Lie groups and their representations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 215A; MAT 240A; MAT 250A; MAT 250B; Or the equivalent, or consent of instructor. Lie groups and Lie algebras. Classification of semi-simple Lie groups. Classical and compact Lie groups. Representations of Lie groups and Lie algebras. Root systems, weights, Weil character formula. Kac-Moody and Virasoro algebras. Applications. Effective: 2002 Fall Quarter.

MAT 261B—Lie groups and their representations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 215A; MAT 240A; MAT 250A; MAT 250B; Or the equivalent, or consent of instructor. Lie groups and Lie algebras. Classification of semi-simple Lie groups. Classical and compact Lie groups. Representations of Lie groups and Lie algebras. Root systems, weights, Weil character formula. Kac-Moody and Virasoro algebras. Applications. Effective: 2002 Fall Quarter.

MAT 265—Mathematical Quantum Mechanics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 201; or Consent of Instructor. Mathematical foundations of quantum mechanics: the Hilbert space and Operator Algebra formulations; the Schrödinger and Heisenberg equations, symmetry in quantum mechanics, basics of spectral theory and perturbation theory. Applications to atoms and molecules. The Dirac equation. Effective: 2003 Fall Quarter.

MAT 266—Mathematical Statistical Mechanics and Quantum Field Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 265; or Consent of Instructor. Mathematical principles of statistical mechanics and quantum field theory. Topics include classical and quantum lattice systems, variational principles, spontaneous symmetry breaking and phase transitions, second quantization and Fock space, and fundamentals of quantum field theory. May be repeated up to 1 time(s). Effective: 2010 Spring Quarter.

MAT 271—Applied and Computational Harmonic Analysis (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): (MAT 125B or MAT 201C); (MAT 128B or MAT 167); MAT 129; Or the equivalent, or consent of instructor. Introduction to mathematical basic building blocks (wavelets, local Fourier basis, and their relatives) useful for diverse fields (signal and image processing, numerical analysis, and statistics). Emphasis on the connection between the continuum and the discrete worlds. Effective: 2007 Fall Quarter.

MAT 280—Topics in Pure and Applied Mathematics (3)
Lecture—3 hours. Prerequisite(s): Graduate standing. Special topics in various fields of pure and applied mathematics. Topics selected based on the mutual interests of students and faculty. May be repeated for credit when topic differs. May be repeated for credit May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

MAT 290—Seminar (1-6)
Seminar—1-6 hours. Advanced study in various fields of mathematics, including analysis, applied mathematics, discrete mathematics, geometry, mathematical biology, mathematical physics, optimization, partial differential equations, probability, and topology. May be repeated for credit. (S/U grading only.) Effective: 2003 Spring Quarter.

MAT 298—Group Study (1-5)
Variable. Effective: 1997 Winter Quarter.

MAT 299—Individual Study (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

MAT 299D—Dissertation Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

MAT 301A—Mathematics Teaching Practicum (3)
Discussion—1 hour; Fieldwork—5 hours. Prerequisite(s): MAT 302A (can be concurrent); MAT 303A (can be concurrent); MAT 302A and MAT 303A required concurrently or consent of instructor. Specialist training in mathematics teaching. Teaching, training, and cross observing classes taught using large group Socratic techniques, small group guided inquiry experiences, and/or other approaches to teaching at various grade levels. Required for advanced degrees in mathematics education. May be repeated up to 1 time(s). Effective: 2001 Fall Quarter.

MAT 301B—Mathematics Teaching Practicum (3)
Discussion—1 hour; Fieldwork—5 hours. Prerequisite(s): MAT 302B (can be concurrent); MAT 303B (can be concurrent); MAT 302B and MAT 303B required concurrently or consent of instructor. Specialist training in mathematics teaching. Teaching, training, and cross observing classes taught using large group Socratic techniques, small group guided inquiry experiences, and/or other approaches to teaching at various grade levels. Required for advanced degrees in mathematics education. May be repeated up to 1 time(s). Effective: 2002 Winter Quarter.

MAT 301C—Mathematics Teaching Practicum (3)
Discussion—1 hour; Fieldwork—5 hours. Prerequisite(s): MAT 302C (can be concurrent); MAT 303B (can be concurrent); MAT 302C and MAT 303C required concurrently or consent of instructor. Specialist training in mathematics teaching. Teaching, training, and cross observing classes taught using large group Socratic techniques, small group guided inquiry experiences, and/or other approaches to teaching at various grade levels. Required for advanced degrees in mathematics education. May be repeated up to 1 time(s). Effective: 2002 Spring Quarter.

MAT 302A—Curriculum Development in Mathematics (1)
Lecture/Discussion—1 hour. Prerequisite(s): MAT 303A (can be concurrent); MAT 303A required concurrently or consent of instructor. Mathematics curriculum development for all grade levels. Required for advanced degrees in mathematics education. May be repeated up to 1 time(s). Effective: 2001 Fall Quarter.

MAT 302B—Curriculum Development in Mathematics (1)
Lecture/Discussion—1 hour. Prerequisite(s): MAT 303B (can be concurrent); MAT 303B required concurrently or consent of instructor. Mathematics curriculum development for all grade levels. Required for advanced degrees in mathematics education. May be repeated up to 1 time(s). Effective: 2002 Winter Quarter.

MAT 302C—Curriculum Development in Mathematics (1)
Lecture/Discussion—1 hour. Prerequisite(s): MAT 303C (can be concurrent); MAT 303C required concurrently or consent of instructor. Mathematics curriculum development for all grade levels. Required for advanced degrees in mathematics education. May be repeated for credit. Effective: 2002 Spring Quarter.

MAT 303A—Mathematics Pedagogy (1)
Lecture/Discussion—1 hour. Prerequisite(s): MAT 302A (can be concurrent) or MAT 210AL (can be concurrent); MAT 302A or MAT 210AL required concurrently or consent of instructor. An investigation of the interplay of mathematical pedagogy and mathematical content, including a historical survey of past and present methods in view of some of the influences that shaped their development. May be repeated up to 1 time(s). Effective: 2001 Fall Quarter.

MAT 303B—Mathematics Pedagogy (1)
Lecture/Discussion—1 hour. Prerequisite(s): MAT 302B (can be concurrent) or MAT 210BL (can be concurrent); MAT 302A or MAT 210AL required concurrently or consent of instructor. An investigation of the interplay of mathematical pedagogy and mathematical content, including a historical survey of past and present methods in view of some of the influences that shaped their development. May be repeated up to 1 time(s). Effective: 2002 Winter Quarter.

MAT 303C—Mathematics Pedagogy (1)
Lecture/Discussion—1 hour. Prerequisite(s): MAT 302C (can be concurrent) or MAT 210CL (can be concurrent); MAT 302C or MAT 210CL required concurrently or consent of instructor. An investigation of the interplay of mathematical pedagogy and mathematical content, including a historical survey of past and present methods in view of some of the influences that shaped their development. May be repeated up to 1 time(s). Effective: 2002 Spring Quarter.

MAT 390—Teaching Assistantship Training (3)
Lecture—3 hours. Prerequisite(s): Graduate standing in the Department of Mathematics. Experience in methods of assisting and teaching of mathematics at the university level. Includes discussion of lecturing techniques, running discussion sessions, holding office hours, preparing and grading of examinations, student-teacher interaction, and related topics. Required of departmental teaching assistants. (S/U grading only.) Effective: 2008 Fall Quarter.

MAT 399—Individual Study (2-4)
Discussion—1 hour; Independent Study—2-3 hours. Individual study of some aspect of mathematics education or a focused work on a curriculum design project under supervision of a faculty member in mathematics. May be repeated up to 1 time(s). (S/U grading only.) Effective: 2002 Spring Quarter.

Mathematics

Mathematics | MAT Information

(College of Letters and Science)

Abigail Thompson, Ph.D., Chairperson

Department Office. 1130 Mathematical Sciences Bldg.; 530-752-0827; studentservices@math.ucdavis.edu; http://www.math.ucdavis.edu

Faculty. https://www.math.ucdavis.edu/people/faculty/

Mathematics | MAT A.B.

(College of Letters and Science)

Abigail Thompson, Ph.D., Chairperson

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The Major Programs

Mathematics is the study of abstract structures, space, change, and the interrelations of these concepts. It also is the language of the exact sciences.

The Program. Students majoring in mathematics may follow a program leading to either the Bachelor of Arts or the Bachelor of Science degree. After completing basic introductory courses such as calculus and linear algebra, students plan an upper division program in consultation with a faculty advisor. Upper division courses include real analysis, probability, modern algebra, as well as a variety of other courses that allow students to further mathematical knowledge and skills that feature their research or career interests. This individualized program can lead to graduate study in pure or applied mathematics, elementary or secondary level teaching, or to other professional goals. It can also reflect a special interest such as computational and applied mathematics, computer science, or statistics, or may be combined with a major in some other field.

Career Alternatives. A degree in mathematics provides entry to many careers in industry in addition to teaching. For instance, operations research, data analysis, systems analysis, computing, actuarial work, insurance, and financial services are only a few such careers. Mathematics is also a sound basis for graduate work in a variety of fields, such as law, engineering, and economics.

Recommended Language Preparation. Bachelor of Science degree candidates are advised, but not required, to satisfy the same language requirement as that for a Bachelor of Arts degree candidate, and to fulfill it in French, German, or Russian.

Major Advisors. For a current list of faculty and staff advisors; see https://www.math.ucdavis.edu/undergrad/advising/advisers/ or contact the Student Services office at studentservices@math.ucdavis.edu.

Depth Subject Matter Requirements. The upper division course offering is grouped into core and enrichment courses. The core classes are intended to provide basic mathematical techniques, whereas the enrichment choices allow students to further mathematical knowledge and skills that feature their research or career interests. Certain mathematically oriented courses given by other departments are admissible in partial satisfaction of the depth subject matter requirements with prior departmental approval. Before graduating, students also complete a mathematics capstone, which can be satisfied by completing an undergraduate thesis, an approved internship, or one of the approved capstone courses.

Statement of Objectives. As early as possible, but no later than the last quarter of the sophomore year or no later than the beginning of the first quarter of the junior year for transfer students, each prospective mathematics major, in consultation with an advisor, should file a formal program of study in one of the majors offered in mathematics. Forms to be used for this are available on OASIS (students.ucdavis.edu), our website or from the Department office. Failure to file a formal program could lead to a delay in graduation.

Information for Undergraduates. Assistance in planning an undergraduate major program in mathematics is available on our website, as well as by consulting an advisor. Information about the Department's advisors can be found on our website, https://www.math.ucdavis.edu/undergrad/advising/advisers/.

Mathematics Placement Requirement. Students who wish to enroll in MAT 012, 016A, 017A, 021A, 021AH, and 021M must satisfy the mathematics placement requirement by taking an online exam. Students who do not satisfy the requirement will be administratively dropped from these courses. For more information, including preparation tips and how to access the online exam, please see the Department of Mathematics' website, at http://www.math.ucdavis.edu/undergrad/math_placement, well in advance of enrolling.

Department Honors. Students who have completed at least 135 units with a minimum GPA of 3.500 in courses counted towards their major will be considered for Department Honors.

Students who meet the minimum GPA requirement for honors at graduation for the College of Letters and Science and who complete a senior project as part of MAT 194 or 199 units in consultation with their faculty adviser may also be recommended by the department for graduation with High Honors or Highest Honors. Recommendations will be based on evaluations of students' academic achievements in their major and the quality of their senior project. For complete details, see our website at http://www.math.ucdavis.edu.

Teaching Credential Subject Representative. Dr. Ali Dad-del

Graduate Study. The Department offers programs of study and research leading to the M.A. and Ph.D. degrees in Mathematics. Information regarding graduate study may be obtained by consulting our website, and by sending an email to studentservices@math.ucdavis.edu.

Preparatory Subject Matter **Units:** 39-43

MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022B	Differential Equations	3

Choose one option:

(a)

MAT 022A	Linear Algebra	3
MAT 108	Introduction to Abstract Mathematics	4

(b)

MAT 067	Modern Linear Algebra	4

ECS 032A	Introduction to Programming	4
OR		
ENG 006	Engineering Problem Solving	4

MAT 022AL	Linear Algebra Computer Laboratory	1
OR		
Equivalent MATLAB knowledge.		

Additional non-Mathematics courses chosen from natural sciences.

NOTE: Basic knowledge of MATLAB is required for both MAT 0022A and MAT 067. Students can learn it on their own, enroll in ENG 006, EME 005, or in the one unit course MAT 022AL (can be taken concurrently).

Depth Subject Matter **Units:** 39

A. Core

MAT 127A	Real Analysis	4
MAT 127B	Real Analysis	4
MAT 127C	Real Analysis	4
MAT 135A	Probability	4
MAT 150A	Modern Algebra	4

B. Choose one Plan:

Plan 1: General Mathematics

Choose four:

MAT 111-185B, excluding MAT 180, worth at least four units each. Up to four of these 16 units may be approved upper division courses outside of the Department of Mathematics with extensive use of mathematics.

Plan 2: Secondary Teaching

MAT 111	History of Mathematics	4
MAT 115A	Number Theory	4
MAT 141	Euclidean Geometry	4

Choose one:

MAT 111-185B, excluding MAT 180, worth at least four units each. Up to four of these 16 units may be approved upper division courses outside of the Department of Mathematics with extensive use of mathematics.

NOTE: Students who wish to satisfy the single subject matter waiver for the teaching credential should see an adviser as early as possible.

C. Capstone Course:

Choose one:

MAT 189	Advanced Problem Solving	3
(Undergraduate Thesis)		
MAT 192	Internship in Applied Mathematics	1-3
MAT 194	Undergraduate Thesis	3
(Special Topics)		
MAT 180	Special Topics	3

Total: 78-82

Mathematics | MAT B.S.

(College of Letters and Science)

Abigail Thompson, Ph.D., Chairperson

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The Major Programs

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Career Alternatives. A degree in mathematics provides entry to many careers in industry in addition to teaching. For instance, operations research, data analysis, systems analysis, computing, actuarial work, insurance, and financial services are only a few such careers. Mathematics is also a sound basis for graduate work in a variety of fields, such as law, engineering, and economics.

Recommended Language Preparation. Bachelor of Science degree candidates are advised, but not required, to satisfy the same language requirement as that for a Bachelor of Arts degree candidate, and to fulfill it in French, German, or Russian.

Major Advisors. For a current list of faculty and staff advisors, see https://www.math.ucdavis.edu/undergrad/advising/advisers/ or contact the Student Services office at studentservices@math.ucdavis.edu.

Depth Subject Matter Requirements. The upper division course offering is grouped into core and enrichment courses. The core classes are intended to provide basic mathematical techniques, whereas the enrichment choices allow students to further mathematical knowledge and skills that feature their research or career interests. Certain mathematically oriented courses given by other departments are admissible in partial satisfaction of the depth subject matter requirements with prior departmental approval. Before graduating, students also complete a mathematics capstone, which can be satisfied by completing an undergraduate thesis, an approved internship, or one of the approved capstone courses.

Statement of Objectives. As early as possible, but no later than the last quarter of the sophomore year or no later than the beginning of the first quarter of the junior year for transfer students, each prospective mathematics major, in consultation with an advisor, should file a formal program of study in one of the majors offered in mathematics. Forms to be used for this are available on OASIS (students.ucdavis.edu), our website or from the Department office. Failure to file a formal program could lead to a delay in graduation.

Information for Undergraduates. Assistance in planning an undergraduate major program in mathematics is available on our website, as well as by consulting an advisor. Information about the Department's advisors can be found on our website: https://www.math.ucdavis.edu/undergrad/advising/advisers/.

Mathematics Placement Requirement. Students who wish to enroll in MAT 012, 016A, 017A, 021A, 021AH, and 021M must satisfy the mathematics placement requirement by taking an online exam. Students who do not satisfy the requirement will be administratively dropped from these courses. For more information, including preparation tips and how to access the online exam, please see the Department of Mathematics' website, at http://www.math.ucdavis.edu/undergrad/math_placement, well in advance of enrolling.

Department Honors. Students who have completed at least 135 units with a minimum GPA of 3.500 in courses counted towards their major will be considered for Department Honors.

Students who meet the minimum GPA requirement for honors at graduation for the College of Letters and Science and who complete a senior project as part of MAT 194 or 199 units in consultation with their faculty adviser may also be recommended by the department for graduation with High Honors or Highest Honors. Recommendations will be based on evaluations of students' academic achievements in their major and the quality of their senior project. For complete details, see our website at https://www.math.ucdavis.edu/undergrad/honors/.

Teaching Credential Subject Representative. Dr. Ali Dad-del

Graduate Study. The Department offers programs of study and research leading to the M.A. and Ph.D. degrees in Mathematics. Information regarding graduate study may be obtained by consulting our website, and by sending an email to studentservices@math.ucdavis.edu.

Preparatory Subject Matter **Units:** 31-36

MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022B	Differential Equations	3

Choose one option:

(a)

MAT 022A	Linear Algebra	3
MAT 108	Introduction to Abstract Mathematics	4

(b)

MAT 067	Modern Linear Algebra	4
ECS 032A	Introduction to Programming	4
OR		
ENG 006	Engineering Problem Solving	4
MAT 022AL	Linear Algebra Computer Laboratory	1
OR		
Equivalent MATLAB knowledge		

Plan I: General Mathematics

PHY 009A	Classical Physics	5

Plan II: Mathematics for Secondary Teaching

Choose one:

PHY 007A	General Physics	4
STA 013	Elementary Statistics	4
(Plan 2)		
STA 100	Applied Statistics for Biological Sciences	4
STA 032	Gateway to Statistical Data Science	4
PHY 009A	Classical Physics	5

NOTE: Basic knowledge of MATLAB is required for both MAT 0022A and MAT 067. Students can learn it on their own, enroll in ENG 006, EME 005, or in the one unit course MAT 022AL (can be taken concurrently).

Depth Subject Matter **Units:** 51

Choose one plan:

Plan 1: General Mathematics

A. Core

MAT 127A	Real Analysis	4
MAT 127B	Real Analysis	4
MAT 127C	Real Analysis	4
MAT 135A	Probability	4
MAT 150A	Modern Algebra	4
MAT 150B	Modern Algebra	4
MAT 150C	Modern Algebra	4
MAT 185A	Complex Analysis	4

B. Enrichment

Choose four:

MAT 111-MAT 185B, excluding MAT 180, worth at least four units each. Up to four units can be approved upper division units outside the Department of Mathematics with extensive use of mathematics.

C. Capstone Course

Choose one:

MAT 189	Advanced Problem Solving	3

(Internship in Applied Mathematics

MAT 192	Internship in Applied Mathematics	1-3

(Undergraduate Thesis)

MAT 194	Undergraduate Thesis	3

(Special Topics)

MAT 180	Special Topics	3

Plan 2: Mathematics for Secondary Teaching

A. Core

MAT 111	History of Mathematics	4
MAT 115A	Number Theory	4
MAT 127A	Real Analysis	4
MAT 127B	Real Analysis	4
MAT 127C	Real Analysis	4
MAT 135A	Probability	4
MAT 141	Euclidean Geometry	4
MAT 150A	Modern Algebra	4

B. Enrichment

Choose four:

MAT111-MAT185B, excluding MAT 180, worth at least four units each. Up to four units can be approved upper division units outside the Department of Mathematics with extensive use of mathematics.

C. Capstone Course

Choose one:

MAT 189	Advanced Problem Solving	3
MAT 192	Internship in Applied Mathematics	1-3
MAT 194	Undergraduate Thesis	3
MAT 180	Special Topics	3

Total: 82-87

Mathematics | MAT M.A.

(College of Letters and Science)

Thomas Strohmer, Ph.D., Chairperson

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Mathematics | MAT Ph.D.

(College of Letters and Science)

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Mathematics | MAT Minor

(College of Letters and Science)

Abigail Thompson, Ph.D., Chairperson

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Faculty. https://www.math.ucdavis.edu/people/faculty/

The Minor Program

Mathematics is the study of abstract structures, space, change, and the interrelations of these concepts. It also is the language of the exact sciences.

Minor Advisor. For a current list of faculty and staff advisor, contact the Student Services office at studentservices@math.ucdavis.edu, or see https://www.math.ucdavis.edu/undergrad/advising/adviser/.

Mathematics **Units:** 20

Choose upper division units in Mathematics; exclusive of:

MAT 192	Internship in Applied Mathematics	1-3
MAT 197TC	Tutoring Mathematics in the Community	1-5
MAT 198	Directed Group Study	1-5
MAT 199	Special Study for Advanced Undergraduates	1-5

Total: 20

Mathematics | MAT Courses

Note: Mathematics 016A, 016B, and 016C are intended for students who will take no more Mathematics courses. Mathematics 017A, 017B, and 017C have the same level of rigor as 016A, 016B, and 016C, yet are much more broad mathematically (containing algebra, differential equations and probability, besides traditional calculus), and are intended for biology.

Courses in MAT:

MAT 000B—Elementary Algebra (no credit) (0)
Lecture—3 hours. Not open to Concurrent student enrollment. Basic concepts of algebra, including polynomials, factoring, equations, graphs, and inequalities. Offered only if sufficient number of students enroll. (P/NP grading only.) Effective: 1997 Winter Quarter.

MAT 000C—Trigonometry (no credit) (0)
Lecture—2 hours. Not open to Concurrent student enrollment. Basic concepts of trigonometry, including trigonometric functions, identities, inverse functions, and applications. Offered only if sufficient number of students enroll. (P/NP grading only.) Effective: 1997 Winter Quarter.

MAT 000D—Intermediate Algebra (no credit) (0)
Lecture—3 hours. Not open to Concurrent student enrollment. Basic concepts of algebra, prepares student for college work in mathematics, such as course 16A or 21A. Functions, equations, graphs, logarithms, and systems of equations. Offered only if sufficient number of students enroll. (P/NP grading only.) Effective: 1997 Winter Quarter.

MAT 012—Precalculus (3)
Lecture—3 hours. Prerequisite(s): Two years of high school algebra, plane geometry, plane trigonometry; and obtaining required score on the Precalculus Diagnostic Examination. Topics selected for their use in calculus, including functions and their graphs, slope, zeroes of polynomials, exponential, logarithmic and trigonometric functions, sketching surfaces and solids. Not open for credit to students who have completed any of courses MAT 016A, MAT 016B, MAT 016C, MAT 017A, MAT 017B, MAT 017C, MAT 021A, MAT 021B, or MAT 021C with a C- or better. GE credit: QL, SE, SL. Effective: 2012 Winter Quarter.

MAT 016A—Short Calculus (3)
Lecture—3 hours. Prerequisite(s): Two years of high school algebra, plane geometry, plane trigonometry, and satisfying the Mathematics Placement Requirement. Limits; differentiation of algebraic functions; analytic geometry; applications, in particular to maxima and minima problems. Not open for credit to students who have completed MAT 017B, MAT 017C, MAT 021A, MAT 021B, or MAT 021C; only 2 units of credit to students who have completed MAT 17A. GE credit: QL, SE, SL. Effective: 2012 Winter Quarter.

MAT 016B—Short Calculus (3)
Lecture—3 hours. Prerequisite(s): MAT 016A C- or better or MAT 017A C- or better or MAT 021A C- or better or MAT 021AH C- or better Integration; calculus for trigonometric, exponential, and logarithmic functions; applications. Not open for credit to students who have completed MAT 017C, MAT 021B, or MAT 021C; only 2 units of credit to students who have completed MAT 017B. GE credit: QL, SE, SL. Effective: 2017 Winter Quarter.

MAT 016C—Short Calculus (3)
Lecture—3 hours. Prerequisite(s): MAT 016B C- or better or MAT 017B C- or better or MAT 021B C- or better or MAT 021BH C- or better Differential equations; partial derivatives; double integrals; applications; series. Not open for credit to students who have completed MAT 021C; only 2 units of credit to students who have completed MAT 017C. GE credit: QL, SE, SL. Effective: 2017 Winter Quarter.

MAT 017A—Calculus for Biology and Medicine (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Two years of high school algebra, plane geometry, plane trigonometry, and analytical geometry, and satisfying the Mathematics Placement Requirement. Introduction to differential calculus via applications in biology and medicine. Limits, derivatives of polynomials, trigonometric, and exponential functions, graphing, applications of the derivative to biology and medicine. Not open for credit to students who have completed MAT 016B, MAT 016C, MAT 021A, MAT 021B, or MAT 021C; only 2 units of credit to students who have completed MAT 016A. GE credit: QL, SE, SL. Effective: 2014 Fall Quarter.

MAT 017B—Calculus for Biology and Medicine (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016A C- or better or MAT 017A C- or better or MAT 021A C- or better or MAT 021AH C- or better Introduction to integral calculus and elementary differential equations via applications to biology and medicine. Fundamental theorem of calculus, techniques of integration including integral tables and numerical methods, improper integrals, elementary first order differential equations, applications in biology and medicine. Not open for credit to students who have completed MAT 016C, MAT 021B, or MAT 021C; only 2 units of credit for students who have completed MAT 016B. GE credit: QL, SE, SL. Effective: 2017 Winter Quarter.

MAT 017C—Calculus for Biology and Medicine (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 017B C- or better Matrix algebra, functions of several variables, partial derivatives, systems of differential equations, and applications to biology and medicine. Not open for credit to students who have completed MAT 21C; only 2 units of credit to students who have completed MAT 16C. GE credit: SE, SL. Effective: 2016 Fall Quarter.

MAT 021A—Calculus (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Two years of high school algebra, plane geometry, plane trigonometry, and analytical geometry, and satisfying the Mathematics Placement Requirement. Functions, limits, continuity. Slope and derivative. Differentiation of algebraic and transcendental functions. Applications to motion, natural growth, graphing, extrema of a function. Differentials. L'Hopital's rule. Not open for credit to students who have completed MAT 016B, MAT 016C, MAT 017B, or MAT 017C; only 2 units of credit to students who have completed MAT 016A or MAT 017A. GE credit: QL, SE, SL. Effective: 2012 Winter Quarter.

MAT 021AH—Honors Calculus (4)
Lecture/Discussion—4 hours. Prerequisite(s): A Precalculus Diagnostic Examination score significantly higher than the minimum for MAT 021A is required. More intensive treatment of material covered in course 21A. GE credit: QL, SE. Effective: 1997 Winter Quarter.

MAT 021AL—Emerging Scholars Program Calculus Workshop (2)
Workshop—6 hours. Prerequisite(s): MAT 021A (can be concurrent); MAT 021A required concurrently. Functions, limits, continuity. Slope and derivative. Same course content as course 21A. Enrollment for students in the Emerging Scholars Program by instructor's invitation only. (P/NP grading only.) GE credit: SE. Effective: 2006 Fall Quarter.

MAT 021B—Calculus (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (MAT 021A C- or better or MAT 021AH C- or better) or MAT 017A B or better Continuation of course 21A. Definition of definite integral, fundamental theorem of calculus, techniques of integration. Application to area, volume, arc length, average of a function, improper integral, surface of revolution. Only 2 units of credit to students who have completed MAT 016B, MAT 016C, MAT 017B, or MAT 017C. GE credit: QL, SE. Effective: 2017 Winter Quarter.

MAT 021BH—Honors Calculus (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021A B or better or MAT 021AH B or better More intensive treatment of material covered in course 21B. Students completing 21BH can continue with course 21CH or the regular 21C. GE credit: SE. Effective: 1997 Winter Quarter.

MAT 021BL—Emerging Scholars Program Calculus Workshop (2)
Workshop—6 hours. Prerequisite(s): MAT 021B (can be concurrent); Concurrent enrollment in MAT 021B. Continuation of course 21A. Same course content as 21B. Enrollment for students in the Emerging Scholars Program by instructor's invitation only. (P/NP grading only.) GE credit: SE. Effective: 2016 Fall Quarter.

MAT 021C—Calculus (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016C C- or better or MAT 017C C- or better or MAT 021B C- or better or MAT 021BH C- or better or MAT 017B B or better; Continuation of course 21B. Sequences, series, tests for convergence, Taylor expansions. Vector algebra, vector calculus, scalar and vector fields. Partial derivatives, total differentials. Applications to maximum and minimum problems in two or more variables. Applications to physical systems. GE credit: QL, SE. Effective: 2017 Winter Quarter.

MAT 021CH—Honors Calculus (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021B B or better or MAT 021BH B or better More intensive treatment of material covered in course 21C. GE credit: SE. Effective: 1997 Winter Quarter.

MAT 021CL—Emerging Scholars Program Calculus Workshop (2)
Workshop—6 hours. Prerequisite(s): MAT 021C (can be concurrent); Concurrent enrollment in MAT 021C. Continuation of course 21B. Same course content as course 21C. Enrollment for students in the Emerging Scholars Program by instructor's invitation only. (P/NP grading only.) GE credit: SE. Effective: 2016 Fall Quarter.

MAT 021D—Vector Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (MAT 021C C- or better or MAT 021CH C- or better) or MAT 017C B or better Continuation of course 21C. Definite integrals over plane and solid regions in various coordinate systems. Line and surface integrals. Green's theorem, Stoke's theorem, divergence theorem. GE credit: QL, SE. Effective: 2017 Winter Quarter.

MAT 021M—Accelerated Calculus (5)
Discussion/Laboratory—1 hour; Lecture/Discussion—4 hours. Prerequisite(s): Grade of B or higher in both semesters of high school calculus or a score of 4 or higher on the Advanced Placement Calculus AB exam, and obtaining the required score on the Precalculus Diagnostic Examination and its trigonometric component. Accelerated treatment of material from courses 21A and 21B, with detailed presentation of theory, definitions, and proofs, and treatment of computational aspects of calculus at a condensed but sophisticated level. Not open for credit to students who have completed MAT 021A or MAT 021B. GE credit: SE. Effective: 1997 Winter Quarter.

MAT 022A—Linear Algebra (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): MAT 016C C- or better or MAT 017C C- or better or MAT 021C C- or better or MAT 021CH C- or better; (ENG 006 or EME 005 or MAT 022AL (can be concurrent)) Matrices and linear transformations, determinants, eigenvalues, eigenvectors, diagonalization, factorization. Not open for credit to students who have completed course 67. GE credit: QL, SE. Effective: 2017 Winter Quarter.

MAT 022A—Linear Algebra (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): (MAT 016C C- or better or MAT 017C C- or better or MAT 021C C- or better or MAT 021CH C- or better); (ENG 006 or EME 005 or ECH 060 or MAT 022AL (can be concurrent)) Matrices and linear transformations, determinants, eigenvalues, eigenvectors, diagonalization, factorization. Not open for credit to students who have completed course 67. GE credit: QL, SE. Effective: 2018 Summer Session 1.

MAT 022AL—Linear Algebra Computer Laboratory (1)
Laboratory—3 hours. Prerequisite(s): MAT 016C or MAT 017C or MAT 021C or MAT 021CH Introduction to Matlab and its use in linear algebra. (P/NP grading only.) GE credit: QL, SE. Effective: 2017 Winter Quarter.

MAT 022B—Differential Equations (3)
Lecture—3 hours. Prerequisite(s): (MAT 022A C- or better or MAT 067 C- or better) Solutions of elementary differential equations. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 025—Advanced Calculus (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021C C- or better or MAT 021CH C- or better Introduction to the rigorous treatment of abstract mathematical analysis. Proofs in mathematics, induction, sets, cardinality; real number system, theory of convergence of sequences. Not open for credit to students who have completed former MAT 127A. GE credit: SE. Effective: 2017 Spring Quarter.

MAT 036—Fundamentals of Mathematics (3)
Lecture—3 hours. Prerequisite(s): Satisfaction of the Mathematics Placement Requirement. Introduction to fundamental mathematical ideas selected from the principal areas of modern mathematics. Properties of the primes, the fundamental theorems of arithmetic, properties of the rationals and irrationals, binary and other number systems. Not open for credit to students who have taken MAT 108. Effective: 2001 Winter Quarter.

MAT 067—Modern Linear Algebra (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021C C- or better or MAT 021CH C- or better Rigorous treatment of linear algebra; topics include vector spaces, bases and dimensions, orthogonal projections, eigenvalues and eigenvectors, similarity transformations, singular value decomposition and positive definiteness. Only one unit of credit to students who have completed MAT 022A. GE credit: SE. Effective: 2017 Winter Quarter.

MAT 071A—Explorations in Elementary Mathematics (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Two years of high school mathematics. Weekly explorations of mathematical ideas related to the elementary school curriculum will be carried out by cooperative learning groups. Lectures will provide background and synthesize the results of group exploration. Effective: 1997 Winter Quarter.

MAT 071B—Explorations in Elementary Mathematics (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Two years of high school mathematics. Weekly explorations of mathematical ideas related to the elementary school curriculum will be carried out by cooperative learning groups. Lectures will provide background and synthesize the results of group exploration. Effective: 1997 Winter Quarter.

MAT 089—Elementary Problem Solving (1)
Lecture—1 hour. Prerequisite(s): High school mathematics through precalculus. Solve and present solutions to challenging and interesting problems in elementary mathematics. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 2001 Winter Quarter.

MAT 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

MAT 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

MAT 108—Introduction to Abstract Mathematics (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021B A rigorous treatment of mathematical concepts with emphasis on developing the ability to understand abstract mathematical ideas, to read and write mathematical concepts, and to prove theorems. Designed to serve as preparation for the more rigorous upper division courses. GE credit: SE. Effective: 2008 Spring Quarter.

MAT 111—History of Mathematics (4) ***Review all entries***
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 025 or MAT 067 or MAT 108 or MAT 114 or MAT 115A or MAT 141 or MAT 145; One of the courses mentioned; eight units of upper division Mathematics. History of mathematics from ancient times through the development of calculus. Mathematics from Arab, Hindu, Chinese and other cultures. Selected topics from the history of modern mathematics. GE credit: SE. Effective: 2010 Fall Quarter.

MAT 111—History of Mathematics (4) ***Review all entries***
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 025 or MAT 127A or MAT 067 or MAT 108 or MAT 114 or MAT 115A or MAT 141 or MAT 145; Eight units of upper division Mathematics. History of mathematics from ancient times through the development of calculus. Mathematics from Arab, Hindu, Chinese and other cultures. Selected topics from the history of modern mathematics. GE credit: SE. Effective: 2018 Fall Quarter.

MAT 114—Convex Geometry (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021C; (MAT 022A or MAT 067) Topics selected from the theory of convex bodies, convex functions, geometric inequalities, combinatorial geometry, and integral geometry. Designed to serve as preparation for the more rigorous upper-division courses. GE credit: SE. Effective: 2007 Winter Quarter.

MAT 115A—Number Theory (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021B Divisibility and related topics, diophantine equations, selected topics from the theory of prime numbers. Designed to serve as preparation for the more rigorous upper division courses. GE credit: QL, SE. Effective: 2006 Fall Quarter.

MAT 115B—Number Theory (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 115A; (MAT 022A or MAT 067) Euler function, Moebius function, congruences, primitive roots, quadratic reciprocity law. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

MAT 116—Differential Geometry (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 021D; MAT 022B; (MAT 022A or MAT 067) Vector analysis, curves, and surfaces in three dimensions. GE credit: SE. Effective: 2017 Winter Quarter.

MAT 118A—Partial Differential Equations: Elementary Methods (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 021D; MAT 022B; (MAT 022A or MAT 067) Derivation of partial differential equations; separation of variables; equilibrium solutions and Laplace's equation; Fourier series; method of characteristics for the one dimensional wave equation. Solution of nonhomogeneous equations. GE credit: QL, SE. Effective: 2006 Fall Quarter.

MAT 118B—Partial Differential Equations: Eigenfunction Expansions (4)
Lecture—3 hours. Prerequisite(s): MAT 118A Sturm-Liouville Theory; selfadjoint operators; mixed boundary conditions; partial differential equations in two and three dimensions;
Eigenvalue problems in circular domains; nonhomogeneous problems and the method of eigenfunction expansions; Poisson's Equations. GE credit: QL, SE. Effective: 2000 Fall Quarter.

MAT 118C—Partial Differential Equations: Green's Functions and Transforms (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 118B Green's functions for one-dimensional problems and Poisson's equation; Fourier transforms; Green's Functions for time dependent problems; Laplace transform and solution of partial differential equations. GE credit: QL, SE. Effective: 2000 Fall Quarter.

MAT 119A—Ordinary Differential Equations (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 021D; MAT 022B; (MAT 022A or MAT 067) Scalar and planar autonomous systems; nonlinear systems and linearization; existence and uniqueness of solutions; matrix solution of linear systems; phase plane analysis; stability analysis; bifurcation theory; Liapunov's method; limit cycles; Poincare Bendixon theory. GE credit: QL, SE. Effective: 2007 Winter Quarter.

MAT 119B—Ordinary Differential Equations (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 119A Lorentz equations; Poincare maps; center manifolds and normal forms; scalar and planar maps; phase space analysis for iterated maps; period-doubling bifurcation; Lyapunov exponent; chaos and symbolic dynamics; strange attractors; fractals. GE credit: QL, SE. Effective: 2007 Spring Quarter.

MAT 124—Mathematical Biology (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): MAT 022B; (MAT 022A or MAT 067) Methods of mathematical modeling of biological systems including difference equations, ordinary differential equations, stochastic and dynamic programming models. Computer simulation methods applied to biological systems. Applications to population growth, cell biology, physiology, evolutionary ecology and protein clustering. MATLAB programming required. GE credit: QL, SE. Effective: 2007 Spring Quarter.

MAT 125A—Real Analysis (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 025 Functions, limits of functions, continuity and uniform continuity, sequences of functions, series of real numbers, series of functions, power series. Not open for credit to students who have completed former MAT 127B. GE credit: SE. Effective: 2006 Fall Quarter.

MAT 125B—Real Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 125A; (MAT 067 or (MAT 022A, MAT 108)) Theory of the derivative, Taylor series, integration, partial derivatives, Implicit Function Theorem. Not open for credit to students who have completed former MAT 127C. GE credit: SE. Effective: 2017 Winter Quarter.

MAT 127A—Real Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021C or MAT 021CH; MAT 067 or (MAT 022A, MAT 108) Real numbers, sequences, series, and continuous functions. Effective: 2017 Fall Quarter.

MAT 127B—Real Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 127A Derivatives, integrals, sequences of functions, and power series. Effective: 2017 Fall Quarter.

MAT 127C—Real Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 127B Metric spaces and multi-variable calculus. Effective: 2017 Fall Quarter.

MAT 128A—Numerical Analysis (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): MAT 021C; ECS 030 Error analysis, approximation, interpolation, numerical differentiation and integration. Programming in language such as Pascal, Fortran, or BASIC required. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 128B—Numerical Analysis in Solution of Equations (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): MAT 021C; (MAT 022A or MAT 067); ECS 030 Solution of nonlinear equations and nonlinear systems. Minimization of functions of several variables. Simultaneous linear equations. Eigenvalue problems. Linear programming. Programming in language such as Pascal, Fortran, or BASIC required. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 128C—Numerical Analysis in Differential Equations (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): MAT 022B; (MAT 022A or MAT 067); ECS 030 Difference equations, operators, numerical solutions of ordinary and partial differential equations. Programming in language such as Pascal, Fortran, or BASIC required. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 129—Fourier Analysis (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 021D; MAT 022B; (MAT 022A or MAT 067); MAT 025 Fourier series and integrals, orthogonal sets of functions. Topics selected from trigonometric approximation, orthogonal polynomials, applications to signal and image processing, numerical analysis, and differential equations. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 133—Mathematical Finance (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): (MAT 067 or (MAT 022A, MAT 108)), MAT 135A Analysis and evaluation of deterministic and random cash flow streams, yield and pricing of basic financial instruments, interest rate theory, mean-variance portfolio theory, capital asset pricing models, utility functions and general principles. MATLAB programming required. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

MAT 135A—Probability (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021C; (MAT 108 or MAT 025) Probability space; discrete probability, combinatorial analysis; independence, conditional probability; random variables, discrete and continuous distributions, probability mass function, joint and marginal density functions; expectation, moments, variance, Chebyshev inequality; sums of random variables, random walk, large number law, central limit theorem. Not open for credit to students who have completed former MAT 131. GE credit: SE. Effective: 2018 Spring Quarter.

MAT 135B—Stochastic Processes (4)
Discussion/Laboratory—4 hours. Prerequisite(s): MAT 135A; (MAT 022A or MAT 067) Generating functions, branching processes, characteristic function; Markov chains; convergence of random variables, law of iterated logarithm; random processes, Brownian motion, stationary processes, renewal processes, queueing theory, martingales. Not open for credit to students who have completed former MAT 132A. GE credit: QL, SE. Effective: 2009 Spring Quarter.

MAT 141—Euclidean Geometry (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021B; (MAT 022A or MAT 067) Axiomatic and analytic examination of Euclidean geometry from an advanced point of view. In particular, a discussion of its relation to other geometries. Designed to serve as preparation for the more rigorous upper division courses. GE credit: SE. Effective: 2018 Winter Quarter.

MAT 145—Combinatorics (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021C Combinatorial methods using basic graph theory, counting methods, generating functions, and recurrence relations. Designed to serve as preparation for the more rigorous upper division courses. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 146—Algebraic Combinatorics (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): MAT 145; MAT 025; (MAT 022A or MAT 067) Enumeration, Polya theory, generating functions, current topics in algebraic combinatorics. Not open for credit to students who have completed former course 149A. GE credit: SE. Effective: 2007 Spring Quarter.

MAT 146—Algebraic Combinatorics (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): ((MAT 022A, MAT 108) or MAT 067)); MAT 145 Enumeration, Polya theory, generating functions, current topics in algebraic combinatorics. Not open for credit to students who have completed former MAT 149A. GE credit: SE. Effective: 2018 Fall Quarter.

MAT 147—Topology (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 025 Basic notions of point-set and combinatorial topology. GE credit: SE. Effective: 2016 Fall Quarter.

MAT 148—Discrete Mathematics (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 067 or (MAT 022A, MAT 108) Coding theory, error correcting codes, finite fields and the algebraic concepts needed in their development. Not open for credit to students who have completed former MAT 149B. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 150A—Modern Algebra (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 067 or (MAT 022A, MAT 108) Basic concepts of groups, symmetries of the plane. Emphasis on the techniques used in the proof of the ideas (Lemmas, Theorems, etc.) developing these concepts. Precise thinking, proof writing, and the ability to deal with abstraction. GE credit: SE. Effective: 2016 Fall Quarter.

MAT 150B—Modern Algebra (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 150A Bilinear forms, rings, factorization, modules. GE credit: SE. Effective: 2007 Winter Quarter.

MAT 150C—Modern Algebra (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 150B Group representations, fields, Galois theory. GE credit: SE. Effective: 2007 Spring Quarter.

MAT 160—Mathematics for Data Analytics and Decision Making (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): MAT 167 Relational model; relational algebra, relational calculus, normal forms, functional and multivalued dependencies, separability. Cost benefit analysis of physical database design and reorganization. Performance via analytical modeling, simulation, and queueing theory. Block accesses; buffering; operating system contention; CPU intensive operations. GE credit: SE. Effective: 2018 Spring Quarter.

MAT 165—Mathematics and Computers (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): MAT 022A or MAT 067; (MAT 025 or MAT 108 or MAT 114 or MAT 115A or MAT 145) Introduction to computational mathematics, symbolic computation, and computer generated/verified proofs in algebra, analysis and geometry. Investigation of rigorous new mathematics developed in conjunction with modern computational questions and the role that computers play in mathematical conjecture and experimentation. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 167—Applied Linear Algebra (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 022A or MAT 067 Applications of linear algebra; LU and QR matrix factorizations, eigenvalue and singular value matrix decompositions. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 168—Optimization (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 021C; ((MAT 022A, MAT 108) or MAT 067) Linear programming, simplex method. Basic properties of unconstrained nonlinear problems, descent methods, conjugate direction method. Constrained minimization. Programming language required. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 180—Special Topics (3)
Lecture—3 hours. Prerequisite(s): MAT 025; (MAT 067 or (MAT 022A, MAT 108)) Special topics from various fields of modern, pure, and applied mathematics. Some recent topics include Knot Theory, General Relativity, and Fuzzy Sets. May be repeated for credit when topics differs. GE credit: SE. Effective: 2016 Fall Quarter.

MAT 185A—Complex Analysis (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): (MAT 067 or (MAT 022A, MAT 108)), MAT 125A Complex number system, analyticity and the Cauchy-Riemann equations, elementary functions, complex integration, power and Laurent series expansions, residue theory. GE credit: SE. Effective: 2016 Fall Quarter.

MAT 185B—Complex Analysis (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 185A Analytical functions, elementary functions and their mapping properties, applications of Cauchy's integral theorem, conformal mapping and applications to heat flow and fluid mechanics. GE credit: SE. Effective: 2007 Spring Quarter.

MAT 189—Advanced Problem Solving (3)
Lecture—3 hours. Prerequisite(s): MAT 025; ((MAT 022A, MAT 108) or MAT 067) Solution and presentation of advanced problem solving techniques. Solve and present interesting and challenging problems of all areas of mathematics. GE credit: OL, QL, SE, WE. Effective: 2016 Fall Quarter.

MAT 192—Internship in Applied Mathematics (1-3)
Internship. Prerequisite(s): Consent of Instructor. Supervised work experience in applied mathematics. Final report. May be repeated up to 10 unit(s). (P/NP grading only.) Effective: 2016 Fall Quarter.

MAT 194—Undergraduate Thesis (3)
Independent Study. Prerequisite(s): Consent of Instructor. Independent research under supervision of a faculty member. Student will submit written report in thesis form. May be repeated for credit with consent of Vice Chairperson. (P/NP grading only.) GE credit: SE. Effective: 2016 Fall Quarter.

MAT 197TC—Tutoring Mathematics in the Community (1-5)
Laboratory—2-6 hours; Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. Special projects in mathematical education developing techniques for mathematics instruction and tutoring on an individual or small group basis. May be repeated once for credit. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 2016 Fall Quarter.

MAT 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2016 Fall Quarter.

MAT 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

MAT 200A—Problem-Solving in Analysis (1)
Extensive Problem Solving; Lecture—1 hour. Prerequisite(s): MAT 201A; MAT 201B; MAT 201C Problem-solving in graduate analysis: continuous functions, metric spaces, Banach and Hilbert spaces, bounded linear operators, the spectral theorem, distributions, Fourier series and transforms, Lp spaces, Sobolev spaces. May be repeated up to 2 time(s). Effective: 2010 Spring Quarter.

MAT 200B—Problem-Solving in Analysis (2)
Extensive Problem Solving; Lecture—1 hour. Prerequisite(s): MAT 201A; MAT 201B; MAT 201C Problem-solving in graduate analysis: continuous functions, metric spaces, Banach and Hilbert spaces, bounded linear operators, the spectral theorem, distributions, Fourier series and transforms, Lp spaces, Sobolev spaces. May be repeated up to 2 time(s). Effective: 2010 Fall Quarter.

MAT 201A—Analysis (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing in Mathematics or Applied Mathematics, or consent of instructor. Metric and normed spaces. Continuous functions. Topological, Hilbert, and Banach spaces. Fourier series. Spectrum of bounded and compact linear operators. Linear differential operators and Green's functions. Distributions. Fourier transform. Measure theory. Lp and Sobolev spaces. Differential calculus and variational methods. Effective: 2004 Fall Quarter.

MAT 201B—Analysis (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing in Mathematics or Applied Mathematics, or consent of instructor. Metric and normed spaces. Continuous functions. Topological, Hilbert, and Banach spaces. Fourier series. Spectrum of bounded and compact linear operators. Linear differential operators and Green's functions. Distributions. Fourier transform. Measure theory. Lp and Sobolev spaces. Differential calculus and variational methods. Effective: 2005 Winter Quarter.

MAT 201C—Analysis (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing in Mathematics or Applied Mathematics, or consent of instructor. Metric and normed spaces. Continuous functions. Topological, Hilbert, and Banach spaces. Fourier series. Spectrum of bounded and compact linear operators. Linear differential operators and Green's functions. Distributions. Fourier transform. Measure theory. Lp and Sobolev spaces. Differential calculus and variational methods. Effective: 2005 Spring Quarter.

MAT 202—Functional Analysis (4)
Lecture—3 hours; Term Paper. Prerequisite(s): MAT 201A; MAT 201B Hahn-Banach, Open mapping, Closed graph, Banach-Steinhaus, and Krein-Milman. Subspaces and quotient spaces. Projections. Weak and weak-star topologies. Compact and adjoint operators in Banach spaces. Fredholm theory. Functions of operators. Spectral theory of self-adjoint operators. Effective: 2009 Winter Quarter.

MAT 205—Complex Analysis (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 185A; Or equivalent to MAT 185A, or consent of instructor. Analytic continuation, Riemann surfaces, conformal mappings, Riemann mapping theorem, entire functions, special functions, elliptic functions. Effective: 2009 Spring Quarter.

MAT 205A—Complex Analysis (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 185A; Or equivalent to MAT 185A, or consent of instructor. Cauchy's theorem, Cauchy's integral formulas, meromorphic functions, complex logarithm, entire functions, Weierstrass infinite product formula, the gamma and zeta functions, and prime number theorem. No credit given to students who have completed MAT 205. Effective: 2011 Fall Quarter.

MAT 205B—Complex Analysis (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 205A; or Consent of Instructor. Conformal mappings, the Schwarz lemma, analytic automorphisms, the Riemann mapping theorem, elliptic functions, Eisenstein series, the Jacobi theta functions, asymptotics, Bessel functions, the Airy function, topics on special functions and Riemann surfaces. May be repeated up to 2 time(s) if topic varies. Effective: 2011 Spring Quarter.

MAT 206—Measure Theory (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 125B Introduction to measure theory. The study of lengths, surface areas, and volumes in general spaces, as related to integration theory. Effective: 2007 Spring Quarter.

MAT 207A—Methods of Applied Mathematics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Ordinary differential equations and dynamical systems. Variational principles. Eigenfunctions, integral equations and Green's functions. Complex analysis and contour integration. Laplace's equation. Diffusion equations. Wave phenomena. Dimensional analysis and scaling. Asymptotic expansions and perturbation theory. Stochastic processes and Brownian motion. Effective: 2010 Fall Quarter.

MAT 207B—Methods of Applied Mathematics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Ordinary differential equations and dynamical systems. Variational principles. Eigenfunctions, integral equations and Green's functions. Complex analysis and contour integration. Laplace's equation. Diffusion equations. Wave phenomena. Dimensional analysis and scaling. Asymptotic expansions and perturbation theory. Stochastic processes and Brownian motion. Effective: 2011 Winter Quarter.

MAT 207C—Methods of Applied Mathematics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Ordinary differential equations and dynamical systems. Variational principles. Eigenfunctions, integral equations and Green's functions. Complex analysis and contour integration. Laplace's equation. Diffusion equations. Wave phenomena. Dimensional analysis and scaling. Asymptotic expansions and perturbation theory. Stochastic processes and Brownian motion. Effective: 2011 Spring Quarter.

MAT 215A—Topology (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Fundamental group and covering space theory. Homology and cohomology. Manifolds and duality. CW complexes. Fixed point theorems. Effective: 2002 Fall Quarter.

MAT 215B—Topology (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Fundamental group and covering space theory. Homology and cohomology. Manifolds and duality. CW complexes. Fixed point theorems. Effective: 2002 Fall Quarter.

MAT 215C—Topology (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Fundamental group and covering space theory. Homology and cohomology. Manifolds and duality. CW complexes. Fixed point theorems. Effective: 2002 Fall Quarter.

MAT 216—Geometric Topology (4)
Extensive Problem Solving—1 hour; Lecture—3 hours. Prerequisite(s): MAT 215A Topology of two- and three-dimensional manifolds. Surfaces and their diffeomorphisms. Dehn twists. Heegaard surfaces. Theory of 3-dimensional manifolds. Knots and knot theory. Hyperbolic manifolds and geometric structures. <p> May be repeated up to 1 time(s). Effective: 2010 Spring Quarter.

MAT 218A—Partial Differential Equations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 201A; MAT 201B; MAT 201C; or Consent of Instructor. Year-long sequence on PDEs which covers linear transport, Laplace, heat, and wave equations, maximum principles, method of characteristics, Sobelev and Hölder space theory, weak derivatives, semilinear, quasilinear, and fully nonlinear elliptic/parabolic equations, nonlinear hyperbolic equations, and compensated compactness. Effective: 2009 Fall Quarter.

MAT 218B—Partial Differential Equations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 218A; or Consent of Instructor. Year-long sequence on PDEs which covers linear transport, Laplace, heat, and wave equations, maximum principles, method of characteristics, Sobelev and Hölder space theory, weak derivatives, semilinear, quasilinear, and fully nonlinear elliptic/parabolic equations, nonlinear hyperbolic equations, and compensated compactness. Effective: 2010 Winter Quarter.

MAT 218C—Partial Differential Equations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 218B; or Consent of Instructor. Year-long sequence on PDEs which covers linear transport, Laplace, heat, and wave equations, maximum principles, method of characteristics, Sobelev and Hölder space theory, weak derivatives, semilinear, quasilinear, and fully nonlinear elliptic/parabolic equations, nonlinear hyperbolic equations, and compensated compactness. Effective: 2010 Spring Quarter.

MAT 221A—Mathematical Fluid Dynamics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 118B; or Consent of Instructor. Kinematics and dynamics of fluids. The Euler and Navier-Stokes equations. Vorticity dynamics. Irrotational flow. Low Reynolds number flows and the Stokes equations. High Reynolds number flows and boundary layers. Compressible fluids. Shock waves. Effective: 2002 Fall Quarter.

MAT 221B—Mathematical Fluid Dynamics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 118B; or Consent of Instructor. Kinematics and dynamics of fluids. The Euler and Navier-Stokes equations. Vorticity dynamics. Irrotational flow. Low Reynolds number flows and the Stokes equations. High Reynolds number flows and boundary layers. Compressible fluids. Shock waves. Effective: 2003 Winter Quarter.

MAT 226A—Numerical Methods: Fundamentals (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 128A; MAT 128B; Or equivalent, or consent of instructor; familiarity with some programming language. Fundamental principles and methods in numerical analysis, including the concepts of stability of algorithms and conditioning of numerical problems, numerical methods for interpolation and integration, eigenvalue problems, singular value decomposition and its applications. Effective: 2009 Fall Quarter.

MAT 226B—Numerical Methods: Large-Scale Matrix Computations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 167; Or equivalent, or consent of instructor; familiarity with some programming language. Numerical methods for large-scale matrix computations, including direct and iterative methods for the solution of linear systems, the computation of eigenvalues and singular values, the solution of least-squares problems, matrix compression, methods for the solution of linear programs. Effective: 2010 Winter Quarter.

MAT 226C—Numerical Methods: Ordinary Differential Equations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 022B; Or equivalent, or consent of instructor; familiarity with some programming language. Numerical methods for the solution of ordinary differential equations, including methods for initial-value problems and two-point boundary-value problems, theory of and methods for differential algebraic equations, dimension reduction of large-scale dynamical systems. Effective: 2010 Spring Quarter.

MAT 227—Mathematical Biology (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Nonlinear ordinary and partial differential equations and stochastic processes of cell and molecular biology. Scaling, qualitative, and numerical analysis of mathematical models. Applications to nerve impulse, chemotaxis, muscle contraction, and morphogenesis. Effective: 2002 Fall Quarter.

MAT 228A—Numerical Solution of Differential Equations (4)
Discussion; Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 128C Numerical solutions of initial-value, eigenvalue and boundary-value problems for ordinary differential equations. Numerical solution of parabolic and hyperbolic partial differential equations. Effective: 1998 Fall Quarter.

MAT 228B—Numerical Solution of Differential Equations (4)
Discussion; Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 128C Numerical solutions of initial-value, eigenvalue and boundary-value problems for ordinary differential equations. Numerical solution of parabolic and hyperbolic partial differential equations. Effective: 1998 Fall Quarter.

MAT 228C—Numerical Solution of Differential Equations (4)
Discussion; Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 128C Numerical solutions of initial-value, eigenvalue and boundary-value problems for ordinary differential equations. Numerical solution of parabolic and hyperbolic partial differential equations. Effective: 1998 Fall Quarter.

MAT 235A—Probability Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 125B; (MAT 135A or STA 131A); or Consent of Instructor. Measure-theoretic foundations, abstract integration, independence, laws of large numbers, characteristic functions, central limit theorems. Weak convergence in metric spaces, Brownian motion, invariance principle. Conditional expectation. Topics selected from: martingales, Markov chains, ergodic theory. (Statistics 235A.) Effective: 2007 Fall Quarter.

MAT 235B—Probability Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 235A or STA 235A; or Consent of Instructor. Measure-theoretic foundations, abstract integration, independence, laws of large numbers, characteristic functions, central limit theorems. Weak convergence in metric spaces, Brownian motion, invariance principle. Conditional expectation. Topics selected from: martingales, Markov chains, ergodic theory. (Statistics 235B.) Effective: 2008 Spring Quarter.

MAT 235C—Probability Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 235B or STA 235B; or Consent of Instructor. Measure-theoretic foundations, abstract integration, independence, laws of large numbers, characteristic functions, central limit theorems. Weak convergence in metric spaces, Brownian motion, invariance principle. Conditional expectation. Topics selected from: martingales, Markov chains, ergodic theory. (Statistics 235C.) Effective: 2008 Spring Quarter.

MAT 236A—Stochastic Dynamics and Applications (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 201C or (MAT 235B or STA 235B); MAT 235A, MAT 235B, MAT 235C/ STA 235A, STA 235B, STA 235C recommended. Stochastic processes, Brownian motion, Stochastic integration, martingales, stochastic differential equations. Diffusions, connections with partial differential equations, mathematical finance. Effective: 2002 Fall Quarter.

MAT 236B—Stochastic Dynamics and Applications (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 201C or (MAT 235B or STA 235B); MAT 235A, MAT 235B, MAT 235C/ STA 235A, STA 235B, STA 235C recommended. Stochastic processes, Brownian motion, Stochastic integration, martingales, stochastic differential equations. Diffusions, connections with partial differential equations, mathematical finance. Effective: 2002 Fall Quarter.

MAT 239—Differential Topology (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 201A; or Consent of Instructor. Vector calculus, point-set topology; MAT 250A and MAT 250B is highly recommended. Topics include: differentiable manifolds, vector fields, transversality, Sard's theorem, examples of differentiable manifolds; orientation, intersection theory, index of vector fields; differential forms, integration, Stokes' theorm, deRham cohomology; Morse functions, Morse lemma, index of critical points. Effective: 2007 Spring Quarter.

MAT 240A—Differential Geometry (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 201A; MAT 239; MAT 250A and MAT 250B highly recommended; intended primarily for second-year graduate students. Riemannian metrics, connections, geodesics, Gauss lemma, convex neighborhoods, curvature tensor, Ricci and scalar curvature, connections and curvature on vector bundles. Effective: 2008 Fall Quarter.

MAT 240B—Differential Geometry (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 240A; Intended primarily for second-year graduate students. Jacobi fields, conjugate points, completeness, Hopf-Rinow theorem, Cartan-Hadamard theorem, energy, variation theorems and their applications, Rauch comparison theorem and its applications. Effective: 2009 Winter Quarter.

MAT 245—Enumerative Combinatorics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 145; MAT 150; or the equivalent, or consent of instructor. Introduction to modern combinatorics and its applications. Emphasis on enumerative aspects of combinatorial theory. Effective: 2004 Fall Quarter.

MAT 246—Algebraic Combinatorics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 245; or Consent of Instructor. Algebraic and geometric aspects of combinatorics. The use of structures such as groups, polytopes, rings, and simplicial complexes to solve combinatorial problems. Effective: 2005 Winter Quarter.

MAT 248A—Algebraic Geometry (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 250A; MAT 250B; MAT 250C Affine varieties and radical ideals. Projective varieties. Abstract varieties. Morphisms and rational maps. Smoothness. Algebraic curves and the Riemann-Roch theorem. Special topics. Effective: 2009 Fall Quarter.

MAT 248B—Algebraic Geometry (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 248A Complex varieties and the analytic topology. Sheaves and schemes.
Fiber products. Separatedness and properness. Applications of scheme
theory. Effective: 2010 Winter Quarter.

MAT 249A—Problem-Solving in Algebra (1)
Extensive Problem Solving; Lecture—1 hour. Prerequisite(s): MAT 250A; MAT 250B Problem-solving in graduate algebra: groups, rings, modules, matrices, tensor products, representations, Galois theory, ring extensions, commutative algebra and homological algebra. May be repeated up to 2 time(s). Effective: 2011 Spring Quarter.

MAT 249B—Problem-Solving in Algebra (2)
Extensive Problem Solving; Lecture—1 hour. Prerequisite(s): MAT 250A; MAT 250B Problem-solving in graduate algebra: groups, rings, modules, matrices, tensor products, representations, Galois theory, ring extensions, commutative algebra and homological algebra. May be repeated up to 2 time(s). Effective: 2011 Fall Quarter.

MAT 250A—Algebra (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing in mathematics or consent of instructor. Group and rings. Sylow theorems, abelian groups, Jordan-Holder theorem. Rings, unique factorization. Algebras, and modules. Fields and vector spaces over fields. Field extensions. Commutative rings. Representation theory and its applications. Effective: 2002 Fall Quarter.

MAT 250B—Algebra (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing in mathematics or consent of instructor. Group and rings. Sylow theorems, abelian groups, Jordan-Holder theorem. Rings, unique factorization. Algebras, and modules. Fields and vector spaces over fields. Field extensions. Commutative rings. Representation theory and its applications. Effective: 2002 Fall Quarter.

MAT 250C—Algebra (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing in mathematics or consent of instructor. Group and rings. Sylow theorems, abelian groups, Jordan-Holder theorem. Rings, unique factorization. Algebras, and modules. Fields and vector spaces over fields. Field extensions. Commutative rings. Representation theory and its applications. Effective: 2002 Fall Quarter.

MAT 258A—Numerical Optimization (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 025; MAT 167 Numerical methods for infinite dimensional optimization problems. Newton and Quasi-Newton methods, linear and sequential quadratic programming, barrier methods; large-scale optimization; theory of approximations; infinite and semi-infinite programming; applications to optimal control, stochastic optimization and distributed systems. Effective: 2007 Fall Quarter.

MAT 258B—Discrete and Mixed-Integer Optimization (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 025; MAT 167; or Consent of Instructor. Combinatorial, integer, and mixed-integer linear optimization problems. Ideal and strong formulations, cutting planes, branch and cut, decomposition methods. Effective: 2014 Fall Quarter.

MAT 261A—Lie groups and their representations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 215A; MAT 240A; MAT 250A; MAT 250B; Or the equivalent, or consent of instructor. Lie groups and Lie algebras. Classification of semi-simple Lie groups. Classical and compact Lie groups. Representations of Lie groups and Lie algebras. Root systems, weights, Weil character formula. Kac-Moody and Virasoro algebras. Applications. Effective: 2002 Fall Quarter.

MAT 261B—Lie groups and their representations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 215A; MAT 240A; MAT 250A; MAT 250B; Or the equivalent, or consent of instructor. Lie groups and Lie algebras. Classification of semi-simple Lie groups. Classical and compact Lie groups. Representations of Lie groups and Lie algebras. Root systems, weights, Weil character formula. Kac-Moody and Virasoro algebras. Applications. Effective: 2002 Fall Quarter.

MAT 265—Mathematical Quantum Mechanics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 201; or Consent of Instructor. Mathematical foundations of quantum mechanics: the Hilbert space and Operator Algebra formulations; the Schrödinger and Heisenberg equations, symmetry in quantum mechanics, basics of spectral theory and perturbation theory. Applications to atoms and molecules. The Dirac equation. Effective: 2003 Fall Quarter.

MAT 266—Mathematical Statistical Mechanics and Quantum Field Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 265; or Consent of Instructor. Mathematical principles of statistical mechanics and quantum field theory. Topics include classical and quantum lattice systems, variational principles, spontaneous symmetry breaking and phase transitions, second quantization and Fock space, and fundamentals of quantum field theory. May be repeated up to 1 time(s). Effective: 2010 Spring Quarter.

MAT 271—Applied and Computational Harmonic Analysis (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): (MAT 125B or MAT 201C); (MAT 128B or MAT 167); MAT 129; Or the equivalent, or consent of instructor. Introduction to mathematical basic building blocks (wavelets, local Fourier basis, and their relatives) useful for diverse fields (signal and image processing, numerical analysis, and statistics). Emphasis on the connection between the continuum and the discrete worlds. Effective: 2007 Fall Quarter.

MAT 280—Topics in Pure and Applied Mathematics (3)
Lecture—3 hours. Prerequisite(s): Graduate standing. Special topics in various fields of pure and applied mathematics. Topics selected based on the mutual interests of students and faculty. May be repeated for credit when topic differs. May be repeated for credit May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

MAT 290—Seminar (1-6)
Seminar—1-6 hours. Advanced study in various fields of mathematics, including analysis, applied mathematics, discrete mathematics, geometry, mathematical biology, mathematical physics, optimization, partial differential equations, probability, and topology. May be repeated for credit. (S/U grading only.) Effective: 2003 Spring Quarter.

MAT 298—Group Study (1-5)
Variable. Effective: 1997 Winter Quarter.

MAT 299—Individual Study (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

MAT 299D—Dissertation Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

MAT 301A—Mathematics Teaching Practicum (3)
Discussion—1 hour; Fieldwork—5 hours. Prerequisite(s): MAT 302A (can be concurrent); MAT 303A (can be concurrent); MAT 302A and MAT 303A required concurrently or consent of instructor. Specialist training in mathematics teaching. Teaching, training, and cross observing classes taught using large group Socratic techniques, small group guided inquiry experiences, and/or other approaches to teaching at various grade levels. Required for advanced degrees in mathematics education. May be repeated up to 1 time(s). Effective: 2001 Fall Quarter.

MAT 301B—Mathematics Teaching Practicum (3)
Discussion—1 hour; Fieldwork—5 hours. Prerequisite(s): MAT 302B (can be concurrent); MAT 303B (can be concurrent); MAT 302B and MAT 303B required concurrently or consent of instructor. Specialist training in mathematics teaching. Teaching, training, and cross observing classes taught using large group Socratic techniques, small group guided inquiry experiences, and/or other approaches to teaching at various grade levels. Required for advanced degrees in mathematics education. May be repeated up to 1 time(s). Effective: 2002 Winter Quarter.

MAT 301C—Mathematics Teaching Practicum (3)
Discussion—1 hour; Fieldwork—5 hours. Prerequisite(s): MAT 302C (can be concurrent); MAT 303B (can be concurrent); MAT 302C and MAT 303C required concurrently or consent of instructor. Specialist training in mathematics teaching. Teaching, training, and cross observing classes taught using large group Socratic techniques, small group guided inquiry experiences, and/or other approaches to teaching at various grade levels. Required for advanced degrees in mathematics education. May be repeated up to 1 time(s). Effective: 2002 Spring Quarter.

MAT 302A—Curriculum Development in Mathematics (1)
Lecture/Discussion—1 hour. Prerequisite(s): MAT 303A (can be concurrent); MAT 303A required concurrently or consent of instructor. Mathematics curriculum development for all grade levels. Required for advanced degrees in mathematics education. May be repeated up to 1 time(s). Effective: 2001 Fall Quarter.

MAT 302B—Curriculum Development in Mathematics (1)
Lecture/Discussion—1 hour. Prerequisite(s): MAT 303B (can be concurrent); MAT 303B required concurrently or consent of instructor. Mathematics curriculum development for all grade levels. Required for advanced degrees in mathematics education. May be repeated up to 1 time(s). Effective: 2002 Winter Quarter.

MAT 302C—Curriculum Development in Mathematics (1)
Lecture/Discussion—1 hour. Prerequisite(s): MAT 303C (can be concurrent); MAT 303C required concurrently or consent of instructor. Mathematics curriculum development for all grade levels. Required for advanced degrees in mathematics education. May be repeated for credit. Effective: 2002 Spring Quarter.

MAT 303A—Mathematics Pedagogy (1)
Lecture/Discussion—1 hour. Prerequisite(s): MAT 302A (can be concurrent) or MAT 210AL (can be concurrent); MAT 302A or MAT 210AL required concurrently or consent of instructor. An investigation of the interplay of mathematical pedagogy and mathematical content, including a historical survey of past and present methods in view of some of the influences that shaped their development. May be repeated up to 1 time(s). Effective: 2001 Fall Quarter.

MAT 303B—Mathematics Pedagogy (1)
Lecture/Discussion—1 hour. Prerequisite(s): MAT 302B (can be concurrent) or MAT 210BL (can be concurrent); MAT 302A or MAT 210AL required concurrently or consent of instructor. An investigation of the interplay of mathematical pedagogy and mathematical content, including a historical survey of past and present methods in view of some of the influences that shaped their development. May be repeated up to 1 time(s). Effective: 2002 Winter Quarter.

MAT 303C—Mathematics Pedagogy (1)
Lecture/Discussion—1 hour. Prerequisite(s): MAT 302C (can be concurrent) or MAT 210CL (can be concurrent); MAT 302C or MAT 210CL required concurrently or consent of instructor. An investigation of the interplay of mathematical pedagogy and mathematical content, including a historical survey of past and present methods in view of some of the influences that shaped their development. May be repeated up to 1 time(s). Effective: 2002 Spring Quarter.

MAT 390—Teaching Assistantship Training (3)
Lecture—3 hours. Prerequisite(s): Graduate standing in the Department of Mathematics. Experience in methods of assisting and teaching of mathematics at the university level. Includes discussion of lecturing techniques, running discussion sessions, holding office hours, preparing and grading of examinations, student-teacher interaction, and related topics. Required of departmental teaching assistants. (S/U grading only.) Effective: 2008 Fall Quarter.

MAT 399—Individual Study (2-4)
Discussion—1 hour; Independent Study—2-3 hours. Individual study of some aspect of mathematics education or a focused work on a curriculum design project under supervision of a faculty member in mathematics. May be repeated up to 1 time(s). (S/U grading only.) Effective: 2002 Spring Quarter.

Mechanical & Aerospace Engineering; Engineering

Mechanical & Aerospace Engineering; Engineering | MAE Information

(College of Engineering)

Stephen K. Robinson, Ph.D., Chairperson of the Department

Benjamin D. Shaw, Ph.D., Vice Chairperson for Undergraduate Studies

Department Office. 2132 Bainer Hall; 530-752-0580; Fax 530-752-4158; http://mae.ucdavis.edu

Faculty. http://mae.ucdavis.edu/people/faculty/

Mechanical & Aerospace Engineering; Engineering | MAE M.S.

(College of Engineering)

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The defining element of graduate study in the Mechanical and Aerospace Engineering Program is interdisciplinary design. Research within this graduate program advances design in diverse fields such as vehicles, plasma MHD propulsion, biomechanics, aerostructures, sensors, combustion, and energy systems. Graduate students acquire skills both to address fundamental issues in these

areas and to design complex, multi-component systems. The highly collaborative environment fosters multidisciplinary research while drawing on the study of mathematics, experimental and space plasma science, electrical engineering, materials science, materials modeling, molecular dynamics and numerical analysis, bioengineering, space physics, and nanotechnology in addition to the core areas. Recruiters from industry are active here, knowing that, in addition to having hands-on design experience, our students are well grounded in engineering fundamentals. They study with professors who "wrote the book" on their discipline, and work on design projects with researchers who are international authorities in their field. Our graduate students are able to work closely with faculty in a friendly but demanding environment where teamwork and faculty mentoring are important, as is the cross-disciplinary, collaborative culture that is unique to UC Davis.

Research Highlights:

- Aeronautics and aerostructures
- Spacecraft design and operation
- Space environmental studies
- Remote sensing
- Electrical propulsion
- Flight dynamics and control
- Computational fluid dynamics
- Experimental MHD turbulence studies
- Dynamic systems and controls
- Robotics
- Materials modeling
- Manufacturing and Mechanical design
- Reacting flows
- Heat transfer
- Automotive system dynamics
- Biosensors/Microelectromechanical Systems (MEMS)
- Molecular self-assembly
- Radiation effects in solids
- Nonlinear dynamics and phase-locking
- Biofluid mechanics
- Biosolid mechanics
- Sports biomechanics
- Energy Systems/Fuel Cell/Hybrid Vehicle Technology
- High energy density science and applications
- Nuclear fusion energy
- Wind energy

Research Facilities and Partnerships:

- Center for Computational Fluid Dynamics
- Institute of Transportation Studies
- Center for Advanced Highway Maintenance and Construction Technology
- GATE Center for Hybrid Electric Vehicles
- Aeronautical Wind Tunnel Facility

Complete Information on our website at http://mae.ucdavis.edu/graduate/.

Mechanical & Aerospace Engineering; Engineering | MAE Ph.D.

(College of Engineering)

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- Biofluid mechanics
- Biosolid mechanics
- Sports biomechanics
- Energy Systems/Fuel Cell/Hybrid Vehicle Technology
- High energy density science and applications
- Nuclear fusion energy
- Wind energy

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Mechanical & Aerospace Engineering; Engineering | EME Courses

Courses in EME:

EME 001—Mechanical Engineering (1)
Lecture—1 hour. Description of the field of mechanical engineering with examples taken from industrial applications, discussions of the practice with respect to engineering principles, ethics, and responsibilities. (P/NP grading only.) Effective: 2001 Fall Quarter.

EME 005—Computer Programming for Engineering Applications (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016A (can be concurrent) or MAT 021A (can be concurrent) Structured programming in C for solving problems in engineering. Introduction to MATLAB and comparison study of C/C++ with MATLAB. GE credit: SE. Effective: 2017 Fall Quarter.

EME 050—Manufacturing Processes (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): ENG 004 C- or better; PHY 009A C- or better Restricted to Mechanical Engineering and Mechanical Engineering/Materials Science Engineering majors. Modern manufacturing methods, safety, manufacturing instructions, computer-aided manufacturing and their role in the engineering design and development process. GE credit: SE. Effective: 2017 Fall Quarter.

EME 092—Internship in Mechanical Engineering (1-5)
Internship. Prerequisite(s): Lower division standing; approval of project prior to period of internship. Supervised work-study experience in engineering. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

EME 097TC—Mentoring and Tutoring Engineering in the Community (1-4)
Variable—3-12 hours. Prerequisite(s): Consent of Instructor. Mentoring, coaching, tutoring and/or supervision of students in K-12 schools in Engineering-related topics. May be repeated for credit. (P/NP grading only.) Effective: 2012 Fall Quarter.

EME 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

EME 106—Thermo-Fluid Dynamics (4)
Lecture—4 hours. Prerequisite(s): ENG 103 C- or better; ENG 105 C- or better Restricted to Mechanical Engineering, Aerospace Science and Engineering, and Mechanical Engineering/Materials Science Engineering majors. Inviscid incompressible flow, compressible flow, ideal gas mixtures, psychrometrics, reacting mixtures and combustion. GE credit: SE. Effective: 2013 Winter Quarter.

EME 108—Measurement Systems (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): ENG 100 C- or better; ENG 102 C- or better; ENG 104 recommended. Restricted to Mechanical Engineering, Aerospace Science & Engineering and Mechanical/Materials Science & Engineering. Experiments to illustrate principles of mechanical systems. Signal analysis; Demonstration of basic sensors for mechanical systems; Experimental project design; Experiments involving voltage measurement; strain gauges, dynamic systems of 1st order. Three units of credit for students who have previously taken BIM 111; two units of credit for students who have previously taken EBS 165; one unit of credit allowed for students who have completed EME 107B (former version of EME 108). GE credit: SE, WE. Effective: 2017 Fall Quarter.

EME 109—Experimental Methods for Thermal Fluids (4)
Discussion—1 hour; Extensive Writing; Laboratory—1.5 hours; Lecture—2 hours. Prerequisite(s): EME 106 C- or better Restricted to Mechanical Engineering, Aerospace Science & Engineering and Mechanical/Materials Science Engineering Majors. Experiments illustrating principles of thermal-fluid systems and related measurement devices. Statistical design of experiments and uncertainty analysis of data; thermodynamic cycles, combustion, compressible and incompressible flows. Three units of credit for students who have previously taken ECH 155A; two units of credit for students who have previously taken ECH 155B; three units of credit for students who have previously taken ECI 141L; one unit of credit for students who have already completed EME 107A (former version of EME 109). GE credit: SE. Effective: 2017 Fall Quarter.

EME 115—Introduction to Numerical Analysis and Methods (4)
Lecture—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): (ENG 006 C- or better or EME 005 C- or better or ECS 030 C- or better or ECM 006 C- or better); (MAT 021A C- or better, MAT 021B C- or better, MAT 021C C- or better, MAT 021D C- or better, MAT 022A C- or better, MAT 022B C- or better); (PHY 009A C- or better, PHY 009B C- or better, PHY 009C C- or better) Number representation, Taylor expansions, error and stability analysis, roots of nonlinear equations, sets of linear equations, numerical integration, ordinary differential equations. Not open for credit to students who have taken EAD 115. GE credit: SE. Effective: 2013 Fall Quarter.

EME 121—Engineering Applications of Dynamics (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 102 C- or better; (ENG 006 C- or better or EME 005 C- or better or ECS 030 C- or better) Restricted to Mechanical Engineering, Aerospace Science and Engineering, and Mechanical Engineering/Materials Science Engineering majors. Technical elective that revisits dynamic principles with emphasis on engineering applications; Equations of motion are derived and put into a format for computer solution; There is a computer laboratory where real engineering systems are simulated. GE credit: SE. Effective: 2017 Fall Quarter.

EME 134—Vehicle Stability (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 102 C- or better Restricted to Mechanical Engineering, Aerospace Science and Engineering, and Mechanical Engineering/Materials Science Engineering majors. Analytical and experimental studies of the dynamics, stability and control of vehicles such as cars, trailers, airplanes, motorcycles, bicycles and rail cars. GE credit: SE. Effective: 2017 Fall Quarter.

EME 139—Stability of Flexible Dynamic Systems (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 102 C- or better; ENG 103 C- or better Stability of flexible systems. Introduction to fluid-structure interaction. Mechanical vibrations. Design of mechanical subsystems or systems under constraints. Dynamic instabilities. Flutter. Control effectiveness. Energy extraction from fluid-structure interactions. Design applications to aerospace, mechanical and biomedical systems. No credit for students who have completed EAE 139. GE credit: SE. Effective: 2016 Spring Quarter.

EME 150A—Mechanical Design (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ENG 045 C- or better or ENG 045Y C- or better); (ENG 104 C- or better, EME 050 C- or better (can be concurrent)) Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering majors. Principles of mechanics applied to design. Deformation and stress analysis. Structural integrity under static and fluctuating loads. Projects demonstrate progression from concept to engineering analysis, with emphasis on strength and durability. GE credit: SE, WE. Effective: 2017 Fall Quarter.

EME 150B—Mechanical Design (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EME 150A C- or better Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering. Principles of engineering mechanics applied to the design and selection of mechanical components. Design projects, which concentrate on conceptual design, engineering analysis, methods of manufacture, material selection, and cost. GE credit: SE. Effective: 2017 Fall Quarter.

EME 151—Statistical Methods in Design and Manufacturing (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EME 150A C- or better Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering. Methods of statistical analysis with emphasis on applications in mechanical design and manufacturing. Applications include product evaluation and decision making, probabilistic design, systems reliability, and fatigue under random loading. GE credit: SE. Effective: 2017 Fall Quarter.

EME 152—Computer-Aided Mechanism Design (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 102 C- or better; (EME 005 C- or better or ENG 006 C- or better or ECS 030 C- or better) Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering. Principles of computer-aided mechanism design. Computer-aided kinematic, static, and dynamic analysis and design of planar mechanisms such as multiple-loop linkages and geared linkages. Introduction to kinematic synthesis of mechanisms. GE credit: SE. Effective: 2017 Fall Quarter.

EME 154—Mechatronics (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 100 C- or better; ENG 102 C- or better; EME 050 C- or better Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering. Overview of mechatronics system and control system design concepts, control software architecture, control hardware architecture, microcontroller and interface technology for mechatronics control, sensor for mechatronics systems, actuator drives. GE credit: SE. Effective: 2017 Fall Quarter.

EME 161—Combustion and the Environment (4)
Lecture—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): EME 106 C- or better Introduction to combustion kinetics; premixed and diffusion flames; turbulent combustion; pollutant formation; examples of combustion devices such as internal combustion engines, gas turbines, furnaces and incinerators; alternative fuels. GE credit: SE. Effective: 2017 Fall Quarter.

EME 163—Internal Combustion Engines and Future Alternatives (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EME 106 C- or better; EME 050 C- or better Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering. Fundamentals of internal combustion engine design and performance. Future needs to adapt to environmental concerns, and the feasibility of better alternatives in the future. GE credit: SE. Effective: 2017 Fall Quarter.

EME 164—Introduction to Heating, Ventilation and Air Conditioning Systems (4)
Lecture—4 hours. Prerequisite(s): EME 106 C- or better; EME 165 C- or better Introduction to basic mechanisms and processes associated with heating, ventilation and air conditioning (HVAC), including equipment and systems used for HVAC in residential and commercial buildings. Only 2 units for students who have completed ECI 125. GE credit: SE. Effective: 2017 Winter Quarter.

EME 165—Heat Transfer (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ENG 006 C- or better or EME 005 C- or better or ECS 030 C- or better); ENG 103 C- or better; ENG 105 C- or better Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering. Conduction, convection, and radiation heat transfer. Computational modeling of heat transfer in engineering. Applications to engineering equipment with the use of digital computers. GE credit: SE. Effective: 2017 Winter Quarter.

EME 171—Analysis, Simulation and Design of Mechatronic Systems (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 100 C- or better; ENG 102 C- or better Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering. Modeling of dynamic engineering systems in various energy domains. Analysis and design of dynamic systems. Response of linear systems. Digital computer simulation and physical experiments. GE credit: SE. Effective: 2017 Fall Quarter.

EME 172—Automatic Control of Engineering Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 100 C- or better; ENG 102 C- or better Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering. Classical feedback control systems; block diagrams; performance specifications; steady state errors; rise and settling times; root locus; PID controllers; Bode and Nyquist plots; stability; phase and gain margins; advanced topics as time allows. GE credit: SE. Effective: 2017 Fall Quarter.

EME 185A—Mechanical Engineering Systems Design Project (4) ***Review all entries***
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): (EME 150A C- or better, EME 165 C- or better (can be concurrent)); CMN 001 or CMN 003 recommended; upper division composition recommended. Restricted to Senior standing in Mechanical Engineering (EMEC). Major mechanical engineering design experience; the mechanical engineering design process and its use in the design of engineering systems incorporating appropriate engineering standards and multiple realistic constraints. GE credit: OL, SE, VL. Effective: 2017 Fall Quarter.

EME 185A—Mechanical Engineering Systems Design Project (4) ***Review all entries***
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): EME 050 C- or better; EME 150A C- or better; EME 165 C- or better (can be concurrent); ENG 003, CMN 001 or CMN 003 recommended; upper division composition recommended. Restricted to Senior standing in Mechanical Engineering (EMEC). Major mechanical engineering design experience; the mechanical engineering design process and its use in the design of engineering systems incorporating appropriate engineering standards and multiple realistic constraints. GE credit: OL, SE, VL. Effective: 2019 Winter Quarter.

EME 185B—Mechanical Engineering Systems Design Project (4)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): EME 185A; senior standing in the Department of Mechanical and Aerospace Engineering. Major mechanical engineering design experience; the mechanical engineering design process and its use in the design of engineering systems incorporating appropriate engineering standards and multiple realistic constraints. GE credit: SE. Effective: 2017 Fall Quarter.

EME 189A—Selected Topics in Mechanical Engineering; Energy Systems and the Environment (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Energy Systems and the Environment. May be repeated for credit when the topic is different. Effective: 2008 Summer Session 1.

EME 189B—Selected Topics in Mechanical Engineering; Engineering Controls (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Engineering Controls. May be repeated for credit when the topic is different. GE credit: SE. Effective: 2008 Summer Session 1.

EME 189C—Selected Topics in Mechanical Engineering; Engineering Dynamics (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Engineering Dynamics. May be repeated for credit when the topic is different. Effective: 2008 Summer Session 1.

EME 189D—Selected Topics in Mechanical Engineering; Biomechanics (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Biomechanics. May be repeated for credit when the topic is different. Effective: 2008 Summer Session 1.

EME 189E—Selected Topics in Mechanical Engineering; Fluid Mechanics (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Fluid Mechanics. May be repeated for credit when the topic is different. Effective: 2008 Summer Session 1.

EME 189F—Selected Topics in Mechanical Engineering; Manufacturing Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Manufacturing Engineering. May be repeated for credit when the topic is different. Effective: 2008 Summer Session 1.

EME 189G—Selected Topics in Mechanical Engineering; Mechanical Engineering and Product Design (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Mechanical Engineering and Product Design. May be repeated for credit when the topic is different. Effective: 2008 Summer Session 1.

EME 189H—Selected Topics in Mechanical Engineering; Mechatronics Systems (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Mechatronics Systems. May be repeated for credit when the topic is different. Effective: 2008 Summer Session 1.

EME 189I—Selected Topics in Mechanical Engineering; MEMS/Nanotechnology (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in MEMS/Nanotechnology. May be repeated for credit when the topic is different. Effective: 2008 Summer Session 1.

EME 189J—Selected Topics in Mechanical Engineering; Solid and Structural Mechanics (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Solid and Structural Mechanics. May be repeated for credit when the topic is different. Effective: 2008 Summer Session 1.

EME 189K—Selected Topics in Mechanical Engineering; Thermodynamics (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Thermodynamics. May be repeated for credit when the topic is different. Effective: 2008 Summer Session 1.

EME 189L—Selected Topics in Mechanical Engineering; Vehicle and Transportation Systems (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Vehicle and Transportation Systems. May be repeated for credit when the topic is different. Effective: 2008 Summer Session 1.

EME 192—Intership in Engineering (1-5)
Variable. Prerequisite(s): Upper division standing; approval of project prior to period of internship. Supervised work experience in mechanical engineering. May be repeated for credit. (P/NP grading only.) Effective: 1997 Fall Quarter.

EME 197TC—Mentoring and Tutoring Engineering in the Community (1-4)
Variable—3-12 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Mentoring, coaching, tutoring and/or supervision of students in K-12 schools in Engineering-related topics. May be repeated for credit. (P/NP grading only.) Effective: 2012 Fall Quarter.

EME 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

EME 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

Mechanical & Aerospace Engineering; Engineering | EAE Courses

Courses in EAE:

EAE 001—Introduction to Aerospace Science Engineering (1)
Lecture—1 hour. Description of the field of aerospace engineering with examples from industry, government, and research. Aerospace engineering principles, ethics, and responsibilities. (P/NP grading only.) Effective: 2002 Fall Quarter.

EAE 010—From the Wright Brothers to Drones and Quadcopters (2)
Lecture—2 hours. History of aircraft and its influence on society. Topics covered will include Unmanned Aerial Vehicles, safety considerations, economics and privacy issues. Aerodynamics, stability and control will also be introduced. GE credit: SE, SS. Effective: 2015 Summer Session 1.

EAE 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

EAE 126—Theoretical and Computational Aerodynamics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ENG 180 C- or better or EAD 115 C- or better or MAT 128C C- or better or EME 115 C- or better); EAE 127 C- or better Development of general equations of fluid motion. Study of flow field kinematics and dynamics. Flow about a body. Thin airfoil theory. Viscous effects. Applications of numerical methods to wing analysis and design. GE credit: SE. Effective: 2013 Fall Quarter.

EAE 127—Applied Aircraft Aerodynamics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EME 106 C- or better Principles, governing equations, and predictive theories for aircraft aerodynamics. Lift and drag of 2D airfoils, 3D wings, and high-lift devices. GE credit: SE, WE. Effective: 2017 Fall Quarter.

EAE 129—Stability and Control of Aerospace Vehicles (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 102 C- or better Restricted to upper division standing. Aircraft and spacecraft stability and control. Derivation of fundamental equations of motion for aircraft/spacecraft. Fundamentals of feedback. Aircraft flight control systems. Spacecraft attitude control systems. GE credit: SE. Effective: 2017 Fall Quarter.

EAE 130A—Aircraft Performance and Design (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): EAE 127 C- or better; EAE 129 C- or better (can be concurrent) Major aircraft design experience with multiple realistic constraints including aerodynamics, performance analysis, weight estimation, stability and control, and appropriate engineering standards. GE credit: SE. Effective: 2017 Fall Quarter.

EAE 130B—Aircraft Performance and Design (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): EAE 130A C- or better Restricted to upper division standing. Major aircraft design experience including detailed design, cost analysis, analysis of aircraft structure, propulsion system, aerodynamics, aircraft handling qualities, manufacturing, or meeting relevant engineering standards. GE credit: OL, SE. Effective: 2017 Fall Quarter.

EAE 133—Finite Element Methods in Structures (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 104 C- or better Open to College of Engineering Students. Introduction to the aerospace structural design process. History of aircraft and spacecraft materials. Effects of loading beyond elastic limit. Deflections and stresses due to combined loading. Virtual work principles, and finite element methods. Applications to aerospace structures. GE credit: SE. Effective: 2011 Fall Quarter.

EAE 135—Aerospace Structures (4)
Lecture—4 hours. Prerequisite(s): ENG 104 C- or better; EAE 126 or EAE 127 recommended. Analysis and design methods used in aerospace structures. Shear flow in open, closed and multicell beam cross-sections, buckling of flat and curved sheets, tension field beams, local buckling. GE credit: SE. Effective: 2017 Fall Quarter.

EAE 137—Structural Composites (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 104 C- or better Overview of materials and technology for creating structures from fiber reinforced resin matrix composite material systems. Elementary design analysis and case studies emphasizing aeronautical applications. GE credit: SE. Effective: 2010 Fall Quarter.

EAE 138—Aircraft Propulsion (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EME 106 C- or better Analysis/design of modern aircraft gas turbine engines. Development/application of cycle performance prediction techniques. Introduction to design of inlets, compressors, burners, turbines, and nozzles. Cycle design for specific applications. GE credit: SE. Effective: 2017 Fall Quarter.

EAE 140—Rocket Propulsion (4)
Lecture—4 hours. Prerequisite(s): EME 106 C- or better Restricted to upper division standing. Fluid and thermodynamics of rocket engines, liquid and solid rocket propulsion. Space propulsion concepts and space mission requirements. Not open for credit to students who have taken identical EAE 189A prior to Fall Quarter 2013. GE credit: SE. Effective: 2016 Winter Quarter.

EAE 141—Space Systems Design (4)
Discussion—2 hours; Lecture—2 hours. Prerequisite(s): ENG 102 C- or better; EME 106 C- or better Introduction to space systems design including space project organization, requirements definition and specification, concepts formulation, system tradeoffs, subsystem design. Prototype space mission concepts are presented and a multidisciplinary mission design is developed that considers all relevant architecture elements. GE credit: SE. Effective: 2013 Fall Quarter.

EAE 142—Orbital Mechanics (4)
Lecture—4 hours. Prerequisite(s): ENG 102 C- or better Restricted to upper division standing. Satellite orbits, multistage rockets, current global boosters, and new technologies. Design application problems include satellites, trajectory optimizations, and interplanetary trajectories. Not open for credit to students who have completed EAE 189B prior to Fall Quarter 2013. GE credit: SE. Effective: 2013 Fall Quarter.

EAE 189C—Flight Simulation and Testing in Design of Aircraft and Spacecraft (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 102; and Consent of Instructor. Teaches flight test techniques together with data analysis methods to prepare students for any type of flight testing including fixed wing, rotary wing and launch vehicles. GE credit: SE. Effective: 2013 Fall Quarter.

EAE 198—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

EAE 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

Mechanical Engineering; Engineering

Mechanical Engineering; Engineering | EME B.S.

(College of Engineering)

Stephen K. Robinson, Ph.D., Chairperson of the Department

Benjamin D. Shaw, Ph.D., Vice Chairperson for Undergraduate Studies

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Faculty. http://mae.ucdavis.edu/people/faculty/

The Mechanical and Aerospace Engineering Undergraduate Programs

The Department of Mechanical and Aerospace Engineering administers two undergraduate programs in the College of Engineering: *(1)* Mechanical Engineering, *(2)* Aerospace Science and Engineering.

For more information about our programs, see http://mae.ucdavis.edu/undergraduate/undergraduate-majors.

Mission. The Department of Mechanical and Aerospace Engineering is committed to educating future engineers so that they may contribute to the economic growth and well-being of the state, the nation, and the world, and to the advancement of knowledge in the mechanical and aerospace sciences.

Objectives. The objectives of the programs offered in Mechanical and Aerospace Engineering include the following: to prepare its graduates to practice mechanical and/or aerospace engineering in a broad range of industries, to enable interested graduates to pursue graduate education, to prepare its graduates to participate in research and development, and in other creative and innovative efforts in science, engineering, and technology and to allow interested graduates to pursue entrepreneurial endeavors.

Mechanical Engineering Undergraduate Program

The Mechanical Engineering program is accredited by the Engineering Accreditation Commission of ABET; http://www.abet.org.

The mechanical engineer uses basic science in the design and manufacture of complex engineering systems, requiring the application of physical and mechanical principles to the development of machines, energy conversion systems, materials, and equipment for guidance and control.

Work in this broad field of engineering requires a thorough knowledge of mathematics, physics, chemistry, material science, applied mechanics, thermodynamics, heat transfer, mass transfer, electricity, manufacturing processes, and economics.

The Mechanical Engineering program is designed to provide knowledge in mechanical engineering and associated applied sciences so that graduates may practice in a broad range of industries, pursue graduate studies, participate in research and development, and/or pursue entrepreneurial endeavors.

Areas of Interest

Students spend their third year in further study of fundamental courses, and in the fourth year they may tailor their studies to their interests by selecting courses in controls and systems analysis, fluid mechanics, heat transfer, mechanical design or thermodynamics. Students can either prepare for graduate study in mechanical engineering or obtain a broad background for entering engineering practice.

Students may select elective courses from among the areas of interest listed below.

Mechanical Design. The creation and improvement of products, processes, or systems that are mechanical in nature are the primary activities of a professional mechanical engineer. The development of a product from concept generation to detailed design, manufacturing process selection and planning, quality control and assurance, and life cycle considerations are areas of study and specialization in the area of mechanical design.

Solutions to such major social problems as environmental pollution, the lack of mass transportation, the lack of raw materials, and energy shortages, will depend heavily on the engineer's ability to create new types of machinery and mechanical systems.

The engineer-designer must have a solid and relatively broad background in the basic physical and engineering sciences and have the ability to synthesize the information from such a background in creative problem solving. In addition to having technical competence, the designer must be able to consider the socioeconomic consequences of a design and its possible impact on the environment. Product safety, reliability, and economics are other considerations.

Suggested technical electives:

Aerospace Science and Engineering 133, 139
Biological Systems Engineering 114, 120, 165
Biomedical Engineering 118/Electrical and Computer Engineering 147
Engineering 122, 160 (only one unit of credit towards Technical Electives requirement)
Materials Science and Engineering 180, 181, 182
Mechanical Engineering 121, 134, 150B, 151, 152, 154, 161, 163

Suggested Advisors. H.H. Cheng, R.T. Farouki, M.R. Hill, B.S. Linke, J. Moore, B. Ravani, M. Soshi, S. Velinsky, K. Yamazaki

Biomedical and Engineering Fluid Mechanics. This field of study is based on the fundamentals of fluid mechanics and their broad range of applications in the biomedical and engineering areas. Areas of current research include blood circulation and its potential role in the regulation of normal physiological function and in the development of disease; groundwater and atmospheric flows and their implications for pollutant transport and environmental concerns; aerodynamic flow around transportation vehicles and its impact on vehicle performance; and flow in combustion engines and other energy systems with considerations of efficiency and environmental impact. These areas are investigated both experimentally and computationally.

Suggested technical electives:

Aerospace Science and Engineering 138
Engineering 160 (only one unit of credit towards technical requirements)
Chemical Engineering 161A, 161B

Civil and Environmental Engineering 144, 149
Mechanical Engineering 161, 163

Suggested Advisors. R.C. Aldredge, J.P. Delplanque, M. Hafez, S. Lee, S.K. Robinson, B.D. Shaw, C.P. van Dam, A.S. Wexler

Combustion and the Environment. Combustion is widely used for energy generation, propulsion, heating, and waste disposal, as well as for many other applications. Mechanical engineers are often heavily involved with the design of combustion systems (internal combustion engines, gas turbines, furnaces, etc.) and deal with aspects of combustion ranging from increasing efficiencies to reducing pollutant emissions. This specialization is for those who would like to work in fields that use combustion, or that deal with pollution related to combustion. With the current increased emphasis on reducing pollutants while maintaining or increasing efficiency, the efforts of mechanical engineers in designing and improving combustion systems are becoming more important.

Suggested technical electives:

Mechanical Engineering 161, 163
Civil and Environmental Engineering 149, 150

Suggested Advisors. R.C. Aldredge, P. A. Erickson, B.D. Shaw

Heat Transfer, Thermodynamics, and Energy Systems. This specialization emphasizes the fundamentals of heat transfer and thermodynamics, and their application to the design of advanced engineering systems. The objective of the program is to introduce students to the fundamental processes of heat transfer and thermodynamics in complex engineering systems so that they are able to design more efficient, cost effective, and reliable systems with less environmental pollution and impact. An understanding of heat transfer and thermodynamics is required for the design of efficient, cost-effective systems for power generation, propulsion, heat exchangers, industrial processes, refining, and chemical processing. This area of specialization is important to many industries—aerospace, defense, automotive—as well as to the thermal design of electronic and computer packages.

Suggested technical electives:

Aerospace Science and Engineering 138
Mechanical Engineering 161, 163

Suggested Advisors. R.C. Aldredge, P.A. Erickson, V. Narayanan, J.W. Park, B.D. Shaw

Manufacturing. Manufacturing is concerned with the conversion of raw materials into finished products by a variety of processes, such as machining, forming, casting, and molding. Modern manufacturing technology is increasingly dependent upon integration with computer-aided design systems and precision computer controls. State-of-the-art laboratories offer the opportunity for hands-on experience with a wide spectrum of manufacturing equipment. Manufacturing engineers must have expertise in design, materials, controls, statistical methods, computer software, and microprocessor applications.

Suggested technical electives:

Biomedical Engineering 118/Electrical and Computer Engineering 147
Electrical and Computer Engineering 160
Materials Science and Engineering 180, 181
Mechanical Engineering 150B, 151, 154

Suggested Advisors. H.H. Cheng, R.T. Farouki, B.S. Linke, D.A. Horsley, V. La Saponara, M. Soshi, B. Ravani, K. Yamazaki

System Dynamics and Control. Engineers are increasingly concerned with the performance of integrated dynamics systems in which it is not possible to optimize component parts without considering the overall system.

System dynamics and control specialists are concerned with the modeling, analysis, and simulation of all types of dynamic systems and with the use of automatic control techniques to change the dynamic characteristics of systems in useful ways. The emphasis in this program is on the physical systems that are closely related to mechanical engineering, but the techniques for studying these systems apply to social, economic, and other dynamic systems.

Ongoing research includes projects on continuously variable transmissions, active and semi-active suspension systems, modeling and control of vehicle dynamics, electromechanical actuator design, electronically controlled steering, the analysis of fuel management systems, and the design of flight-control systems with humans in the loop.

Suggested technical electives:

Aerospace Science and Engineering 129, 139, 141
Electrical and Computer Engineering 160
Engineering 122
Mechanical Engineering 121, 134, 154

Suggested Advisors. F. Assadian, D.A. Horsley, S. Joshi, Z. Kong, X. Lin, J. Moore

Ground Vehicle Systems. An important aspect of mechanical engineering is the design of more environmentally benign surface vehicles that provide efficient individual and public transportation. Innovations in the field require competence in vehicle dynamics, control of vehicle dynamics, power sources and power transmission, lightweight structures and systems, alternatively fueled power systems, including electrical drives and fuel cells, and mechanical systems.

Suggested technical electives:

Aerospace Science and Engineering 127, 129, 139
Civil and Environmental Engineering 130, 149, 160
Engineering 122, 160 (only one unit of credit towards technical electives requirement)
Mechanical Engineering 121, 134, 152

Suggested Advisors. F. Assadian, P. A. Erickson, M. Hill, X. Lin, J. Park, N. Sarigul-Klijn, S. Velinsky

Transportation Systems. As society recognizes the increasing importance of optimizing transportation systems to minimize environmental degradation and energy expenditure, engineers will need to consider major innovations in the way people and goods are moved. Such innovations will require competence in vehicle dynamics, propulsion and control, and an understanding of the problems caused by present-day modes of transportation. Vehicle control requires an understanding of sensors and actuators, and the integration of yet-to-be-proposed concepts into overall vehicular dynamics. Competence in these areas allows for the development of alternative propulsion concepts, such as electric, hybrid, and fuel cell.

Suggested technical electives:

Aerospace Science and Engineering 127, 129
Biological Systems Engineering 114, 120
Civil and Environmental Engineering 131, 149
Engineering 122, 160 (only one unit of credit towards Technical Electives requirement)
Mechanical Engineering 134, 150B, 161, 163

Suggested Advisors. F. Assadian, P.A. Erickson, X. Lin, J.W. Park, S. Velinsky

Mechanical Engineering Program Requirements

Students are encouraged to adhere carefully to all prerequisite requirements. The instructor is authorized to drop students from a course for which stated prerequisites have not been completed.

Exclusive of General Education units, the minimum number of units required for the Mechanical Engineering major is 148.

Lower Division Required Courses **Units:** 78

MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3
MAT 022B	Differential Equations	3
PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
OR		
CHE 002AH	Honors General Chemistry	5
CHE 002BH	Honors General Chemistry	5
ENG 004	Engineering Graphics in Design	3
ENG 006	Engineering Problem Solving	4
OR		
EME 005	Computer Programming for Engineering Applications	4
ENG 017	Circuits I	4
ENG 035	Statics	4
ENG 045	Properties of Materials	4
OR		
ENG 045Y	Properties of Materials	4
EME 050	Manufacturing Processes	4

Choose one; a grade of C- or better is required:

ENL 003	Introduction to Literature	4
UWP 001	Expository Writing	4
UWP 001Y	Expository Writing	4
UWP 001V	Expository Writing	4
COM 001	Major Books of Western Culture: The Ancient World	4
COM 002	Major Books of Western Culture: From the Middle Ages to the Enlightenment	4
COM 003	Major Books of Western Culture: The Modern Crisis	4
COM 004	Major Books of the Contemporary World	4
NAS 005	Introduction to Native American Literature	4

Choose one:

CMN 001	Introduction to Public Speaking	4
CMN 003	Interpersonal Communication Competence	4
ENG 003	Introduction to Engineering Design	4

Upper Division Required Courses **Units:** 70-74

ENG 100	Electronic Circuits and Systems	3
ENG 102	Dynamics	4
ENG 103	Fluid Mechanics	4

ENG 104	Mechanics of Materials	4
ENG 105	Thermodynamics	4
ENG 190	Professional Responsibilities of Engineers	3
EME 106	Thermo-Fluid Dynamics	4
EME 108	Measurement Systems	4
EME 109	Experimental Methods for Thermal Fluids	4
EME 150A	Mechanical Design	4
EME 165	Heat Transfer	4
EME 172	Automatic Control of Engineering Systems	4
EME 185A	Mechanical Engineering Systems Design Project	4
EME 185B	Mechanical Engineering Systems Design Project	4

Both EME 185A & 185B taken in consecutive quarters.

OR

EAE 130A	Aircraft Performance and Design	4
EAE 130B	Aircraft Performance and Design	4

Applied Mathematics Electives, choose one:

ECH 140	Mathematical Methods in Biochemical and Chemical Engineering	4
ECI 114	Probabilistic Systems Analysis for Civil Engineers	4
ECS 130	Scientific Computation	4
ENG 180	Engineering Analysis	4
MAT 118A	Partial Differential Equations: Elementary Methods	4
MAT 128A	Numerical Analysis	4
MAT 128B	Numerical Analysis in Solution of Equations	4
EME 115	Introduction to Numerical Analysis and Methods	4
EME 151	Statistical Methods in Design and Manufacturing	4
STA 130A	Mathematical Statistics: Brief Course	4
STA 131A	Introduction to Probability Theory	4

System Dynamics/Mechanical Design Electives; choose one:

ENG 122	Introduction to Mechanical Vibrations	4
EME 121	Engineering Applications of Dynamics	4
EME 139	Stability of Flexible Dynamic Systems	4
EME 150B	Mechanical Design	4
EME 154	Mechatronics	4
EME 171	Analysis, Simulation and Design of Mechatronic Systems	4

Restricted Electives; choose two:

EAE 129	Stability and Control of Aerospace Vehicles	4
EAE 138	Aircraft Propulsion	4
EAE 140	Rocket Propulsion	4
EAE 141	Space Systems Design	4
EAE 142	Orbital Mechanics	4
ENG 122	Introduction to Mechanical Vibrations	4
ENG 188	Science and Technology of Sustainable Power Generation	4
EMS 180	Materials in Engineering Design	4
EMS 182	Failure Analysis	4
EME 134	Vehicle Stability	4
EME 152	Computer-Aided Mechanism Design	4
EME 161	Combustion and the Environment	4
EME 163	Internal Combustion Engines and Future Alternatives	4
EME 164	Introduction to Heating, Ventilation and Air Conditioning Systems	4

Students may also choose from EAE 130A, 130B, EME 121, 139, 150B, 151, 154, 171 if these courses are not used in satisfaction of other degree requirements.

Upper Division Composition Requirement

Choose one; a grade of C- or better is required:

UWP 101	Advanced Composition	4
UWP 102E	Writing in the Disciplines: Engineering	4
UWP 104A	Writing in the Professions: Business Writing	4
UWP 104E	Writing in the Professions: Science	4
UWP 104T	Writing in the Professions: Technical Writing	4

Passing the Upper-Division Composition Exam.

Total: 148

Mechanical Engineering; Engineering | EME Courses

Courses in EME:

EME 001—Mechanical Engineering (1)
Lecture—1 hour. Description of the field of mechanical engineering with examples taken from industrial applications, discussions of the practice with respect to engineering principles, ethics, and responsibilities. (P/NP grading only.) Effective: 2001 Fall Quarter.

EME 005—Computer Programming for Engineering Applications (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016A (can be concurrent) or MAT 021A (can be concurrent) Structured programming in C for solving problems in engineering. Introduction to MATLAB and comparison study of C/C++ with MATLAB. GE credit: SE. Effective: 2017 Fall Quarter.

EME 050—Manufacturing Processes (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): ENG 004 C- or better; PHY 009A C- or better Restricted to Mechanical Engineering and Mechanical Engineering/Materials Science Engineering majors. Modern manufacturing methods, safety, manufacturing instructions, computer-aided manufacturing and their role in the engineering design and development process. GE credit: SE. Effective: 2017 Fall Quarter.

EME 092—Internship in Mechanical Engineering (1-5)
Internship. Prerequisite(s): Lower division standing; approval of project prior to period of internship. Supervised work-study experience in engineering. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

EME 097TC—Mentoring and Tutoring Engineering in the Community (1-4)
Variable—3-12 hours. Prerequisite(s): Consent of Instructor. Mentoring, coaching, tutoring and/or supervision of students in K-12 schools in Engineering-related topics. May be repeated for credit. (P/NP grading only.) Effective: 2012 Fall Quarter.

EME 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

EME 106—Thermo-Fluid Dynamics (4)
Lecture—4 hours. Prerequisite(s): ENG 103 C- or better; ENG 105 C- or better Restricted to Mechanical Engineering, Aerospace Science and Engineering, and Mechanical Engineering/Materials Science Engineering majors. Inviscid incompressible flow, compressible flow, ideal gas mixtures, psychrometrics, reacting mixtures and combustion. GE credit: SE. Effective: 2013 Winter Quarter.

EME 108—Measurement Systems (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): ENG 100 C- or better; ENG 102 C- or better; ENG 104 recommended. Restricted to Mechanical Engineering, Aerospace Science & Engineering and Mechanical/Materials Science & Engineering. Experiments to illustrate principles of mechanical systems. Signal analysis; Demonstration of basic sensors for mechanical systems; Experimental project design; Experiments involving voltage measurement; strain gauges, dynamic systems of 1st order. Three units of credit for students who have previously taken BIM 111; two units of credit for students who have previously taken EBS 165; one unit of credit allowed for students who have completed EME 107B (former version of EME 108). GE credit: SE, WE. Effective: 2017 Fall Quarter.

EME 109—Experimental Methods for Thermal Fluids (4)
Discussion—1 hour; Extensive Writing; Laboratory—1.5 hours; Lecture—2 hours. Prerequisite(s): EME 106 C- or better Restricted to Mechanical Engineering, Aerospace Science & Engineering and Mechanical/Materials Science Engineering Majors. Experiments illustrating principles of thermal-fluid systems and related measurement devices. Statistical design of experiments and uncertainty analysis of data; thermodynamic cycles, combustion, compressible and incompressible flows. Three units of credit for students who have previously taken ECH 155A; two units of credit for students who have previously taken ECH 155B; three units of credit for students who have previously taken ECI 141L; one unit of credit for students who have already completed EME 107A (former version of EME 109). GE credit: SE. Effective: 2017 Fall Quarter.

EME 115—Introduction to Numerical Analysis and Methods (4)
Lecture—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): (ENG 006 C- or better or EME 005 C- or better or ECS 030 C- or better or ECM 006 C- or better); (MAT 021A C- or better, MAT 021B C- or better, MAT 021C C- or better, MAT 021D C- or better, MAT 022A C- or better, MAT 022B C- or better); (PHY 009A C- or better, PHY 009B C- or better, PHY 009C C- or better) Number representation, Taylor expansions, error and stability analysis, roots of nonlinear equations, sets of linear equations, numerical integration, ordinary differential equations. Not open for credit to students who have taken EAD 115. GE credit: SE. Effective: 2013 Fall Quarter.

EME 121—Engineering Applications of Dynamics (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 102 C- or better; (ENG 006 C- or better or EME 005 C- or better or ECS 030 C- or better) Restricted to Mechanical Engineering, Aerospace Science and Engineering, and Mechanical Engineering/Materials Science Engineering majors. Technical elective that revisits dynamic principles with emphasis on engineering applications; Equations of motion are derived and put into a format for computer solution; There is a computer laboratory where real engineering systems are simulated. GE credit: SE. Effective: 2017 Fall Quarter.

EME 134—Vehicle Stability (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 102 C- or better Restricted to Mechanical Engineering, Aerospace Science and Engineering, and Mechanical Engineering/Materials Science Engineering majors. Analytical and experimental studies of the dynamics, stability and control of vehicles such as cars, trailers, airplanes, motorcycles, bicycles and rail cars. GE credit: SE. Effective: 2017 Fall Quarter.

EME 139—Stability of Flexible Dynamic Systems (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 102 C- or better; ENG 103 C- or better Stability of flexible systems. Introduction to fluid-structure interaction. Mechanical vibrations. Design of mechanical subsystems or systems under constraints. Dynamic instabilities. Flutter. Control effectiveness. Energy extraction from fluid-structure interactions. Design applications to aerospace, mechanical and biomedical systems. No credit for students who have completed EAE 139. GE credit: SE. Effective: 2016 Spring Quarter.

EME 150A—Mechanical Design (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ENG 045 C- or better or ENG 045Y C- or better); (ENG 104 C- or better, EME 050 C- or better (can be concurrent)) Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering majors. Principles of mechanics applied to design. Deformation and stress analysis. Structural integrity under static and fluctuating loads. Projects demonstrate progression from concept to engineering analysis, with emphasis on strength and durability. GE credit: SE, WE. Effective: 2017 Fall Quarter.

EME 150B—Mechanical Design (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EME 150A C- or better Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering. Principles of engineering mechanics applied to the design and selection of mechanical components. Design projects, which concentrate on conceptual design, engineering analysis, methods of manufacture, material selection, and cost. GE credit: SE. Effective: 2017 Fall Quarter.

EME 151—Statistical Methods in Design and Manufacturing (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EME 150A C- or better Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering. Methods of statistical analysis with emphasis on applications in mechanical design and manufacturing. Applications include product evaluation and decision making, probabilistic design, systems reliability, and fatigue under random loading. GE credit: SE. Effective: 2017 Fall Quarter.

EME 152—Computer-Aided Mechanism Design (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 102 C- or better; (EME 005 C- or better or ENG 006 C- or better or ECS 030 C- or better) Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering. Principles of computer-aided mechanism design. Computer-aided kinematic, static, and dynamic analysis and design of planar mechanisms such as multiple-loop linkages and geared linkages. Introduction to kinematic synthesis of mechanisms. GE credit: SE. Effective: 2017 Fall Quarter.

EME 154—Mechatronics (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 100 C- or better; ENG 102 C- or better; EME 050 C- or better Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering. Overview of mechatronics system and control system design concepts, control software architecture, control hardware architecture, microcontroller and interface technology for mechatronics control, sensor for mechatronics systems, actuator drives. GE credit: SE. Effective: 2017 Fall Quarter.

EME 161—Combustion and the Environment (4)
Lecture—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): EME 106 C- or better Introduction to combustion kinetics; premixed and diffusion flames; turbulent combustion; pollutant formation; examples of combustion devices such as internal combustion engines, gas turbines, furnaces and incinerators; alternative fuels. GE credit: SE. Effective: 2017 Fall Quarter.

EME 163—Internal Combustion Engines and Future Alternatives (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EME 106 C- or better; EME 050 C- or better Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering. Fundamentals of internal combustion engine design and performance. Future needs to adapt to environmental concerns, and the feasibility of better alternatives in the future. GE credit: SE. Effective: 2017 Fall Quarter.

EME 164—Introduction to Heating, Ventilation and Air Conditioning Systems (4)
Lecture—4 hours. Prerequisite(s): EME 106 C- or better; EME 165 C- or better Introduction to basic mechanisms and processes associated with heating, ventilation and air conditioning (HVAC), including equipment and systems used for HVAC in residential and commercial buildings. Only 2 units for students who have completed ECI 125. GE credit: SE. Effective: 2017 Winter Quarter.

EME 165—Heat Transfer (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ENG 006 C- or better or EME 005 C- or better or ECS 030 C- or better); ENG 103 C- or better; ENG 105 C- or better Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering. Conduction, convection, and radiation heat transfer. Computational modeling of heat transfer in engineering. Applications to engineering equipment with the use of digital computers. GE credit: SE. Effective: 2017 Winter Quarter.

EME 171—Analysis, Simulation and Design of Mechatronic Systems (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 100 C- or better; ENG 102 C- or better Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering. Modeling of dynamic engineering systems in various energy domains. Analysis and design of dynamic systems. Response of linear systems. Digital computer simulation and physical experiments. GE credit: SE. Effective: 2017 Fall Quarter.

EME 172—Automatic Control of Engineering Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 100 C- or better; ENG 102 C- or better Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering. Classical feedback control systems; block diagrams; performance specifications; steady state errors; rise and settling times; root locus; PID controllers; Bode and Nyquist plots; stability; phase and gain margins; advanced topics as time allows. GE credit: SE. Effective: 2017 Fall Quarter.

EME 185A—Mechanical Engineering Systems Design Project (4) ***Review all entries***
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): (EME 150A C- or better, EME 165 C- or better (can be concurrent)); CMN 001 or CMN 003 recommended; upper division composition recommended. Restricted to Senior standing in Mechanical Engineering (EMEC). Major mechanical engineering design experience; the mechanical engineering design process and its use in the design of engineering systems incorporating appropriate engineering standards and multiple realistic constraints. GE credit: OL, SE, VL. Effective: 2017 Fall Quarter.

EME 185A—Mechanical Engineering Systems Design Project (4) ***Review all entries***
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): EME 050 C- or better; EME 150A C- or better; EME 165 C- or better (can be concurrent); ENG 003, CMN 001 or CMN 003 recommended; upper division composition recommended. Restricted to Senior standing in Mechanical Engineering (EMEC). Major mechanical engineering design experience; the mechanical engineering design process and its use in the design of engineering systems incorporating appropriate engineering standards and multiple realistic constraints. GE credit: OL, SE, VL. Effective: 2019 Winter Quarter.

EME 185B—Mechanical Engineering Systems Design Project (4)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): EME 185A; senior standing in the Department of Mechanical and Aerospace Engineering. Major mechanical engineering design experience; the mechanical engineering design process and its use in the design of engineering systems incorporating appropriate engineering standards and multiple realistic constraints. GE credit: SE. Effective: 2017 Fall Quarter.

EME 189A—Selected Topics in Mechanical Engineering; Energy Systems and the Environment (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Energy Systems and the Environment. May be repeated for credit when the topic is different. Effective: 2008 Summer Session 1.

EME 189B—Selected Topics in Mechanical Engineering; Engineering Controls (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Engineering Controls. May be repeated for credit when the topic is different. GE credit: SE. Effective: 2008 Summer Session 1.

EME 189C—Selected Topics in Mechanical Engineering; Engineering Dynamics (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Engineering Dynamics. May be repeated for credit when the topic is different. Effective: 2008 Summer Session 1.

EME 189D—Selected Topics in Mechanical Engineering; Biomechanics (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Biomechanics. May be repeated for credit when the topic is different. Effective: 2008 Summer Session 1.

EME 189E—Selected Topics in Mechanical Engineering; Fluid Mechanics (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Fluid Mechanics. May be repeated for credit when the topic is different. Effective: 2008 Summer Session 1.

EME 189F—Selected Topics in Mechanical Engineering; Manufacturing Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Manufacturing Engineering. May be repeated for credit when the topic is different. Effective: 2008 Summer Session 1.

EME 189G—Selected Topics in Mechanical Engineering; Mechanical Engineering and Product Design (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Mechanical Engineering and Product Design. May be repeated for credit when the topic is different. Effective: 2008 Summer Session 1.

EME 189H—Selected Topics in Mechanical Engineering; Mechatronics Systems (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Mechatronics Systems. May be repeated for credit when the topic is different. Effective: 2008 Summer Session 1.

EME 189I—Selected Topics in Mechanical Engineering; MEMS/Nanotechnology (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in MEMS/Nanotechnology. May be repeated for credit when the topic is different. Effective: 2008 Summer Session 1.

EME 189J—Selected Topics in Mechanical Engineering; Solid and Structural Mechanics (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Solid and Structural Mechanics. May be repeated for credit when the topic is different. Effective: 2008 Summer Session 1.

EME 189K—Selected Topics in Mechanical Engineering; Thermodynamics (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Thermodynamics. May be repeated for credit when the topic is different. Effective: 2008 Summer Session 1.

EME 189L—Selected Topics in Mechanical Engineering; Vehicle and Transportation Systems (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Vehicle and Transportation Systems. May be repeated for credit when the topic is different. Effective: 2008 Summer Session 1.

EME 192—Intership in Engineering (1-5)
Variable. Prerequisite(s): Upper division standing; approval of project prior to period of internship. Supervised work experience in mechanical engineering. May be repeated for credit. (P/NP grading only.) Effective: 1997 Fall Quarter.

EME 197TC—Mentoring and Tutoring Engineering in the Community (1-4)
Variable—3-12 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Mentoring, coaching, tutoring and/or supervision of students in K-12 schools in Engineering-related topics. May be repeated for credit. (P/NP grading only.) Effective: 2012 Fall Quarter.

EME 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

EME 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

Medical-Veterinary Entomology Minor; Entomology & Nematology

Medical-Veterinary Entomology Minor; Entomology & Nematology | Medical-Veterinary Entomology Minor

Formerly the departments of Entomology and Nematology

(College of Agricultural and Environmental Sciences)

Steve Nadler, Ph.D., Chairperson of the Department

Joanna Chiu, Ph.D., Vice Chairperson of the Department

Department Office. 367 Briggs Hall; 530-752-0492; http://entomology.ucdavis.edu

Faculty. http://entomology.ucdavis.edu/Faculty/

Minor Requirements:

The Department of Entomology has five minor programs open to students in other disciplines who are interested in rounding out their academic study with a concentration in the area of entomology.

Minor Adviser. S. Lawler, S. Nadler

Medical-Veterinary Entomology **Units:** 19

ENT 100	General Entomology	4
ENT 100L	General Entomology Laboratory	2
ENT 104	Behavioral Ecology of Insects	3
ENT 153	Medical Entomology	3
ENT 156	Biology of Parasitism	3

Choose at least four units:

ENT 156L	Biology of Parasitism Laboratory	1
ENT 158	Forensic Entomology	3
MIC 162	General Virology	4

Total: 19

Medical-Veterinary Entomology Minor; Entomology & Nematology | ENT Courses

Courses in ENT:

ENT 001—Art, Science and the World of Insects (3)
Laboratory—3 hours; Lecture—3 hours. Fusion of entomology and art to create an appreciation of insect biology, ecology, interactions with humans and importance in human culture. Multidisciplinary approaches in education and career paths in entomology and art will be highlighted. GE credit: AH, OL, SE, SS, VL, WE. Effective: 2013 Fall Quarter.

ENT 002—Biodiversity (3)
Lecture—2 hours; Lecture/Discussion—1 hour. Introduction to nature, scope and geographical distribution of biodiversity (diversity of life, with emphasis on plants and animals, especially insects).Humans and biodiversity - domestication, aesthetics, ethics and valuation.Species richness and "success".Biodiversity through time; monitoring, evaluation and conservation.Biomes-global, continental and Californian. (EVE 002.) GE credit: SE, SL, WE. Effective: 2013 Fall Quarter.

ENT 010—Natural History of Insects (3)
Lecture—3 hours. Introduction to the insects detailing their great variety, structures and functions, habits, and their significance in relation to plants and animals including man. Designed for students not specializing in entomology. Not open for credit to students who have had ENT 100, but students who have taken this course may take ENT 100 for credit. GE credit: SE, SL. Effective: 2013 Fall Quarter.

ENT 090X—Special Topics in Entomology (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. Freshman seminar course for indepth examination of a special topic within the subject area. May be repeated up to 2 time(s). (P/NP grading only.) Effective: 2013 Fall Quarter.

ENT 092—Internship (1-12)
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. Work-learn experience on and off campus in all subject areas offered by the department, supervised by a member of the faculty. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2013 Fall Quarter.

ENT 099—Special Study for Undergraduates (1-5)
Effective: 2013 Fall Quarter.

ENT 100—General Entomology (4)
Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): BIS 001B Biology, anatomy, physiology, development, classification, ecology and relation of insects to human welfare. GE credit: WE. Effective: 2013 Fall Quarter.

ENT 100L—General Entomology Laboratory (2)
Laboratory—6 hours. Prerequisite(s): ENT 100 (can be concurrent) Anatomy, development, population ecology, methods of collecting, classification and identification of insects of all orders and of major families. GE credit: VL. Effective: 2013 Fall Quarter.

ENT 101—Functional Insect Morphology (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): ENT 100 Study of the basic external and internal structures, organs and tissues of insects, with emphasis on functional systems. Functional anatomy, histology and fine structures of important organs and tissues will be discussed. Effective: 2013 Fall Quarter.

ENT 102—Insect Physiology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENT 100; Or course in physiology or invertebrate zoology. Processes by which insects maintain themselves, reproduce, and adapt to environment. Insects as models for basic/applied research through detailed analysis of metabolic, physiological, and behavioral processes. Emphasis on analysis of methodology, fact, and theory. GE credit: SE, WE. Effective: 2013 Fall Quarter.

ENT 103—Insects Systematics (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): Introductory course in zoology or entomology. Principles and methods of systematics, with particular reference to insects. Emphasis on different theories of classification, and analysis of phylogenetic relationships. Effective: 2013 Fall Quarter.

ENT 104—Behavioral Ecology of Insects (3)
Lecture—3 hours. Prerequisite(s): Introductory biology or zoology. Basic principles and mechanisms of insect behavior and ecology. An evolutionary approach to understanding behavioral ecology of insects. Effective: 2013 Fall Quarter.

ENT 105—Insect Ecology (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): BIS 002B (can be concurrent); Consent of Instructor. Introduction to insect ecology combining fundamental concepts and questions in ecology with ideas, hypotheses and insights from insects. Integrates aspects of individual, population, community and ecosystem ecology. GE credit: OL, SE, SL, WE. Effective: 2017 Fall Quarter.

ENT 107—California Insect Diversity (5)
Fieldwork—6 hours; Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): An introductory course in entomology. Survey of the diversity of insects from selected ecological zones in California with emphasis on collection, identification, and natural history. GE credit: SE. Effective: 2013 Fall Quarter.

ENT 109—Field Taxonomy and Ecology (7)
Laboratory—36 hours; Lecture—2 hours. Prerequisite(s): An introductory course in entomology or consent of instructor. GE credit: SE. Effective: 2013 Fall Quarter.

ENT 110—Arthropod Pest Management (5)
Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): BIS 001B Development of the ecological basis for the integrated pest management paradigm with emphasis on agriculture. Ecological and practical aspects of control tactics. Laboratory emphasizes identification of pests and beneficials of agriculture and urban situations. GE credit: SE, WE. Effective: 2013 Fall Quarter.

ENT 116—Freshwater Macroinvertebrates (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): BIS 002B; Or equivalent. Limited enrollment. Biology, ecology and taxonomy of freshwater macroinvertebrates, including insects, crustaceans, molluscs, worms, leeches, flatworms and others. Adaptations to life in freshwater. Aquatic food webs. Uses of macroinvertebrates in water quality monitoring. Field trips during regular lab hours. GE credit: SE, SL. Effective: 2013 Fall Quarter.

ENT 116L—Aquatic Insect Collection (2)
Fieldwork—2 hours; Laboratory—4 hours. Prerequisite(s): ENT 100L or ENT 116 (can be concurrent); Or prior experience with insect/arthropod identification to Family level. Restricted to 25 students. Collection of aquatic insects and identification to the Family level. Collections will require two, one-day weekend field trips (by arrangement). Collection requirement is 40 Families. Effective: 2016 Fall Quarter.

ENT 117—Longevity (4)
Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): Upper division standing or consent of instructor. Nature, origin, determinants, and limits of longevity with particular reference to humans; emphasis on implications of findings from non-human model systems including natural history, ecology and evolution of life span; description of basic demographic techniques including life table methods. (HDE 117.) GE credit: SE, SL, WE. Effective: 2013 Fall Quarter.

ENT 119—Apiculture (3)
Lecture—3 hours. Biology and behavior of honeybees; communication, orientation, social organization, foraging activities, honey production, pollination activities. GE credit: OL, SE, VL, WE. Effective: 2016 Fall Quarter.

ENT 123—Plant-Virus-Vector Interaction (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 101; PLB 105, PLP 120, and ENT 100 recommended. Analysis of interactions necessary for viruses to infect plants.Interactions among insect vectors and host plants involved in the plant-virus life cycle. Evolutionary aspects of the molecular components in viral infection and modern approaches to the interdiction of viral movement. (PBI 123 and PLP 123.) GE credit: SE, SL, WE. Effective: 2014 Winter Quarter.

ENT 135—Introduction to Biological Control (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENT 100 or ENT 110 Effective: 2013 Fall Quarter.

ENT 153—Medical Entomology (3)
Lecture—3 hours. Prerequisite(s): BIS 001A; BIS 001B; Upper division standing in one of the biological sciences, or consent of instructor. Basic biology and classification of medically important arthropods with special emphasis on the ecology of arthropodborne diseases and principles of their control. Relationships of arthropods to human health. GE credit: SE, SL, WE. Effective: 2013 Fall Quarter.

ENT 156—Biology of Parasitism (3)
Lecture/Discussion—3 hours. Prerequisite(s): BIS 001A; or Consent of Instructor. Lectures on the biological and ecological aspects affecting host-parasite relationships using selected examples from protozoan and metazoan fauna. GE credit: SE. Effective: 2013 Fall Quarter.

ENT 156L—Biology of Parasitism Laboratory (1)
Laboratory—3 hours. Prerequisite(s): ENT 156 (can be concurrent); ENT 156 required concurrently or consent of instructor. Laboratory demonstrations using selected examples of protozoan and metazoan organisms along with various techniques used in parasitology to exemplify concepts presented in the lecture course. GE credit: SE. Effective: 2013 Fall Quarter.

ENT 158—Forensic Entomology (3)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): BIS 001B or ENT 100; Upper division standing. Arthropods, their general biology, succession, developmental cycles and population biology in matters of criminal prosecution and civil litigation. Emphasis on basic arthropod biology, ecological and developmental concepts and methods, development of reasoning abilities, implication, development of opinions and evidence. GE credit: WE. Effective: 2013 Fall Quarter.

ENT 180A—Experimental Ecology and Evolution in the Field (4)
Fieldwork—3 hours; Lecture/Lab—3 hours. Prerequisite(s): (ENT 105 or ESP 100); EVE 100; EVE 101 Experimental design in field ecology. Examination of primary literature, experimental design, independent and collaborative research, analysis of data, development of original research paper based on field experiments. (EVE 180A.) GE credit: QL, SE, VL. Effective: 2014 Winter Quarter.

ENT 180B—Experimental Ecology and Evolution in the Field (4)
Fieldwork—3 hours; Lecture/Lab—3 hours. Prerequisite(s): (EVE 180A or ENT 180A); (EVE 100 or EVE 101 or ESP 100); ENT 105 Experimental design in field ecology. Examination of primary literature, experimental design, independent and collaborative research, analysis of data, development of original research paper based on field experiments. (EVE 180B.) GE credit: QL, SE, VL, WE. Effective: 2014 Winter Quarter.

ENT 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Laboratory experience or fieldwork off and on campus in all subject areas offered in the Department of Entomology. Internships supervised by a member of the faculty. (P/NP grading only.) Effective: 2013 Fall Quarter.

ENT 197T—Tutoring in Entomology (1-3)
Discussion—1-3 hours. Leading small discussion groups. Preview assignments and prepare guidelines for discussion. (P/NP grading only.) Effective: 2013 Fall Quarter.

ENT 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2013 Fall Quarter.

ENT 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 2013 Fall Quarter.

ENT 212—Molecular Biology of Insects and Insect Viruses (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. A molecular biological analysis of insect systematics, physiology, and defense mechanisms. Molecular biology of insect viruses. Baculovirus expresion vectors and post-translation modification of expressed polypeptides. Biological control of using neuropeptides and toxin genes in insect viruses. Effective: 2013 Fall Quarter.

ENT 214—Vector-borne Infectious Diseases: Changing Patterns (2)
Lecture/Discussion—2 hours. Prerequisite(s): Open to graduate students, MPVM and MPH students, DVM and medical students with second- or third-year standing. Open to upper division undergraduate students with consent of instructor(s). Vector-borne infectious diseases especially as they relate to changing patterns associated with climatic changes, trade and population movement. (PMI 214.) Effective: 2013 Fall Quarter.

ENT 225—Terrestrial Field Ecology (4)
Fieldwork—12 hours; Seminar—1 hour. Prerequisite(s): Introductory ecology and introductory statistics or consent of instructor. A field course conducted over spring break and four weekends at Bodega Bay, emphasizing student projects. Ecological hypothesis testing, data gathering, analysis and written and oral presentation of results. (ECK 225 and PBG 225.) Effective: 2013 Fall Quarter.

ENT 230—Advanced Biological Control (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): Graduate or upper division standing in biological science or consent of instructor. Principles and current issues in biological control of arthropod pests and weeds; laboratory devoted to identification and life history of the major groups of parasitic and predaceous arthropods. Effective: 2013 Fall Quarter.

ENT 253—Advanced Medical Entolomogy (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): One upper division course in Entomology (other than ENT 153) and one course in Microbiology: ENT 153 strongly recommended. An analysis of several anthropod-borne human diseases with emphasis on the relationships of the biology of the vector to the ecology of the disease. Discussion includes demonstration of vectors and techniques. Effective: 2013 Fall Quarter.

ENT 290—Exploratory Topics in Entomology (2)
Seminar—2 hours. Interdisciplinary topics in entomology, including innovative applications of entomological concepts to other fields of research and human endeavor (e.g. medicine, technology, art, criminology). May be repeated up to 8 unit(s) when topic differs. Effective: 2013 Fall Quarter.

ENT 291—Current topics in Medical and Veterinary Entomology (2)
Seminar—2 hours. Prerequisite(s): ENT 153 Discussions of parasitology, ecology and epidemiology related to vectors of pathogens causing disease in humans and animals. May be repeated up to 1 time(s). Effective: 2013 Fall Quarter.

ENT 292—Current Topics in Insect Physiology and Behavior (2)
Seminar—2 hours. Prerequisite(s): ENT 102 if topic is physiology, a course in behavior if topic is behavior, or either if topic bridges both. Analysis of contemporary advances in insect physiology, biochemistry and/or behavior. Interpretation and description of physiological and behavioral mechanisms and functions. Application of general principles to solution of problems in the laboratory and field. May be repeated up to 8 unit(s) topic differs. Effective: 2013 Fall Quarter.

ENT 293N—Current Topics in Insect Biotechnology and Genomics (2)
Seminar—2 hours. Prerequisite(s): ENT 212 Discussion of advances in insect biotechnology, including genetic engineering and genomics. May be repeated up to 6 unit(s) topic differs. Effective: 2013 Fall Quarter.

ENT 294—Current topics in Insect Ecology, Evolution, and Systematics (2)
Seminar—2 hours. Prerequisite(s): ENT 103; General course in ecology or evolution. Discussions of advanced topics in ecology, evolution and systematics with emphasis on analysis of factors influencing the distribution, abundance, adaptations and evolutionary relationships of insects. Includes consideration of applications of basic theory (e.g. biological control). May be repeated up to 8 unit(s) topic differs. Effective: 2013 Fall Quarter.

ENT 295—Current Topics in Agricultural Entomology and Bee Biology (2)
Seminar—2 hours. Prerequisite(s): ENT 110 if topic relates to pests and beneficial predators; ENT 119 if topic is bee biology; either if topic bridges both. Discussion of advanced topics about the biology, ecology, behavior, and management of pest and beneficial insects. May be repeated up to 8 unit(s) if topic differs. Effective: 2013 Fall Quarter.

ENT 297N—Seminar in Entomology (1)
Seminar—1 hour. Weekly Entomology seminar. May be repeated up to 9 unit(s) topic differs. (S/U grading only.) Effective: 2013 Summer Quarter.

ENT 298—Group Study (1-5)
Variable. (S/U grading only.) Effective: 2013 Fall Quarter.

ENT 299—Research (1-12)
Variable. (S/U grading only.) Effective: 2013 Fall Quarter.

Medicine, School of

Medicine, School of | SOM Information

School of Medicine Dean's Office. Education Building; 4610 X Street, Sacramento, CA 95817; http://www.ucdmc.ucdavis.edu/medschool/

Faculty. http://www.ucdmc.ucdavis.edu/search/faculty/searchdetail.asp?searchtype=3

Medicine, School of | SOM Program

School of Medicine Dean's Office. Education Building; 4610 X Street, Sacramento, CA 95817; http://www.ucdmc.ucdavis.edu/medschool/

Faculty. http://www.ucdmc.ucdavis.edu/search/faculty/searchdetail.asp?searchtype=3

Curriculum for the School of Medicine

The curriculum for the M.D. degree at the UC Davis School of Medicine is a four-year program providing comprehensive preparation for graduate medical training (internships and residencies) and the practice of medicine. It offers a blend of basic science training and clinical experience with opportunities for research.

The first-year curriculum begins in August and extends into May and is organized into two blocks, Foundations and Mechanisms & Diseases. The basic science portion of the Foundations block includes courses in Molecular Biology, Cell and Tissue Biology, GrossAnatomy/Embryology/Radiology, and Human Physiology. The major organizing theme is structure-function along the continuum of hierarchical biologic structure from molecule to cell, tissue and major organ systems. The three-year Doctoring curriculum begins with Doctoring 1, which is presented concurrently with the other courses. The focus of Doctoring 1 is physical examination training using standardized patients and models, correlated with concurrent gross anatomy and physiology by organ system. Behavioral medicine, epidemiology, biostatistics, cross-cultural medicine, and ethics are woven into the cases and didactic presentations and team-based learning modules. Students are required to attend preceptorships in the community and participate in home visits. Periodic quizzes and review sessions are used in the basic science courses throughout the block for formative assessment, and all courses administer comprehensive summative final examinations in December.

The Mechanisms & Disease block of the first-year curriculum begins in January and extends through April, with final exams in early May. There are two major threads, each of which is composed of several integrated courses. The Doctoring 1 course is offered concurrently. The Immunology/Microbiology/Pharmacology/Pathology thread presents an introduction to host defense, infection, basic pharmacologic principles, and general pathologic processes. The Endocrinology/Nutrition/Reproduction/Genetics (ENRG) thread covers essential concepts ingenetics, basic and clinical nutrition, reproductive medicine, and clinical endocrinology. The general pathology course also includes male-female GU and endocrine pathology, and the pharmacology course covers antibiotics and endocrine pharmacology, with the goal of integration with concurrent courses. Periodic quizzes and review sessions provide formative feedback, and final examinations are used for summative assessment. The Doctoring 1 course continues with an emphasis on interviewing skills and clinical assessment. Cases are used in the problem-based learning approach for basic-science-clinical correlation, and for the exploration of psychosocial issues. Preceptorships and home visits continue. The Doctoring 1 course concludes with a comprehensive final examination, and also includes an observed complete history and physical examination.

The first-year curriculum ends with a five-week unscheduled block that may be used for vacation, remediation, electives, research, and international experiences.

The second-year curriculum is composed of two blocks-, Brain & Behavior and Pathophysiology. Brain & Behavior begins in late June and extends through August with a

neurosciences block composed of integrated neuroanatomy-clinical neurosciences. The latter emphasizes the pathophysiology of common neurological disorders. The systemic pathology curriculum continues with a focus on neuropathology, and the pharmacology course covers neuropharmacology. A clinical psychiatry course is also presented during this period. The Doctoring 2 course begins, focusing on advanced clinical skills and clinical reasoning using a combination of standardized patient assessments, problem-based learning, subspecialty physical examination sessions, preceptorships, and didactics in clinical epidemiology, medical economics, and socio-behavioral medicine. The Pathophysiology Block is devoted to compressed pathophysiology courses with tight integration of the systemic pathology and pharmacology courses. The courses are organized according to organ system (cardiovascular, pulmonary, renal, musculoskeletal system, hematology, gastroenterology, oncology, and dermatology). The Doctoring 2 curriculum continues concurrently with its focus on advanced clinical skills, epidemiology, ethics, and problem-based assessment. History taking and physical diagnosis skills are correlated with the ongoing pathophysiology courses. Like the first year, all of the second-year courses utilize periodic quizzes and review sessions and a comprehensive final examination. The Doctoring 2 course includes an objective structured clinical examination (OSCE) using standardized patients at the end of the course series.

The second-year curriculum ends in February and is followed by a six-week, unscheduled block for preparation for USMLE Step 1, remediation, electives, and vacation.

The third-year program begins in April and includes six required clerkship rotations in the clinical specialties. Clerkships in surgery, internal medicine, obstetrics & gynecology, pediatrics, and psychiatry run for 8 weeks each. A four-week family medicine clerkship and a four-week selective are also required. In addition to the core clerkships, students will participate in a longitudinal primary care clinic throughout the third year. The third-year Doctoring program consists of longitudinal small groups led by faculty members who remain with their group throughout the year as the students rotate through their clerkships. Doctoring 3 themes include advanced interviewing techniques, clinical reasoning, clinical epidemiology, evidence-based medicine, and ethics/jurisprudence. Students must take a comprehensive clinical skills examination at the end of the third year which features self-assessment and faculty feedback.

The fourth-year curriculum features built-in flexibility to allow students to individualize their medical careers. The early start to the fourth year in May allows students to pursue electives for early exposure to clinical specialties or to complete clerkships which may have been deferred. All students are required to select a minimum of 32 weeks of clinical electives in addition to a single 4-week special study module or scholarly project. The Special Study modules are designed to integrate basic sciences with clinical sciences, provide opportunities for students to practice and refine fundamental skills in critical appraisal and analysis of emerging scientific developments, and to allow students to focus in-depth on a multidisciplinary topic of special interest to the student. The Scholarly Project requires independent inquiry with faculty mentorship and leads to a publishable manuscript and student presentation of the project at a research forum held in the winter.

Individual student programs are designed under the guidance of college directors, mentors and faculty advisers, with the support of the Career Advising Office. Each student's fourth year program must be approved by the Fourth Year Oversight Committee to ensure appropriate breadth, depth, and vigor. There are strict guidelines for the choices and time allowed away from the home institution. To satisfy the M.D. degree program, the student must successfully complete the required course work, clerkships, and fourth-year requirements. Students must pass USMLE Step 1, USMLE Step 2 CS and CK, and complete the fourth-year clinical performance examination. In addition to the fourth-year elective program available, there is the opportunity for students to select from a variety of electives during the first two years. Examples include electives in history of ethics and medicine, medical Spanish and insights in clinical research. Most students also participate in one of several student-run, community clinics for elective credit during their first and second years.

Coordination with other Advanced Degree Programs

The curriculum for the M.D. degree provides flexibility and encourages coordination with other advanced degree programs (Ph.D., M.S., M.A., M.B.A., and M.P.H.). These programs offer a wide breadth of study areas and draw upon the considerable expertise of the entire campus faculty. The Department of Public Health Sciences offers an M.P.H. program in conjunction with the M.D. program. This program is designed for students interested in disease prevention and community health, health professionals and State Health Department employees.

Medicine, School of | SOM Requirements

Required Curriculum for the M.D. Degree **Units:** 0

The following listing is the typical sequencing of all courses required for earning the M.D. degree. Course descriptions are given under the individual departmental course offerings.

First-Year Required Courses **Units:** 62

Year 1, Foundations Block

BCM 410A	Molecular Medicine	4
CHA 400	Developmental, Gross & Radiologic Anatomy	7.5
HPH 400	Human Physiology	6
CHA 402	Cell and Tissue Biology	4.5
MDS 411	Doctoring 1	9

Year 1, Mechanisms & Disease Block

MMI 480A	Medical Immunology	2.5
MMI 480B	Medical Microbiology	5.5
PMD 410A	General and Endocrine Pathology	2.5
PHA 400A	Pharmacology	2
MDS 406	Endocrinology, Nutrition, Reproduction and Genetics	9.5
MDS 411	Doctoring 1	9

Second-Year Required Courses **Units:** 57

Year 2, Brain & Behavior Block

CHA 403	Medical Neuroanatomy	5
PMD 410B	Systemic Pathology	1
PHA 400B	Pharmacology	1.5
NEU 420	Clinical Neurosciences	2
MDS 428	Foundations of Bioethics	1
PSY 403	Fundamentals of Clinical Psychiatry	3
MDS 421A	Doctoring 2	6

Year 2, Pathophysiology Block

DER 420	Integumentary System	2
IMD 420D	Cardiovascular System	2.5
IMD 420C	Pulmonary & Critical Care Medicine	2.5
IMD 420E	Nephrology	2
IMD 420A	Hematology	2
PMD 410C	Systemic Pathology	2
PMD 410D	Systemic Pathology	2.5
PHA 400C	Pharmacology	3.5
HON 420	Oncology	4
IMD 420B	Gastrointestinal System	2.5
MDS 421B	Doctoring 2	6
MDS 421C	Doctoring 2	6

Third- and Fourth-Year Required Courses **Units:** 75-81

MDS 429	Transition to Clerkships	1

Required Third-Year Clerkships

IMD 430	Medicine Clerkship	12
SUR 430	Surgery Clerkship	12
PED 430	Pediatric Clerkship	12
FAP 430	Family Medicine Clerkship	6-12
FAP 431A	Primary Care Continuity Clinic	1
FAP 431B	Primary Care Continuity Clinic	1
FAP 431C	Primary Care Continuity Clinic	1
FAP 431D	Primary Care Continuity Clinic	1
OBG 430	Obstetrics and Gynecology Clerkship	12
PSY 430	Psychiatry Clinical Clerkship	12
MDS 430A	Doctoring 3	1
MDS 430B	Doctoring 3	1
MDS 430C	Doctoring 3	1
MDS 430D	Doctoring 3	1

Fourth-Year Requirements

Thirty-six weeks of Required Course work comprised of the following specifics:

Four weeks of an Inpatient Acting Internship from one of the following departments at UC Davis: Internal Medicine, OB-GYN, Pediatrics, Surgery, Family & Community Medicine and Psychiatry.
Four weeks of Inpatient or Ambulatory Acting Internship in any department/discipline.
Four weeks of Special Studies Module or Scholarly Project.
Four weeks of Emergency Medicine.
Twenty weeks of additional Acting Internships, Advanced Clinical Clerkships or Clinical Didactics.
Sixteen weeks must be taken at UC Davis.
Twenty-eight weeks must be in direct patient care.

Medicine, School of | SOM Courses

Courses in School of Medicine:

ANE 192—Internship in Anesthesiology (1-6)
Internship—3-18 hours; Project (Term Project). Prerequisite(s): Upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in anesthesia and related fields. (P/F grading only.) Effective: 1997 Winter Quarter.

ANE 199—Special Study for Advanced Undergraduates (1-5)
Variable—3-15 hours. May be repeated for credit. (P/NP grading only.) Effective: 2007 Fall Quarter.

ANE 435—Primary Care Multidisciplinary Pain Management (3)
Clinical Activity. Rotation will give 3rd year primary-care bound students an overview of the scope of Pain Medicine. May be repeated for credit. (H/P/F grading only.) Effective: 2016 Fall Quarter.

ANE 455—Externship in Anesthesiology (3-6)
Clinical Activity. Prerequisite(s): Consent of Instructor. Away clinical rotation in Anesthesiology or Pain Medicine. (H/P/F grading only.) Effective: 2017 Summer Quarter.

ANE 460—Anesthesiology Clinical Clerkship (3-18)
Discussion—2 hours; Practice—10 hours; Variable—30 hours. Prerequisite(s): Consent of Instructor. Medical student. In-depth exposure to anesthesia through informal lectures and mentoring by anesthesiologists. Emphasis on understanding and applying anesthetic principles in managing administration of general, regional, and specialized areas. (H/P/F grading only.) Effective: 1997 Spring Quarter.

ANE 461—Perioperative Medicine (3-12)
Clinical Activity—30 hours. Prerequisite(s): Successful completion of third-year clerkships; consent of IOR. Two week rotation provides a broad exposure to various patient care services within the Department of Anesthesiology and Pain Medicine to apply medical knowledge to safely care for patients. (H/P/F grading only.) Effective: 2011 Spring Quarter.

ANE 462—Perioperative Management of the Obstetric Patient (3-6)
Variable—2 hours. Prerequisite(s): Consent of Instructor. Perioperative Management of Obstetric Patient advanced clinical clerkship will offer the medical student the chance to understand and be able to apply the principles of basic science into major improvements in obstetric anesthesia patient care. May be repeated for credit. (H/P/F grading only.) Effective: 2018 Spring Quarter.

ANE 463—Multidisciplinary Pain Management (6)
Clinical Activity—30 hours; Lecture/Discussion—10 hours. Prerequisite(s): Senior medical student in good standing. Senior clerkship to expose students to all facets of treating pain in all aspects of clinical care: outpatient and inpatient settings, acute and chronic pain, end of life issues, pediatrics, rehabilitation, etc. Daily clinics, rounds, and lectures. (H/P/F grading only.) Effective: 1999 Summer Quarter.

ANE 464—Multidisciplinary Approach to the Neurosurgical Patient (3-9)
Clinical Activity—40 hours. Prerequisite(s): Consent of Instructor. Participate in the perioperative care of patients undergoing neurosurgical procedures while under the supervision of anesthesia, neurology and neurosurgical ICU residents and attending physicians. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Winter Quarter.

ANE 465—Away Acting Internship in Anesthesiology (3-18)
Clinical Activity—40 hours; Variable—3-18 hours. Prerequisite(s): Consent of Instructor. Satisfactory completion of Anesthesiology Clerkship. Work at the level of a sub intern in Inpatient and/or Outpatient settings. Expectation is to provide direct patient management. May be repeated for credit. (H/P/F grading only.) Effective: 2010 Summer Quarter.

ANE 480—Brief Introduction to Clinical Anesthesiology and Chronic Pain Management (3)
Clinical Activity—30 hours. Prerequisite(s): Second-year medical student. Daily experience in clinical anesthesiology at the preoperative screening unit, operating room, post anesthesia care unit, chronic pain management clinic with daily clinical correlation case discussions, and one-on-one interaction with faculty anesthesiologists. (H/P/F grading only.) Effective: 1997 Spring Quarter.

ANE 493A—Applied Physiology and Pharmacology (6)
Clinical Activity—4 hours; Laboratory—16 hours; Lecture—5 hours; Lecture/Lab—10 hours. Prerequisite(s): Consent of Instructor. UC Davis School of Medicine students only. Review and demonstrate the application of basic physiology and pharmacology to patient care. There will be an in-depth analysis of the physiology and pharmacology of the cardiovascular, pulmonary, nervous, renal and endocrine systems. (H/P/F grading only.) Effective: 2007 Winter Quarter.

ANE 493B—Interdisciplinary Medicine in Pain Care (6)
Clinical Activity—4 hours; Laboratory—16 hours; Lecture—5 hours; Lecture/Lab—10 hours. Prerequisite(s): Consent of Instructor. UC Davis School of Medicine students only. Integrate applied and practical neuroanatomy, physiology, pharmacology, psychology/psychiatry and social medicine in the care of patients who are receiving care for pain caused by acute or chronic medical disease or trauma. (H/P/F grading only.) Effective: 2007 Spring Quarter.

ANE 498—Individual or Group Study (1-5)
Discussion—1-5 hours; Laboratory—2-10 hours. Prerequisite(s): Interns and residents with consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics. (H/P/F grading only.) Effective: 1997 Winter Quarter.

ANE 499—Anesthesiology Research (1-18)
Laboratory—12-54 hours. Prerequisite(s): Third- or fourth-year medical students, advanced standing undergraduate and veterinary medicine students; or consent of instructor. Problems in clinical and/or laboratory research. May be repeated for credit. (H/P/F grading only.) Effective: 2018 Spring Quarter.

BCM 092—Internship in Biological Chemistry (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Supervised work experience in biological chemistry and related fields (P/NP grading only.) Effective: 1997 Winter Quarter.

BCM 192—Internship in Biological Chemistry (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project prior to internship by preceptor. Supervised work experience in Biological Chemistry and related fields. (P/NP grading only.) Effective: 1997 Winter Quarter.

BCM 198—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. For undergraduate students desiring to explore particular topics in depth. Lecture and conferences may be involved. (P/NP grading only.) Effective: 1997 Winter Quarter.

BCM 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

BCM 209—Prostaglandins/Leukotrienes and Related Lipids (2)
Lecture—2 hours. Prerequisite(s): (BCP 101A and BCP 101B) or (PHC 101A and PHC 101B) or (PGG 100A and PGG 100B). Oxidative desaturation/elongation of polyunsaturated fatty acids. Biosynthesis of prostaglandins/leukotrienes from polyunsaturated fatty acids. Chemistry, biochemistry, and metabolism. Nutritional regulation. Physiological/pathophysiological implications; pharmacological and clinical relevance. Effective: 1997 Winter Quarter.

BCM 217—Molecular Genetics of Fungi (3)
Lecture—3 hours. Prerequisite(s): PLP 130; PLP 215X; BCP 101B; BOT 119; GGG 100; GGG 102A; Graduate standing in a biological science; MIC 215 recommended. Advanced treatment of molecular biology and genetics of filamentous fungi and yeasts, including gene structure, organization and regulation; secretion; control of reproduction; molecular evolution; transformation; and gene manipulation. (PLP 217.) Effective: 1997 Winter Quarter.

BCM 222—Mechanisms of Translational Control (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): BCP 201C or Consent of Instructor. Molecular mechanisms of protein synthesis and translational control in eukaryotic cells, with emphasis on mammalian cells and their viruses. An advanced graduate-level treatment of topics of current interest, with readings and discussion of primary papers from the literature. Effective: 1997 Winter Quarter.

BCM 230—Practical NMR Spectroscopy and Imaging (1)
Lecture—1 hour. Prerequisite(s): CHE 107A; CHE 107B; (PHY 009A, PHY 009B, PHY 009C; or PHY 005A, PHY 005B, PHY 005C) or consent of instructor. Basic theory, experimental methods, and instrumentation of NMR. Enables students to understand NMR spectroscopy and imaging experiments. (S/U grading only.) Effective: 1997 Winter Quarter.

BCM 231—Biological Nuclear Magnetic Resonance (3)
Lecture—3 hours. Prerequisite(s): MCB 221A; Or equivalent or consent of instructor. Principles and applications of magnetic resonance in biomedicine. Fundamental concepts and the biophysical basis for magnetic resonance
applications in areas of tissue characterization/imaging, metabolic regulation, and cellular bioenergetics. (BPH 231.) Effective: 1997 Winter Quarter.

BCM 291—Seminar in Genetic Approaches to Pathogenesis of Human Disease (1)
Seminar—1 hour. Prerequisite(s): Student in Genetics Graduate Group or consent of instructor. Current genetic approaches to understanding the pathogenesis of disease and mammalian development presented and critically discussed by faculty, fellows and students. Topics include Mendelian and non-Mendelian diseases, imprinting, homologous recombination, statistical methods, genetic epidemiology and cell cycle dependent expression. (BCM 491.) (S/U grading only.) Effective: 1999 Fall Quarter.

BCM 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be involved. Effective: 1997 Winter Quarter.

BCM 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

BCM 410A—Molecular Medicine (4)
Discussion—3 hours; Lecture—3 hours; Web Virtual Lecture—1 hour. Prerequisite(s): Consent of Instructor. Restricted to Medical Students only. Biochemistry of proteins and nucleic acids. Includes an introduction to cancer biology and a full discussion of carbohydrate metabolism. Molecular aspects of human disease are highlighted throughout the course. (P/F grading only.) Effective: 2015 Summer Quarter.

BCM 491—Seminar in Genetic Approaches to Pathogenesis of Human Disease (1)
Seminar—1 hour. Prerequisite(s): Student in Genetics Graduate Group or consent of instructor. Current genetic approaches to understanding the pathogenesis of disease and mammalian development presented and critically discussed by faculty, fellows and students. Topics include Mendelian and non-Mendelian diseases, imprinting, homologous recombination, statistical methods, genetic epidemiology and cell cycle dependent expression. (BCM 291.) (H/P/F grading only.) Effective: 1999 Fall Quarter.

BCM 493—Medical Genomics (6)
Clinical Activity—4 hours; Laboratory—12 hours; Lecture—4 hours. Prerequisite(s): Consent of Instructor. Four-week module will focus on the clinical methods and applications of medical genomics. Topics will include an introduction to the human genome and human genomics, genetic and epigenetic variation and the ethics of medical genomics. (H/P/F grading only.) Effective: 2012 Spring Quarter.

BCM 497T—Tutoring in Biological Chemistry (1-5)
Tutorial—3-15 hours. Prerequisite(s): Advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum of the School of Medicine. (H/P/F grading only.) Effective: 1997 Winter Quarter.

BCM 498—Group Study (1-5)
Variable. Prerequisite(s): Medical students with consent of instructor. (H/P/F grading only.) Effective: 1997 Winter Quarter.

BCM 499—Research (1-12)
Variable. Prerequisite(s): Medical students with consent of instructor. Research with Department of Biological Chemistry. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

CHA 101—Human Gross Anatomy (4)
Lecture—4 hours. Prerequisite(s): BIS 002A; Concurrent enrollment in EXB 106L or CHA 101L strongly recommended. Upper division students only; Pass One open to upper division Exercise Biology or Anthropology majors only; Pass Two open to Seniors in any major; open enrollment at the start of the quarter for upper division students in any major. Detailed study of the gross anatomical structure of the human body, with emphasis on function and clinical relevance to students entering health care professions. (EXB 106.) GE credit: SE. Effective: 2010 Fall Quarter.

CHA 101L—Human Gross Anatomy Laboratory (3)
Laboratory—9 hours. Prerequisite(s): BIS 002A; (EXB 106 (can be concurrent) or CHA 101 (can be concurrent)); If EXB 106 or CHA 101 is not taken concurrently, it must have been already completed. Upper division students only; Pass One open to upper division Exercise Biology or Anthropology majors only; Pass Two open to Seniors in any major; open enrollment at the start of the quarter for upper division students in any major; mandatory attendance on first day of lab. Detailed study of prosected human cadavers in small group format with extensive hands-on experience. (EXB 106L.) GE credit: SE. Effective: 2010 Fall Quarter.

CHA 102—Human Microscopic Anatomy: Structure and Function of Human Tissues and Organ Systems (4.5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): BIS 104 Limited enrollment. Course complements Gross Anatomy by extending the study of structure to the microscopic level. Shows how cells are assembled into tissues, and tissues into organs, with an emphasis on demonstrating how microscopic structure explains function. GE credit: SE. Effective: 2017 Winter Quarter.

CHA 103—Human Clinical Neuroanatomy (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHA 101; or Consent of Instructor. Open to upper division students. Clinically relevant anatomy of the normal human nervous system, including external and internal anatomy of the brain, spinal cord, and cranial nerves. Blood supply to the brain and spinal cord. Functional neuroanatomy of motor, sensory, and cognitive systems. Application of neuroanatomical principles relevant to clinical problem solving for students entering health care professions. (NEU 103.) GE credit: SE. Effective: 2018 Spring Quarter.

CHA 192—Internship in Morphology (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; laboratory science experience including some chemistry; approval of project by preceptor prior to period of internship. Experience of supervised internship in research laboratories of members of the department. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHA 197T—Tutoring in Cell Biology and Human Anatomy (1-5)
Discussion—1 hour; Laboratory—6-9 hours. Prerequisite(s): CHA 101 B or better; and Consent of Instructor. Provides laboratory instruction in gross and microscopic human anatomy, with small groups of undergraduates under the supervision of the instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHA 198—Directed Group Study (1-5)
Discussion—1-10 hours. Prerequisite(s): Consent of Instructor. Directed reading, discussion, and/or laboratory experience on selected topics. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHA 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHA 200—Graduate Human Gross Anatomy (6)
Laboratory—6 hours; Lecture—4 hours. Prerequisite(s): Consent of Instructor. Open only to full-time graduate students. Lectures on human gross anatomy and cadaver dissection laboratory. Topics arranged by region; emphasis on osteology, neuromuscular anatomy, cardiovascular anatomy, gastrointestinal anatomy and anatomy of reproductive systems. Only 2 units of credit for students who have completed CHA 101. Effective: 2008 Winter Quarter.

CHA 202—Microscopic Anatomy for Researchers (3)
Discussion/Laboratory—3 hours; Lecture—2 hours. Open to graduate students in the biomedical sciences (no consent required); advanced undergraduates seeking research careers in the biomedical sciences (consent of instructor required). The growing importance of the use of gene knock-out studies and imaging technology requires significant understanding of basic anatomy. Designed to familiarize students in diverse fields with anatomical, cellular and tissue organization of typical animal models. Effective: 2017 Spring Quarter.

CHA 203—Neurobiology (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Two upper division or one graduate course in Neurobiology. Physiology and anatomy of the normal human nervous system in an integrated format. Effective: 2004 Spring Quarter.

CHA 290—Seminar (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

CHA 290C—Research Group Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate student with research experience (may be taken concurrently). Discussion of problems, progress and literature groups relevant to current research undertaken by laboratory groups Human Anatomy. (S/U grading only.) Effective: 1997 Winter Quarter.

CHA 298—Advanced Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Effective: 1997 Winter Quarter.

CHA 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

CHA 400—Developmental, Gross & Radiologic Anatomy (7.5)
Laboratory—5 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Medical students only. Integrated presentation of developmental, gross and radiologic anatomy. Embryology and radiology correlated with the dissection of the entire body. Embryology from implantation to birth. (P/F grading only.) Effective: 2011 Summer Quarter.

CHA 402—Cell and Tissue Biology (4.5)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Medical student only. Microscopic structure of the basic cells, tissues and organs of the body with an emphasis on how structure explains function. Analysis and identification of sectioned material at the light microscopic and ultrastructural levels. (P/F grading only.) Effective: 2011 Summer Quarter.

CHA 403—Medical Neuroanatomy (5)
Discussion/Laboratory—1 hour; Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): CHA 400; Block 1. Restricted to medical students only. Anatomy of the normal human nervous system, to include gross external and internal morphology of brain and spinal cord, and function neuroanatomy of motor, sensory and cognitive systems. Incorporates application of neuroanatomy to clinical problem solving. (HPH 403.) (P/F grading only.) Effective: 2007 Summer Quarter.

CHA 493B—Anatomy Medical Education Special Study Module (6)
Auto Tutorial—6 hours; Clinical Activity—14 hours; Independent Study—10 hours; Seminar—10 hours. Prerequisite(s): Consent of Instructor. UC Davis School of Medicine students only. Attend all of the lectures and laboratory sessions for course 400 and 402 during the four-week section (approximately seven anatomy labs and three to four histology labs);tutor first-year students during the laboratory sessions; prepare and present a clinical correlate session. (H/P/F grading only.) Effective: 2007 Spring Quarter.

CHA 497T—Tutoring in Human Anatomy (1-5)
Tutorial—3-15 hours. Prerequisite(s): Advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum for the School of Medicine. (H/P/F grading only.) Effective: 1997 Winter Quarter.

CHA 498—Advanced Group Study (1-12)
Variable. Prerequisite(s): Medical students, interns, and residents with consent of instructor. Directed reading and group discussions and/or laboratory experience on selected topics. (H/P/F grading only.) Effective: 1997 Winter Quarter.

CHA 499—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (H/P/F grading only.) Effective: 1997 Winter Quarter.

CLH 200—Introduction to Clinical Research (3)
Independent Study—3 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. One of the following degrees: MD, DDS, DMD, OD, ND, DO, PharmD, DVM, PhD or DNS in nursing. Application and acceptance into the Clinical Research Graduate Group, K30 program or other SOM/CTSC training programs. Introduction to the CRGG program and overview of major clinical research topics. Overview of basic clinical skills needed to accomplish CRGG mentored research project. (S/U grading only.) Effective: 2008 Summer Special Session.

CLH 201—Strategies for Grant Writing (2)
Lecture—2 hours. Prerequisite(s): Consent of Instructor. Completed one of the following degrees: MD, DDS, DMD, OD, ND, DO, PharmD, DVM, PhD or DNS in nursing. Application and acceptance into the Clinical Research Graduate Group, K30 program or other SOM/CTSC training program. Practical skills and strategies to create successful grant proposals in NIH style/format. Generating ideas, identifying and accessing research resources, grant components, specific aims, background and significance, preliminary studies, budgets, and bios. Matriculation through UC system, and resubmissions. (Former course MDS 461CR.) (S/U grading only.) Effective: 2008 Summer Special Session.

CLH 202—Introduction to Clinical Epidemiology and Study Design (3)
Discussion—10 hours; Lecture—25 hours. Prerequisite(s): Consent of Instructor. Completed one of the following degrees: MD, DDS, DMD, OD, ND, DO, PharmD, DVM, PhD or DNS in nursing; application and acceptance into the Clinical Research Graduate Group, (K30) program, or other SOM/CTSC training programs. Anatomy and physiology of conducting clinical epidemiologic research. Familiarity with three basic study designs (cross-sectional, case-control, and cohort). Discussion of principles of measurements in clinical epidemiological studies, basic methods for analyzing data, and ethical issues involved in conducting research. (S/U grading only.) Effective: 2008 Summer Special Session.

CLH 203—Methods in Clinical Research (3)
Discussion—1 hour; Independent Study—10 hours; Lecture—4 hours. Prerequisite(s): Consent of Instructor. Completed one of the following degrees: MD, DDS, DMD, OD, ND, DO, PharmD, DVM, PhD or DNS in nursing; application and acceptance into the Clinical Research Graduate Group, K30 program or other SOM traing programs. Overview of major approaches to clinical research, including health services research techniques, informatics, GCRC, and preclinical methodologies to enhance clinical projects. Overview of UCD clinical research support infrastructure. Methodologies applicable to clinical research and its multi-disciplinary perspective. (S/U grading only.) Effective: 2015 Spring Quarter.

CLH 204—The Ethics of Research (1)
Lecture—1 hour. Prerequisite(s): Consent of Instructor. Priority given to those with acceptance into the Clinical Research Graduate Group, K12, T32 or other SOM/CTSC training program. Acquire information about ethical responsibilities; Explore major questions in ethics; Apply ethical principles, concepts and values; Gain an appreciation of the role of trust in scientific research. Recommend three quarters of CLH204. Must enroll in Fall to continue through Spring. May be repeated up to 3 unit(s). (S/U grading only.) Effective: 2016 Fall Quarter.

CLH 207—Team Science (1)
Lecture/Discussion—1 hour. Prerequisite(s): Participation in CTSC Research Education and Training Programs, or consent of instructor. Restricted to 25 students. Today's scientific challenges necessitate cross-disciplinary engagement and high collaboration levels. This course offers guidance on how best to engage in team science to pursue complex questions, work effectively with team members, and produce high impact research that meets society's needs. (S/U grading only.) Effective: 2015 Winter Quarter.

CLH 208—Introduction to Grant Writing, I (2)
Extensive Writing; Lecture/Discussion—2 hours. First in a two-quarter series. Scholars are encouraged to enroll in both classes. The two-course sequence provides training in practical aspects of competitive grant writing. The focus is NIH, but information will apply to other funding agencies. (S/U grading only.) Effective: 2014 Fall Quarter.

CLH 209—Introduction to Grant Writing, II (1)
Lecture/Discussion—1 hour. Prerequisite(s): CLH 208; Consent of Instructor. Restricted to students who have completed course 208. Second in a two-quarter series. Two-course sequence provides training in practical aspects of competitive grant writing. (S/U grading only.) Effective: 2016 Fall Quarter.

CLH 210Y—Principles and Methods of Comparative Effectiveness Research (4)
Discussion—2 hours; Project (Term Project)—6 hours; Web Electronic Discussion; Web Virtual Lecture—4 hours. Prerequisite(s): Consent of Instructor. Familiarity with research methodology, and a course in introductory statistics. Provides an introduction to Comparative Effectiveness Research (CER) and methods for conducting CER. (S/U grading only.) Effective: 2015 Winter Quarter.

CLH 211—Critical Assessment of the Biomedical Literature (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Exposes students to topical issues and controversies in the design of interdisciplinary translational research, with an emphasis on critical assessment of the biomedical and health sciences literature. The course extends students' knowledge of study design through practical application. May be repeated up to 3 unit(s). (S/U grading only.) Effective: 2016 Fall Quarter.

CLH 212—Introduction to Stem Cell Biology (3)
Lecture/Discussion—3 hours. Open to graduate students with a fundamental knowledge of cell biology. Introduction to Stem Cell Biology. Each week will focus on different aspects of stem cells, including general concepts, stem cells in lower organisms, embryonic stem cells and cellular reprogramming. Effective: 2016 Spring Quarter.

CLH 214A—Biodesign I (2)
Lecture—2 hours. Prerequisite(s): Consent of Instructor. Prior approval by instructor required; student must commit to taking both courses; Biodesign I and Biodesign II. Focuses on the principles of needs identification and invention of biomedical technologies. Two part course provides a basic understanding of the elements of the innovation process and how to translate these principles into biomedical device design. Effective: 2016 Fall Quarter.

CLH 214B—Biodesign II (2)
Lecture—2 hours. Prerequisite(s): CLH 214A; Consent of Instructor. Prior approval by instructor required; student must commit to taking both courses; Biodesign I and Biodesign II. Focuses on the implementation of biomedical technologies and translational process. Two part course provides a basic understanding of the elements of the innovation process and how to translate these principles into biomedical device design. Effective: 2017 Winter Quarter.

CLH 220—Basics of Stem and Progenitor Cells (1)
Lecture—1 hour. Prerequisite(s): MCP 200L; MCP 200; Consent of Intructor; Graduate standing. This is a lecture course designed for graduate students who have experience in cell culture techniques. It is designed to give a broad overview of the field and current cells of interest to the greater research community. (S/U grading only.) Effective: 2007 Spring Quarter.

CLH 222—Ethical Issues in Stem Cell Biology (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Critical presentation and analysis of recent articles in stem cell biology and small group discussions of the ethical issues surrounding this area of research. (S/U grading only.) Effective: 2007 Winter Quarter.

CLH 230—Congestive Heart Failure, Mechanism of Disease (3)
Lecture/Discussion—2 hours; Project (Term Project). Prerequisite(s): Consent of Instructor. Graduate standing. Underlying mechanisms of cardiomyopathy and heart failure. Presentation of fundamental knowledge of and recent basic research on heart failure. Student team projects: investigation and presentation of a research topic and bench research project to advance research in the same area. Effective: 2008 Summer Session 1.

CLH 231—Current Techniques in Clinical Research (2)
Clinical Activity—3 hours; Lecture—1 hour. Prerequisite(s): CLH 250; and Consent of Instructor. Graduate standing. Current techniques used in clinical research such as electrophysiology, cardiovascular surgery, cardiac catheterization and echocardiography, team science, and patient management. Lectures are presented by experts on each technique, with an emphasis on use in translational research. (S/U grading only.) Effective: 2006 Fall Quarter.

CLH 233—Molecular Mechanisms of Disease: Cancer (3)
Lecture/Discussion—2 hours; Project (Term Project)—3 hours. Prerequisite(s): Consent of Instructor. Restricted to students pursuing the designated emphasis in Translational Research; graduate standing. Cutting edge of research on underlying mechanisms of cancer development, progression and prevention—clinical trials/drug development, signaling pathways and molecular mechanisms of cancer development, recent basic research on cancer stem cells, genetics and epigenetic events and animal models used. Effective: 2013 Fall Quarter.

CLH 240—Predoctoral Clinical Research Training Program Research Integration (1)
Discussion—0.5 hours; Seminar—0.5 hours. Prerequisite(s): Consent of Instructor. Enrollment in the Predoctoral Clinical Research Training Program in the CTSC, School of Medicine. Alternating sessions: journal club, seminar/discussion, and research integration sessions. May be repeated up to 3 time(s). (S/U grading only.) Effective: 2007 Fall Quarter.

CLH 244—Introduction to Medical Statistics (4)
Lecture—4 hours. Introduction to statistical methods and software in clinical, laboratory and population medicine. Graphical and tabular presentation of data, probability, binomial, Poisson, normal, t-, F-, and Chi-square distributions, elementary nonparametric methods, simple linear regression and correlation, life tables. Only one unit of credit for students who have completed STA 100 or MPM 402. (SPH 244.) Effective: 2017 Winter Quarter.

CLH 245—Biostatistics for Biomedical Science (4)
Lecture—4 hours. Prerequisite(s): CLH 244 or SPH 244; Consent of Instructor. Or equivalent. Analysis of data and design of experiments for laboratory data. (SPH 245.) Effective: 2015 Spring Quarter.

CLH 246—Biostatistics for Clinical Research (4)
Lecture—4 hours. Prerequisite(s): CLH 245 or SPH 245 Emphasizes critical biostatistics for clinical research and targets biomedical audience. Students will develop understanding for basic planning and analysis of clinical studies and learn to develop collaborations with biostatisticians. May be repeated for credit. (SPH 246.) Effective: 2015 Winter Quarter.

CLH 247—Statistical Analysis for Laboratory Data (4)
Lecture—4 hours. Prerequisite(s): CLH 245 or SPH 245 Statistical methods for experimental design and analysis of laboratory data including gene expression arrays, RNA-Seq, and mass spec. (SPH 247.) Effective: 2015 Spring Quarter.

CLH 250—Integrating Medicine Into Basic Science (6)
Clinical Activity—8 hours; Discussion—6 hours; Lecture—3.75 hours; Seminar—2.5 hours. Graduate standing; acceptance into HHMI Integrating Medicine into Basic Science program. Four-week summer institute consisting of didactic lectures, reading assignments, group discussions, and clinical rotations to acculturate students to the human medical environment; integrate medical principles, physiology and pathophysiology into basic research; introduce high-impact clinical studies related to medicine and health. (S/U grading only.) Effective: 2006 Fall Quarter.

CLH 290A—Hot Topics in Clinical Research (1)
Seminar—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Seminars presented by guest lecturers on subjects of their own research activities May be repeated for credit. (S/U grading only.) Effective: 2006 Fall Quarter.

CLH 290B—Hot Topics in Stem Cell Biology (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Seminars presented by guest lecturers on subjects of their own research (S/U grading only.) Effective: 2006 Fall Quarter.

CLH 290C—Literature in Stem Cell Biology (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Critical presentation and analysis of recent journal articles in stem cell biology by students. May be repeated for credit. (S/U grading only.) Effective: 2006 Fall Quarter.

CLH 290D—Literature in Translational Research (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Critical presentation and analysis of recent journal articles in translational research by students. May be repeated for credit. (S/U grading only.) Effective: 2009 Fall Quarter.

CLH 298—Group Study in Clinical Research (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Restricted to students enrolled in the Mentored Clinical Research Training Program. Special topics in Clinical Research appropriate for group study at the graduate level. May be repeated for credit. (S/U grading only.) Effective: 2006 Winter Quarter.

CLH 299—Clinical Research (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Restricted to students enrolled in the Mentored Clinical Research Training Program. Independent research and special topics in clinical research appropriate for graduate level. May be repeated for credit. (S/U grading only.) Effective: 2006 Fall Quarter.

DER 192—Internship in Cutaneous Biology (1-4)
Internship—8-20 hours. Prerequisite(s): Upper division standing or consent of instructor. Approval of project prior to internship by preceptor. Supervised work experience involving research on the skin. Final report. (P/NP grading only.) Effective: 1997 Winter Quarter.

DER 199—Special Study in Cutaneous Biology (1-4)
Variable. Prerequisite(s): Advanced undergraduate standing and/or consent of instructor. Special study by individual arrangement of specialized topics in biology of skin. Work may be assigned readings, laboratory research or a combination. (P/NP grading only.) Effective: 1997 Winter Quarter.

DER 299—Research in Cutaneous Biology (1-12)
Laboratory—3-36 hours. Prerequisite(s): Consent of Instructor. Independent research in cellular and biochemical mechanisms of cutaneous biology and pathology. (S/U grading only.) Effective: 1997 Winter Quarter.

DER 420—Integumentary System (2)
Clinical Activity—0.25 hours; Lecture/Discussion—3 hours. Prerequisite(s): Approval of School of Medicine Committee on Student Promotions. Restricted to Medical students only; student must have passed all SOM Year 1 courses. Cell biology, pathology, and physical diagnosis of the skin. Recognition of normal variations, and common or important dermatoses. Patient demonstrations of select conditions. (P/F grading only.) Effective: 2013 Fall Quarter.

DER 460—Dermatology Clinical Clerkship (3-9)
Clinical Activity—40 hours. Prerequisite(s): Completion of three years of medical school; or consent of instructor. Limited enrollment. Observation and participation in dermatology clinics/practice and participation in Ward Rounds and Dermatology Clinics at UC Davis Medical Center, Kaiser, and private practitioner offices. May be repeated for credit. (H/P/F grading only.) Effective: 2011 Summer Quarter.

DER 465—Specialty Externship in Dermatology (3-16)
Clinical Activity—30 hours. Prerequisite(s): Consent of Instructor. Externship provides in-depth exposure to one of a variety of sub-specialties in Dermatology. May be repeated for credit. (H/P/F grading only.) Effective: 2011 Summer Quarter.

DER 466—Away Acting Internship in Dermatology (3-18)
Clinical Activity—40 hours; Lecture—6 hours; Variable—3-18 hours. Prerequisite(s): Consent of Instructor. Work at the level of a sub intern in Inpatient and/or Outpatient settings. Expectation is to provide direct patient management. May be repeated for credit. (H/P/F grading only.) Effective: 2010 Summer Quarter.

DER 470—Introduction to Dermatopathology (6)
Clinical Activity—20 hours; Independent Study—20 hours; Lecture/Discussion—6 hours. Prerequisite(s): Consent of Instructor. Previous rotation in a Dermatology Clerkship. Restricted to fourth year medical student. Integrated, multi-specialty approach to the microscopic diagnosis of inflammatory and neoplastic skin disorders. (H/P/F grading only.) Effective: 2010 Spring Quarter.

DER 475—Telehealth in Dermatology (6)
Clinical Activity—4 hours; Project (Term Project)—36 hours. Restricted to Medical students. Introduction to the application of telehealth in dermatology to provide diagnoses, consultation, treatment, and education. Participate in teledermatology clinics with remote sites throughout California, conduct telehealth project(s), and review the latest literature in telehealth application in improving healthcare access. May be repeated up to 6 unit(s) for additional time needed to complete telehealth project or to work on new telehealth projects. (H/P/F grading only.) Effective: 2012 Winter Quarter.

DER 480—Insights in Dermatology (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. First- and second- year medical students in good academic standing. Clinical experience limited to observation of delivery of dermatologic care and attendance at some conferences. (H/P/F grading only.) Effective: 1997 Winter Quarter.

DER 495—Wound Healing: From Bench to Bedside (6)
Auto Tutorial—15 hours; Clinical Activity—12 hours; Laboratory—8 hours; Term Paper. Prerequisite(s): Consent of Instructor. Restricted to medical students only. An integrated, multi-specialty approach to clinical soft tissue wound healing. (H/P/F grading only.) Effective: 2001 Summer Quarter.

DER 498—Special Topics in Clinical Dermatology (1-6)
Independent Study—3-18 hours. Prerequisite(s): Medical students with consent of instructor. Individually arranged study of special topics in clinical dermatology
determined by student and instructor. Assigned readings and/or clinical examination of selected patients. (H/P/F grading only.) Effective: 1997 Winter Quarter.

DER 499—Research in Cutaneous Biology (1-12)
Laboratory—3-36 hours. Prerequisite(s): Consent of Instructor. Research, either laboratory or clinical, on ongoing projects within the department under supervision of faculty. (H/P/F grading only.) Effective: 1997 Winter Quarter.

FAP 092C—Primary Care Clinic (2)
Clinical Activity—8 hours; Lecture—2 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Enrollment at the UC Davis campus, for freshman and sophomore students. Students must apply and interview with the Board of Clinica Tepati or Imani Clinic. Field experience exposes lower division students to health care delivery, patient histories, physical examinations,health promotion, disease prevention, diagnosis; treatment of episodic,acute,chronic illness; appropriate referral and follow-up. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

FAP 192C—Primary Care Clinics (1-2)
Clinical Activity—6-8 hours; Lecture—1-2 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Enrollment at the UC Davis campus, upper-division standing. Students must apply and interview with the Board of Clinica Tepati or Imani Clinic. Field experience introduces students to health care delivery, patient histories and physical examinations, health promotions and disease prevention, diagnosis and treatment of episodic, acute and chronic illness, basic laboratory testing and appropriate referral and follow-up. May be repeated for credit. (P/NP grading only.) Effective: 2004 Fall Quarter.

FAP 195—Health Care to Underserved Populations (1)
Lecture—1 hour. Prerequisite(s): Sociology, political science, or applied behavioral science background recommended, or registration in medical school. Discusses sociocultural perspectives of underserved populations in California impacting their health; roles of family/interpersonal relationships in making health care decisions; and clinician's perspectives in treating people of cultures which are unfamiliar and/or uncomfortable with Western medicine. May be repeated for credit. (P/NP grading only.) Effective: 2011 Spring Quarter.

FAP 401—Introductory Preceptorship in Family Practice (3-9)
Clinical Activity—20-40 hours. Prerequisite(s): Completion of first-year of medical training. Preceptorship in family practice offered as an introduction to clinical
medicine. 20 hours or 40 hours per week in a family physician's office, doing patient interviews, historytaking, and performing physical exams. (H/P/F grading only.) Effective: 1999 Summer Quarter.

FAP 405—The Healer's Art (1)
Lecture—0.6 hours; Workshop—3 hours. Prerequisite(s): Consent of Instructor. Limited to first-year medical students. Learning to strengthen your humanity and remain open-hearted can make the difference between burnout and a fulfilling life. Learn tools for selfcare, healing, finding meaning, strengthening commitment and becoming a true physician. May be repeated for credit. (P/F grading only.) Effective: 2016 Fall Quarter.

FAP 411—Selected Studies of Systems for Chronic Illness Care (3)
Clinical Activity—4 hours; Discussion—4 hours. Prerequisite(s): FAP 400A; FAP 400B; FAP 400C; Medical students with consent of instructor. Understanding of chronic illness, particularly diabetes, participate in patient care, alternative techniques. May be repeated up to 1 time(s). (H/P/F grading only.) Effective: 2004 Spring Quarter.

FAP 430—Family Medicine Clerkship (6-12)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Approval by School of Medicine Committee on Student Progress. Family medicine clerkship for third year medical students. (H/P/F grading only.) Effective: 2015 Spring Quarter.

FAP 430FA—SJVP Longitudinal Family Medicine Clerkship (1.5-6)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Family Medicine Clerkship runs concurrently with Internal Medicine, Pediatrics and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 430FB—SJVP Longitudinal Family Medicine Clerkship (1.5-6)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Family Medicine Clerkship runs concurrently with Internal Medicine, Pediatrics and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 430FC—SJVP Longitudinal Family Medicine Clerkship (1.5-6)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Family Medicine Clerkship runs concurrently with Internal Medicine, Pediatrics and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 430FD—SJVP Longitudinal Family Medicine Clerkship (1.5-6)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Family Medicine Clerkship runs concurrently with Internal Medicine, Pediatrics and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 430R—Rural PRIME Family Medicine Longitudinal Clerkship (2)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Approval by School of Medicine Committee on Student Progress. Family Medicine Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 430RA—Rural PRIME Family Medicine Longitudinal Clerkship (3)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Consent of Instructor. Family Medicine Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 430RB—Rural PRIME Family Medicine Longitudinal Clerkship (3)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Consent of Instructor. Family Medicine Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 430RC—Rural PRIME Family Medicine Longitudinal Clerkship (3)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Consent of Instructor. Family Medicine Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 430RD—Rural PRIME Family Medicine Longitudinal Clerkship (1)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Consent of Instructor. Family Medicine Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 430TA—TeachMS Longitudinal Primary Care Clerkship (A) (4)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Internal Medicine and Psychiatry for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. (H/P/F grading only.) Effective: 2013 Fall Quarter.

FAP 430TB—TeachMS Longitudinal Primary Care Clerkship (B) (6)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Internal Medicine and Psychiatry for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. (H/P/F grading only.) Effective: 2013 Fall Quarter.

FAP 430TC—TeachMS Longitudinal Primary Care Clerkship (C) (2)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Internal Medicine and Psychiatry for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. (H/P/F grading only.) Effective: 2013 Fall Quarter.

FAP 431—Introduction to Primary Care Continuity Clinic (1)
Clinical Activity—4 hours; Project (Term Project)—1 hour. Prerequisite(s): Consent of Instructor. Completion of the Pre-Clinical Curriculum. Longitudinal component of the third-year primary care curriculum. Student attends their clinic roughly 18 half-days over the course of the year, working one-on-one with a primary care preceptor. (H/P/F grading only.) Effective: 2016 Fall Quarter.

FAP 431A—Primary Care Continuity Clinic (1)
Clinical Activity—4 hours; Project (Term Project)—1 hour. Prerequisite(s): Consent of Instructor. Completion of the Pre-Clinical Curriculum. Longitudinal component of the third-year primary care curriculum. Student attends their clinic roughly 18 half-days over the course of the year, working one-on-one with a primary care preceptor. (H/P/F grading only.) Effective: 2015 Spring Quarter.

FAP 431B—Primary Care Continuity Clinic (1)
Clinical Activity—4 hours; Project (Term Project)—1 hour. Prerequisite(s): Consent of Instructor. Completion of the Pre-Clinical Curriculum. Longitudinal component of the third-year primary care curriculum. Student attends their clinic roughly 18 half-days over the course of the year, working one-on-one with a primary care preceptor. (H/P/F grading only.) Effective: 2015 Spring Quarter.

FAP 431C—Primary Care Continuity Clinic (1)
Clinical Activity—4 hours; Project (Term Project)—1 hour. Prerequisite(s): Consent of Instructor. Completion of the Pre-Clinical Curriculum. Longitudinal component of the third-year primary care curriculum. Student attends their clinic roughly 18 half-days over the course of the year, working one-on-one with a primary care preceptor. (H/P/F grading only.) Effective: 2015 Spring Quarter.

FAP 431D—Primary Care Continuity Clinic (1)
Clinical Activity—4 hours; Project (Term Project)—1 hour. Prerequisite(s): Consent of Instructor. Completion of the Pre-Clinical Curriculum. Longitudinal component of the third-year primary care curriculum. Student attends their clinic roughly 18 half-days over the course of the year, working one-on-one with a primary care preceptor. (H/P/F grading only.) Effective: 2015 Spring Quarter.

FAP 431KA—ACE-PC Continuity Clinic (6)
Clinical Activity—40 hours. Prerequisite(s): Consent of Instructor. Longitudinal clinic component of the 2nd year of the ACE-PC Program. Students start off with a 4 week immersion experience and then 12 additional half-days over the course of the year, working one-on-one with a primary care preceptor. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 431KB—ACE-PC Continuity Clinic (0.5)
Clinical Activity—2 hours. Prerequisite(s): Consent of Instructor. Longitudinal clinic component of the 2nd year of the ACE-PC Program. Students start off with a 4 week immersion experience and then 12 additional half-days over the course of the year, working one-on-one with a primary care preceptor. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 431KC—ACE-PC Continuity Clinic (0.5)
Clinical Activity—2 hours. Prerequisite(s): Consent of Instructor. Longitudinal clinic component of the 2nd year of the ACE-PC Program. Students start off with a 4 week immersion experience and then 12 additional half-days over the course of the year, working one-on-one with a primary care preceptor. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 431KD—ACE-PC Continuity Clinic (0.5)
Clinical Activity—2 hours. Prerequisite(s): Consent of Instructor. Longitudinal clinic component of the 2nd year of the ACE-PC Program. Students start off with a 4 week immersion experience and then 12 additional half-days over the course of the year, working one-on-one with a primary care preceptor. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 434—Primary Care Clinics-Clínica Tepati (3-12)
Clinical Activity—32-36 hours; Lecture—1-2 hours; Seminar—0-2 hours. Open to medical students in all four years of medical school. Medical students will learn counseling, diagnosis and treatment of patients with chronic and acute disease under supervision of physician. Provides exposure to special health care needs of various ethnic and poverty-level populations. May be repeated for credit. (P/F grading only.) Effective: 2010 Winter Quarter.

FAP 435—Primary Care Clinics-Imani Clinic (3-12)
Clinical Activity—32-36 hours; Lecture—1-2 hours; Seminar—0-2 hours. Open to medical students in all four years of medical school. Learn counseling, diagnosis and treatment of patients with chronic and acute disease under supervision of physician. Provides exposure to special health care needs of various ethnic and poverty-level populations. May be repeated for credit. (P/F grading only.) Effective: 2010 Winter Quarter.

FAP 436—Continuity Clinic in Primary Care--Shifa Clinic (3-12)
Clinical Activity—32-36 hours; Lecture—1-2 hours; Seminar—0-2 hours; Variable. Open to medical students in all four years of medical school. Learn counseling, diagnosis and treatment of patients with chronic and acute disease under supervision of physician. Provides exposure to special health care needs of various ethnic and poverty-level populations. May be repeated for credit. (P/F grading only.) Effective: 2010 Winter Quarter.

FAP 437—Primary Care Clinics-Knights Landing (3)
Clinical Activity—3 hours; Lecture—1 hour. Must complete an application and interview prior to registering. Learn counseling, diagnosis and treatment of patients with chronic and acute disease under supervision of physician. Provides exposure to special health care needs of various ethnic and poverty-level populations in the community of Knights Landing. May be repeated for credit. (P/F grading only.) Effective: 2012 Winter Quarter.

FAP 439D—Directed Clinical Studies in Family Medicine (1-12)
Clinical Activity—40 hours. Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for modified curriculum or to complete a clinical rotation following a leave of absence. May be repeated for credit. (P/F grading only.) Effective: 2011 Spring Quarter.

FAP 439R—Directed Studies in Family Medicine (1-12)
Clinical Activity—30 hours; Independent Study—10 hours. Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for remediation of all or part of clinical rotation. Clinical studies to accommodate and satisfy remedial work as directed by the Committee on Student Progress and approved by the course IOR. May be repeated for credit. (P/F grading only.) Effective: 2011 Summer Quarter.

FAP 444—Advanced Preceptorship in Family Medicine (3-18)
Clinical Activity—40 hours. Prerequisite(s): Completion of third-year primary care plus clerkship or consent of instructor. Open to medical students only. Preceptorships with primary care physicians in a variety of settings. Acquisition skills to evaluate and devleop a treatment plan for patients with common medical problems seen by primary care physicians in an out patient setting. May be repeated up to 18 unit(s). (H/P/F grading only.) Effective: 2002 Fall Quarter.

FAP 450—CAM in Family & Community Health (3-18)
Variable—20-40 hours. Complementary and alternative medicine courses at away institutions that cover various aspects of integrative medicine, including but not limited to: botanicals, homeopathy, mind/body, naturopathy, nutrition, traditional Chinese medicine, osteopathy, and energy medicine. Intended to grant units for away rotations; not offered at the UC Davis Medical Center. (H/P/F grading only.) Effective: 2011 Winter Quarter.

FAP 460—Geriatrics in Community Health (3-6)
Clinical Activity—12 hours; Fieldwork—24 hours; Lecture—4 hours. Prerequisite(s): FAP 430 Visits to community agencies including mental health teams, adult day health centers, a diagnostic and research center, and case management specialists. Observation and participation in MMSE's, patient-family conferences, interdisciplinary team meetings, neuropsychiatric testing and home visit evaluations. (H/P/F grading only.) Effective: 2001 Spring Quarter.

FAP 468—International Preceptorship (3-12)
Clinical Activity—40 hours. Prerequisite(s): Medical students with consent of instructor. Preceptorship with a family practitioner in a foreign country (Arranged by student contact or with assistance of the Family and Community Medicine Department.) Participate in clinical activities, analyze and report characteristics of the practice. May be repeated up to 12 unit(s). (H/P/F grading only.) Effective: 2002 Fall Quarter.

FAP 469—Inpatient Acting Internship in Family Medicine (3-12)
Clinical Activity—40 hours. Prerequisite(s): Completion of third-year of medical school or consent of instructor. Open to medical students only. Comprehensive primary medical care of inpatients on a family medicine hospital service. Available sites are university-based family medicine residency programs and programs within the UC Davis Network of Affiliated Family Medicine Residency Programs. May be repeated up to 12 unit(s). (H/P/F grading only.) Effective: 2011 Spring Quarter.

FAP 470—Inpatient Clinical Elective in Family Medicine (3-12)
Clinical Activity—40 hours. Prerequisite(s): Completion of third-year of medical school or consent of instructor. Open to medical students only. Comprehensive primary medical care of patients on a family medicine hospital service. Usually includes inpatient and outpatient experience. May be repeated up to 12 unit(s). (H/P/F grading only.) Effective: 2011 Spring Quarter.

FAP 475—Combined Inpatient/Outpatient Clinical Elective in Family Medicine (3-12)
Clinical Activity—40 hours. Prerequisite(s): Completion of third-year of medical school or consent of instructor. Open to Medical students only. Combined inpatient and outpatient elective. Consists of comprehensive primary medical care of patients on a family medicine hospital service and in a family medicine outpatient clinic. May be repeated up to 12 unit(s). (H/P/F grading only.) Effective: 2011 Fall Quarter.

FAP 488—Selected Studies in Family Practice (1-9)
Variable—3-27 hours. Prerequisite(s): Medical students with consent of instructor. Assigned readings in family practice to increase understanding on selected topics relating to family medicine and primary health care delivery; visits to and written analysis of selected health care programs; and/or exposure to family practice with a community physician preceptor. May be repeated up to 9 unit(s). (H/P/F grading only.) Effective: 2002 Fall Quarter.

FAP 490—Health Care to Underserved Populations (1)
Lecture—1 hour. Prerequisite(s): Sociology, Political Science, or Applied Behavioral Science background recommended, or registration in medical school. Discusses sociocultural perspectives of underserved populations impacting health; roles of family/interpersonal relationships in making health care decisions; the nature of ethnic/racial/socioeconomic health care disparities; and clinicians' perspectives in treating people of cultures which are unfamiliar and/or uncomfortable with Western medicine. May be repeated for credit. (P/F grading only.) Effective: 2012 Winter Quarter.

FAP 493—Aging and Health (6)
Seminar—12 hours. Prerequisite(s): Consent of Instructor. Is disease and infirmity the inevitable consequence of aging? We will spend four weeks exploring this question by reviewing the biology of aging, physiologic changes seen in aged individuals and disease processes commonly found in elderly persons. (H/P/F grading only.) Effective: 2010 Summer Quarter.

FAP 495—LGBTIQQA Healthcare Lecture Series (1)
Lecture—6 hours. Increase the awareness of medical issues surrounding the LGBTIQQA community and arm students with knowledge of the health disparities the community faces. Provide better quality care to the LGBTIQQA patients cared for as physicians. May be repeated for credit. (P/F grading only.) Effective: 2012 Winter Quarter.

FAP 498—Directed Group Study (1-5)
Variable—3-15 hours. Explore in-depth various topics in primary care. Extensive contact with and oversight by instructor. May be repeated for credit. (H/P/F grading only.) Effective: 2008 Spring Quarter.

FAP 499—Research (1-12)
Prerequisite(s): Medical students with consent of instructor. Research in various aspects of the health care delivery system. (H/P/F grading only.) Effective: 1997 Winter Quarter.

HPH 099—Special Study for Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2004 Fall Quarter.

HPH 115—Cannabis and Cannabinoids in Physiology and Medicine (3)
Lecture—3 hours. Prerequisite(s): NPB 100 or NPB 101 or NPB 110B; or Consent of Instructor. In-depth scientific analysis of cannabis and cannabinoids, topics include biochemical, physiological, behavioral, pharmacological, social and therapeutic aspects of cannabinoids, with emphasis on the physiological impacts on major organ systems in humans and animals, and the potential medicinal uses. GE credit: SE, SL. Effective: 2017 Spring Quarter.

HPH 157—Advanced Physiology of Animal/Human Disease (3)
Lecture—1 hour; Lecture/Discussion—2 hours. Prerequisite(s): NPB 101 B+ or better or NPB 110C B+ or better; Consent of Instructor. Limited to 35 students initially. Centers on fundamental mechanisms and pathophysiological basis for animal and human diseases. Course is case-based and uses animal and human diseases to help exemplify the physiological consequences of organ dysfunction. (NPB 157.) Effective: 2017 Spring Quarter.

HPH 192—Internship in Human Physiology (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in physiology and related fields. (P/NP grading only.) Effective: 1997 Winter Quarter.

HPH 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed reading, discussion and/or laboratory experience on selected topics. (P/NP grading only.) Effective: 1997 Winter Quarter.

HPH 199—Special Study for Advanced Undergraduates (1-5)
Laboratory—3-15 hours. Prerequisite(s): Consent of Instructor. Senior standing in biology, chemistry, physics, psychology, or engineering. (P/NP grading only.) Effective: 1997 Winter Quarter.

HPH 210A—Advanced Physiology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Physiology Ph.D. program or consent of instructor. Advanced course in general principles of physiology, surveying homeostasis, cellular and selected topics, and neurophysiology. (Physiology 210A) Effective: 1999 Fall Quarter.

HPH 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. For graduate students desiring to explore particular topics in depth.
Lectures and conferences may be involved. Effective: 1997 Winter Quarter.

HPH 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

HPH 400—Human Physiology (6)
Laboratory—2 hours; Lecture—3 hours. Medical student only. General and cellular physiology of neurons, muscle, and epithelial cells and systemic physiology of cardiovascular, respiratory, gastrointestinal, and renal systems. (P/F grading only.) Effective: 2011 Summer Quarter.

HPH 403—Medical Neuroanatomy (5)
Discussion/Laboratory—1 hour; Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): HPH 400; Block 1. Restricted to medical students only. Anatomy of the normal human nervous system, to include gross external and internal morphology of brain and spinal cord, and function neuroanatomy of motor, sensory and cognitive systems. Incorporates application of neuroanatomy to clinical problem solving. (Cell Biology and Human Anatomy 403.) (P/F grading only.) Effective: 2007 Summer Quarter.

HPH 440—Cannabis and Cannabinoids in Physiology and Medicine (3)
Lecture. Prerequisite(s): Consent of Instructor. Provides an in-depth scientific analysis of current knowledge on cannabis and cannabinoids pertaining to human physiology and potential medicinal uses. May be repeated for credit. (H/P/F grading only.) Effective: 2018 Winter Quarter.

HPH 493—Physiological Principles in SICU SSM (6)
Clinical Activity—4 hours; Laboratory—16 hours; Lecture—5 hours; Lecture/Lab—10 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. Special Study Module, a four week course on the topic: Care of the Critically Ill Surgical Patient: Use of Physiological Principles to Guide Treatment of Patients with Common Surgical Problems (Surgery 493C.) (H/P/F grading only.) Effective: 2008 Winter Quarter.

HPH 497T—Tutoring in Human Physiology (1-5)
Tutorial—3-15 hours. Prerequisite(s): Advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum of the School of Medicine. (S/U grading only.) Effective: 1997 Winter Quarter.

HPH 498—Directed Reading and Group Study (1-4)
Discussion—2-8 hours. Prerequisite(s): Consent of Instructor. Medical student. Directed reading and discussion on selected topics in human physiology. (S/U grading only.) Effective: 1997 Winter Quarter.

HPH 499—Research (1-6)
Variable. Prerequisite(s): Medical students with consent of instructor. Laboratory investigation on selected topics. (S/U grading only.) Effective: 1997 Winter Quarter.

IMD 090—Seminar in Medical Ethics (1)
Lecture—1 hour. Seminar Series covering the current topics in Medical Ethics. (P/NP grading only.) Effective: 2017 Winter Quarter.

IMD 092—Internship (1-4)
Internship—3-12 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Supervised internship in internal medicine and related fields. (P/NP grading only.) Effective: 1997 Winter Quarter.

IMD 098—Directed Group Study (1-2)
Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Directed group study in medicine and related fields. (P/F grading only.) Effective: 1997 Winter Quarter.

IMD 099—Undergraduate Research in Medicine: Molecular and Cell Biology (1-3)
Variable. Prerequisite(s): Consent of Instructor. (P/F grading only.) Effective: 1997 Winter Quarter.

IMD 164—Practicum in Community Health Clinic: Bayanihan Clinic (1-2)
Clinical Activity—5 hours. Through active participation in the medical aspects of community health clinics, the undergraduate student gains knowledge of the organization, administration, and problem-solving capabilities. May be repeated for credit. (P/NP grading only.) Effective: 2014 Winter Quarter.

IMD 192—Internship in Internal Medicine (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Supervised work experience in internal medicine and related fields. (P/F grading only.) Effective: 1997 Winter Quarter.

IMD 194—Practicum in Community Health Clinics (1-3)
Clinical Activity—5-15 hours. Prerequisite(s): Consent of Instructor. The undergraduate student, through active participation in the medical aspects of community health clinics, gains knowledge of the organization, administration, and problem-solving capabilities of these primary care facilities. May be repeated for credit. (P/F grading only.) Effective: 1997 Winter Quarter.

IMD 198—Directed Group Study (1-3)
Extensive Problem Solving—2 hours; Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. Directed group study in medicine and related fields. (P/NP grading only.) Effective: 2014 Winter Quarter.

IMD 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/F grading only.) Effective: 1997 Winter Quarter.

IMD 214—Topics in Medical Ethics (1)
Seminar—1 hour. The complex moral, legal and ethical dilemmas that patients, families, and health care providers face in today's clinics. May be repeated up to 1 time(s). (S/U grading only.) Effective: 2001 Fall Quarter.

IMD 220D—Cardiovascular System (2.5)
Lecture/Discussion—5.5 hours. Prerequisite(s): HPH 200; and Consent of Instructor. Graduate student status. Principles of etiology, mechanisms, diagnosis and management of the major diseases of the cardiovascular system. Included are ischemic, valvular, hypertensive, cardiomyopathic, pericardial, and electrical disorders. Effective: 2002 Fall Quarter.

IMD 250—Medicine and the Law (3)
Lecture/Discussion—2 hours; Project (Term Project)—2 hours. Legal and bioethical principles and concepts in medicine. Topics include standard of care, informed consent, reproductive medicine, and end-of-life issues. (S/U grading only.) Effective: 2002 Winter Quarter.

IMD 414—One Health: A Course on Global Health (1)
Conference—8 hours. Global health problems are complex and require culturally-sensitive, socially-acceptable, and action-oriented approaches to create practical and cost-effective solutions. Will examine major health problems created by the convergence of human, animal, and environmental influences. May be repeated for credit. (P/F grading only.) Effective: 2011 Summer Quarter.

IMD 416—Summer Institute on Race and Health (6)
Independent Study—30 hours. Prerequisite(s): Consent of Instructor. Limited enrollment. Using field trips, media, readings, and clinical experiences, 8-10 first year medical students will explore issues of race, health disparities and related issues in a 4 week institute during the summer break. (P/F grading only.) Effective: 2011 Spring Quarter.

IMD 420A—Hematology (2)
Discussion—1 hour; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Restricted to Medical students only. Malignant disorders of blood cells and transfusion therapy. Covers acute leukemia, myelodysplasia, myeloproliferative disorders, lymphoma, and myeloma. (P/F grading only.) Effective: 2010 Summer Quarter.

IMD 420B—Gastrointestinal System (2.5)
Discussion—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): Approval of Committee on Student Progress. Restricted to Medical students only. Basic pathophysiologic principles of digestive diseases on which clinical concepts and judgments can be developed. Emphasis on pathophysiologic basis of gastroenterological and hepatic disorders with discussion of major disorders and their diagnosis and management. (P/F grading only.) Effective: 2008 Winter Quarter.

IMD 420C—Pulmonary & Critical Care Medicine (2.5)
Lecture/Discussion—5.5 hours. Prerequisite(s): Approval of SOM's Committee on Student Promotions. Restricted to Medical students only; student must pass all SOM Year 1 courses. Clinical aspects of respiratory anatomy, physiology, and pathology. Diagnostic procedures and a description of the major pulmonary diseases & disorders, and critical care medicine. (P/F grading only.) Effective: 2013 Fall Quarter.

IMD 420D—Cardiovascular System (2.5)
Lecture/Discussion—5.5 hours. Prerequisite(s): Approval of the School of Medicine Committee on Student Promotions. Restricted to Medical students only; student must pass all SOM Year 1 courses. Principles of etiology, mechanisms, diagnosis and management of the major diseases of the cardiovascular system. Included are ischemic, valvular, hypertensive, cardiomyopathic, pericardial, and electrical disorders. (P/F grading only.) Effective: 2013 Fall Quarter.

IMD 420E—Nephrology (2)
Discussion—2 hours; Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): Approval of Student Progress Committee. Fundamental aspects of disorders of body water, electrolytes and acid/base balance; major categories and mechanisms of parenchymal renal diseases; urinary tract infections. (P/F grading only.) Effective: 2002 Winter Quarter.

IMD 430—Medicine Clerkship (12)
Clinical Activity—45 hours. Prerequisite(s): Approval by School of Medicine Committee on Student Progress. Clerkship is divided into two, four-week blocks, one each at UCDMC and at Kaiser Hospitals. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. (H/P/F grading only.) Effective: 2001 Summer Quarter.

IMD 430FA—SJVP Longitudinal Medicine Clerkship (1.5-6)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Family Medicine, Pediatrics and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Spring Quarter.

IMD 430FB—SJVP Longitudinal Medicine Clerkship (1.5-6)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Family Medicine, Pediatrics and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Spring Quarter.

IMD 430FC—SJVP Longitudinal Medicine Clerkship (1.5-6)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Family Medicine, Pediatrics and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Spring Quarter.

IMD 430FD—SJVP Longitudinal Medicine Clerkship (1.5-6)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Family Medicine, Pediatrics and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Spring Quarter.

IMD 430R—Rural PRIME Internal Medicine Longitudinal Clerkship (2)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Internal Medicine Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

IMD 430RA—Rural PRIME Internal Medicine Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Internal Medicine Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

IMD 430RB—Rural PRIME Internal Medicine Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Internal Medicine Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

IMD 430RC—Rural PRIME Internal Medicine Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Internal Medicine Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

IMD 430RD—Rural PRIME Internal Medicine Longitudinal Clerkship (1)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Internal Medicine Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

IMD 430TA—TeachMS Longitudinal Medicine Clerkship (A) (4)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only.) Effective: 2013 Fall Quarter.

IMD 430TB—TeachMS Longitudinal Medicine Clerkship (B) (6)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only.) Effective: 2013 Fall Quarter.

IMD 430TC—TeachMS Longitudinal Medicine Clerkship (C) (2)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only.) Effective: 2013 Fall Quarter.

IMD 439D—Directed Clinical Studies in Internal Medicine (1-12)
Clinical Activity—40 hours. Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for modified curriculum or to complete a clinical rotation following a leave of absence. May be repeated for credit. (P/F grading only.) Effective: 2011 Spring Quarter.

IMD 439R—Directed Studies in Internal Medicine (1-12)
Clinical Activity—30 hours; Independent Study—10 hours. Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for remediation of all or part of clinical rotation. Clinical studies to accommodate and satisfy remedial work as directed by the Committee on Student Progress and approved by the course IOR. May be repeated for credit. (P/F grading only.) Effective: 2011 Summer Quarter.

IMD 450A—Medicine and the Law (1.5)
Discussion—2 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Restricted to Medical students only. Legal and bioethical principles and concepts in medicine. Topics include standard of care, informed consent, reproductive medicine, and end-of-life issues. (H/P/F grading only.) Effective: 2010 Summer Quarter.

IMD 450B—Medicine and the Law (1.5)
Discussion—2 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Restricted to Medical students only. Legal and bioethical principles and concepts in medicine. Topics include standard of care, informed consent, reproductive medicine, and end-of-life issues. (H/P/F grading only.) Effective: 2010 Summer Quarter.

IMD 459—Oncology: Research and Treatment of Cancer (2)
Lecture/Discussion—2 hours. Prerequisite(s): Second-, third-, or fourth-year medical student and/or consent of instructor. Comprehensive review of current treatment practices of cancer and state-of-the-art research impacting treatment and prevention of cancer.
Emphasis on epidemiology, molecular biology, and pharmacology. (H/P/F grading only.) Effective: 1997 Winter Quarter.

IMD 460—Correctional Health Care Clerkship (1-4)
Clinical Activity. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing. Covers Correctional Health delivery and the effects of detention and incarceration on health status. Special emphasis on problems unique to health care delivery in a prison setting. Student will spend time in clinical settings at three prison facilities. (H/P/F grading only.) Effective: 1997 Winter Quarter.

IMD 461—Mather VA Internal Medicine AI (6)
Clinical Activity—50 hours; Independent Study—5 hours; Lecture/Discussion—5 hours. Prerequisite(s): Consent of Instructor. Limited enrollment. Acting Internship in Internal Medicine for qualified 4th year Medical Students from the UC Davis School of Medicine at the Sacramento VA Hospital. Experiences will somewhat mirror those of AIs at UCDMC. May be repeated for credit. (H/P/F grading only.) Effective: 2014 Summer Quarter.

IMD 462—Medicine Wards AI (6)
Clinical Activity—40 hours. Prerequisite(s): Consent of Instructor. MDS 431; demonstrated ability to accept responsibility. Limited enrollment. Assume role of acting intern and be primary physician on medical ward under direction of medical resident and staff. Teams I-V take call every fifth night. Emphasis on evidence-based inpatient care. May be repeated for credit. (H/P/F grading only.) Effective: 2012 Fall Quarter.

IMD 463—Acting Internship in Medicine Intensive Care Unit (MICU) (3-6)
Clinical Activity—40 hours. Prerequisite(s): Completion of third-year in medical school; consent of Director of MICU. Limited enrollment. At UCDMC, student functions as acting intern on MICU service under direction of medical resident and staff. Responsibility for patients admitted to MICU. On call in hospital every fourth night. May be repeated for credit. (H/P/F grading only.) Effective: 2016 Spring Quarter.

IMD 464—Bayanihan Primary Care Clinic (3)
Clinical Activity—0.6 hours. Restricted to medical students in all four years of medical school. Under the guidance and supervision of a physician, medical students will learn patient history taking, medical documentation, counseling, diagnosis and treatment of patients with chronic and acute disease. Provides exposure to the special needs of various ethnic and socioeconomic groups. May be repeated for credit. (P/F grading only.) Effective: 2009 Spring Quarter.

IMD 465—Medicos-Global Health Sciences (9)
Clinical Activity—25 hours; Fieldwork—5 hours; Lecture—5 hours; Project (Term Project)—5 hours. Prerequisite(s): Consent of Instructor. Medical students only. Travel to foreign country for four weeks to collaborate with faculty from local universities and work in urban and rural environments, including hands-on experience with clinic patients. Cultural exchange and awareness of global health care. (P/F grading only.) Effective: 2007 Summer Quarter.

IMD 468—Ambulatory Internal Medicine Externship (3-18)
Clinical Activity—40 hours; Variable—12-40 hours. Prerequisite(s): IMD 430; and Consent of Instructor. Demonstrated ability to accept responsibility. Limited enrollment. Hands-on primary care clinical experience in the ambulatory setting supervised by a general internist. Emphasis on evidence-based outpatient care. (H/P/F grading only.) Effective: 2010 Summer Quarter.

IMD 470—Critical Evaluation of Landmark Studies in Evidence-Based Medicine (3)
Seminar. Prerequisite(s): Fourth-year medical student. Primary objective is to prepare future physicians to effectively integrate evidence-based medicine into their clinical practice. While this course will have an Internal Medicine emphasis, the skills the course aims to impart (formulating focused clinical questions, searching the medical literature, evaluating the quality of research, and integrating evidence into clinical practice, giving effective article presentations) will apply to all future clinicians, regardless of their specialty. (P/F grading only.) Effective: 2017 Fall Quarter.

IMD 480—Person Centered Assessment (1)
Lecture—1 hour. Prerequisite(s): Open to all medical students. Person-centered assessment modalities and diagnostic approaches with regards to Internal Medicine and its different subspecialties. (P/F grading only.) Effective: 2002 Fall Quarter.

IMD 493—Introduction Interprofessionalism, Pain Management, and Palliative Care (6)
Clinical Activity—24 hours; Discussion—4 hours; Independent Study—2 hours. Prerequisite(s): Consent of Instructor. Learners will spend one week with the inpatient palliative care service, one week with the inpatient pain pharmacy service and two weeks with Snowline Hospice. (P/F grading only.) Effective: 2018 Winter Quarter.

IMD 494—Practicum in Community Health Clinics (1-3)
Clinical Activity—15-40 hours. Prerequisite(s): Medical student with consent of instructor. Students are assigned to clinical settings that demonstrate ethnic,
urban/rural, or other related aspects of clinical community health. Through active participation in health care delivery, students are able to relate conceptual with practical aspects of primary health care. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

IMD 497—Medicine, Bioethics and the Holocaust (3)
Lecture/Discussion—10 hours. Prerequisite(s): Consent of Instructor. Medical students only. The concept of "evil" and the role of collaborators, bystanders and participants exemplified by the holocaust and compared to problems physicians face in practice today. Demonstration that evil emerges incrementally until taken for granted. (P/F grading only.) Effective: 2004 Winter Quarter.

IMD 498—Group Study in Internal Medicine (1-18)
Variable. Prerequisite(s): Consent of Instructor. Special study for medical students which may involve laboratory or library research, ambulatory or inpatient care responsibility on campus, at UCDMC or off campus by specific arrangement. (H/P/F grading only.) Effective: 1997 Winter Quarter.

IMD 499—General Medicine Reseach (1-18)
Independent Study—20 hours. (H/P/F grading only.) Effective: 2006 Winter Quarter.

CAR 192—Internship in Cardiology (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project by preceptor prior to internship. Supervised work experience in cardiology. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

CAR 199—Cardiology Research (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special study by individual arrangement in cardiovascular medicine. Work will include directed readings, laboratory and discussions. (P/NP grading only.) Effective: 1997 Winter Quarter.

CAR 220—Basic Science in Cardiology (1)
Lecture—1 hour. Prerequisite(s): Graduate or medical student status. Fundamentals underlying cardiovascular medicine. Including hemodynamics, neural control of the circulation, biochemistry and some experimental design and statistics. Experts in each of these fields will give current information in their areas. (S/U grading only.) Effective: 1997 Winter Quarter.

CAR 299—Cardiology Research (1-12)
Variable—40 hours. Prerequisite(s): Consent of Instructor. Research or special studies. (S/U grading only.) Effective: 2010 Spring Quarter.

CAR 401—Clinical Cardiology Clerkship: Kaiser (3-18)
Clinical Activity—1-5 hours. Prerequisite(s): Third- and fourth-year medical students with advance approval by Division of Cardiology. Limited enrollment. Emphasis placed on history taking and physical examination of pediatric and adult patients with congenital and acquired cardiovascular disease. Hospital rounds in CCU and elsewhere. Roles of ECG, PCG, and cardiac fluoroscopy, etc., in office cardiology will be evaluated. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

CAR 460—Cardiology Clinical Clerkship (3-18)
Clinical Activity—2-12 hours. Prerequisite(s): IMD 430; Third- and fourth-year medical students in good academic standing with consent of instructor. Limited enrollment. Participation with members of subspecialty consultation service in initial clinical evaluation, work-up, management, and follow-up of patients with cardiologic disorders. Two outpatient clinics per week. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

CAR 461—Management of Coronary Artery Disease: Coronary Care Unit (3-18)
Clinical Activity. Prerequisite(s): Completion of second-year of medical school and advance approval by Division of Cardiology. Limited enrollment. Research in laboratory and exercise testing to be determined by instructor. Current methods of clinical research involving certain aspects of diagnosis and treatment. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

CAR 464—Preventive Cardiology (3-6)
Clinical Activity; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Completion of third-year medical school. Clinical experience, weekly seminar and reading on primary and secondary prevention of cardiovascular disease. Will be carried out in Lipid and Hypertension Clinics, Exercise Laboratory, Cardiac Care Unit, Cardiac Catheterization, and Cardiac Surgery services. (H/P/F grading only.) Effective: 1997 Winter Quarter.

CAR 480—Insights in Cardiology (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Medical student in good academic standing and approval by Division of Cardiology. Students attend one or more cardiovascular medicine clinics: general, hypertension, arrhythmia. Introduction to the diagnosis/treatment of common cardiovascular problems. (H/P/F grading only.) Effective: 1997 Winter Quarter.

CAR 493—Gender Specific Medicine SSM (6)
Clinical Activity—4 hours; Laboratory—16 hours; Lecture—5 hours; Lecture/Lab—10 hours. Prerequisite(s): Consent of Instructor. UC Davis School of Medicine students only. Special Studies Module, a four week course on the topic:Basic Science Principles Relating to Gender Specific Medicine. (OBG 493.) (H/P/F grading only.) Effective: 2007 Spring Quarter.

CAR 498—Special Group Study: EKG Unit (1-12)
Variable. Prerequisite(s): Medical student with advance approval by monthly attending faculty. Limited enrollment. Special group study in cardiology for medical students in EKG unit. May include lectures, directed reading, and/or discussion groups. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

CAR 499—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Approval by Division of Cardiology. (H/P/F grading only.) Effective: 1997 Winter Quarter.

EMR 092—Emergency Medicine Clinical Research Internship (1-4)
Internship—6-12 hours. Prerequisite(s): Consent of Instructor. Undergraduate student in good academic standing at UC Davis. Intended to give the undergraduate student an opportunity to conduct "hands-on" clinical research in the Emergency Department. Through the lecture/discussion, students will learn the basics of conducting and developing clinical research studies, using examples from ongoing studies. May be repeated up to 4 unit(s). Units awarded will depend on hours worked. (P/NP grading only.) Effective: 2007 Summer Session 1.

EMR 092C—Joan Viteri Memorial Clinic Preceptorship (1.5)
Clinical Activity; Seminar—1 hour. Prerequisite(s): Consent of Instructor. Directed towards the undergraduate students at UC Davis that volunteer at the Joan Viteri Memorial Clinic (JVMC). May be repeated for credit. (P/NP grading only.) Effective: 2017 Spring Quarter.

EMR 192—Emergency Medicine Clinical Research Internship (1-4)
Internship—6-12 hours. Prerequisite(s): Consent of Instructor. Undergraduate student in good academic standing at UC Davis. Intended to give the upper division undergraduate student an opportunity to conduct "hands-on" clinical research in the Emergency Department. Through the lecture/discussion, students learn the basics of conducting and developing clinical research studies. May be repeated up to 2 time(s). (P/NP grading only.) Effective: 2007 Summer Quarter.

EMR 199A—Special Study for Advanced Undergraduates (4-12)
Variable—4-12 hours. Prerequisite(s): Consent of Instructor. Experienced RA's who have successfully performed in the EMRAP program for a minimum of 3 quarters; must have database skills. For students interested in working on specific EM projects in a more extensive way. Must commit at least four hours per week for two quarters. Will be awarded credit upon completion of course 199B. Credit awarded upon completion of EMR 199B. Effective: 2007 Fall Quarter.

EMR 299—Research (1-12)
Variable—1-12 hours. Prerequisite(s): Consent of Instructor. Directed research in the Department of Emergency Medicine. May be repeated for credit. (S/U grading only.) Effective: 2017 Spring Quarter.

EMR 401—Preceptorship in Emergency Medicine (1-6)
Clinical Activity—10 hours. Prerequisite(s): Consent of Instructor. Exposure to the specialty of Emergency Medicine and observation of a wide array of patients in the Emergency Department. May be repeated for credit. (P/F grading only.) Effective: 2012 Spring Quarter.

EMR 430—Introduction to Medical Toxicology (3-6)
Variable—40 hours. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good standing. In-depth review of clinical and medical toxicologic emergencies. Rotation includes contact with toxicology trained emergency faculty, didactic lectures, journal club, simulation training and exposure to a very busy poison control center. (H/P/F grading only.) Effective: 2012 Spring Quarter.

EMR 435—Wilderness Medicine (3-6)
Clinical Activity—12 hours; Independent Study—8 hours; Lecture/Discussion—20 hours. Prerequisite(s): Consent of Instructor. Designed as an introductory elective course for students to explore how physicians can interact with the environment in austere conditions through lectures, hands-on/field experience, and case-based learning. (P/F grading only.) Effective: 2018 Spring Quarter.

EMR 440—Emergency Medicine Clerkship (6)
Clinical Activity—46 hours; Lecture/Discussion—4 hours. Prerequisite(s): Satisfactory completion of Medicine, Surgery, and Pediatric Clerkship. Students complete clinical shifts in the Emergency Department, functioning as Acting Intern. Treat a wide variety of patients and problems under the supervision of the EM Attending. Students are expected to take focused histories and present in clear, concise fashion. May be repeated for credit. (H/P/F grading only.) Effective: 2011 Fall Quarter.

EMR 445—Emergency Medicine Ultrasound for Fourth-Year Medical Student (3-6)
Variable. Prerequisite(s): Fourth-year Medical Student in good standing; interest in Emergency Medicine or Critical Care is recommended; EMR 440 or equivalent is recommended prior to the rotation. Limited enrollment. Intended for students interested in learning both the technical and cognitive skills of bedside ultrasound. Emphasis will be on the use of ultrasound in emergency medicine as a diagnostic tool and in procedural guidance. (H/P/F grading only.) Effective: 2008 Fall Quarter.

EMR 450—Ambulatory Elective in Emergency Medicine (3-18)
Variable. Restricted to MS4 students in good standing; externships/away rotations only. Credit will be given for approved non-AI Emergency Medicine courses at other institutions to which there is not an equal learning experience at UC Davis. May be repeated up to 2 time(s). (H/P/F grading only.) Effective: 2016 Fall Quarter.

EMR 455A—Focus on POCUS A (6)
Clinical Activity—30 hours. Prerequisite(s): Consent of Instructor. Directed towards gaining a greater proficiency of point-of-care ultrasound. Particularly useful for those pursuing careers that use this modality heavily in clinical practice such as primary care, pediatrics, emergency medicine, critical care, physical medicine and rehabilitation, etc. (H/P/F grading only.) Effective: 2017 Summer Quarter.

EMR 455B—Focus on POCUS B (6)
Clinical Activity—30 hours. Prerequisite(s): Consent of Instructor. Directed towards gaining a greater proficiency of point-of-care ultrasound. Particularly useful for those pursuing careers that use this modality heavily in clinical practice such as primary care, pediatrics, emergency medicine, critical care, physical medicine and rehabilitation, etc. (H/P/F grading only.) Effective: 2017 Summer Quarter.

EMR 465—Externship in Emergency Medicine (3-9)
Clinical Activity—36 hours; Lecture/Discussion—4 hours. Prerequisite(s): Satisfactory completion of Medicine, Surgery and Pediatrics. Students complete clinical shifts in the Emergency Department, functioning as Acting Intern. Treat a wide variety of patients and problems under the supervision of the EM Attending. Students are expected to take focused histories and present in clear, concise fashion. May be repeated for credit No Limit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

EMR 470—Pediatric Emergency Medicine Clerkship (3-6)
Clinical Activity—36 hours; Lecture/Discussion—4 hours. Prerequisite(s): Satisfactory completion of Medicine, Surgery, and Pediatrics. Restricted to fourth-year medical student in good standing only. See patients in the Pediatric area of the Emergency Department under the supervision of an Emergency Medicine Attending. Emphasis on recognition and management of the acutely ill pediatric patient and treatment of common pediatric complaints. (H/P/F grading only.) Effective: 2017 Summer Quarter.

EMR 480—Understanding Health Policy: A Focus on Analysis and Translation (1-6)
Discussion—16 hours; Independent Study—10 hours; Lecture—4 hours. Prerequisite(s): Consent of Instructor. The paradigm of healthcare delivery in the US is changing rapidly. To prepare the next generation of physician leaders, this course will provide students with the skills, tools, and knowledge needed to impact decisions made at the policy level. (H/P/F grading only.) Effective: 2015 Fall Quarter.

EMR 490—Emergency Procedures Elective (3)
Discussion/Laboratory—24 hours; Independent Study—4 hours; Tutorial—4 hours; Web Virtual Lecture—8 hours. Prerequisite(s): Current basic life support (BLS) certification. Restricted to fourth-year medical student in good standing only. Simulator-based skills training for emergency procedures. Topics include airway management, central venous access, chest tube placement, and general critical care resuscitation skills. (P/F grading only.) Effective: 2010 Summer Quarter.

EMR 493A—Cardiac Arrest, Resuscitation and Repurfusion SSM (3)
Clinical Activity—4 hours; Laboratory—16 hours; Lecture—5 hours; Lecture/Lab—10 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. Special Studies Module, a four week course specific to the topics of Cardiac Arrest, Resusciatation and Repurfusion. (H/P/F grading only.) Effective: 2010 Summer Quarter.

EMR 493B—Cardiac Arrest, Resuscitation and Repurfusion SSM (3)
Clinical Activity—4 hours; Laboratory—16 hours; Lecture—5 hours; Lecture/Lab—10 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. Special Studies Module, a four week course specific to the topics of Cardiac Arrest, Resusciatation and Repurfusion. (H/P/F grading only.) Effective: 2010 Summer Quarter.

EMR 499—Research (2-18)
Laboratory. Prerequisite(s): Consent of Instructor. Elective where topics may be selected in either basic or clinical research areas of Emergency and/or Critical Care Medicine. The goals will be tailored to each individual student. Enrollment requires prior discussion and consent of instructor. (H/P/F grading only.) Effective: 1997 Winter Quarter.

ENM 192—Internship in Endocrinology (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project by preceptor prior to internship. Supervised work experience in endocrinology. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

ENM 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Endocrinology research. (S/U grading only.) Effective: 1997 Winter Quarter.

ENM 460—Endocrinology Clinical Clerkship (3-18)
Clinical Activity. Prerequisite(s): IMD 430; And/or consent of instructor. Limited enrollment. Participation with members of subspecialty service in the initial evaluation, work-up, management and follow-up of patients with endocrinologic disorders. Limited enrollment. (H/P/F grading only.) Effective: 1997 Winter Quarter.

ENM 465—Clinical Nutrition Clerkship (3-18)
Clinical Activity—30 hours. Prerequisite(s): IMD 430; Consent of IOR. In-depth experience in assessment and monitoring of nutritional support of patients whose illnesses are complicated by malnutrition and of patients with problems in under-nutrition due to various illnesses. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

ENM 480—Insights in Endocrinology (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. Student in good academic standing. First- or second-year students observe in morning Endocrine and Diabetes clinics and attend bi-weekly noon and afternoon endocrine conferences. They also give brief endocrine physiology oral presentation to the endocrine group. (H/P/F grading only.) Effective: 1997 Winter Quarter.

ENM 499—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (H/P/F grading only.) Effective: 1997 Winter Quarter.

GAS 192—Internship in Gastroenterology (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project by preceptor prior to internship. Supervised work experience in gastroenterology. May be repeated for credit up to 12 units. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

GAS 299—Research (1-12)
Variable. Research in gastroenterology. (S/U grading only.) Effective: 1997 Winter Quarter.

GAS 460—Gastroenterology Clinical Clerkship (3-18)
Clinical Activity—30 hours. Prerequisite(s): Consent of Instructor. Completion of third-year of medical school. Work-up, manage, and follow-up new patients on active inpatient consulting service. Gastroenterology/Hepatology patients. Daily rounds with attending physician. May be repeated for credit. (H/P/F grading only.) Effective: 2013 Summer Quarter.

GAS 480—Insights in Gastroenterology (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. Student in good academic standing. To gain insight in clinical activities of Gastroenterology Division through attendance at any of the following: endoscopic procedures, ward rounds, outpatient clinic, and G.I. grand rounds. (H/P/F grading only.) Effective: 1997 Winter Quarter.

GAS 499—Research (1-12)
Clinical Activity. Prerequisite(s): Consent of Instructor. Medical student status. Part-time participation in active clinical and basic research projects.
Some will involve both patient care and relevant laboratory procedures. Basic research includes liver metabolism, cancer markers, porphyrias diet and cancer, folate metabolism. May be repeated for credit. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

GMD 192—Internship in General Medicine (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project by preceptor prior to internship. Supervised work experience in general medicine. May be repeated for credit up to 12 units. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

GMD 291—Seminars in Human Health Services Research and Clinical Epidemiology (1)
Seminar—1 hour. Critical review, evaluation, and discussion of research in health services and clinical epidemiology. Presentation of statistical, epidemiologic, and econometric methods. Students present their own research and critique the work of others. May be repeated for credit. May be repeated for credit. (Epidemiology 291) (S/U grading only.) Effective: 1998 Fall Quarter.

GMD 460—General Medicine Consults (1-18)
Clinical Activity—1-18 hours; Variable—1-18 hours. Prerequisite(s): Fourth-year medical students with consent of instructor; a general medicine clerkship. Limited enrollment. Supervised opportunity to see entire spectrum of medical problems encountered by a general internist. Student spends time in General Medicine Clinic and on the General Medicine Consult Service. Consultation Service is particularly concerned with medical evaluation of surgical patients. (H/P/F grading only.) Effective: 1997 Winter Quarter.

GMD 470—Health Care Ethics (3-9)
Discussion/Laboratory—1 hour; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Guided independent study of issues in biomedical ethics, with discussion of readings that are based on student interests and needs. Participation in ethics rounds. (Nursing 470.) (H/P/F grading only.) Effective: 2012 Spring Quarter.

GMD 485—Introduction to Health Care Ethics (1)
Lecture. Prerequisite(s): Medical student in good standing. Introduction to concepts and methods of healthcare ethics. Emphasis on problems and methods. (H/P/F grading only.) Effective: 1997 Fall Quarter.

GMD 499—General Medicine Research (1-18)
Clinical Activity—8-40 hours; Discussion—3 hours. Prerequisite(s): Consent of Instructor. Student will be involved in a clinical research problem within the
areas, interest and expertise of members of Division of General Internal Medicine. Alternatively,the research effort will be directed toward investigation of a clinical problem of general medical interest. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

HON 199—Research in Hematology-Oncology (1-5)
Laboratory. Prerequisite(s): Consent of Instructor. Upper division standing. Experience in laboratory research. (P/NP grading only.) Effective: 1997 Winter Quarter.

HON 298—Topics in Hematology (1-4)
Variable. Prerequisite(s): One year of graduate work and/or consent of instructor. Basic concepts of the physiology of the hematopoietic organ, the pathophysiology of hematopoietic disease, and concepts of therapeutics
will be offered for study. The specific topics to be dictated by the interest and background of the students. Effective: 1997 Winter Quarter.

HON 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Laboratory investigation contributing to the dissertation for a graduate
degree. (S/U grading only.) Effective: 1997 Winter Quarter.

HON 420—Oncology (4)
Lecture/Discussion—2 hours. Prerequisite(s): Approval by the SOM Committee on Student Promotions. Restricted to Medical student only; students must pass all Year 1 SOM courses. Covers the principles of oncology and the pathophysiology of specific, common cancers correlated with organ systems pathophysiology and systemic pathology courses. (P/F grading only.) Effective: 2015 Fall Quarter.

HON 460—Hematology-Oncology Consult Clerkship (6-12)
Clinical Activity. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing. Limited enrollment. Acting intern on inpatient hematology/oncology ward service. May be repeated for credit. Limited enrollment. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

HON 461—Hematology-Oncology Consult Clerkship (6-12)
Clinical Activity. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing. Limited enrollment. Student is an integral member of the inpatient hematology and oncology consult service, the bone marrow service, and will attend all conferences sponsored by the Division. May be repeated for credit. Limited enrollment. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

HON 462—Hematology-Oncology Ambulatory Clerkship (3-18)
Clinical Activity—30 hours. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing. Limited enrollment. Outpatient rotations in related clinics. Participation with members of the subspecialty service in the initial clinical evaluation, work-up, management and follow-up of the patient with hematologic or oncologic disorders. May be repeated for credit. (H/P/F grading only.) Effective: 2011 Winter Quarter.

HON 493—Cancer as a Process (1-6)
Auto Tutorial—6 hours; Clinical Activity—14 hours; Independent Study—10 hours; Seminar—10 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. Covers cancer as a process, beginning with risks and prevention, preneoplasia, microinvasion, treatment options, metastases and systemic therapy, pain medicine and palliative care, and cancer communication. Format includes traditional lectures, student-led case discussions, and problem-based learning. (H/P/F grading only.) Effective: 2012 Summer Quarter.

HON 499—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (H/P/F grading only.) Effective: 1997 Winter Quarter.

IDI 141—Infectious Diseases of Humans (1)
Lecture—1 hour. Prerequisite(s): Introductory knowledge in biology and chemistry recommended. Course integrates information on biological and molecular nature of the causative organism, modern diagnostics, treatment and prevention strategies, and the role of infectious diseases in contemporary society and throughout human history. (P/NP grading only.) Effective: 1997 Winter Quarter.

IDI 192—Research Internship in Internal Medicine (1-12)
Internship—3-36 hours. Supervised work experience in the division of Infectious Diseases. Undergraduates will have an opportunity to acquire research experience in clinical settings. May be repeated for credit up to 12 units. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

IDI 199—Infectious Diseases Research (1-5)
Variable. Prerequisite(s): Consent of Instructor. Chemistry through organic chemistry (in addition, physical and biochemistry preferred), biology through basic bacteriology (in addition, microbiology and immunology preferred). Discrete problem requiring reading and actual manual effort in solution will be assigned to each student. Progress and results will be reviewed at intervals with instructor and via seminar presentation. (P/NP grading only.) Effective: 1997 Winter Quarter.

IDI 211—Epidemiology and Prevention of Infectious Diseases (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): EPI 205B; (EPI 207; or IMD 421). Infectious disease epidemiology and prevention, with equal emphasis on human and veterinary diseases. Major categories of infectious diseases by mode of transmission. Effective: 2002 Spring Quarter.

IDI 299—Research in Infectious Diseases (1-12)
Variable. Prerequisite(s): Consent of Instructor. Laboratory investigation contributing to the dissertation for a graduate
degree. (S/U grading only.) Effective: 1997 Winter Quarter.

IDI 440—Introduction to AIDS and Related Disorders (1.5-6)
Clinical Activity—30 hours; Discussion—10 hours. Prerequisite(s): First- and second-year medical students must be in good academic standing and have consent from the instructor. Familiarizes students with the diagnosis and treatment of individuals infected with the human immunodeficiency virus. Students will interview patients, observe patient care and participate in ongoing clinic research as well as examine alternative lifestyles. May be repeated for credit. May be repeated for credit. (H/P/F grading only.) Effective: 2005 Spring Quarter.

IDI 450—Clinical and Social Care of the Injection Drug User (1-4)
Clinical Activity—3 hours; Lecture—1 hour. Prerequisite(s): Consent of Instructor. First- and second-year medical students in good academic standing. Lecture and guided clinical practice in a supervised clinical setting, focusing on the social and medical aspects of health care for injection drug users. May be repeated for credit up to 24 units. May be repeated up to 24 unit(s). (H/P/F grading only.) Effective: 1999 Fall Quarter.

IDI 460—Infectious Diseases Clinical Clerkship (3-6)
Clinical Activity. Prerequisite(s): Successful completion of two years of study in an accredited medical school. Limited enrollment with priority to fourth-year medical students. Patients ill with infectious diseases, including AIDS, will be evaluated and presented at rounds and case conferences. Patients are also seen in the Infectious Diseases Clinic. Instruction in clinical microbiology and the proper use of the laboratory will be provided. (H/P/F grading only.) Effective: 1997 Winter Quarter.

IDI 493—Correctional Medicine SSM - Evaluation of HIV and Hepatitis C Patients (6)
Clinical Activity—30 hours; Discussion—5 hours. Primary agenda focuses on the evaluation of treatment of HIV and Hepatitis C patients in the correctional environment. (H/P/F grading only.) Effective: 2016 Fall Quarter.

IDI 499—Research Topics in Infectious Disease (2-12)
Variable. Prerequisite(s): Successful completion of the first-year of study in School of Medicine, graduate students (approved for graduate credit), and/or consent of instructor. Discrete problem requiring reading and actual manual effort in solution will be assigned to each student. Progress and results to be reviewed at
intervals with instructor and via seminar presentation. (H/P/F grading only.) Effective: 1997 Winter Quarter.

NEP 192—Internship in Nephrology (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project by preceptor prior to internship. Supervised work experience in nephrology. May be repeated for credit up to 12 units. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

NEP 299—Nephrology Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Research topics in Nephrology. May be repeated for credit. (S/U grading only.) Effective: 2002 Summer Quarter.

NEP 444—Curriculum Design for Doctoring (1)
Project (Term Project)—2 hours; Seminar—1 hour. Prerequisite(s): Consent of Instructor. Second year standing in School of Medicine. Design of Doctoring curriculum for medical students in focused topic areas to be announced annually. Students will design sessions, consider resource needs, and work with IORs to initiate the curriculum. (P/F grading only.) Effective: 2007 Summer Quarter.

NEP 460—Nephrology and Fluid Balance (3-6)
Clinical Activity—4 hours; Lecture/Discussion—10 hours. Prerequisite(s): Consent of Instructor. Completion of third-year medical school; completion of Medicine Core Clerkship. Limited enrollment. Active participation in all inpatient/outpatient clinical activities, attendance at specific lectures and conferences at UCD Medical Center covering the field of nephrology and fluid-electrolyte disorders. (H/P/F grading only.) Effective: 2001 Summer Quarter.

NEP 499—Research in Nephrology (3-18)
Variable. Prerequisite(s): Consent of Instructor. Individual arrangement. Independent laboratory research on a specific problem related to biochemical or immunologic causes of renal disease and/or uremic disorders in humans or animals. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

PUL 192—Internship in Pulmonary Medicine (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Upper division standing; approval of project by preceptor prior to internship. Supervised work experience in pulmonary medicine. May be repeated for
credit up to 12 units. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

PUL 299—Pulmonary Disease Research (1-12)
Laboratory. Prerequisite(s): Consent of Instructor. By arrangement only. Pulmonary disease research activity with focus in inhalation toxicity, oxidants or lung biochemistry, and cell and molecular biology. (S/U grading only.) Effective: 1997 Winter Quarter.

PUL 460—Comprehensive Pulmonary Medicine Clerkship (3-6)
Clinical Activity—40 hours. Prerequisite(s): Completion of second year of medical school and/or consent of instructor; completion of Internal Medicine Clerkship. Rotation intended to provide a comprehensive student education in Pulmonary Medicine. Students will participate in hands on clinical education, as well as completing an assigned curricula. Intended for students pursuing Internal Medicine & Primary Care careers. May be repeated for credit. (H/P/F grading only.) Effective: 2013 Summer Quarter.

PUL 461—Critical Care Clinical Clerkship (3-6)
Clinical Activity—40 hours. Prerequisite(s): Completion of second year of medical school and/or consent of instructor; completion of Internal Medicine and Surgical Clerkships. Rotation intended to provide student education in the Critical Care Management of sub-specialty patients. May be repeated for credit. (H/P/F grading only.) Effective: 2013 Summer Quarter.

PUL 462—Pulmonary Consult Clerkship (3-6)
Clinical Activity—35 hours. Prerequisite(s): Completion of second year of medical school and/or consent of instructor; completion of Internal Medicine Clerkship. Similar to course 460. Rotation designed for students interested in learning pulmonary medicine, but who desire more variety in their clerkships, and do not desire the comprehensive experience offered by a four-week pulmonary rotation. May be repeated for credit. (H/P/F grading only.) Effective: 2013 Summer Quarter.

PUL 470—Practicum in Care of the Terminally Ill (3-6)
Clinical Activity—35 hours; Seminar—5 hours; Variable—3-6 hours. Prerequisite(s): Consent of Instructor. Restricted to fourth-year Medical students in good standing. Work with hospice interdisciplinary team. Direct experience in the care of patients with illnesses where no cure is possible. Emphasis on symptom relief, end of life issues, physician assisted suicide. (H/P/F grading only.) Effective: 2010 Spring Quarter.

PUL 475—Encounters in Ethics in the ICU (3-6)
Clinical Activity—12 hours; Independent Study—6 hours; Lecture/Discussion—6 hours. Prerequisite(s): Fourth-year Medical Student. Care for critically ill adults with complex medical disease carries with it unique ethical roles and duties for the physician. May be repeated for credit. (H/P/F grading only.) Effective: 2011 Summer Quarter.

PUL 480—Pulmonary-Critical Care Medicine Insights (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. Student in good academic standing. Attend respiratory outpatient clinics and in-patient pulmonary consultation rounds and medical intensive care rounds. Introduction to diagnosis and treatment of common pulmonary problems. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PUL 499—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Research opportunity in Pulmonary Medicine. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

RAL 099—Directed Research Immunology (1-5)
Laboratory. Prerequisite(s): Consent of Instructor. Independent research will be encouraged in basic immunology, including the role of the cellular immune system in oncogenesis. (P/NP grading only.) Effective: 1997 Winter Quarter.

RAL 192—Internship in Rheumatology-Allergy (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project by preceptor prior to internship. Supervised work experience in rheumatology-allergy. May be repeated for credit up to 12 units. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

RAL 199—Directed Research in Immunology (1-5)
Laboratory. Prerequisite(s): Consent of Instructor. Independent research will be encouraged in basic immunology, including the role of the cellular immune system in oncogenesis. (P/NP grading only.) Effective: 1997 Winter Quarter.

RAL 209—Current Topics in Immunology: From Presentations to Grants (3)
Lecture—1 hour; Project (Term Project)—1 hour; Term Paper/Discussion—1 hour. Prerequisite(s): IMM 201 Current developments in various aspects of immunology and their interrelationships. Focus on areas of immunology not currently covered in the basic and advanced immunology courses. Oral presentation, written review and grant preparation. Effective: 2008 Winter Quarter.

RAL 298—Topics in Rheumatology and Clinical Immunology (1-5)
Laboratory. Prerequisite(s): Consent of Instructor. Library and/or laboratory work as required. (S/U grading only.) Effective: 1997 Winter Quarter.

RAL 299—Research in Autoimmune Disease (1-12)
Laboratory. Prerequisite(s): Consent of Instructor. Independent research will be encouraged in both animal models of human disease (including congenitally athymic [nude], asplenic, and New Zealand mice) and the cellular immune system of patients with systemic lupus erythematosus, Sjögrens syndrome, polymyositis and drug hypersensitivity. (S/U grading only.) Effective: 1997 Winter Quarter.

RAL 460—Rheumatology Clinical Clerkship (1-18)
Clinical Activity—2-40 hours. Prerequisite(s): MDS 431 and Consent of Instructor. Participation with members of the subspecialty service in the diagnosis and therapeutic management of patients with rheumatologic diseases. May be repeated for credit. (H/P/F grading only.) Effective: 2009 Spring Quarter.

RAL 461—Allergy Clinical Clerkship (3-18)
Clinical Activity. Prerequisite(s): Consent of Instructor. Completion of second year of medical school. Student will work with practicing allergist in daily work with patients and participate in weekly allergy clinic and teaching conferences. Study of the literature. Will see patients with problems in clinical immunology, immunodeficiency, asthma, allergic rhinitis. (H/P/F grading only.) Effective: 1997 Winter Quarter.

RAL 480—Insights in Rheumatology (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. Student in good academic standing. Participation in rheumatology consultation rounds, rheumatic disease clinics and conferences with supervised readings in rheumatology. (S/U grading only.) Effective: 1997 Winter Quarter.

RAL 499—Research (1-12)
Variable—2-40 hours. Prerequisite(s): Medical student with consent of instructor. Part-time participation in active clinical and basic research projects which can involve both patient care and relevant laboratory procedures.
Students can gain experience in clinical medicine and clinical investigation. May be repeated for credit. (H/P/F grading only.) Effective: 2009 Spring Quarter.

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MMI 130—Medical Mycology (2)
Lecture—2 hours. Prerequisite(s): Consent of Instructor. A course in pathogenic microbiology. Various aspects of pathogenic fungi, particularly affecting humans, will be discussed including epidemiology, pathogenesis and pathology, diagnosis and therapy. (430) Effective: 1997 Winter Quarter.

MMI 188—Human Immunology (3)
Lecture—3 hours. Prerequisite(s): Undergraduate level introductory Biology course. Human immune system and mechanisms of immunity. Basic components and function of immune system. Molecular basis of immune response; basic cellular and molecular mechanisms. Interactions between cells of immune system producing immune responses; regulating molecules. Effective: 2004 Spring Quarter.

MMI 192—Internship in Medical Microbiology (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project prior to period of internship. Supervised work experience in medical microbiology and related fields. (P/NP grading only.) Effective: 1997 Winter Quarter.

MMI 194H—Senior Honors Project in Medical Microbiology and Immunology (5)
Independent Study—15 hours. Prerequisite(s): MMI 199; and Consent of Instructor. Project in research related to immunology of medically important viruses. Development of a hypothesis-driven project, performance of experimental protocols and preparation of graphical representation of original data. Requires oral and written presentation of research results. May be repeated up to 3 time(s) with consent of instructor. (P/NP grading only.) Effective: 2004 Spring Quarter.

MMI 198—Group Study in Medical Microbiology (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. Directed reading and discussion and/or laboratory investigation on selected topics. (P/NP grading only.) Effective: 1997 Winter Quarter.

MMI 199—Research in Medical Microbiology (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. Individual research. (P/NP grading only.) Effective: 1997 Winter Quarter.

MMI 200D—Mechanisms for Microbial Interactions with Hosts (3)
Lecture/Discussion—3 hours. Prerequisite(s): MIB 200A; or Consent of Instructor. Study of mechanisms involved in microbial interactions within a host
environment. The following principles are basic to understanding these interactions: host recognition, invasion, competition and growth, and host defense. Effective: 1997 Winter Quarter.

MMI 210A—Critical Analysis of Contemporary Research on Animal Models of Human Infectious Disease (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Students funded by the Animal Models of Infectious Diseases Training Grant. Limited enrollment. Topics will include diverse vertebrate and invertebrate models of human infectious diseases. May be repeated for credit. (S/U grading only.) Effective: 2013 Fall Quarter.

MMI 210B—Comparative Analysis of Animal Models of Human Infectious Diseases (1)
Lecture/Discussion—1 hour. Prerequisite(s): Students funded by the Animal Models of Infectious Diseases Training Grant; others by consent of instructor. Limited enrollment. Compares the major vertebrate and invertebrate animal models that are used most commonly to study human infectious disease, including mouse, non-human primate, Caenorhabditis elegans, and drosophila. May be repeated for credit. (S/U grading only.) Effective: 2014 Winter Quarter.

MMI 215—Medical Parasitology (3)
Discussion—1.5 hours; Lecture—1.5 hours. Prerequisite(s): Graduate student with consent of instructor. Epidemiology, pathogenesis, diagnostic methods and current literature discussion of protozoa, helminths and arthropods of medical importance. Effective: 2011 Spring Quarter.

MMI 280—The Endogenous Microbiota in Health and Disease (3)
Lecture—3 hours. Prerequisite(s): Graduate standing. Recent insights into the microbial communities inhabiting mucosal surfaces, and will discuss how the composition of these communities contributes to normal development, metabolism, education of the immune system, and disease susceptibility. Effective: 2016 Spring Quarter.

MMI 291—Seminar in Microbiology and Immunology (1)
Seminar—1 hour. Restricted to students with upper division or graduate standing. Research seminars on current topics in microbiology and immunology. May be repeated for credit when topic differs. (S/U grading only.) Effective: 2007 Spring Quarter.

MMI 298—Group Study in Medical Microbiology and Immunology (1-5)
Variable. Prerequisite(s): Consent of Instructor. Open to graduate students. Directed reading and discussion and/or laboratory investigation on selected topics. Sections 1, 2, 4, 5 are S/U grading only. (S/U grading only.) Effective: 1997 Winter Quarter.

MMI 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Open to graduate students. Laboratory investigation contributing to the dissertation for a graduate degree. (S/U grading only.) Effective: 1997 Winter Quarter.

MMI 410—Physician Scientist Molecular Medicine Journal Club (1)
Lecture/Discussion—1 hour. Weekly seminars by students on research articles in current literature. Topics/articles to be selected by instructors to include a broad range of frontiers in biomedical literature. May be repeated for credit. (H/P/F grading only.) Effective: 2004 Fall Quarter.

MMI 430—Medical Mycology (2)
Lecture—2 hours. Prerequisite(s): Consent of Instructor. A course in pathogenic microbiology. Various aspects of pathogenic fungi, particularly affecting humans, will be discussed including epidemiology, pathogenesis and pathology, diagnosis and therapy. (130) (H/P/F grading only.) Effective: 1997 Winter Quarter.

MMI 480A—Medical Immunology (2.5)
Discussion/Laboratory—0.5 hours; Lecture—2 hours. Restricted to Medical students only. Helping to understand the immune system, the nomenclature and functional significance of the tissues, cells, proteins and genes of the immune system, as well as the normal regulatory mechanisms and pathologic outcomes related to the immune response. (P/F grading only.) Effective: 2016 Spring Quarter.

MMI 480B—Medical Microbiology (5.5)
Discussion/Laboratory—1 hour; Lecture—2.75 hours. Restricted to Medical students only. Discussion of the diseases caused by infectious agents includes their pathogenesis, clinical manifestations, diagnosis, treatment epidemiology and prevention. Covers the general properties of and diagnostic techniques for bacteria, fungi and viruses. (P/F grading only.) Effective: 2016 Spring Quarter.

MMI 497T—Tutoring in Medical Microbiology (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of Instructor. Appropriate preparation in subject matter. Assist instructor by tutoring medical students in one of the departmental courses that is a component of the required curriculum of the School of Medicine. (H/P/F grading only.) Effective: 1997 Winter Quarter.

MMI 498—Group Study in Medical Microbiology and Immunology (1-5)
Variable. Prerequisite(s): Medical students with consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics. (H/P/F grading only.) Effective: 1997 Winter Quarter.

MMI 499—Research (1-12)
Variable. Prerequisite(s): Medical students with consent of instructor. May be repeated for credit. (H/P/F grading only.) Effective: 2008 Winter Quarter.

MDS 099—Special Study in Medicine for Undergraduates (1-5)
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. Participate in research projects relating to medicine with faculty in the School of Medicine. (P/NP grading only.) Effective: 1997 Fall Quarter.

MDS 192—Medical Education Internship for Advanced Undergraduates (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Competency with computers. Enrollment dependent on availability of intern positions. Participate in projects related to curriculum development in support of curriculum for M.D. degree. Gain work experience and appreciation for innovative approaches to learning in basic and clinical sciences of medical education. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

MDS 400—Summer Pre-Matriculation Program (2)
Independent Study—15 hours; Lecture—14 hours; PE Activity—7 hours. Prerequisite(s): Consent of Instructor. Two week program provides students from diverse backgrounds an early introduction to learning skills that will facilitate success in medical school. (P/F grading only.) Effective: 2016 Summer Quarter.

MDS 401—Applications of Computers to Medical Practice (2)
Auto Tutorial—2 hours. Prerequisite(s): Enrollment in medical school. Proficiency in computer applications relative to practice of medicine, with emphasis on email, literature searching, file transfer, and hospital information services. Course given online, at home or in lab; time and place determined by student. (H/P/F grading only.) Effective: 1997 Winter Quarter.

MDS 402—Clinical & Cultural Spanish (2)
Independent Study—4 hours; Lecture—1 hour; Practice—1 hour. Prerequisite(s): Consent of Instructor. Medical students, nursing students and physician assistants students who are fluent Spanish speakers will learn a comprehensive set of medical vocabulary and cultural aspects related to the treatment of Spanish speaking patients. (P/F grading only.) Effective: 2015 Winter Quarter.

MDS 403—Science & Practice of Mindfulness and Compassion (1)
Independent Study—20 hours; Lecture/Discussion—10 hours. Course will examine current scientific evidence for the effects of different mindfulness and compassion meditation practices in both healthy and clinical samples. (P/F grading only.) Effective: 2015 Summer Quarter.

MDS 406—Endocrinology, Nutrition, Reproduction and Genetics (9.5)
Discussion/Laboratory—2.8 hours; Lecture—3.8 hours. Prerequisite(s): BCM 410A; HPH 400; and Consent of Instructor. Restricted to Medical students only. Basic and pathophysiologic processes involved in human reproductive and endocrine control systems, nutritional regulation, and foundational genetics across the lifespan. Integrate information across these systems and use clinical reasoning process to identify and understand relevant perturbations and diseases. May be repeated up to 3 time(s). (P/F grading only.) Effective: 2016 Winter Quarter.

MDS 411—Doctoring 1 (9)
Clinical Activity—1 hour; Discussion—1 hour; Lecture—1 hour. Prerequisite(s): Consent of Instructor. Small group training in patient communication, interviewing techniques, physical exam and clinical identification. Outpatient clinical experiences and didactic presentations also included. (P/F grading only.) Effective: 2017 Summer Quarter.

MDS 411B—Doctoring 1 (5)
Clinical Activity—1.5 hours; Discussion—1.5 hours; Lecture/Discussion—1.8 hours. Medical students only. Small, case-based learning groups with training in patient communication and interviewing techniques, clinical identification and problem solving, applications of social, psychological, cultural, bioethical, and basic science concepts to patient case scenarios, outpatient clinical experiences and didactic presentations. (P/F grading only.) Effective: 2018 Winter Quarter.

MDS 411KA—ACE-PC Program Doctoring 1 (13)
Clinical Activity—5 hours; Lecture/Discussion—6 hours. Prerequisite(s): Consent of Instructor. Small case-based learning groups with training in patient communication and interviewing techniques clinical identification and problem solving applications of social psychological cultural bioethical and basic science concepts to patient case scenarios outpatient clinical experiences and didactic presentations. (P/F grading only.) Effective: 2014 Summer Quarter.

MDS 411KB—ACE-PC Program Doctoring 1 (5)
Clinical Activity—4 hours; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Application of multidisciplinary basic, social and clinical science to clinical cases in small groups. History, physical examination with preceptors. Didactics in epidemiology, ethics, sexuality and clinical reasoning. Evaluation of professional competencies, attitudes and skills needed in the practice of medicine. (P/F grading only.) Effective: 2015 Winter Quarter.

MDS 415—Population Health and Evidence-Based Medicine (2) ***Review all entries***
Discussion—4 hours; Lecture—12 hours. Prerequisite(s): Consent of Instructor. Focuses on the bedrock themes of public health: populations and prevention. (P/F grading only.) Effective: 2017 Summer Quarter.

MDS 415—Population Health and Evidence-Based Medicine (2) ***Review all entries Discontinued***
Discussion—4 hours; Lecture—12 hours. Prerequisite(s): Consent of Instructor. Focuses on the bedrock themes of public health: populations and prevention. (P/F grading only.) Effective: 2018 Summer Quarter.

MDS 415A—Population Health and Evidence-Based Medicine (2)
Discussion—4 hours; Lecture—12 hours. Prerequisite(s): Consent of Instructor. Introduces the fundamental concepts and tools of population health, evidence-based medicine, and system science. (P/F grading only.) Effective: 2018 Summer Quarter.

MDS 415B—Critical Appraisal of Topics in Population Health (0.5)
Discussion—6 hours. Apply foundational skills to explore critical issues in 21st century public health, including tobacco control, firearm violence, and obesity. In a series of small-group discussions "interpreting the medical literature," key concepts from epidemiology and biostatistics are reinforced while students are armed with specific strategies for addressing high-risk behaviors in the context of population health. (P/F grading only.) Effective: 2018 Summer Quarter.

MDS 415C—Population Health and System Science (1.5)
Discussion—6 hours; Fieldwork—3 hours; Lecture—4 hours. Prerequisite(s): Consent of Instructor. Addresses the social, economic, cultural, policy-related, and environmental factors that affect the health of populations and individuals, and the role of health care systems (locally, regionally, nationally, and globally) in moderating the effects of these factors. Content builds on MDS 415A/B, the TeamPEACE (Teamwork for Professionalism, Ethics, and Cultural Enrichment) curriculum in Doctoring 1, and students' lived experience in UC Davis free clinics. (P/F grading only.) Effective: 2018 Summer Quarter.

MDS 420—Multisystem Clinical Presentations (0.5)
Extensive Problem Solving—15 hours; Independent Study—6 hours. Prerequisite(s): Consent of Instructor. Completion of Pathophysiology Block. Capstone course integrates coursework, knowledge, skills and experiential learning to enable the student to demonstrate a broad mastery of learning across the curriculum. (P/F grading only.) Effective: 2014 Winter Quarter.

MDS 421A—Doctoring 2 (6)
Discussion—1 hour; Internship—0.5 hours; Lecture/Discussion—1 hour. Prerequisite(s): Approval by the School of Medicine Committee on Student Progress; medical students only. Application of multidisciplinary basic, social and clinical science to clinical cases in small groups. History, physical examination with preceptors. Didactics in epidemiology, ethics, sexuality and clinical reasoning. Evaluation of professional competencies, attitudes and skills needed in the practice of medicine. (P/F grading only.) Effective: 2007 Summer Quarter.

MDS 421B—Doctoring 2 (6)
Discussion—1 hour; Internship—0.5 hours; Lecture/Discussion—1 hour. Prerequisite(s): Approval by the School of Medicine on Student Progress; medical students only. Application of multidisciplinary basic, social & clinical science concepts to cases in small groups. History, physical examination with preceptors. Didactics in epidemiology, ethics, sexuality, and clinical reasoning. Evaluation of professional competencies, attitudes and skills needed in the practice of medicine. (P/F grading only.) Effective: 2007 Summer Quarter.

MDS 421C—Doctoring 2 (6)
Discussion—1 hour; Internship—0.5 hours; Lecture/Discussion—1 hour. Prerequisite(s): Approval by the School of Medicine Committee on Student Progress; medical students only. Application of multidisciplinary basic, social and clinical science concepts to clinical cases in small group discussions facilitated by medical school faculty. Evaluation of professional competencies, attitudes and skills needed in the practice of clinical medicine. (P/F grading only.) Effective: 2007 Summer Quarter.

MDS 421KA—ACE-PC Program Doctoring 2 (6)
Discussion—1 hour; Internship—0.5 hours; Lecture/Discussion—1 hour. Prerequisite(s): MDS 411KA; MDS 411KB; Admission into ACE-PC. MDS 421KA-C are a year-long series of courses. Objectives and assessments have been accelerated to accommodate the students enrolled in the ACE-PC Program. Students will participate in all aspects of Doctoring 2, other than what was done in 411KA/KB. (P/F grading only.) Effective: 2015 Summer Quarter.

MDS 421KB—ACE-PC Program Doctoring 2 (6)
Discussion—1 hour; Internship—0.5 hours; Lecture/Discussion—1 hour. Prerequisite(s): Approval by the School of Medicine on Student Progress; medical students only. MDS 421KA-C are a year-long series of courses. Objectives and assessments have been accelerated to accommodate the students enrolled in the ACEPC Program. Students will participate in all aspects of Doctoring 2, other than what was done in 411KA/KB. (P/F grading only.) Effective: 2015 Summer Quarter.

MDS 421KC—ACE-PC Program Doctoring 2 (6)
Discussion—1 hour; Internship—0.5 hours; Lecture/Discussion—1 hour. Prerequisite(s): Approval by the School of Medicine Committee on Student Progress; medical students only. MDS 421KA-C are a year-long series of courses. Objectives and assessments have been accelerated to accommodate the students enrolled in the ACEPC Program. Students will participate in all aspects of Doctoring 2, other than what was done in 411KA/KB. (P/F grading only.) Effective: 2015 Summer Quarter.

MDS 428—Foundations of Bioethics (1)
Discussion—3 hours; Independent Study—16.5 hours; Lecture/Discussion—3 hours; Web Virtual Lecture—1 hour. Prerequisite(s): Consent of Instructor. Course will expose students to core content in bioethics and the law and introduce a framework for ethical decision-making, while emphasizing relationships between bioethics and clinical care. (P/F grading only.) Effective: 2014 Summer Quarter.

MDS 429—Transition to Clerkships (1)
Discussion—7 hours; Discussion/Laboratory—12 hours; Independent Study—2 hours; Workshop—13 hours. Incoming third-year medical students will participate in a variety of educational experiences designed to prepare them to begin their clerkship curriculum. Course content will be disseminated in large and small group settings. (P/F grading only.) Effective: 2015 Spring Quarter.

MDS 430—Introduction to Doctoring 3 (1)
Discussion/Laboratory—2 hours. Prerequisite(s): Approval by SOM Committee on Student Progress. Restricted to Medical students only. Application of multidisciplinary basic, social and clinical science concepts to clinical cases in small group discussions facilitated by medical school faculty. Evaluation of professional competencies, attitudes and skills needed in the practice of clinical medicine. (H/P/F grading only.) Effective: 2011 Spring Quarter.

MDS 430A—Doctoring 3 (1)
Discussion—3 hours. Prerequisite(s): Approval by SOM Committee on Student Progress. Restricted to Medical students only. Application of multidisciplinary basic, social and clinical science concepts to clinical cases in small group discussions facilitated by medical school faculty. Evaluation of professional competencies, attitudes and skills needed in the practice of clinical medicine. (H/P/F grading only.) Effective: 2015 Spring Quarter.

MDS 430B—Doctoring 3 (1)
Discussion—2 hours. Prerequisite(s): Approval by SOM Committee on Student Progress. Restricted to Medical students only. Application of multidisciplinary basic, social & clinical science concepts to clinical cases in small group discussions facilitated by medical school faculty. Evaluation of professional competencies, attitudes and skills needed in the practice of clinical medicine. (H/P/F grading only.) Effective: 2015 Spring Quarter.

MDS 430C—Doctoring 3 (1)
Discussion—2 hours. Prerequisite(s): Approval by SOM Committee on Student Progress. Restricted to Medical students only. Application of multidisciplinary basic, social & clinical science concepts to clinical cases in small group discussions facilitated by medical school faculty. Evaluation of professional competencies, attitudes and skills needed in the practice of clinical medicine. (H/P/F grading only.) Effective: 2015 Spring Quarter.

MDS 430D—Doctoring 3 (1)
Discussion—2 hours. Prerequisite(s): Approval by SOM Committee on Student Progress. Restricted to Medical students only. Application of multidisciplinary basic, social & clinical science concepts to clinical cases in small group discussions facilitated by medical school faculty. Evaluation of professional competencies, attitudes and skills needed in the practice of clinical medicine. (H/P/F grading only.) Effective: 2015 Summer Quarter.

MDS 435KA—ACE-PC Longitudinal Integrated Clerkship A (18)
Clinical Activity—45 hours; Discussion—4 hours; Independent Study—6 hours. Prerequisite(s): Consent of Instructor. Longitudinal Clerkship will combine the Internal Medicine, OBGYN, Pediatrics, Psychiatry and Surgery Clerkships for the ACE-PC Program. (H/P/F grading only.) Effective: 2016 Spring Quarter.

MDS 435KB—ACE-PC Longitudinal Integrated Clerkship B (21)
Clinical Activity—45 hours; Discussion—4 hours; Independent Study—6 hours. Prerequisite(s): Consent of Instructor. Longitudinal Clerkship will combine the Internal Medicine, OBGYN, Pediatrics, Psychiatry and Surgery Clerkships for the ACE-PC Program. (H/P/F grading only.) Effective: 2016 Spring Quarter.

MDS 435KC—ACE-PC Longitudinal Integrated Clerkship C (18)
Clinical Activity—45 hours; Discussion—4 hours; Independent Study—6 hours. Prerequisite(s): Consent of Instructor. Longitudinal Clerkship will combine the Internal Medicine, OBGYN, Pediatrics, Psychiatry and Surgery Clerkships for the ACE-PC Program. (H/P/F grading only.) Effective: 2016 Spring Quarter.

MDS 440—Doctoring 4 Teaching Fellowship (3)
Discussion—0.5 hours; Seminar—0.25 hours. Prerequisite(s): MDS 430A; MDS 430B; MDS 430C; MDS 430D; and Consent of Instructor. Restricted to Medical student only. Instruction on teaching methodology and pedagogy. Mentored teaching of junior medical students in seminar, lecture, and bedside. (H/P/F grading only.) Effective: 2015 Spring Quarter.

MDS 441—Combined Ophthalmology and Otolaryngology Clerkship (6)
Clinical Activity—4 hours. Prerequisite(s): Approval by Committee on Student Promotion and Evaluation. Fundamental knowledge of ophthalmology and otolaryngology for the treatment of eye, ear, nose and throat problems at a level of training of general physicians, including when to refer patients to a specialist. (H/P/F grading only.) Effective: 1997 Summer Quarter.

MDS 445—Race and Health in the United States (3-6)
Discussion—4 hours. Interprofessional course facilitates the professional and personal developmental of medical students and other health professions students who think they would like to be leaders in securing equity in population health and work environments. (P/F grading only.) Effective: 2017 Fall Quarter.

MDS 449—Transition to Residency (3-6)
Clinical Activity. Prerequisite(s): Consent of Instructor. Transition to Residency program addresses the graduating medical students need to improve clinical skills necessary for the first six months of residency and unmet graduation competencies in our competency-based curriculum. (P/F grading only.) Effective: 2017 Fall Quarter.

MDS 450—Introduction to UCD Medical Center (1)
Seminar. Prerequisite(s): Second-year medical student. Designed to assist medical student in transition from classroom to hospital setting. (H/P/F grading only.) Effective: 1997 Winter Quarter.

MDS 455—Student Run Clinics (1-3)
Clinical Activity—3-9 hours. Open to medical students in good standing. Will learn counseling, diagnosis and treatment of patients with chronic and acute disease under supervision of physician. Meet all requirements and prerequisites of the particular clinic within which they work. May be repeated for credit. (P/F grading only.) Effective: 2011 Summer Quarter.

MDS 460CR—Introduction to Clinical Research (2)
Independent Study—3 hours; Lecture—2 hours. Restricted to completion of M.D., D.D.S, D.M.D., O.D., N.D., Pharm.D., D.V.M., Ph.D., or D.N.S. in nursing; application and acceptance into the Clinical Research Graduate Group, K30 program Introduction to the CRGG program and overview of major clinical research topics. Overview of basic clinical skills needed to accomplish CRGG mentored research project. (P/F grading only.) Effective: 2006 Summer Special Session.

MDS 461CR—Strategies for Grant Writing (2)
Lecture—2 hours. Restricted to completion of M.D., D.D.S, D.M.D., O.D., N.D., Pharm.D., D.V.M., Ph.D., or D.N.S. in nursing; application and acceptance into the Clinical Research Graduate Group, K30 program. Practical skills and strategies to create successful grant proposals in the NIH style and format. Generating ideas, identifying and accessing research resources, grant components, specific aims, backgound and significance, preliminary studies, budgets, and bios. Matriculation through UC system, and resubmissions. (S/U grading only.) Effective: 2007 Spring Quarter.

MDS 462CR—Introduction to Clinical Epidemiology and Study Design (3)
Discussion—10 hours; Lecture—25 hours. Restricted to completion of M.D., D.D.S, D.M.D., O.D., N.D., Pharm.D., D.V.M., Ph.D., or D.N.S. in nursing; application and acceptance into the Clinical Research Graduate Group, K30 program. Anatomy and physiology of conducting clinical epidemiologic research. Familiarity with three basic study designs (cross-sectional, case-control,and cohort). Discussion of principles of measurements in clinical epidemiological studies, basic methods for analyzing data, and ethical issues involved in conducting research. (S/U grading only.) Effective: 2004 Summer Special Session.

MDS 463CR—Methods in Clinical Research (5)
Discussion—2 hours; Lecture—3 hours. Restricted to completion of M.D., D.D.S, D.M.D., O.D., N.D., Pharm.D., D.V.M., Ph.D., or D.N.S. in nursing; application and acceptance into the Clinical Research Graduate Group, K30 program. Overview of major approaches to clinical research, including health services research techniques, informatics, the GCRC, and preclinical methodologies to enhance clinical projects. Overview of UC Davis clinical research support infrastructure. Methodologies applicable to clinical research and its multi-disciplinary perspective. (S/U grading only.) Effective: 2007 Spring Quarter.

MDS 464CR—Responsible Conduct of Research (3)
Lecture—3 hours. Restricted to completion of M.D., D.D.S, D.M.D., O.D., N.D., Pharm.D., D.V.M., Ph.D., or D.N.S. in nursing; application and acceptance into the Clinical Research Graduate Group, K30 program. The nine NIH-mandated modules: Data Acquisition and Reporting, Mentor Training, Publication Practices and Authorship, Peer Review/Grant Process, Collaborative Science, Human Subjects, Research with Animals, Conflict of Interest, Research Misconduct, and Entrepreneurship/Industry Collaborations/Intellectual Property/Technology Transfer. (S/U grading only.) Effective: 2004 Summer Special Session.

MDS 465CR—Introduction to Medical Statistics (4)
Laboratory—2 hours; Lecture—3 hours. Restricted to completion of M.D., D.D.S, D.M.D., O.D., N.D., Pharm.D., D.V.M., Ph.D., or D.N.S. in nursing; application and acceptance into the Clinical Research Graduate Group, K30 program. Biomedical applications of statistical methods in clinical, laboratory and population medicine. Graphical/tabular data presentation, probability, binomial, Poisson, normal, t-, F-, and Chi-square distributions, elementary nonparametric methods, simple linear regression/correlation, life tables. Microcomputer applications of statistical procedures in population medicine. (S/U grading only.) Effective: 2005 Summer Special Session.

MDS 468C—International Clinical Preceptorship (1-12)
Clinical Activity—30 hours. Prerequisite(s): Consent of Instructor. Medical students. Multidisciplinary preceptorship in a foreign country. Clinical credit will be awarded using this course, once approval has been received from the appropriate governing committee. May be repeated for credit. (H/P/F grading only.) Effective: 2015 Spring Quarter.

MDS 468D—International Elective (1-12)
Clinical Activity—10 hours; Independent Study—20 hours. Prerequisite(s): Consent of Instructor. Medical students. Multidisciplinary preceptorship in a foreign country. Course used to award non-clinical credit for international experiences which have been approved by the appropriate governing committee. May be repeated for credit. (H/P/F grading only.) Effective: 2015 Summer Quarter.

MDS 470—Introduction to Dentistry (3-18)
Clinical Activity—34 hours; Lecture—6 hours; Variable—3-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good standing. Introduction to Dentistry and basic Oral and Maxillofacial Surgery. Course is offered by the Oral and Maxillofacial Surgery department at UC San Francisco. (P/F grading only.) Effective: 2009 Fall Quarter.

MDS 480—Insights in Clinical Research (1)
Lecture—1 hour. Prerequisite(s): Medical student in good standing. Seminars on research presented by Medical School faculty; overview of pertinent issues, including medical ethics, human subjects protocols, case control methods, etc. May be repeated for credit. (P/F grading only.) Effective: 2005 Spring Quarter.

MDS 481—Insights into Clinical Specialties (1)
Lecture/Discussion—1 hour. Prerequisite(s): Medical student in good standing. Exposure to various medical specialties, their residency programs and ways in which medical students can prepare for and improve their candidacy for such programs. May be repeated for credit. (H/P/F grading only.) Effective: 1998 Winter Quarter.

MDS 482—Lecture Series in Reproductive Health (1)
Lecture—1 hour. Psychosocial and public health aspects of providing quality reproductive health care and application in student-run free clinics and in 3rd year clerkships. May be repeated up to 2 time(s). Only medical students may enroll for credit; undergraduates may audit the course. (P/F grading only.) Effective: 2002 Winter Quarter.

MDS 483—Insights in Political, Legal and Business Aspects of Medicine (1)
Lecture—1 hour. Prerequisite(s): Medical students in good standing. Restricted to Medical student only. The practical aspects of a medical career. May be repeated up to 2 time(s). (P/F grading only.) Effective: 2002 Spring Quarter.

MDS 485—Health Policy Lecture Series (1)
Lecture—1 hour. Lecture series provides an overview of local, state, national and international health policy. The current challenges health care reform implementation is facing provides how medical students can successfully advocate for changes in health policy. May be repeated for credit. (P/F grading only.) Effective: 2011 Fall Quarter.

MDS 486—Topics in Health Care Improvement (0.5)
Lecture/Discussion—15 hours. Lecture series will cover major topics in health care improvement, presented by guest speakers who are leaders in the field. May be repeated for credit. (P/F grading only.) Effective: 2015 Spring Quarter.

MDS 487—History and Ethics of Medicine (1)
Lecture—1.25 hours. Introduction to ethical problems and events in health care in both modern and historical contexts. Eight one-hour and fifteen-minute interactive sessions designed to introduce students to historical topics in medicine and medical ethics. (P/F grading only.) Effective: 2004 Winter Quarter.

MDS 489—Directed Studies (1-9)
Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for modified curriculum, USMLE exams, and/or as required by Committee on Student Progress. Independent studies to accommodate modified curriculums, prepare for taking USMLE exams and for remediation course work directed by the Committee on Student Progress. May be repeated for credit. (P/F grading only.) Effective: 2009 Winter Quarter.

MDS 489C—Clinical Reintroduction Experience (1-9)
Clinical Activity—20 hours. Prerequisite(s): Consent of Instructor. Learn and practice basic clinical skills in a supervised clinical setting. Skills include patient interviewing, history, physical examination, diagnostic and clinical reasoning, case presentation, and medical records documentation. Direct observation and individual feedback on clinical skills development is provided. (P/F grading only.) Effective: 2012 Summer Quarter.

MDS 489R—USMLE Directed Remedial Studies (1-9)
Independent Study—20 hours. Prerequisite(s): Recommendation by Committee on Student Progress. Independent studies to accommodate remediation for taking USMLE exams directed by the Committee on Student Progress. May be repeated for credit. (P/F grading only.) Effective: 2011 Spring Quarter.

MDS 490A—Community Health Scholars Seminar A (1.5)
Lecture—1 hour. Prerequisite(s): Consent of Instructor. Longitudinal year-long course starting on July 1 and concluding at the end of Block 2. Focuses on immersing students in their respective communities to understand the strengths and challenges they face in relation to health. May be repeated for credit. (P/F grading only.) Effective: 2017 Summer Quarter.

MDS 490B—Community Health Scholars Seminar B (0.5)
Lecture—1 hour. Prerequisite(s): Consent of Instructor. Longitudinal year-long course starting on July 1 and concluding at the end of Block 2. Focuses on immersing students in their respective communities to understand the strengths and challenges they face in relation to health. May be repeated for credit. (P/F grading only.) Effective: 2017 Summer Quarter.

MDS 490C—Community Health Scholars Seminar C (0.5)
Lecture—1 hour. Prerequisite(s): Consent of Instructor. Longitudinal year-long course starting on July 1 and concluding at the end of Block 2. Focuses on immersing students in their respective communities to understand the strengths and challenges they face in relation to health. May be repeated for credit. (P/F grading only.) Effective: 2017 Summer Quarter.

MDS 490D—Community Health Scholars Seminar D (0.5)
Lecture—1 hour. Prerequisite(s): Consent of Instructor. Longitudinal year-long course starting on July 1 and concluding at the end of Block 2. Focuses on immersing students in their respective communities to understand the strengths and challenges they face in relation to health. May be repeated for credit. (P/F grading only.) Effective: 2017 Summer Quarter.

MDS 493—Independent Special Study Module (3-12)
Variable—20 hours. Prerequisite(s): Consent of Instructor. FYOC approval required. Student developed alternative to the SSM/SPO Requirement. Approval by FYOC is required. (H/P/F grading only.) Effective: 2015 Winter Quarter.

MDS 493A—International and Comparative Health Care--SSM (6)
Discussion—20 hours; Lecture—10 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. Through a series of lectures, seminars and clinical experiences, all occurring in other nations, students will research how health care systems address critical health issues. In 2007, Chronic Disease is the focal issue. SSM Component. (H/P/F grading only.) Effective: 2012 Spring Quarter.

MDS 493B—International and Comparative Health Care--Clinical (3-9)
Clinical Activity—30 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. Through a series of lectures, seminars and clinical experiences, all occurring in other nations, students will research how health care systems address critical health issues. In 2007, Chronic Disease is the focal issue. Clinical Component. (H/P/F grading only.) Effective: 2014 Spring Quarter.

MDS 493D—Teaching the Basic Sciences SSM (6)
Laboratory—30 hours; Lecture—6 hours; Lecture/Lab—8 hours; Tutorial—10 hours. Prerequisite(s): MDS 440 (can be concurrent); and Consent of Instructor. MDS 440 required concurrently. Restricted to UC Davis School of Medicine students only. Special Studies Module, a yearlong in progress court to teach lecture and discussion education technique and theory. (H/P/F grading only.) Effective: 2015 Spring Quarter.

MDS 493Q—Improving Quality in Health Care (6)
Discussion/Laboratory—10 hours; Lecture—8 hours; Project (Term Project)—10 hours. Prerequisite(s): Consent of Instructor. Working in interdisciplinary teams, will explore the theory and practical methods being employed to make improvement in health care systems while providing an opportunity for interprofessional educational experience. (H/P/F grading only.) Effective: 2015 Fall Quarter.

MDS 493QA—Improving Quality in Health Care (3)
Discussion/Laboratory—10 hours; Lecture—8 hours; Project (Term Project)—10 hours. Prerequisite(s): Consent of Instructor. Working in interdisciplinary teams, will explore the theory and practical methods being employed to make improvement in health care systems while providing an opportunity for interprofessional educational experience. (H/P/F grading only.) Effective: 2012 Fall Quarter.

MDS 493QB—Improving Quality in Health Care (3)
Discussion/Laboratory—10 hours; Lecture—8 hours; Project (Term Project)—10 hours. Prerequisite(s): Consent of Instructor. Working in interdisciplinary teams, will explore the theory and practical methods being employed to make improvement in health care systems while providing an opportunity for interprofessional educational experience. (H/P/F grading only.) Effective: 2012 Fall Quarter.

MDS 493QC—Enhancing Patient Safety in Health Care (6)
Clinical Activity—8 hours; Discussion—6 hours; Seminar—6 hours. Prerequisite(s): Consent of Instructor. Fourth-year Medical student. Inter-professional module is designed to explore the theory and practical methods being employed to improve patient safety in health care while providing an opportunity for interprofessional educational experience. (H/P/F grading only.) Effective: 2013 Spring Quarter.

MDS 494—Non-Clinical Medical Student Externship (3-9)
Clinical Activity—10 hours; Independent Study—20 hours. Prerequisite(s): Consent of Instructor. Restricted to students with approval of credit by the Fourth Year Oversight Committee. Generic course for awarding externship credit for medical student rotations that are not primarily focused on patient care. May be repeated for credit. (H/P/F grading only.) Effective: 2014 Fall Quarter.

MDS 495—Medicine Literature Review (1-9)
Discussion—3-27 hours. Prerequisite(s): Medical student in good academic standing and permission of the Associate Dean of Curricular Affairs. Independent study: topics for selection include, but are not restricted to, medical ethics, economics and jurisprudence, culture and medicine, ethnicity and medicine, gender and medicine, history of medicine, health manpower, and medical education. A prepared paper on the selected topic will be required. (P/F grading only.) Effective: 1997 Fall Quarter.

MDS 497—Scholarly Project (6)
Independent Study—0.5 hours; Seminar—0.25 hours. Prerequisite(s): Consent of Instructor. Project proposal must be accepted by the Scholarly Project Executive Committee (SPEC). Restricted to 4th year medical school students only. Develop a research project on a focused topic area, implements the research, writes a publishable paper, and presents an oral summary of the project. (H/P/F grading only.) Effective: 2015 Spring Quarter.

MDS 499—Research in Medical Education & Curriculum Development (4-9) ***Review all entries***
Independent Study—10-36 hours. Prerequisite(s): Medical students in good standing and competency with computers. Research and development of an independent project related to expanding computer-assisted resources in support of the MD curriculum at UC Davis. (H/P/F grading only.) Effective: 1997 Fall Quarter.

MDS 499—Medical Student Research Fellowship (1-9) ***Review all entries***
Independent Study—10-36 hours. Prerequisite(s): Medical students in good standing and competency with computers. Independent research project as part of the Medical Student Research Fellowship. (H/P/F grading only.) Effective: 2018 Summer Quarter.

PHA 092—Internship in Pharmacology (1-12)
Internship—3-36 hours. Prerequisite(s): Lower division student with good academic standing; approval of project prior to period of internship. Supervised work experience in pharmacology and related fields. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHA 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHA 192—Internship in Pharmacology (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Upper division standing; approval of project prior to period of internship. Supervised work experience in pharmacology and related fields. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHA 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHA 199—Special Study for Advanced Undergraduates (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHA 205—Problem Solving in Pharmacology (1)
Lecture/Discussion—1 hour. Restricted to Graduate Students in Pharmacology and Toxicology, Chemistry and Clinical Research Graduate Groups; other students may be accepted with consent of instructor. Students will be introduced to a current biomedical problem that would benefit from a developing drug and will develop an experimental strategy for addressing the issue. Students will develop model systems for testing various classic and recent pharmacological approaches. May be repeated up to 12 time(s) Course changes subjects every quarter; each course is unique and can be taken as often as desirable; certain students (Trainees of the Training Program in Pharmacological Sciences) must take course for at least three years. Effective: 2014 Fall Quarter.

PHA 207—Drug Discovery and Development (3)
Extensive Writing—1 hour; Lecture/Discussion—2 hours. Prerequisite(s): An equivalent course in general pharmacology, or knowledge of basic pharmacology. Intended for graduate students in Pharmacology and Toxicology, Chemistry and Clinical Research Graduate Groups; other students, including undergraduates, may be accepted with consent of instructors. Survey of the process by which a drug is discovered, developed and made available to the public. Topics include drug identification and optimization, safety testing, clinical evaluation, regulatory issues, intellectual property, formulation, and the global pharmaceutical industry. May be repeated for credit. Effective: 2010 Winter Quarter.

PHA 208—Advanced Cardiac Physiology and Pharmacology (3)
Lecture—2 hours; Lecture/Discussion—1 hour. Prerequisite(s): An equivalent course in general pharmacology or physiology (example, BIM 204), or knowledge of basic pharmacology/physiology. Open to graduate students from the Pharmacology and Toxicology, Molecular, Cellular and Integrated Physiology, Biomedical Engineering and Clinical Research Graduate Groups; other students (including undergraduates) may be accepted upon consultation with the instructors. Detailed characterization of the mechanisms involved in cardiac excitation–contraction coupling, alterations that occur in heart disease and pharmacological interventions. Topics include cardiac contractile apparatus, action potential, Ca cycling, excitation–transcription coupling, cardiac inotropy, heart failure and arrhythmias. Effective: 2013 Spring Quarter.

PHA 225—Gene and Cellular Therapies (3)
Lecture/Discussion—3 hours. Gene therapy from basic concepts to clinical applications. Topics include the human genome and genetic variation, genetic diseases, methods to manipulate gene expression, viral and non-viral delivery vectors, history and progress of gene therapy, case studies, and ethical issues. (Genetics 225.) Effective: 2017 Winter Quarter.

PHA 250—Functional Genomics: From Bench to Bedside (3)
Lecture/Discussion—3 hours. Prerequisite(s): GGG 201C; MCB 214; Or equivalent. Functional genomics (how genetic variation and epigenomics affect gene expression), with an emphasis on clinical relevance and applications. Topics include genetic variation and human disease, cancer therapeutics, and biomarker discovery. (Genetics 250.) Effective: 2015 Spring Quarter.

PHA 291—Pharmacology Research Seminar Series (1)
Discussion—1 hour; Seminar—1 hour. Prerequisite(s): Consent of Instructor. Upper division or graduate standing. Research seminars on current topics in Pharmacology. May be repeated for credit when topic differs. (S/U grading only.) Effective: 2007 Fall Quarter.

PHA 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Effective: 1997 Winter Quarter.

PHA 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

PHA 400A—Pharmacology (2)
Discussion/Laboratory—0.3 hours; Lecture—1 hour. Prerequisite(s): Approval by School of Medicine Committee on Student Progress. Restricted to Medical student only. Principles in pharmacology, including pharmacokinetics, drug metabolism and the actions, uses and toxicities of the major classes of drugs. (P/F grading only.) Effective: 2012 Winter Quarter.

PHA 400B—Pharmacology (1.5)
Discussion—0.25 hours; Lecture—1 hour. Prerequisite(s): Approval by School of Medicine Committee on Student Progress; medical students only. Principles in pharmacology, including autonomic pharmacology, general anesthetics, neuropharmacology and sedative/hypnotics. (P/F grading only.) Effective: 2008 Fall Quarter.

PHA 400C—Pharmacology (3.5)
Discussion—0.5 hours; Lecture—2 hours. Prerequisite(s): PHA 400A; PHA 400B; Approval by School of Medicine Committee on Student Progress; medical students only. Treatment of respiratory and cardiovascular disease, central nervous system drugs, GI, Toxicology and chemotherapy. Specific topics include: asthma, chronic obstructive pulmonary disease, hypertension, congestive heart failure, and the treatment of arrhythmias. Pain Management, depression, psychosis, acid reflux, IBS and toxicology. (P/F grading only.) Effective: 2015 Fall Quarter.

PHA 445—Introduction to Integrative Medicine (1)
Lecture/Discussion—1 hour. Prerequisite(s): Medical student in good standing. Basic principles of alternative medical systems (e.g., traditional Chinese, Ayurvedic, Tibetan), alternative practices (e.g., chiropractic, osteopathy, naturopathy, homeopathy, herbalism, guided imagery/meditation, massage therapy), and mind/body connection are presented as introduction to integrating alternative treatments into traditional medicinal practice. (H/P/F grading only.) Effective: 2000 Winter Quarter.

PHA 490—Seminar in Pharmacology for Medical Students (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Seminar in pharmacology for medical students. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PHA 497T—Tutoring in Pharmacology (1-5)
Tutorial—3-15 hours. Prerequisite(s): Advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum of the School of Medicine. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PHA 498—Special Study for Medical Students (1-5)
Discussion; Lecture. Prerequisite(s): Consent of Instructor. Special study in pharmacology for medical students. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PHA 499—Directed Research for Medical Students (1-12)
Laboratory—3-36 hours. Prerequisite(s): Consent of Instructor. Directed research in pharmacology for medical students. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

NEU 103—Human Clinical Neuroanatomy (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHA 101; or Consent of Instructor. Open to upper division students. Clinically relevant anatomy of the normal human nervous system, including external and internal anatomy of the brain, spinal cord, and cranial nerves. Blood supply to the brain and spinal cord. Functional neuroanatomy of motor, sensory, and cognitive systems. Application of neuroanatomical principles relevant to clinical problem solving for students entering health care professions. (CHA 103.) GE credit: SE. Effective: 2018 Spring Quarter.

NEU 199—Individual Special Study and Research (1-4)
Variable. Prerequisite(s): Consent of Instructor. Individual special study in neurophysiology and biomedical engineering
is offered to qualified students. Studies on psychophysics, single-unit electrophysiology and instrumentation are offered in Davis. (P/NP grading only.) Effective: 1997 Winter Quarter.

NEU 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. For graduate students desiring to explore particular topics in depth.
Lectures and conferences may be involved. (S/U grading only.) Effective: 1997 Winter Quarter.

NEU 299—Individual Special Study and Research (1-12)
Laboratory—3-36 hours. Prerequisite(s): Consent of Instructor. Individual special study and research in Neurophysiology and Biomedical engineering is offered at both Davis and Sacramento Medical Center. (S/U grading only.) Effective: 1997 Winter Quarter.

NEU 420—Clinical Neurosciences (2)
Lecture—1.5 hours; Lecture/Discussion—1 hour. Restricted to Medical Students only. Pathophysiology underlying neurological disorders, including disorders of development, muscle, nerve, cerebral circulation, metabolism, myelin, cortical function, movement, cerebrospinal fluid, autonomic function and special senses. Anatomical basis of clinical testing, nervous system infection, neoplasia and trauma. (P/F grading only.) Effective: 2007 Summer Quarter.

NEU 440—Where Drugs Come From: How They are Discovered, Developed, Regulated, and Marketed (3-6)
Lecture. Includes the following topics: Overview of the Drug Discovery Process; Drug Regulation in the United States; Patents and Other Forms of Exclusivity; Drug Targets and Pharmacology; Identification of Lead Candidates; Preclinical Assessment; ADME Including Basic Pharmacokinetic Principles; Principles of Drug Toxicity; Principles of Drug Safety; Clinical Trials; Generic Drugs; Pharmaceutical Industry; Drug Distribution and Marketing; Dietary Supplements; Controlled Substances. (H/P/F grading only.) Effective: 2018 Winter Quarter.

NEU 450—Clinical Neurology Clerkship (3-6)
Clinical Activity—24 hours; Conference—12 hours; Independent Study—10 hours; Seminar—4 hours. Prerequisite(s): Open to all fourth year medical students and third year medical students with consent of instructor. Restricted to six students per rotation. Critical elements of neurological clinical skills (history & exam) and basic and clinical neurological concepts expected for general residency preparation. Active, didactic, experiential and independent learning to encourage maturation of general professional competencies. May be repeated for credit. (H/P/F grading only.) Effective: 2011 Winter Quarter.

NEU 452—Advanced Clinical Neurology (6)
Clinical Activity. Prerequisite(s): Consent of Instructor. Completion of four-week Neurology selective. Extension of basic Neurology clerkship. Designed for students with special interest in medical disorders of nervous system. By arrangement
with department, student may serve as an acting intern. Principles of neurological differential diagnosis and therapeutics emphasized. (H/P/F grading only.) Effective: 1997 Winter Quarter.

NEU 455—Child Neurology (6)
Clinical Activity. Prerequisite(s): IMD 430; OBG 430; PED 430; and Consent of Instructor. Student exposed to children with disorders of the nervous system, both in outpatient and inpatient services. Cases presented to a member of full-time faculty who will discuss clinical findings,differential diagnosis, management and therapy.This course satisfies the fourth year neuroscience requirement. (H/P/F grading only.) Effective: 1997 Winter Quarter.

NEU 460—Externship in Neurology (3-6)
Clinical Activity. Prerequisite(s): Consent of Instructor. Externship course for Neurology rotations not meeting the qualifications to be an Acting Internship. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Summer Quarter.

NEU 462—Externship in Advanced Neurology (3-6)
Clinical Activity. Prerequisite(s): Consent of Instructor. Away rotation in Neurology where coursework meets the standards to be counted as an Acting Internship. (H/P/F grading only.) Effective: 2017 Summer Quarter.

NEU 493F—Issues in Geriatric Care (6)
Seminar. Four-week module teaches an approach to common problems in the elderly through history and exam, with an emphasis on integration of underlying anatomy, physiology, and pathophysiology in common geriatric presentations. May be repeated for credit. (H/P/F grading only.) Effective: 2018 Winter Quarter.

NEU 498NE—Group Study in Neurology (1-6)
Variable—3-5 hours. Prerequisite(s): Medical students with consent of instructor. Directed readings and discussions with a comprehensive written examination at the end of course. (P/F grading only.) Effective: 2002 Summer Session 2.

NEU 499—Research (1-12)
Laboratory—2-24 hours. Prerequisite(s): Consent of Instructor. Approved for graduate degree credit. Laboratory investigation on selected topics. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

NSU 199—Special Study in Neurosurgery for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Advanced undergraduate standing with consent of instructor. Students may participate in ongoing neurosurgical projects or may pursue and design independent projects. (P/NP grading only.) Effective: 1997 Winter Quarter.

NSU 299—Neurosurgery Research (3-12)
Prerequisite(s): Graduate student with consent of instructor. Student may participate in ongoing neurosurgical projects or may pursue and design independent projects. (S/U grading only.) Effective: 1997 Winter Quarter.

NSU 451—Neurosurgical Critical Care Clerkship (3)
Clinical Activity. Prerequisite(s): Third- or fourth-year medical student having completed a neurosurgical clerkship or consent of instructor. Students participate in the care of neurosurgical patients in the NSICU and in the admission and surgical management of patients admitted through the Emergency Room. (H/P/F grading only.) Effective: 1997 Winter Quarter.

NSU 455—Clinical Pediatric Neurosurgery (6)
Clinical Activity. Prerequisite(s): NSU 460; and Consent of Instructor. Third- or fourth-year medical students. Admission and follow-up of pediatric patients. Neurological history, examination, and diagnostic procedures are emphasized. Students will participate in surgical procedures and are required to attend all pediatric neurosurgery conferences. (H/P/F grading only.) Effective: 1997 Winter Quarter.

NSU 460—Clinical Neurosurgery (6-18)
Clinical Activity. Prerequisite(s): Consent of Instructor. Third- and fourth-year medical students. Approved for graduate degree credit. Admission and follow-up of patients. Neurological history, examination and further diagnostic procedures emphasized. Students participate in meaningful aspects of surgical procedures and attend listed conferences, rounds, and seminars. (H/P/F grading only.) Effective: 1997 Winter Quarter.

NSU 464—Externship (3-9)
Clinical Activity. Prerequisite(s): Fourth-year medical student having completed a neurosurgical clerkship or consent of instructor. Clerkship in neurosurgery to be arranged at another institution with accredited residency program in neurosurgery under proper supervision. (H/P/F grading only.) Effective: 2016 Summer Quarter.

NSU 470—Advanced Clinical Neurosurgery (6-18)
Clinical Activity. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing. Student will function as acting intern on neurosurgery service. Admission and management of patients. Neurological history, examination, diagnostic procedures, and surgical management are emphasized. Students participate in meaningful aspects of surgical procedures and attend required conferences and rounds. (H/P/F grading only.) Effective: 1997 Winter Quarter.

NSU 480—Insights in Neurosurgery (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. First- and second-year medical students in good academic standing. Observation of neurosurgical care in emergency room, operating room
and hospital floors, including manner of treatment of a variety of chronic and acute neurological diseases. (H/P/F grading only.) Effective: 1997 Winter Quarter.

NSU 499—Neurosurgery Research (1-18)
Variable. Prerequisite(s): Medical student with consent of instructor. Student may participate in ongoing neurosurgical projects or may pursue and design independent projects. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

OBG 192—Shifa Clinic/student volunteer (1)
Clinical Activity—8 hours; Conference—2 hours; Discussion—2 hours. Open to undergraduates only. Supervised work experience in Obstetrics & Gynecology. May be repeated up to 3 time(s). (P/NP grading only.) Effective: 2003 Fall Quarter.

OBG 194—Shifa Clinic Student Volunteer (1)
Clinical Activity—6 hours; Conference—1 hour. Prerequisite(s): Consent of Instructor. The applications will be available for students. Selection of students will be made by selection committee of medical students coordinators and the IOR. Attend clinic every third Sunday performing duties of receptionist, intake, translation, monitor. Students attend a meeting immediately after end of clinic. There is a mandatory Monday meeting with Clinic co-directors. Students are expected to participate on various committees. May be repeated up to 3 time(s). (P/NP grading only.) Effective: 2008 Fall Quarter.

OBG 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

OBG 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

OBG 220—Genetics of Reproduction (3)
Lecture/Discussion—3 hours. Introduction to genetics of mammalian reproduction for domestic species,
species used in research, and the human. Mendelian and non-Mendelian modes of inheritance. Research paper. Effective: 2000 Winter Quarter.

OBG 290—Current Topics in Research (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Selected topics in reproductive biology. (S/U grading only.) Effective: 1997 Winter Quarter.

OBG 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. Effective: 1997 Winter Quarter.

OBG 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

OBG 430—Obstetrics and Gynecology Clerkship (12)
Clinical Activity—45 hours. Prerequisite(s): Approval by School of Medicine Committee on Student Progress. Obstetrics, gynecologic and gynecological oncology experience in the delivery room, operating room, clinics and wards at UCDMC and affiliated sites. Rounds, conferences, interactive student presentations and seminars ongoing. (H/P/F grading only.) Effective: 2001 Summer Quarter.

OBG 430F—SJVP OBGYN Clerkship at UCSF (6-12)
Clinical Activity—45 hours. Prerequisite(s): Approval by School of Medicine Committee on Student Progress. Obstetrics, gynecologic and gynecological oncology experience in the delivery room, operating room, clinics and wards at UCSF Fresno. Rounds, conferences, interactive student presentations and seminars ongoing. (H/P/F grading only.) Effective: 2017 Spring Quarter.

OBG 430R—Rural PRIME OBGYN Longitudinal Clerkship (2)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Obstetrics and Gynecology Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

OBG 430RA—Rural PRIME OBGYN Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Obstetrics and Gynecology Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

OBG 430RB—Rural PRIME OBGYN Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Obstetrics and Gynecology Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

OBG 430RC—Rural PRIME OBGYN Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Obstetrics and Gynecology Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

OBG 430RD—Rural PRIME OBGYN Longitudinal Clerkship (1)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Obstetrics and Gynecology Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

OBG 439D—Directed Clinical Studies in OBGYN (1-12)
Clinical Activity—40 hours. Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for modified curriculum or to complete a clinical rotation following a leave of absence. May be repeated for credit. (P/F grading only.) Effective: 2011 Spring Quarter.

OBG 439R—Directed Studies in OBGYN (1-12)
Clinical Activity—30 hours; Independent Study—10 hours. Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for remediation of all or part of clinical rotation. Clinical studies to accommodate and satisfy remedial work as directed by the Committee on Student Progress and approved by the course IOR. May be repeated for credit. (P/F grading only.) Effective: 2011 Summer Quarter.

OBG 460—Away Clinical Elective in OBGYN (3-18)
Clinical Activity—30 hours; Variable—10 hours. Prerequisite(s): OBG 430; and Consent of Instructor. Or the equivalent; third- or fourth-year medical student. Active participation in inpatient and/our outpatient care. Attendance at specified conferences; student-faculty member informal conferences. May be repeated for credit. (H/P/F grading only.) Effective: 2010 Spring Quarter.

OBG 465—Away Acting Internship in OBGYN (3-18)
Clinical Activity—40 hours; Variable—10 hours. Prerequisite(s): OBG 430; and Consent of Instructor. Other third-year core clerkships. Work at the level of a sub intern in Inpatient and/or Outpatient settings. Students are expected to provide direct patient management. (H/P/F grading only.) Effective: 2010 Summer Quarter.

OBG 470—Gynecologic Oncology Acting Internship (3-18)
Clinical Activity—40 hours; Variable—10 hours. Prerequisite(s): OBG 430; and Consent of Instructor. The third-year core clerkships. Four week elective primarily involves direct inpatient management of women on the UCDMC Gyn/Onc service. Students will be acting at the level of a sub-intern and will work under the supervision of house staff, fellows, and attendings. May be repeated up to 99 unit(s). (H/P/F grading only.) Effective: 2010 Spring Quarter.

OBG 471—Ambulatory Gynecology and Obstetrics Elective (3-18)
Clinical Activity—35 hours. Prerequisite(s): OBG 430; and Consent of Instructor. Third- or fourth-year Medical Student. Conduct examinations, present patients and discuss treatment regimens at the following ambulatory clinics: General Obstetrics & Gynecology, New and Return Obstetrics (including Post-Partum), High-Risk Obstetrics, Pre-Operative Clinic, and other sub-specialty clinics as assigned. May be repeated for credit. (H/P/F grading only.) Effective: 2010 Summer Quarter.

OBG 472—Family Planning and Reproductive Health (1-6)
Clinical Activity—30 hours; Seminar—5 hours. Prerequisite(s): OBG 430; and Consent of Instructor. Elective that will focus on the Gynecologic Subspecialty of Family Planning. Counseling and provision of contraceptive methods, experience with pelvic ultrasounds, management of spontaneous, inevitable and induced abortion and post-abortion care by both surgical and medical techniques are included. May be repeated for credit. (H/P/F grading only.) Effective: 2014 Spring Quarter.

OBG 475—Labor & Delivery Acting Internship (3-18)
Clinical Activity—40 hours; Variable—10 hours. Prerequisite(s): OBG 430; and Consent of Instructor. The third-year core clerkships. Four week elective primarily involves direct inpatient management of women on the UCDMC L&D unit. Students will be acting at the level of a sub-intern and will work under the supervision of house staff, fellows, and attendings. May be repeated for credit. (H/P/F grading only.) Effective: 2010 Spring Quarter.

OBG 480—The Birthing Process (1)
Lecture/Discussion—1 hour. Open only to UC Davis medical students. Training to assist in the birthing process as a Doula. Topics not covered in the summer course. (S/U grading only.) Effective: 2000 Fall Quarter.

OBG 493—Gender Specific Medicine SSM (6)
Clinical Activity—4 hours; Laboratory—16 hours; Lecture—5 hours; Lecture/Lab—10 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. Special Studies Module, a four week course on the topic: Basic Science Principles Relating to Gender Specific Medicine. (Cardiology 493.) (H/P/F grading only.) Effective: 2007 Spring Quarter.

OBG 494—Shifa Clinic (6)
Clinical Activity—8 hours. Prerequisite(s): Medical student in good standing. Restricted to Medical student only. Interaction with patients from multiple ethnic and cultural backgrounds under the direct supervision of a physician/preceptor. Women's health issues and primary care issues in a diversely mixed population. May be repeated up to 3 time(s). (P/F grading only.) Effective: 2008 Fall Quarter.

OBG 494A—Shifa Clinic (1)
Clinical Activity—8 hours. Prerequisite(s): Consent of Instructor. Medical student in good standing. Interaction with patients from multiple ethnic and cultural backgrounds under the direct supervision of a physician/preceptor. Women's health issues and primary care issues in a diversely mixed population. (H/P/F grading only.) Effective: 2012 Summer Quarter.

OBG 494B—Shifa Clinic (1)
Clinical Activity—8 hours. Prerequisite(s): Consent of Instructor. Medical student in good standing. Interaction with patients from multiple ethnic and cultural backgrounds under the direct supervision of a physician/preceptor. Women's health issues and primary care issues in a diversely mixed population. (H/P/F grading only.) Effective: 2012 Summer Quarter.

OBG 494C—Shifa Clinic (1)
Clinical Activity—8 hours. Prerequisite(s): Consent of Instructor. Medical student in good standing. Interaction with patients from multiple ethnic and cultural backgrounds under the direct supervision of a physician/preceptor. Women's health issues and primary care issues in a diversely mixed population. (H/P/F grading only.) Effective: 2012 Summer Quarter.

OBG 498—Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Explore particular topics in-depth in Obstetrics and Gynecology. Extensive contact with and oversight by instructor. May be repeated for credit. (H/P/F grading only.) Effective: 2004 Fall Quarter.

OBG 499—Research in Obstetrics & Gynecology (2-12)
Clinical Activity; Variable. Prerequisite(s): Consent of Instructor. Fourth-year medical student. Research in Obstetrics and Gynecology arranged with instructor. May be repeated up to 8 time(s). (H/P/F grading only.) Effective: 2006 Fall Quarter.

OPT 192—Research Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in ophthalmology research. Research staff in Ophthalmology have programs in cell biology, electron microscopy, biochemistry, immunology and visual psychophysics. (P/NP grading only.) Effective: 1997 Winter Quarter.

OPT 199—Special Study for Advanced Undergraduates (1-4)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

OPT 299—Basic Research in Visual Science (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

OPT 442—Introduction to Ophthalmology (3)
Clinical Activity—40 hours. Prerequisite(s): Third- or fourth-year Medical Student with consent of instructor; consent of advisor; completion of third-year clerkships in Medicine and Surgery; consult Course Coordinator. Ocular disease diagnosis and management relevant to the clinical practice of future primary care physicians and others. (H/P/F grading only.) Effective: 2010 Summer Quarter.

OPT 465—Advanced Subspecialty Ophthalmology (3-6)
Clinical Activity—40 hours; Variable—40 hours. Prerequisite(s): IMD 430; and Consent of Instructor. Medical students in third or fourth year. Participation in disciplines of neuro-ophthalmology/pediatric ophthalmology, diseases of the cornea and external eye, glaucoma and retina. (H/P/F grading only.) Effective: 2010 Summer Quarter.

OPT 498—Group Study (1-3)
Variable. Prerequisite(s): Medical students with consent of instructor. Directed reading and discussion. (H/P/F grading only.) Effective: 1997 Winter Quarter.

OPT 499—Research in Ophthalmology (1-12)
Variable—3-36 hours. Prerequisite(s): Medical students with consent of instructor. Individual research on selected topics in optics and visual physiology, cornea and external disease. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

OSU 099—Special Studies for Undergraduates (1-4)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

OSU 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

OSU 421—The Musculoskeletal System (2.5)
Discussion—2 hours; Lecture/Discussion—4 hours. Prerequisite(s): Consent of committee on student progress. Restricted to Medical students only. Basic and clinical science of orthopaedic surgery and rheumatology. (P/NP grading only.) Effective: 2012 Summer Quarter.

OSU 428—Ambulatory and Emergency Room Orthopaedics (3-6)
Clinical Activity. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing. Limited enrollment. Introduction to general orthopaedic problems and trauma and their management in an outpatient environment, including the emergency room. Student will conduct orthopaedic examinations, present patients to staff rotating through trauma, hand, pediatrics, adult and foot clinics. (H/P/F grading only.) Effective: 1997 Winter Quarter.

OSU 462—Community Preceptorship (3-6)
Clinical Activity. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing; consent of instructor. Acquaints student with private practice of orthopaedics in the community setting. Opportunity to observe and assist private practitioners in office, emergency room, operating room and inpatient environment. Student must provide own transportation. (H/P/F grading only.) Effective: 1997 Winter Quarter.

OSU 464—Acting Internship (6)
Clinical Activity. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing. Rotation designed to increase basic knowledge of musculoskeletal abnormalities at clinical level. Attention focused on selective case material. For those students who demonstrate proficiency, responsibility will be similar to that of intern. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

OSU 465—Externship in Advanced Orthopaedics (3-6)
Clinical Activity—40 hours. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing. Advanced Orthopaedic rotation done at an approved institution. Topics may include Trauma, Sports, Spine, Pediatrics, Joint and/or Foot/Ankle. Students are expected to perform at the level of an Intern. May be repeated for credit. (H/P/F grading only.) Effective: 2013 Summer Quarter.

OSU 480—Insights in Orthopardic Surgery (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. First- and second-year medical students in good academic standing. Exposure to aims, methods and procedures in orthopaedic surgery via attendance at grand rounds, patient care conferences, and group discussions. (H/P/F grading only.) Effective: 1997 Winter Quarter.

OSU 481—History of Medicine for Medical Students (1.5)
Lecture/Discussion—2.5 hours. Prerequisite(s): Third- or fourth-year students in the School of Medicine or second-year students with consent of instructor. Overview of the history of medicine throughout the world to introduce medical students to landmark accomplishments and key figures in the
development of health care and to provide an expanded philosophical perspective on the everchanging field of modern medicine. (H/P/F grading only.) Effective: 1997 Winter Quarter.

OSU 499—Orthopardics Research (1-12)
Clinical Activity. Prerequisite(s): Consent of Instructor. Third- or fourth-year medical student in good academic standing. Laboratory or clinical investigation on selected topics. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

OTO 192—Internship in Otolaryngology (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in otolaryngology and related fields. Final project report. (P/NP grading only.) Effective: 1997 Winter Quarter.

OTO 199—Special Study in Otolaryngology for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Advanced undergraduate with consent of instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

OTO 290C—Research Conference in Otolaryngology (1)
Lecture/Discussion—1 hour. Prerequisite(s): Graduate students; medical students; advanced undergraduates with consent of instructor. Presentation and discussion of faculty and student research in otolaryngology. (S/U grading only.) Effective: 1997 Winter Quarter.

OTO 291—Principles of Speech, Hearing and Equilibrium (3)
Lecture/Discussion—3 hours. Prerequisite(s): Graduate students; medical students; advanced undergraduates with consent of instructor. Presentations by faculty and guest lecturers on anatomy, physiology, and
behaviors involved in speech production, hearing, and equilibrium. Each student will be expected to make one class presentation. Effective: 1997 Winter Quarter.

OTO 299—Individual Study in Otolaryngology for Advanced Graduate Students (1-12)
Variable. Prerequisite(s): Advanced graduate student with consent of instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

OTO 403—Basic Principles of Reconstructive Surgery (1)
Lecture. Prerequisite(s): Third- or fourth-year medical student with consent of instructor. Formal presentations covering basic principles of reconstructive surgery, including wound healing, treatment of lacerations, skin and bone grafts, flaps, Z-plasties and revision of scars. Laboratory session utilizing animal tissues. Effective: 1997 Winter Quarter.

OTO 440—Otolaryngology Required Clerkship (3-9)
Clinical Activity—30 hours. Prerequisite(s): Consent by Committee on Student Evaluation and Promotion. Provide fundamental knowledge of otorhinolaryngologic diagnosis and principles, develop facility with basic ENT instruments, provide an understanding of treatment for ear, nose and throat problems and provide knowledge of what patients should be referred for otorhinolaryngologic care. May be repeated for credit. (H/P/F grading only.) Effective: 2011 Summer Quarter.

OTO 450—Fourth Year Otolaryngology Elective (6)
Clinical Activity—35 hours; Discussion—1 hour; Film Viewing—0.25 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Third- or fourth-year Medical Students. Participation in Otolaryngology Clinic and operating room. Evaluation and management of common Otolaryngologic diseases. (H/P/F grading only.) Effective: 2001 Fall Quarter.

OTO 460—Clinical Otolaryngology Elective (3-18)
Clinical Activity. Prerequisite(s): Third- and fourth-year medical students with consent of instructor; open to graduate students. Approved for graduate degree credit. Total involvement in clinical activities of the department. (H/P/F grading only.) Effective: 1997 Winter Quarter.

OTO 465—Away Acting Internship in Otolaryngology (3-6)
Clinical Activity. Externship rotation for Acting Internships in Otolaryngology. May be repeated for credit. (H/P/F grading only.) Effective: 2018 Spring Quarter.

OTO 490—Journal Seminar (1)
Lecture/Discussion—10 hours. Prerequisite(s): Fourth-year medical students with consent of instructor; open to graduate students. Approved for graduate degree credit. Monthly review of current otolaryngologic and related literature and recent advances. (H/P/F grading only.) Effective: 1997 Winter Quarter.

OTO 498—Individual or Group Study (1-5)
Laboratory—1-4 hours; Lecture/Discussion—1-2 hours. Prerequisite(s): Consent of Instructor. Introduction to basic research in Otolaryngology. Lectures, discussion
and laboratory study of sensory and motor systems. (H/P/F grading only.) Effective: 1997 Winter Quarter.

OTO 499—Research (1-12)
Variable. Prerequisite(s): Medical students with consent of instructor; Open to graduate students. Approved for graduate degree credit. Participation in ongoing projects. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

PMD 192—Internship in Human Pathology (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in pathology and related fields. (P/NP grading only.) Effective: 1997 Winter Quarter.

PMD 199—Special Study in Pathology for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Advanced undergraduates. (P/NP grading only.) Effective: 1997 Winter Quarter.

PMD 290C—Research Group Conferences (1)
Seminar—1 hour. Prerequisite(s): Graduate level standing. Focused around the mechanisms of function of the central nervous system under normal and pathogenic conditions. Seminars lead by various speakers from UC Davis and other Institutions, both domestic and international. May be repeated for credit. (S/U grading only.) Effective: 2017 Fall Quarter.

PMD 296—Neurodevelopment Group Study (1-6)
Variable—1-6 hours. Explore mechanisms that impact perinatal development of the cerebral cortex, and other cortical structures, under normal and pathological conditions. (S/U grading only.) Effective: 2017 Summer Quarter.

PMD 298—Advanced Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Group Study provides the opportunity for a faculty member to work with students in a focused manner. (S/U grading only.) Effective: 2017 Summer Quarter.

PMD 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

PMD 405—Brain Cutting Conference (1-4)
Seminar—1-4 hours. Prerequisite(s): Third- and fourth year medical students or consent of instructor. Current specimens are sectioned, discussed, and clinical correlations proposed. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PMD 407—Advanced Neuropathology (3-18)
Lecture/Discussion—40 hours. Prerequisite(s): Consent of Instructor. Third or fourth year medical student. Restricted to Medical students only. Presents an integrated introduction to mechanisms of the central and peripheral nervous system injury. Gain an understanding of pathological mechanisms underlying disease, the anatomic and molecular manifestations of pathologic processes of the CNS and PNS. (H/P/F grading only.) Effective: 2015 Fall Quarter.

PMD 410A—General and Endocrine Pathology (2.5)
Discussion/Laboratory—4.5 hours; Lecture—4 hours. Restricted to medical students only. Pathologic mechanisms of human disease. Concepts of general pathologic processes, i.e., cell death, inflammation and neoplasia. Endocrine pathology in the context of clinical human disease. Emphasis on integration of clinical practice with gross and histologic images emphasizing team-based learning. (P/F grading only.) Effective: 2015 Winter Quarter.

PMD 410B—Systemic Pathology (1)
Discussion/Laboratory—0.5 hours; Lecture—1 hour. Prerequisite(s): Approval by SOM Committee on Student progress. Restricted to Medical students only. Anatomic and clinical pathology of organ system human disease with an emphasis on integration with clinical medicine. Topics include hematopathology and neuropathology. (P/F grading only.) Effective: 2010 Spring Quarter.

PMD 410C—Systemic Pathology (2)
Discussion—2 hours; Lecture—1 hour. Prerequisite(s): Approval by SOM Committee on Student progress. Restricted to Medical students only. Anatomic and clinical pathology of organ system human disease with an emphasis on integration with clinical medicine. Topics include pulmonary pathology, cardiovascular pathology, hematopatology, oncologic pathology, and nephropathology. (P/F grading only.) Effective: 2010 Spring Quarter.

PMD 410D—Systemic Pathology (2.5)
Discussion—2 hours; Lecture—1 hour. Prerequisite(s): Approval by SOM Committee on Student progress. Restricted to Medical students only. Anatomic and clinical pathology of organ system human disease with emphasis on integration with clinical medicine. Course content parallels concurrent clinical courses with integration of lectures and discussions. Topics include gastrointestinal and gynecologic pathology, hepatopathology, oncologic pathology and musculoskeletal pathology. (P/F grading only.) Effective: 2010 Spring Quarter.

PMD 435—Clinical Patient Care in Pathology (3-9)
Clinical Activity—24 hours; Independent Study—7 hours; Lecture/Discussion—4 hours. Prerequisite(s): and Consent of Instructor. Completed one of the following 3rd year clerkships: Family Medicine, Internal Medicine, Surgery, OBGYN or Pediatrics. Four-week course is designed to give the third-year medical student an exposure to the diverse roles that pathologists have in clinical patient care. May be repeated for credit. (H/P/F grading only.) Effective: 2015 Summer Quarter.

PMD 440—Surgery-Pathology-Radiology (SPR) Research Laboratory (2)
Discussion/Laboratory—2 hours; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Provide future clinicians and scientists with basic clinical and bioengineering laboratory skills to prepare for careers in translational research (P/F grading only.) Effective: 2014 Summer Quarter.

PMD 464—Anatomic Pathology (3-6)
Clinical Activity—40 hours; Variable. Prerequisite(s): Consent of Instructor. Fourth-year Medical Students. Restricted to Medical Students only. Anatomic pathology with an emphasis on autopsy and surgical pathology with application to clinical practice. Specimen grossing, frozen sections, microscopic sign-out and conferences. Exposure to cytopathology, hematopathology, and clinical pathology is available. (H/P/F grading only.) Effective: 2010 Winter Quarter.

PMD 465—Applied Clinical Laboratory Medicine (3-6)
Variable—40 hours. Prerequisite(s): Consent of Instructor. Emphasis upon laboratory techniques, procedures, and interpretation of laboratory results. Students will be expected to participate fully and in all laboratory operations including bench techniques, laboratory management, and quality control. May be repeated for credit. (H/P/F grading only.) Effective: 2012 Winter Quarter.

PMD 470—Sub-Specialty in Didactic Pathology (3-16)
Lecture/Lab—25 hours. Prerequisite(s): Consent of Instructor. Externship provides in-depth exposure to one of a variety of sub-specialties in Pathology. May be repeated for credit. (H/P/F grading only.) Effective: 2011 Spring Quarter.

PMD 474—Anatomic Pathology Acting Internship (3-9)
Clinical Activity—40-80 hours. Prerequisite(s): Fourth-year medical student or consent of instructor. Restricted to medical students only. Anatomic Pathology AI will permit students to gain skills needed for first year Pathology Residency. Students will perform autopsies and take full responsibility for a variety of surgical pathology cases. A mix of outpatient and inpatient cases is expected. May be repeated for credit. (H/P/F grading only.) Effective: 2011 Summer Quarter.

PMD 475—Anatomic Pathology Acting Internship (3-9)
Clinical Activity—40-80 hours. Prerequisite(s): PMD 410A; PMD 410B; PMD 410C; PMD 410D; and Consent of Instructor. Or equivalent. Successful completion of third-year clinical rotations. Restricted to Medical Students only. Year four level course is designed to provide a concentrated experience in Surgical Pathology and Cytolopathology. Rotate on the surgical and cytopathology sub-specialty teams and assume responsibility for patient cases. May be repeated for credit. (H/P/F grading only.) Effective: 2015 Summer Quarter.

PMD 493—Interdisciplinary Study of Gastrointestinal Cancer (6)
Clinical Activity—12 hours; Discussion/Laboratory—20 hours; Laboratory—3 hours; Lecture—5 hours. Prerequisite(s): Consent of Instructor. In-depth study of gastrointestinal, hepatic and pancreatic cancer. Emphasis on an integration of basic science and clinical medicine. Participating departments include pathology, surgical oncology, medical oncology, gastroenterology, radiology and radiotherapy. (Surgery 493D.) (H/P/F grading only.) Effective: 2012 Summer Quarter.

PMD 497T—Tutoring in Pathology (1-5)
Tutorial—3-15 hours. Prerequisite(s): Advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum of the School of Medicine. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PMD 498—Advanced Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Medical student. Group study in variety of advanced topics in general, special, experimental, or comparative pathology. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PMD 499—Research (1-18)
Variable. Prerequisite(s): Medical student with consent of instructor. Limited enrollment. Research in experimental, molecular, comparative, and applied pathology. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

PED 199—Special Study in Pediatric Research (1-5)
Variable. Prerequisite(s): Undergraduate student with consent of instructor based upon adequate preparation as determined by instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

PED 299—Pediatric Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate students who are candidates for a degree in some area of biology or behavioral sciences. (S/U grading only.) Effective: 1997 Winter Quarter.

PED 401—Preceptorship in Pediatrics (2)
Variable. Prerequisite(s): Second-year medical student or first-year medical student with consent of instructor. Opportunity to observe and participate in primary medical care in a practicing pediatricians office. Participation in history-taking and physical examination will be at discretion of preceptor and dependent on students experience. Evaluation by student. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PED 402—Clinical Experience in Private Practice (1-18)
Clinical Activity. Prerequisite(s): PED 430; Third-or fourth-year medical student; consent of preceptor and Chairperson. Opportunity to participate in practice of preceptor, performing such tasks as history taking, physical examination, and patient management. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PED 405—Pediatrics Lecture Series (0.5)
Lecture—15 hours. Prerequisite(s): Consent of Instructor. Lecture series covers major topics in pediatrics with case presentations and panels from pediatric subspecialists. Topics include, but are not limited to: cardiology, pulmonology, nephrology, gastroenterology, critical care, and primary care pediatrics. May be repeated for credit. (P/F grading only.) Effective: 2014 Fall Quarter.

PED 415—Fetal and Neonatal Physiology (1)
Independent Study—4 hours; Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Elective is designed to combine for study a variety of aspects of the physiology, anatomy and biochemistry of the fetus and newborn with relevant clinical examples of disorders in each of the 10 topics that will be discussed. (P/F grading only.) Effective: 2014 Spring Quarter.

PED 430—Pediatric Clerkship (12)
Clinical Activity—45 hours. Prerequisite(s): Approval by School of Medicine Committee on Student Progress. Restricted to Medical students only. Eight week clinical clerkship providing students with the opportunity to learn fundamentals of caring for the pediatric patient by participating in nursery, ambulatory and inpatient services at UCDMC and affiliated clinical sites. Rounds, conferences, student presentations ongoing. (P/NP grading only.) Effective: 2001 Summer Quarter.

PED 430F—SJVP Pediatric Clerkship at UCSF (12)
Clinical Activity—45 hours. Prerequisite(s): Approval by School of Medicine Committee on Student Progress. Restricted to Medical students only. Eight-week clinical clerkship providing students with the opportunity to learn fundamentals of caring for the pediatric patient by participating in nursery, ambulatory and inpatient services at UCSF Fresno. Rounds, conferences, student presentations ongoing. (H/P/F grading only.) Effective: 2013 Fall Quarter.

PED 430FA—SJVP Longitudinal Pediatrics Clerkship (1.5-6)
Clinical Activity—40-60 hours. Prerequisite(s): Consent of Instructor. Longitudinal Pediatrics Clerkship runs concurrently with Internal Medicine, Family Medicine and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PED 430FB—SJVP Longitudinal Pediatrics Clerkship (1.5-6)
Clinical Activity—40-60 hours. Prerequisite(s): Consent of Instructor. Longitudinal Pediatrics Clerkship runs concurrently with Internal Medicine, Family Medicine and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PED 430FC—SJVP Longitudinal Pediatrics Clerkship (1.5-6)
Clinical Activity—40-60 hours. Prerequisite(s): Consent of Instructor. Longitudinal Pediatrics Clerkship runs concurrently with Internal Medicine, Family Medicine and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PED 430FD—SJVP Longitudinal Pediatrics Clerkship (1.5-6)
Clinical Activity—40-60 hours. Prerequisite(s): Consent of Instructor. Longitudinal Pediatrics Clerkship runs concurrently with Internal Medicine, Family Medicine and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PED 430R—Rural PRIME Pediatrics Longitudinal Clerkship (2)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Pediatrics Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PED 430RA—Rural PRIME Pediatrics Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Pediatrics Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PED 430RB—Rural PRIME Pediatrics Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Pediatrics Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PED 430RC—Rural PRIME Pediatrics Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Pediatrics Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PED 430RD—Rural PRIME Pediatrics Longitudinal Clerkship (1)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Pediatrics Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PED 430TA—TeachMS Longitudinal Pediatrics Clerkship (A) (4)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Longitudinal Clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. (H/P/F grading only.) Effective: 2016 Fall Quarter.

PED 430TB—TeachMS Longitudinal Pediatrics Clerkship (B) (6)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Longitudinal clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. (H/P/F grading only.) Effective: 2016 Fall Quarter.

PED 430TC—TeachMS Longitudinal Pediatrics Clerkship (C) (2)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Longitudinal clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. (H/P/F grading only.) Effective: 2016 Fall Quarter.

PED 439D—Directed Clinical Studies in Pediatrics (1-12)
Clinical Activity—40 hours. Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for modified curriculum or to complete a clinical rotation following a leave of absence. May be repeated for credit. (P/F grading only.) Effective: 2011 Spring Quarter.

PED 439R—Directed Studies in Pediatrics (1-12)
Clinical Activity—30 hours; Independent Study—10 hours. Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for remediation of all or part of clinical rotation. Clinical studies to accommodate and satisfy remedial work as directed by the Committee on Student Progress and approved by the course IOR. May be repeated for credit. (P/F grading only.) Effective: 2011 Summer Quarter.

PED 460A—Acting Internship: General Inpatient Pediatric Clerkship (3-18)
Clinical Activity. Prerequisite(s): PED 430 B or better; and Consent of Instructor. Letter of recommendation from Pediatrics faculty member. Limited enrollment. The Ward Acting Intern functions in a manner similar to that of a pediatric intern. The Acting Intern takes admissions in the regular sequence and is expected to take night call. (H/P/F grading only.) Effective: 2016 Fall Quarter.

PED 460B—Acting Internship: Outpatient Pediatrics (3-18)
Clinical Activity. Prerequisite(s): PED 430 B or better; and Consent of Instructor. Letter of recommendation from Pediatrics faculty member. Limited enrollment. Supervised experience in pediatric care on outpatient service at UCDMC. Student functions as Acting Intern with appropriate supervision by residents and attending faculty. Limited enrollment. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PED 461—Pediatric Inpatient AI in Hematology/Oncology (6)
Clinical Activity—37.5 hours; Lecture—7.5 hours. Prerequisite(s): PED 430; and Consent of Instructor. Satisfactory completed. Limited Enrollment. Inpatient and outpatient experience in diagnosis and management of oncologic and hematologic disorders in children. Laboratory experience and participation in clinical investigation may be arranged. (H/P/F grading only.) Effective: 2009 Spring Quarter.

PED 462—Elective in Pediatric Endocrinology (3-18)
Clinical Activity. Prerequisite(s): Consent of Instructor. Completion of second-year study or the equivalent. Limited enrollment. Inpatient and outpatient experience in diagnosis and management of endocrine endocrine disorders in children. Laboratory experience and participation in clinical investigation may be arranged. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PED 463—Medical and Mental Health Evaluation of Children at Risk for Maltreatment (3-9)
Clinical Activity—30 hours; Discussion—4 hours. Elective for fourth-year medical students covers basic areas of knowledge needed for child abuse prevention and consultation. Rotation includes legals cases, abuse exams, child and parent interactive therapy and visits to community organizations. May be repeated for credit. (H/P/F grading only.) Effective: 2012 Spring Quarter.

PED 464—Acting Internship in Neonatology (3-12)
Clinical Activity—60 hours. Prerequisite(s): PED 430 B or better; and Consent of Instructor. Letter of recommendation from Pediatrics faculty member. Limited enrollment. Diagnostic and therapeutic aspect of the medical and surgical high-risk neonate. Student expected to take night call. May be repeated for credit. (H/P/F grading only.) Effective: 2014 Fall Quarter.

PED 465—Pediatrics Specialty Clinic Elective (3-18)
Clinical Activity. Prerequisite(s): PED 430; and Consent of Instructor. Satisfactory completed. Limited enrollment. Supervised experience in a variety of pediatric subspecialty clinics. Limited enrollment. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PED 466—Elective in Pediatric Cardiology (3-18)
Clinical Activity. Prerequisite(s): PED 430; Satisfactory completed. Inpatient and outpatient experience in diagnosis and management of cardiologic disorders in children. Laboratory experience and participation in clinical investigation may be arranged. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PED 467—Elective in Pulmonary Medicine (3-18)
Clinical Activity. Prerequisite(s): Pediatric clerkship. Inpatient and outpatient management of pediatric patients with pulmonary diseases. These will include but will not be limited to cystic fibrosis, asthma, and other forms of chronic pulmonary diseases as well as congenital abnormalities. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PED 468—Elective in Pediatrics Nephrology (3-18)
Clinical Activity. Prerequisite(s): PED 430; and Consent of Instructor. Satisfactory completed. Limited enrollment. Inpatient and outpatient experience in diagnosis and management of renal disorders in children. Laboratory experience and participation in clinical investigation may be arranged. Limited enrollment. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PED 469—Elective in Pediatric Infectious Disease (3-18)
Clinical Activity. Prerequisite(s): PED 430; and Consent of Instructor. Satisfactory completed. Limited enrollment. Inpatient and outpatient experience in diagnosis and treatment of infectious disease of infants and children. Laboratory and clinical investigation may be arranged. Limited enrollment. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PED 470—Elective in Pediatric Neurology (3-18)
Clinical Activity. Prerequisite(s): PED 430; IMD 430; OBG 430; and Consent of Instructor. All courses satisfactory completed. Limited enrollment. Inpatient and outpatient experience in diagnosis and management of neurological disorders in children. Students will also participate in other pediatric subspecialty clinics which serve children with neurological disorders. This course does not satisfy the fourth year neurology requirement. Limited enrollment. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PED 471—Elective in Pediatric Gastroenterology (3-18)
Clinical Activity. Prerequisite(s): PED 430; and Consent of Instructor. Satisfactory completed. Limited enrollment. Inpatient and outpatient experience in diagnosis and management of gastroenterology disorders in children. Laboratory experience and participation in clinical investigation may be arranged. Limited enrollment. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PED 472—Clinical Rotation in Adolescent Medicine (3-9)
Clinical Activity—39 hours; Lecture—1 hour. Prerequisite(s): Consent of Instructor. Fourth-year Medical Student. Under supervision, students will see patients in the UCD clinic and at a number of community-based sites. Emphasis on the socially-mediated problems that face adolescents, including substance abuse, STD's, pregnancy, depression and suicide. One hour of lecture each week. (H/P/F grading only.) Effective: 2011 Summer Quarter.

PED 473—Away Acting Internship in Pediatrics (6-18)
Clinical Activity—40 hours; Lecture—6 hours; Variable. Prerequisite(s): Consent of Instructor. Satisfactory completion of Pediatrics Clerkship. Work at the level of a sub intern in Inpatient and/or Outpatient settings. Expectation is to provide direct patient management. (H/P/F grading only.) Effective: 2010 Spring Quarter.

PED 476—Acting Internship in Pediatric Intensive Care (3-18)
Clinical Activity. Prerequisite(s): PED 430 A is required; or Consent of Instructor. Letter of recommendation from Pediatrics faculty member. Limited enrollment. Evaluation and support of critically ill infants and children. In general, student expected to take night call every third night during rotation. May be repeated for credit. (H/P/F grading only.) Effective: 2016 Fall Quarter.

PED 493—Ethical, Legal and Social Issues in Clinical Genetics (6)
Auto Tutorial—8 hours; Clinical Activity—18 hours; Independent Study—2 hours; Seminar—12 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. Develop advanced knowledge, communication skills and attitudes necessary to provide compassionate, knowledgeable, and expert care to patients who may be at increased genetic risk for disease. Seminars cover ethical and legal principles, epidemiology, and genetics. (H/P/F grading only.) Effective: 2010 Summer Quarter.

PED 493B—Living with Intellectual & Developmental Disability in the Community (1-6)
Clinical Activity—4 hours; Fieldwork—4 hours; Lecture—10 hours; Seminar—4 hours. Prerequisite(s): Consent of Instructor. In-depth experience with Intellectual & Developmental Disability across the lifespan. (H/P/F grading only.) Effective: 2012 Summer Quarter.

PED 493C—Fetal and Neonatal Physiology SSM (6)
Clinical Activity—8 hours; Lecture/Discussion—24 hours. Prerequisite(s): Consent of Instructor. Elective is available for students interested in exploring the fascinating world of the fetus and neonate. The elective is designed to combine the basic sciences with relevant clinical examples of disorders. (H/P/F grading only.) Effective: 2014 Fall Quarter.

PED 498—Directed Group Study (1-5)
Variable—3-15 hours. Explore in-depth various topics in Pediatrics. Extensive contact with and oversight by instructor. May be repeated for credit. (H/P/F grading only.) Effective: 2004 Fall Quarter.

PED 499—Research Topics in Pediatrics (1-18)
Variable. Prerequisite(s): Student in Medical School with consent of instructor. Individual research project in pediatric subspecialty areas (cardiology, endocrinology, hematology, metabolism, newborn physiology and others) may be arranged with faculty member. Independent research by student will be emphasized and long-term projects are possible. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

PMR 100—Research Approaches to Disability and Rehabilitation (2)
Lecture/Discussion—2 hours. Discussion and evaluation of research approaches to medical rehabilitation, community integration, and quality of life of disabled persons, with a focus on the progressive disabilities associated with neuromuscular diseases. Intent is to encourage interest in professions that serve the disabled community and increase awareness of rehabilitation goals. Effective: 2002 Winter Quarter.

PMR 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Advanced standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

PMR 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Advanced standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

PMR 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

PMR 405—Healthy Living: Leading by Example (1.5)
Clinical Activity—1 hour; Discussion—2 hours; Laboratory—4 hours; Lecture—4 hours. Prerequisite(s): Consent of Instructor. Course is to improve the physical and mental health of participating students while supplementing their medical education with specific concepts. May be repeated for credit. (P/F grading only.) Effective: 2014 Fall Quarter.

PMR 405A—Healthy Living: Leading by Example (1)
Clinical Activity—1 hour; Discussion—2 hours; Laboratory—4 hours; Lecture—4 hours. Prerequisite(s): Consent of Instructor. Improve the physical and mental health of participating students while supplementing their medical education with specific concepts. May be repeated for credit. (P/F grading only.) Effective: 2014 Fall Quarter.

PMR 405B—Healthy Living: Leading by Example (0.5)
Clinical Activity—1 hour; Discussion—2 hours; Laboratory—4 hours; Lecture—4 hours. Prerequisite(s): Consent of Instructor. Improve the physical and mental health of participating students while supplementing their medical education with specific concepts. May be repeated for credit. (P/F grading only.) Effective: 2014 Fall Quarter.

PMR 421—Introduction to Sports Medicine (1)
Clinical Activity—4 hours; Fieldwork; Lecture—1 hour. Introduction to basic concepts of Sports Medicine in Physical Medicine and Rehabilitation. Students attend afternoon clinic with Sports Medicine attending; attend lectures focusing on Sports Medicine topics. Students also eligible to cover sporting events with attending physicians where available. (P/F grading only.) Effective: 2007 Summer Quarter.

PMR 440—Rehabilitation Medicine Clerkship (3)
Clinical Activity—36 hours; Lecture/Discussion—4 hours. Prerequisite(s): IMD 430; SUR 430; and Consent of Instructor. Rehabilitation and comprehensive care of physically disabled and physical medicine management of neurologic, neuromuscular and musculoskeletal disorders. Emphasis on evaluation and conservative treatment of spinal disorders, sports injuries and neuromuscular disease. Emphasis on inpatient rehabilitation, pediatrics, spine or sports possible. (H/P/F grading only.) Effective: 2008 Spring Quarter.

PMR 461—Rehabilitation Medicine (6)
Clinical Activity—36 hours; Lecture/Discussion—4 hours. Prerequisite(s): IMD 430; SUR 430; and Consent of Instructor. 4-week rotation designed as broad overview of PM&R practice for students interested in residency training in the specialty. Emphasis on evaluation and conservative treatment of spinal disorders, sports injuries, neuromuscular disease, neurological and non-operative orthopedic problems requiring rehabilitative management. (H/P/F grading only.) Effective: 2008 Winter Quarter.

PMR 462—Rehabilitation Medicine Clinical Elective (5-18)
Clinical Activity. Prerequisite(s): IMD 430; SUR 430; and Consent of Instructor. Completion of third year in Medical School. Emphasis on evaluation of patients with neurological or orthopaedic problems requiring rehabilitative techniques for their management. Introduction to management of such patients. Physical Medicine and Rehabilitation at off-campus facility must be approved by Chairperson. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PMR 470—Away Acting Internship in Physical Medicine & Rehabilitation (3-6)
Clinical Activity. Prerequisite(s): Consent of Instructor. AI Externship option for PM&R rotations at other institutions. May be repeated for credit. (H/P/F grading only.) Effective: 2018 Spring Quarter.

PMR 493—Applied Musculoskeletal Anatomy: Sports & Spine SSM (6)
Clinical Activity—4 hours; Laboratory—16 hours; Lecture—5 hours; Lecture/Lab—10 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. This four week module will review the anatomy and biomechanics of the musculoskeletal system as well as its associated pathology. The students will be instructed on appropriate musculoskeletal exam techniques and logical approach to the patient in the clinical setting. (H/P/F grading only.) Effective: 2008 Winter Quarter.

PMR 498—Advanced Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Study and experience for medical students in any of a number of areas in physical medicine and rehabilitation. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PMR 499—Research for Medical Students (1-12)
Variable. Prerequisite(s): Consent of Instructor. Research on any of a variety of topics in physical medicine and rehabilitation. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

PSU 460—Clinical Plastic Surgery Elective (1-18)
Clinical Activity. Prerequisite(s): SUR 430; and Consent of Instructor. Third- or fourth-year medical students. Total involvement in patient care involving surgical preparation, treatment, operative care, and follow-up. Developing and understanding reconstruction and aesthetic plastic surgery. Microvascular surgery included. Student rotation. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PSY 092—Willow Clinic (1-2)
Clinical Activity—2-6 hours; Seminar—1-2 hours; Variable. Open to lower division undergraduate students. Student run clinic for undergraduate students interested in learning about and meeting the unique health care needs for the homeless population. May be repeated for credit. (P/NP grading only.) Effective: 2009 Fall Quarter.

PSY 192—Willow Clinic (1-2)
Clinical Activity—2-6 hours; Lecture—1-2 hours; Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. UC Davis enrollment; upper division standing. Student run clinic for upper division students interested in learning about and meeting the unique health care needs for the homeless population. May be repeated for credit. (P/NP grading only.) Effective: 2009 Winter Quarter.

PSY 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Advanced standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

PSY 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Advanced standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

PSY 298—Directed Group Study for Graduate Students (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. Effective: 1997 Winter Quarter.

PSY 299—Special Study for Graduate Students (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

PSY 403—Fundamentals of Clinical Psychiatry (3)
Clinical Activity—1 hour; Lecture—3 hours. Prerequisite(s): Approval of SOM Committee on Student Progress. Restricted to medical student only. Psychiatric interviewing, Mental Status Exam and diagnosis. Major child and adult disorders, including substance abuse and dependence. Weekly student interviews of psychiatric patients in small group format. (P/F grading only.) Effective: 2008 Winter Quarter.

PSY 410—Klingenstein Summer Elective (2.5)
Clinical Activity—20 hours. Prerequisite(s): Consent of Instructor. During this "mini-clerkship," fellows will attend clinics, in-patient settings, and clinicians' offices. They will meet weekly to present cases and review current literature, and will complete a summary narrative at the end of their experience. (P/F grading only.) Effective: 2015 Spring Quarter.

PSY 410L—Klingenstein Longitudinal Elective (2)
Clinical Activity—5 hours; Discussion—2 hours; Discussion/Laboratory—10 hours. Prerequisite(s): Consent of Instructor. Year-long mentoring program provides clinical exposure to child and adolescent psychiatric healthcare during a medical student's pre-clinical years. (P/F grading only.) Effective: 2015 Fall Quarter.

PSY 412—Psychiatry Grand Rounds (1)
Lecture—1 hour. Prerequisite(s): Medical students or staff or other qualified mental health professionals with consent of instructor. Weekly conference at UCDMC for presentation of selected clinical cases,
presentation of lecture and research reports. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PSY 413—Outpatient Psychiatry Clerkship (6)
Clinical Activity—36 hours; Conference—2 hours; Lecture—2 hours. Prerequisite(s): PSY 430; And/or consent of coordinator. Experience in clinical management/treatment of adult outpatients with psychiatric and substance abuse disorders; crisis management/intervention, evaluation/development of diagnosis and treatment plan; emphasis on outpatient psychopharmacology/brief psychotherapy; observation of group therapy. Individual supervision by faculty/residents. (H/P/F grading only.) Effective: 2009 Winter Quarter.

PSY 414—Psychosomatic Medicine Clerkship (3-12)
Clinical Activity—32 hours; Discussion—8 hours. Prerequisite(s): Psychiatry Clerkship or consent of instructor; medical students only. A large university hospital service in which the student functions as a member of the team in evaluation, management and psychiatric liaison with other medical specialties. Intensive supervision from senior staff and psychiatric residents. May be repeated up to 2 time(s). (H/P/F grading only.) Effective: 2007 Winter Quarter.

PSY 415—Telemedicine Clinical Elective (3-9)
Clinical Activity—20 hours. Prerequisite(s): Fourth-year medical student with consent of instructor. Fourth-year medical student elective in Telemedicine focusing on psychiatric issues. Align with University, School and Center for Health and Technology mission of rural outreach and public health, particularly in primary care. May be repeated for credit. (H/P/F grading only.) Effective: 2011 Winter Quarter.

PSY 416—Child Psychiatry Clerkship (6)
Clinical Activity—36 hours; Conference—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): PSY 430; And/or consent of coordinator. Didactic and clinical inpatient, outpatient, and consultation-liaison experiences with children, adolescents and families. Clinical observations, diagnostic assessment, and treatment will be undertaken with close supervision. Literature review and case conferences presented on a regular basis. (H/P/F grading only.) Effective: 2009 Winter Quarter.

PSY 417—Jail Psychiatric Clerkship (6)
Clinical Activity—28 hours; Conference—8 hours; Lecture—4 hours. Prerequisite(s): PSY 430; And/or consent of course coordinator. Students gain experience, under close faculty supervision, assessing
acute and chronic mentally ill inmates in both inpatient and clinic settings. (H/P/F grading only.) Effective: 2009 Winter Quarter.

PSY 418—Off-Campus Clinical Experience (3-9)
Clinical Activity—20-40 hours. Prerequisite(s): Consent of Instructor. Fourth-year medical students. Clinical or research elective in off-campus medical school or mental health setting. To be arranged with advance approval of instructor and
individual in charge of off-campus setting. May be repeated for credit. (H/P/F grading only.) Effective: 2012 Winter Quarter.

PSY 419—Combined Family Medicine-Psychiatry Clerkship (3-6)
Clinical Activity—32 hours; Discussion—8 hours. Students rotate through the county Primary Care Clinic under the supervision of dual-boarded Psychiatry and Family Practice Faculty to provide medical care of indigent and uninsured patients as well as primary care for psychiatry patients. May be repeated for credit. (H/P/F grading only.) Effective: 2018 Winter Quarter.

PSY 420—Acting Internship in Psychiatry (3-6)
Clinical Activity—40 hours. Prerequisite(s): PSY 430; And/or consent of course coordinator. Acting intern position with close faculty supervision with emphasis on biological psychiatry, psychopharmacology and psychodynamic aspects appropriate to diagnostic and long-term patient management. (H/P/F grading only.) Effective: 2016 Summer Quarter.

PSY 421—Combined Internal Medicine-Psychiatry Clerkship (3-6)
Clinical Activity—32 hours; Discussion—8 hours. Prerequisite(s): Psychiatry Clerkship or consent of instructor; medical students only. Students rotate through the county Primary Care Clinic under the supervision of dual-boarded Psychiatry and Internal Medicine Faculty to provide medical care of indigent and uninsured patients as well as primary care for psychiatry patients. May be repeated for credit. (H/P/F grading only.) Effective: 2018 Winter Quarter.

PSY 422—Readings in Psychiatry (1-3)
Discussion. Independent reading of a selected topic in psychiatry. Supervision and
discussion with a psychiatry faculty member. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PSY 423—Willow Clinic (3-12)
Variable—4-10 hours. Prerequisite(s): Open to medical students in all four years of medical school. Student run clinic for medical students interested in learning about and meeting the unique health care needs for the homeless population. May be repeated for credit. (P/F grading only.) Effective: 2009 Spring Quarter.

PSY 424—Functional Genomics (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): Graduate standing or consent of instructor. The theory, methods and principles of functional neurogenomics with
emphasis on the relationship to molecular mechanisms involved in development and disease of the nervous system. (H/P/F grading only.) Effective: 2010 Winter Quarter.

PSY 430—Psychiatry Clinical Clerkship (12)
Clinical Activity—45 hours. Prerequisite(s): Approval by School of Medicine Committee on Student Progress. Assigned to clinical settings, students build upon the skills gained in preclinical years; emphasis on diagnostic, therapeutic and interpersonal skills. Areas of focus - patient management, interviewing skills, mental status exam, differential diagnosis, basic psychopharmacology, crisis assessment, intervention and case (H/P/F grading only.) Effective: 2001 Summer Quarter.

PSY 430FA—SJVP Longitudinal Psychiatry Clerkship (1.5-6)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Family Medicine, Pediatrics and Internal Medicine for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PSY 430FB—SJVP Longitudinal Psychiatry Clerkship (1.5-6)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Family Medicine, Pediatrics and Internal Medicine for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PSY 430FC—SJVP Longitudinal Psychiatry Clerkship (1.5-6)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Family Medicine, Pediatrics and Internal Medicine for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PSY 430FD—SJVP Longitudinal Psychiatry Clerkship (1.5-6)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Family Medicine, Pediatrics and Internal Medicine for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PSY 430R—Rural PRIME Psychiatry Longitudinal Clerkship (2)
Clinical Activity—45 hours. Psychiatry Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PSY 430RA—Rural PRIME Psychiatry Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Psychiatry Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PSY 430RB—Rural PRIME Psychiatry Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Psychiatry Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PSY 430RC—Rural PRIME Psychiatry Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Psychiatry Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PSY 430RD—Rural PRIME Psychiatry Longitudinal Clerkship (1)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Psychiatry Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PSY 430TA—TeachMS Longitudinal Psychiatry Clerkship (A) (4)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Promotions. Longitudinal Clerkship runs concurrently with Primary Care and Medicine for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only.) Effective: 2013 Fall Quarter.

PSY 430TB—TeachMS Longitudinal Psychiatry Clerkship (B) (6)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Promotions. Longitudinal Clerkship runs concurrently with Primary Care and Medicine for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only.) Effective: 2013 Fall Quarter.

PSY 430TC—TeachMS Longitudinal Psychiatry Clerkship (C) (2)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Promotions. Longitudinal Clerkship runs concurrently with Primary Care and Medicine for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only.) Effective: 2013 Fall Quarter.

PSY 439D—Directed Clinical Studies in Psychiatry (1-12)
Clinical Activity—40 hours. Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for modified curriculum or to complete a clinical rotation following a leave of absence. May be repeated for credit. (P/F grading only.) Effective: 2011 Spring Quarter.

PSY 439R—Directed Studies in Psychiatry (1-12)
Clinical Activity—30 hours; Independent Study—10 hours. Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for remediation of all or part of clinical rotation. Clinical studies to accommodate and satisfy remedial work as directed by the Committee on Student Progress and approved by the course IOR. May be repeated for credit. (P/F grading only.) Effective: 2011 Summer Quarter.

PSY 480—Insights in Psychiatry (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. First- or second-year medical student in good academic standing. On individual basis, student provided with an opportunity for gaining
insight into various clinical activities in the practice of psychiatry. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PSY 488—Acting Internship in Inpatient Psychiatry, Away Rotation (6)
Clinical Activity—40 hours. Prerequisite(s): Psychiatry Clerkship and/or consent of course coordinator. Inpatient acting internship at approved non-UCDHS affiliated training program that provides experience and preparation for ambulatory medical care. Students perform as an intern, with a smaller number of patients, greater supervision, and responsibility for the ongoing care of assigned patients. (H/P/F grading only.) Effective: 2009 Summer Quarter.

PSY 489—Acting Internship in Ambulatory Psychiatry, Away Rotation (6)
Clinical Activity—40 hours. Prerequisite(s): Psychiatry Clerkship and/or consent of course coordinator. Outpatient acting internship at an approved non-UCDHS affiliated training program that provides experience and preparation for ambulatory medical care. Students perform as an intern, with smaller number of patients, greater supervision, and responsibility for the ongoing care of assigned patients. (H/P/F grading only.) Effective: 2009 Summer Quarter.

PSY 493—Culture, Medicine and Society (6)
Clinical Activity—16 hours; Discussion—4 hours; Independent Study—8 hours; Seminar—12 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. Students will learn about the epidemiological significance of health disparities and barriers to access to health care. The course will cover (1) Epidemiology/Health Disparities; (2) Society and Medicine; (3) Cinemeducation; (4) Reflection/Integration. (H/P/F grading only.) Effective: 2007 Spring Quarter.

PSY 498—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Approved for graduate degree credit. Medical students desiring to explore particular topics in depth. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PSY 499—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Approved for graduate degree credit. Individual research on selected topics or research projects. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

RON 199—Special Study for Advanced Undergraduates; Research in Radiation Biology (1-5)
Variable—3-15 hours. Radiation Oncology is a unique discipline combining elements of clinical practice linked to complex physics based dosimetry and treatment planning. Included within this clinical environment is a strong basis in biology that underpins the clinical effectiveness of radiation treatment. May be repeated for credit. (P/NP grading only.) Effective: 2010 Fall Quarter.

RON 211—Introduction to Radiation Oncology Physics (3-6)
Variable. Prerequisite(s): Consent of Instructor. Restricted to physics and engineering graduate students and senior undergraduate physics majors. Class size limited to three students. Introduction to radiation oncology physics. Overview of treatment methodologies. Medical physics equipment. Treatment machine dosimetry, including calibration. Machine quality assurance. Patient dosimetry. Treatment planning. Simulation and treatment. Treatment quality assurance, including calculation checks and chart checks. Brachytherapy. (S/U grading only.) Effective: 2008 Fall Quarter.

RON 299—Independent Study and Research (1-12)
Laboratory—3-40 hours. Prerequisite(s): Enrollment with a graduate group for Ph.D. candidacy and consent of group advisor and sponsor. Research under supervision of Radiation Oncology faculty. Work must be appropriate to fulfill the requirements for the Ph.D. degree. (S/U grading only.) Effective: 2012 Fall Quarter.

RON 420—Radiobiology Lecture Course (1)
Lecture—1 hour. Prerequisite(s): BIS 001A; MAT 012; PHY 001A Radiobiology lectures are designed to engage the physician residents, physics residents and medical students in learning Radiobiology principles and concepts during the year the Radiation Physics course is taught. May be repeated up to 2 time(s). (H/P/F grading only.) Effective: 2011 Winter Quarter.

RON 463—Radiation Oncology Clerkship (3-9)
Clinical Activity—30 hours. Prerequisite(s): MDS 430; MDS 431; third-year clinical clerkship; consent of instructor required. Introduction to radiation oncology. Students will participate in workup and treatment planning for radiation oncology patients and will be introduced to the concepts involved in clinical radiation oncology, radiation biology, and radiation physics. May be repeated for credit. (H/P/F grading only.) Effective: 2012 Summer Quarter.

RON 465—Externship in Radiation Oncology (3-16)
Clinical Activity—30 hours. Prerequisite(s): Consent of Instructor. Externship provides in-depth exposure to the field of Radiation Oncology for students who rotation through an affiliated institution. May be repeated for credit. (H/P/F grading only.) Effective: 2015 Spring Quarter.

RON 499—Independent Study and Research in Therapeutic Radiology (1-18)
Variable—3-40 hours. Prerequisite(s): Consent of Instructor. Advanced-level research seminar in clinical and/or translational radiation oncology. Work with the course instructor to generate a testable hypothesis. May be repeated for credit. (H/P/F grading only.) Effective: 2014 Fall Quarter.

RDI 413—Radiological Diagnosis II (Physics of Diagnostic Radiology) (5)
Laboratory—6 hours; Lecture—49 hours. Prerequisite(s): Consent of Instructor. Physics of diagnostic imaging; x-ray production and interaction; image formation; modulation transfer function; fluoroscopy; cine fluoroscopy; stereoscopy; xeroradiography; computerized and geometrical tomography;
magnetic resonance and ultrasound. Principles of radiation protection in imaging will be covered. (H/P/F grading only.) Effective: 1997 Winter Quarter.

RDI 414—Medical Radiation Biology (3)
Lecture—27 hours. Prerequisite(s): Consent of Instructor. Medical radiation biology; molecular cellular and organ system response to acute and chronic irradiation; radiation carcinogenesis and genetic effects; radiation risk assessment; diagnostic ultrasound and magnetic resonance imaging health effects. Medical/legal considerations of radiation exposure. (H/P/F grading only.) Effective: 1997 Winter Quarter.

RDI 430—Introduction to Clinical Radiology (3-6)
Variable. Prerequisite(s): Consent of Instructor. Introduces students to common radiology tests, including limitations and risks by using ACR Appropriateness Criteria and incorporate patient specific clinical data into ordering and interpreting appropriate imaging tests. (H/P/F grading only.) Effective: 2017 Fall Quarter.

RDI 461—Advanced Clinical Clerkship in Diagnostic Radiology (3-6)
Clinical Activity—35 hours; Conference—4 hours; Discussion/Laboratory—1 hour. Prerequisite(s): Consent of Instructor. Satisfactory completion of second year medical school curriculum and of third-year clerkships in Internal Medicine and General Surgery. Restricted to eight students per rotation; open to visiting medical students from accredited programs. Work with clinical Radiologists in image interpretation fluoroscopy angiography image-guided intervention cardiac stress testing radionuclide therapy. Daily conferences in Radiology Diagnosis and Therapy Health Physics Radiation Safety. Prepare two clinical cases for in-class presentation. Assigned readings. May be repeated for credit. (H/P/F grading only.) Effective: 2014 Spring Quarter.

RDI 462—Diagnostic Imaging of Acquired and Congenital Heart Disease (2)
Lecture/Discussion—5 hours. Prerequisite(s): RDI 461 (can be concurrent); Fourth-year medical student in good academic standing. Main emphasis on radiology of acquired and congenital heart disease, but also on magnetic resonance, nuclear medicine, and echocardiography of heart diseases. (H/P/F grading only.) Effective: 1997 Winter Quarter.

RDI 473—Advanced Clinical Clerkship in Neuroradiology (3-6)
Clinical Activity—35 hours; Conference—4 hours; Independent Study—1 hour; Variable—9-18 hours. Prerequisite(s): Fourth-year medical student with interest in Diagnostic Radiology, Neuroradiology, Neurology, Neurosurgery, Psychiatry, Psychology, or related field; satisfactory completion of RDI 461, or the equivalent, is strongly encouraged. Restricted to one student per 2/4 week rotation. Work with Neuroradiologists in image interpretation of CT, MRI, and fluoroscopy. Opportunity to participate in assessment of Neurointerventional patients, and to observe Neurointerventional procedures. Daily conferences in Neuroimaging, General Radiology, Health Physics, and Radiology Safety. Assigned readings. May be repeated for credit. Credit limited to 3 units for 2 weeks; 6 units for 4 weeks. (H/P/F grading only.) Effective: 2014 Spring Quarter.

RDI 474—Advanced Clinical Clerkship in Pediatric Radiology (3-6)
Clinical Activity—30 hours; Conference—5 hours; Film Viewing—3 hours; Independent Study—2 hours. Prerequisite(s): Fourth-year medical students with interest in Radiology and/or Pediatrics; interested third-year medical students who have successfully completed Pediatrics clinical clerkships may enroll, given availability and consent of the instructor of record; prior completion of PDI 461, or the equivalent, encouraged. Restricted to two students per two-week or four-week rotation. Participation in the radiological care of Pediatric patients; evaluate the patient receiving the radiographic study, including pertinent historical/physical findings. Student expected to write up case files on interesting cases encountered during their rotation. May be repeated for credit. Credit limited to 3 units for 2 weeks; 6 units for 4 weeks. (H/P/F grading only.) Effective: 2014 Spring Quarter.

RDI 475—Advanced Clinical Clerkship in Musculoskeletal Radiology (MSK) (3-6)
Clinical Activity—35 hours; Conference—4 hours; Discussion/Laboratory—1 hour; Variable—9-18 hours. Prerequisite(s): Fourth-year medical student with interest in Musculoskeletal Radiology, Orthopedic Surgery, Sports Medicine, PMNR, or related field; satisfactory completion of RDI 461, or the equivalent, is strongly encouraged. Restricted to one student per 2/4 week rotation. Work with Musculoskeletal Radiologists in interpretation of CT, MRI, radiography, and fluoroscopy. Opportunity to assess patients for, and to observe image-guided procedures. Daily conferences in Musculoskeletal Imaging, General Radiology, Health Physics, and Radiology Safety. Assigned readings. May be repeated for credit. credit limited to 3 units for 2 weeks, 6 units for 4 weeks. (H/P/F grading only.) Effective: 2014 Spring Quarter.

RDI 476—Advanced Clinical Clerkship Vascular/Interventional Radiology (IR) (3-6)
Clinical Activity—35 hours; Conference—4 hours; Discussion/Laboratory—1 hour; Variable—9-18 hours. Prerequisite(s): Fourth-year medical student with interest in Diagnostic Radiology, Vascular/Interventional Radiology, Cardiovascular Imaging, Cardiology, Cardiovascular Surgery, Surgical Oncology, General Surgery, or related field; satisfactory completion of RDI 461, or the equivalent, is strongly encouraged. Restricted to one student per 2/4 week rotation. Medical student will work with Vascular/Interventional Radiologists in the evaluation of patients for interventional procedures. There will be opportunities to Daily conferences in Neuroimaging, General Radiology, Health Physics, and Radiology Safety. Assigned readings. May be repeated for credit. Credit limited to 3 units for 2 weeks, 6 units for 4 weeks. (H/P/F grading only.) Effective: 2014 Spring Quarter.

RDI 477—Advanced Clinical Clerkship in Ultrasound Radiology (3-6)
Clinical Activity—30 hours; Conference—5 hours; Film Viewing—3 hours; Variable—9-18 hours. Prerequisite(s): Fourth-year medical student with interest in Radiology, OB/GYN, or in other medical or surgical subspecialties employing ultrasound in their clinical practice; prior completion of RDI 461, or the equivalent, is encouraged. Restricted to two students per 2/4 week rotation. Participation as an active team member on a busy clinical ultrasound service. May be repeated for credit. (H/P/F grading only.) Effective: 2016 Summer Quarter.

RDI 478—Advanced Clinical Clerkship Abdominal Imaging (3-6)
Clinical Activity—35 hours; Conference—4 hours; Discussion/Laboratory—1 hour; Variable—9-18 hours. Restricted to one student per 2/4 week rotation. Work with clinical Radiologists on abdominal and pelvic CT, MR, ultrasound, digital radiography, gastrointestinal and genitourinary procedures, image-guided intervention. Offered as a 2-week rotation for third-year medical students and a 2/4-week rotation for fourth-year medical students. May be repeated for credit. Credit limited to 3 units for 2 weeks, 6 units for 4 weeks. (H/P/F grading only.) Effective: 2014 Spring Quarter.

RDI 479—Specialty Externship in Radiology (3-16)
Clinical Activity—25 hours; Discussion—10 hours. Externship provides in-depth exposure to one of a variety of sub-specialties in Radiology. May be repeated for credit. (H/P/F grading only.) Effective: 2011 Winter Quarter.

RDI 498—Group Study in Diagnostic Radiology (1-12)
Variable. Prerequisite(s): Consent of Instructor. (H/P/F grading only.) Effective: 1997 Winter Quarter.

RDI 499—Research in Diagnostic Radiology (1-12)
Variable. Prerequisite(s): Consent of Instructor. Approved for graduate degree credit. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

RNU 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

RNU 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

RNU 299—Research: Special Study for Graduate Students (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

RNU 401—Biomedical Radiochemistry (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate and medical students. Approved for graduate degree credit.Course is designed to combine basic nuclear physics, chemistry, and biology into a comprehensive and vigorous lecture-laboratory experience in biomedical nuclear chemistry.Subjects include choice and purification of appropriate gamma and beta radioisotopes,compounding biological pharmacodynamics and radioimmunoassay. (H/P/F grading only.) Effective: 1997 Winter Quarter.

RNU 411—Radiological Physics I (Physics of Nuclear Medicine) (5)
Laboratory—12 hours; Lecture—43 hours. Prerequisite(s): Consent of Instructor. Physics of diagnostic and therapeutic nuclear medicine, nuclear physics, radioactive decay; interaction of ionizing radiation; dosimeters; attenuation; internal and external dosimetry; health physics; radiation detection and imaging, scintillation cameras, computerized planar and tomographic imaging. Offered at UC Davis Medical Center. (H/P/F grading only.) Effective: 1997 Winter Quarter.

RNU 463—Clinical Clerkship in Nuclear Medicine (3-8)
Clinical Activity. Prerequisite(s): Consent of Instructor. Satisfactory completion of second-year medical school; RDI 461 recommended. Limited enrollment. Clerkship correlates radioisotopic methods with clinical, pathophysiological, and other diagnostic aspects of the patients care. Each patient reviewed with student by faculty member. Reading assignments, informal projects, and research techniques available. (H/P/F grading only.) Effective: 1999 Spring Quarter.

RNU 498—Group Study in Nuclear Medicine (1-12)
Variable. Prerequisite(s): Consent of Instructor. Approved for graduate degree credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

RNU 499—Research in Nuclear Medicine (1-12)
Variable. Prerequisite(s): Consent of Instructor. Research in Nuclear Medicine. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

SUR 099—Cardiovascular Tissue Engineering Research (1-5)
Laboratory—3-15 hours. Multidisciplinary research in cardiovascular tissue engineering and regeneration for acquired and congenital cardiovascular disease. Effective: 2011 Summer Session 1.

SUR 192—Internship in General Surgery (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in general surgery and related fields. (P/NP grading only.) Effective: 1997 Winter Quarter.

SUR 199—Special Study in General Surgery for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Advanced undergraduate student with consent of instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

SUR 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

SUR 430—Surgery Clerkship (12)
Clinical Activity—45 hours. Prerequisite(s): Approval by School of Medicine Committee on Student Progress. Eight week general surgery clerkship includes GI, Burn, Oncology, Plastics, Vascular Cardiothoracic, consult, transplant and trauma. Clerkship assignments are at UCDMC. Daily core material presentations and reading assignments. Student involvement includes work-up and care of surgical patients. (H/P/F grading only.) Effective: 2001 Summer Quarter.

SUR 430F—SJVP Surgery Clerkship at UCSF (6-12)
Clinical Activity—45 hours. Prerequisite(s): Approval by School of Medicine Committee on Student Progress. General surgery clerkship includes GI, Burn, Oncology, Plastics, Vascular Cardiothoracic, consult, transplant and trauma. Clerkship assignments are at UCSF Fresno. Student involvement includes work-up and care of surgical patients. (H/P/F grading only.) Effective: 2017 Winter Quarter.

SUR 430R—Rural PRIME Surgery Longitudinal Clerkship (2)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Surgery Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

SUR 430RA—Rural PRIME Surgery Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Surgery Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

SUR 430RB—Rural PRIME Surgery Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Surgery Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

SUR 430RC—Rural PRIME Surgery Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Surgery Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

SUR 430RD—Rural PRIME Surgery Longitudinal Clerkship (1)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Surgery Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

SUR 439D—Directed Clinical Studies in Surgery (1-12)
Clinical Activity—40 hours. Prerequisite(s): Consent of Instructor. Partial completion of a Clinical Rotation. Individual directed studies in extended preparation for modified curriculum or to complete a clinical rotation following a leave of absence. May be repeated for credit. (P/F grading only.) Effective: 2011 Spring Quarter.

SUR 439R—Directed Studies in Surgery (1-12)
Clinical Activity—30 hours; Independent Study—10 hours. Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for remediation of all or part of clinical rotation. Clinical studies to accommodate and satisfy remedial work as directed by the Committee on Student Progress and approved by the course IOR. May be repeated for credit. (P/F grading only.) Effective: 2011 Summer Quarter.

SUR 450—Surgical Skills Boot Camp (3-6)
Independent Study—30 hours; Workshop—10 hours. Prerequisite(s): Consent of Instructor. Goal of the surgical skills boot camp didactic is to enable students to demonstrate competence in basic surgical skills and theory, using analytical thinking and hands-on simulation. May be repeated for credit. (H/P/F grading only.) Effective: 2015 Spring Quarter.

SUR 461—Surgery Burn Unit Clerkship (6-18)
Clinical Activity. Prerequisite(s): SUR 430; and Consent of Instructor. Fourth-year medical student or third-year medical student. Rotation through Surgery Specialty Clinics:Vascular, GI, GU, Thoracic, Plastic, Radiotherapy. Student works up one new and two return visit patients. Presents consult to on-site faculty. Weekly review with preceptor and course director. Reading assignments to add perspective for in-depth discussions. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SUR 462—Surgery Trauma Service Clerkship (6-9)
Clinical Activity. Prerequisite(s): SUR 430; and Consent of Instructor. Fourth-year medical student, or third-year medical student. Student works as an extern on one of the two general surgery Trauma teams, participating in resuscitation and management of critically injured patients. Team hours consist of 24 hours on, and 24 hours off. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SUR 463—Surgery Intensive Care Unit (6-9)
Clinical Activity. Prerequisite(s): SUR 430; and Consent of Instructor. Fourth-year medical student, or third-year medical student. Student participates in direct supervision of critically ill surgical patients in a twelve-bed surgery ICU. Each student is closely supervised. Provides in-depth experience with management of critically ill patients. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SUR 466—Clinical Plastic Surgery Elective (3-9)
Clinical Activity—50 hours. Prerequisite(s): SUR 430; and Consent of Instructor. Third- or fourth-year medical students. Total involvement in patient care involving surgical preparation, treatment, operative care, and follow-up. Developing and understanding reconstruction and aesthetic plastic surgery. Microvascular surgery included. Student rotation. (H/P/F grading only.) Effective: 2014 Fall Quarter.

SUR 467—Surgical Oncology (3-9)
Clinical Activity. Prerequisite(s): SUR 430; and Consent of Instructor. Fourth-year medical student, or third-year medical student. Students actively participate in management of patients requiring surgery for cancer, endocrine disease and selected general surgical problems. Cases include malignant melanoma, sarcomas, gastrointestinal cancer, head and neck pathology, and metastatic malignancies. Attending rounds daily. Four teaching conferences weekly. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SUR 468—Cardiothoracic Surgery Clerkship (6-9)
Clinical Activity. Prerequisite(s): SUR 430; and Consent of Instructor. Fourth-year medical student, or third-year medical student. Student works as an extern on the Cardiothoracic Surgical Service, participating in perioperative management and operations on the heart, lungs, mediastinum, and other thoracic structures. Regularly scheduled teaching conferences are conducted. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SUR 471—Gastrointestinal Surgery (3-9)
Clinical Activity. Prerequisite(s): SUR 430; IMD 430; PED 430; and Consent of Instructor. Fourth-year medical student or third-year medical student. Student participates on the GI Surgery Service, working under the immediate supervision of the faculty and surgical housestaff, involving the full spectrum of gastrointestinal diseases performed by the medical student. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SUR 472—Vascular Surgery (3-9)
Clinical Activity. Prerequisite(s): SUR 430; IMD 430; PED 430; and Consent of Instructor. Fourth-year medical student or third-year medical student. Student participates on the vascular surgery service and in the management and operations of arterial and venous system, exclusive of diseases that require cardiopulmonary bypass for treatment. Includes patient care responsibilities with appropriate supervision. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SUR 474—Colorectal Surgery (3-6)
Clinical Activity. Prerequisite(s): Consent of Instructor. Fourth-year medical student. Students actively participate in clinic and the operating room on colon and rectal patients. This includes medical and surgical management. Assignments involve work up and care of the surgical patients. May be repeated for credit. (H/P/F grading only.) Effective: 2018 Spring Quarter.

SUR 475—Pediatric Surgery (6-9)
Clinical Activity—4-6 hours. Prerequisite(s): SUR 430; and Consent of Instructor. Fourth-year medical student or third-year medical student. Care of patients with neonatal congenital surgical problems. Fluid and electrolyte management in infants. General experience with acquired surgical diseases in children. (H/P/F grading only.) Effective: 1998 Fall Quarter.

SUR 476—Surgical Consult Service (6-9)
Clinical Activity. Prerequisite(s): SUR 430; and Consent of Instructor. Fourth-year medical student or third-year medical student. Students function as acting interns working in parallel with the interns on the service. They consult on all non-trauma patients in the emergency room and on the wards and also participate in the operating room. (H/P/F grading only.) Effective: 1998 Fall Quarter.

SUR 477—Clinically Oriented Anatomy (3)
Clinical Activity—40 hours. Prerequisite(s): Completion of three years of medical school. Restricted to fourth-year medical student only. Anatomy of selected regions of the body using cadaver dissection, prosections and interactive CD ROMs. Anatomical relationships relevant to common surgical procedures. Surgical and interventional radiology procedures. (P/NP grading only.) Effective: 2002 Winter Quarter.

SUR 478—Surgical Preceptorship: Off Campus (3-18)
Clinical Activity—60 hours. Prerequisite(s): Consent of Instructor. Fourth-year medical student. Student participates in the preoperative, operative and postoperative care of surgical patients under the supervision of attending staff. (H/P/F grading only.) Effective: 2014 Fall Quarter.

SUR 480—Insights in Surgery (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. Medical student in good academic standing. Individualized activities, including ward rounds, subspecialty clinics and conferences, grand rounds, and observation of a variety of surgical procedures. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SUR 481—Interactive Clinical Case Presentation (ICCP) (3)
Clinical Activity—1 hour. Prerequisite(s): Fourth-year medical students; however, course is open for third and fourth year student observers. Course taught as one session (4 hours) per month for three quarters (July to March); students who enroll can earn up to three credits and the minimum requirements will be to attend at least six sessions; students can do all nine sessions and work toward an honor; for the written part students will have to pick two of the nine case presentations and write a detailed paper with a literature review on "The Current management" of that disease-this can in fact be a manuscript submitted for publication with a faculty member as an advisor; maximum of 10-15 students in good standing. Case presentation of common clinical scenarios (i.e. chestpain/MI; fever/pneumonia; abdo pain/chlecy stites, etc.) from various discipline held in an auditorium with real patients exposure. Interactive session to review history, physical findings and case management. Students will be asked to perform H&P. (H/P/F grading only.) Effective: 2007 Summer Quarter.

SUR 493B—Critically Ill Surgical Patients SSM (6)
Clinical Activity—4 hours; Laboratory—16 hours; Lecture—5 hours; Lecture/Lab—10 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. Special Study Module, a four week course on the topic: Application of Basic Cardiopulmonary Physiology to Problems Encountered in Critically Ill Surgical Patients. (H/P/F grading only.) Effective: 2007 Spring Quarter.

SUR 493C—Physiological Principles in SICU SSM (6)
Clinical Activity—4 hours; Laboratory—16 hours; Lecture—5 hours; Lecture/Lab—10 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. Special Studies Module, A four week course on the topic: Care of the Critically Ill Surgical Patient: Use of Physiological Principles to Guide Treatment of Patients with Common Surgical Problems. (Human Physiology 493C.) (H/P/F grading only.) Effective: 2007 Spring Quarter.

SUR 493D—Interdisciplinary Study of Gastrointestinal Cancer (6)
Clinical Activity—12 hours; Discussion/Laboratory—20 hours; Laboratory—3 hours; Lecture—5 hours. Prerequisite(s): Consent of Instructor. In-depth study of gastrointestinal, hepatic and pancreatic cancer. Emphasis on an integration of basic science and clinical medicine. Participating departments include pathology, surgical oncology, medical oncology, gastroenterology, radiology and radiotherapy. (Pathology 493.) (H/P/F grading only.) Effective: 2012 Summer Quarter.

SUR 494H—Fourth-Year Surgical Honors Program (18)
Variable. Prerequisite(s): SUR 430; and Consent of Instructor. Completion of third year of medical school with superior performance on SUR 430. To provide intensive and comprehensive training in surgery to students interested in a postgraduate surgical career, that would enable them to succeed during the internship and residency training. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SUR 495—Intense Introduction to Cardiac Surgery (3)
Clinical Activity—16 hours; Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Restricted to medical student between first and second year. Close contact with vascular surgeon for two-week period. Includes Sunday mornings. 100% mandatory attendance. Physiology of going on and off cardiopulmonary bypass. Atherosclerotic cardiovascular disease, structural and valvular heart disease and electrical and rhythmic heart disease. May be repeated up to 1 time(s). (P/F grading only.) Effective: 2009 Spring Quarter.

SUR 498—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Medical student. Directed reading and discussion and/or laboratory investigation on selected topics. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SUR 499—Laboratory Research (1-12)
Laboratory—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of second year of medical school. Laboratory research on surgically related problems. Participation in projects to include the following: burn, nutrition, oncology, transplant and others. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

URO 199—Special Study for Advanced Undergraduates (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

URO 400—Office Urology (1)
Clinical Activity—4 hours. Prerequisite(s): Fourth-year medical students with consent of instructor. Introduction to ambulatory care of urologic patients including basic therapeutic and diagnostic procedures from case material referred to
private clinic. Management of urinary tract infection will be emphasized. (H/P/F grading only.) Effective: 1997 Winter Quarter.

URO 460—Urology Clinical Clerkship (5-18)
Clinical Activity—8-40 hours. Prerequisite(s): Consent of Instructor. Third-year medical student; physical diagnosis or the equivalent. Limited enrollment. Clinical experience in diagnosis and treatment of urologic disease. Student will work closely with house staff, participate in conferences and surgery, and perform initial patient evaluation on new patients. May be repeated for credit. (H/P/F grading only.) Effective: 2010 Winter Quarter.

URO 461—Externship in Urology (3-18)
Clinical Activity—60 hours. Prerequisite(s): Consent of Instructor. Fourth-year medical students. Under supervision, student acting as intern will assume full inpatient responsibility including admission history, physical examination, management of hospitalization, and participate in surgical procedures, outpatient clinic and learning diagnostic and therapeutic procedures. May be repeated for credit. (H/P/F grading only.) Effective: 2014 Fall Quarter.

URO 499—Research in Urology (1-12)
Variable. Prerequisite(s): Medical or veterinary medical students with consent of instructor. Research in oncology, male infertility, urodynamics, neurogenic bladder. Unique opportunity to apply recent technologies (nuclear medicine resonance, flow cytometry, recombinant DNA) in investigation, diagnosis and treatment of GU cancer, infectious disease, male infertility and development of genitourinary bioprosthetics. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Winter Quarter.

SOM Courses | ANE

in Anesthesiology and Pain Medicine:

ANE 192—Internship in Anesthesiology (1-6)
Internship—3-18 hours; Project (Term Project). Prerequisite(s): Upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in anesthesia and related fields. (P/F grading only.) Effective: 1997 Winter Quarter.

ANE 199—Special Study for Advanced Undergraduates (1-5)
Variable—3-15 hours. May be repeated for credit. (P/NP grading only.) Effective: 2007 Fall Quarter.

ANE 435—Primary Care Multidisciplinary Pain Management (3)
Clinical Activity. Rotation will give 3rd year primary-care bound students an overview of the scope of Pain Medicine. May be repeated for credit. (H/P/F grading only.) Effective: 2016 Fall Quarter.

ANE 455—Externship in Anesthesiology (3-6)
Clinical Activity. Prerequisite(s): Consent of Instructor. Away clinical rotation in Anesthesiology or Pain Medicine. (H/P/F grading only.) Effective: 2017 Summer Quarter.

ANE 460—Anesthesiology Clinical Clerkship (3-18)
Discussion—2 hours; Practice—10 hours; Variable—30 hours. Prerequisite(s): Consent of Instructor. Medical student. In-depth exposure to anesthesia through informal lectures and mentoring by anesthesiologists. Emphasis on understanding and applying anesthetic principles in managing administration of general, regional, and specialized areas. (H/P/F grading only.) Effective: 1997 Spring Quarter.

ANE 461—Perioperative Medicine (3-12)
Clinical Activity—30 hours. Prerequisite(s): Successful completion of third-year clerkships; consent of IOR. Two week rotation provides a broad exposure to various patient care services within the Department of Anesthesiology and Pain Medicine to apply medical knowledge to safely care for patients. (H/P/F grading only.) Effective: 2011 Spring Quarter.

ANE 462—Perioperative Management of the Obstetric Patient (3-6)
Variable—2 hours. Prerequisite(s): Consent of Instructor. Perioperative Management of Obstetric Patient advanced clinical clerkship will offer the medical student the chance to understand and be able to apply the principles of basic science into major improvements in obstetric anesthesia patient care. May be repeated for credit. (H/P/F grading only.) Effective: 2018 Spring Quarter.

ANE 463—Multidisciplinary Pain Management (6)
Clinical Activity—30 hours; Lecture/Discussion—10 hours. Prerequisite(s): Senior medical student in good standing. Senior clerkship to expose students to all facets of treating pain in all aspects of clinical care: outpatient and inpatient settings, acute and chronic pain, end of life issues, pediatrics, rehabilitation, etc. Daily clinics, rounds, and lectures. (H/P/F grading only.) Effective: 1999 Summer Quarter.

ANE 464—Multidisciplinary Approach to the Neurosurgical Patient (3-9)
Clinical Activity—40 hours. Prerequisite(s): Consent of Instructor. Participate in the perioperative care of patients undergoing neurosurgical procedures while under the supervision of anesthesia, neurology and neurosurgical ICU residents and attending physicians. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Winter Quarter.

ANE 465—Away Acting Internship in Anesthesiology (3-18)
Clinical Activity—40 hours; Variable—3-18 hours. Prerequisite(s): Consent of Instructor. Satisfactory completion of Anesthesiology Clerkship. Work at the level of a sub intern in Inpatient and/or Outpatient settings. Expectation is to provide direct patient management. May be repeated for credit. (H/P/F grading only.) Effective: 2010 Summer Quarter.

ANE 480—Brief Introduction to Clinical Anesthesiology and Chronic Pain Management (3)
Clinical Activity—30 hours. Prerequisite(s): Second-year medical student. Daily experience in clinical anesthesiology at the preoperative screening unit, operating room, post anesthesia care unit, chronic pain management clinic with daily clinical correlation case discussions, and one-on-one interaction with faculty anesthesiologists. (H/P/F grading only.) Effective: 1997 Spring Quarter.

ANE 493A—Applied Physiology and Pharmacology (6)
Clinical Activity—4 hours; Laboratory—16 hours; Lecture—5 hours; Lecture/Lab—10 hours. Prerequisite(s): Consent of Instructor. UC Davis School of Medicine students only. Review and demonstrate the application of basic physiology and pharmacology to patient care. There will be an in-depth analysis of the physiology and pharmacology of the cardiovascular, pulmonary, nervous, renal and endocrine systems. (H/P/F grading only.) Effective: 2007 Winter Quarter.

ANE 493B—Interdisciplinary Medicine in Pain Care (6)
Clinical Activity—4 hours; Laboratory—16 hours; Lecture—5 hours; Lecture/Lab—10 hours. Prerequisite(s): Consent of Instructor. UC Davis School of Medicine students only. Integrate applied and practical neuroanatomy, physiology, pharmacology, psychology/psychiatry and social medicine in the care of patients who are receiving care for pain caused by acute or chronic medical disease or trauma. (H/P/F grading only.) Effective: 2007 Spring Quarter.

ANE 498—Individual or Group Study (1-5)
Discussion—1-5 hours; Laboratory—2-10 hours. Prerequisite(s): Interns and residents with consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics. (H/P/F grading only.) Effective: 1997 Winter Quarter.

ANE 499—Anesthesiology Research (1-18)
Laboratory—12-54 hours. Prerequisite(s): Third- or fourth-year medical students, advanced standing undergraduate and veterinary medicine students; or consent of instructor. Problems in clinical and/or laboratory research. May be repeated for credit. (H/P/F grading only.) Effective: 2018 Spring Quarter.

SOM Courses | BCM

Courses in BCM:

BCM 092—Internship in Biological Chemistry (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Supervised work experience in biological chemistry and related fields (P/NP grading only.) Effective: 1997 Winter Quarter.

BCM 192—Internship in Biological Chemistry (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project prior to internship by preceptor. Supervised work experience in Biological Chemistry and related fields. (P/NP grading only.) Effective: 1997 Winter Quarter.

BCM 198—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. For undergraduate students desiring to explore particular topics in depth. Lecture and conferences may be involved. (P/NP grading only.) Effective: 1997 Winter Quarter.

BCM 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

BCM 209—Prostaglandins/Leukotrienes and Related Lipids (2)
Lecture—2 hours. Prerequisite(s): (BCP 101A and BCP 101B) or (PHC 101A and PHC 101B) or (PGG 100A and PGG 100B). Oxidative desaturation/elongation of polyunsaturated fatty acids. Biosynthesis of prostaglandins/leukotrienes from polyunsaturated fatty acids. Chemistry, biochemistry, and metabolism. Nutritional regulation. Physiological/pathophysiological implications; pharmacological and clinical relevance. Effective: 1997 Winter Quarter.

BCM 217—Molecular Genetics of Fungi (3)
Lecture—3 hours. Prerequisite(s): PLP 130; PLP 215X; BCP 101B; BOT 119; GGG 100; GGG 102A; Graduate standing in a biological science; MIC 215 recommended. Advanced treatment of molecular biology and genetics of filamentous fungi and yeasts, including gene structure, organization and regulation; secretion; control of reproduction; molecular evolution; transformation; and gene manipulation. (PLP 217.) Effective: 1997 Winter Quarter.

BCM 222—Mechanisms of Translational Control (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): BCP 201C or Consent of Instructor. Molecular mechanisms of protein synthesis and translational control in eukaryotic cells, with emphasis on mammalian cells and their viruses. An advanced graduate-level treatment of topics of current interest, with readings and discussion of primary papers from the literature. Effective: 1997 Winter Quarter.

BCM 230—Practical NMR Spectroscopy and Imaging (1)
Lecture—1 hour. Prerequisite(s): CHE 107A; CHE 107B; (PHY 009A, PHY 009B, PHY 009C; or PHY 005A, PHY 005B, PHY 005C) or consent of instructor. Basic theory, experimental methods, and instrumentation of NMR. Enables students to understand NMR spectroscopy and imaging experiments. (S/U grading only.) Effective: 1997 Winter Quarter.

BCM 231—Biological Nuclear Magnetic Resonance (3)
Lecture—3 hours. Prerequisite(s): MCB 221A; Or equivalent or consent of instructor. Principles and applications of magnetic resonance in biomedicine. Fundamental concepts and the biophysical basis for magnetic resonance
applications in areas of tissue characterization/imaging, metabolic regulation, and cellular bioenergetics. (BPH 231.) Effective: 1997 Winter Quarter.

BCM 291—Seminar in Genetic Approaches to Pathogenesis of Human Disease (1)
Seminar—1 hour. Prerequisite(s): Student in Genetics Graduate Group or consent of instructor. Current genetic approaches to understanding the pathogenesis of disease and mammalian development presented and critically discussed by faculty, fellows and students. Topics include Mendelian and non-Mendelian diseases, imprinting, homologous recombination, statistical methods, genetic epidemiology and cell cycle dependent expression. (BCM 491.) (S/U grading only.) Effective: 1999 Fall Quarter.

BCM 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be involved. Effective: 1997 Winter Quarter.

BCM 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

BCM 410A—Molecular Medicine (4)
Discussion—3 hours; Lecture—3 hours; Web Virtual Lecture—1 hour. Prerequisite(s): Consent of Instructor. Restricted to Medical Students only. Biochemistry of proteins and nucleic acids. Includes an introduction to cancer biology and a full discussion of carbohydrate metabolism. Molecular aspects of human disease are highlighted throughout the course. (P/F grading only.) Effective: 2015 Summer Quarter.

BCM 491—Seminar in Genetic Approaches to Pathogenesis of Human Disease (1)
Seminar—1 hour. Prerequisite(s): Student in Genetics Graduate Group or consent of instructor. Current genetic approaches to understanding the pathogenesis of disease and mammalian development presented and critically discussed by faculty, fellows and students. Topics include Mendelian and non-Mendelian diseases, imprinting, homologous recombination, statistical methods, genetic epidemiology and cell cycle dependent expression. (BCM 291.) (H/P/F grading only.) Effective: 1999 Fall Quarter.

BCM 493—Medical Genomics (6)
Clinical Activity—4 hours; Laboratory—12 hours; Lecture—4 hours. Prerequisite(s): Consent of Instructor. Four-week module will focus on the clinical methods and applications of medical genomics. Topics will include an introduction to the human genome and human genomics, genetic and epigenetic variation and the ethics of medical genomics. (H/P/F grading only.) Effective: 2012 Spring Quarter.

BCM 497T—Tutoring in Biological Chemistry (1-5)
Tutorial—3-15 hours. Prerequisite(s): Advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum of the School of Medicine. (H/P/F grading only.) Effective: 1997 Winter Quarter.

BCM 498—Group Study (1-5)
Variable. Prerequisite(s): Medical students with consent of instructor. (H/P/F grading only.) Effective: 1997 Winter Quarter.

BCM 499—Research (1-12)
Variable. Prerequisite(s): Medical students with consent of instructor. Research with Department of Biological Chemistry. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

SOM Courses | CHA

Courses in CHA:

CHA 101—Human Gross Anatomy (4)
Lecture—4 hours. Prerequisite(s): BIS 002A; Concurrent enrollment in EXB 106L or CHA 101L strongly recommended. Upper division students only; Pass One open to upper division Exercise Biology or Anthropology majors only; Pass Two open to Seniors in any major; open enrollment at the start of the quarter for upper division students in any major. Detailed study of the gross anatomical structure of the human body, with emphasis on function and clinical relevance to students entering health care professions. (EXB 106.) GE credit: SE. Effective: 2010 Fall Quarter.

CHA 101L—Human Gross Anatomy Laboratory (3)
Laboratory—9 hours. Prerequisite(s): BIS 002A; (EXB 106 (can be concurrent) or CHA 101 (can be concurrent)); If EXB 106 or CHA 101 is not taken concurrently, it must have been already completed. Upper division students only; Pass One open to upper division Exercise Biology or Anthropology majors only; Pass Two open to Seniors in any major; open enrollment at the start of the quarter for upper division students in any major; mandatory attendance on first day of lab. Detailed study of prosected human cadavers in small group format with extensive hands-on experience. (EXB 106L.) GE credit: SE. Effective: 2010 Fall Quarter.

CHA 102—Human Microscopic Anatomy: Structure and Function of Human Tissues and Organ Systems (4.5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): BIS 104 Limited enrollment. Course complements Gross Anatomy by extending the study of structure to the microscopic level. Shows how cells are assembled into tissues, and tissues into organs, with an emphasis on demonstrating how microscopic structure explains function. GE credit: SE. Effective: 2017 Winter Quarter.

CHA 103—Human Clinical Neuroanatomy (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHA 101; or Consent of Instructor. Open to upper division students. Clinically relevant anatomy of the normal human nervous system, including external and internal anatomy of the brain, spinal cord, and cranial nerves. Blood supply to the brain and spinal cord. Functional neuroanatomy of motor, sensory, and cognitive systems. Application of neuroanatomical principles relevant to clinical problem solving for students entering health care professions. (NEU 103.) GE credit: SE. Effective: 2018 Spring Quarter.

CHA 192—Internship in Morphology (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; laboratory science experience including some chemistry; approval of project by preceptor prior to period of internship. Experience of supervised internship in research laboratories of members of the department. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHA 197T—Tutoring in Cell Biology and Human Anatomy (1-5)
Discussion—1 hour; Laboratory—6-9 hours. Prerequisite(s): CHA 101 B or better; and Consent of Instructor. Provides laboratory instruction in gross and microscopic human anatomy, with small groups of undergraduates under the supervision of the instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHA 198—Directed Group Study (1-5)
Discussion—1-10 hours. Prerequisite(s): Consent of Instructor. Directed reading, discussion, and/or laboratory experience on selected topics. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHA 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHA 200—Graduate Human Gross Anatomy (6)
Laboratory—6 hours; Lecture—4 hours. Prerequisite(s): Consent of Instructor. Open only to full-time graduate students. Lectures on human gross anatomy and cadaver dissection laboratory. Topics arranged by region; emphasis on osteology, neuromuscular anatomy, cardiovascular anatomy, gastrointestinal anatomy and anatomy of reproductive systems. Only 2 units of credit for students who have completed CHA 101. Effective: 2008 Winter Quarter.

CHA 202—Microscopic Anatomy for Researchers (3)
Discussion/Laboratory—3 hours; Lecture—2 hours. Open to graduate students in the biomedical sciences (no consent required); advanced undergraduates seeking research careers in the biomedical sciences (consent of instructor required). The growing importance of the use of gene knock-out studies and imaging technology requires significant understanding of basic anatomy. Designed to familiarize students in diverse fields with anatomical, cellular and tissue organization of typical animal models. Effective: 2017 Spring Quarter.

CHA 203—Neurobiology (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Two upper division or one graduate course in Neurobiology. Physiology and anatomy of the normal human nervous system in an integrated format. Effective: 2004 Spring Quarter.

CHA 290—Seminar (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

CHA 290C—Research Group Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate student with research experience (may be taken concurrently). Discussion of problems, progress and literature groups relevant to current research undertaken by laboratory groups Human Anatomy. (S/U grading only.) Effective: 1997 Winter Quarter.

CHA 298—Advanced Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Effective: 1997 Winter Quarter.

CHA 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

CHA 400—Developmental, Gross & Radiologic Anatomy (7.5)
Laboratory—5 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Medical students only. Integrated presentation of developmental, gross and radiologic anatomy. Embryology and radiology correlated with the dissection of the entire body. Embryology from implantation to birth. (P/F grading only.) Effective: 2011 Summer Quarter.

CHA 402—Cell and Tissue Biology (4.5)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Medical student only. Microscopic structure of the basic cells, tissues and organs of the body with an emphasis on how structure explains function. Analysis and identification of sectioned material at the light microscopic and ultrastructural levels. (P/F grading only.) Effective: 2011 Summer Quarter.

CHA 403—Medical Neuroanatomy (5)
Discussion/Laboratory—1 hour; Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): CHA 400; Block 1. Restricted to medical students only. Anatomy of the normal human nervous system, to include gross external and internal morphology of brain and spinal cord, and function neuroanatomy of motor, sensory and cognitive systems. Incorporates application of neuroanatomy to clinical problem solving. (HPH 403.) (P/F grading only.) Effective: 2007 Summer Quarter.

CHA 493B—Anatomy Medical Education Special Study Module (6)
Auto Tutorial—6 hours; Clinical Activity—14 hours; Independent Study—10 hours; Seminar—10 hours. Prerequisite(s): Consent of Instructor. UC Davis School of Medicine students only. Attend all of the lectures and laboratory sessions for course 400 and 402 during the four-week section (approximately seven anatomy labs and three to four histology labs);tutor first-year students during the laboratory sessions; prepare and present a clinical correlate session. (H/P/F grading only.) Effective: 2007 Spring Quarter.

CHA 497T—Tutoring in Human Anatomy (1-5)
Tutorial—3-15 hours. Prerequisite(s): Advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum for the School of Medicine. (H/P/F grading only.) Effective: 1997 Winter Quarter.

CHA 498—Advanced Group Study (1-12)
Variable. Prerequisite(s): Medical students, interns, and residents with consent of instructor. Directed reading and group discussions and/or laboratory experience on selected topics. (H/P/F grading only.) Effective: 1997 Winter Quarter.

CHA 499—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SOM Courses | CLH

Course in CLH:

CLH 200—Introduction to Clinical Research (3)
Independent Study—3 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. One of the following degrees: MD, DDS, DMD, OD, ND, DO, PharmD, DVM, PhD or DNS in nursing. Application and acceptance into the Clinical Research Graduate Group, K30 program or other SOM/CTSC training programs. Introduction to the CRGG program and overview of major clinical research topics. Overview of basic clinical skills needed to accomplish CRGG mentored research project. (S/U grading only.) Effective: 2008 Summer Special Session.

CLH 201—Strategies for Grant Writing (2)
Lecture—2 hours. Prerequisite(s): Consent of Instructor. Completed one of the following degrees: MD, DDS, DMD, OD, ND, DO, PharmD, DVM, PhD or DNS in nursing. Application and acceptance into the Clinical Research Graduate Group, K30 program or other SOM/CTSC training program. Practical skills and strategies to create successful grant proposals in NIH style/format. Generating ideas, identifying and accessing research resources, grant components, specific aims, background and significance, preliminary studies, budgets, and bios. Matriculation through UC system, and resubmissions. (Former course MDS 461CR.) (S/U grading only.) Effective: 2008 Summer Special Session.

CLH 202—Introduction to Clinical Epidemiology and Study Design (3)
Discussion—10 hours; Lecture—25 hours. Prerequisite(s): Consent of Instructor. Completed one of the following degrees: MD, DDS, DMD, OD, ND, DO, PharmD, DVM, PhD or DNS in nursing; application and acceptance into the Clinical Research Graduate Group, (K30) program, or other SOM/CTSC training programs. Anatomy and physiology of conducting clinical epidemiologic research. Familiarity with three basic study designs (cross-sectional, case-control, and cohort). Discussion of principles of measurements in clinical epidemiological studies, basic methods for analyzing data, and ethical issues involved in conducting research. (S/U grading only.) Effective: 2008 Summer Special Session.

CLH 203—Methods in Clinical Research (3)
Discussion—1 hour; Independent Study—10 hours; Lecture—4 hours. Prerequisite(s): Consent of Instructor. Completed one of the following degrees: MD, DDS, DMD, OD, ND, DO, PharmD, DVM, PhD or DNS in nursing; application and acceptance into the Clinical Research Graduate Group, K30 program or other SOM traing programs. Overview of major approaches to clinical research, including health services research techniques, informatics, GCRC, and preclinical methodologies to enhance clinical projects. Overview of UCD clinical research support infrastructure. Methodologies applicable to clinical research and its multi-disciplinary perspective. (S/U grading only.) Effective: 2015 Spring Quarter.

CLH 204—The Ethics of Research (1)
Lecture—1 hour. Prerequisite(s): Consent of Instructor. Priority given to those with acceptance into the Clinical Research Graduate Group, K12, T32 or other SOM/CTSC training program. Acquire information about ethical responsibilities; Explore major questions in ethics; Apply ethical principles, concepts and values; Gain an appreciation of the role of trust in scientific research. Recommend three quarters of CLH204. Must enroll in Fall to continue through Spring. May be repeated up to 3 unit(s). (S/U grading only.) Effective: 2016 Fall Quarter.

CLH 207—Team Science (1)
Lecture/Discussion—1 hour. Prerequisite(s): Participation in CTSC Research Education and Training Programs, or consent of instructor. Restricted to 25 students. Today's scientific challenges necessitate cross-disciplinary engagement and high collaboration levels. This course offers guidance on how best to engage in team science to pursue complex questions, work effectively with team members, and produce high impact research that meets society's needs. (S/U grading only.) Effective: 2015 Winter Quarter.

CLH 208—Introduction to Grant Writing, I (2)
Extensive Writing; Lecture/Discussion—2 hours. First in a two-quarter series. Scholars are encouraged to enroll in both classes. The two-course sequence provides training in practical aspects of competitive grant writing. The focus is NIH, but information will apply to other funding agencies. (S/U grading only.) Effective: 2014 Fall Quarter.

CLH 209—Introduction to Grant Writing, II (1)
Lecture/Discussion—1 hour. Prerequisite(s): CLH 208; Consent of Instructor. Restricted to students who have completed course 208. Second in a two-quarter series. Two-course sequence provides training in practical aspects of competitive grant writing. (S/U grading only.) Effective: 2016 Fall Quarter.

CLH 210Y—Principles and Methods of Comparative Effectiveness Research (4)
Discussion—2 hours; Project (Term Project)—6 hours; Web Electronic Discussion; Web Virtual Lecture—4 hours. Prerequisite(s): Consent of Instructor. Familiarity with research methodology, and a course in introductory statistics. Provides an introduction to Comparative Effectiveness Research (CER) and methods for conducting CER. (S/U grading only.) Effective: 2015 Winter Quarter.

CLH 211—Critical Assessment of the Biomedical Literature (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Exposes students to topical issues and controversies in the design of interdisciplinary translational research, with an emphasis on critical assessment of the biomedical and health sciences literature. The course extends students' knowledge of study design through practical application. May be repeated up to 3 unit(s). (S/U grading only.) Effective: 2016 Fall Quarter.

CLH 212—Introduction to Stem Cell Biology (3)
Lecture/Discussion—3 hours. Open to graduate students with a fundamental knowledge of cell biology. Introduction to Stem Cell Biology. Each week will focus on different aspects of stem cells, including general concepts, stem cells in lower organisms, embryonic stem cells and cellular reprogramming. Effective: 2016 Spring Quarter.

CLH 214A—Biodesign I (2)
Lecture—2 hours. Prerequisite(s): Consent of Instructor. Prior approval by instructor required; student must commit to taking both courses; Biodesign I and Biodesign II. Focuses on the principles of needs identification and invention of biomedical technologies. Two part course provides a basic understanding of the elements of the innovation process and how to translate these principles into biomedical device design. Effective: 2016 Fall Quarter.

CLH 214B—Biodesign II (2)
Lecture—2 hours. Prerequisite(s): CLH 214A; Consent of Instructor. Prior approval by instructor required; student must commit to taking both courses; Biodesign I and Biodesign II. Focuses on the implementation of biomedical technologies and translational process. Two part course provides a basic understanding of the elements of the innovation process and how to translate these principles into biomedical device design. Effective: 2017 Winter Quarter.

CLH 220—Basics of Stem and Progenitor Cells (1)
Lecture—1 hour. Prerequisite(s): MCP 200L; MCP 200; Consent of Intructor; Graduate standing. This is a lecture course designed for graduate students who have experience in cell culture techniques. It is designed to give a broad overview of the field and current cells of interest to the greater research community. (S/U grading only.) Effective: 2007 Spring Quarter.

CLH 222—Ethical Issues in Stem Cell Biology (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Critical presentation and analysis of recent articles in stem cell biology and small group discussions of the ethical issues surrounding this area of research. (S/U grading only.) Effective: 2007 Winter Quarter.

CLH 230—Congestive Heart Failure, Mechanism of Disease (3)
Lecture/Discussion—2 hours; Project (Term Project). Prerequisite(s): Consent of Instructor. Graduate standing. Underlying mechanisms of cardiomyopathy and heart failure. Presentation of fundamental knowledge of and recent basic research on heart failure. Student team projects: investigation and presentation of a research topic and bench research project to advance research in the same area. Effective: 2008 Summer Session 1.

CLH 231—Current Techniques in Clinical Research (2)
Clinical Activity—3 hours; Lecture—1 hour. Prerequisite(s): CLH 250; and Consent of Instructor. Graduate standing. Current techniques used in clinical research such as electrophysiology, cardiovascular surgery, cardiac catheterization and echocardiography, team science, and patient management. Lectures are presented by experts on each technique, with an emphasis on use in translational research. (S/U grading only.) Effective: 2006 Fall Quarter.

CLH 233—Molecular Mechanisms of Disease: Cancer (3)
Lecture/Discussion—2 hours; Project (Term Project)—3 hours. Prerequisite(s): Consent of Instructor. Restricted to students pursuing the designated emphasis in Translational Research; graduate standing. Cutting edge of research on underlying mechanisms of cancer development, progression and prevention—clinical trials/drug development, signaling pathways and molecular mechanisms of cancer development, recent basic research on cancer stem cells, genetics and epigenetic events and animal models used. Effective: 2013 Fall Quarter.

CLH 240—Predoctoral Clinical Research Training Program Research Integration (1)
Discussion—0.5 hours; Seminar—0.5 hours. Prerequisite(s): Consent of Instructor. Enrollment in the Predoctoral Clinical Research Training Program in the CTSC, School of Medicine. Alternating sessions: journal club, seminar/discussion, and research integration sessions. May be repeated up to 3 time(s). (S/U grading only.) Effective: 2007 Fall Quarter.

CLH 244—Introduction to Medical Statistics (4)
Lecture—4 hours. Introduction to statistical methods and software in clinical, laboratory and population medicine. Graphical and tabular presentation of data, probability, binomial, Poisson, normal, t-, F-, and Chi-square distributions, elementary nonparametric methods, simple linear regression and correlation, life tables. Only one unit of credit for students who have completed STA 100 or MPM 402. (SPH 244.) Effective: 2017 Winter Quarter.

CLH 245—Biostatistics for Biomedical Science (4)
Lecture—4 hours. Prerequisite(s): CLH 244 or SPH 244; Consent of Instructor. Or equivalent. Analysis of data and design of experiments for laboratory data. (SPH 245.) Effective: 2015 Spring Quarter.

CLH 246—Biostatistics for Clinical Research (4)
Lecture—4 hours. Prerequisite(s): CLH 245 or SPH 245 Emphasizes critical biostatistics for clinical research and targets biomedical audience. Students will develop understanding for basic planning and analysis of clinical studies and learn to develop collaborations with biostatisticians. May be repeated for credit. (SPH 246.) Effective: 2015 Winter Quarter.

CLH 247—Statistical Analysis for Laboratory Data (4)
Lecture—4 hours. Prerequisite(s): CLH 245 or SPH 245 Statistical methods for experimental design and analysis of laboratory data including gene expression arrays, RNA-Seq, and mass spec. (SPH 247.) Effective: 2015 Spring Quarter.

CLH 250—Integrating Medicine Into Basic Science (6)
Clinical Activity—8 hours; Discussion—6 hours; Lecture—3.75 hours; Seminar—2.5 hours. Graduate standing; acceptance into HHMI Integrating Medicine into Basic Science program. Four-week summer institute consisting of didactic lectures, reading assignments, group discussions, and clinical rotations to acculturate students to the human medical environment; integrate medical principles, physiology and pathophysiology into basic research; introduce high-impact clinical studies related to medicine and health. (S/U grading only.) Effective: 2006 Fall Quarter.

CLH 290A—Hot Topics in Clinical Research (1)
Seminar—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Seminars presented by guest lecturers on subjects of their own research activities May be repeated for credit. (S/U grading only.) Effective: 2006 Fall Quarter.

CLH 290B—Hot Topics in Stem Cell Biology (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Seminars presented by guest lecturers on subjects of their own research (S/U grading only.) Effective: 2006 Fall Quarter.

CLH 290C—Literature in Stem Cell Biology (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Critical presentation and analysis of recent journal articles in stem cell biology by students. May be repeated for credit. (S/U grading only.) Effective: 2006 Fall Quarter.

CLH 290D—Literature in Translational Research (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Critical presentation and analysis of recent journal articles in translational research by students. May be repeated for credit. (S/U grading only.) Effective: 2009 Fall Quarter.

CLH 298—Group Study in Clinical Research (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Restricted to students enrolled in the Mentored Clinical Research Training Program. Special topics in Clinical Research appropriate for group study at the graduate level. May be repeated for credit. (S/U grading only.) Effective: 2006 Winter Quarter.

CLH 299—Clinical Research (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Restricted to students enrolled in the Mentored Clinical Research Training Program. Independent research and special topics in clinical research appropriate for graduate level. May be repeated for credit. (S/U grading only.) Effective: 2006 Fall Quarter.

SOM Courses | DER

Courses in DER:

DER 192—Internship in Cutaneous Biology (1-4)
Internship—8-20 hours. Prerequisite(s): Upper division standing or consent of instructor. Approval of project prior to internship by preceptor. Supervised work experience involving research on the skin. Final report. (P/NP grading only.) Effective: 1997 Winter Quarter.

DER 199—Special Study in Cutaneous Biology (1-4)
Variable. Prerequisite(s): Advanced undergraduate standing and/or consent of instructor. Special study by individual arrangement of specialized topics in biology of skin. Work may be assigned readings, laboratory research or a combination. (P/NP grading only.) Effective: 1997 Winter Quarter.

DER 299—Research in Cutaneous Biology (1-12)
Laboratory—3-36 hours. Prerequisite(s): Consent of Instructor. Independent research in cellular and biochemical mechanisms of cutaneous biology and pathology. (S/U grading only.) Effective: 1997 Winter Quarter.

DER 420—Integumentary System (2)
Clinical Activity—0.25 hours; Lecture/Discussion—3 hours. Prerequisite(s): Approval of School of Medicine Committee on Student Promotions. Restricted to Medical students only; student must have passed all SOM Year 1 courses. Cell biology, pathology, and physical diagnosis of the skin. Recognition of normal variations, and common or important dermatoses. Patient demonstrations of select conditions. (P/F grading only.) Effective: 2013 Fall Quarter.

DER 460—Dermatology Clinical Clerkship (3-9)
Clinical Activity—40 hours. Prerequisite(s): Completion of three years of medical school; or consent of instructor. Limited enrollment. Observation and participation in dermatology clinics/practice and participation in Ward Rounds and Dermatology Clinics at UC Davis Medical Center, Kaiser, and private practitioner offices. May be repeated for credit. (H/P/F grading only.) Effective: 2011 Summer Quarter.

DER 465—Specialty Externship in Dermatology (3-16)
Clinical Activity—30 hours. Prerequisite(s): Consent of Instructor. Externship provides in-depth exposure to one of a variety of sub-specialties in Dermatology. May be repeated for credit. (H/P/F grading only.) Effective: 2011 Summer Quarter.

DER 466—Away Acting Internship in Dermatology (3-18)
Clinical Activity—40 hours; Lecture—6 hours; Variable—3-18 hours. Prerequisite(s): Consent of Instructor. Work at the level of a sub intern in Inpatient and/or Outpatient settings. Expectation is to provide direct patient management. May be repeated for credit. (H/P/F grading only.) Effective: 2010 Summer Quarter.

DER 470—Introduction to Dermatopathology (6)
Clinical Activity—20 hours; Independent Study—20 hours; Lecture/Discussion—6 hours. Prerequisite(s): Consent of Instructor. Previous rotation in a Dermatology Clerkship. Restricted to fourth year medical student. Integrated, multi-specialty approach to the microscopic diagnosis of inflammatory and neoplastic skin disorders. (H/P/F grading only.) Effective: 2010 Spring Quarter.

DER 475—Telehealth in Dermatology (6)
Clinical Activity—4 hours; Project (Term Project)—36 hours. Restricted to Medical students. Introduction to the application of telehealth in dermatology to provide diagnoses, consultation, treatment, and education. Participate in teledermatology clinics with remote sites throughout California, conduct telehealth project(s), and review the latest literature in telehealth application in improving healthcare access. May be repeated up to 6 unit(s) for additional time needed to complete telehealth project or to work on new telehealth projects. (H/P/F grading only.) Effective: 2012 Winter Quarter.

DER 480—Insights in Dermatology (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. First- and second- year medical students in good academic standing. Clinical experience limited to observation of delivery of dermatologic care and attendance at some conferences. (H/P/F grading only.) Effective: 1997 Winter Quarter.

DER 495—Wound Healing: From Bench to Bedside (6)
Auto Tutorial—15 hours; Clinical Activity—12 hours; Laboratory—8 hours; Term Paper. Prerequisite(s): Consent of Instructor. Restricted to medical students only. An integrated, multi-specialty approach to clinical soft tissue wound healing. (H/P/F grading only.) Effective: 2001 Summer Quarter.

DER 498—Special Topics in Clinical Dermatology (1-6)
Independent Study—3-18 hours. Prerequisite(s): Medical students with consent of instructor. Individually arranged study of special topics in clinical dermatology
determined by student and instructor. Assigned readings and/or clinical examination of selected patients. (H/P/F grading only.) Effective: 1997 Winter Quarter.

DER 499—Research in Cutaneous Biology (1-12)
Laboratory—3-36 hours. Prerequisite(s): Consent of Instructor. Research, either laboratory or clinical, on ongoing projects within the department under supervision of faculty. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SOM Courses | EPP

Course in EPP:
SOM Courses | FAP

Courses in FAP:

FAP 092C—Primary Care Clinic (2)
Clinical Activity—8 hours; Lecture—2 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Enrollment at the UC Davis campus, for freshman and sophomore students. Students must apply and interview with the Board of Clinica Tepati or Imani Clinic. Field experience exposes lower division students to health care delivery, patient histories, physical examinations,health promotion, disease prevention, diagnosis; treatment of episodic,acute,chronic illness; appropriate referral and follow-up. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

FAP 192C—Primary Care Clinics (1-2)
Clinical Activity—6-8 hours; Lecture—1-2 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Enrollment at the UC Davis campus, upper-division standing. Students must apply and interview with the Board of Clinica Tepati or Imani Clinic. Field experience introduces students to health care delivery, patient histories and physical examinations, health promotions and disease prevention, diagnosis and treatment of episodic, acute and chronic illness, basic laboratory testing and appropriate referral and follow-up. May be repeated for credit. (P/NP grading only.) Effective: 2004 Fall Quarter.

FAP 195—Health Care to Underserved Populations (1)
Lecture—1 hour. Prerequisite(s): Sociology, political science, or applied behavioral science background recommended, or registration in medical school. Discusses sociocultural perspectives of underserved populations in California impacting their health; roles of family/interpersonal relationships in making health care decisions; and clinician's perspectives in treating people of cultures which are unfamiliar and/or uncomfortable with Western medicine. May be repeated for credit. (P/NP grading only.) Effective: 2011 Spring Quarter.

FAP 401—Introductory Preceptorship in Family Practice (3-9)
Clinical Activity—20-40 hours. Prerequisite(s): Completion of first-year of medical training. Preceptorship in family practice offered as an introduction to clinical
medicine. 20 hours or 40 hours per week in a family physician's office, doing patient interviews, historytaking, and performing physical exams. (H/P/F grading only.) Effective: 1999 Summer Quarter.

FAP 405—The Healer's Art (1)
Lecture—0.6 hours; Workshop—3 hours. Prerequisite(s): Consent of Instructor. Limited to first-year medical students. Learning to strengthen your humanity and remain open-hearted can make the difference between burnout and a fulfilling life. Learn tools for selfcare, healing, finding meaning, strengthening commitment and becoming a true physician. May be repeated for credit. (P/F grading only.) Effective: 2016 Fall Quarter.

FAP 411—Selected Studies of Systems for Chronic Illness Care (3)
Clinical Activity—4 hours; Discussion—4 hours. Prerequisite(s): FAP 400A; FAP 400B; FAP 400C; Medical students with consent of instructor. Understanding of chronic illness, particularly diabetes, participate in patient care, alternative techniques. May be repeated up to 1 time(s). (H/P/F grading only.) Effective: 2004 Spring Quarter.

FAP 430—Family Medicine Clerkship (6-12)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Approval by School of Medicine Committee on Student Progress. Family medicine clerkship for third year medical students. (H/P/F grading only.) Effective: 2015 Spring Quarter.

FAP 430FA—SJVP Longitudinal Family Medicine Clerkship (1.5-6)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Family Medicine Clerkship runs concurrently with Internal Medicine, Pediatrics and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 430FB—SJVP Longitudinal Family Medicine Clerkship (1.5-6)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Family Medicine Clerkship runs concurrently with Internal Medicine, Pediatrics and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 430FC—SJVP Longitudinal Family Medicine Clerkship (1.5-6)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Family Medicine Clerkship runs concurrently with Internal Medicine, Pediatrics and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 430FD—SJVP Longitudinal Family Medicine Clerkship (1.5-6)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Family Medicine Clerkship runs concurrently with Internal Medicine, Pediatrics and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 430R—Rural PRIME Family Medicine Longitudinal Clerkship (2)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Approval by School of Medicine Committee on Student Progress. Family Medicine Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 430RA—Rural PRIME Family Medicine Longitudinal Clerkship (3)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Consent of Instructor. Family Medicine Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 430RB—Rural PRIME Family Medicine Longitudinal Clerkship (3)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Consent of Instructor. Family Medicine Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 430RC—Rural PRIME Family Medicine Longitudinal Clerkship (3)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Consent of Instructor. Family Medicine Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 430RD—Rural PRIME Family Medicine Longitudinal Clerkship (1)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Consent of Instructor. Family Medicine Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 430TA—TeachMS Longitudinal Primary Care Clerkship (A) (4)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Internal Medicine and Psychiatry for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. (H/P/F grading only.) Effective: 2013 Fall Quarter.

FAP 430TB—TeachMS Longitudinal Primary Care Clerkship (B) (6)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Internal Medicine and Psychiatry for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. (H/P/F grading only.) Effective: 2013 Fall Quarter.

FAP 430TC—TeachMS Longitudinal Primary Care Clerkship (C) (2)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Internal Medicine and Psychiatry for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. (H/P/F grading only.) Effective: 2013 Fall Quarter.

FAP 431—Introduction to Primary Care Continuity Clinic (1)
Clinical Activity—4 hours; Project (Term Project)—1 hour. Prerequisite(s): Consent of Instructor. Completion of the Pre-Clinical Curriculum. Longitudinal component of the third-year primary care curriculum. Student attends their clinic roughly 18 half-days over the course of the year, working one-on-one with a primary care preceptor. (H/P/F grading only.) Effective: 2016 Fall Quarter.

FAP 431A—Primary Care Continuity Clinic (1)
Clinical Activity—4 hours; Project (Term Project)—1 hour. Prerequisite(s): Consent of Instructor. Completion of the Pre-Clinical Curriculum. Longitudinal component of the third-year primary care curriculum. Student attends their clinic roughly 18 half-days over the course of the year, working one-on-one with a primary care preceptor. (H/P/F grading only.) Effective: 2015 Spring Quarter.

FAP 431B—Primary Care Continuity Clinic (1)
Clinical Activity—4 hours; Project (Term Project)—1 hour. Prerequisite(s): Consent of Instructor. Completion of the Pre-Clinical Curriculum. Longitudinal component of the third-year primary care curriculum. Student attends their clinic roughly 18 half-days over the course of the year, working one-on-one with a primary care preceptor. (H/P/F grading only.) Effective: 2015 Spring Quarter.

FAP 431C—Primary Care Continuity Clinic (1)
Clinical Activity—4 hours; Project (Term Project)—1 hour. Prerequisite(s): Consent of Instructor. Completion of the Pre-Clinical Curriculum. Longitudinal component of the third-year primary care curriculum. Student attends their clinic roughly 18 half-days over the course of the year, working one-on-one with a primary care preceptor. (H/P/F grading only.) Effective: 2015 Spring Quarter.

FAP 431D—Primary Care Continuity Clinic (1)
Clinical Activity—4 hours; Project (Term Project)—1 hour. Prerequisite(s): Consent of Instructor. Completion of the Pre-Clinical Curriculum. Longitudinal component of the third-year primary care curriculum. Student attends their clinic roughly 18 half-days over the course of the year, working one-on-one with a primary care preceptor. (H/P/F grading only.) Effective: 2015 Spring Quarter.

FAP 431KA—ACE-PC Continuity Clinic (6)
Clinical Activity—40 hours. Prerequisite(s): Consent of Instructor. Longitudinal clinic component of the 2nd year of the ACE-PC Program. Students start off with a 4 week immersion experience and then 12 additional half-days over the course of the year, working one-on-one with a primary care preceptor. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 431KB—ACE-PC Continuity Clinic (0.5)
Clinical Activity—2 hours. Prerequisite(s): Consent of Instructor. Longitudinal clinic component of the 2nd year of the ACE-PC Program. Students start off with a 4 week immersion experience and then 12 additional half-days over the course of the year, working one-on-one with a primary care preceptor. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 431KC—ACE-PC Continuity Clinic (0.5)
Clinical Activity—2 hours. Prerequisite(s): Consent of Instructor. Longitudinal clinic component of the 2nd year of the ACE-PC Program. Students start off with a 4 week immersion experience and then 12 additional half-days over the course of the year, working one-on-one with a primary care preceptor. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 431KD—ACE-PC Continuity Clinic (0.5)
Clinical Activity—2 hours. Prerequisite(s): Consent of Instructor. Longitudinal clinic component of the 2nd year of the ACE-PC Program. Students start off with a 4 week immersion experience and then 12 additional half-days over the course of the year, working one-on-one with a primary care preceptor. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 434—Primary Care Clinics-Clínica Tepati (3-12)
Clinical Activity—32-36 hours; Lecture—1-2 hours; Seminar—0-2 hours. Open to medical students in all four years of medical school. Medical students will learn counseling, diagnosis and treatment of patients with chronic and acute disease under supervision of physician. Provides exposure to special health care needs of various ethnic and poverty-level populations. May be repeated for credit. (P/F grading only.) Effective: 2010 Winter Quarter.

FAP 435—Primary Care Clinics-Imani Clinic (3-12)
Clinical Activity—32-36 hours; Lecture—1-2 hours; Seminar—0-2 hours. Open to medical students in all four years of medical school. Learn counseling, diagnosis and treatment of patients with chronic and acute disease under supervision of physician. Provides exposure to special health care needs of various ethnic and poverty-level populations. May be repeated for credit. (P/F grading only.) Effective: 2010 Winter Quarter.

FAP 436—Continuity Clinic in Primary Care--Shifa Clinic (3-12)
Clinical Activity—32-36 hours; Lecture—1-2 hours; Seminar—0-2 hours; Variable. Open to medical students in all four years of medical school. Learn counseling, diagnosis and treatment of patients with chronic and acute disease under supervision of physician. Provides exposure to special health care needs of various ethnic and poverty-level populations. May be repeated for credit. (P/F grading only.) Effective: 2010 Winter Quarter.

FAP 437—Primary Care Clinics-Knights Landing (3)
Clinical Activity—3 hours; Lecture—1 hour. Must complete an application and interview prior to registering. Learn counseling, diagnosis and treatment of patients with chronic and acute disease under supervision of physician. Provides exposure to special health care needs of various ethnic and poverty-level populations in the community of Knights Landing. May be repeated for credit. (P/F grading only.) Effective: 2012 Winter Quarter.

FAP 439D—Directed Clinical Studies in Family Medicine (1-12)
Clinical Activity—40 hours. Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for modified curriculum or to complete a clinical rotation following a leave of absence. May be repeated for credit. (P/F grading only.) Effective: 2011 Spring Quarter.

FAP 439R—Directed Studies in Family Medicine (1-12)
Clinical Activity—30 hours; Independent Study—10 hours. Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for remediation of all or part of clinical rotation. Clinical studies to accommodate and satisfy remedial work as directed by the Committee on Student Progress and approved by the course IOR. May be repeated for credit. (P/F grading only.) Effective: 2011 Summer Quarter.

FAP 444—Advanced Preceptorship in Family Medicine (3-18)
Clinical Activity—40 hours. Prerequisite(s): Completion of third-year primary care plus clerkship or consent of instructor. Open to medical students only. Preceptorships with primary care physicians in a variety of settings. Acquisition skills to evaluate and devleop a treatment plan for patients with common medical problems seen by primary care physicians in an out patient setting. May be repeated up to 18 unit(s). (H/P/F grading only.) Effective: 2002 Fall Quarter.

FAP 450—CAM in Family & Community Health (3-18)
Variable—20-40 hours. Complementary and alternative medicine courses at away institutions that cover various aspects of integrative medicine, including but not limited to: botanicals, homeopathy, mind/body, naturopathy, nutrition, traditional Chinese medicine, osteopathy, and energy medicine. Intended to grant units for away rotations; not offered at the UC Davis Medical Center. (H/P/F grading only.) Effective: 2011 Winter Quarter.

FAP 460—Geriatrics in Community Health (3-6)
Clinical Activity—12 hours; Fieldwork—24 hours; Lecture—4 hours. Prerequisite(s): FAP 430 Visits to community agencies including mental health teams, adult day health centers, a diagnostic and research center, and case management specialists. Observation and participation in MMSE's, patient-family conferences, interdisciplinary team meetings, neuropsychiatric testing and home visit evaluations. (H/P/F grading only.) Effective: 2001 Spring Quarter.

FAP 468—International Preceptorship (3-12)
Clinical Activity—40 hours. Prerequisite(s): Medical students with consent of instructor. Preceptorship with a family practitioner in a foreign country (Arranged by student contact or with assistance of the Family and Community Medicine Department.) Participate in clinical activities, analyze and report characteristics of the practice. May be repeated up to 12 unit(s). (H/P/F grading only.) Effective: 2002 Fall Quarter.

FAP 469—Inpatient Acting Internship in Family Medicine (3-12)
Clinical Activity—40 hours. Prerequisite(s): Completion of third-year of medical school or consent of instructor. Open to medical students only. Comprehensive primary medical care of inpatients on a family medicine hospital service. Available sites are university-based family medicine residency programs and programs within the UC Davis Network of Affiliated Family Medicine Residency Programs. May be repeated up to 12 unit(s). (H/P/F grading only.) Effective: 2011 Spring Quarter.

FAP 470—Inpatient Clinical Elective in Family Medicine (3-12)
Clinical Activity—40 hours. Prerequisite(s): Completion of third-year of medical school or consent of instructor. Open to medical students only. Comprehensive primary medical care of patients on a family medicine hospital service. Usually includes inpatient and outpatient experience. May be repeated up to 12 unit(s). (H/P/F grading only.) Effective: 2011 Spring Quarter.

FAP 475—Combined Inpatient/Outpatient Clinical Elective in Family Medicine (3-12)
Clinical Activity—40 hours. Prerequisite(s): Completion of third-year of medical school or consent of instructor. Open to Medical students only. Combined inpatient and outpatient elective. Consists of comprehensive primary medical care of patients on a family medicine hospital service and in a family medicine outpatient clinic. May be repeated up to 12 unit(s). (H/P/F grading only.) Effective: 2011 Fall Quarter.

FAP 488—Selected Studies in Family Practice (1-9)
Variable—3-27 hours. Prerequisite(s): Medical students with consent of instructor. Assigned readings in family practice to increase understanding on selected topics relating to family medicine and primary health care delivery; visits to and written analysis of selected health care programs; and/or exposure to family practice with a community physician preceptor. May be repeated up to 9 unit(s). (H/P/F grading only.) Effective: 2002 Fall Quarter.

FAP 490—Health Care to Underserved Populations (1)
Lecture—1 hour. Prerequisite(s): Sociology, Political Science, or Applied Behavioral Science background recommended, or registration in medical school. Discusses sociocultural perspectives of underserved populations impacting health; roles of family/interpersonal relationships in making health care decisions; the nature of ethnic/racial/socioeconomic health care disparities; and clinicians' perspectives in treating people of cultures which are unfamiliar and/or uncomfortable with Western medicine. May be repeated for credit. (P/F grading only.) Effective: 2012 Winter Quarter.

FAP 493—Aging and Health (6)
Seminar—12 hours. Prerequisite(s): Consent of Instructor. Is disease and infirmity the inevitable consequence of aging? We will spend four weeks exploring this question by reviewing the biology of aging, physiologic changes seen in aged individuals and disease processes commonly found in elderly persons. (H/P/F grading only.) Effective: 2010 Summer Quarter.

FAP 495—LGBTIQQA Healthcare Lecture Series (1)
Lecture—6 hours. Increase the awareness of medical issues surrounding the LGBTIQQA community and arm students with knowledge of the health disparities the community faces. Provide better quality care to the LGBTIQQA patients cared for as physicians. May be repeated for credit. (P/F grading only.) Effective: 2012 Winter Quarter.

FAP 498—Directed Group Study (1-5)
Variable—3-15 hours. Explore in-depth various topics in primary care. Extensive contact with and oversight by instructor. May be repeated for credit. (H/P/F grading only.) Effective: 2008 Spring Quarter.

FAP 499—Research (1-12)
Prerequisite(s): Medical students with consent of instructor. Research in various aspects of the health care delivery system. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SOM Courses | HPH

Courses in HPH:

HPH 099—Special Study for Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2004 Fall Quarter.

HPH 115—Cannabis and Cannabinoids in Physiology and Medicine (3)
Lecture—3 hours. Prerequisite(s): NPB 100 or NPB 101 or NPB 110B; or Consent of Instructor. In-depth scientific analysis of cannabis and cannabinoids, topics include biochemical, physiological, behavioral, pharmacological, social and therapeutic aspects of cannabinoids, with emphasis on the physiological impacts on major organ systems in humans and animals, and the potential medicinal uses. GE credit: SE, SL. Effective: 2017 Spring Quarter.

HPH 157—Advanced Physiology of Animal/Human Disease (3)
Lecture—1 hour; Lecture/Discussion—2 hours. Prerequisite(s): NPB 101 B+ or better or NPB 110C B+ or better; Consent of Instructor. Limited to 35 students initially. Centers on fundamental mechanisms and pathophysiological basis for animal and human diseases. Course is case-based and uses animal and human diseases to help exemplify the physiological consequences of organ dysfunction. (NPB 157.) Effective: 2017 Spring Quarter.

HPH 192—Internship in Human Physiology (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in physiology and related fields. (P/NP grading only.) Effective: 1997 Winter Quarter.

HPH 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed reading, discussion and/or laboratory experience on selected topics. (P/NP grading only.) Effective: 1997 Winter Quarter.

HPH 199—Special Study for Advanced Undergraduates (1-5)
Laboratory—3-15 hours. Prerequisite(s): Consent of Instructor. Senior standing in biology, chemistry, physics, psychology, or engineering. (P/NP grading only.) Effective: 1997 Winter Quarter.

HPH 210A—Advanced Physiology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Physiology Ph.D. program or consent of instructor. Advanced course in general principles of physiology, surveying homeostasis, cellular and selected topics, and neurophysiology. (Physiology 210A) Effective: 1999 Fall Quarter.

HPH 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. For graduate students desiring to explore particular topics in depth.
Lectures and conferences may be involved. Effective: 1997 Winter Quarter.

HPH 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

HPH 400—Human Physiology (6)
Laboratory—2 hours; Lecture—3 hours. Medical student only. General and cellular physiology of neurons, muscle, and epithelial cells and systemic physiology of cardiovascular, respiratory, gastrointestinal, and renal systems. (P/F grading only.) Effective: 2011 Summer Quarter.

HPH 403—Medical Neuroanatomy (5)
Discussion/Laboratory—1 hour; Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): HPH 400; Block 1. Restricted to medical students only. Anatomy of the normal human nervous system, to include gross external and internal morphology of brain and spinal cord, and function neuroanatomy of motor, sensory and cognitive systems. Incorporates application of neuroanatomy to clinical problem solving. (Cell Biology and Human Anatomy 403.) (P/F grading only.) Effective: 2007 Summer Quarter.

HPH 440—Cannabis and Cannabinoids in Physiology and Medicine (3)
Lecture. Prerequisite(s): Consent of Instructor. Provides an in-depth scientific analysis of current knowledge on cannabis and cannabinoids pertaining to human physiology and potential medicinal uses. May be repeated for credit. (H/P/F grading only.) Effective: 2018 Winter Quarter.

HPH 493—Physiological Principles in SICU SSM (6)
Clinical Activity—4 hours; Laboratory—16 hours; Lecture—5 hours; Lecture/Lab—10 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. Special Study Module, a four week course on the topic: Care of the Critically Ill Surgical Patient: Use of Physiological Principles to Guide Treatment of Patients with Common Surgical Problems (Surgery 493C.) (H/P/F grading only.) Effective: 2008 Winter Quarter.

HPH 497T—Tutoring in Human Physiology (1-5)
Tutorial—3-15 hours. Prerequisite(s): Advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum of the School of Medicine. (S/U grading only.) Effective: 1997 Winter Quarter.

HPH 498—Directed Reading and Group Study (1-4)
Discussion—2-8 hours. Prerequisite(s): Consent of Instructor. Medical student. Directed reading and discussion on selected topics in human physiology. (S/U grading only.) Effective: 1997 Winter Quarter.

HPH 499—Research (1-6)
Variable. Prerequisite(s): Medical students with consent of instructor. Laboratory investigation on selected topics. (S/U grading only.) Effective: 1997 Winter Quarter.

SOM Courses | IMD

Courses in IMD:

IMD 090—Seminar in Medical Ethics (1)
Lecture—1 hour. Seminar Series covering the current topics in Medical Ethics. (P/NP grading only.) Effective: 2017 Winter Quarter.

IMD 092—Internship (1-4)
Internship—3-12 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Supervised internship in internal medicine and related fields. (P/NP grading only.) Effective: 1997 Winter Quarter.

IMD 098—Directed Group Study (1-2)
Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Directed group study in medicine and related fields. (P/F grading only.) Effective: 1997 Winter Quarter.

IMD 099—Undergraduate Research in Medicine: Molecular and Cell Biology (1-3)
Variable. Prerequisite(s): Consent of Instructor. (P/F grading only.) Effective: 1997 Winter Quarter.

IMD 164—Practicum in Community Health Clinic: Bayanihan Clinic (1-2)
Clinical Activity—5 hours. Through active participation in the medical aspects of community health clinics, the undergraduate student gains knowledge of the organization, administration, and problem-solving capabilities. May be repeated for credit. (P/NP grading only.) Effective: 2014 Winter Quarter.

IMD 192—Internship in Internal Medicine (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Supervised work experience in internal medicine and related fields. (P/F grading only.) Effective: 1997 Winter Quarter.

IMD 194—Practicum in Community Health Clinics (1-3)
Clinical Activity—5-15 hours. Prerequisite(s): Consent of Instructor. The undergraduate student, through active participation in the medical aspects of community health clinics, gains knowledge of the organization, administration, and problem-solving capabilities of these primary care facilities. May be repeated for credit. (P/F grading only.) Effective: 1997 Winter Quarter.

IMD 198—Directed Group Study (1-3)
Extensive Problem Solving—2 hours; Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. Directed group study in medicine and related fields. (P/NP grading only.) Effective: 2014 Winter Quarter.

IMD 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/F grading only.) Effective: 1997 Winter Quarter.

IMD 214—Topics in Medical Ethics (1)
Seminar—1 hour. The complex moral, legal and ethical dilemmas that patients, families, and health care providers face in today's clinics. May be repeated up to 1 time(s). (S/U grading only.) Effective: 2001 Fall Quarter.

IMD 220D—Cardiovascular System (2.5)
Lecture/Discussion—5.5 hours. Prerequisite(s): HPH 200; and Consent of Instructor. Graduate student status. Principles of etiology, mechanisms, diagnosis and management of the major diseases of the cardiovascular system. Included are ischemic, valvular, hypertensive, cardiomyopathic, pericardial, and electrical disorders. Effective: 2002 Fall Quarter.

IMD 250—Medicine and the Law (3)
Lecture/Discussion—2 hours; Project (Term Project)—2 hours. Legal and bioethical principles and concepts in medicine. Topics include standard of care, informed consent, reproductive medicine, and end-of-life issues. (S/U grading only.) Effective: 2002 Winter Quarter.

IMD 414—One Health: A Course on Global Health (1)
Conference—8 hours. Global health problems are complex and require culturally-sensitive, socially-acceptable, and action-oriented approaches to create practical and cost-effective solutions. Will examine major health problems created by the convergence of human, animal, and environmental influences. May be repeated for credit. (P/F grading only.) Effective: 2011 Summer Quarter.

IMD 416—Summer Institute on Race and Health (6)
Independent Study—30 hours. Prerequisite(s): Consent of Instructor. Limited enrollment. Using field trips, media, readings, and clinical experiences, 8-10 first year medical students will explore issues of race, health disparities and related issues in a 4 week institute during the summer break. (P/F grading only.) Effective: 2011 Spring Quarter.

IMD 420A—Hematology (2)
Discussion—1 hour; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Restricted to Medical students only. Malignant disorders of blood cells and transfusion therapy. Covers acute leukemia, myelodysplasia, myeloproliferative disorders, lymphoma, and myeloma. (P/F grading only.) Effective: 2010 Summer Quarter.

IMD 420B—Gastrointestinal System (2.5)
Discussion—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): Approval of Committee on Student Progress. Restricted to Medical students only. Basic pathophysiologic principles of digestive diseases on which clinical concepts and judgments can be developed. Emphasis on pathophysiologic basis of gastroenterological and hepatic disorders with discussion of major disorders and their diagnosis and management. (P/F grading only.) Effective: 2008 Winter Quarter.

IMD 420C—Pulmonary & Critical Care Medicine (2.5)
Lecture/Discussion—5.5 hours. Prerequisite(s): Approval of SOM's Committee on Student Promotions. Restricted to Medical students only; student must pass all SOM Year 1 courses. Clinical aspects of respiratory anatomy, physiology, and pathology. Diagnostic procedures and a description of the major pulmonary diseases & disorders, and critical care medicine. (P/F grading only.) Effective: 2013 Fall Quarter.

IMD 420D—Cardiovascular System (2.5)
Lecture/Discussion—5.5 hours. Prerequisite(s): Approval of the School of Medicine Committee on Student Promotions. Restricted to Medical students only; student must pass all SOM Year 1 courses. Principles of etiology, mechanisms, diagnosis and management of the major diseases of the cardiovascular system. Included are ischemic, valvular, hypertensive, cardiomyopathic, pericardial, and electrical disorders. (P/F grading only.) Effective: 2013 Fall Quarter.

IMD 420E—Nephrology (2)
Discussion—2 hours; Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): Approval of Student Progress Committee. Fundamental aspects of disorders of body water, electrolytes and acid/base balance; major categories and mechanisms of parenchymal renal diseases; urinary tract infections. (P/F grading only.) Effective: 2002 Winter Quarter.

IMD 430—Medicine Clerkship (12)
Clinical Activity—45 hours. Prerequisite(s): Approval by School of Medicine Committee on Student Progress. Clerkship is divided into two, four-week blocks, one each at UCDMC and at Kaiser Hospitals. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. (H/P/F grading only.) Effective: 2001 Summer Quarter.

IMD 430FA—SJVP Longitudinal Medicine Clerkship (1.5-6)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Family Medicine, Pediatrics and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Spring Quarter.

IMD 430FB—SJVP Longitudinal Medicine Clerkship (1.5-6)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Family Medicine, Pediatrics and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Spring Quarter.

IMD 430FC—SJVP Longitudinal Medicine Clerkship (1.5-6)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Family Medicine, Pediatrics and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Spring Quarter.

IMD 430FD—SJVP Longitudinal Medicine Clerkship (1.5-6)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Family Medicine, Pediatrics and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Spring Quarter.

IMD 430R—Rural PRIME Internal Medicine Longitudinal Clerkship (2)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Internal Medicine Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

IMD 430RA—Rural PRIME Internal Medicine Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Internal Medicine Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

IMD 430RB—Rural PRIME Internal Medicine Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Internal Medicine Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

IMD 430RC—Rural PRIME Internal Medicine Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Internal Medicine Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

IMD 430RD—Rural PRIME Internal Medicine Longitudinal Clerkship (1)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Internal Medicine Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

IMD 430TA—TeachMS Longitudinal Medicine Clerkship (A) (4)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only.) Effective: 2013 Fall Quarter.

IMD 430TB—TeachMS Longitudinal Medicine Clerkship (B) (6)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only.) Effective: 2013 Fall Quarter.

IMD 430TC—TeachMS Longitudinal Medicine Clerkship (C) (2)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only.) Effective: 2013 Fall Quarter.

IMD 439D—Directed Clinical Studies in Internal Medicine (1-12)
Clinical Activity—40 hours. Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for modified curriculum or to complete a clinical rotation following a leave of absence. May be repeated for credit. (P/F grading only.) Effective: 2011 Spring Quarter.

IMD 439R—Directed Studies in Internal Medicine (1-12)
Clinical Activity—30 hours; Independent Study—10 hours. Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for remediation of all or part of clinical rotation. Clinical studies to accommodate and satisfy remedial work as directed by the Committee on Student Progress and approved by the course IOR. May be repeated for credit. (P/F grading only.) Effective: 2011 Summer Quarter.

IMD 450A—Medicine and the Law (1.5)
Discussion—2 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Restricted to Medical students only. Legal and bioethical principles and concepts in medicine. Topics include standard of care, informed consent, reproductive medicine, and end-of-life issues. (H/P/F grading only.) Effective: 2010 Summer Quarter.

IMD 450B—Medicine and the Law (1.5)
Discussion—2 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Restricted to Medical students only. Legal and bioethical principles and concepts in medicine. Topics include standard of care, informed consent, reproductive medicine, and end-of-life issues. (H/P/F grading only.) Effective: 2010 Summer Quarter.

IMD 459—Oncology: Research and Treatment of Cancer (2)
Lecture/Discussion—2 hours. Prerequisite(s): Second-, third-, or fourth-year medical student and/or consent of instructor. Comprehensive review of current treatment practices of cancer and state-of-the-art research impacting treatment and prevention of cancer.
Emphasis on epidemiology, molecular biology, and pharmacology. (H/P/F grading only.) Effective: 1997 Winter Quarter.

IMD 460—Correctional Health Care Clerkship (1-4)
Clinical Activity. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing. Covers Correctional Health delivery and the effects of detention and incarceration on health status. Special emphasis on problems unique to health care delivery in a prison setting. Student will spend time in clinical settings at three prison facilities. (H/P/F grading only.) Effective: 1997 Winter Quarter.

IMD 461—Mather VA Internal Medicine AI (6)
Clinical Activity—50 hours; Independent Study—5 hours; Lecture/Discussion—5 hours. Prerequisite(s): Consent of Instructor. Limited enrollment. Acting Internship in Internal Medicine for qualified 4th year Medical Students from the UC Davis School of Medicine at the Sacramento VA Hospital. Experiences will somewhat mirror those of AIs at UCDMC. May be repeated for credit. (H/P/F grading only.) Effective: 2014 Summer Quarter.

IMD 462—Medicine Wards AI (6)
Clinical Activity—40 hours. Prerequisite(s): Consent of Instructor. MDS 431; demonstrated ability to accept responsibility. Limited enrollment. Assume role of acting intern and be primary physician on medical ward under direction of medical resident and staff. Teams I-V take call every fifth night. Emphasis on evidence-based inpatient care. May be repeated for credit. (H/P/F grading only.) Effective: 2012 Fall Quarter.

IMD 463—Acting Internship in Medicine Intensive Care Unit (MICU) (3-6)
Clinical Activity—40 hours. Prerequisite(s): Completion of third-year in medical school; consent of Director of MICU. Limited enrollment. At UCDMC, student functions as acting intern on MICU service under direction of medical resident and staff. Responsibility for patients admitted to MICU. On call in hospital every fourth night. May be repeated for credit. (H/P/F grading only.) Effective: 2016 Spring Quarter.

IMD 464—Bayanihan Primary Care Clinic (3)
Clinical Activity—0.6 hours. Restricted to medical students in all four years of medical school. Under the guidance and supervision of a physician, medical students will learn patient history taking, medical documentation, counseling, diagnosis and treatment of patients with chronic and acute disease. Provides exposure to the special needs of various ethnic and socioeconomic groups. May be repeated for credit. (P/F grading only.) Effective: 2009 Spring Quarter.

IMD 465—Medicos-Global Health Sciences (9)
Clinical Activity—25 hours; Fieldwork—5 hours; Lecture—5 hours; Project (Term Project)—5 hours. Prerequisite(s): Consent of Instructor. Medical students only. Travel to foreign country for four weeks to collaborate with faculty from local universities and work in urban and rural environments, including hands-on experience with clinic patients. Cultural exchange and awareness of global health care. (P/F grading only.) Effective: 2007 Summer Quarter.

IMD 468—Ambulatory Internal Medicine Externship (3-18)
Clinical Activity—40 hours; Variable—12-40 hours. Prerequisite(s): IMD 430; and Consent of Instructor. Demonstrated ability to accept responsibility. Limited enrollment. Hands-on primary care clinical experience in the ambulatory setting supervised by a general internist. Emphasis on evidence-based outpatient care. (H/P/F grading only.) Effective: 2010 Summer Quarter.

IMD 470—Critical Evaluation of Landmark Studies in Evidence-Based Medicine (3)
Seminar. Prerequisite(s): Fourth-year medical student. Primary objective is to prepare future physicians to effectively integrate evidence-based medicine into their clinical practice. While this course will have an Internal Medicine emphasis, the skills the course aims to impart (formulating focused clinical questions, searching the medical literature, evaluating the quality of research, and integrating evidence into clinical practice, giving effective article presentations) will apply to all future clinicians, regardless of their specialty. (P/F grading only.) Effective: 2017 Fall Quarter.

IMD 480—Person Centered Assessment (1)
Lecture—1 hour. Prerequisite(s): Open to all medical students. Person-centered assessment modalities and diagnostic approaches with regards to Internal Medicine and its different subspecialties. (P/F grading only.) Effective: 2002 Fall Quarter.

IMD 493—Introduction Interprofessionalism, Pain Management, and Palliative Care (6)
Clinical Activity—24 hours; Discussion—4 hours; Independent Study—2 hours. Prerequisite(s): Consent of Instructor. Learners will spend one week with the inpatient palliative care service, one week with the inpatient pain pharmacy service and two weeks with Snowline Hospice. (P/F grading only.) Effective: 2018 Winter Quarter.

IMD 494—Practicum in Community Health Clinics (1-3)
Clinical Activity—15-40 hours. Prerequisite(s): Medical student with consent of instructor. Students are assigned to clinical settings that demonstrate ethnic,
urban/rural, or other related aspects of clinical community health. Through active participation in health care delivery, students are able to relate conceptual with practical aspects of primary health care. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

IMD 497—Medicine, Bioethics and the Holocaust (3)
Lecture/Discussion—10 hours. Prerequisite(s): Consent of Instructor. Medical students only. The concept of "evil" and the role of collaborators, bystanders and participants exemplified by the holocaust and compared to problems physicians face in practice today. Demonstration that evil emerges incrementally until taken for granted. (P/F grading only.) Effective: 2004 Winter Quarter.

IMD 498—Group Study in Internal Medicine (1-18)
Variable. Prerequisite(s): Consent of Instructor. Special study for medical students which may involve laboratory or library research, ambulatory or inpatient care responsibility on campus, at UCDMC or off campus by specific arrangement. (H/P/F grading only.) Effective: 1997 Winter Quarter.

IMD 499—General Medicine Reseach (1-18)
Independent Study—20 hours. (H/P/F grading only.) Effective: 2006 Winter Quarter.

SOM Courses | CAR

Courses in CAR:

CAR 192—Internship in Cardiology (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project by preceptor prior to internship. Supervised work experience in cardiology. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

CAR 199—Cardiology Research (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special study by individual arrangement in cardiovascular medicine. Work will include directed readings, laboratory and discussions. (P/NP grading only.) Effective: 1997 Winter Quarter.

CAR 220—Basic Science in Cardiology (1)
Lecture—1 hour. Prerequisite(s): Graduate or medical student status. Fundamentals underlying cardiovascular medicine. Including hemodynamics, neural control of the circulation, biochemistry and some experimental design and statistics. Experts in each of these fields will give current information in their areas. (S/U grading only.) Effective: 1997 Winter Quarter.

CAR 299—Cardiology Research (1-12)
Variable—40 hours. Prerequisite(s): Consent of Instructor. Research or special studies. (S/U grading only.) Effective: 2010 Spring Quarter.

CAR 401—Clinical Cardiology Clerkship: Kaiser (3-18)
Clinical Activity—1-5 hours. Prerequisite(s): Third- and fourth-year medical students with advance approval by Division of Cardiology. Limited enrollment. Emphasis placed on history taking and physical examination of pediatric and adult patients with congenital and acquired cardiovascular disease. Hospital rounds in CCU and elsewhere. Roles of ECG, PCG, and cardiac fluoroscopy, etc., in office cardiology will be evaluated. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

CAR 460—Cardiology Clinical Clerkship (3-18)
Clinical Activity—2-12 hours. Prerequisite(s): IMD 430; Third- and fourth-year medical students in good academic standing with consent of instructor. Limited enrollment. Participation with members of subspecialty consultation service in initial clinical evaluation, work-up, management, and follow-up of patients with cardiologic disorders. Two outpatient clinics per week. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

CAR 461—Management of Coronary Artery Disease: Coronary Care Unit (3-18)
Clinical Activity. Prerequisite(s): Completion of second-year of medical school and advance approval by Division of Cardiology. Limited enrollment. Research in laboratory and exercise testing to be determined by instructor. Current methods of clinical research involving certain aspects of diagnosis and treatment. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

CAR 464—Preventive Cardiology (3-6)
Clinical Activity; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Completion of third-year medical school. Clinical experience, weekly seminar and reading on primary and secondary prevention of cardiovascular disease. Will be carried out in Lipid and Hypertension Clinics, Exercise Laboratory, Cardiac Care Unit, Cardiac Catheterization, and Cardiac Surgery services. (H/P/F grading only.) Effective: 1997 Winter Quarter.

CAR 480—Insights in Cardiology (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Medical student in good academic standing and approval by Division of Cardiology. Students attend one or more cardiovascular medicine clinics: general, hypertension, arrhythmia. Introduction to the diagnosis/treatment of common cardiovascular problems. (H/P/F grading only.) Effective: 1997 Winter Quarter.

CAR 493—Gender Specific Medicine SSM (6)
Clinical Activity—4 hours; Laboratory—16 hours; Lecture—5 hours; Lecture/Lab—10 hours. Prerequisite(s): Consent of Instructor. UC Davis School of Medicine students only. Special Studies Module, a four week course on the topic:Basic Science Principles Relating to Gender Specific Medicine. (OBG 493.) (H/P/F grading only.) Effective: 2007 Spring Quarter.

CAR 498—Special Group Study: EKG Unit (1-12)
Variable. Prerequisite(s): Medical student with advance approval by monthly attending faculty. Limited enrollment. Special group study in cardiology for medical students in EKG unit. May include lectures, directed reading, and/or discussion groups. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

CAR 499—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Approval by Division of Cardiology. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SOM Courses | EMR

Courses in EMR:

EMR 092—Emergency Medicine Clinical Research Internship (1-4)
Internship—6-12 hours. Prerequisite(s): Consent of Instructor. Undergraduate student in good academic standing at UC Davis. Intended to give the undergraduate student an opportunity to conduct "hands-on" clinical research in the Emergency Department. Through the lecture/discussion, students will learn the basics of conducting and developing clinical research studies, using examples from ongoing studies. May be repeated up to 4 unit(s). Units awarded will depend on hours worked. (P/NP grading only.) Effective: 2007 Summer Session 1.

EMR 092C—Joan Viteri Memorial Clinic Preceptorship (1.5)
Clinical Activity; Seminar—1 hour. Prerequisite(s): Consent of Instructor. Directed towards the undergraduate students at UC Davis that volunteer at the Joan Viteri Memorial Clinic (JVMC). May be repeated for credit. (P/NP grading only.) Effective: 2017 Spring Quarter.

EMR 192—Emergency Medicine Clinical Research Internship (1-4)
Internship—6-12 hours. Prerequisite(s): Consent of Instructor. Undergraduate student in good academic standing at UC Davis. Intended to give the upper division undergraduate student an opportunity to conduct "hands-on" clinical research in the Emergency Department. Through the lecture/discussion, students learn the basics of conducting and developing clinical research studies. May be repeated up to 2 time(s). (P/NP grading only.) Effective: 2007 Summer Quarter.

EMR 199A—Special Study for Advanced Undergraduates (4-12)
Variable—4-12 hours. Prerequisite(s): Consent of Instructor. Experienced RA's who have successfully performed in the EMRAP program for a minimum of 3 quarters; must have database skills. For students interested in working on specific EM projects in a more extensive way. Must commit at least four hours per week for two quarters. Will be awarded credit upon completion of course 199B. Credit awarded upon completion of EMR 199B. Effective: 2007 Fall Quarter.

EMR 299—Research (1-12)
Variable—1-12 hours. Prerequisite(s): Consent of Instructor. Directed research in the Department of Emergency Medicine. May be repeated for credit. (S/U grading only.) Effective: 2017 Spring Quarter.

EMR 401—Preceptorship in Emergency Medicine (1-6)
Clinical Activity—10 hours. Prerequisite(s): Consent of Instructor. Exposure to the specialty of Emergency Medicine and observation of a wide array of patients in the Emergency Department. May be repeated for credit. (P/F grading only.) Effective: 2012 Spring Quarter.

EMR 430—Introduction to Medical Toxicology (3-6)
Variable—40 hours. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good standing. In-depth review of clinical and medical toxicologic emergencies. Rotation includes contact with toxicology trained emergency faculty, didactic lectures, journal club, simulation training and exposure to a very busy poison control center. (H/P/F grading only.) Effective: 2012 Spring Quarter.

EMR 435—Wilderness Medicine (3-6)
Clinical Activity—12 hours; Independent Study—8 hours; Lecture/Discussion—20 hours. Prerequisite(s): Consent of Instructor. Designed as an introductory elective course for students to explore how physicians can interact with the environment in austere conditions through lectures, hands-on/field experience, and case-based learning. (P/F grading only.) Effective: 2018 Spring Quarter.

EMR 440—Emergency Medicine Clerkship (6)
Clinical Activity—46 hours; Lecture/Discussion—4 hours. Prerequisite(s): Satisfactory completion of Medicine, Surgery, and Pediatric Clerkship. Students complete clinical shifts in the Emergency Department, functioning as Acting Intern. Treat a wide variety of patients and problems under the supervision of the EM Attending. Students are expected to take focused histories and present in clear, concise fashion. May be repeated for credit. (H/P/F grading only.) Effective: 2011 Fall Quarter.

EMR 445—Emergency Medicine Ultrasound for Fourth-Year Medical Student (3-6)
Variable. Prerequisite(s): Fourth-year Medical Student in good standing; interest in Emergency Medicine or Critical Care is recommended; EMR 440 or equivalent is recommended prior to the rotation. Limited enrollment. Intended for students interested in learning both the technical and cognitive skills of bedside ultrasound. Emphasis will be on the use of ultrasound in emergency medicine as a diagnostic tool and in procedural guidance. (H/P/F grading only.) Effective: 2008 Fall Quarter.

EMR 450—Ambulatory Elective in Emergency Medicine (3-18)
Variable. Restricted to MS4 students in good standing; externships/away rotations only. Credit will be given for approved non-AI Emergency Medicine courses at other institutions to which there is not an equal learning experience at UC Davis. May be repeated up to 2 time(s). (H/P/F grading only.) Effective: 2016 Fall Quarter.

EMR 455A—Focus on POCUS A (6)
Clinical Activity—30 hours. Prerequisite(s): Consent of Instructor. Directed towards gaining a greater proficiency of point-of-care ultrasound. Particularly useful for those pursuing careers that use this modality heavily in clinical practice such as primary care, pediatrics, emergency medicine, critical care, physical medicine and rehabilitation, etc. (H/P/F grading only.) Effective: 2017 Summer Quarter.

EMR 455B—Focus on POCUS B (6)
Clinical Activity—30 hours. Prerequisite(s): Consent of Instructor. Directed towards gaining a greater proficiency of point-of-care ultrasound. Particularly useful for those pursuing careers that use this modality heavily in clinical practice such as primary care, pediatrics, emergency medicine, critical care, physical medicine and rehabilitation, etc. (H/P/F grading only.) Effective: 2017 Summer Quarter.

EMR 465—Externship in Emergency Medicine (3-9)
Clinical Activity—36 hours; Lecture/Discussion—4 hours. Prerequisite(s): Satisfactory completion of Medicine, Surgery and Pediatrics. Students complete clinical shifts in the Emergency Department, functioning as Acting Intern. Treat a wide variety of patients and problems under the supervision of the EM Attending. Students are expected to take focused histories and present in clear, concise fashion. May be repeated for credit No Limit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

EMR 470—Pediatric Emergency Medicine Clerkship (3-6)
Clinical Activity—36 hours; Lecture/Discussion—4 hours. Prerequisite(s): Satisfactory completion of Medicine, Surgery, and Pediatrics. Restricted to fourth-year medical student in good standing only. See patients in the Pediatric area of the Emergency Department under the supervision of an Emergency Medicine Attending. Emphasis on recognition and management of the acutely ill pediatric patient and treatment of common pediatric complaints. (H/P/F grading only.) Effective: 2017 Summer Quarter.

EMR 480—Understanding Health Policy: A Focus on Analysis and Translation (1-6)
Discussion—16 hours; Independent Study—10 hours; Lecture—4 hours. Prerequisite(s): Consent of Instructor. The paradigm of healthcare delivery in the US is changing rapidly. To prepare the next generation of physician leaders, this course will provide students with the skills, tools, and knowledge needed to impact decisions made at the policy level. (H/P/F grading only.) Effective: 2015 Fall Quarter.

EMR 490—Emergency Procedures Elective (3)
Discussion/Laboratory—24 hours; Independent Study—4 hours; Tutorial—4 hours; Web Virtual Lecture—8 hours. Prerequisite(s): Current basic life support (BLS) certification. Restricted to fourth-year medical student in good standing only. Simulator-based skills training for emergency procedures. Topics include airway management, central venous access, chest tube placement, and general critical care resuscitation skills. (P/F grading only.) Effective: 2010 Summer Quarter.

EMR 493A—Cardiac Arrest, Resuscitation and Repurfusion SSM (3)
Clinical Activity—4 hours; Laboratory—16 hours; Lecture—5 hours; Lecture/Lab—10 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. Special Studies Module, a four week course specific to the topics of Cardiac Arrest, Resusciatation and Repurfusion. (H/P/F grading only.) Effective: 2010 Summer Quarter.

EMR 493B—Cardiac Arrest, Resuscitation and Repurfusion SSM (3)
Clinical Activity—4 hours; Laboratory—16 hours; Lecture—5 hours; Lecture/Lab—10 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. Special Studies Module, a four week course specific to the topics of Cardiac Arrest, Resusciatation and Repurfusion. (H/P/F grading only.) Effective: 2010 Summer Quarter.

EMR 499—Research (2-18)
Laboratory. Prerequisite(s): Consent of Instructor. Elective where topics may be selected in either basic or clinical research areas of Emergency and/or Critical Care Medicine. The goals will be tailored to each individual student. Enrollment requires prior discussion and consent of instructor. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SOM Courses | ENM

Courses in ENM:

ENM 192—Internship in Endocrinology (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project by preceptor prior to internship. Supervised work experience in endocrinology. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

ENM 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Endocrinology research. (S/U grading only.) Effective: 1997 Winter Quarter.

ENM 460—Endocrinology Clinical Clerkship (3-18)
Clinical Activity. Prerequisite(s): IMD 430; And/or consent of instructor. Limited enrollment. Participation with members of subspecialty service in the initial evaluation, work-up, management and follow-up of patients with endocrinologic disorders. Limited enrollment. (H/P/F grading only.) Effective: 1997 Winter Quarter.

ENM 465—Clinical Nutrition Clerkship (3-18)
Clinical Activity—30 hours. Prerequisite(s): IMD 430; Consent of IOR. In-depth experience in assessment and monitoring of nutritional support of patients whose illnesses are complicated by malnutrition and of patients with problems in under-nutrition due to various illnesses. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

ENM 480—Insights in Endocrinology (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. Student in good academic standing. First- or second-year students observe in morning Endocrine and Diabetes clinics and attend bi-weekly noon and afternoon endocrine conferences. They also give brief endocrine physiology oral presentation to the endocrine group. (H/P/F grading only.) Effective: 1997 Winter Quarter.

ENM 499—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SOM Courses | GAS

Courses in GAS:

GAS 192—Internship in Gastroenterology (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project by preceptor prior to internship. Supervised work experience in gastroenterology. May be repeated for credit up to 12 units. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

GAS 299—Research (1-12)
Variable. Research in gastroenterology. (S/U grading only.) Effective: 1997 Winter Quarter.

GAS 460—Gastroenterology Clinical Clerkship (3-18)
Clinical Activity—30 hours. Prerequisite(s): Consent of Instructor. Completion of third-year of medical school. Work-up, manage, and follow-up new patients on active inpatient consulting service. Gastroenterology/Hepatology patients. Daily rounds with attending physician. May be repeated for credit. (H/P/F grading only.) Effective: 2013 Summer Quarter.

GAS 480—Insights in Gastroenterology (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. Student in good academic standing. To gain insight in clinical activities of Gastroenterology Division through attendance at any of the following: endoscopic procedures, ward rounds, outpatient clinic, and G.I. grand rounds. (H/P/F grading only.) Effective: 1997 Winter Quarter.

GAS 499—Research (1-12)
Clinical Activity. Prerequisite(s): Consent of Instructor. Medical student status. Part-time participation in active clinical and basic research projects.
Some will involve both patient care and relevant laboratory procedures. Basic research includes liver metabolism, cancer markers, porphyrias diet and cancer, folate metabolism. May be repeated for credit. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SOM Courses | GMD

Courses in GMD:

GMD 192—Internship in General Medicine (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project by preceptor prior to internship. Supervised work experience in general medicine. May be repeated for credit up to 12 units. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

GMD 291—Seminars in Human Health Services Research and Clinical Epidemiology (1)
Seminar—1 hour. Critical review, evaluation, and discussion of research in health services and clinical epidemiology. Presentation of statistical, epidemiologic, and econometric methods. Students present their own research and critique the work of others. May be repeated for credit. May be repeated for credit. (Epidemiology 291) (S/U grading only.) Effective: 1998 Fall Quarter.

GMD 460—General Medicine Consults (1-18)
Clinical Activity—1-18 hours; Variable—1-18 hours. Prerequisite(s): Fourth-year medical students with consent of instructor; a general medicine clerkship. Limited enrollment. Supervised opportunity to see entire spectrum of medical problems encountered by a general internist. Student spends time in General Medicine Clinic and on the General Medicine Consult Service. Consultation Service is particularly concerned with medical evaluation of surgical patients. (H/P/F grading only.) Effective: 1997 Winter Quarter.

GMD 470—Health Care Ethics (3-9)
Discussion/Laboratory—1 hour; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Guided independent study of issues in biomedical ethics, with discussion of readings that are based on student interests and needs. Participation in ethics rounds. (Nursing 470.) (H/P/F grading only.) Effective: 2012 Spring Quarter.

GMD 485—Introduction to Health Care Ethics (1)
Lecture. Prerequisite(s): Medical student in good standing. Introduction to concepts and methods of healthcare ethics. Emphasis on problems and methods. (H/P/F grading only.) Effective: 1997 Fall Quarter.

GMD 499—General Medicine Research (1-18)
Clinical Activity—8-40 hours; Discussion—3 hours. Prerequisite(s): Consent of Instructor. Student will be involved in a clinical research problem within the
areas, interest and expertise of members of Division of General Internal Medicine. Alternatively,the research effort will be directed toward investigation of a clinical problem of general medical interest. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SOM Courses | HON

Courses in HON:

HON 199—Research in Hematology-Oncology (1-5)
Laboratory. Prerequisite(s): Consent of Instructor. Upper division standing. Experience in laboratory research. (P/NP grading only.) Effective: 1997 Winter Quarter.

HON 298—Topics in Hematology (1-4)
Variable. Prerequisite(s): One year of graduate work and/or consent of instructor. Basic concepts of the physiology of the hematopoietic organ, the pathophysiology of hematopoietic disease, and concepts of therapeutics
will be offered for study. The specific topics to be dictated by the interest and background of the students. Effective: 1997 Winter Quarter.

HON 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Laboratory investigation contributing to the dissertation for a graduate
degree. (S/U grading only.) Effective: 1997 Winter Quarter.

HON 420—Oncology (4)
Lecture/Discussion—2 hours. Prerequisite(s): Approval by the SOM Committee on Student Promotions. Restricted to Medical student only; students must pass all Year 1 SOM courses. Covers the principles of oncology and the pathophysiology of specific, common cancers correlated with organ systems pathophysiology and systemic pathology courses. (P/F grading only.) Effective: 2015 Fall Quarter.

HON 460—Hematology-Oncology Consult Clerkship (6-12)
Clinical Activity. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing. Limited enrollment. Acting intern on inpatient hematology/oncology ward service. May be repeated for credit. Limited enrollment. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

HON 461—Hematology-Oncology Consult Clerkship (6-12)
Clinical Activity. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing. Limited enrollment. Student is an integral member of the inpatient hematology and oncology consult service, the bone marrow service, and will attend all conferences sponsored by the Division. May be repeated for credit. Limited enrollment. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

HON 462—Hematology-Oncology Ambulatory Clerkship (3-18)
Clinical Activity—30 hours. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing. Limited enrollment. Outpatient rotations in related clinics. Participation with members of the subspecialty service in the initial clinical evaluation, work-up, management and follow-up of the patient with hematologic or oncologic disorders. May be repeated for credit. (H/P/F grading only.) Effective: 2011 Winter Quarter.

HON 493—Cancer as a Process (1-6)
Auto Tutorial—6 hours; Clinical Activity—14 hours; Independent Study—10 hours; Seminar—10 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. Covers cancer as a process, beginning with risks and prevention, preneoplasia, microinvasion, treatment options, metastases and systemic therapy, pain medicine and palliative care, and cancer communication. Format includes traditional lectures, student-led case discussions, and problem-based learning. (H/P/F grading only.) Effective: 2012 Summer Quarter.

HON 499—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SOM Courses | IDI

Courses in IDI:

IDI 141—Infectious Diseases of Humans (1)
Lecture—1 hour. Prerequisite(s): Introductory knowledge in biology and chemistry recommended. Course integrates information on biological and molecular nature of the causative organism, modern diagnostics, treatment and prevention strategies, and the role of infectious diseases in contemporary society and throughout human history. (P/NP grading only.) Effective: 1997 Winter Quarter.

IDI 192—Research Internship in Internal Medicine (1-12)
Internship—3-36 hours. Supervised work experience in the division of Infectious Diseases. Undergraduates will have an opportunity to acquire research experience in clinical settings. May be repeated for credit up to 12 units. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

IDI 199—Infectious Diseases Research (1-5)
Variable. Prerequisite(s): Consent of Instructor. Chemistry through organic chemistry (in addition, physical and biochemistry preferred), biology through basic bacteriology (in addition, microbiology and immunology preferred). Discrete problem requiring reading and actual manual effort in solution will be assigned to each student. Progress and results will be reviewed at intervals with instructor and via seminar presentation. (P/NP grading only.) Effective: 1997 Winter Quarter.

IDI 211—Epidemiology and Prevention of Infectious Diseases (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): EPI 205B; (EPI 207; or IMD 421). Infectious disease epidemiology and prevention, with equal emphasis on human and veterinary diseases. Major categories of infectious diseases by mode of transmission. Effective: 2002 Spring Quarter.

IDI 299—Research in Infectious Diseases (1-12)
Variable. Prerequisite(s): Consent of Instructor. Laboratory investigation contributing to the dissertation for a graduate
degree. (S/U grading only.) Effective: 1997 Winter Quarter.

IDI 440—Introduction to AIDS and Related Disorders (1.5-6)
Clinical Activity—30 hours; Discussion—10 hours. Prerequisite(s): First- and second-year medical students must be in good academic standing and have consent from the instructor. Familiarizes students with the diagnosis and treatment of individuals infected with the human immunodeficiency virus. Students will interview patients, observe patient care and participate in ongoing clinic research as well as examine alternative lifestyles. May be repeated for credit. May be repeated for credit. (H/P/F grading only.) Effective: 2005 Spring Quarter.

IDI 450—Clinical and Social Care of the Injection Drug User (1-4)
Clinical Activity—3 hours; Lecture—1 hour. Prerequisite(s): Consent of Instructor. First- and second-year medical students in good academic standing. Lecture and guided clinical practice in a supervised clinical setting, focusing on the social and medical aspects of health care for injection drug users. May be repeated for credit up to 24 units. May be repeated up to 24 unit(s). (H/P/F grading only.) Effective: 1999 Fall Quarter.

IDI 460—Infectious Diseases Clinical Clerkship (3-6)
Clinical Activity. Prerequisite(s): Successful completion of two years of study in an accredited medical school. Limited enrollment with priority to fourth-year medical students. Patients ill with infectious diseases, including AIDS, will be evaluated and presented at rounds and case conferences. Patients are also seen in the Infectious Diseases Clinic. Instruction in clinical microbiology and the proper use of the laboratory will be provided. (H/P/F grading only.) Effective: 1997 Winter Quarter.

IDI 493—Correctional Medicine SSM - Evaluation of HIV and Hepatitis C Patients (6)
Clinical Activity—30 hours; Discussion—5 hours. Primary agenda focuses on the evaluation of treatment of HIV and Hepatitis C patients in the correctional environment. (H/P/F grading only.) Effective: 2016 Fall Quarter.

IDI 499—Research Topics in Infectious Disease (2-12)
Variable. Prerequisite(s): Successful completion of the first-year of study in School of Medicine, graduate students (approved for graduate credit), and/or consent of instructor. Discrete problem requiring reading and actual manual effort in solution will be assigned to each student. Progress and results to be reviewed at
intervals with instructor and via seminar presentation. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SOM Courses | NEP

Courses in NEP:

NEP 192—Internship in Nephrology (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project by preceptor prior to internship. Supervised work experience in nephrology. May be repeated for credit up to 12 units. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

NEP 299—Nephrology Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Research topics in Nephrology. May be repeated for credit. (S/U grading only.) Effective: 2002 Summer Quarter.

NEP 444—Curriculum Design for Doctoring (1)
Project (Term Project)—2 hours; Seminar—1 hour. Prerequisite(s): Consent of Instructor. Second year standing in School of Medicine. Design of Doctoring curriculum for medical students in focused topic areas to be announced annually. Students will design sessions, consider resource needs, and work with IORs to initiate the curriculum. (P/F grading only.) Effective: 2007 Summer Quarter.

NEP 460—Nephrology and Fluid Balance (3-6)
Clinical Activity—4 hours; Lecture/Discussion—10 hours. Prerequisite(s): Consent of Instructor. Completion of third-year medical school; completion of Medicine Core Clerkship. Limited enrollment. Active participation in all inpatient/outpatient clinical activities, attendance at specific lectures and conferences at UCD Medical Center covering the field of nephrology and fluid-electrolyte disorders. (H/P/F grading only.) Effective: 2001 Summer Quarter.

NEP 499—Research in Nephrology (3-18)
Variable. Prerequisite(s): Consent of Instructor. Individual arrangement. Independent laboratory research on a specific problem related to biochemical or immunologic causes of renal disease and/or uremic disorders in humans or animals. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

SOM Courses | PUL

Courses in PUL:

PUL 192—Internship in Pulmonary Medicine (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Upper division standing; approval of project by preceptor prior to internship. Supervised work experience in pulmonary medicine. May be repeated for
credit up to 12 units. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

PUL 299—Pulmonary Disease Research (1-12)
Laboratory. Prerequisite(s): Consent of Instructor. By arrangement only. Pulmonary disease research activity with focus in inhalation toxicity, oxidants or lung biochemistry, and cell and molecular biology. (S/U grading only.) Effective: 1997 Winter Quarter.

PUL 460—Comprehensive Pulmonary Medicine Clerkship (3-6)
Clinical Activity—40 hours. Prerequisite(s): Completion of second year of medical school and/or consent of instructor; completion of Internal Medicine Clerkship. Rotation intended to provide a comprehensive student education in Pulmonary Medicine. Students will participate in hands on clinical education, as well as completing an assigned curricula. Intended for students pursuing Internal Medicine & Primary Care careers. May be repeated for credit. (H/P/F grading only.) Effective: 2013 Summer Quarter.

PUL 461—Critical Care Clinical Clerkship (3-6)
Clinical Activity—40 hours. Prerequisite(s): Completion of second year of medical school and/or consent of instructor; completion of Internal Medicine and Surgical Clerkships. Rotation intended to provide student education in the Critical Care Management of sub-specialty patients. May be repeated for credit. (H/P/F grading only.) Effective: 2013 Summer Quarter.

PUL 462—Pulmonary Consult Clerkship (3-6)
Clinical Activity—35 hours. Prerequisite(s): Completion of second year of medical school and/or consent of instructor; completion of Internal Medicine Clerkship. Similar to course 460. Rotation designed for students interested in learning pulmonary medicine, but who desire more variety in their clerkships, and do not desire the comprehensive experience offered by a four-week pulmonary rotation. May be repeated for credit. (H/P/F grading only.) Effective: 2013 Summer Quarter.

PUL 470—Practicum in Care of the Terminally Ill (3-6)
Clinical Activity—35 hours; Seminar—5 hours; Variable—3-6 hours. Prerequisite(s): Consent of Instructor. Restricted to fourth-year Medical students in good standing. Work with hospice interdisciplinary team. Direct experience in the care of patients with illnesses where no cure is possible. Emphasis on symptom relief, end of life issues, physician assisted suicide. (H/P/F grading only.) Effective: 2010 Spring Quarter.

PUL 475—Encounters in Ethics in the ICU (3-6)
Clinical Activity—12 hours; Independent Study—6 hours; Lecture/Discussion—6 hours. Prerequisite(s): Fourth-year Medical Student. Care for critically ill adults with complex medical disease carries with it unique ethical roles and duties for the physician. May be repeated for credit. (H/P/F grading only.) Effective: 2011 Summer Quarter.

PUL 480—Pulmonary-Critical Care Medicine Insights (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. Student in good academic standing. Attend respiratory outpatient clinics and in-patient pulmonary consultation rounds and medical intensive care rounds. Introduction to diagnosis and treatment of common pulmonary problems. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PUL 499—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Research opportunity in Pulmonary Medicine. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

SOM Courses | RAL

Course in RAL:

RAL 099—Directed Research Immunology (1-5)
Laboratory. Prerequisite(s): Consent of Instructor. Independent research will be encouraged in basic immunology, including the role of the cellular immune system in oncogenesis. (P/NP grading only.) Effective: 1997 Winter Quarter.

RAL 192—Internship in Rheumatology-Allergy (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project by preceptor prior to internship. Supervised work experience in rheumatology-allergy. May be repeated for credit up to 12 units. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

RAL 199—Directed Research in Immunology (1-5)
Laboratory. Prerequisite(s): Consent of Instructor. Independent research will be encouraged in basic immunology, including the role of the cellular immune system in oncogenesis. (P/NP grading only.) Effective: 1997 Winter Quarter.

RAL 209—Current Topics in Immunology: From Presentations to Grants (3)
Lecture—1 hour; Project (Term Project)—1 hour; Term Paper/Discussion—1 hour. Prerequisite(s): IMM 201 Current developments in various aspects of immunology and their interrelationships. Focus on areas of immunology not currently covered in the basic and advanced immunology courses. Oral presentation, written review and grant preparation. Effective: 2008 Winter Quarter.

RAL 298—Topics in Rheumatology and Clinical Immunology (1-5)
Laboratory. Prerequisite(s): Consent of Instructor. Library and/or laboratory work as required. (S/U grading only.) Effective: 1997 Winter Quarter.

RAL 299—Research in Autoimmune Disease (1-12)
Laboratory. Prerequisite(s): Consent of Instructor. Independent research will be encouraged in both animal models of human disease (including congenitally athymic [nude], asplenic, and New Zealand mice) and the cellular immune system of patients with systemic
lupus erythematosus, Sjögrens syndrome, polymyositis and drug hypersensitivity. (S/U grading only.) Effective: 1997 Winter Quarter.

RAL 460—Rheumatology Clinical Clerkship (1-18)
Clinical Activity—2-40 hours. Prerequisite(s): MDS 431 and Consent of Instructor. Participation with members of the subspecialty service in the diagnosis and therapeutic management of patients with rheumatologic diseases. May be repeated for credit. (H/P/F grading only.) Effective: 2009 Spring Quarter.

RAL 461—Allergy Clinical Clerkship (3-18)
Clinical Activity. Prerequisite(s): Consent of Instructor. Completion of second year of medical school. Student will work with practicing allergist in daily work with patients and participate in weekly allergy clinic and teaching conferences. Study of the literature. Will see patients with problems in clinical immunology, immunodeficiency, asthma, allergic rhinitis. (H/P/F grading only.) Effective: 1997 Winter Quarter.

RAL 480—Insights in Rheumatology (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. Student in good academic standing. Participation in rheumatology consultation rounds, rheumatic disease clinics and conferences with supervised readings in rheumatology. (S/U grading only.) Effective: 1997 Winter Quarter.

RAL 499—Research (1-12)
Variable—2-40 hours. Prerequisite(s): Medical student with consent of instructor. Part-time participation in active clinical and basic research projects which can involve both patient care and relevant laboratory procedures.
Students can gain experience in clinical medicine and clinical investigation. May be repeated for credit. (H/P/F grading only.) Effective: 2009 Spring Quarter.

SOM Courses | MMI

Courses in MMI:

MMI 130—Medical Mycology (2)
Lecture—2 hours. Prerequisite(s): Consent of Instructor. A course in pathogenic microbiology. Various aspects of pathogenic fungi, particularly affecting humans, will be discussed including epidemiology, pathogenesis and pathology, diagnosis and therapy. (430) Effective: 1997 Winter Quarter.

MMI 188—Human Immunology (3)
Lecture—3 hours. Prerequisite(s): Undergraduate level introductory Biology course. Human immune system and mechanisms of immunity. Basic components and function of immune system. Molecular basis of immune response; basic cellular and molecular mechanisms. Interactions between cells of immune system producing immune responses; regulating molecules. Effective: 2004 Spring Quarter.

MMI 192—Internship in Medical Microbiology (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project prior to period of internship. Supervised work experience in medical microbiology and related fields. (P/NP grading only.) Effective: 1997 Winter Quarter.

MMI 194H—Senior Honors Project in Medical Microbiology and Immunology (5)
Independent Study—15 hours. Prerequisite(s): MMI 199; and Consent of Instructor. Project in research related to immunology of medically important viruses. Development of a hypothesis-driven project, performance of experimental protocols and preparation of graphical representation of original data. Requires oral and written presentation of research results. May be repeated up to 3 time(s) with consent of instructor. (P/NP grading only.) Effective: 2004 Spring Quarter.

MMI 198—Group Study in Medical Microbiology (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. Directed reading and discussion and/or laboratory investigation on selected topics. (P/NP grading only.) Effective: 1997 Winter Quarter.

MMI 199—Research in Medical Microbiology (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. Individual research. (P/NP grading only.) Effective: 1997 Winter Quarter.

MMI 200D—Mechanisms for Microbial Interactions with Hosts (3)
Lecture/Discussion—3 hours. Prerequisite(s): MIB 200A; or Consent of Instructor. Study of mechanisms involved in microbial interactions within a host
environment. The following principles are basic to understanding these interactions: host recognition, invasion, competition and growth, and host defense. Effective: 1997 Winter Quarter.

MMI 210A—Critical Analysis of Contemporary Research on Animal Models of Human Infectious Disease (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Students funded by the Animal Models of Infectious Diseases Training Grant. Limited enrollment. Topics will include diverse vertebrate and invertebrate models of human infectious diseases. May be repeated for credit. (S/U grading only.) Effective: 2013 Fall Quarter.

MMI 210B—Comparative Analysis of Animal Models of Human Infectious Diseases (1)
Lecture/Discussion—1 hour. Prerequisite(s): Students funded by the Animal Models of Infectious Diseases Training Grant; others by consent of instructor. Limited enrollment. Compares the major vertebrate and invertebrate animal models that are used most commonly to study human infectious disease, including mouse, non-human primate, Caenorhabditis elegans, and drosophila. May be repeated for credit. (S/U grading only.) Effective: 2014 Winter Quarter.

MMI 215—Medical Parasitology (3)
Discussion—1.5 hours; Lecture—1.5 hours. Prerequisite(s): Graduate student with consent of instructor. Epidemiology, pathogenesis, diagnostic methods and current literature discussion of protozoa, helminths and arthropods of medical importance. Effective: 2011 Spring Quarter.

MMI 280—The Endogenous Microbiota in Health and Disease (3)
Lecture—3 hours. Prerequisite(s): Graduate standing. Recent insights into the microbial communities inhabiting mucosal surfaces, and will discuss how the composition of these communities contributes to normal development, metabolism, education of the immune system, and disease susceptibility. Effective: 2016 Spring Quarter.

MMI 291—Seminar in Microbiology and Immunology (1)
Seminar—1 hour. Restricted to students with upper division or graduate standing. Research seminars on current topics in microbiology and immunology. May be repeated for credit when topic differs. (S/U grading only.) Effective: 2007 Spring Quarter.

MMI 298—Group Study in Medical Microbiology and Immunology (1-5)
Variable. Prerequisite(s): Consent of Instructor. Open to graduate students. Directed reading and discussion and/or laboratory investigation on selected topics. Sections 1, 2, 4, 5 are S/U grading only. (S/U grading only.) Effective: 1997 Winter Quarter.

MMI 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Open to graduate students. Laboratory investigation contributing to the dissertation for a graduate degree. (S/U grading only.) Effective: 1997 Winter Quarter.

MMI 410—Physician Scientist Molecular Medicine Journal Club (1)
Lecture/Discussion—1 hour. Weekly seminars by students on research articles in current literature. Topics/articles to be selected by instructors to include a broad range of frontiers in biomedical literature. May be repeated for credit. (H/P/F grading only.) Effective: 2004 Fall Quarter.

MMI 430—Medical Mycology (2)
Lecture—2 hours. Prerequisite(s): Consent of Instructor. A course in pathogenic microbiology. Various aspects of pathogenic fungi, particularly affecting humans, will be discussed including epidemiology, pathogenesis and pathology, diagnosis and therapy. (130) (H/P/F grading only.) Effective: 1997 Winter Quarter.

MMI 480A—Medical Immunology (2.5)
Discussion/Laboratory—0.5 hours; Lecture—2 hours. Restricted to Medical students only. Helping to understand the immune system, the nomenclature and functional significance of the tissues, cells, proteins and genes of the immune system, as well as the normal regulatory mechanisms and pathologic outcomes related to the immune response. (P/F grading only.) Effective: 2016 Spring Quarter.

MMI 480B—Medical Microbiology (5.5)
Discussion/Laboratory—1 hour; Lecture—2.75 hours. Restricted to Medical students only. Discussion of the diseases caused by infectious agents includes their pathogenesis, clinical manifestations, diagnosis, treatment epidemiology and prevention. Covers the general properties of and diagnostic techniques for bacteria, fungi and viruses. (P/F grading only.) Effective: 2016 Spring Quarter.

MMI 497T—Tutoring in Medical Microbiology (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of Instructor. Appropriate preparation in subject matter. Assist instructor by tutoring medical students in one of the departmental courses that is a component of the required curriculum of the School of Medicine. (H/P/F grading only.) Effective: 1997 Winter Quarter.

MMI 498—Group Study in Medical Microbiology and Immunology (1-5)
Variable. Prerequisite(s): Medical students with consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics. (H/P/F grading only.) Effective: 1997 Winter Quarter.

MMI 499—Research (1-12)
Variable. Prerequisite(s): Medical students with consent of instructor. May be repeated for credit. (H/P/F grading only.) Effective: 2008 Winter Quarter.

SOM Courses | MDS

Courses in MDS:

MDS 099—Special Study in Medicine for Undergraduates (1-5)
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. Participate in research projects relating to medicine with faculty in the School of Medicine. (P/NP grading only.) Effective: 1997 Fall Quarter.

MDS 192—Medical Education Internship for Advanced Undergraduates (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Competency with computers. Enrollment dependent on availability of intern positions. Participate in projects related to curriculum development in support of curriculum for M.D. degree. Gain work experience and appreciation for innovative approaches to learning in basic and clinical sciences of medical education. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

MDS 400—Summer Pre-Matriculation Program (2)
Independent Study—15 hours; Lecture—14 hours; PE Activity—7 hours. Prerequisite(s): Consent of Instructor. Two week program provides students from diverse backgrounds an early introduction to learning skills that will facilitate success in medical school. (P/F grading only.) Effective: 2016 Summer Quarter.

MDS 401—Applications of Computers to Medical Practice (2)
Auto Tutorial—2 hours. Prerequisite(s): Enrollment in medical school. Proficiency in computer applications relative to practice of medicine, with emphasis on email, literature searching, file transfer, and hospital information services. Course given online, at home or in lab; time and place determined by student. (H/P/F grading only.) Effective: 1997 Winter Quarter.

MDS 402—Clinical & Cultural Spanish (2)
Independent Study—4 hours; Lecture—1 hour; Practice—1 hour. Prerequisite(s): Consent of Instructor. Medical students, nursing students and physician assistants students who are fluent Spanish speakers will learn a comprehensive set of medical vocabulary and cultural aspects related to the treatment of Spanish speaking patients. (P/F grading only.) Effective: 2015 Winter Quarter.

MDS 403—Science & Practice of Mindfulness and Compassion (1)
Independent Study—20 hours; Lecture/Discussion—10 hours. Course will examine current scientific evidence for the effects of different mindfulness and compassion meditation practices in both healthy and clinical samples. (P/F grading only.) Effective: 2015 Summer Quarter.

MDS 406—Endocrinology, Nutrition, Reproduction and Genetics (9.5)
Discussion/Laboratory—2.8 hours; Lecture—3.8 hours. Prerequisite(s): BCM 410A; HPH 400; and Consent of Instructor. Restricted to Medical students only. Basic and pathophysiologic processes involved in human reproductive and endocrine control systems, nutritional regulation, and foundational genetics across the lifespan. Integrate information across these systems and use clinical reasoning process to identify and understand relevant perturbations and diseases. May be repeated up to 3 time(s). (P/F grading only.) Effective: 2016 Winter Quarter.

MDS 411—Doctoring 1 (9)
Clinical Activity—1 hour; Discussion—1 hour; Lecture—1 hour. Prerequisite(s): Consent of Instructor. Small group training in patient communication, interviewing techniques, physical exam and clinical identification. Outpatient clinical experiences and didactic presentations also included. (P/F grading only.) Effective: 2017 Summer Quarter.

MDS 411B—Doctoring 1 (5)
Clinical Activity—1.5 hours; Discussion—1.5 hours; Lecture/Discussion—1.8 hours. Medical students only. Small, case-based learning groups with training in patient communication and interviewing techniques, clinical identification and problem solving, applications of social, psychological, cultural, bioethical, and basic science concepts to patient case scenarios, outpatient clinical experiences and didactic presentations. (P/F grading only.) Effective: 2018 Winter Quarter.

MDS 411KA—ACE-PC Program Doctoring 1 (13)
Clinical Activity—5 hours; Lecture/Discussion—6 hours. Prerequisite(s): Consent of Instructor. Small case-based learning groups with training in patient communication and interviewing techniques clinical identification and problem solving applications of social psychological cultural bioethical and basic science concepts to patient case scenarios outpatient clinical experiences and didactic presentations. (P/F grading only.) Effective: 2014 Summer Quarter.

MDS 411KB—ACE-PC Program Doctoring 1 (5)
Clinical Activity—4 hours; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Application of multidisciplinary basic, social and clinical science to clinical cases in small groups. History, physical examination with preceptors. Didactics in epidemiology, ethics, sexuality and clinical reasoning. Evaluation of professional competencies, attitudes and skills needed in the practice of medicine. (P/F grading only.) Effective: 2015 Winter Quarter.

MDS 415—Population Health and Evidence-Based Medicine (2) ***Review all entries***
Discussion—4 hours; Lecture—12 hours. Prerequisite(s): Consent of Instructor. Focuses on the bedrock themes of public health: populations and prevention. (P/F grading only.) Effective: 2017 Summer Quarter.

MDS 415—Population Health and Evidence-Based Medicine (2) ***Review all entries Discontinued***
Discussion—4 hours; Lecture—12 hours. Prerequisite(s): Consent of Instructor. Focuses on the bedrock themes of public health: populations and prevention. (P/F grading only.) Effective: 2018 Summer Quarter.

MDS 415A—Population Health and Evidence-Based Medicine (2)
Discussion—4 hours; Lecture—12 hours. Prerequisite(s): Consent of Instructor. Introduces the fundamental concepts and tools of population health, evidence-based medicine, and system science. (P/F grading only.) Effective: 2018 Summer Quarter.

MDS 415B—Critical Appraisal of Topics in Population Health (0.5)
Discussion—6 hours. Apply foundational skills to explore critical issues in 21st century public health, including tobacco control, firearm violence, and obesity. In a series of small-group discussions "interpreting the medical literature," key concepts from epidemiology and biostatistics are reinforced while students are armed with specific strategies for addressing high-risk behaviors in the context of population health. (P/F grading only.) Effective: 2018 Summer Quarter.

MDS 415C—Population Health and System Science (1.5)
Discussion—6 hours; Fieldwork—3 hours; Lecture—4 hours. Prerequisite(s): Consent of Instructor. Addresses the social, economic, cultural, policy-related, and environmental factors that affect the health of populations and individuals, and the role of health care systems (locally, regionally, nationally, and globally) in moderating the effects of these factors. Content builds on MDS 415A/B, the TeamPEACE (Teamwork for Professionalism, Ethics, and Cultural Enrichment) curriculum in Doctoring 1, and students' lived experience in UC Davis free clinics. (P/F grading only.) Effective: 2018 Summer Quarter.

MDS 420—Multisystem Clinical Presentations (0.5)
Extensive Problem Solving—15 hours; Independent Study—6 hours. Prerequisite(s): Consent of Instructor. Completion of Pathophysiology Block. Capstone course integrates coursework, knowledge, skills and experiential learning to enable the student to demonstrate a broad mastery of learning across the curriculum. (P/F grading only.) Effective: 2014 Winter Quarter.

MDS 421A—Doctoring 2 (6)
Discussion—1 hour; Internship—0.5 hours; Lecture/Discussion—1 hour. Prerequisite(s): Approval by the School of Medicine Committee on Student Progress; medical students only. Application of multidisciplinary basic, social and clinical science to clinical cases in small groups. History, physical examination with preceptors. Didactics in epidemiology, ethics, sexuality and clinical reasoning. Evaluation of professional competencies, attitudes and skills needed in the practice of medicine. (P/F grading only.) Effective: 2007 Summer Quarter.

MDS 421B—Doctoring 2 (6)
Discussion—1 hour; Internship—0.5 hours; Lecture/Discussion—1 hour. Prerequisite(s): Approval by the School of Medicine on Student Progress; medical students only. Application of multidisciplinary basic, social & clinical science concepts to cases in small groups. History, physical examination with preceptors. Didactics in epidemiology, ethics, sexuality, and clinical reasoning. Evaluation of professional competencies, attitudes and skills needed in the practice of medicine. (P/F grading only.) Effective: 2007 Summer Quarter.

MDS 421C—Doctoring 2 (6)
Discussion—1 hour; Internship—0.5 hours; Lecture/Discussion—1 hour. Prerequisite(s): Approval by the School of Medicine Committee on Student Progress; medical students only. Application of multidisciplinary basic, social and clinical science concepts to clinical cases in small group discussions facilitated by medical school faculty. Evaluation of professional competencies, attitudes and skills needed in the practice of clinical medicine. (P/F grading only.) Effective: 2007 Summer Quarter.

MDS 421KA—ACE-PC Program Doctoring 2 (6)
Discussion—1 hour; Internship—0.5 hours; Lecture/Discussion—1 hour. Prerequisite(s): MDS 411KA; MDS 411KB; Admission into ACE-PC. MDS 421KA-C are a year-long series of courses. Objectives and assessments have been accelerated to accommodate the students enrolled in the ACE-PC Program. Students will participate in all aspects of Doctoring 2, other than what was done in 411KA/KB. (P/F grading only.) Effective: 2015 Summer Quarter.

MDS 421KB—ACE-PC Program Doctoring 2 (6)
Discussion—1 hour; Internship—0.5 hours; Lecture/Discussion—1 hour. Prerequisite(s): Approval by the School of Medicine on Student Progress; medical students only. MDS 421KA-C are a year-long series of courses. Objectives and assessments have been accelerated to accommodate the students enrolled in the ACEPC Program. Students will participate in all aspects of Doctoring 2, other than what was done in 411KA/KB. (P/F grading only.) Effective: 2015 Summer Quarter.

MDS 421KC—ACE-PC Program Doctoring 2 (6)
Discussion—1 hour; Internship—0.5 hours; Lecture/Discussion—1 hour. Prerequisite(s): Approval by the School of Medicine Committee on Student Progress; medical students only. MDS 421KA-C are a year-long series of courses. Objectives and assessments have been accelerated to accommodate the students enrolled in the ACEPC Program. Students will participate in all aspects of Doctoring 2, other than what was done in 411KA/KB. (P/F grading only.) Effective: 2015 Summer Quarter.

MDS 428—Foundations of Bioethics (1)
Discussion—3 hours; Independent Study—16.5 hours; Lecture/Discussion—3 hours; Web Virtual Lecture—1 hour. Prerequisite(s): Consent of Instructor. Course will expose students to core content in bioethics and the law and introduce a framework for ethical decision-making, while emphasizing relationships between bioethics and clinical care. (P/F grading only.) Effective: 2014 Summer Quarter.

MDS 429—Transition to Clerkships (1)
Discussion—7 hours; Discussion/Laboratory—12 hours; Independent Study—2 hours; Workshop—13 hours. Incoming third-year medical students will participate in a variety of educational experiences designed to prepare them to begin their clerkship curriculum. Course content will be disseminated in large and small group settings. (P/F grading only.) Effective: 2015 Spring Quarter.

MDS 430—Introduction to Doctoring 3 (1)
Discussion/Laboratory—2 hours. Prerequisite(s): Approval by SOM Committee on Student Progress. Restricted to Medical students only. Application of multidisciplinary basic, social and clinical science concepts to clinical cases in small group discussions facilitated by medical school faculty. Evaluation of professional competencies, attitudes and skills needed in the practice of clinical medicine. (H/P/F grading only.) Effective: 2011 Spring Quarter.

MDS 430A—Doctoring 3 (1)
Discussion—3 hours. Prerequisite(s): Approval by SOM Committee on Student Progress. Restricted to Medical students only. Application of multidisciplinary basic, social and clinical science concepts to clinical cases in small group discussions facilitated by medical school faculty. Evaluation of professional competencies, attitudes and skills needed in the practice of clinical medicine. (H/P/F grading only.) Effective: 2015 Spring Quarter.

MDS 430B—Doctoring 3 (1)
Discussion—2 hours. Prerequisite(s): Approval by SOM Committee on Student Progress. Restricted to Medical students only. Application of multidisciplinary basic, social & clinical science concepts to clinical cases in small group discussions facilitated by medical school faculty. Evaluation of professional competencies, attitudes and skills needed in the practice of clinical medicine. (H/P/F grading only.) Effective: 2015 Spring Quarter.

MDS 430C—Doctoring 3 (1)
Discussion—2 hours. Prerequisite(s): Approval by SOM Committee on Student Progress. Restricted to Medical students only. Application of multidisciplinary basic, social & clinical science concepts to clinical cases in small group discussions facilitated by medical school faculty. Evaluation of professional competencies, attitudes and skills needed in the practice of clinical medicine. (H/P/F grading only.) Effective: 2015 Spring Quarter.

MDS 430D—Doctoring 3 (1)
Discussion—2 hours. Prerequisite(s): Approval by SOM Committee on Student Progress. Restricted to Medical students only. Application of multidisciplinary basic, social & clinical science concepts to clinical cases in small group discussions facilitated by medical school faculty. Evaluation of professional competencies, attitudes and skills needed in the practice of clinical medicine. (H/P/F grading only.) Effective: 2015 Summer Quarter.

MDS 435KA—ACE-PC Longitudinal Integrated Clerkship A (18)
Clinical Activity—45 hours; Discussion—4 hours; Independent Study—6 hours. Prerequisite(s): Consent of Instructor. Longitudinal Clerkship will combine the Internal Medicine, OBGYN, Pediatrics, Psychiatry and Surgery Clerkships for the ACE-PC Program. (H/P/F grading only.) Effective: 2016 Spring Quarter.

MDS 435KB—ACE-PC Longitudinal Integrated Clerkship B (21)
Clinical Activity—45 hours; Discussion—4 hours; Independent Study—6 hours. Prerequisite(s): Consent of Instructor. Longitudinal Clerkship will combine the Internal Medicine, OBGYN, Pediatrics, Psychiatry and Surgery Clerkships for the ACE-PC Program. (H/P/F grading only.) Effective: 2016 Spring Quarter.

MDS 435KC—ACE-PC Longitudinal Integrated Clerkship C (18)
Clinical Activity—45 hours; Discussion—4 hours; Independent Study—6 hours. Prerequisite(s): Consent of Instructor. Longitudinal Clerkship will combine the Internal Medicine, OBGYN, Pediatrics, Psychiatry and Surgery Clerkships for the ACE-PC Program. (H/P/F grading only.) Effective: 2016 Spring Quarter.

MDS 440—Doctoring 4 Teaching Fellowship (3)
Discussion—0.5 hours; Seminar—0.25 hours. Prerequisite(s): MDS 430A; MDS 430B; MDS 430C; MDS 430D; and Consent of Instructor. Restricted to Medical student only. Instruction on teaching methodology and pedagogy. Mentored teaching of junior medical students in seminar, lecture, and bedside. (H/P/F grading only.) Effective: 2015 Spring Quarter.

MDS 441—Combined Ophthalmology and Otolaryngology Clerkship (6)
Clinical Activity—4 hours. Prerequisite(s): Approval by Committee on Student Promotion and Evaluation. Fundamental knowledge of ophthalmology and otolaryngology for the treatment of eye, ear, nose and throat problems at a level of training of general physicians, including when to refer patients to a specialist. (H/P/F grading only.) Effective: 1997 Summer Quarter.

MDS 445—Race and Health in the United States (3-6)
Discussion—4 hours. Interprofessional course facilitates the professional and personal developmental of medical students and other health professions students who think they would like to be leaders in securing equity in population health and work environments. (P/F grading only.) Effective: 2017 Fall Quarter.

MDS 449—Transition to Residency (3-6)
Clinical Activity. Prerequisite(s): Consent of Instructor. Transition to Residency program addresses the graduating medical students need to improve clinical skills necessary for the first six months of residency and unmet graduation competencies in our competency-based curriculum. (P/F grading only.) Effective: 2017 Fall Quarter.

MDS 450—Introduction to UCD Medical Center (1)
Seminar. Prerequisite(s): Second-year medical student. Designed to assist medical student in transition from classroom to hospital setting. (H/P/F grading only.) Effective: 1997 Winter Quarter.

MDS 455—Student Run Clinics (1-3)
Clinical Activity—3-9 hours. Open to medical students in good standing. Will learn counseling, diagnosis and treatment of patients with chronic and acute disease under supervision of physician. Meet all requirements and prerequisites of the particular clinic within which they work. May be repeated for credit. (P/F grading only.) Effective: 2011 Summer Quarter.

MDS 460CR—Introduction to Clinical Research (2)
Independent Study—3 hours; Lecture—2 hours. Restricted to completion of M.D., D.D.S, D.M.D., O.D., N.D., Pharm.D., D.V.M., Ph.D., or D.N.S. in nursing; application and acceptance into the Clinical Research Graduate Group, K30 program Introduction to the CRGG program and overview of major clinical research topics. Overview of basic clinical skills needed to accomplish CRGG mentored research project. (P/F grading only.) Effective: 2006 Summer Special Session.

MDS 461CR—Strategies for Grant Writing (2)
Lecture—2 hours. Restricted to completion of M.D., D.D.S, D.M.D., O.D., N.D., Pharm.D., D.V.M., Ph.D., or D.N.S. in nursing; application and acceptance into the Clinical Research Graduate Group, K30 program. Practical skills and strategies to create successful grant proposals in the NIH style and format. Generating ideas, identifying and accessing research resources, grant components, specific aims, backgound and significance, preliminary studies, budgets, and bios. Matriculation through UC system, and resubmissions. (S/U grading only.) Effective: 2007 Spring Quarter.

MDS 462CR—Introduction to Clinical Epidemiology and Study Design (3)
Discussion—10 hours; Lecture—25 hours. Restricted to completion of M.D., D.D.S, D.M.D., O.D., N.D., Pharm.D., D.V.M., Ph.D., or D.N.S. in nursing; application and acceptance into the Clinical Research Graduate Group, K30 program. Anatomy and physiology of conducting clinical epidemiologic research. Familiarity with three basic study designs (cross-sectional, case-control,and cohort). Discussion of principles of measurements in clinical epidemiological studies, basic methods for analyzing data, and ethical issues involved in conducting research. (S/U grading only.) Effective: 2004 Summer Special Session.

MDS 463CR—Methods in Clinical Research (5)
Discussion—2 hours; Lecture—3 hours. Restricted to completion of M.D., D.D.S, D.M.D., O.D., N.D., Pharm.D., D.V.M., Ph.D., or D.N.S. in nursing; application and acceptance into the Clinical Research Graduate Group, K30 program. Overview of major approaches to clinical research, including health services research techniques, informatics, the GCRC, and preclinical methodologies to enhance clinical projects. Overview of UC Davis clinical research support infrastructure. Methodologies applicable to clinical research and its multi-disciplinary perspective. (S/U grading only.) Effective: 2007 Spring Quarter.

MDS 464CR—Responsible Conduct of Research (3)
Lecture—3 hours. Restricted to completion of M.D., D.D.S, D.M.D., O.D., N.D., Pharm.D., D.V.M., Ph.D., or D.N.S. in nursing; application and acceptance into the Clinical Research Graduate Group, K30 program. The nine NIH-mandated modules: Data Acquisition and Reporting, Mentor Training, Publication Practices and Authorship, Peer Review/Grant Process, Collaborative Science, Human Subjects, Research with Animals, Conflict of Interest, Research Misconduct, and Entrepreneurship/Industry Collaborations/Intellectual Property/Technology Transfer. (S/U grading only.) Effective: 2004 Summer Special Session.

MDS 465CR—Introduction to Medical Statistics (4)
Laboratory—2 hours; Lecture—3 hours. Restricted to completion of M.D., D.D.S, D.M.D., O.D., N.D., Pharm.D., D.V.M., Ph.D., or D.N.S. in nursing; application and acceptance into the Clinical Research Graduate Group, K30 program. Biomedical applications of statistical methods in clinical, laboratory and population medicine. Graphical/tabular data presentation, probability, binomial, Poisson, normal, t-, F-, and Chi-square distributions, elementary nonparametric methods, simple linear regression/correlation, life tables. Microcomputer applications of statistical procedures in population medicine. (S/U grading only.) Effective: 2005 Summer Special Session.

MDS 468C—International Clinical Preceptorship (1-12)
Clinical Activity—30 hours. Prerequisite(s): Consent of Instructor. Medical students. Multidisciplinary preceptorship in a foreign country. Clinical credit will be awarded using this course, once approval has been received from the appropriate governing committee. May be repeated for credit. (H/P/F grading only.) Effective: 2015 Spring Quarter.

MDS 468D—International Elective (1-12)
Clinical Activity—10 hours; Independent Study—20 hours. Prerequisite(s): Consent of Instructor. Medical students. Multidisciplinary preceptorship in a foreign country. Course used to award non-clinical credit for international experiences which have been approved by the appropriate governing committee. May be repeated for credit. (H/P/F grading only.) Effective: 2015 Summer Quarter.

MDS 470—Introduction to Dentistry (3-18)
Clinical Activity—34 hours; Lecture—6 hours; Variable—3-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good standing. Introduction to Dentistry and basic Oral and Maxillofacial Surgery. Course is offered by the Oral and Maxillofacial Surgery department at UC San Francisco. (P/F grading only.) Effective: 2009 Fall Quarter.

MDS 480—Insights in Clinical Research (1)
Lecture—1 hour. Prerequisite(s): Medical student in good standing. Seminars on research presented by Medical School faculty; overview of pertinent issues, including medical ethics, human subjects protocols, case control methods, etc. May be repeated for credit. (P/F grading only.) Effective: 2005 Spring Quarter.

MDS 481—Insights into Clinical Specialties (1)
Lecture/Discussion—1 hour. Prerequisite(s): Medical student in good standing. Exposure to various medical specialties, their residency programs and ways in which medical students can prepare for and improve their candidacy for such programs. May be repeated for credit. (H/P/F grading only.) Effective: 1998 Winter Quarter.

MDS 482—Lecture Series in Reproductive Health (1)
Lecture—1 hour. Psychosocial and public health aspects of providing quality reproductive health care and application in student-run free clinics and in 3rd year clerkships. May be repeated up to 2 time(s). Only medical students may enroll for credit; undergraduates may audit the course. (P/F grading only.) Effective: 2002 Winter Quarter.

MDS 483—Insights in Political, Legal and Business Aspects of Medicine (1)
Lecture—1 hour. Prerequisite(s): Medical students in good standing. Restricted to Medical student only. The practical aspects of a medical career. May be repeated up to 2 time(s). (P/F grading only.) Effective: 2002 Spring Quarter.

MDS 485—Health Policy Lecture Series (1)
Lecture—1 hour. Lecture series provides an overview of local, state, national and international health policy. The current challenges health care reform implementation is facing provides how medical students can successfully advocate for changes in health policy. May be repeated for credit. (P/F grading only.) Effective: 2011 Fall Quarter.

MDS 486—Topics in Health Care Improvement (0.5)
Lecture/Discussion—15 hours. Lecture series will cover major topics in health care improvement, presented by guest speakers who are leaders in the field. May be repeated for credit. (P/F grading only.) Effective: 2015 Spring Quarter.

MDS 487—History and Ethics of Medicine (1)
Lecture—1.25 hours. Introduction to ethical problems and events in health care in both modern and historical contexts. Eight one-hour and fifteen-minute interactive sessions designed to introduce students to historical topics in medicine and medical ethics. (P/F grading only.) Effective: 2004 Winter Quarter.

MDS 489—Directed Studies (1-9)
Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for modified curriculum, USMLE exams, and/or as required by Committee on Student Progress. Independent studies to accommodate modified curriculums, prepare for taking USMLE exams and for remediation course work directed by the Committee on Student Progress. May be repeated for credit. (P/F grading only.) Effective: 2009 Winter Quarter.

MDS 489C—Clinical Reintroduction Experience (1-9)
Clinical Activity—20 hours. Prerequisite(s): Consent of Instructor. Learn and practice basic clinical skills in a supervised clinical setting. Skills include patient interviewing, history, physical examination, diagnostic and clinical reasoning, case presentation, and medical records documentation. Direct observation and individual feedback on clinical skills development is provided. (P/F grading only.) Effective: 2012 Summer Quarter.

MDS 489R—USMLE Directed Remedial Studies (1-9)
Independent Study—20 hours. Prerequisite(s): Recommendation by Committee on Student Progress. Independent studies to accommodate remediation for taking USMLE exams directed by the Committee on Student Progress. May be repeated for credit. (P/F grading only.) Effective: 2011 Spring Quarter.

MDS 490A—Community Health Scholars Seminar A (1.5)
Lecture—1 hour. Prerequisite(s): Consent of Instructor. Longitudinal year-long course starting on July 1 and concluding at the end of Block 2. Focuses on immersing students in their respective communities to understand the strengths and challenges they face in relation to health. May be repeated for credit. (P/F grading only.) Effective: 2017 Summer Quarter.

MDS 490B—Community Health Scholars Seminar B (0.5)
Lecture—1 hour. Prerequisite(s): Consent of Instructor. Longitudinal year-long course starting on July 1 and concluding at the end of Block 2. Focuses on immersing students in their respective communities to understand the strengths and challenges they face in relation to health. May be repeated for credit. (P/F grading only.) Effective: 2017 Summer Quarter.

MDS 490C—Community Health Scholars Seminar C (0.5)
Lecture—1 hour. Prerequisite(s): Consent of Instructor. Longitudinal year-long course starting on July 1 and concluding at the end of Block 2. Focuses on immersing students in their respective communities to understand the strengths and challenges they face in relation to health. May be repeated for credit. (P/F grading only.) Effective: 2017 Summer Quarter.

MDS 490D—Community Health Scholars Seminar D (0.5)
Lecture—1 hour. Prerequisite(s): Consent of Instructor. Longitudinal year-long course starting on July 1 and concluding at the end of Block 2. Focuses on immersing students in their respective communities to understand the strengths and challenges they face in relation to health. May be repeated for credit. (P/F grading only.) Effective: 2017 Summer Quarter.

MDS 493—Independent Special Study Module (3-12)
Variable—20 hours. Prerequisite(s): Consent of Instructor. FYOC approval required. Student developed alternative to the SSM/SPO Requirement. Approval by FYOC is required. (H/P/F grading only.) Effective: 2015 Winter Quarter.

MDS 493A—International and Comparative Health Care--SSM (6)
Discussion—20 hours; Lecture—10 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. Through a series of lectures, seminars and clinical experiences, all occurring in other nations, students will research how health care systems address critical health issues. In 2007, Chronic Disease is the focal issue. SSM Component. (H/P/F grading only.) Effective: 2012 Spring Quarter.

MDS 493B—International and Comparative Health Care--Clinical (3-9)
Clinical Activity—30 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. Through a series of lectures, seminars and clinical experiences, all occurring in other nations, students will research how health care systems address critical health issues. In 2007, Chronic Disease is the focal issue. Clinical Component. (H/P/F grading only.) Effective: 2014 Spring Quarter.

MDS 493D—Teaching the Basic Sciences SSM (6)
Laboratory—30 hours; Lecture—6 hours; Lecture/Lab—8 hours; Tutorial—10 hours. Prerequisite(s): MDS 440 (can be concurrent); and Consent of Instructor. MDS 440 required concurrently. Restricted to UC Davis School of Medicine students only. Special Studies Module, a yearlong in progress court to teach lecture and discussion education technique and theory. (H/P/F grading only.) Effective: 2015 Spring Quarter.

MDS 493Q—Improving Quality in Health Care (6)
Discussion/Laboratory—10 hours; Lecture—8 hours; Project (Term Project)—10 hours. Prerequisite(s): Consent of Instructor. Working in interdisciplinary teams, will explore the theory and practical methods being employed to make improvement in health care systems while providing an opportunity for interprofessional educational experience. (H/P/F grading only.) Effective: 2015 Fall Quarter.

MDS 493QA—Improving Quality in Health Care (3)
Discussion/Laboratory—10 hours; Lecture—8 hours; Project (Term Project)—10 hours. Prerequisite(s): Consent of Instructor. Working in interdisciplinary teams, will explore the theory and practical methods being employed to make improvement in health care systems while providing an opportunity for interprofessional educational experience. (H/P/F grading only.) Effective: 2012 Fall Quarter.

MDS 493QB—Improving Quality in Health Care (3)
Discussion/Laboratory—10 hours; Lecture—8 hours; Project (Term Project)—10 hours. Prerequisite(s): Consent of Instructor. Working in interdisciplinary teams, will explore the theory and practical methods being employed to make improvement in health care systems while providing an opportunity for interprofessional educational experience. (H/P/F grading only.) Effective: 2012 Fall Quarter.

MDS 493QC—Enhancing Patient Safety in Health Care (6)
Clinical Activity—8 hours; Discussion—6 hours; Seminar—6 hours. Prerequisite(s): Consent of Instructor. Fourth-year Medical student. Inter-professional module is designed to explore the theory and practical methods being employed to improve patient safety in health care while providing an opportunity for interprofessional educational experience. (H/P/F grading only.) Effective: 2013 Spring Quarter.

MDS 494—Non-Clinical Medical Student Externship (3-9)
Clinical Activity—10 hours; Independent Study—20 hours. Prerequisite(s): Consent of Instructor. Restricted to students with approval of credit by the Fourth Year Oversight Committee. Generic course for awarding externship credit for medical student rotations that are not primarily focused on patient care. May be repeated for credit. (H/P/F grading only.) Effective: 2014 Fall Quarter.

MDS 495—Medicine Literature Review (1-9)
Discussion—3-27 hours. Prerequisite(s): Medical student in good academic standing and permission of the Associate Dean of Curricular Affairs. Independent study: topics for selection include, but are not restricted to, medical ethics, economics and jurisprudence, culture and medicine, ethnicity and medicine, gender and medicine, history of medicine, health manpower, and medical education. A prepared paper on the selected topic will be required. (P/F grading only.) Effective: 1997 Fall Quarter.

MDS 497—Scholarly Project (6)
Independent Study—0.5 hours; Seminar—0.25 hours. Prerequisite(s): Consent of Instructor. Project proposal must be accepted by the Scholarly Project Executive Committee (SPEC). Restricted to 4th year medical school students only. Develop a research project on a focused topic area, implements the research, writes a publishable paper, and presents an oral summary of the project. (H/P/F grading only.) Effective: 2015 Spring Quarter.

MDS 499—Research in Medical Education & Curriculum Development (4-9) ***Review all entries***
Independent Study—10-36 hours. Prerequisite(s): Medical students in good standing and competency with computers. Research and development of an independent project related to expanding computer-assisted resources in support of the MD curriculum at UC Davis. (H/P/F grading only.) Effective: 1997 Fall Quarter.

MDS 499—Medical Student Research Fellowship (1-9) ***Review all entries***
Independent Study—10-36 hours. Prerequisite(s): Medical students in good standing and competency with computers. Independent research project as part of the Medical Student Research Fellowship. (H/P/F grading only.) Effective: 2018 Summer Quarter.

SOM Courses | PHA

Courses in PHA:

PHA 092—Internship in Pharmacology (1-12)
Internship—3-36 hours. Prerequisite(s): Lower division student with good academic standing; approval of project prior to period of internship. Supervised work experience in pharmacology and related fields. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHA 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHA 192—Internship in Pharmacology (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Upper division standing; approval of project prior to period of internship. Supervised work experience in pharmacology and related fields. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHA 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHA 199—Special Study for Advanced Undergraduates (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHA 205—Problem Solving in Pharmacology (1)
Lecture/Discussion—1 hour. Restricted to Graduate Students in Pharmacology and Toxicology, Chemistry and Clinical Research Graduate Groups; other students may be accepted with consent of instructor. Students will be introduced to a current biomedical problem that would benefit from a developing drug and will develop an experimental strategy for addressing the issue. Students will develop model systems for testing various classic and recent pharmacological approaches. May be repeated up to 12 time(s) Course changes subjects every quarter; each course is unique and can be taken as often as desirable; certain students (Trainees of the Training Program in Pharmacological Sciences) must take course for at least three years. Effective: 2014 Fall Quarter.

PHA 207—Drug Discovery and Development (3)
Extensive Writing—1 hour; Lecture/Discussion—2 hours. Prerequisite(s): An equivalent course in general pharmacology, or knowledge of basic pharmacology. Intended for graduate students in Pharmacology and Toxicology, Chemistry and Clinical Research Graduate Groups; other students, including undergraduates, may be accepted with consent of instructors. Survey of the process by which a drug is discovered, developed and made available to the public. Topics include drug identification and optimization, safety testing, clinical evaluation, regulatory issues, intellectual property, formulation, and the global pharmaceutical industry. May be repeated for credit. Effective: 2010 Winter Quarter.

PHA 208—Advanced Cardiac Physiology and Pharmacology (3)
Lecture—2 hours; Lecture/Discussion—1 hour. Prerequisite(s): An equivalent course in general pharmacology or physiology (example, BIM 204), or knowledge of basic pharmacology/physiology. Open to graduate students from the Pharmacology and Toxicology, Molecular, Cellular and Integrated Physiology, Biomedical Engineering and Clinical Research Graduate Groups; other students (including undergraduates) may be accepted upon consultation with the instructors. Detailed characterization of the mechanisms involved in cardiac excitation–contraction coupling, alterations that occur in heart disease and pharmacological interventions. Topics include cardiac contractile apparatus, action potential, Ca cycling, excitation–transcription coupling, cardiac inotropy, heart failure and arrhythmias. Effective: 2013 Spring Quarter.

PHA 225—Gene and Cellular Therapies (3)
Lecture/Discussion—3 hours. Gene therapy from basic concepts to clinical applications. Topics include the human genome and genetic variation, genetic diseases, methods to manipulate gene expression, viral and non-viral delivery vectors, history and progress of gene therapy, case studies, and ethical issues. (Genetics 225.) Effective: 2017 Winter Quarter.

PHA 250—Functional Genomics: From Bench to Bedside (3)
Lecture/Discussion—3 hours. Prerequisite(s): GGG 201C; MCB 214; Or equivalent. Functional genomics (how genetic variation and epigenomics affect gene expression), with an emphasis on clinical relevance and applications. Topics include genetic variation and human disease, cancer therapeutics, and biomarker discovery. (Genetics 250.) Effective: 2015 Spring Quarter.

PHA 291—Pharmacology Research Seminar Series (1)
Discussion—1 hour; Seminar—1 hour. Prerequisite(s): Consent of Instructor. Upper division or graduate standing. Research seminars on current topics in Pharmacology. May be repeated for credit when topic differs. (S/U grading only.) Effective: 2007 Fall Quarter.

PHA 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Effective: 1997 Winter Quarter.

PHA 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

PHA 400A—Pharmacology (2)
Discussion/Laboratory—0.3 hours; Lecture—1 hour. Prerequisite(s): Approval by School of Medicine Committee on Student Progress. Restricted to Medical student only. Principles in pharmacology, including pharmacokinetics, drug metabolism and the actions, uses and toxicities of the major classes of drugs. (P/F grading only.) Effective: 2012 Winter Quarter.

PHA 400B—Pharmacology (1.5)
Discussion—0.25 hours; Lecture—1 hour. Prerequisite(s): Approval by School of Medicine Committee on Student Progress; medical students only. Principles in pharmacology, including autonomic pharmacology, general anesthetics, neuropharmacology and sedative/hypnotics. (P/F grading only.) Effective: 2008 Fall Quarter.

PHA 400C—Pharmacology (3.5)
Discussion—0.5 hours; Lecture—2 hours. Prerequisite(s): PHA 400A; PHA 400B; Approval by School of Medicine Committee on Student Progress; medical students only. Treatment of respiratory and cardiovascular disease, central nervous system drugs, GI, Toxicology and chemotherapy. Specific topics include: asthma, chronic obstructive pulmonary disease, hypertension, congestive heart failure, and the treatment of arrhythmias. Pain Management, depression, psychosis, acid reflux, IBS and toxicology. (P/F grading only.) Effective: 2015 Fall Quarter.

PHA 445—Introduction to Integrative Medicine (1)
Lecture/Discussion—1 hour. Prerequisite(s): Medical student in good standing. Basic principles of alternative medical systems (e.g., traditional Chinese, Ayurvedic, Tibetan), alternative practices (e.g., chiropractic, osteopathy, naturopathy, homeopathy, herbalism, guided imagery/meditation, massage therapy), and mind/body connection are presented as introduction to integrating alternative treatments into traditional medicinal practice. (H/P/F grading only.) Effective: 2000 Winter Quarter.

PHA 490—Seminar in Pharmacology for Medical Students (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Seminar in pharmacology for medical students. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PHA 497T—Tutoring in Pharmacology (1-5)
Tutorial—3-15 hours. Prerequisite(s): Advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum of the School of Medicine. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PHA 498—Special Study for Medical Students (1-5)
Discussion; Lecture. Prerequisite(s): Consent of Instructor. Special study in pharmacology for medical students. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PHA 499—Directed Research for Medical Students (1-12)
Laboratory—3-36 hours. Prerequisite(s): Consent of Instructor. Directed research in pharmacology for medical students. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

SOM Courses | NEU

Course in NEU:

NEU 103—Human Clinical Neuroanatomy (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHA 101; or Consent of Instructor. Open to upper division students. Clinically relevant anatomy of the normal human nervous system, including external and internal anatomy of the brain, spinal cord, and cranial nerves. Blood supply to the brain and spinal cord. Functional neuroanatomy of motor, sensory, and cognitive systems. Application of neuroanatomical principles relevant to clinical problem solving for students entering health care professions. (CHA 103.) GE credit: SE. Effective: 2018 Spring Quarter.

NEU 199—Individual Special Study and Research (1-4)
Variable. Prerequisite(s): Consent of Instructor. Individual special study in neurophysiology and biomedical engineering
is offered to qualified students. Studies on psychophysics, single-unit electrophysiology and instrumentation are offered in Davis. (P/NP grading only.) Effective: 1997 Winter Quarter.

NEU 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. For graduate students desiring to explore particular topics in depth.
Lectures and conferences may be involved. (S/U grading only.) Effective: 1997 Winter Quarter.

NEU 299—Individual Special Study and Research (1-12)
Laboratory—3-36 hours. Prerequisite(s): Consent of Instructor. Individual special study and research in Neurophysiology and Biomedical engineering is offered at both Davis and Sacramento Medical Center. (S/U grading only.) Effective: 1997 Winter Quarter.

NEU 420—Clinical Neurosciences (2)
Lecture—1.5 hours; Lecture/Discussion—1 hour. Restricted to Medical Students only. Pathophysiology underlying neurological disorders, including disorders of development, muscle, nerve, cerebral circulation, metabolism, myelin, cortical function, movement, cerebrospinal fluid, autonomic function and special senses. Anatomical basis of clinical testing, nervous system infection, neoplasia and trauma. (P/F grading only.) Effective: 2007 Summer Quarter.

NEU 440—Where Drugs Come From: How They are Discovered, Developed, Regulated, and Marketed (3-6)
Lecture. Includes the following topics: Overview of the Drug Discovery Process; Drug Regulation in the United States; Patents and Other Forms of Exclusivity; Drug Targets and Pharmacology; Identification of Lead Candidates; Preclinical Assessment; ADME Including Basic Pharmacokinetic Principles; Principles of Drug Toxicity; Principles of Drug Safety; Clinical Trials; Generic Drugs; Pharmaceutical Industry; Drug Distribution and Marketing; Dietary Supplements; Controlled Substances. (H/P/F grading only.) Effective: 2018 Winter Quarter.

NEU 450—Clinical Neurology Clerkship (3-6)
Clinical Activity—24 hours; Conference—12 hours; Independent Study—10 hours; Seminar—4 hours. Prerequisite(s): Open to all fourth year medical students and third year medical students with consent of instructor. Restricted to six students per rotation. Critical elements of neurological clinical skills (history & exam) and basic and clinical neurological concepts expected for general residency preparation. Active, didactic, experiential and independent learning to encourage maturation of general professional competencies. May be repeated for credit. (H/P/F grading only.) Effective: 2011 Winter Quarter.

NEU 452—Advanced Clinical Neurology (6)
Clinical Activity. Prerequisite(s): Consent of Instructor. Completion of four-week Neurology selective. Extension of basic Neurology clerkship. Designed for students with special interest in medical disorders of nervous system. By arrangement
with department, student may serve as an acting intern. Principles of neurological differential diagnosis and therapeutics emphasized. (H/P/F grading only.) Effective: 1997 Winter Quarter.

NEU 455—Child Neurology (6)
Clinical Activity. Prerequisite(s): IMD 430; OBG 430; PED 430; and Consent of Instructor. Student exposed to children with disorders of the nervous system, both in outpatient and inpatient services. Cases presented to a member of full-time faculty who will discuss clinical findings,differential diagnosis, management and therapy.This course satisfies the fourth year neuroscience requirement. (H/P/F grading only.) Effective: 1997 Winter Quarter.

NEU 460—Externship in Neurology (3-6)
Clinical Activity. Prerequisite(s): Consent of Instructor. Externship course for Neurology rotations not meeting the qualifications to be an Acting Internship. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Summer Quarter.

NEU 462—Externship in Advanced Neurology (3-6)
Clinical Activity. Prerequisite(s): Consent of Instructor. Away rotation in Neurology where coursework meets the standards to be counted as an Acting Internship. (H/P/F grading only.) Effective: 2017 Summer Quarter.

NEU 493F—Issues in Geriatric Care (6)
Seminar. Four-week module teaches an approach to common problems in the elderly through history and exam, with an emphasis on integration of underlying anatomy, physiology, and pathophysiology in common geriatric presentations. May be repeated for credit. (H/P/F grading only.) Effective: 2018 Winter Quarter.

NEU 498NE—Group Study in Neurology (1-6)
Variable—3-5 hours. Prerequisite(s): Medical students with consent of instructor. Directed readings and discussions with a comprehensive written examination at the end of course. (P/F grading only.) Effective: 2002 Summer Session 2.

NEU 499—Research (1-12)
Laboratory—2-24 hours. Prerequisite(s): Consent of Instructor. Approved for graduate degree credit. Laboratory investigation on selected topics. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

SOM Courses | NSU

Courses in NSU:

NSU 199—Special Study in Neurosurgery for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Advanced undergraduate standing with consent of instructor. Students may participate in ongoing neurosurgical projects or may pursue and design independent projects. (P/NP grading only.) Effective: 1997 Winter Quarter.

NSU 299—Neurosurgery Research (3-12)
Prerequisite(s): Graduate student with consent of instructor. Student may participate in ongoing neurosurgical projects or may pursue and design independent projects. (S/U grading only.) Effective: 1997 Winter Quarter.

NSU 451—Neurosurgical Critical Care Clerkship (3)
Clinical Activity. Prerequisite(s): Third- or fourth-year medical student having completed a neurosurgical clerkship or consent of instructor. Students participate in the care of neurosurgical patients in the NSICU and in the admission and surgical management of patients admitted through the Emergency Room. (H/P/F grading only.) Effective: 1997 Winter Quarter.

NSU 455—Clinical Pediatric Neurosurgery (6)
Clinical Activity. Prerequisite(s): NSU 460; and Consent of Instructor. Third- or fourth-year medical students. Admission and follow-up of pediatric patients. Neurological history, examination, and diagnostic procedures are emphasized. Students will participate in surgical procedures and are required to attend all pediatric neurosurgery conferences. (H/P/F grading only.) Effective: 1997 Winter Quarter.

NSU 460—Clinical Neurosurgery (6-18)
Clinical Activity. Prerequisite(s): Consent of Instructor. Third- and fourth-year medical students. Approved for graduate degree credit. Admission and follow-up of patients. Neurological history, examination and further diagnostic procedures emphasized. Students participate in meaningful aspects of surgical procedures and attend listed conferences, rounds, and seminars. (H/P/F grading only.) Effective: 1997 Winter Quarter.

NSU 464—Externship (3-9)
Clinical Activity. Prerequisite(s): Fourth-year medical student having completed a neurosurgical clerkship or consent of instructor. Clerkship in neurosurgery to be arranged at another institution with accredited residency program in neurosurgery under proper supervision. (H/P/F grading only.) Effective: 2016 Summer Quarter.

NSU 470—Advanced Clinical Neurosurgery (6-18)
Clinical Activity. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing. Student will function as acting intern on neurosurgery service. Admission and management of patients. Neurological history, examination, diagnostic procedures, and surgical management are emphasized. Students participate in meaningful aspects of surgical procedures and attend required conferences and rounds. (H/P/F grading only.) Effective: 1997 Winter Quarter.

NSU 480—Insights in Neurosurgery (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. First- and second-year medical students in good academic standing. Observation of neurosurgical care in emergency room, operating room
and hospital floors, including manner of treatment of a variety of chronic and acute neurological diseases. (H/P/F grading only.) Effective: 1997 Winter Quarter.

NSU 499—Neurosurgery Research (1-18)
Variable. Prerequisite(s): Medical student with consent of instructor. Student may participate in ongoing neurosurgical projects or may pursue and design independent projects. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

Courses in OBG:

OBG 192—Shifa Clinic/student volunteer (1)
Clinical Activity—8 hours; Conference—2 hours; Discussion—2 hours. Open to undergraduates only. Supervised work experience in Obstetrics & Gynecology. May be repeated up to 3 time(s). (P/NP grading only.) Effective: 2003 Fall Quarter.

OBG 194—Shifa Clinic Student Volunteer (1)
Clinical Activity—6 hours; Conference—1 hour. Prerequisite(s): Consent of Instructor. The applications will be available for students. Selection of students will be made by selection committee of medical students coordinators and the IOR. Attend clinic every third Sunday performing duties of receptionist, intake, translation, monitor. Students attend a meeting immediately after end of clinic. There is a mandatory Monday meeting with Clinic co-directors. Students are expected to participate on various committees. May be repeated up to 3 time(s). (P/NP grading only.) Effective: 2008 Fall Quarter.

OBG 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

OBG 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

OBG 220—Genetics of Reproduction (3)
Lecture/Discussion—3 hours. Introduction to genetics of mammalian reproduction for domestic species,
species used in research, and the human. Mendelian and non-Mendelian modes of inheritance. Research paper. Effective: 2000 Winter Quarter.

OBG 290—Current Topics in Research (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Selected topics in reproductive biology. (S/U grading only.) Effective: 1997 Winter Quarter.

OBG 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. Effective: 1997 Winter Quarter.

OBG 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

OBG 430—Obstetrics and Gynecology Clerkship (12)
Clinical Activity—45 hours. Prerequisite(s): Approval by School of Medicine Committee on Student Progress. Obstetrics, gynecologic and gynecological oncology experience in the delivery room, operating room, clinics and wards at UCDMC and affiliated sites. Rounds, conferences, interactive student presentations and seminars ongoing. (H/P/F grading only.) Effective: 2001 Summer Quarter.

OBG 430F—SJVP OBGYN Clerkship at UCSF (6-12)
Clinical Activity—45 hours. Prerequisite(s): Approval by School of Medicine Committee on Student Progress. Obstetrics, gynecologic and gynecological oncology experience in the delivery room, operating room, clinics and wards at UCSF Fresno. Rounds, conferences, interactive student presentations and seminars ongoing. (H/P/F grading only.) Effective: 2017 Spring Quarter.

OBG 430R—Rural PRIME OBGYN Longitudinal Clerkship (2)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Obstetrics and Gynecology Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

OBG 430RA—Rural PRIME OBGYN Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Obstetrics and Gynecology Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

OBG 430RB—Rural PRIME OBGYN Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Obstetrics and Gynecology Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

OBG 430RC—Rural PRIME OBGYN Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Obstetrics and Gynecology Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

OBG 430RD—Rural PRIME OBGYN Longitudinal Clerkship (1)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Obstetrics and Gynecology Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

OBG 439D—Directed Clinical Studies in OBGYN (1-12)
Clinical Activity—40 hours. Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for modified curriculum or to complete a clinical rotation following a leave of absence. May be repeated for credit. (P/F grading only.) Effective: 2011 Spring Quarter.

OBG 439R—Directed Studies in OBGYN (1-12)
Clinical Activity—30 hours; Independent Study—10 hours. Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for remediation of all or part of clinical rotation. Clinical studies to accommodate and satisfy remedial work as directed by the Committee on Student Progress and approved by the course IOR. May be repeated for credit. (P/F grading only.) Effective: 2011 Summer Quarter.

OBG 460—Away Clinical Elective in OBGYN (3-18)
Clinical Activity—30 hours; Variable—10 hours. Prerequisite(s): OBG 430; and Consent of Instructor. Or the equivalent; third- or fourth-year medical student. Active participation in inpatient and/our outpatient care. Attendance at specified conferences; student-faculty member informal conferences. May be repeated for credit. (H/P/F grading only.) Effective: 2010 Spring Quarter.

OBG 465—Away Acting Internship in OBGYN (3-18)
Clinical Activity—40 hours; Variable—10 hours. Prerequisite(s): OBG 430; and Consent of Instructor. Other third-year core clerkships. Work at the level of a sub intern in Inpatient and/or Outpatient settings. Students are expected to provide direct patient management. (H/P/F grading only.) Effective: 2010 Summer Quarter.

OBG 470—Gynecologic Oncology Acting Internship (3-18)
Clinical Activity—40 hours; Variable—10 hours. Prerequisite(s): OBG 430; and Consent of Instructor. The third-year core clerkships. Four week elective primarily involves direct inpatient management of women on the UCDMC Gyn/Onc service. Students will be acting at the level of a sub-intern and will work under the supervision of house staff, fellows, and attendings. May be repeated up to 99 unit(s). (H/P/F grading only.) Effective: 2010 Spring Quarter.

OBG 471—Ambulatory Gynecology and Obstetrics Elective (3-18)
Clinical Activity—35 hours. Prerequisite(s): OBG 430; and Consent of Instructor. Third- or fourth-year Medical Student. Conduct examinations, present patients and discuss treatment regimens at the following ambulatory clinics: General Obstetrics & Gynecology, New and Return Obstetrics (including Post-Partum), High-Risk Obstetrics, Pre-Operative Clinic, and other sub-specialty clinics as assigned. May be repeated for credit. (H/P/F grading only.) Effective: 2010 Summer Quarter.

OBG 472—Family Planning and Reproductive Health (1-6)
Clinical Activity—30 hours; Seminar—5 hours. Prerequisite(s): OBG 430; and Consent of Instructor. Elective that will focus on the Gynecologic Subspecialty of Family Planning. Counseling and provision of contraceptive methods, experience with pelvic ultrasounds, management of spontaneous, inevitable and induced abortion and post-abortion care by both surgical and medical techniques are included. May be repeated for credit. (H/P/F grading only.) Effective: 2014 Spring Quarter.

OBG 475—Labor & Delivery Acting Internship (3-18)
Clinical Activity—40 hours; Variable—10 hours. Prerequisite(s): OBG 430; and Consent of Instructor. The third-year core clerkships. Four week elective primarily involves direct inpatient management of women on the UCDMC L&D unit. Students will be acting at the level of a sub-intern and will work under the supervision of house staff, fellows, and attendings. May be repeated for credit. (H/P/F grading only.) Effective: 2010 Spring Quarter.

OBG 480—The Birthing Process (1)
Lecture/Discussion—1 hour. Open only to UC Davis medical students. Training to assist in the birthing process as a Doula. Topics not covered in the summer course. (S/U grading only.) Effective: 2000 Fall Quarter.

OBG 493—Gender Specific Medicine SSM (6)
Clinical Activity—4 hours; Laboratory—16 hours; Lecture—5 hours; Lecture/Lab—10 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. Special Studies Module, a four week course on the topic: Basic Science Principles Relating to Gender Specific Medicine. (Cardiology 493.) (H/P/F grading only.) Effective: 2007 Spring Quarter.

OBG 494—Shifa Clinic (6)
Clinical Activity—8 hours. Prerequisite(s): Medical student in good standing. Restricted to Medical student only. Interaction with patients from multiple ethnic and cultural backgrounds under the direct supervision of a physician/preceptor. Women's health issues and primary care issues in a diversely mixed population. May be repeated up to 3 time(s). (P/F grading only.) Effective: 2008 Fall Quarter.

OBG 494A—Shifa Clinic (1)
Clinical Activity—8 hours. Prerequisite(s): Consent of Instructor. Medical student in good standing. Interaction with patients from multiple ethnic and cultural backgrounds under the direct supervision of a physician/preceptor. Women's health issues and primary care issues in a diversely mixed population. (H/P/F grading only.) Effective: 2012 Summer Quarter.

OBG 494B—Shifa Clinic (1)
Clinical Activity—8 hours. Prerequisite(s): Consent of Instructor. Medical student in good standing. Interaction with patients from multiple ethnic and cultural backgrounds under the direct supervision of a physician/preceptor. Women's health issues and primary care issues in a diversely mixed population. (H/P/F grading only.) Effective: 2012 Summer Quarter.

OBG 494C—Shifa Clinic (1)
Clinical Activity—8 hours. Prerequisite(s): Consent of Instructor. Medical student in good standing. Interaction with patients from multiple ethnic and cultural backgrounds under the direct supervision of a physician/preceptor. Women's health issues and primary care issues in a diversely mixed population. (H/P/F grading only.) Effective: 2012 Summer Quarter.

OBG 498—Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Explore particular topics in-depth in Obstetrics and Gynecology. Extensive contact with and oversight by instructor. May be repeated for credit. (H/P/F grading only.) Effective: 2004 Fall Quarter.

OBG 499—Research in Obstetrics & Gynecology (2-12)
Clinical Activity; Variable. Prerequisite(s): Consent of Instructor. Fourth-year medical student. Research in Obstetrics and Gynecology arranged with instructor. May be repeated up to 8 time(s). (H/P/F grading only.) Effective: 2006 Fall Quarter.

SOM Courses | OPT

Courses in OPT:

OPT 192—Research Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in ophthalmology research. Research staff in Ophthalmology have programs in cell biology, electron microscopy, biochemistry, immunology and visual psychophysics. (P/NP grading only.) Effective: 1997 Winter Quarter.

OPT 199—Special Study for Advanced Undergraduates (1-4)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

OPT 299—Basic Research in Visual Science (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

OPT 442—Introduction to Ophthalmology (3)
Clinical Activity—40 hours. Prerequisite(s): Third- or fourth-year Medical Student with consent of instructor; consent of advisor; completion of third-year clerkships in Medicine and Surgery; consult Course Coordinator. Ocular disease diagnosis and management relevant to the clinical practice of future primary care physicians and others. (H/P/F grading only.) Effective: 2010 Summer Quarter.

OPT 465—Advanced Subspecialty Ophthalmology (3-6)
Clinical Activity—40 hours; Variable—40 hours. Prerequisite(s): IMD 430; and Consent of Instructor. Medical students in third or fourth year. Participation in disciplines of neuro-ophthalmology/pediatric ophthalmology, diseases of the cornea and external eye, glaucoma and retina. (H/P/F grading only.) Effective: 2010 Summer Quarter.

OPT 498—Group Study (1-3)
Variable. Prerequisite(s): Medical students with consent of instructor. Directed reading and discussion. (H/P/F grading only.) Effective: 1997 Winter Quarter.

OPT 499—Research in Ophthalmology (1-12)
Variable—3-36 hours. Prerequisite(s): Medical students with consent of instructor. Individual research on selected topics in optics and visual physiology, cornea and external disease. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

SOM Courses | OSU

Course in OSU:

OSU 099—Special Studies for Undergraduates (1-4)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

OSU 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

OSU 421—The Musculoskeletal System (2.5)
Discussion—2 hours; Lecture/Discussion—4 hours. Prerequisite(s): Consent of committee on student progress. Restricted to Medical students only. Basic and clinical science of orthopaedic surgery and rheumatology. (P/NP grading only.) Effective: 2012 Summer Quarter.

OSU 428—Ambulatory and Emergency Room Orthopaedics (3-6)
Clinical Activity. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing. Limited enrollment. Introduction to general orthopaedic problems and trauma and their management in an outpatient environment, including the emergency room. Student will conduct orthopaedic examinations, present patients to staff rotating through trauma, hand, pediatrics, adult and foot clinics. (H/P/F grading only.) Effective: 1997 Winter Quarter.

OSU 462—Community Preceptorship (3-6)
Clinical Activity. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing; consent of instructor. Acquaints student with private practice of orthopaedics in the community setting. Opportunity to observe and assist private practitioners in office, emergency room, operating room and inpatient environment. Student must provide own transportation. (H/P/F grading only.) Effective: 1997 Winter Quarter.

OSU 464—Acting Internship (6)
Clinical Activity. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing. Rotation designed to increase basic knowledge of musculoskeletal abnormalities at clinical level. Attention focused on selective case material. For those students who demonstrate proficiency, responsibility will be similar to that of intern. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

OSU 465—Externship in Advanced Orthopaedics (3-6)
Clinical Activity—40 hours. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing. Advanced Orthopaedic rotation done at an approved institution. Topics may include Trauma, Sports, Spine, Pediatrics, Joint and/or Foot/Ankle. Students are expected to perform at the level of an Intern. May be repeated for credit. (H/P/F grading only.) Effective: 2013 Summer Quarter.

OSU 480—Insights in Orthopardic Surgery (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. First- and second-year medical students in good academic standing. Exposure to aims, methods and procedures in orthopaedic surgery via attendance at grand rounds, patient care conferences, and group discussions. (H/P/F grading only.) Effective: 1997 Winter Quarter.

OSU 481—History of Medicine for Medical Students (1.5)
Lecture/Discussion—2.5 hours. Prerequisite(s): Third- or fourth-year students in the School of Medicine or second-year students with consent of instructor. Overview of the history of medicine throughout the world to introduce medical students to landmark accomplishments and key figures in the
development of health care and to provide an expanded philosophical perspective on the everchanging field of modern medicine. (H/P/F grading only.) Effective: 1997 Winter Quarter.

OSU 499—Orthopardics Research (1-12)
Clinical Activity. Prerequisite(s): Consent of Instructor. Third- or fourth-year medical student in good academic standing. Laboratory or clinical investigation on selected topics. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SOM Courses | OTO

Course in OTO:

OTO 192—Internship in Otolaryngology (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in otolaryngology and related fields. Final project report. (P/NP grading only.) Effective: 1997 Winter Quarter.

OTO 199—Special Study in Otolaryngology for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Advanced undergraduate with consent of instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

OTO 290C—Research Conference in Otolaryngology (1)
Lecture/Discussion—1 hour. Prerequisite(s): Graduate students; medical students; advanced undergraduates with consent of instructor. Presentation and discussion of faculty and student research in otolaryngology. (S/U grading only.) Effective: 1997 Winter Quarter.

OTO 291—Principles of Speech, Hearing and Equilibrium (3)
Lecture/Discussion—3 hours. Prerequisite(s): Graduate students; medical students; advanced undergraduates with consent of instructor. Presentations by faculty and guest lecturers on anatomy, physiology, and
behaviors involved in speech production, hearing, and equilibrium. Each student will be expected to make one class presentation. Effective: 1997 Winter Quarter.

OTO 299—Individual Study in Otolaryngology for Advanced Graduate Students (1-12)
Variable. Prerequisite(s): Advanced graduate student with consent of instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

OTO 403—Basic Principles of Reconstructive Surgery (1)
Lecture. Prerequisite(s): Third- or fourth-year medical student with consent of instructor. Formal presentations covering basic principles of reconstructive surgery, including wound healing, treatment of lacerations, skin and bone grafts, flaps, Z-plasties and revision of scars. Laboratory session utilizing animal tissues. Effective: 1997 Winter Quarter.

OTO 440—Otolaryngology Required Clerkship (3-9)
Clinical Activity—30 hours. Prerequisite(s): Consent by Committee on Student Evaluation and Promotion. Provide fundamental knowledge of otorhinolaryngologic diagnosis and principles, develop facility with basic ENT instruments, provide an understanding of treatment for ear, nose and throat problems and provide knowledge of what patients should be referred for otorhinolaryngologic care. May be repeated for credit. (H/P/F grading only.) Effective: 2011 Summer Quarter.

OTO 450—Fourth Year Otolaryngology Elective (6)
Clinical Activity—35 hours; Discussion—1 hour; Film Viewing—0.25 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Third- or fourth-year Medical Students. Participation in Otolaryngology Clinic and operating room. Evaluation and management of common Otolaryngologic diseases. (H/P/F grading only.) Effective: 2001 Fall Quarter.

OTO 460—Clinical Otolaryngology Elective (3-18)
Clinical Activity. Prerequisite(s): Third- and fourth-year medical students with consent of instructor; open to graduate students. Approved for graduate degree credit. Total involvement in clinical activities of the department. (H/P/F grading only.) Effective: 1997 Winter Quarter.

OTO 465—Away Acting Internship in Otolaryngology (3-6)
Clinical Activity. Externship rotation for Acting Internships in Otolaryngology. May be repeated for credit. (H/P/F grading only.) Effective: 2018 Spring Quarter.

OTO 490—Journal Seminar (1)
Lecture/Discussion—10 hours. Prerequisite(s): Fourth-year medical students with consent of instructor; open to graduate students. Approved for graduate degree credit. Monthly review of current otolaryngologic and related literature and recent advances. (H/P/F grading only.) Effective: 1997 Winter Quarter.

OTO 498—Individual or Group Study (1-5)
Laboratory—1-4 hours; Lecture/Discussion—1-2 hours. Prerequisite(s): Consent of Instructor. Introduction to basic research in Otolaryngology. Lectures, discussion
and laboratory study of sensory and motor systems. (H/P/F grading only.) Effective: 1997 Winter Quarter.

OTO 499—Research (1-12)
Variable. Prerequisite(s): Medical students with consent of instructor; Open to graduate students. Approved for graduate degree credit. Participation in ongoing projects. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

SOM Courses | PMD

Courses in PMD:

PMD 192—Internship in Human Pathology (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in pathology and related fields. (P/NP grading only.) Effective: 1997 Winter Quarter.

PMD 199—Special Study in Pathology for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Advanced undergraduates. (P/NP grading only.) Effective: 1997 Winter Quarter.

PMD 290C—Research Group Conferences (1)
Seminar—1 hour. Prerequisite(s): Graduate level standing. Focused around the mechanisms of function of the central nervous system under normal and pathogenic conditions. Seminars lead by various speakers from UC Davis and other Institutions, both domestic and international. May be repeated for credit. (S/U grading only.) Effective: 2017 Fall Quarter.

PMD 296—Neurodevelopment Group Study (1-6)
Variable—1-6 hours. Explore mechanisms that impact perinatal development of the cerebral cortex, and other cortical structures, under normal and pathological conditions. (S/U grading only.) Effective: 2017 Summer Quarter.

PMD 298—Advanced Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Group Study provides the opportunity for a faculty member to work with students in a focused manner. (S/U grading only.) Effective: 2017 Summer Quarter.

PMD 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

PMD 405—Brain Cutting Conference (1-4)
Seminar—1-4 hours. Prerequisite(s): Third- and fourth year medical students or consent of instructor. Current specimens are sectioned, discussed, and clinical correlations proposed. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PMD 407—Advanced Neuropathology (3-18)
Lecture/Discussion—40 hours. Prerequisite(s): Consent of Instructor. Third or fourth year medical student. Restricted to Medical students only. Presents an integrated introduction to mechanisms of the central and peripheral nervous system injury. Gain an understanding of pathological mechanisms underlying disease, the anatomic and molecular manifestations of pathologic processes of the CNS and PNS. (H/P/F grading only.) Effective: 2015 Fall Quarter.

PMD 410A—General and Endocrine Pathology (2.5)
Discussion/Laboratory—4.5 hours; Lecture—4 hours. Restricted to medical students only. Pathologic mechanisms of human disease. Concepts of general pathologic processes, i.e., cell death, inflammation and neoplasia. Endocrine pathology in the context of clinical human disease. Emphasis on integration of clinical practice with gross and histologic images emphasizing team-based learning. (P/F grading only.) Effective: 2015 Winter Quarter.

PMD 410B—Systemic Pathology (1)
Discussion/Laboratory—0.5 hours; Lecture—1 hour. Prerequisite(s): Approval by SOM Committee on Student progress. Restricted to Medical students only. Anatomic and clinical pathology of organ system human disease with an emphasis on integration with clinical medicine. Topics include hematopathology and neuropathology. (P/F grading only.) Effective: 2010 Spring Quarter.

PMD 410C—Systemic Pathology (2)
Discussion—2 hours; Lecture—1 hour. Prerequisite(s): Approval by SOM Committee on Student progress. Restricted to Medical students only. Anatomic and clinical pathology of organ system human disease with an emphasis on integration with clinical medicine. Topics include pulmonary pathology, cardiovascular pathology, hematopatology, oncologic pathology, and nephropathology. (P/F grading only.) Effective: 2010 Spring Quarter.

PMD 410D—Systemic Pathology (2.5)
Discussion—2 hours; Lecture—1 hour. Prerequisite(s): Approval by SOM Committee on Student progress. Restricted to Medical students only. Anatomic and clinical pathology of organ system human disease with emphasis on integration with clinical medicine. Course content parallels concurrent clinical courses with integration of lectures and discussions. Topics include gastrointestinal and gynecologic pathology, hepatopathology, oncologic pathology and musculoskeletal pathology. (P/F grading only.) Effective: 2010 Spring Quarter.

PMD 435—Clinical Patient Care in Pathology (3-9)
Clinical Activity—24 hours; Independent Study—7 hours; Lecture/Discussion—4 hours. Prerequisite(s): and Consent of Instructor. Completed one of the following 3rd year clerkships: Family Medicine, Internal Medicine, Surgery, OBGYN or Pediatrics. Four-week course is designed to give the third-year medical student an exposure to the diverse roles that pathologists have in clinical patient care. May be repeated for credit. (H/P/F grading only.) Effective: 2015 Summer Quarter.

PMD 440—Surgery-Pathology-Radiology (SPR) Research Laboratory (2)
Discussion/Laboratory—2 hours; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Provide future clinicians and scientists with basic clinical and bioengineering laboratory skills to prepare for careers in translational research (P/F grading only.) Effective: 2014 Summer Quarter.

PMD 464—Anatomic Pathology (3-6)
Clinical Activity—40 hours; Variable. Prerequisite(s): Consent of Instructor. Fourth-year Medical Students. Restricted to Medical Students only. Anatomic pathology with an emphasis on autopsy and surgical pathology with application to clinical practice. Specimen grossing, frozen sections, microscopic sign-out and conferences. Exposure to cytopathology, hematopathology, and clinical pathology is available. (H/P/F grading only.) Effective: 2010 Winter Quarter.

PMD 465—Applied Clinical Laboratory Medicine (3-6)
Variable—40 hours. Prerequisite(s): Consent of Instructor. Emphasis upon laboratory techniques, procedures, and interpretation of laboratory results. Students will be expected to participate fully and in all laboratory operations including bench techniques, laboratory management, and quality control. May be repeated for credit. (H/P/F grading only.) Effective: 2012 Winter Quarter.

PMD 470—Sub-Specialty in Didactic Pathology (3-16)
Lecture/Lab—25 hours. Prerequisite(s): Consent of Instructor. Externship provides in-depth exposure to one of a variety of sub-specialties in Pathology. May be repeated for credit. (H/P/F grading only.) Effective: 2011 Spring Quarter.

PMD 474—Anatomic Pathology Acting Internship (3-9)
Clinical Activity—40-80 hours. Prerequisite(s): Fourth-year medical student or consent of instructor. Restricted to medical students only. Anatomic Pathology AI will permit students to gain skills needed for first year Pathology Residency. Students will perform autopsies and take full responsibility for a variety of surgical pathology cases. A mix of outpatient and inpatient cases is expected. May be repeated for credit. (H/P/F grading only.) Effective: 2011 Summer Quarter.

PMD 475—Anatomic Pathology Acting Internship (3-9)
Clinical Activity—40-80 hours. Prerequisite(s): PMD 410A; PMD 410B; PMD 410C; PMD 410D; and Consent of Instructor. Or equivalent. Successful completion of third-year clinical rotations. Restricted to Medical Students only. Year four level course is designed to provide a concentrated experience in Surgical Pathology and Cytolopathology. Rotate on the surgical and cytopathology sub-specialty teams and assume responsibility for patient cases. May be repeated for credit. (H/P/F grading only.) Effective: 2015 Summer Quarter.

PMD 493—Interdisciplinary Study of Gastrointestinal Cancer (6)
Clinical Activity—12 hours; Discussion/Laboratory—20 hours; Laboratory—3 hours; Lecture—5 hours. Prerequisite(s): Consent of Instructor. In-depth study of gastrointestinal, hepatic and pancreatic cancer. Emphasis on an integration of basic science and clinical medicine. Participating departments include pathology, surgical oncology, medical oncology, gastroenterology, radiology and radiotherapy. (Surgery 493D.) (H/P/F grading only.) Effective: 2012 Summer Quarter.

PMD 497T—Tutoring in Pathology (1-5)
Tutorial—3-15 hours. Prerequisite(s): Advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum of the School of Medicine. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PMD 498—Advanced Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Medical student. Group study in variety of advanced topics in general, special, experimental, or comparative pathology. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PMD 499—Research (1-18)
Variable. Prerequisite(s): Medical student with consent of instructor. Limited enrollment. Research in experimental, molecular, comparative, and applied pathology. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

SOM Courses | PED

Courses in PED:

PED 199—Special Study in Pediatric Research (1-5)
Variable. Prerequisite(s): Undergraduate student with consent of instructor based upon adequate preparation as determined by instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

PED 299—Pediatric Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate students who are candidates for a degree in some area of biology or behavioral sciences. (S/U grading only.) Effective: 1997 Winter Quarter.

PED 401—Preceptorship in Pediatrics (2)
Variable. Prerequisite(s): Second-year medical student or first-year medical student with consent of instructor. Opportunity to observe and participate in primary medical care in a practicing pediatricians office. Participation in history-taking and physical examination will be at discretion of preceptor and dependent on students experience. Evaluation by student. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PED 402—Clinical Experience in Private Practice (1-18)
Clinical Activity. Prerequisite(s): PED 430; Third-or fourth-year medical student; consent of preceptor and Chairperson. Opportunity to participate in practice of preceptor, performing such tasks as history taking, physical examination, and patient management. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PED 405—Pediatrics Lecture Series (0.5)
Lecture—15 hours. Prerequisite(s): Consent of Instructor. Lecture series covers major topics in pediatrics with case presentations and panels from pediatric subspecialists. Topics include, but are not limited to: cardiology, pulmonology, nephrology, gastroenterology, critical care, and primary care pediatrics. May be repeated for credit. (P/F grading only.) Effective: 2014 Fall Quarter.

PED 415—Fetal and Neonatal Physiology (1)
Independent Study—4 hours; Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Elective is designed to combine for study a variety of aspects of the physiology, anatomy and biochemistry of the fetus and newborn with relevant clinical examples of disorders in each of the 10 topics that will be discussed. (P/F grading only.) Effective: 2014 Spring Quarter.

PED 430—Pediatric Clerkship (12)
Clinical Activity—45 hours. Prerequisite(s): Approval by School of Medicine Committee on Student Progress. Restricted to Medical students only. Eight week clinical clerkship providing students with the opportunity to learn fundamentals of caring for the pediatric patient by participating in nursery, ambulatory and inpatient services at UCDMC and affiliated clinical sites. Rounds, conferences, student presentations ongoing. (P/NP grading only.) Effective: 2001 Summer Quarter.

PED 430F—SJVP Pediatric Clerkship at UCSF (12)
Clinical Activity—45 hours. Prerequisite(s): Approval by School of Medicine Committee on Student Progress. Restricted to Medical students only. Eight-week clinical clerkship providing students with the opportunity to learn fundamentals of caring for the pediatric patient by participating in nursery, ambulatory and inpatient services at UCSF Fresno. Rounds, conferences, student presentations ongoing. (H/P/F grading only.) Effective: 2013 Fall Quarter.

PED 430FA—SJVP Longitudinal Pediatrics Clerkship (1.5-6)
Clinical Activity—40-60 hours. Prerequisite(s): Consent of Instructor. Longitudinal Pediatrics Clerkship runs concurrently with Internal Medicine, Family Medicine and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PED 430FB—SJVP Longitudinal Pediatrics Clerkship (1.5-6)
Clinical Activity—40-60 hours. Prerequisite(s): Consent of Instructor. Longitudinal Pediatrics Clerkship runs concurrently with Internal Medicine, Family Medicine and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PED 430FC—SJVP Longitudinal Pediatrics Clerkship (1.5-6)
Clinical Activity—40-60 hours. Prerequisite(s): Consent of Instructor. Longitudinal Pediatrics Clerkship runs concurrently with Internal Medicine, Family Medicine and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PED 430FD—SJVP Longitudinal Pediatrics Clerkship (1.5-6)
Clinical Activity—40-60 hours. Prerequisite(s): Consent of Instructor. Longitudinal Pediatrics Clerkship runs concurrently with Internal Medicine, Family Medicine and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PED 430R—Rural PRIME Pediatrics Longitudinal Clerkship (2)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Pediatrics Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PED 430RA—Rural PRIME Pediatrics Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Pediatrics Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PED 430RB—Rural PRIME Pediatrics Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Pediatrics Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PED 430RC—Rural PRIME Pediatrics Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Pediatrics Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PED 430RD—Rural PRIME Pediatrics Longitudinal Clerkship (1)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Pediatrics Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PED 430TA—TeachMS Longitudinal Pediatrics Clerkship (A) (4)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Longitudinal Clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. (H/P/F grading only.) Effective: 2016 Fall Quarter.

PED 430TB—TeachMS Longitudinal Pediatrics Clerkship (B) (6)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Longitudinal clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. (H/P/F grading only.) Effective: 2016 Fall Quarter.

PED 430TC—TeachMS Longitudinal Pediatrics Clerkship (C) (2)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Longitudinal clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. (H/P/F grading only.) Effective: 2016 Fall Quarter.

PED 439D—Directed Clinical Studies in Pediatrics (1-12)
Clinical Activity—40 hours. Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for modified curriculum or to complete a clinical rotation following a leave of absence. May be repeated for credit. (P/F grading only.) Effective: 2011 Spring Quarter.

PED 439R—Directed Studies in Pediatrics (1-12)
Clinical Activity—30 hours; Independent Study—10 hours. Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for remediation of all or part of clinical rotation. Clinical studies to accommodate and satisfy remedial work as directed by the Committee on Student Progress and approved by the course IOR. May be repeated for credit. (P/F grading only.) Effective: 2011 Summer Quarter.

PED 460A—Acting Internship: General Inpatient Pediatric Clerkship (3-18)
Clinical Activity. Prerequisite(s): PED 430 B or better; and Consent of Instructor. Letter of recommendation from Pediatrics faculty member. Limited enrollment. The Ward Acting Intern functions in a manner similar to that of a pediatric intern. The Acting Intern takes admissions in the regular sequence and is expected to take night call. (H/P/F grading only.) Effective: 2016 Fall Quarter.

PED 460B—Acting Internship: Outpatient Pediatrics (3-18)
Clinical Activity. Prerequisite(s): PED 430 B or better; and Consent of Instructor. Letter of recommendation from Pediatrics faculty member. Limited enrollment. Supervised experience in pediatric care on outpatient service at UCDMC. Student functions as Acting Intern with appropriate supervision by residents and attending faculty. Limited enrollment. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PED 461—Pediatric Inpatient AI in Hematology/Oncology (6)
Clinical Activity—37.5 hours; Lecture—7.5 hours. Prerequisite(s): PED 430; and Consent of Instructor. Satisfactory completed. Limited Enrollment. Inpatient and outpatient experience in diagnosis and management of oncologic and hematologic disorders in children. Laboratory experience and participation in clinical investigation may be arranged. (H/P/F grading only.) Effective: 2009 Spring Quarter.

PED 462—Elective in Pediatric Endocrinology (3-18)
Clinical Activity. Prerequisite(s): Consent of Instructor. Completion of second-year study or the equivalent. Limited enrollment. Inpatient and outpatient experience in diagnosis and management of endocrine endocrine disorders in children. Laboratory experience and participation in clinical investigation may be arranged. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PED 463—Medical and Mental Health Evaluation of Children at Risk for Maltreatment (3-9)
Clinical Activity—30 hours; Discussion—4 hours. Elective for fourth-year medical students covers basic areas of knowledge needed for child abuse prevention and consultation. Rotation includes legals cases, abuse exams, child and parent interactive therapy and visits to community organizations. May be repeated for credit. (H/P/F grading only.) Effective: 2012 Spring Quarter.

PED 464—Acting Internship in Neonatology (3-12)
Clinical Activity—60 hours. Prerequisite(s): PED 430 B or better; and Consent of Instructor. Letter of recommendation from Pediatrics faculty member. Limited enrollment. Diagnostic and therapeutic aspect of the medical and surgical high-risk neonate. Student expected to take night call. May be repeated for credit. (H/P/F grading only.) Effective: 2014 Fall Quarter.

PED 465—Pediatrics Specialty Clinic Elective (3-18)
Clinical Activity. Prerequisite(s): PED 430; and Consent of Instructor. Satisfactory completed. Limited enrollment. Supervised experience in a variety of pediatric subspecialty clinics. Limited enrollment. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PED 466—Elective in Pediatric Cardiology (3-18)
Clinical Activity. Prerequisite(s): PED 430; Satisfactory completed. Inpatient and outpatient experience in diagnosis and management of cardiologic disorders in children. Laboratory experience and participation in clinical investigation may be arranged. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PED 467—Elective in Pulmonary Medicine (3-18)
Clinical Activity. Prerequisite(s): Pediatric clerkship. Inpatient and outpatient management of pediatric patients with pulmonary diseases. These will include but will not be limited to cystic fibrosis, asthma, and other forms of chronic pulmonary diseases as well as congenital abnormalities. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PED 468—Elective in Pediatrics Nephrology (3-18)
Clinical Activity. Prerequisite(s): PED 430; and Consent of Instructor. Satisfactory completed. Limited enrollment. Inpatient and outpatient experience in diagnosis and management of renal disorders in children. Laboratory experience and participation in clinical investigation may be arranged. Limited enrollment. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PED 469—Elective in Pediatric Infectious Disease (3-18)
Clinical Activity. Prerequisite(s): PED 430; and Consent of Instructor. Satisfactory completed. Limited enrollment. Inpatient and outpatient experience in diagnosis and treatment of infectious disease of infants and children. Laboratory and clinical investigation may be arranged. Limited enrollment. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PED 470—Elective in Pediatric Neurology (3-18)
Clinical Activity. Prerequisite(s): PED 430; IMD 430; OBG 430; and Consent of Instructor. All courses satisfactory completed. Limited enrollment. Inpatient and outpatient experience in diagnosis and management of neurological disorders in children. Students will also participate in other pediatric subspecialty clinics which serve children with neurological disorders. This course does not satisfy the fourth year neurology requirement. Limited enrollment. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PED 471—Elective in Pediatric Gastroenterology (3-18)
Clinical Activity. Prerequisite(s): PED 430; and Consent of Instructor. Satisfactory completed. Limited enrollment. Inpatient and outpatient experience in diagnosis and management of gastroenterology disorders in children. Laboratory experience and participation in clinical investigation may be arranged. Limited enrollment. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PED 472—Clinical Rotation in Adolescent Medicine (3-9)
Clinical Activity—39 hours; Lecture—1 hour. Prerequisite(s): Consent of Instructor. Fourth-year Medical Student. Under supervision, students will see patients in the UCD clinic and at a number of community-based sites. Emphasis on the socially-mediated problems that face adolescents, including substance abuse, STD's, pregnancy, depression and suicide. One hour of lecture each week. (H/P/F grading only.) Effective: 2011 Summer Quarter.

PED 473—Away Acting Internship in Pediatrics (6-18)
Clinical Activity—40 hours; Lecture—6 hours; Variable. Prerequisite(s): Consent of Instructor. Satisfactory completion of Pediatrics Clerkship. Work at the level of a sub intern in Inpatient and/or Outpatient settings. Expectation is to provide direct patient management. (H/P/F grading only.) Effective: 2010 Spring Quarter.

PED 476—Acting Internship in Pediatric Intensive Care (3-18)
Clinical Activity. Prerequisite(s): PED 430 A is required; or Consent of Instructor. Letter of recommendation from Pediatrics faculty member. Limited enrollment. Evaluation and support of critically ill infants and children. In general, student expected to take night call every third night during rotation. May be repeated for credit. (H/P/F grading only.) Effective: 2016 Fall Quarter.

PED 493—Ethical, Legal and Social Issues in Clinical Genetics (6)
Auto Tutorial—8 hours; Clinical Activity—18 hours; Independent Study—2 hours; Seminar—12 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. Develop advanced knowledge, communication skills and attitudes necessary to provide compassionate, knowledgeable, and expert care to patients who may be at increased genetic risk for disease. Seminars cover ethical and legal principles, epidemiology, and genetics. (H/P/F grading only.) Effective: 2010 Summer Quarter.

PED 493B—Living with Intellectual & Developmental Disability in the Community (1-6)
Clinical Activity—4 hours; Fieldwork—4 hours; Lecture—10 hours; Seminar—4 hours. Prerequisite(s): Consent of Instructor. In-depth experience with Intellectual & Developmental Disability across the lifespan. (H/P/F grading only.) Effective: 2012 Summer Quarter.

PED 493C—Fetal and Neonatal Physiology SSM (6)
Clinical Activity—8 hours; Lecture/Discussion—24 hours. Prerequisite(s): Consent of Instructor. Elective is available for students interested in exploring the fascinating world of the fetus and neonate. The elective is designed to combine the basic sciences with relevant clinical examples of disorders. (H/P/F grading only.) Effective: 2014 Fall Quarter.

PED 498—Directed Group Study (1-5)
Variable—3-15 hours. Explore in-depth various topics in Pediatrics. Extensive contact with and oversight by instructor. May be repeated for credit. (H/P/F grading only.) Effective: 2004 Fall Quarter.

PED 499—Research Topics in Pediatrics (1-18)
Variable. Prerequisite(s): Student in Medical School with consent of instructor. Individual research project in pediatric subspecialty areas (cardiology, endocrinology, hematology, metabolism, newborn physiology and others) may be arranged with faculty member. Independent research by student will be emphasized and long-term projects are possible. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

SOM Courses | PMR

Courses in PMR:

PMR 100—Research Approaches to Disability and Rehabilitation (2)
Lecture/Discussion—2 hours. Discussion and evaluation of research approaches to medical rehabilitation, community integration, and quality of life of disabled persons, with a focus on the progressive disabilities associated with neuromuscular diseases. Intent is to encourage interest in professions that serve the disabled community and increase awareness of rehabilitation goals. Effective: 2002 Winter Quarter.

PMR 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Advanced standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

PMR 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Advanced standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

PMR 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

PMR 405—Healthy Living: Leading by Example (1.5)
Clinical Activity—1 hour; Discussion—2 hours; Laboratory—4 hours; Lecture—4 hours. Prerequisite(s): Consent of Instructor. Course is to improve the physical and mental health of participating students while supplementing their medical education with specific concepts. May be repeated for credit. (P/F grading only.) Effective: 2014 Fall Quarter.

PMR 405A—Healthy Living: Leading by Example (1)
Clinical Activity—1 hour; Discussion—2 hours; Laboratory—4 hours; Lecture—4 hours. Prerequisite(s): Consent of Instructor. Improve the physical and mental health of participating students while supplementing their medical education with specific concepts. May be repeated for credit. (P/F grading only.) Effective: 2014 Fall Quarter.

PMR 405B—Healthy Living: Leading by Example (0.5)
Clinical Activity—1 hour; Discussion—2 hours; Laboratory—4 hours; Lecture—4 hours. Prerequisite(s): Consent of Instructor. Improve the physical and mental health of participating students while supplementing their medical education with specific concepts. May be repeated for credit. (P/F grading only.) Effective: 2014 Fall Quarter.

PMR 421—Introduction to Sports Medicine (1)
Clinical Activity—4 hours; Fieldwork; Lecture—1 hour. Introduction to basic concepts of Sports Medicine in Physical Medicine and Rehabilitation. Students attend afternoon clinic with Sports Medicine attending; attend lectures focusing on Sports Medicine topics. Students also eligible to cover sporting events with attending physicians where available. (P/F grading only.) Effective: 2007 Summer Quarter.

PMR 440—Rehabilitation Medicine Clerkship (3)
Clinical Activity—36 hours; Lecture/Discussion—4 hours. Prerequisite(s): IMD 430; SUR 430; and Consent of Instructor. Rehabilitation and comprehensive care of physically disabled and physical medicine management of neurologic, neuromuscular and musculoskeletal disorders. Emphasis on evaluation and conservative treatment of spinal disorders, sports injuries and neuromuscular disease. Emphasis on inpatient rehabilitation, pediatrics, spine or sports possible. (H/P/F grading only.) Effective: 2008 Spring Quarter.

PMR 461—Rehabilitation Medicine (6)
Clinical Activity—36 hours; Lecture/Discussion—4 hours. Prerequisite(s): IMD 430; SUR 430; and Consent of Instructor. 4-week rotation designed as broad overview of PM&R practice for students interested in residency training in the specialty. Emphasis on evaluation and conservative treatment of spinal disorders, sports injuries, neuromuscular disease, neurological and non-operative orthopedic problems requiring rehabilitative management. (H/P/F grading only.) Effective: 2008 Winter Quarter.

PMR 462—Rehabilitation Medicine Clinical Elective (5-18)
Clinical Activity. Prerequisite(s): IMD 430; SUR 430; and Consent of Instructor. Completion of third year in Medical School. Emphasis on evaluation of patients with neurological or orthopaedic problems requiring rehabilitative techniques for their management. Introduction to management of such patients. Physical Medicine and Rehabilitation at off-campus facility must be approved by Chairperson. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PMR 470—Away Acting Internship in Physical Medicine & Rehabilitation (3-6)
Clinical Activity. Prerequisite(s): Consent of Instructor. AI Externship option for PM&R rotations at other institutions. May be repeated for credit. (H/P/F grading only.) Effective: 2018 Spring Quarter.

PMR 493—Applied Musculoskeletal Anatomy: Sports & Spine SSM (6)
Clinical Activity—4 hours; Laboratory—16 hours; Lecture—5 hours; Lecture/Lab—10 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. This four week module will review the anatomy and biomechanics of the musculoskeletal system as well as its associated pathology. The students will be instructed on appropriate musculoskeletal exam techniques and logical approach to the patient in the clinical setting. (H/P/F grading only.) Effective: 2008 Winter Quarter.

PMR 498—Advanced Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Study and experience for medical students in any of a number of areas in physical medicine and rehabilitation. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PMR 499—Research for Medical Students (1-12)
Variable. Prerequisite(s): Consent of Instructor. Research on any of a variety of topics in physical medicine and rehabilitation. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

SOM Courses | PSU

Courses in PSU:

PSU 460—Clinical Plastic Surgery Elective (1-18)
Clinical Activity. Prerequisite(s): SUR 430; and Consent of Instructor. Third- or fourth-year medical students. Total involvement in patient care involving surgical preparation, treatment, operative care, and follow-up. Developing and understanding reconstruction and aesthetic plastic surgery. Microvascular surgery included. Student rotation. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SOM Courses | PSY

Courses in PSY:

PSY 092—Willow Clinic (1-2)
Clinical Activity—2-6 hours; Seminar—1-2 hours; Variable. Open to lower division undergraduate students. Student run clinic for undergraduate students interested in learning about and meeting the unique health care needs for the homeless population. May be repeated for credit. (P/NP grading only.) Effective: 2009 Fall Quarter.

PSY 192—Willow Clinic (1-2)
Clinical Activity—2-6 hours; Lecture—1-2 hours; Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. UC Davis enrollment; upper division standing. Student run clinic for upper division students interested in learning about and meeting the unique health care needs for the homeless population. May be repeated for credit. (P/NP grading only.) Effective: 2009 Winter Quarter.

PSY 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Advanced standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

PSY 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Advanced standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

PSY 298—Directed Group Study for Graduate Students (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. Effective: 1997 Winter Quarter.

PSY 299—Special Study for Graduate Students (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

PSY 403—Fundamentals of Clinical Psychiatry (3)
Clinical Activity—1 hour; Lecture—3 hours. Prerequisite(s): Approval of SOM Committee on Student Progress. Restricted to medical student only. Psychiatric interviewing, Mental Status Exam and diagnosis. Major child and adult disorders, including substance abuse and dependence. Weekly student interviews of psychiatric patients in small group format. (P/F grading only.) Effective: 2008 Winter Quarter.

PSY 410—Klingenstein Summer Elective (2.5)
Clinical Activity—20 hours. Prerequisite(s): Consent of Instructor. During this "mini-clerkship," fellows will attend clinics, in-patient settings, and clinicians' offices. They will meet weekly to present cases and review current literature, and will complete a summary narrative at the end of their experience. (P/F grading only.) Effective: 2015 Spring Quarter.

PSY 410L—Klingenstein Longitudinal Elective (2)
Clinical Activity—5 hours; Discussion—2 hours; Discussion/Laboratory—10 hours. Prerequisite(s): Consent of Instructor. Year-long mentoring program provides clinical exposure to child and adolescent psychiatric healthcare during a medical student's pre-clinical years. (P/F grading only.) Effective: 2015 Fall Quarter.

PSY 412—Psychiatry Grand Rounds (1)
Lecture—1 hour. Prerequisite(s): Medical students or staff or other qualified mental health professionals with consent of instructor. Weekly conference at UCDMC for presentation of selected clinical cases,
presentation of lecture and research reports. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PSY 413—Outpatient Psychiatry Clerkship (6)
Clinical Activity—36 hours; Conference—2 hours; Lecture—2 hours. Prerequisite(s): PSY 430; And/or consent of coordinator. Experience in clinical management/treatment of adult outpatients with psychiatric and substance abuse disorders; crisis management/intervention, evaluation/development of diagnosis and treatment plan; emphasis on outpatient psychopharmacology/brief psychotherapy; observation of group therapy. Individual supervision by faculty/residents. (H/P/F grading only.) Effective: 2009 Winter Quarter.

PSY 414—Psychosomatic Medicine Clerkship (3-12)
Clinical Activity—32 hours; Discussion—8 hours. Prerequisite(s): Psychiatry Clerkship or consent of instructor; medical students only. A large university hospital service in which the student functions as a member of the team in evaluation, management and psychiatric liaison with other medical specialties. Intensive supervision from senior staff and psychiatric residents. May be repeated up to 2 time(s). (H/P/F grading only.) Effective: 2007 Winter Quarter.

PSY 415—Telemedicine Clinical Elective (3-9)
Clinical Activity—20 hours. Prerequisite(s): Fourth-year medical student with consent of instructor. Fourth-year medical student elective in Telemedicine focusing on psychiatric issues. Align with University, School and Center for Health and Technology mission of rural outreach and public health, particularly in primary care. May be repeated for credit. (H/P/F grading only.) Effective: 2011 Winter Quarter.

PSY 416—Child Psychiatry Clerkship (6)
Clinical Activity—36 hours; Conference—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): PSY 430; And/or consent of coordinator. Didactic and clinical inpatient, outpatient, and consultation-liaison experiences with children, adolescents and families. Clinical observations, diagnostic assessment, and treatment will be undertaken with close supervision. Literature review and case conferences presented on a regular basis. (H/P/F grading only.) Effective: 2009 Winter Quarter.

PSY 417—Jail Psychiatric Clerkship (6)
Clinical Activity—28 hours; Conference—8 hours; Lecture—4 hours. Prerequisite(s): PSY 430; And/or consent of course coordinator. Students gain experience, under close faculty supervision, assessing
acute and chronic mentally ill inmates in both inpatient and clinic settings. (H/P/F grading only.) Effective: 2009 Winter Quarter.

PSY 418—Off-Campus Clinical Experience (3-9)
Clinical Activity—20-40 hours. Prerequisite(s): Consent of Instructor. Fourth-year medical students. Clinical or research elective in off-campus medical school or mental health setting. To be arranged with advance approval of instructor and
individual in charge of off-campus setting. May be repeated for credit. (H/P/F grading only.) Effective: 2012 Winter Quarter.

PSY 419—Combined Family Medicine-Psychiatry Clerkship (3-6)
Clinical Activity—32 hours; Discussion—8 hours. Students rotate through the county Primary Care Clinic under the supervision of dual-boarded Psychiatry and Family Practice Faculty to provide medical care of indigent and uninsured patients as well as primary care for psychiatry patients. May be repeated for credit. (H/P/F grading only.) Effective: 2018 Winter Quarter.

PSY 420—Acting Internship in Psychiatry (3-6)
Clinical Activity—40 hours. Prerequisite(s): PSY 430; And/or consent of course coordinator. Acting intern position with close faculty supervision with emphasis on biological psychiatry, psychopharmacology and psychodynamic aspects appropriate to diagnostic and long-term patient management. (H/P/F grading only.) Effective: 2016 Summer Quarter.

PSY 421—Combined Internal Medicine-Psychiatry Clerkship (3-6)
Clinical Activity—32 hours; Discussion—8 hours. Prerequisite(s): Psychiatry Clerkship or consent of instructor; medical students only. Students rotate through the county Primary Care Clinic under the supervision of dual-boarded Psychiatry and Internal Medicine Faculty to provide medical care of indigent and uninsured patients as well as primary care for psychiatry patients. May be repeated for credit. (H/P/F grading only.) Effective: 2018 Winter Quarter.

PSY 422—Readings in Psychiatry (1-3)
Discussion. Independent reading of a selected topic in psychiatry. Supervision and discussion with a psychiatry faculty member. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PSY 423—Willow Clinic (3-12)
Variable—4-10 hours. Prerequisite(s): Open to medical students in all four years of medical school. Student run clinic for medical students interested in learning about and meeting the unique health care needs for the homeless population. May be repeated for credit. (P/F grading only.) Effective: 2009 Spring Quarter.

PSY 424—Functional Genomics (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): Graduate standing or consent of instructor. The theory, methods and principles of functional neurogenomics with emphasis on the relationship to molecular mechanisms involved in development and disease of the nervous system. (H/P/F grading only.) Effective: 2010 Winter Quarter.

PSY 430—Psychiatry Clinical Clerkship (12)
Clinical Activity—45 hours. Prerequisite(s): Approval by School of Medicine Committee on Student Progress. Assigned to clinical settings, students build upon the skills gained in preclinical years; emphasis on diagnostic, therapeutic and interpersonal skills. Areas of focus - patient management, interviewing skills, mental status exam, differential diagnosis, basic psychopharmacology, crisis assessment, intervention and case (H/P/F grading only.) Effective: 2001 Summer Quarter.

PSY 430FA—SJVP Longitudinal Psychiatry Clerkship (1.5-6)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Family Medicine, Pediatrics and Internal Medicine for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PSY 430FB—SJVP Longitudinal Psychiatry Clerkship (1.5-6)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Family Medicine, Pediatrics and Internal Medicine for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PSY 430FC—SJVP Longitudinal Psychiatry Clerkship (1.5-6)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Family Medicine, Pediatrics and Internal Medicine for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PSY 430FD—SJVP Longitudinal Psychiatry Clerkship (1.5-6)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Family Medicine, Pediatrics and Internal Medicine for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PSY 430R—Rural PRIME Psychiatry Longitudinal Clerkship (2)
Clinical Activity—45 hours. Psychiatry Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PSY 430RA—Rural PRIME Psychiatry Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Psychiatry Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PSY 430RB—Rural PRIME Psychiatry Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Psychiatry Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PSY 430RC—Rural PRIME Psychiatry Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Psychiatry Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PSY 430RD—Rural PRIME Psychiatry Longitudinal Clerkship (1)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Psychiatry Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PSY 430TA—TeachMS Longitudinal Psychiatry Clerkship (A) (4)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Promotions. Longitudinal Clerkship runs concurrently with Primary Care and Medicine for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only.) Effective: 2013 Fall Quarter.

PSY 430TB—TeachMS Longitudinal Psychiatry Clerkship (B) (6)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Promotions. Longitudinal Clerkship runs concurrently with Primary Care and Medicine for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only.) Effective: 2013 Fall Quarter.

PSY 430TC—TeachMS Longitudinal Psychiatry Clerkship (C) (2)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Promotions. Longitudinal Clerkship runs concurrently with Primary Care and Medicine for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only.) Effective: 2013 Fall Quarter.

PSY 439D—Directed Clinical Studies in Psychiatry (1-12)
Clinical Activity—40 hours. Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for modified curriculum or to complete a clinical rotation following a leave of absence. May be repeated for credit. (P/F grading only.) Effective: 2011 Spring Quarter.

PSY 439R—Directed Studies in Psychiatry (1-12)
Clinical Activity—30 hours; Independent Study—10 hours. Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for remediation of all or part of clinical rotation. Clinical studies to accommodate and satisfy remedial work as directed by the Committee on Student Progress and approved by the course IOR. May be repeated for credit. (P/F grading only.) Effective: 2011 Summer Quarter.

PSY 480—Insights in Psychiatry (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. First- or second-year medical student in good academic standing. On individual basis, student provided with an opportunity for gaining
insight into various clinical activities in the practice of psychiatry. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PSY 488—Acting Internship in Inpatient Psychiatry, Away Rotation (6)
Clinical Activity—40 hours. Prerequisite(s): Psychiatry Clerkship and/or consent of course coordinator. Inpatient acting internship at approved non-UCDHS affiliated training program that provides experience and preparation for ambulatory medical care. Students perform as an intern, with a smaller number of patients, greater supervision, and responsibility for the ongoing care of assigned patients. (H/P/F grading only.) Effective: 2009 Summer Quarter.

PSY 489—Acting Internship in Ambulatory Psychiatry, Away Rotation (6)
Clinical Activity—40 hours. Prerequisite(s): Psychiatry Clerkship and/or consent of course coordinator. Outpatient acting internship at an approved non-UCDHS affiliated training program that provides experience and preparation for ambulatory medical care. Students perform as an intern, with smaller number of patients, greater supervision, and responsibility for the ongoing care of assigned patients. (H/P/F grading only.) Effective: 2009 Summer Quarter.

PSY 493—Culture, Medicine and Society (6)
Clinical Activity—16 hours; Discussion—4 hours; Independent Study—8 hours; Seminar—12 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. Students will learn about the epidemiological significance of health disparities and barriers to access to health care. The course will cover (1) Epidemiology/Health Disparities; (2) Society and Medicine; (3) Cinemeducation; (4) Reflection/Integration. (H/P/F grading only.) Effective: 2007 Spring Quarter.

PSY 498—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Approved for graduate degree credit. Medical students desiring to explore particular topics in depth. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PSY 499—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Approved for graduate degree credit. Individual research on selected topics or research projects. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

SOM Courses | RON

Course in RON:

RON 199—Special Study for Advanced Undergraduates; Research in Radiation Biology (1-5)
Variable—3-15 hours. Radiation Oncology is a unique discipline combining elements of clinical practice linked to complex physics based dosimetry and treatment planning. Included within this clinical environment is a strong basis in biology that underpins the clinical effectiveness of radiation treatment. May be repeated for credit. (P/NP grading only.) Effective: 2010 Fall Quarter.

RON 211—Introduction to Radiation Oncology Physics (3-6)
Variable. Prerequisite(s): Consent of Instructor. Restricted to physics and engineering graduate students and senior undergraduate physics majors. Class size limited to three students. Introduction to radiation oncology physics. Overview of treatment methodologies. Medical physics equipment. Treatment machine dosimetry, including calibration. Machine quality assurance. Patient dosimetry. Treatment planning. Simulation and treatment. Treatment quality assurance, including calculation checks and chart checks. Brachytherapy. (S/U grading only.) Effective: 2008 Fall Quarter.

RON 299—Independent Study and Research (1-12)
Laboratory—3-40 hours. Prerequisite(s): Enrollment with a graduate group for Ph.D. candidacy and consent of group advisor and sponsor. Research under supervision of Radiation Oncology faculty. Work must be appropriate to fulfill the requirements for the Ph.D. degree. (S/U grading only.) Effective: 2012 Fall Quarter.

RON 420—Radiobiology Lecture Course (1)
Lecture—1 hour. Prerequisite(s): BIS 001A; MAT 012; PHY 001A Radiobiology lectures are designed to engage the physician residents, physics residents and medical students in learning Radiobiology principles and concepts during the year the Radiation Physics course is taught. May be repeated up to 2 time(s). (H/P/F grading only.) Effective: 2011 Winter Quarter.

RON 463—Radiation Oncology Clerkship (3-9)
Clinical Activity—30 hours. Prerequisite(s): MDS 430; MDS 431; third-year clinical clerkship; consent of instructor required. Introduction to radiation oncology. Students will participate in workup and treatment planning for radiation oncology patients and will be introduced to the concepts involved in clinical radiation oncology, radiation biology, and radiation physics. May be repeated for credit. (H/P/F grading only.) Effective: 2012 Summer Quarter.

RON 465—Externship in Radiation Oncology (3-16)
Clinical Activity—30 hours. Prerequisite(s): Consent of Instructor. Externship provides in-depth exposure to the field of Radiation Oncology for students who rotation through an affiliated institution. May be repeated for credit. (H/P/F grading only.) Effective: 2015 Spring Quarter.

RON 499—Independent Study and Research in Therapeutic Radiology (1-18)
Variable—3-40 hours. Prerequisite(s): Consent of Instructor. Advanced-level research seminar in clinical and/or translational radiation oncology. Work with the course instructor to generate a testable hypothesis. May be repeated for credit. (H/P/F grading only.) Effective: 2014 Fall Quarter.

SOM Courses | RDI

Courses in RDI:

RDI 413—Radiological Diagnosis II (Physics of Diagnostic Radiology) (5)
Laboratory—6 hours; Lecture—49 hours. Prerequisite(s): Consent of Instructor. Physics of diagnostic imaging; x-ray production and interaction; image formation; modulation transfer function; fluoroscopy; cine fluoroscopy; stereoscopy; xeroradiography; computerized and geometrical tomography;
magnetic resonance and ultrasound. Principles of radiation protection in imaging will be covered. (H/P/F grading only.) Effective: 1997 Winter Quarter.

RDI 414—Medical Radiation Biology (3)
Lecture—27 hours. Prerequisite(s): Consent of Instructor. Medical radiation biology; molecular cellular and organ system response to acute and chronic irradiation; radiation carcinogenesis and genetic effects; radiation risk assessment; diagnostic ultrasound and magnetic resonance imaging health effects. Medical/legal considerations of radiation exposure. (H/P/F grading only.) Effective: 1997 Winter Quarter.

RDI 430—Introduction to Clinical Radiology (3-6)
Variable. Prerequisite(s): Consent of Instructor. Introduces students to common radiology tests, including limitations and risks by using ACR Appropriateness Criteria and incorporate patient specific clinical data into ordering and interpreting appropriate imaging tests. (H/P/F grading only.) Effective: 2017 Fall Quarter.

RDI 461—Advanced Clinical Clerkship in Diagnostic Radiology (3-6)
Clinical Activity—35 hours; Conference—4 hours; Discussion/Laboratory—1 hour. Prerequisite(s): Consent of Instructor. Satisfactory completion of second year medical school curriculum and of third-year clerkships in Internal Medicine and General Surgery. Restricted to eight students per rotation; open to visiting medical students from accredited programs. Work with clinical Radiologists in image interpretation fluoroscopy angiography image-guided intervention cardiac stress testing radionuclide therapy. Daily conferences in Radiology Diagnosis and Therapy Health Physics Radiation Safety. Prepare two clinical cases for in-class presentation. Assigned readings. May be repeated for credit. (H/P/F grading only.) Effective: 2014 Spring Quarter.

RDI 462—Diagnostic Imaging of Acquired and Congenital Heart Disease (2)
Lecture/Discussion—5 hours. Prerequisite(s): RDI 461 (can be concurrent); Fourth-year medical student in good academic standing. Main emphasis on radiology of acquired and congenital heart disease, but also on magnetic resonance, nuclear medicine, and echocardiography of heart diseases. (H/P/F grading only.) Effective: 1997 Winter Quarter.

RDI 473—Advanced Clinical Clerkship in Neuroradiology (3-6)
Clinical Activity—35 hours; Conference—4 hours; Independent Study—1 hour; Variable—9-18 hours. Prerequisite(s): Fourth-year medical student with interest in Diagnostic Radiology, Neuroradiology, Neurology, Neurosurgery, Psychiatry, Psychology, or related field; satisfactory completion of RDI 461, or the equivalent, is strongly encouraged. Restricted to one student per 2/4 week rotation. Work with Neuroradiologists in image interpretation of CT, MRI, and fluoroscopy. Opportunity to participate in assessment of Neurointerventional patients, and to observe Neurointerventional procedures. Daily conferences in Neuroimaging, General Radiology, Health Physics, and Radiology Safety. Assigned readings. May be repeated for credit. Credit limited to 3 units for 2 weeks; 6 units for 4 weeks. (H/P/F grading only.) Effective: 2014 Spring Quarter.

RDI 474—Advanced Clinical Clerkship in Pediatric Radiology (3-6)
Clinical Activity—30 hours; Conference—5 hours; Film Viewing—3 hours; Independent Study—2 hours. Prerequisite(s): Fourth-year medical students with interest in Radiology and/or Pediatrics; interested third-year medical students who have successfully completed Pediatrics clinical clerkships may enroll, given availability and consent of the instructor of record; prior completion of PDI 461, or the equivalent, encouraged. Restricted to two students per two-week or four-week rotation. Participation in the radiological care of Pediatric patients; evaluate the patient receiving the radiographic study, including pertinent historical/physical findings. Student expected to write up case files on interesting cases encountered during their rotation. May be repeated for credit. Credit limited to 3 units for 2 weeks; 6 units for 4 weeks. (H/P/F grading only.) Effective: 2014 Spring Quarter.

RDI 475—Advanced Clinical Clerkship in Musculoskeletal Radiology (MSK) (3-6)
Clinical Activity—35 hours; Conference—4 hours; Discussion/Laboratory—1 hour; Variable—9-18 hours. Prerequisite(s): Fourth-year medical student with interest in Musculoskeletal Radiology, Orthopedic Surgery, Sports Medicine, PMNR, or related field; satisfactory completion of RDI 461, or the equivalent, is strongly encouraged. Restricted to one student per 2/4 week rotation. Work with Musculoskeletal Radiologists in interpretation of CT, MRI, radiography, and fluoroscopy. Opportunity to assess patients for, and to observe image-guided procedures. Daily conferences in Musculoskeletal Imaging, General Radiology, Health Physics, and Radiology Safety. Assigned readings. May be repeated for credit. credit limited to 3 units for 2 weeks, 6 units for 4 weeks. (H/P/F grading only.) Effective: 2014 Spring Quarter.

RDI 476—Advanced Clinical Clerkship Vascular/Interventional Radiology (IR) (3-6)
Clinical Activity—35 hours; Conference—4 hours; Discussion/Laboratory—1 hour; Variable—9-18 hours. Prerequisite(s): Fourth-year medical student with interest in Diagnostic Radiology, Vascular/Interventional Radiology, Cardiovascular Imaging, Cardiology, Cardiovascular Surgery, Surgical Oncology, General Surgery, or related field; satisfactory completion of RDI 461, or the equivalent, is strongly encouraged. Restricted to one student per 2/4 week rotation. Medical student will work with Vascular/Interventional Radiologists in the evaluation of patients for interventional procedures. There will be opportunities to Daily conferences in Neuroimaging, General Radiology, Health Physics, and Radiology Safety. Assigned readings. May be repeated for credit. Credit limited to 3 units for 2 weeks, 6 units for 4 weeks. (H/P/F grading only.) Effective: 2014 Spring Quarter.

RDI 477—Advanced Clinical Clerkship in Ultrasound Radiology (3-6)
Clinical Activity—30 hours; Conference—5 hours; Film Viewing—3 hours; Variable—9-18 hours. Prerequisite(s): Fourth-year medical student with interest in Radiology, OB/GYN, or in other medical or surgical subspecialties employing ultrasound in their clinical practice; prior completion of RDI 461, or the equivalent, is encouraged. Restricted to two students per 2/4 week rotation. Participation as an active team member on a busy clinical ultrasound service. May be repeated for credit. (H/P/F grading only.) Effective: 2016 Summer Quarter.

RDI 478—Advanced Clinical Clerkship Abdominal Imaging (3-6)
Clinical Activity—35 hours; Conference—4 hours; Discussion/Laboratory—1 hour; Variable—9-18 hours. Restricted to one student per 2/4 week rotation. Work with clinical Radiologists on abdominal and pelvic CT, MR, ultrasound, digital radiography, gastrointestinal and genitourinary procedures, image-guided intervention. Offered as a 2-week rotation for third-year medical students and a 2/4-week rotation for fourth-year medical students. May be repeated for credit. Credit limited to 3 units for 2 weeks, 6 units for 4 weeks. (H/P/F grading only.) Effective: 2014 Spring Quarter.

RDI 479—Specialty Externship in Radiology (3-16)
Clinical Activity—25 hours; Discussion—10 hours. Externship provides in-depth exposure to one of a variety of sub-specialties in Radiology. May be repeated for credit. (H/P/F grading only.) Effective: 2011 Winter Quarter.

RDI 498—Group Study in Diagnostic Radiology (1-12)
Variable. Prerequisite(s): Consent of Instructor. (H/P/F grading only.) Effective: 1997 Winter Quarter.

RDI 499—Research in Diagnostic Radiology (1-12)
Variable. Prerequisite(s): Consent of Instructor. Approved for graduate degree credit. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

SOM Courses | RNU

Courses in RNU:

RNU 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

RNU 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

RNU 299—Research: Special Study for Graduate Students (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

RNU 401—Biomedical Radiochemistry (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate and medical students. Approved for graduate degree credit.Course is designed to combine basic nuclear physics, chemistry, and biology into a comprehensive and vigorous lecture-laboratory experience in biomedical nuclear chemistry.Subjects include choice and purification of appropriate gamma and beta radioisotopes,compounding biological pharmacodynamics and radioimmunoassay. (H/P/F grading only.) Effective: 1997 Winter Quarter.

RNU 411—Radiological Physics I (Physics of Nuclear Medicine) (5)
Laboratory—12 hours; Lecture—43 hours. Prerequisite(s): Consent of Instructor. Physics of diagnostic and therapeutic nuclear medicine, nuclear physics, radioactive decay; interaction of ionizing radiation; dosimeters; attenuation; internal and external dosimetry; health physics; radiation detection and imaging, scintillation cameras, computerized planar and tomographic imaging. Offered at UC Davis Medical Center. (H/P/F grading only.) Effective: 1997 Winter Quarter.

RNU 463—Clinical Clerkship in Nuclear Medicine (3-8)
Clinical Activity. Prerequisite(s): Consent of Instructor. Satisfactory completion of second-year medical school; RDI 461 recommended. Limited enrollment. Clerkship correlates radioisotopic methods with clinical, pathophysiological, and other diagnostic aspects of the patients care. Each patient reviewed with student by faculty member. Reading assignments, informal projects, and research techniques available. (H/P/F grading only.) Effective: 1999 Spring Quarter.

RNU 498—Group Study in Nuclear Medicine (1-12)
Variable. Prerequisite(s): Consent of Instructor. Approved for graduate degree credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

RNU 499—Research in Nuclear Medicine (1-12)
Variable. Prerequisite(s): Consent of Instructor. Research in Nuclear Medicine. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

SOM Courses | SUR

Course in SUR:

SUR 099—Cardiovascular Tissue Engineering Research (1-5)
Laboratory—3-15 hours. Multidisciplinary research in cardiovascular tissue engineering and regeneration for acquired and congenital cardiovascular disease. Effective: 2011 Summer Session 1.

SUR 192—Internship in General Surgery (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in general surgery and related fields. (P/NP grading only.) Effective: 1997 Winter Quarter.

SUR 199—Special Study in General Surgery for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Advanced undergraduate student with consent of instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

SUR 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

SUR 430—Surgery Clerkship (12)
Clinical Activity—45 hours. Prerequisite(s): Approval by School of Medicine Committee on Student Progress. Eight week general surgery clerkship includes GI, Burn, Oncology, Plastics, Vascular Cardiothoracic, consult, transplant and trauma. Clerkship assignments are at UCDMC. Daily core material presentations and reading assignments. Student involvement includes work-up and care of surgical patients. (H/P/F grading only.) Effective: 2001 Summer Quarter.

SUR 430F—SJVP Surgery Clerkship at UCSF (6-12)
Clinical Activity—45 hours. Prerequisite(s): Approval by School of Medicine Committee on Student Progress. General surgery clerkship includes GI, Burn, Oncology, Plastics, Vascular Cardiothoracic, consult, transplant and trauma. Clerkship assignments are at UCSF Fresno. Student involvement includes work-up and care of surgical patients. (H/P/F grading only.) Effective: 2017 Winter Quarter.

SUR 430R—Rural PRIME Surgery Longitudinal Clerkship (2)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Surgery Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

SUR 430RA—Rural PRIME Surgery Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Surgery Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

SUR 430RB—Rural PRIME Surgery Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Surgery Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

SUR 430RC—Rural PRIME Surgery Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Surgery Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

SUR 430RD—Rural PRIME Surgery Longitudinal Clerkship (1)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Surgery Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

SUR 439D—Directed Clinical Studies in Surgery (1-12)
Clinical Activity—40 hours. Prerequisite(s): Consent of Instructor. Partial completion of a Clinical Rotation. Individual directed studies in extended preparation for modified curriculum or to complete a clinical rotation following a leave of absence. May be repeated for credit. (P/F grading only.) Effective: 2011 Spring Quarter.

SUR 439R—Directed Studies in Surgery (1-12)
Clinical Activity—30 hours; Independent Study—10 hours. Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for remediation of all or part of clinical rotation. Clinical studies to accommodate and satisfy remedial work as directed by the Committee on Student Progress and approved by the course IOR. May be repeated for credit. (P/F grading only.) Effective: 2011 Summer Quarter.

SUR 450—Surgical Skills Boot Camp (3-6)
Independent Study—30 hours; Workshop—10 hours. Prerequisite(s): Consent of Instructor. Goal of the surgical skills boot camp didactic is to enable students to demonstrate competence in basic surgical skills and theory, using analytical thinking and hands-on simulation. May be repeated for credit. (H/P/F grading only.) Effective: 2015 Spring Quarter.

SUR 461—Surgery Burn Unit Clerkship (6-18)
Clinical Activity. Prerequisite(s): SUR 430; and Consent of Instructor. Fourth-year medical student or third-year medical student. Rotation through Surgery Specialty Clinics:Vascular, GI, GU, Thoracic, Plastic, Radiotherapy. Student works up one new and two return visit patients. Presents consult to on-site faculty. Weekly review with preceptor and course director. Reading assignments to add perspective for in-depth discussions. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SUR 462—Surgery Trauma Service Clerkship (6-9)
Clinical Activity. Prerequisite(s): SUR 430; and Consent of Instructor. Fourth-year medical student, or third-year medical student. Student works as an extern on one of the two general surgery Trauma teams, participating in resuscitation and management of critically injured patients. Team hours consist of 24 hours on, and 24 hours off. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SUR 463—Surgery Intensive Care Unit (6-9)
Clinical Activity. Prerequisite(s): SUR 430; and Consent of Instructor. Fourth-year medical student, or third-year medical student. Student participates in direct supervision of critically ill surgical patients in a twelve-bed surgery ICU. Each student is closely supervised. Provides in-depth experience with management of critically ill patients. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SUR 466—Clinical Plastic Surgery Elective (3-9)
Clinical Activity—50 hours. Prerequisite(s): SUR 430; and Consent of Instructor. Third- or fourth-year medical students. Total involvement in patient care involving surgical preparation, treatment, operative care, and follow-up. Developing and understanding reconstruction and aesthetic plastic surgery. Microvascular surgery included. Student rotation. (H/P/F grading only.) Effective: 2014 Fall Quarter.

SUR 467—Surgical Oncology (3-9)
Clinical Activity. Prerequisite(s): SUR 430; and Consent of Instructor. Fourth-year medical student, or third-year medical student. Students actively participate in management of patients requiring surgery for cancer, endocrine disease and selected general surgical problems. Cases include malignant melanoma, sarcomas, gastrointestinal cancer, head and neck pathology, and metastatic malignancies. Attending rounds daily. Four teaching conferences weekly. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SUR 468—Cardiothoracic Surgery Clerkship (6-9)
Clinical Activity. Prerequisite(s): SUR 430; and Consent of Instructor. Fourth-year medical student, or third-year medical student. Student works as an extern on the Cardiothoracic Surgical Service, participating in perioperative management and operations on the heart, lungs, mediastinum, and other thoracic structures. Regularly scheduled teaching conferences are conducted. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SUR 471—Gastrointestinal Surgery (3-9)
Clinical Activity. Prerequisite(s): SUR 430; IMD 430; PED 430; and Consent of Instructor. Fourth-year medical student or third-year medical student. Student participates on the GI Surgery Service, working under the immediate supervision of the faculty and surgical housestaff, involving the full spectrum of gastrointestinal diseases performed by the medical student. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SUR 472—Vascular Surgery (3-9)
Clinical Activity. Prerequisite(s): SUR 430; IMD 430; PED 430; and Consent of Instructor. Fourth-year medical student or third-year medical student. Student participates on the vascular surgery service and in the management and operations of arterial and venous system, exclusive of diseases that require cardiopulmonary bypass for treatment. Includes patient care responsibilities with appropriate supervision. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SUR 474—Colorectal Surgery (3-6)
Clinical Activity. Prerequisite(s): Consent of Instructor. Fourth-year medical student. Students actively participate in clinic and the operating room on colon and rectal patients. This includes medical and surgical management. Assignments involve work up and care of the surgical patients. May be repeated for credit. (H/P/F grading only.) Effective: 2018 Spring Quarter.

SUR 475—Pediatric Surgery (6-9)
Clinical Activity—4-6 hours. Prerequisite(s): SUR 430; and Consent of Instructor. Fourth-year medical student or third-year medical student. Care of patients with neonatal congenital surgical problems. Fluid and electrolyte management in infants. General experience with acquired surgical diseases in children. (H/P/F grading only.) Effective: 1998 Fall Quarter.

SUR 476—Surgical Consult Service (6-9)
Clinical Activity. Prerequisite(s): SUR 430; and Consent of Instructor. Fourth-year medical student or third-year medical student. Students function as acting interns working in parallel with the interns on the service. They consult on all non-trauma patients in the emergency room and on the wards and also participate in the operating room. (H/P/F grading only.) Effective: 1998 Fall Quarter.

SUR 477—Clinically Oriented Anatomy (3)
Clinical Activity—40 hours. Prerequisite(s): Completion of three years of medical school. Restricted to fourth-year medical student only. Anatomy of selected regions of the body using cadaver dissection, prosections and interactive CD ROMs. Anatomical relationships relevant to common surgical procedures. Surgical and interventional radiology procedures. (P/NP grading only.) Effective: 2002 Winter Quarter.

SUR 478—Surgical Preceptorship: Off Campus (3-18)
Clinical Activity—60 hours. Prerequisite(s): Consent of Instructor. Fourth-year medical student. Student participates in the preoperative, operative and postoperative care of surgical patients under the supervision of attending staff. (H/P/F grading only.) Effective: 2014 Fall Quarter.

SUR 480—Insights in Surgery (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. Medical student in good academic standing. Individualized activities, including ward rounds, subspecialty clinics and conferences, grand rounds, and observation of a variety of surgical procedures. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SUR 481—Interactive Clinical Case Presentation (ICCP) (3)
Clinical Activity—1 hour. Prerequisite(s): Fourth-year medical students; however, course is open for third and fourth year student observers. Course taught as one session (4 hours) per month for three quarters (July to March); students who enroll can earn up to three credits and the minimum requirements will be to attend at least six sessions; students can do all nine sessions and work toward an honor; for the written part students will have to pick two of the nine case presentations and write a detailed paper with a literature review on "The Current management" of that disease-this can in fact be a manuscript submitted for publication with a faculty member as an advisor; maximum of 10-15 students in good standing. Case presentation of common clinical scenarios (i.e. chestpain/MI; fever/pneumonia; abdo pain/chlecy stites, etc.) from various discipline held in an auditorium with real patients exposure. Interactive session to review history, physical findings and case management. Students will be asked to perform H&P. (H/P/F grading only.) Effective: 2007 Summer Quarter.

SUR 493B—Critically Ill Surgical Patients SSM (6)
Clinical Activity—4 hours; Laboratory—16 hours; Lecture—5 hours; Lecture/Lab—10 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. Special Study Module, a four week course on the topic: Application of Basic Cardiopulmonary Physiology to Problems Encountered in Critically Ill Surgical Patients. (H/P/F grading only.) Effective: 2007 Spring Quarter.

SUR 493C—Physiological Principles in SICU SSM (6)
Clinical Activity—4 hours; Laboratory—16 hours; Lecture—5 hours; Lecture/Lab—10 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. Special Studies Module, A four week course on the topic: Care of the Critically Ill Surgical Patient: Use of Physiological Principles to Guide Treatment of Patients with Common Surgical Problems. (Human Physiology 493C.) (H/P/F grading only.) Effective: 2007 Spring Quarter.

SUR 493D—Interdisciplinary Study of Gastrointestinal Cancer (6)
Clinical Activity—12 hours; Discussion/Laboratory—20 hours; Laboratory—3 hours; Lecture—5 hours. Prerequisite(s): Consent of Instructor. In-depth study of gastrointestinal, hepatic and pancreatic cancer. Emphasis on an integration of basic science and clinical medicine. Participating departments include pathology, surgical oncology, medical oncology, gastroenterology, radiology and radiotherapy. (Pathology 493.) (H/P/F grading only.) Effective: 2012 Summer Quarter.

SUR 494H—Fourth-Year Surgical Honors Program (18)
Variable. Prerequisite(s): SUR 430; and Consent of Instructor. Completion of third year of medical school with superior performance on SUR 430. To provide intensive and comprehensive training in surgery to students interested in a postgraduate surgical career, that would enable them to succeed during the internship and residency training. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SUR 495—Intense Introduction to Cardiac Surgery (3)
Clinical Activity—16 hours; Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Restricted to medical student between first and second year. Close contact with vascular surgeon for two-week period. Includes Sunday mornings. 100% mandatory attendance. Physiology of going on and off cardiopulmonary bypass. Atherosclerotic cardiovascular disease, structural and valvular heart disease and electrical and rhythmic heart disease. May be repeated up to 1 time(s). (P/F grading only.) Effective: 2009 Spring Quarter.

SUR 498—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Medical student. Directed reading and discussion and/or laboratory investigation on selected topics. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SUR 499—Laboratory Research (1-12)
Laboratory—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of second year of medical school. Laboratory research on surgically related problems. Participation in projects to include the following: burn, nutrition, oncology, transplant and others. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

SOM Courses | URO

Courses in URO:

URO 199—Special Study for Advanced Undergraduates (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

URO 400—Office Urology (1)
Clinical Activity—4 hours. Prerequisite(s): Fourth-year medical students with consent of instructor. Introduction to ambulatory care of urologic patients including basic therapeutic and diagnostic procedures from case material referred to
private clinic. Management of urinary tract infection will be emphasized. (H/P/F grading only.) Effective: 1997 Winter Quarter.

URO 460—Urology Clinical Clerkship (5-18)
Clinical Activity—8-40 hours. Prerequisite(s): Consent of Instructor. Third-year medical student; physical diagnosis or the equivalent. Limited enrollment. Clinical experience in diagnosis and treatment of urologic disease. Student will work closely with house staff, participate in conferences and surgery, and perform initial patient evaluation on new patients. May be repeated for credit. (H/P/F grading only.) Effective: 2010 Winter Quarter.

URO 461—Externship in Urology (3-18)
Clinical Activity—60 hours. Prerequisite(s): Consent of Instructor. Fourth-year medical students. Under supervision, student acting as intern will assume full inpatient responsibility including admission history, physical examination, management of hospitalization, and participate in surgical procedures, outpatient clinic and learning diagnostic and therapeutic procedures. May be repeated for credit. (H/P/F grading only.) Effective: 2014 Fall Quarter.

URO 499—Research in Urology (1-12)
Variable. Prerequisite(s): Medical or veterinary medical students with consent of instructor. Research in oncology, male infertility, urodynamics, neurogenic bladder. Unique opportunity to apply recent technologies (nuclear medicine resonance, flow cytometry, recombinant DNA) in investigation, diagnosis and treatment of GU cancer, infectious disease, male infertility and development of genitourinary bioprosthetics. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Winter Quarter.

Medieval & Early Modern Studies; Medieval Studies

Medieval & Early Modern Studies; Medieval Studies | MST Information

(College of Letters and Science)

Sally McKee, Ph.D. (History), Program Director

Program Office. 176 Voorhies Hall; 530-752-2257; http://mems.ucdavis.edu

Faculty. http://mems.ucdavis.edu/people

Medieval & Early Modern Studies; Medieval Studies | MST A.B.

(College of Letters and Science)

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The Major Program

The major in Medieval and Early Modern Studies examines the intellectual, political, and cultural forces that shaped modern European civilization during the period from the end of Ancient Rome (fifth century) to the beginning of the Enlightenment (mid-eighteenth century). An interdisciplinary and interdepartmental program, the major includes studies in history, art history, philosophy, literature, drama, music, national languages, religion, rhetoric, and political theory.

The Program. The major requires interdisciplinary work, while allowing the student to focus on the early Middle Ages, the High Middle Ages, the Renaissance, or the Baroque. The series of medieval and early modern courses in the program provides the foundation for the major and prepares students for advanced work within the individual disciplines. On the upper-division level, students may choose course work in specific areas of History, Comparative Literature, English, French, German, Italian, Spanish, and Latin, philosophy and religion, arts and language, and political thought. In addition, each student may elect to complete a senior thesis on a selected aspect of medieval and/or early modern culture.

Career Alternatives. The major in Medieval and Early Modern Studies is a liberal arts degree providing excellent preparation for the rigors of professional schools as well as careers in law, museology, journalism, and teaching.

Major Advisor. See Program office.

Preparatory Subject Matter **Units:** 22

MST 020A	Early Medieval Culture	4
MST 020B	The Culture of the High Middle Ages	4

Choose three:

AHI 001B	Medieval and Renaissance Art	4
AHI 001C	Baroque to Modern Art	4
AHI 001E	Islamic Art and Architecture	4
COM 002	Major Books of Western Culture: From the Middle Ages to the Enlightenment	4
COM 010A	Master Authors in World Literature; Gilgamesh, Ramayana, Beowulf, Nibelungenlied	2
COM 010B	Master Authors in World Literature; Metamorphoses, Decameron, Arabian Nights, Canterbury Tales	2
COM 010C	Master Authors in World Literature; Chanson de Roland, El Cid, Igor's Campaign, Morte D'Arthur	2
COM 010D	Master Authors in World Literature; Sakuntala, Tristan and Isolde, Aucassin and Nicolette, Gawain and the Green Knight	2
COM 010E	Master Authors in World Literature; Swift, Rabelais, La Celestina, Simplicissimus	2
ENL 010A	Literatures in English I: To 1700	4
GER 048	Myth and Saga in the Germanic Cultures	4
HIS 004A	History of Western Civilization	4

HIS 004B	History of Western Civilization	4
HUM 001	Humanities Forum	2
Prior approval by Undergraduate Advisor necessary.		
HUM 009	Don Quixote and the Modern World	2
PHI 021	Philosophical Classics of the Ancient Era	4
PHI 022	Philosophical Classics of the Modern Era	4

MST 098/099 (total any combination)

MST 098	Directed Group Study	1-5
MST 099	Special Study for Undergraduates	1-5

Language proficiency is a desideratum. Courses in Latin and other European languages are strongly recommended, particularly for students planning to pursue graduate studies in the medieval or early modern field.

Depth Subject Matter **Units:** 44

In consultation with the undergraduate advisor, students choose a total of eleven courses from the following disciplines with at least three courses each from the medieval and early modern periods:

AHI 155	The Islamic City	4
AHI 156	Arts of the Islamic Book	4
AHI 178B	Early Italian Renaissance Art and Architecture	4
AHI 178C	High and Late Italian Renaissance Art and Architecture	4
AHI 179B	Baroque Art	4
AHI 190B	Undergraduate Seminar in Art History: Medieval	4
AHI 190C	Undergraduate Seminar in Art History: Renaissance	4
CLA 110	Origins of Rhetoric	4
COM 139	Shakespeare and the Classical World	4
COM 164A	The European Middle Ages	4
COM 164B	The Renaissance	4
COM 164C	Baroque and Neoclassicism	4
COM 166A	The Epic	4
COM 180	Selected Topics in Comparative Literature*	4
ENL 111	Topics in Medieval Literature	4
ENL 113A	Chaucer: Troilus and the "Minor" Poems	4
ENL 113B	Chaucer: The Canterbury Tales	4
ENL 115	Topics in Sixteenth and Seventeenth Century Literature	4
ENL 117	Shakespeare	4
ENL 122	Milton	4
ENL 150A	British Drama to 1800	4
ENL 153	Topics in Drama*	4
ENL 165	Topics in Poetry*	4
ENL 185A	Women's Writing I*	4
ENL 188A	Topics in Literary and Critical Theory*	4
ENL 189	Seminar in Literary Studies*	4
FRE 115	Medieval French Literature and Society	4
FRE 116	The French Renaissance	4
FRE 117A	Baroque and Preclassicism	4
FRE 118B	Private Lives and Public Secrets: The Early French Novel	4
FRE 141	Selected Topics in French Literature*	4
GER 101A	Survey of German Literature, 800-1800	4
GER 112	Topics in German Literature*	4
GER 120	Survey of German Culture	4
GER 121	The Medieval Period in German Literature	4
GER 122	Reformation and Baroque	4

GER 124	Major Movements in German Literature*	4
GER 131	German Lyric Poetry	4
GER 134	Topics in German Intellectual History*	4
GER 160	Love in the Middle Ages	4
HIS 102B	Undergraduate Proseminar in History; Medieval	5
HIS 102D	Undergraduate Proseminar in History; Modern Europe to 1815	5
HIS 121A	Medieval History	4
HIS 121B	Medieval History	4
HIS 121C	Medieval History	4
HIS 122	Selected Themes in Medieval History	4
HIS 125	Topics in Early Modern European History	4
HIS 130A	Christianity and Culture in Europe: 50-1450	4
HIS 130B	Christianity and Culture in Europe: 1450-1600	4
HIS 131A	Early Modern European History	4
HIS 131B	European History During the Renaissance and Reformation	4
HIS 131C	The Old Regime: Absolution, Enlightenment and Revolution in Europe	4
HIS 132	Crime and Punishment in Early Modern Europe	4
HIS 135A	History of Science to the 18th Century	4
HIS 136	Scientific Revolution	4
HIS 139A	Medieval and Renaissance Medicine	4
HIS 144A	History of Germany, 1450 to 1789	4
HIS 148A	Women and Society in Europe: 1500-1789	4
HIS 151A	England: The Middle Ages	4
HIS 151B	England: The Early Modern Centuries	4
HIS 190B	Middle Eastern History II: The Age of the Crusades, 1001-1400	4
HIS 190C	Middle Eastern History III: The Ottomans, 1401-1730	4
ITA 105	Introduction to Italian Literature	4
ITA 112	Medieval and Renaissance Poetry: St. Francis to Petrarch	4
ITA 113	Dante Alighieri, Divina Commedia (Inferno, Purgatorio, Paradiso)	4
ITA 114	Boccaccio, Decameron, and the Renaissance Novella	4
ITA 115A	Studies in the Cinquecento	4
ITA 115B	Italian Literature of the Renaissance and the Baroque: From Cellini to Marino	4
ITA 115C	Italian Drama from Machiavelli to the Enlightenment	4
ITA 115D	Early Modern Italian Lyric	4
ITA 118	Italian Literature of the Eighteenth Century	4
ITA 139B	Italian Literature in English: Boccaccio, Petrarch and the Renaissance	4
ITA 140	Italian Literature in English Translation: Dante, Divine Comedy	4
ITA 141	Gender and Interpretation in the Renaissance	4
LAT 100	Readings in Latin Prose	4
LAT 101	Livy	4
LAT 102	Roman Comedy	5
LAT 103	Vergil: Aeneid	4
LAT 104	Sallust	4
LAT 105	Catullus	4
LAT 106	Horace: Odes and Epodes	4
LAT 108	Horace: Satires and Epistles	4
LAT 109	Roman Elegy	4

LAT 110	Ovid	4
LAT 112	Cicero	4
LAT 115	Lucretius	4
LAT 116	Vergil: Eclogues and Georgics	4
LAT 118	Roman Historians	4
LAT 119	Readings in Republican Latin Literature	4
LAT 120	Readings in Imperial Latin Literature	4
LAT 121	Latin Prose Composition	4
LAT 125	Medieval Latin	4
LAT 130	Readings in Late Latin	4
MST 130A	Special Themes in Medieval Cultures	4
MST 130B	Special Themes in Renaissance Culture	4
MST 131	Cross-Cultural Relations in the Medieval and/or Early Modern World	4
MST 189	Seminar in Medieval and Early Modern Culture	4
MST 190	Senior Thesis	4
MUS 121	Topics in Music Scholarship*	4
MUS 124A	History of Western Music: Middle Ages to 1600	3
MUS 124B	History of Western Music: 1600-1750	3
PHI 105	Philosophy of Religion	4
PHI 145	Christian, Islamic, and Jewish Philosophers of the Middle Ages	4
PHI 168	Descartes	4
PHI 170	Spinoza and Leibniz	4
PHI 172	Locke and Berkeley	4
POL 115	Medieval Political Thought	4
POL 116	Foundations of Political Thought	4
POL 118A	History of Political Theory: Ancient	4
RST 102	Christian Origins	4
RST 115	Mysticism	4
RST 130	Topics in Religious Studies*	4
SPA 130	Survey of Spanish Literature to 1700	4
SPA 133N	Golden Age Literature of Spain	4
SPA 134A	Don Quijote I	4
SPA 134B	Don Quijote II	4
SPA 142	Special Topics in Spanish Cultural and Literary Studies*	4

*Prior approval by Undergraduate Advisor necessary.

Total: 66

Medieval & Early Modern Studies; Medieval Studies | MST Minor

(College of Letters and Science)

Sally McKee, Ph.D. (History), Program Director

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Minor Advisor. See Program office.

Medieval and Early Modern Studies **Units:** 24

The minor in Medieval and Early Modern Studies is a coherent program of interdisciplinary study. Medieval Studies units may be taken in one or more of the traditional fields of concentration, including art, history, literature, music, national languages, philosophy, political theory, and religious studies. Courses must be upper-division with at least two courses each from the medieval and early modern periods. Students may also select a minor with a thematic emphasis.

Although there is no foreign language requirement for the minor, knowledge of Latin or a modern European language is recommended.

The minor must be designed in consultation with the Undergraduate Advisor.

Total: 24

Medieval & Early Modern Studies; Medieval Studies | MST Courses

Courses in MST:

MST 020A—Early Medieval Culture (5) ***Review all entries***
Discussion—1 hour; Extensive Writing; Lecture—3 hours. Readings (in translation) in medieval culture, such as Codes of Justinian, Confessions of Saint Augustine, Beowulf, the Nibelungenlied, The Song of Roland, the Summa Theologica of Thomas Aquinas, the Chronicles of Froissart, Chaucer's Canterbury Tales, and Dante's Divine Comedy. GE credit: AH, WC, WE. Effective: 2012 Fall Quarter.

MST 020A—Early Medieval Culture (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Readings (in translation) in medieval culture, such as Codes of Justinian, Confessions of Saint Augustine, Beowulf, the Nibelungenlied, The Song of Roland, the Summa Theologica of Thomas Aquinas, the Chronicles of Froissart, Chaucer's Canterbury Tales, and Dante's Divine Comedy. GE credit: AH, WC, WE. Effective: 2018 Fall Quarter.

MST 020B—The Culture of the High Middle Ages (4)
Discussion—1 hour; Lecture—3 hours. Great transformations that created the modern world: Constitutional Government, the Hundred Years War, the Black Death, and the Peasants Revolts, the Renaissance, Reformation and Counter-Reformation, and the Baroque. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

MST 098—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

MST 098F—Student Facilitated Course (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Student facilitated course intended primarily for lower division students. (P/NP grading only.) Effective: 2017 Winter Quarter.

MST 099—Special Study for Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

MST 130A—Special Themes in Medieval Cultures (4)
Discussion—1 hour; Lecture—3 hours. Each offering concentrates on an interdisciplinary aspect of medieval
culture in the Middle East and Europe: the idea of the hero, mysticism, urban development. Extensive readings focused on medieval source material. May be repeated for credit. May be repeated for credit. GE credit: AH, WC, WE. Effective: 1997 Spring Quarter.

MST 130B—Special Themes in Renaissance Culture (4)
Discussion—1 hour; Lecture—3 hours. Each theme illuminates an interdisciplinary aspect of Renaissance culture in the eastern and western hemispheres: exploration, medical pathology, daily life, baroque culture. Immersion in source material from 1500-1650. May be repeated for credit. May be repeated for credit. GE credit: AH, WC, WE. Effective: 1997 Fall Quarter.

MST 131—Cross-Cultural Relations in the Medieval and/or Early Modern World (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): MST 020A or MST 020B; or Consent of Instructor. Medieval and/or Renaissance aspects of cross culturalism. Relations between Christians, Jews, and Muslims: Europeans, Africans, and Asians; Old World and New World. GE credit: WC, WE. Effective: 2011 Fall Quarter.

MST 189—Seminar in Medieval and Early Modern Culture (4)
Seminar—3 hours; Term Paper. Prerequisite(s): MST 020A or MST 020B; or Consent of Instructor. Focus on a particular problem or issue in the Medieval or Early Modern periods. Seminar topics might include (but not limited to) monasticism, origins of the university, chivalry, exploration, the role of women in the Medieval and Early Modern world. GE credit: WE. Effective: 2011 Fall Quarter.

MST 190—Senior Thesis (4)
Seminar—4 hours. Prerequisite(s): Senior standing and major in Medieval Studies. Preparation of a research paper dealing with a selected aspect of
medieval culture, under supervision of three members of the Committee in Charge. Effective: 1997 Winter Quarter.

MST 197T—Tutoring in Medieval Studies (1-4)
Seminar—2 hours. Prerequisite(s): MST 020A; MST 020B; Upper division standing; consent of instructor and chairperson of curriculum committee. Tutoring in Medieval Studies 20A and 20B, including leadership in small discussion groups affiliated with the course. May be repeated for credit for a total of 6 units. May be repeated up to 6 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

MST 198—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

MST 198F—Student Facilitated Course (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Student facilitated course intended primarily for upper division students. (P/NP grading only.) Effective: 2017 Winter Quarter.

MST 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

MST 199FA—Student Facilitated Course Development (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Under the supervision of a faculty member, an undergraduate student plans and develops the course they will offer under 98F/198F. (P/NP grading only.) Effective: 2017 Winter Quarter.

MST 199FB—Student Facilitated Teaching (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Student facilitated. Under the supervision of a faculty member, an undergraduate student teaches a course under 98F/198F. (P/NP grading only.) Effective: 2017 Winter Quarter.

Microbiology (Graduate Group)

Microbiology (Graduate Group) | MIB Information

Renée M. Tsolis, Ph.D., Chairperson of the Group

Group Office. 3143 Tupper Hall (Medical: Microbiology and Immunology); 530-752-0262

Faculty. https://mgg.ucdavis.edu/our-faculty

Microbiology (Graduate Group) | MIB M.S.

Renée M. Tsolis, Ph.D., Chairperson of the Group

Group Office. 3143 Tupper Hall (Medical: Microbiology and Immunology); 530-752-0262

Faculty. https://mgg.ucdavis.edu/our-faculty

Graduate Study. The Graduate Group in Microbiology offers study and research leading to the M.S. and Ph.D. degrees. Strong preference is given to doctoral applicants. The group offers study

in modern molecular approaches to microbiological problems. Areas of research span fundamental, applied, and pathogenic microbiology, including bacterial and viral pathogenesis, eukaryotic microbiology, microbial genomics and genetics, microbial physiology and development, microbial ecology and environmental microbiology, cancer biology, and bioengineering and bioremediation. For information on the graduate study and undergraduate preparation for the program contact a graduate advisor or the chairperson of the group.

The Master of Science degree is offered only en route to the Ph.D.

Graduate Advisors. S.C. Dawson (Microbiology & Molecular Genetics), A. Gelli (Med :Pharmacology), S.J. Lin (Microbiology & Molecular Genetics), R.E. Parales (Microbiology & Molecular Genetics), B. Shacklett (Med:Microbiology & Immunology), E.E. Sparger (Vet Med: Medicine), H. Zhou (Animal Science)

Microbiology (Graduate Group) | MIB Ph.D.

Renée M. Tsolis, Ph.D., Chairperson of the Group

Group Office. 3143 Tupper Hall (Medical: Microbiology and Immunology); 530-752-0262

Faculty. https://mgg.ucdavis.edu/our-faculty

Graduate Study. The Graduate Group in Microbiology offers study and research leading to the M.S. and Ph.D. degrees. Strong preference is given to doctoral applicants. The group offers study in modern molecular approaches to microbiological problems. Areas of research span fundamental, applied, and pathogenic microbiology, including bacterial and viral pathogenesis, eukaryotic microbiology, microbial genomics and genetics, microbial physiology and development, microbial ecology and environmental microbiology, cancer biology, and bioengineering and bioremediation. For information on the graduate study and undergraduate preparation for the program contact a graduate advisor or the chairperson of the group.

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Microbiology (Graduate Group) | MIB Courses

Courses in MIB:

MIB 200A—Microbial Biology (3)
Lecture—3 hours. Prerequisite(s): MIC 102; Or equivalent; prior coursework in Microbiology. Designed to provide an overview of various aspects of microbiology and microbial processes. Topics will include microbial genetics and genomics, microbial metabolism, signaling, and adaptations. Effective: 2011 Fall Quarter.

MIB 201L—Advanced Microbiology Laboratory Rotations (5)
Laboratory—15 hours. Two five-week assignments in microbiology research laboratories. Individual research problems with emphasis on methodological/procedural experience and experimental design. May be repeated up to 2 time(s). Effective: 2011 Fall Quarter.

MIB 210—Microbial Interactions (2)
Lecture—2 hours. Prerequisite(s): MIB 200A; or Consent of Instructor. Analysis at the molecular level of the interactions of microbes with the environment, microbes with other microbes, and microbes in symbiotic and/or pathogenic associations with eukaryotic hosts. Topics discussed will vary. May be repeated up to 2 time(s). Effective: 2011 Fall Quarter.

MIB 290C—Advanced Research Conference (1)
Conference—1 hour; Discussion—1 hour. Prerequisite(s): Graduate standing and/or consent of instructor. Presentation and critical discussion of staff research activities.
Designed for advanced graduate students. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

MIB 299—Research (1-12)
Variable. Research under the guidance of dissertation committee. (S/U grading only.) Effective: 1997 Winter Quarter.

Microbiology & Molecular Genetics

Microbiology & Molecular Genetics | MIC Information

Formerly Microbiology

(College of Biological Sciences)

Wolf-Dietrich Heyer, Ph.D., Chairperson of the Department

Department Office. 357 Briggs Hall; 530-752-2626; http://microbiology.ucdavis.edu

Faculty. http://microbiology.ucdavis.edu/people/faculty/

Microbiology & Molecular Genetics | MIC A.B.

(College of Biological Sciences)

Wolf-Dietrich Heyer, Ph.D., Chairperson of the Department

Department Office. 357 Briggs Hall; 530-752-2626; http://microbiology.ucdavis.edu

Faculty. http://microbiology.ucdavis.edu/people/faculty/

The Major Program

Microbiology is the branch of biology that deals with bacteria, yeasts and other fungi, algae, protozoa, and viruses. These microorganisms are ubiquitous in nature and play a crucial role in areas such as agriculture, biotechnology, ecology, medicine, and veterinary science. The field of microbiology contributes to areas of fundamental inquiry such as biochemistry, cell biology, evolution, genetics, molecular biology, pathogenesis, and physiology. The ease and power of simultaneous genetic and biochemical analysis of microbes led to the emergence of the new disciplines of molecular biology and molecular genetics, and spawned the new industry of biotechnology.

The Program. The Microbiology Undergraduate Program offers Bachelor of Science and Bachelor of Arts degrees in the College of Biological Sciences. Both degrees are designed to provide students with quantitative skills and knowledge across the breadth of Biological Sciences, while maintaining a focus on the biology of microorganisms. The B.S. degree offers more training in mathematics, biochemistry and laboratory methodology; the A.B. degree incorporates more exposure to the liberal arts. The choice of a major program and its suitability for particular career options should be discussed with a major advisor.

Career Alternatives. A bachelor's degree in microbiology serves as the foundation for advanced study in microbiology, entry into the professional schools of all health sciences, or immediate employment in biotechnology, health care and food science industries.

Graduate Study. The Graduate Group in Microbiology offers programs of study and research leading to the M.S. and Ph.D. degrees.

Strong preference is given to doctoral applicants. The group offers study in general microbiology, microbial physiology, microbial genetics, molecular mechanisms of microbial regulation, molecular mechanisms of microbial pathogenesis, immunology, virology, and recombinant DNA technology. For information on the graduate study and undergraduate preparation for the program contact a graduate adviser or the Chairperson of the Group.

Related Courses. The offerings of the Department of Microbiology and Molecular Genetics are augmented by courses in Food Science and Technology; Medical Microbiology; Molecular and Cellular Biology; Pathology, Microbiology, and Immunology; Plant Pathology; and Soil Science.

Faculty of the Department of Microbiology and Molecular Genetics also teach or participate in the following courses: BIS 002A, 101, 104 and 181.

Advising. Biology Academic Success Center (BASC); 1023 Sciences Laboratory Building; 530-752-0410; http://basc.ucdavis.edu/.

Master Advisor. Su-Ju Lin, Ph.D.

Honors and Honors Program. Su-Ju Lin, Ph.D.

Teaching Credential Subject Representative. Su-Ju Lin, Ph.D; see the Teaching Credential/M.A. Program.

Preparatory Subject Matter **Units:** 45-57

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
BIS 002C	Introduction to Biology: Biodiversity and the Tree of Life	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
OR		
CHE 003A	Chemistry for Life Sciences: Determining Structure and Predicting Properties	5
CHE 003B	Chemistry for Life Sciences: Predicting and Characterizing Chemical Change	5
CHE 008A	Organic Chemistry: Brief Course	2
CHE 008B	Organic Chemistry: Brief Course	4
OR		
CHE 118A	Organic Chemistry for Health and Life Sciences	4
CHE 118B	Organic Chemistry for Health and Life Sciences	4
CHE 118C	Organic Chemistry for Health and Life Sciences	4
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
PHY 001A	Principles of Physics	3
PHY 001B	Principles of Physics	3
OR		
PHY 007A	General Physics	4
PHY 007B	General Physics	4
PHY 007C	General Physics	4

Depth Subject Matter **Units:** 36

BIS 101	Genes and Gene Expression	4
BIS 105	Biomolecules and Metabolism	3
OR		
BIS 102	Structure and Function of Biomolecules	3
BIS 103	Bioenergetics and Metabolism	3

MIC 102	Introductory Microbiology	3
MIC 104L	General Microbiology Laboratory	3
MIC 105	Microbial Diversity	3
MIC 105L	Microbial Diversity Laboratory	3
MIC 111	Human Microbiology	3

Choose at least one course from each of the areas of study below:

Areas of Study:

1. Microbial Genetics:

MIC 115	Recombinant DNA Cloning and Analysis	3
MIC 150	Genomes of Pathogenic Bacteria	3
MIC 170	Yeast Molecular Genetics	3

2. Virology or Immunology:

MIC 162	General Virology	4
MMI 188	Human Immunology	3
PMI 126	Fundamentals of Immunology	3
PMI 128	Biology of Animal Viruses	3

Choose additional course work from the list below, to achieve a total of 36 or more units. Upper division Microbiology courses not used in satisfaction of any other requirement; or:

BIS 104	Cell Biology	3
BIS 181	Comparative Genomics	3
BIS 183	Functional Genomics	3
FST 104	Food Microbiology	3
MCB 121	Advanced Molecular Biology	3
MCB 182	Principles of Genomics	3
PLP 130	Fungal Biotechnology and Biochemistry	3
SSC 111	Soil Microbiology	4

Or upper division courses in related fields, relevant to the student's interest and chosen in consultation with the advisor. No more than 3 units of variable-unit courses (numbered 192, 198, or 199) may be used for credit in this category.
Note: Although a course may be listed in more than one category, that course may satisfy only one requirement in the entire major.

Total: 81-93

Microbiology & Molecular Genetics | MIC B.S.

(College of Biological Sciences)

Wolf-Dietrich Heyer, Ph.D., Chairperson of the Department

Department Office. 357 Briggs Hall; 530-752-2626; http://microbiology.ucdavis.edu

Faculty. http://microbiology.ucdavis.edu/people/faculty/

The Major Program

Microbiology is the branch of biology that deals with bacteria, yeasts and other fungi, algae, protozoa, and viruses. These microorganisms are ubiquitous in nature and play a crucial role in areas such as agriculture, biotechnology, ecology, medicine, and veterinary science. The field of microbiology contributes to areas of fundamental inquiry such as biochemistry, cell biology, evolution, genetics, molecular biology, pathogenesis, and physiology. The ease and power of simultaneous genetic and biochemical analysis of microbes led to the emergence of the new

disciplines of molecular biology and molecular genetics, and spawned the new industry of biotechnology.

The Program. The Microbiology Undergraduate Program offers Bachelor of Science and Bachelor of Arts degrees in the College of Biological Sciences. Both degrees are designed to provide students with quantitative skills and knowledge across the breadth of Biological Sciences, while maintaining a focus on the biology of microorganisms. The B.S. degree offers more training in mathematics, biochemistry and laboratory methodology; the A.B. degree incorporates more exposure to the liberal arts. The choice of a major program and its suitability for particular career options should be discussed with a major advisor.

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Master Advisor. Su-Ju Lin, Ph.D.

Honors and Honors Program. Su-Ju Lin, Ph.D.

Teaching Credential Subject Representative. Su-Ju Lin, Ph.D; see the Teaching Credential/M.A. Program.

Preparatory Subject Matter **Units:** 57-67

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
BIS 002C	Introduction to Biology: Biodiversity and the Tree of Life	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 002C	General Chemistry	5
OR		
CHE 003A	Chemistry for Life Sciences: Determining Structure and Predicting Properties	5
CHE 003B	Chemistry for Life Sciences: Predicting and Characterizing Chemical Change	5
CHE 003C	Chemistry for Life Sciences: Controlling Processes and Synthetic Pathways	5
CHE 008A	Organic Chemistry: Brief Course	2
CHE 008B	Organic Chemistry: Brief Course	4
OR		

CHE 118A	Organic Chemistry for Health and Life Sciences	4
CHE 118B	Organic Chemistry for Health and Life Sciences	4
CHE 118C	Organic Chemistry for Health and Life Sciences	4
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
MAT 017C	Calculus for Biology and Medicine	4
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021C recommended.		
PHY 007A	General Physics	4
PHY 007B	General Physics	4
PHY 007C	General Physics	4
MIC 091	Introduction to Research	1
OR		
MIC 191	Introduction to Research for Advanced Undergraduates	1

Depth Subject Matter **Units:** 45

BIS 101	Genes and Gene Expression	4
BIS 105	Biomolecules and Metabolism	3
OR		
BIS 102	Structure and Function of Biomolecules	3
BIS 103	Bioenergetics and Metabolism	3
BIS 104	Cell Biology	3
STA 100	Applied Statistics for Biological Sciences	4
MIC 102	Introductory Microbiology	3
MIC 104L	General Microbiology Laboratory	3
MIC 105	Microbial Diversity	3
MIC 105L	Microbial Diversity Laboratory	3
MIC 111	Human Microbiology	3

Choose at least one course from each of the areas of study below:

Areas of Study:

1. Molecular Microbiology:

MIC 115	Recombinant DNA Cloning and Analysis	3
MIC 150	Genomes of Pathogenic Bacteria	3
MIC 170	Yeast Molecular Genetics	3

2. Virology:

MIC 162	General Virology	4
PMI 128	Biology of Animal Viruses	3

3. Immunology:

MMI 188	Human Immunology	3
PMI 126	Fundamentals of Immunology	3

Choose additional course work from the list below, to achieve a total of 36 or more units. Upper division Microbiology courses not used in satisfaction of any other requirement; or:

BIS 181	Comparative Genomics	3
BIS 183	Functional Genomics	3
FST 104	Food Microbiology	3
MCB 121	Advanced Molecular Biology	3
MCB 182	Principles of Genomics	3
PLP 130	Fungal Biotechnology and Biochemistry	3
SSC 111	Soil Microbiology	4

OR

Upper division courses in related fields, relevant to the student's interest and chosen in consultation with the advisor.
No more than three units of variable-unit courses (numbered 192, 198, or 199) may be used for credit in this category.

Note: Although a course might be listed in more than one category, that course may satisfy only one requirement in the entire major.

Total: 102-112

Microbiology & Molecular Genetics | MIC Courses

Courses in MIC:

MIC 010—Natural History of Infectious Diseases (3)
Lecture—3 hours. Topics in the natural history of infectious diseases principally affecting humans. Introduction to infectious microbial agents, ecology, epidemiology, and induction of disease. Focus on diseases of a contemporary nature. Not open for credit to students who have completed MIC 101, MIC 102, or MIC 104. GE credit: SE. Effective: 2014 Fall Quarter.

MIC 091—Introduction to Research (1)
Seminar—1 hour. Prerequisite(s): BIS 002A; Or equivalent. Restricted to lower division standing. Discussion of faculty research focusing on the biochemistry, genetics, and cell biology of microorganisms, along with ways undergraduates can participate in research projects of faculty members. May be repeated up to 3 time(s). (P/NP grading only.) GE credit: SE. Effective: 2016 Fall Quarter.

MIC 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Primarily for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

MIC 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2003 Spring Quarter.

MIC 101—Introductory Microbiology (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (BIS 001A or BIS 002A); CHE 002B (can be concurrent) Survey of microorganisms emphasizing their interactions with humans and diseases. Topics include microscopy, survey of various microbes, the immune system, food microbiology, microbial pathogens, and mechanisms of disease transmission. Designed for students requiring microbiology for professional schools. Not open for credit to students who have completed MIC 102, MIC 102L, MIC 104, or MIC 104L. GE credit: SE, SL. Effective: 2014 Winter Quarter.

MIC 102—Introductory Microbiology (3)
Lecture—3 hours. Prerequisite(s): (BIS 001A or BIS 002A); CHE 002B (can be concurrent) Essentials of microbial biology, emphasizing phylogeny, physiology, genetics, ecology, and pathogenesis. Interactions with other microbes, humans, and the biosphere. Uses of microbes in agriculture and biotechnology. Not open for credit to students who have completed MIC 101 or MIC 104. GE credit: QL, SE, SL. Effective: 2016 Winter Quarter.

MIC 103L—Introductory Microbiology Laboratory (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): MIC 102 C- or better; CHE 002B Introduction to principles and laboratory methods employed in working with microorganisms. Designed for students requiring microbiology for professional school admission. Not open to students who completed MIC 101 before spring 2016, or who have completed MIC 102L or MIC 104L. Effective: 2016 Fall Quarter.

MIC 104L—General Microbiology Laboratory (3)
Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): MIC 102 C or better; (CHE 008B or CHE 118B or CHE 129A); and Consent of Instructor. Students must complete a petition for consideration of enrollment; petition available on department of Microbiology and Molecular Genetics website. Principles and laboratory methods employed in working with microorganisms. Designed for students continuing in microbiology, genetics, or biochemistry. Only two units of credit for students who completed MIC 101 before spring 2016, or who have completed MIC 103L; not open to students who have completed MIC 102L. GE credit: SE, WE. Effective: 2016 Fall Quarter.

MIC 105—Microbial Diversity (3)
Lecture—3 hours. Prerequisite(s): MIC 102 or MIC 104; BIS 101; BIS 103 or BIS 105 strongly recommended. Survey of the major groups of microorganisms emphasizing diversity of energy metabolism, morphology, evolution, and natural history. GE credit: SE. Effective: 2017 Winter Quarter.

MIC 105L—Microbial Diversity Laboratory (3)
Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): (MIC 102 or MIC 104); (MIC 102L or MIC 104L); MIC 105 (can be concurrent) Classical enrichments for the isolation of metabolically diverse microbes; modern molecular methods for the identification of isolates; cultivation independent analysis of microbial communities from local environmental samples. GE credit: SE, WE. Effective: 2017 Winter Quarter.

MIC 111—Human Microbiology (3)
Lecture—3 hours. Prerequisite(s): MIC 102; BIS 101 Biology of microorganisms that form commensal, mutualistic, and pathogenic relationships with human beings, emphasizing their phylogeny, physiology, genetics, and ecology. Effects on human nutrition, development and physiology. Mechanisms of pathogenesis, immune response evasion, antibiotic action, and antibiotic resistance. GE credit: SE. Effective: 2016 Spring Quarter.

MIC 115—Recombinant DNA Cloning and Analysis (3)
Lecture—3 hours. Prerequisite(s): BIS 101; Or the equivalent. Cloning and analysis of recombinant DNA, with emphasis on Escherichia coli host-vector systems. DNA-modifying enzymes; vectors and their use; manipulation and expression of insert DNA; polymerase chain reaction; and sequence annotation. Graduate students see course 215. GE credit: SE. Effective: 2006 Fall Quarter.

MIC 120—Microbial Ecology (3)
Lecture—3 hours. Prerequisite(s): MIC 105; (BIS 102 or BIS 105) Interactions between non-pathogenic microorganisms and their environment, emphasizing physiological and metabolic characteristics
of various groups and their adaptation to and modification of specific habitats. GE credit: SE. Effective: 2008 Fall Quarter.

MIC 140—Bacterial Physiology (3)
Lecture—3 hours. Prerequisite(s): (BIS 101, BIS 102, BIS 103 (can be concurrent)) or (BIS 101, BIS 105); MIC 102 recommended. Fundamentals of bacterial growth and bacterial responses to environmental stresses. Topics will include carbon and nitrogen regulation, growth rate control, post-exponential growth, and motility and chemotaxis. Not open for credit to students who have completed MIC 130A. GE credit: SE. Effective: 2008 Fall Quarter.

MIC 150—Genomes of Pathogenic Bacteria (3)
Lecture—3 hours. Prerequisite(s): MIC 102; BIS 101 Molecular genetics and comparative genomics of representative pathogenic bacteria. Roles of mobile genetic elements, lateral gene transfer, and genome rearrangements in pathogen evolution. Mutation, recombination, and complementation as tools for genetic analysis. Content includes close examination of primary research articles. GE credit: SE. Effective: 2016 Spring Quarter.

MIC 155L—Bacterial Physiology Lab (4)
Laboratory—8 hours; Lecture/Discussion—1 hour. Prerequisite(s): (MIC 140 or MIC 150); MIC 120L; and Consent of Instructor. Physiology and genetics of bacteria. Isolation and characterization of mutant strains. Mapping of mutations by conjugation and transduction studies of control of enzyme synthesis by induction, repression, and catabolite repression. Effective: 2004 Spring Quarter.

MIC 162—General Virology (4)
Lecture—4 hours. Prerequisite(s): BIS 101; BIS 102 or BIS 105 recommended. Integrated presentation of the nature of animal, bacterial, and plant viruses, including their structure, replication and genetics. Three units to students who have completed PMI 128. GE credit: SE. Effective: 2017 Winter Quarter.

MIC 170—Yeast Molecular Genetics (3)
Lecture—3 hours. Prerequisite(s): BIS 101; MIC 102 or MIC 105 strongly recommended. Survey of the genetics, cell biology and technologies in yeasts and related lower eukaryotes. Topics include diversity of yeasts; cell structure; metabolism; cell cycle; genetic approaches and genomics; gene expression; yeasts as models to study higher eukaryotes; and contemporary techniques. GE credit: SE. Effective: 2016 Fall Quarter.

MIC 172—Host-Parasite Interactions (3)
Lecture—3 hours. Prerequisite(s): MIC 102 or MIC 101 or MIC 104; BIS 101; Biological Sciences 102 or 105 strongly recommended. Exploration of host-parasite interactions at multiple levels, with an emphasis on global health and medically important human parasites. GE credit: SE, SL. Effective: 2017 Fall Quarter.

MIC 175—Cancer Biology (3)
Lecture—3 hours. Prerequisite(s): BIS 101; (BIS 102 or BIS 105) Exploration of the causes and treatments of cancer at multiple levels: molecular/cell biology, clinical manifestations, epidemiology and prevention. GE credit: SE, SL. Effective: 2016 Spring Quarter.

MIC 190C—Undergraduates Research Conference (1)
Discussion—1 hour. Prerequisite(s): MIC 199 (can be concurrent); and Consent of Instructor. Upper division standing, MIC 199 required concurrently. Presentation and critical discussion of staff research activities: designed for advanced undergraduate students. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 1997 Fall Quarter.

MIC 191—Introduction to Research for Advanced Undergraduates (1)
Seminar—1 hour. Prerequisite(s): BIS 002A; Or equivalent. Restricted to upper division standing. Discussion of faculty research focusing on the biochemistry, genetics, and cell biology of microorganisms, along with ways undergraduates can participate in research projects of faculty members. May be repeated up to 3 time(s). (P/NP grading only.) GE credit: SE. Effective: 2016 Fall Quarter.

MIC 192—Internship (1-12)
Internship—3-36 hours. Technical and/or professional experience on or off campus. Supervised by a member of the Microbiology Section faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

MIC 194H—Microbiology Honors Research (2)
Independent Study—6 hours. Prerequisite(s): Senior standing; eligibility for college honors; completion of six units of MIC 199; consent of section. Continuation of an individual microbiological research project culminating in writing of a senior thesis under a faculty director. (P/NP grading only.) Effective: 1997 Winter Quarter.

MIC 197T—Tutoring in Microbiology (1-12)
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Assisting the instructor in one of the section's regular courses by tutoring individual or small groups of students in a laboratory, in voluntary discussion groups, or other voluntary course activities. May be repeated for credit. (P/NP grading only.) Effective: 2004 Spring Quarter.

MIC 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

MIC 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

MIC 200B—Advanced Bacteriology (3)
Lecture—3 hours. Prerequisite(s): MIB 200A Intended for first-year graduate students in Microbiology and closely-related fields. Advanced topics in phylogeny, physiology and diversity of bacteria. Effective: 2001 Winter Quarter.

MIC 215—Recombinant DNA (3)
Lecture—3 hours. Prerequisite(s): BIS 101; BIS 102; BIS 103; Or the equivalent. Application of recombinant DNA technology to modern problems in biology, biochemistry, and genetics, emphasizing molecular cloning strategies, choice of vectors, preparation of insert DNA, and selection procedures. Effective: 1998 Fall Quarter.

MIC 262—Advanced General and Molecular Virology (3)
Lecture—3 hours. Prerequisite(s): Graduate standing. Advanced integrated presentation of animal, bacterial, and plant viruses, including their structure, modes of regulation, expression and replication, and effects on host cells and organisms. Effective: 1997 Winter Quarter.

MIC 263—Principles of Protein-Nucleic Acid Interactions (3)
Lecture—3 hours. Prerequisite(s): Advanced graduate standing and completion of one year of basic graduate course work in biochemistry, biophysics, chemistry, genetics, microbiology, or molecular biology. Physical basis of protein-nucleic acid interaction. Topics include nucleic acid recognition by proteins,thermodynamics of protein-nucleic acid stability,and kinetics of binding process for both non-specific and sequence-specific nucleic acid binding proteins. Emphasis on systems that represent paradigms in protein-nucleic acid interactions. Effective: 1997 Winter Quarter.

MIC 274—Seminar in Genetic Recombination (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Biochemical and genetic aspects of genetic recombination in prokaryotes and eukaryotes. Mechanisms of recombination and biochemical and genetic characteristics of recombination proteins. Proteins include DNA strand
exchange, DNA helicases, and Holliday junction resolving proteins. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1998 Winter Quarter.

MIC 275—Seminar in DNA Repair and Recombination (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing in Microbiology or closely-related field. Review and discussion of current research and literature in DNA repair and recombination with presentations by individual students and invited speakers. May be repeated for credit. (S/U grading only.) Effective: 2006 Fall Quarter.

MIC 276—Advanced Concepts in DNA Metabolism (3)
Lecture—3 hours. Prerequisite(s): MCB 221C or GGG 201C or equivalent course recommended. DNA damage checkpoints, homologous recombination, and meiotic recombination. An advanced treatment of the clinical and current literature to discuss emerging principles and current models in these research areas. Effective: 2008 Fall Quarter.

MIC 290C—Advanced Research Conference (1)
Conference—1 hour; Discussion—1 hour. Prerequisite(s): Graduate standing and/or consent of instructor. Presentation and critical discussion of staff research activities.
Designed for advanced graduate students. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

MIC 291—Selected Topics in Microbiology (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Current progress in microbiology and cellular and molecular biology. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

MIC 292—Seminar in Bacterial Physiology and Genetics (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing in Microbiology or closely-related field. Review and discussion of current research and literature in bacterial physiology and genetics, with presentations by individual students. (S/U grading only.) Effective: 2000 Spring Quarter.

MIC 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

MIC 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

MIC 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Middle East/South Asia Studies

Middle East/South Asia Studies | MSA Information

(College of Letters and Science)

Smriti Srinivas, Ph.D., Program Director

Program Office. 155 Kerr Hall; 530-754-4926; http://mesa.ucdavis.edu

Faculty. http://mesa.ucdavis.edu/directory-of-people/affiliated-faculty-1

Middle East/South Asia Studies | MSA A.B.

(College of Letters and Science)

Smriti Srinivas, Ph.D., Program Director

Program Office. 155 Kerr Hall; 530-754-4926; http://mesa.ucdavis.edu

Faculty. http://mesa.ucdavis.edu/directory-of-people/affiliated-faculty-1

The Major Program

A study of the Middle East and South Asia as a whole allows students to explore a unique set of issues of both historical and contemporary importance. In order to guide students in comparative analysis, faculty help majors deepen their inquiries through coursework on antique, medieval, and early modern empires and political systems. Given the dynamism of modern cultural contexts, majors are invited to concentrate their studies on a wide range of variables including the evolution of states along with new understandings of citizenship, the rise and development of nationalist movements, political conflicts informed by religious majorities, the nuclearization of India and Pakistan, the growth of information societies and computer industries, the production of oil and its social and cultural legacies, labor migrations, urbanization, the emergence of sizeable middle classes, transnational literary movements using sophisticated media technologies, the expansion and intrusion of global security regimes into everyday life, and peace initiatives that shape struggles for justice across the world. Our program's focus on both the Middle East and South Asia is a pioneering achievement in the United States rivaled by only four other colleges or universities.

By the end of their studies, majors will have acquired an in-depth understanding of the common historical experience shared by many peoples in these regions, and of the legacies of culture, social exchange, power and empowerment across diverse settings. Students are also required to complete at least two years of training in a language appropriate to their area of expertise.

The major in Middle East/South Asia Studies at UC Davis offers a unique opportunity to study exchanges, complementarities, and correspondences in such fields as history, political economy, culture, literature and film, religion, family structures, gender relations, media, anthropology, law, international relations, development, diasporas, and urbanism. Students who complete our major will be well suited to embark on careers in non-governmental organizations, journalism and media industries, education and research, governmental service and diplomacy, and business.

Major Advisor. Consult the Middle East/South Asia Studies Program in 155 Kerr Hall 530-754-4926 or the Middle East/South Asia Studies website at http://mesa.ucdavis.edu.

Programs, Internships, and Career Alternatives. Many internship opportunities are available for the Middle East/South Asia Studies major and minor, consult with your advisor.

Middle East/South Asia Studies Abroad Program. University of California Education Abroad Program. More information can be found at http://eap.ucop.edu/ and http://summer-abroad.ucdavis.edu/.

Preparatory Subject Matter **Units:** 8-38

HIS 006	Introduction to the Middle East	4
HIS 008	History of Indian Civilization	4

Two years (or the equivalent) of Arabic, Hebrew, or Hindi/Urdu (other Middle East/South Asia Studies regional languages accepted with petition).

ARB 001	Elementary Arabic 1	5
ARB 002	Elementary Arabic 2	5
ARB 003	Elementary Arabic 3	5
ARB 021	Intermediate Arabic 21	4
ARB 022	Intermediate Arabic 22	4
ARB 023	Intermediate Arabic 23	4
HEB 001	Elementary Hebrew	5
HEB 002	Elementary Hebrew	5
HEB 003	Elementary Hebrew	5
HEB 021	Intermediate Modern Hebrew I	4
HEB 022	Intermediate Modern Hebrew II	4
HEB 023	Intermediate Modern Hebrew III	4
HIN 001	Elementary Hindi/Urdu I	5
HIN 002	Elementary Hindi/Urdu II	5
HIN 003	Elementary Hindi/Urdu III	5
HIN 021	Intermediate Hindi/Urdu I	4
HIN 022	Intermediate Hindi/Urdu II	4
HIN 023	Intermediate Hindi/Urdu III	4

Depth Subject Matter **Units:** 40-42

MSA 100	Middle East and South Asia: Comparative Perspectives	4
MSA 180	Topics in Middle East and South Asian Studies	4

Choose two:

ANT 142	Peoples of the Middle East	4
COM 166	Literatures of the Modern Middle East	4
HIS 113	History of Modern Israel	4

HIS 190A	Middle Eastern History I: The Rise of Islam, 600-1000	4
HIS 190B	Middle Eastern History II: The Age of the Crusades, 1001-1400	4
HIS 190C	Middle Eastern History III: The Ottomans, 1401-1730	4
HIS 193A	History of the Modern Middle East, 1750-1914	4
HIS 193B	History of the Modern Middle East, From 1914	4
POL 135	International Politics of the Middle East	4
POL 136	The Arab-Israeli Conflict	4
RST 160	Introduction to Islamic Thought	4
RST 162	Introduction to Islamic Law	4
WMS 184	Gender in the Arab World	4

Choose two:

ANT 145	Performance, Embodiment, and Space in South Asia	4
HIS 102Q	Undergraduate Proseminar in History; India	5
HIS 196A	Medieval India	4
HIS 196B	Modern India	4
RST 170	Buddhism	4
WMS 178B	Women Writers and the Transnational Imaginary; Asia	4

Additional Electives from Core Course List

ANT 142	Peoples of the Middle East	4
ANT 145	Performance, Embodiment, and Space in South Asia	4
ARB 001	Elementary Arabic 1	5
ARB 002	Elementary Arabic 2	5
ARB 003	Elementary Arabic 3	5
ARB 021	Intermediate Arabic 21	4
ARB 022	Intermediate Arabic 22	4
ARB 023	Intermediate Arabic 23	4
AHI 001E	Islamic Art and Architecture	4
AHI 155	The Islamic City	4
ASA 150F	South Asian American History, Culture, & Politics	4
ASA 189E	Topics in Asian American Studies: Comparative Racial Studies	4
CLA 001	Ancient Near East and Early Greece: 3000-500 B.C.E.	4
COM 053B	Literature of South Asia	4
COM 053C	Literatures of the Islamic World	4
COM 166	Literatures of the Modern Middle East	4
HEB 001	Elementary Hebrew	5
HEB 002	Elementary Hebrew	5
HEB 003	Elementary Hebrew	5
HEB 021	Intermediate Modern Hebrew I	4
HEB 022	Intermediate Modern Hebrew II	4
HEB 023	Intermediate Modern Hebrew III	4
HIN 001	Elementary Hindi/Urdu I	5
HIN 002	Elementary Hindi/Urdu II	5
HIN 003	Elementary Hindi/Urdu III	5
HIN 021	Intermediate Hindi/Urdu I	4
HIN 022	Intermediate Hindi/Urdu II	4
HIN 023	Intermediate Hindi/Urdu III	4
HIS 102Q	Undergraduate Proseminar in History; India	5
HIS 102R	Undergraduate Proseminar in History; Muslim Societies	5
HIS 113	History of Modern Israel	4
HIS 190A	Middle Eastern History I: The Rise of Islam, 600-1000	4
HIS 190B	Middle Eastern History II: The Age of the Crusades, 1001-1400	4

HIS 190C	Middle Eastern History III: The Ottomans, 1401-1730	4
HIS 193A	History of the Modern Middle East, 1750-1914	4
HIS 193B	History of the Modern Middle East, From 1914	4
HIS 196A	Medieval India	4
HIS 196B	Modern India	4
MSA 092	ME/SA 92. Internship in Middle East/South Asia Studies	3-15
MSA 098	Directed Group Study	1-5
MSA 099	Special Study for Undergraduates	1-5
MSA 180	Topics in Middle East and South Asian Studies	4
MSA 192	Internship	1-12
MSA 198	Directed Group Study	1-5
MSA 199	Special Study for Advanced Undergraduates	1-5
MUS 129B	Musics of Africa, Middle East, Indian Subcontinent	4
MUS 148	Hindustani Vocal Ensemble	2
POL 135	International Politics of the Middle East	4
POL 136	The Arab-Israeli Conflict	4
RST 021	The Bible and Its Interpreters	4
RST 023	Introduction to Judaism	4
RST 060	Introduction to Islam	4
RST 065C	The Qur'an and Its Interpretation	4
RST 068	Hinduism	4
RST 160	Introduction to Islamic Thought	4
RST 161	Modern Islam	4
RST 162	Introduction to Islamic Law	4
RST 170	Buddhism	4
WMS 178A	Women Writers and the Transnational Imaginary; The Arab World	4
WMS 178B	Women Writers and the Transnational Imaginary; Asia	4
WMS 184	Gender in the Arab World	4

Note: With prior consultation with an advisor, students can petition in the Program Committee in advance to accept other elective courses toward the major program, including language courses.

Note: While some courses are identified as fulfilling more than one requirement, a given course can only fulfill one such requirement.

Restriction: No more than six units of MSA 092, 098, 099, 192, 198, 199 may be offered in satisfaction of the major requirements. However, students must have completed at least 40 units of upper division course work in satisfaction of the major requirements.

Total: 48-80

Middle East/South Asia Studies | MSA Minor

(College of Letters and Science)

Smriti Srinivas, Ph.D., Program Director

Program Office. 155 Kerr Hall; 530-754-4926; http://mesa.ucdavis.edu

Faculty. http://mesa.ucdavis.edu/directory-of-people/affiliated-faculty-1

Minor Advisor. Consult the Middle East/South Asia Studies Program in 155 Kerr Hall 530-754-4926 or the Middle East/South Asia Studies website at http://mesa.ucdavis.edu.

Middle East/South Asia Studies **Units:** 20-24

MSA 100	Middle East and South Asia: Comparative Perspectives	4

Choose one:

ANT 142	Peoples of the Middle East	4
ASA 189E	Topics in Asian American Studies: Comparative Racial Studies	4
COM 166	Literatures of the Modern Middle East	4
HIS 113	History of Modern Israel	4
HIS 190A	Middle Eastern History I: The Rise of Islam, 600-1000	4
HIS 190B	Middle Eastern History II: The Age of the Crusades, 1001-1400	4
HIS 190C	Middle Eastern History III: The Ottomans, 1401-1730	4
HIS 193A	History of the Modern Middle East, 1750-1914	4
HIS 193B	History of the Modern Middle East, From 1914	4
MUS 129B	Musics of Africa, Middle East, Indian Subcontinent	4
RST 160	Introduction to Islamic Thought	4
RST 161	Modern Islam	4
RST 162	Introduction to Islamic Law	4
WMS 178A	Women Writers and the Transnational Imaginary; The Arab World	4
WMS 184	Gender in the Arab World	4

Choose one:

ANT 145	Performance, Embodiment, and Space in South Asia	4
ASA 150F	South Asian American History, Culture, & Politics	4
ASA 189E	Topics in Asian American Studies: Comparative Racial Studies	4
HIS 102Q	Undergraduate Proseminar in History; India	5
HIS 196A	Medieval India	4
HIS 196B	Modern India	4
MUS 129B	Musics of Africa, Middle East, Indian Subcontinent	4
MUS 148	Hindustani Vocal Ensemble	2
RST 168 (Discontinued 2005)		
RST 170	Buddhism	4
WMS 178B	Women Writers and the Transnational Imaginary; Asia	4

Additional Electives from Core Course list for major

With prior consultation with an advisor, students can petition the Program Committee in advance to accept:

Other elective courses toward the minor program. Under no circumstances may more than one lower division course be offered in satisfaction of requirements for the minor.

More than four units of Middle East/South Asia Studies 192, 198, and/or 199 towards the minor program.

Total: 20-24

Middle East/South Asia Studies | MSA Courses

Courses in MSA:

MSA 092—ME/SA 92. Internship in Middle East/South Asia Studies (3-15)
Internship. Prerequisite(s): Consent of Instructor. Work experience on and off campus in all subject areas offered as part of the ME/SA Studies program. Internship supervised by a member of the ME/SA faculty. May be repeated up to 15 unit(s). (P/NP grading only.) Effective: 2007 Fall Quarter.

MSA 098—Directed Group Study (1-5)
Variable—3-15 hours. May be repeated for credit. (P/NP grading only.) Effective: 2006 Fall Quarter.

MSA 099—Special Study for Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2006 Fall Quarter.

MSA 100—Middle East and South Asia: Comparative Perspectives (4)
Extensive Writing; Lecture—3 hours. Ethnographic and historical points of intersection and divergence in various aspects of the Middle East and South Asia in precolonial, colonial, and postcolonial societies. Anthropological, historical, and theoretical debates surrounding the region. GE credit: AH, SS, WC, WE. Effective: 2004 Summer Session 1.

MSA 111A—Great Cities of Arab Middle East and South Asia (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Some knowledge of Islamic/Middle Eastern history is very useful. In-depth examination of the great cities of North Africa, the Middle East and South Asia as cultural and historical artifacts. Topics include: the concept of the Islamic city, processes of modernity, and representations that reinforce imagination, memory and personal identity. GE credit: AH, SS, WC, WE. Effective: 2013 Fall Quarter.

MSA 112—History of South Asian Islam (4)
Discussion—1 hour; Lecture—3 hours. Comparative study of Muslim communities of South Asia. Commonalities in cultural identity and historical experience. Rise and spread of Islam, comparative history of Islamic Empires, colonial rule, and post-colonial nationalism. Effective: 2007 Fall Quarter.

MSA 121A—Shahnameh: The Persian Book of Kings (4)
Lecture/Discussion—3 hours; Term Paper. In-depth analysis of the Persian Book of Kings (Shahnameh) by Abu al-Qasim Ferdowsi (d. 1020 CE) in its historical context with a comparative perspective on the role of this work in Persian and world literature. (Comparative Literature 175.) GE credit: AH, WC, WE. Effective: 2015 Winter Quarter.

MSA 121C—A Story for a Life: The Arabian Nights (4)
Lecture/Discussion—3 hours; Term Paper. In-depth exploration of The Arabian Nights, the best-known work of pre-modern Arabic literature and a major work of world literature. Analysis of the work in its historical context and in comparison to other frame tales in world literature. (Comparative Literature 172 and Arabic 140.) GE credit: AH, WC, WE. Effective: 2016 Winter Quarter.

MSA 122A—Themes in the Arabic Novel (4)
Extensive Writing; Independent Study; Lecture/Discussion—3 hours. Class size limited to 30 students. Select modern Arabic fiction (novels and short stories) in translation. Thematically connected readings supplemented by non-fictional writings when appropriate. May be repeated up to 2 time(s) if the texts/theme of required course readings sufficiently change. GE credit: AH, OL, WC, WE. Effective: 2013 Fall Quarter.

MSA 131A—Modern Iranian Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): Upper division standing, or consent of instructor. Iranian cinema of the 20th century in the context of profound cultural and social changes in Iran especially since the Iranian Revolution. Productions by representative directors such as Kiarostami, Makhmalbaf, Bahram Beizaie are included. Knowledge of Persian not required. (Cinema & Technocultural Studies 146A.) GE credit: AH, OL, VL, WC, WE. Effective: 2013 Fall Quarter.

MSA 131B—Modern South Asia Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): Upper-division standing or consent of instructor. South Asian cinema of last 100 years in the context of cultural, social, and political changes. South Asian history, Independence, Partition, urban life, class, migration, postcolonial identity, diaspora, gender, sexuality, religion, sport, performance, etc (CTS146B/ANT147) GE credit: AH, SS, VL, WC, WE. Effective: 2017 Winter Quarter.

MSA 131C—Religion and Media in Arab World (4)
Lecture—4 hours. Exploration of the role and experience of media technologies in the Arab world. Study of digital and electronic media as well as alternative media practices. Investigation of new trends in political activism and identity formation. (Religious Studies 166.) GE credit: OL, SS, VL, WC, WE. Effective: 2014 Fall Quarter.

MSA 131D—Modern Turkish Cinema (4)
Film Viewing—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): Upper-division standing or consent of instructor. Turkish cinema of the 20th & 21st century in the context of cultural, social, & political changes. Issues covered include history, nationalism, political dissent, identity, migration, diaspora, gender, sexuality, religion, and incorporate viewpoints of Kurdish & other minority members. (CTS 146D and HIS 193E) GE credit: AH, OL, SS, VL, WC, WE. Effective: 2016 Winter Quarter.

MSA 150—Women and Islamic Discourses (4)
Lecture/Discussion—4 hours. Prerequisite(s): WMS 050; Or comparable course. Introduction to the debates/discourses about women and Islam. Transformations in debates/discourses in colonial and postcolonial periods in the Middle East & South Asia. Comparative study of debates/discourses on family, work, law, sexuality, religion, comportment, human rights, feminist and religious movements. (Women's Studies 185.) GE credit: AH, SS, WC. Effective: 2008 Fall Quarter.

MSA 151A—Iranian Society & Culture (4)
Discussion—1 hour; Lecture—2 hours; Term Paper. In-depth investigation of modern Iranian society and culture. Exploration of structures of Iranian society: family, gender, religion, minorities, economy, politics, and state. Iran’s role in the globalizing world, and the role of Iranian diasporas. GE credit: AH, OL, VL, WC, WE. Effective: 2013 Spring Quarter.

MSA 180—Topics in Middle East and South Asian Studies (4)
Extensive Writing; Lecture—3 hours. Comparative perspective on the Middle East and South Asia. Topics may include: modernity, religious traditions, colonialism, subalternity and social movements, gender and sexuality, history and memory, science and development, ritual and performance, public culture, diasporas. May be repeated up to 1 time(s) topic varies. GE credit: AH, SS, WC, WE. Effective: 2004 Fall Quarter.

MSA 181A—Topics in Regional ME/SA Studies (4)
Lecture—3 hours; Term Paper. Iran & Persian topics for students specializing in region-specific Middle East and South Asia Studies. May be repeated up to 3 time(s). GE credit: AH, SS, WC, WE. Effective: 2015 Winter Quarter.

MSA 181B—Topics in Regional ME/SA Studies (4)
Lecture—3 hours; Term Paper. Indian/South Asia topics for students specializing in region-specific Middle East and South Asia Studies. May be repeated up to 3 time(s). GE credit: AH, SS, WC, WE. Effective: 2013 Fall Quarter.

MSA 181C—Topics in Regional ME/SA Studies: Arab Studies (4)
Lecture—3 hours; Term Paper. Arab Studies topics. May be repeated up to 3 time(s) when different topics and themes are studied. GE credit: AH, SS. Effective: 2013 Fall Quarter.

MSA 182A—Undergraduate Proseminar in Middle East/South Asia (4)
Seminar—3 hours; Term Paper. Prerequisite(s): MSA 100 recommended. Class size limited to 15 students. Seminar in Iran & Persian topics specializing in region-specific Middle East and South Asia studies. May be repeated up to 3 time(s). Effective: 2015 Winter Quarter.

MSA 182B—Undergraduate Proseminar in Middle East/South Asia (4)
Seminar—3 hours; Term Paper. Prerequisite(s): MSA 100 recommended. Class size limited to 15 students. Seminar in India/South Asia topics specializing in region-specific Middle East and South Asia studies. May be repeated up to 3 time(s) when different topics and themes are studied. Effective: 2012 Fall Quarter.

MSA 182C—Undergraduate Proseminar in Middle East/South Asia: Arab Studies Seminar (4)
Seminar—3 hours; Term Paper. Prerequisite(s): MSA 100 recommended. Class size limited to 15 students. Seminar in Arab Studies topics. May be repeated up to 3 time(s). GE credit: WE. Effective: 2013 Fall Quarter.

MSA 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Supervised internship on and off campus in the area of Middle East and South Asia Studies. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2018 Spring Quarter.

MSA 194H—Special Study for Honors Students (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Open only to majors of senior standing who qualify for honors program. Independent study of a problem in Middle East/South Asian studies involving the writing of an honors thesis. May be repeated up to 12 unit(s). Effective: 2009 Winter Quarter.

MSA 198—Directed Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2018 Spring Quarter.

MSA 199—Special Study for Advanced Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2018 Spring Quarter.

Military Science

Military Science | Military Science

(College of Letters and Science)

Reserve Officers' Training Corps (ROTC), Army

Ryan Burkert, Lieutenant Colonel., Chairperson of the Department

Department Office. 125 Hickey Gymnasium; 530-752-5211

Faculty. https://militaryscience.ucdavis.edu/people

Program of Study

The Military Science Department is a classroom and hands on leadership and management program. The program stresses the following Army Values: loyalty, duty, respect, selfless-service, honor, integrity, and personal courage. We cover the basics of the Army, including Army ranks, organizational structure, basic skills, and tactics. We also discuss current events, national and international politics, military affairs, ethics, and human relations. Military skills (such as drill and ceremony, map reading, and squad tactics) are taught to the extent necessary to create an environment where students can enter leadership positions and apply theories taught in the classroom. The program assists students in all academic fields to prepare for positions of leadership in military or civilian careers.

The department offers two program tracks: (1) a purely academic track; (2) a pre-commissioning track for those desiring a commission as an Officer in the Active Duty U.S. Army, Army Nation Guard, or Army Reserves. The academic track entails no obligation to the military and is open to all students but is limited ot MSC 012 and MSC 022B. Students pursuing the academic track do not wear a uniform or otherwise participate in extra-curricular activities designed as part of the pre-commissioning process.

Students who desire a commission in the U.S. Army participate in both the academic portion of the program and in the leadership laboratories and extra-curricular activities designed to enhance their military leadership and tactical and technical skills. They wear uniforms to leadership laboratories and selected classes and become ROTC cadets. Students may be cadets in the lower division courses without incurring a military obligation. Students must contract with ROTC to participate in

the upper division pre-commissioning program and incur a military obligation. Extra-curricular activities for cadets include an intercollegiate sports team (Ranger Challenge), the university color guard, a military honor society, and opportunities to participate in field training exercises.

Department Programs

Students are enrolled in Military Science under one of two programs.

Four-Year Program

There is no military obligation associated with attendance in lower division courses. Students are enrolled in the basic course (lower division) for the first two years on a voluntary basis. Admission to the advanced course (upper division) is by application from second-year lower division students who meet the academic, physical, and military aptitude requirements. Qualified veterans can enter the advanced course immediately based on of their military service experience and graduation from Basic Training, upon approval by the Department Chairperson.

During the course, all Military Science text books, uniforms and equipment are provided without cost. Contracted students are given leadership development experience at the ROTC Advanced Camp in Fort Knox, Kentucky, between their third and fourth years of the course. Emphasis is on military fitness, tactics, and leadership.

Two-Year Program

The two-year program is for students, including graduate students, who have not attended lower division Military Science classes. In lieu of lower division courses an applicant attends a six-week summer program, Basic Camp, which is voluntary and carries no military obligation. Base Camp attendees are paid and transportation costs covered. Applications are accepted at anytime prior to the student's junior year; graduate students are also accepted, as long as they have two years of academics remaining.

Scholarship Program

There are three and two year scholarship opportunities available at the discretion of the Department Chairperson that covers full tuition and fees and $1200 annually for books. Cadets also receive a $420 monthly stipend.

Army Reserve Officers' Training Corps four-year Active Duty merit scholarships are awarded to qualified high school seniors in a national competition each year. As high school seniors, students compete for the scholarship by submitting their complete application at http://www.goarmy.com/rotc/.

If high school seniors are not awarded the four year National Scholarship, there are still opportunities for campus based three and two year scholarships.

Leadership Laboratory

During the course of the school year, two hours per week are spent conducting practical exercises. Classes emphasize adventure activities including military offense, defense and patrolling, operations, weapons familiarization, rappelling, leadership scenarios, and land navigation. All cadets are required to attend leadership laboratories for practical leadership experience and to prepare for attendance at Advanced Camp.

Academic Credit

College of Agricultural and Environmental Sciences. The Bachelor of Science degree in agriculture requires the completion of 180 units. Military Science courses are counted in the unit allowance for electives.

College of Biological Sciences. The Bachelor of Science degree requires the completion of 180 units. Military Science courses are counted in the allowance for electives.

College of Engineering. Military Science units are acceptable toward the requirements for the

Bachelor of Science degree to the extent of the unrestricted elective units available in the curriculum being followed.

College of Letters and Science. The Bachelor of Arts and Bachelor of Science degrees require the completion of 180 units. Military Science courses are counted in the allowance for electives.

School of Veterinary Medicine. The number of Military Science units acceptable toward the Bachelor of Science degree in Veterinary Medicine is on an individual program basis approved by the Dean of the School. Graduates with the D.V.M. degree may apply for direct commission in the United States Army Veterinary Corps.

Aerospace Studies (Air Force)

The Air Force Reserve Officer's Training Corps (AFROTC) is an educational program providing training in leadership, management, communications and military proficiency on college and university campuses. It also provides an opportunity to obtain a commission as a second lieutenant in the Air Force and enter the active duty forces after you complete a bachelor's or a graduate degree. The skills you acquire will become valuable assets for any subsequent career you choose.

The program is normally four years long, but a flexible design allows students to complete the curriculum in as little as two years. Undergraduate scholarships are available, but are not necessary for participation. Until you accept a scholarship or enter your junior year of the program, you have no obligation to join the Air Force. There are no costs for AFROTC uniforms, books, or classes.

UC Davis students have the option of taking the Air Force program on the UC Berkeley or CSU Sacramento campus.

Qualifications

Freshmen/Sophomore applicants must:

- Be full-time college students in good academic standing
- Have good moral character
- Be in strong physical condition
- Be at least 14 years old

Additionally, Juniors/Seniors/Scholarship recipients must:

- Be United States citizens or in the process of applying for citizenship
- Be 18 years old (or 17 years old with consent of parent or guardian)
- Pass the Air Force Officer Qualifying Test
- Pass a medical examination
- Be under the age of 31 at time of graduation (may be waived)

Scholarships

Opportunities for four-year and three-year undergraduate scholarships are better than ever. Scholarships cover the full cost of tuition, books and required fees at the University of California and are available for eligible high school seniors. It also includes $300-$500 monthly stipend during the school year. If you are a junior or senior in high school and plan on attending a college or university in Northern California, you can write, call or visit the local AFROTC detachments for a scholarship application. Applications are also available from local Air Force recruiters or your high school guidance counselors.

All scholarships are merit-based and consider a variety of factors: cumulative GPA, class standing, SAT/ACT scores, academic awards/achievements, leadership ability, athletic involvement, extracurricular activities, community service and letters of recommendation. A personal interview with an Air Force officer is also part of the application process. Prior to activating a scholarship, students must meet AFROTC medical and physical fitness standards. All scholarships must be used

at an accredited college or university that offers AFROTC on campus or through cross-registration. The program is available at more than 1,000 universities and colleges nationwide.

If you are already in college, contact our office directly and apply for enrollment into AFROTC as a cadet. Three- and two-year full tuition scholarships are available for all academic majors, especially scientific and technical majors such as engineering, atmospheric science, math, computer science, and physics. GPA Scholarship requirements for nontechnical majors are slightly higher. Applicants are primarily evaluated on their leadership ability and academic performance.

Challenging Careers

All commissioned officers enter the Air Force as second lieutenants for a 4-year active duty service commitment. Pilots and navigators serve longer commitments, based on training requirements. Once on active duty, you'll be given instant responsibility in one of 32 primary career fields. Opportunities to fly are better than ever. Whether you are piloting the F-22 fighter, supervising 150 aircraft maintainers on the flightline, or caring for sick personnel in the emergency room, you will be rewarded knowing that you are making a difference.

Air Force ROTC is offered through the Aerospace Studies departments at California State University Sacramento and U.C. Berkeley. Scholarships (including tuition, book allowance, and stipend) are available for qualified students. Students may enroll and attend one course per semester at the U.C. Berkeley or CSU Sacramento campus at no cost. Topics covered in AFROTC courses include Basic Military knowledge (1-credit), Military History (1-credit), Leadership Training (3-credits), and U.S. National Security Affairs and Preparation for Active Duty (3-credits). Additional components of the AFROTC program include 2 hours per week of fitness activities, 2 hours per week of Leadership Lab, and a 4-week Summer Field Training between the Sophomore and Junior years. Upon completion of the program and granting of 4-year degree, students will commission as Second Lieutenants in the United States Air Force. To be eligible for AFROTC, applicants should be a full time student and meet additional fitness, GPA, testing, and other requirements. Interested students, please contact their department of choice:

For CSU Sacramento: http://www.csus.edu/afrotc
916-278-7315; det088@maxwell.af.mil

For U.C. Berkeley: http://airforcerotc.berkeley.edu
510-642-3572; airforce@berkeley.edu

Department of Naval Science

152 Hearst Gymnasium, UC Berkeley
Berkeley, CA 94270-3640
510-642-3551; http://navyrotc.berkeley.edu

UC Davis students may participate in the Navy and Marine Corps ROTC program at UC Berkeley. The program is 4 years long and includes courses and weekly professional development laboratories (drill) at UC Berkeley. Students normally compete for national scholarships as high school seniors, although interested students may enroll as freshmen or sophomores and compete for scholarships based on successful participation in the program. A student whosatisfactorily completes an ROTC program and is awarded a degree from UC Davis receives an active duty commission as a Second Lieutenant in the U.S. Marine Corps or an Ensign in the U.S. Navy.

Navy option students take the following courses:

Freshman year:
NS 1 Introduction to Naval Science
NS 2 Sea Power and Maritime Affairs

Sophomore year:

NS 3 Leadership and Management
NS 10 Naval Ship Systems I

Junior year:
NS 12A Navigation and Naval Operations I
NS 12B Navigation and Naval Operations II

Senior year:
NS 401 Naval Ship Systems II
NS 412 Leadership and Ethics

In lieu of NS401, NS10, NS12A and NS12B, Marine Corps students participate in Marine Seminars and complete MA154, History of Littoral Warfare and MA20, Evolution of Warfare (or a designated equivalent).

Scholarship students are required to complete a number of other courses at Davis, including one year each of calculus, physics, and English, and one quarter each of computer science, and military history or national security policy.

Interested students should contact the Department of Naval Science at UC Berkeley at the address above to obtain information and apply.

Military Science | MSC Courses

Courses in MSC:

MSC 011—U.S. Army Leadership and Personal Development (1)
Lecture—1 hour. Prerequisite(s): Lower division standing. United States Army, its organization, customs, courtesies, and rank structure. Course surveys personal development skills needed for effective leadership such as critical thinking, time management, and health and fitness. Familiarization with the Army ROTC program. Effective: 2011 Fall Quarter.

MSC 012—Introduction to Tactical Military Leadership (1)
Lecture—1 hour. Prerequisite(s): Lower division standing. Military leadership fundamentals to include setting direction, problem-solving, presenting briefs, and using effective writing skills. Basic military tactics, orienteering and land navigation. Dimensions of leadership values, attributes, skills, and actions. Effective: 2008 Fall Quarter.

MSC 013—Introduction to Basic Military Operations (1)
Lecture—1 hour. Prerequisite(s): Lower division standing. Basic military tactical theories and their application at the individual and squad level. Military tactical operations and basic military first aid. Effective: 2008 Fall Quarter.

MSC 014A—Introduction to Military Leadership Skills (0.5)
Laboratory—2 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Personal and organizational leadership skills introduced in leadership laboratory. Extensive supervised leadership experiences conducted in a military environment. Basic military skills necessary to function in a leadership role. (P/NP grading only.) Effective: 2008 Fall Quarter.

MSC 014B—Introduction to Military Leadership Skills (0.5)
Laboratory—2 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Continuation of development of leadership and military skills introduced in course 14A. Emphasis on the role of the individual, the basic organizational element of the Army, the squad. Supervisory controls reduced as students gain capabilities. (P/NP grading only.) Effective: 2008 Fall Quarter.

MSC 014C—Introduction to Military Leadership Skills (0.5)
Laboratory—2 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Development of skills required for promotion to junior non-commissioned officer level. Chain of command from company through individual levels. Interrelationship of squad and platoon organizations. (P/NP grading only.) Effective: 2008 Fall Quarter.

MSC 021—Military History, Study of Battles (2)
Lecture—2 hours. Prerequisite(s): MSC 022B; or Consent of Instructor. Application of the nine Principles of War to key battles in American and World history. Tactics on a strategic and operational level. Evaluation of leadership and decision-making processes of key leaders. Effective: 2008 Fall Quarter.

MSC 022A—Innovative Team Leadership (2)
Lecture—2 hours. Prerequisite(s): Lower division standing or consent of instructor. Leadership values, attributes and theories. Use of basic military skills such as land navigation and squad operations to enhance understanding of the Army. Types of military briefings. Practice in interpersonal skills. Presentation of a briefing. Effective: 2008 Fall Quarter.

MSC 022B—Foundations of Tactical Leadership (2)
Lecture—2 hours. Prerequisite(s): MSC 022A; or Consent of Instructor. Leadership of tactical teams in complex operating environment. Self-assessment of leadership style. Basic military skills: terrain analysis, patrolling and operations orders. Dynamics of adaptive leadership in the context of military operations. Effective: 2008 Fall Quarter.

MSC 024A—Individual Military Leadership Skills (0.5)
Laboratory—2 hours. Prerequisite(s): MSC 014A; MSC 014B; MSC 014C; MSC 022A (can be concurrent); or Consent of Instructor. MSC 022A required concurrently. Develop and practice personal military leadership skills in extensive supervised leadership labs. Cadets perform basic military skills, improve on troop leading procedures and lead subordinates in tactical situations. Begin with drill and ceremony, land navigation and individual movement techniques. (P/NP grading only.) Effective: 2008 Fall Quarter.

MSC 024B—Individual Military Leadership Skills (0.5)
Laboratory—2 hours. Prerequisite(s): MSC 014A; MSC 014B; MSC 014C; MSC 022B (can be concurrent); or Consent of Instructor. MSC 022B required concurrently. Development and practice of personal military leadership skills in extensive supervised leadership labs. Performance of basic military skills, improvement on troop-leading procedures, leadership of subordinates in tactical situations. (P/NP grading only.) Effective: 2008 Fall Quarter.

MSC 024C—Individual Military Leadership Skills (0.5)
Laboratory—2 hours. Prerequisite(s): MSC 014A; MSC 014B; MSC 014C; MSC 021 (can be concurrent); or Consent of Instructor. MSC 021 required concurrently. Develop and practice personal military leadership skills in extensive supervised leadership labs. Begin with drill and ceremony, land navigation and individual movement techniques. Cadets perform basic military skills, improve on troop leading procedures and lead subordinates in tactical situations. (P/NP grading only.) Effective: 2008 Fall Quarter.

MSC 131—Military Leadership and Management (2)
Lecture—2 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Leadership and management in organizational context. Team dynamics, leadership styles, professional ethics, development of a leadership framework. Management skills for planning, decision making, and organizing developed through definition of problems, development of courses of action, implementation of solutions. Effective: 2008 Fall Quarter.

MSC 132A—Advanced Military Operations (2)
Lecture—2 hours. Prerequisite(s): MSC 131; or Consent of Instructor. Upper division standing. Military small unit tactical theory as the basis for leadership development. Principles of war, contemporary operating environment, Geneva Law of Land Warfare, military offensive and defensive operations. Emphasis on development of critical thinking, problem solving, and communication skills. Effective: 2008 Fall Quarter.

MSC 132B—Applied Leadership (2)
Lecture—2 hours. Prerequisite(s): MSC 132A; or Consent of Instructor. Upper division standing. Military small unit tactical theory and application as basis for leadership development. Application of leadership styles and skills to complete problem-solving exercises and the development of an adaptable framework applicable to a variety of shifting environments and situations. Effective: 2008 Fall Quarter.

MSC 134A—Adaptive Tactical Leadership (0.5)
Laboratory—2 hours. Prerequisite(s): MSC 131; or Consent of Instructor. Upper division standing. Small unit tactical operations serve as the basis for enhancement of leadership performance through tactical application. Assessment of leadership attributes, skills, and actions through participation in a variety of leadership roles in problem-solving exercises. (P/NP grading only.) Effective: 2008 Fall Quarter.

MSC 134B—Adaptive Tactical Leadership (0.5)
Laboratory—2 hours. Prerequisite(s): MSC 132A; or Consent of Instructor. Upper division standing. Small unit tactical operations as the basis for enhancement of leadership performance through tactical application. Assessment of leadership attributes, skills, and actions through participation in a variety of leadership roles in problem-solving exercises. (P/NP grading only.) Effective: 2008 Fall Quarter.

MSC 134C—Adaptive Tactical Leadership (0.5)
Laboratory—2 hours. Prerequisite(s): MSC 132B; or Consent of Instructor. Upper division standing. Small unit tactical operations are taught, serve as basis for students exploration, development. Serve in variety of leadership roles in which leadership attributes, skills, actions are closely assessed and developed while they are faced with series of problem solving exercises. (P/NP grading only.) Effective: 2008 Fall Quarter.

MSC 141—Ethical Leadership (2)
Lecture—2 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Direct influence of leaders on individual motivation and group processes. The complexities of balancing moral, legal, and ethical obligations while applying fundamental business principles in determining the best possible outcome from competing solutions. Effective: 2008 Fall Quarter.

MSC 142—Military Law (2)
Lecture—2 hours. Prerequisite(s): MSC 141; or Consent of Instructor. Upper division standing. The United States Constitution and the Military Justice System. Basic law of war, with an emphasis on issues that might arise on the battlefield or during a national emergency. Effective: 2008 Fall Quarter.

MSC 143—U.S. Army Management Systems (2)
Lecture—2 hours. Prerequisite(s): MSC 142; or Consent of Instructor. Upper division standing. Leadership and management, focusing on four management systems: planning, organizing, leading and controlling. Practical methodologies for assessing management decisions while balancing competing ethical, economic, infrastructure and future growth trade-offs. Effective: 2008 Fall Quarter.

MSC 144A—Military Training Leadership Skills (0.5)
Laboratory—2 hours. Prerequisite(s): MSC 141; or Consent of Instructor. Upper division standing. Enhancement of student leadership performance through practical application. Small unit military tactical operations as the basis for the student exploration and development. (P/NP grading only.) Effective: 2008 Fall Quarter.

MSC 144B—Military Training Leadership Skills (0.5)
Laboratory—2 hours. Prerequisite(s): MSC 142; or Consent of Instructor. Upper division standing. Enhancement of student leadership performance through practical application. Small unit military tactical operations serve as the basis for student exploration and development. (P/NP grading only.) Effective: 2008 Fall Quarter.

MSC 144C—Military Training Leadership Skills (0.5)
Laboratory—2 hours. Prerequisite(s): MSC 143; or Consent of Instructor. Upper division standing. Enhancement of student leadership performance through practical application. Small unit military tactical operations as the basis for student exploration and development. (P/NP grading only.) Effective: 2008 Fall Quarter.

MSC 191—Special Studies in Military Science (2)
Independent Study—6 hours. Prerequisite(s): MSC 131; MSC 132A; MSC 132B; MSC 141; MSC 142; MSC 143; Consent of department chair. Intensive examination of one or more special problems in military science. Possible areas of study include leadership dimensions, principles of war, air-land battle imperatives, military strategy, the operational art and professional ethics. May be repeated up to 2 time(s) when topic differs. (P/NP grading only.) Effective: 1997 Winter Quarter.

Molecular, Cellular, & Integrative Physiology (Graduate Group)

Molecular, Cellular, & Integrative Physiology (Graduate Group) | MCP Information

Julie Bossuyt, Ph.D., Chairperson of the Group

Group Office. 227 Life Sciences Building; 530-752-9092; http://mcip.ucdavis.edu

Faculty. http://mcip.ucdavis.edu/faculty/

Molecular, Cellular, & Integrative Physiology (Graduate Group) | MCP M.S.

Julie Bossuyt, Ph.D., Chairperson of the Group

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Graduate Study

The Graduate Group in Molecular, Cellular, and Integrative Physiology offers programs of study and research leading to the M.S. and Ph.D. degrees and participates in joint Ph.D./M.D. and Ph.D./D.V.M. programs. The programs emphasize broad training in the fundamental principles of cellular, molecular, and integrative physiology.

Master Advisor. Chao-Yin Chen

Graduate Advisors. Gretchen Casazza, Nipavan Chiamvimonvat, Eleonora Grandi

Molecular, Cellular, & Integrative Physiology (Graduate Group) | MCP Ph.D.

Julie Bossuyt, Ph.D., Chairperson of the Group

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Graduate Study

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Molecular, Cellular, & Integrative Physiology (Graduate Group) | MCP Courses

Courses in MCP:

MCP 200L—Animal Cell Culture Laboratory (4)
Discussion—2 hours; Laboratory—6 hours. Prerequisite(s): Courses in undergraduate Biochemistry, Cell Biology, or General Physiology, or consent of instructor. Techniques of cell culture, with emphases on cell physiology and the actions of drugs and toxicants on cultured somatic cells. Design, performance and interpretation of experiments with animal cells in vitro. Effective: 2003 Fall Quarter.

MCP 210A—Advanced Physiology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Physiology Ph.D. program, or consent of instructor. Advanced course in general principles of physiology, surveying homeostasis, cellular and selected topics, and neurophysiology. (Human Physiology 210A.) Effective: 2003 Fall Quarter.

MCP 210B—Advanced Physiology (6)
Discussion—1 hour; Lecture—5 hours. Prerequisite(s): Physiology Ph.D. program, or consent of instructor. Advanced course in general principles of physiology, surveying homeostasis, cellular and selected topis, and neurophysiology. Effective: 2003 Fall Quarter.

MCP 210C—Advanced Physiology (5)
Lecture—5 hours. Prerequisite(s): Doctoral student in the Molecular, Integrative and Comparative Physiology Graduate Group, or consent of instructor. Graduate level instruction in the general principles of physiology and the neural and humoral control of the cardiovascular, renal, respiratory, gastrointestinal, sensory, musculoskeletal, and reproductive systems. Effective: 2008 Spring Quarter.

MCP 210L—Physiology Laboratory Rotations (5)
Laboratory—15 hours. Restricted to Molecular, Cellular and Integrative Physiology (MCIP) graduate students. One mandatory rotation and up-to two voluntary rotations. Students learn techniques and perform experiments related to particular research problems. At the end of the rotations students give a short talk and hand in a research paper. May be repeated up to 2 time(s). (S/U grading only.) Effective: 2014 Spring Quarter.

MCP 215—Electrophysiology Techniques and Applications (3)
Discussion—1.5 hours; Lecture—1.5 hours. Broad scope of topics in electrophysiology techniques and applications. (Pharmacology and Toxicology 215.) (S/U grading only.) Effective: 2015 Spring Quarter.

MCP 216—Neurophysiology Literature (3)
Discussion—2 hours; Lecture—1 hour. Lectures covering experimental and theoretical methods in studying cell membrane ion channels and the resulting characterization of the physiological functions and structure/function relationships of some of the most important channel types. Discussion of classical and current original papers. Effective: 2003 Fall Quarter.

MCP 219—Muscle Growth and Development (3)
Lecture—2 hours; Seminar—1 hour. Prerequisite(s): BIS 103; (BIS 104 or MCB 150); or Consent of Instructor. Integration of growth and development of skeletal muscle; morphology, biochemistry, neural control mechanisms, circulatory and nutritional factors. Prenatal and neonatal differentiation of fiber types. Experimental and hereditary myopathies. Effective: 2003 Fall Quarter.

MCP 220—Biological Sciences 103, Biological Sciences 104 or Molecular and Cellular Biology 150, or consent of instructor. (3)
Lecture—3 hours. Prerequisite(s): BIS 101; BIS 103; NPB 110; NPB 110L. Basic phenomena of sexual and asexual reproduction and comparisons of processes in a wide variety of animals; gamete formation, structure, and metabolism; fertilization; neuroendocrine mechanisms in maturation and reproductive cycles; behavioral aspects. Effective: 2003 Fall Quarter.

MCP 222—Mammalian Gametogenesis and Fertilization (3)
Lecture—3 hours. Prerequisite(s): NPB 121; Or the equivalent. Course will emphasize our current understanding of events in mammalian gametogenesis and the fertilization process. Published results, conclusions drawn from these results, and their contribution to our understanding will be discussed. Effective: 2003 Fall Quarter.

MCP 230—Advanced Endocrinology (2)
Lecture—2 hours. Prerequisite(s): NPB 130; Or the equivalent, and graduate standing. Focus on timely topic of endrocrine research. Critical review of current literature and discussion of future research strategies in the area. May be repeated for credit when topic differs. Effective: 2003 Fall Quarter.

MCP 231—Neuroendocrinology (3)
Lecture—3 hours. Prerequisite(s): NPB 130; or the equivalent course in endocrinology; NPB 110 or the equivalent course in systemic physiology. Neural-endocrine interactions; neural regulation of the endocrine system, especially in relation to reproduction; the role of hormones and growth factors in sexual differentiation of the brain. Effective: 2003 Fall Quarter.

MCP 234—Current Topics in Neurotoxicology (3)
Lecture—3 hours. Prerequisite(s): Core courses in one of the following graduate programs: Pharmacology and Toxicology, Agricultural and Environmental Chemistry, Biochemistry and Molecular Biology, Cell and Developmental Biology, Immunology, Molecular Cellular and Integrative Physiology or Neuroscience. Restricted to upper level undergraduate students must obtain permission from the course coordinator. General principles of neurotoxicology, the cell and molecular mechanisms and health impacts of specific neurotoxicants and the contribution of neurotoxic compounds to complex neurodevelopmental disorders and neurodegenerative diseases. (Environmental Toxicology 234 and Molecular Biosciences 234.) Effective: 2010 Fall Quarter.

MCP 242—Biological Rhythms (3)
Lecture—2 hours; Lecture/Discussion—1 hour. Prerequisite(s): NPB 110 or the equivalent. General aspects and basic mechanisms of biological rhythms; the importance of rhythm desynchronization in areas of pharmacology and space medicine; telemetry; mathematical methods; chronometry; daily, reproductive, and annual periods; shift-work, jet lag and sleep disorders. Effective: 2003 Fall Quarter.

MCP 255—Physiology of the Stress Response (2)
Lecture/Discussion—2 hours. Prerequisite(s): Graduate Student Status. Definition of Stress; Physiological mechanisms of adaptation to stress; Hormonal control of the systemic stress response; Mechanisms of the cellular stress response; Discussion of current trends in stress physiology and current methods for studying the stress response; (ABG 255) Effective: 2006 Summer Session 2.

MCP 261A—Topics in Vision: Eyes and Retinal Mechanisms (2)
Lecture/Discussion—2 hours. Prerequisite(s): NPB 100 or NPB 112; Or the equivalent; graduate standing. Structure and function of the visual system, with emphasis on the eye and retina, including optics, anatomy, transduction, retinal synapses, adaptation, and parallel processing. (NSC261A and NPB261A) (S/U grading only.) Effective: 2004 Winter Quarter.

MCP 261B—Topics in Vision: Systems, Psychophysics, Computational Models (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. MCP 261A recommended. Functions of the central visual pathways and their underlying mechanisms. Recent research on aspects of anatomy, biochemistry, electrophysiology, psychophysics, development, and genetics of the visual system. (NSC261B and NPB261B) (S/U grading only.) Effective: 2004 Winter Quarter.

MCP 261C—Topics in Vision: Clinical Vision Science (2)
Lecture/Discussion—2 hours. Prerequisite(s): MCP 261A; MCP 261B; or Consent of Instructor. Causes and mechanistic bases of major blinding diseases. Recent research on aspects of anatomy, biochemistry, electrophysiology , psychophysics, development, and genetics of the visual system related to disease. (NSC261C and NPB261C) (S/U grading only.) Effective: 2005 Spring Quarter.

MCP 275—Neurohumoral Regulatory Mechanisms of Thermogenesis (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): BIS 104; BIS 102; and Consent of Instructor. Or equivalent courses. Designed for graduate and advanced undergraduate students, this course will examine thermogenic systems in homeotherms (primarily mammals) with respect to regulation (hormonal and central nervous control) and effector mechanisms (basis of heat generation at the target cell). Effective: 2003 Fall Quarter.

MCP 290—Seminar (1)
Seminar—1 hour. Discussion and critical evaluation of advanced topics and current trends in research. (P/NP grading only.) Effective: 2003 Fall Quarter.

MCP 290C—Research Conference in Physiology (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Presentation and discussion of faculty and graduate student research in physiology. May be repeated for credit. (P/NP grading only.) Effective: 2003 Fall Quarter.

MCP 291B—Seminar in Cellular Mechanisms of Adaptation (1)
Discussion—0.5 hours; Seminar—0.5 hours. Prerequisite(s): BIS 103; NPB 100B; Consent of Instructor. Review and evaluation of current literature and research in cellular adaptations to the environment. May be repeated for credit when topic differs. (P/NP grading only.) Effective: 2003 Fall Quarter.

MCP 291D—Research Approaches in Physiology (2)
Seminar—2 hours. Current research in physiology. Overall design of experiments and particular research areas. (P/NP grading only.) Effective: 2003 Fall Quarter.

MCP 293—Current Progress in Physiology (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Seminars presented by guest lecturers describing their current research activities. May be repeated for credit. (P/NP grading only.) Effective: 2003 Fall Quarter.

MCP 298—Group Study (1-5)
Variable. Effective: 2003 Fall Quarter.

MCP 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

MCP 300A—Pedagogical Aspects of Physiology in Higher Education (3)
Discussion; Laboratory; Lecture. Prerequisite(s): Meet qualifications for teaching assistant in physiology. Participation as a teaching assistant for one quarter in a designated physiology course. Instruction in methods of leading discussion groups, leading laboratory sections, writing and grading quizzes, operation and use of laboratory equipment, and reading and grading laboratory reports. Course meets teaching requirements for Ph.D. program in Physiology. (P/NP grading only.) Effective: 2003 Fall Quarter.

MCP 300B—Pedagogical Aspects of Physiology in Higher Education (3)
Discussion; Laboratory; Lecture. Prerequisite(s): Meet qualifications for teaching assistant in physiology. Participation as a teaching assistant for one quarter in a designated physiology course. Instruction in methods of leading discussion groups, leading laboratory sections, writing and grading quizzes, operation and use of laboratory equipment, and reading and grading laboratory reports. Course meets teaching requirements for Ph.D. program in Physiology. (P/NP grading only.) Effective: 2003 Fall Quarter.

MCP 390—The Teaching of Physiology (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Teaching Assistant assignment to a physiology lecture course. Practical experience in methods and problems of teaching physiology lecture courses. May include analyses of texts and supporting material, discussion of teaching techniques, preparing for and conducting discussion sessions, and formulation of topics and questions for examinations under supervision of instructor. May be repeated for credit. (P/NP grading only.) Effective: 2003 Fall Quarter.

Music

Music | MUS Information

(College of Letters and Science)

Henry Spiller, Ph.D., Chairperson of the Department

Department Office. 112 Music Building; 530-752-5537; Fax 530-752-0983; http://music.ucdavis.edu

Faculty. http://arts.ucdavis.edu/music-faculty

Music | MUS A.B.

(College of Letters and Science)

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The Major Program

The Bachelor of Arts degree in music provides both a broad liberal arts education and the skills necessary to explore music through its history, composition, theory, and performance. Students majoring in music may choose from three tracks in the major: *(1)* composition, *(2)* music history, theory, and ethnomusicology, or *(3)* performance. After a common core of courses in the lower division, students pursue their chosen track with specialized courses leading to an appropriate senior project.

All majors are expected to complete a substantial project (composition, research presentation, recital) in the senior year (Music 195). Music majors who intend to pursue graduate studies in music are encouraged to satisfy the requirements of one of the honors programs in music.

Study Abroad and the Music Major. The department encourages students to pursue a portion of their studies abroad. In close collaboration with their undergraduate advisers, students plan a course of study abroad that complements their coursework at Davis. UC Davis Music Majors have completed upper division coursework at EAP partner institutions in Australia, England, France, Germany, and Italy; Music faculty members lead summer programs in Argentina and Austria.

The Program. A fundamental grounding in music theory, music history, and performance during the first two years of study leads to more specialized study of composition, music scholarship, or performance during the last two years of undergraduate work.

Career Alternatives. Students who graduate with a B.A. in music from UC Davis have gone on to careers as composers and performers, in academia, and in the concert, media, and computing industries. Others have continued in medicine, law and business.

Foreign Language. Students contemplating graduate study in music are advised to consider pursuing foreign language study beyond the elementary level.

Diagnostic Exams are given before admission into MUS 006A-006B-006C. As an alternative MUS 003A-003B may be recommended. Diagnostic exams are also given for MUS 016A-016B-016C and 017A-017B-017C at the beginning of each year. Transfer students should take the Music 6 diagnostic exam given during the first class meetings.

Beginning and transfer students are required to take MUS 002A-002B-002C (Keyboard Competence) unless they can pass out of one or more of the classes by demonstrating proficiency through a diagnostic exam given at the beginning of each quarter. Students learn (1) four-part keyboard harmony in all major and minor keys; (2) moderate fluency with figured bass at the keyboard; (3) major and minor scales with proper fingering; (4) ability to sight read simple piano music and Bach chorales.

Student Performing Activities. The Department of Music presents more than 100 concerts each year, offering performance opportunities for both majors and non-majors in the UC Davis Symphony Orchestra, University Chorus, Concert Band and Wind Ensemble, Early Music Ensemble, Baroque Chamber Orchestra, Jazz Band, world music ensembles (Gamelan, Samba School, Hindustani Vocal Ensemble, Korean Drumming Ensemble) and numerous chamber ensembles. There is a close relationship with the Robert and Margrit Mondavi Center for the Performing Arts, where several of the ensembles are resident.

Chamber ensembles perform frequently in the popular weekly Thursday Noon Concerts. Performance groups have collaborated with the Department of Theatre and Dance in productions of musical theater and opera. Study of instruments and voice with professional performers and teachers is required of all majors. Similar opportunities exist for qualified non-majors.

Faculty and Facilities. The faculty is noted for its achievements in a variety of areas. The music scholars are active in research, writing, and performance; the music of the composers is performed and recorded nationally and internationally. The journal, *19th-Century Music*, is housed in the department.

The regular faculty is joined throughout the year by visiting Artists-in-Residence, distinguished performers who give public concerts and lectures and who work with students informally.

The Empyrean Ensemble, a professional new music ensemble, is in residence at UC Davis, where it performs concerts of new music and annually premieres the work of student composers.

The department's facilities include a collection of Renaissance, Baroque, and modern instruments, along with non-western instruments including a Sundanese gamelan. The arts quadrangle houses the Computer and Electronic Music Studio, practice and rehearsal rooms, and an music library with well over 12,000 CDs, several hundred videos and a collection of music reference materials. The newly-opened Ann E. Pitzer Center, next door to the Music Building, features a 399-seat state-of-the-art concert hall, six practice rooms, and four large teaching/rehearsal studios. Scores and music monographs are housed in the Peter J. Shields Library, adjacent to the Music Building. A partnership of campus libraries affords online access to more than 100,000 tracks of classical and world music by streaming audio.

Honors. A student becomes eligible for graduation with honors by meeting the minimum GPA and course requirements established by the College of Letters and Science. To qualify for high or highest honors, students must also complete the Music Department honors program with a GPA of 3.500 or above and write a thesis or submit a portfolio that meets the criteria for high honors or highest honors. Students apply to participate in the department honors program during the latter part of their junior year. Admission to the program is based on GPA, a thesis proposal, examples of previous writing, and the recommendation of a faculty member who is willing to sponsor the student's project. Students who anticipate seeking admission to the honors program are urged to complete at least one offering of MUS 121 or 122 before the end of their junior year. Interested students are urged to consult with faculty in their field early in their junior year.

Major Advisors. A. Triest, J. McGilvray, B. Olivier

Preparatory Subject Matter **Units:** 27-45

MUS 006A	Elementary Theory, Part 1	3
MUS 006B	Elementary Theory, Part 2	3
MUS 006C	Elementary Theory, Part 3	3
MUS 002A	Keyboard Competence, Part 1*	2
MUS 002B	Keyboard Competence, Part 2*	2
MUS 002C	Keyboard Competence, Part 3*	2
MUS 016A	Elementary Musicianship, Part 1*	2

MUS 016B	Elementary Musicianship, Part 2*	2
MUS 016C	Elementary Musicianship, Part 3*	2
MUS 007A	Intermediate Theory, Part 1	3
MUS 007B	Intermediate Theory, Part 2	3
MUS 007C	Intermediate Theory, Part 3	3
MUS 017A	Intermediate Musicianship, Part 1*	2
MUS 017B	Intermediate Musicianship, Part 2*	2
MUS 017C	Intermediate Musicianship, Part 3*	2
MUS 024A	Introduction to the History of Music I	3
MUS 024B	Introduction to the History of Music II	3
MUS 024C	Introduction to the History of Music III	3

*May be excused by diagnostic examination at the beginning of each quarter.

Depth Subject Matter **Units:** 40-43

Choose one track:

Track 1: Music Composition

MUS 123	Music as Culture	3
MUS 124A	History of Western Music: Middle Ages to 1600	3
MUS 124B	History of Western Music: 1600-1750	3
MUS 121	Topics in Music Scholarship	4
OR		
MUS 122	Topics in Analysis and Theory	4

MUS 131 (three quarters)

MUS 131A	Applied Study of Music: Advanced (Individual)	2
MUS 131B	Applied Study of Music: Advanced (Individual); Piano	2
MUS 131C	Applied Study of Music: Advanced (Individual); Harpsichord	2
MUS 131D	Applied Study of Music: Advanced (Individual); Organ	2
MUS 131E	Applied Study of Music: Advanced (Individual); Violin	2
MUS 131F	Applied Study of Music: Advanced (Individual); Viola	2
MUS 131G	Applied Study of Music: Advanced (Individual); Cello	2
MUS 131H	Applied Study of Music; Advanced (Individual); Double Bass	2
MUS 131I	Applied Study of Music: Advanced (Individual); Flute	2
MUS 131J	Applied Study of Music: Advanced (Individual); Oboe	2
MUS 131K	Applied Study of Music: Advanced (Individual); Clarinet	2
MUS 131L	Applied Study of Music: Advanced (Individual); Bassoon	2
MUS 131M	Applied Study of Music: Advanced (Individual); French Horn	2

MUS 131N	Applied Study of Music: Advanced (Individual); Trumpet	2
MUS 131O	Applied Study of Music: Advanced (Individual);Trombone	2
MUS 131P	Applied Study of Music: Advanced (Individual); Tuba	2
MUS 131Q	Applied Study of Music: Advanced (Individual); Percussion	2
MUS 131R	Applied Study of Music: Advanced (Individual); Classical Guitar	2
MUS 131U	Applied Study of Music: Advanced (Individual); Saxophone	2

MUS 195	Senior Project	2

Choose at least six units:

MUS 140	University Jazz Band	2
MUS 141	University Symphony	2
MUS 142	University Chamber Singers	2
MUS 143	University Concert Band	2
MUS 144	University Chorus	2
MUS 145	Early Music Ensemble	2
MUS 146	Chamber Music Ensemble	1
MUS 147	University Wind Ensemble	2
MUS 148	Hindustani Vocal Ensemble	2
MUS 149	Indonesian Gamelan Ensemble	2
MUS 150	Brasilian Samba School	2
MUS 151	Korean Percussion Ensemble	2
MUS 152	Afro-Cuban Ensemble	2

MUS 101A	Advanced Theory, Part 1	4
MUS 101B	Advanced Theory, Part 2	4
MUS 103	Workshop in Composition	3

Choose at least four units:

MUS 102	Tonal Counterpoint	4
MUS 105	History and Analysis of Jazz	4
MUS 106	History of Rock Music	4
MUS 107A	Computer and Electronic Music	3
MUS 107B	Handmade Electronic Music	4
MUS 108A	Orchestration	2
MUS 108B	Orchestration	2
MUS 110A	The Music of a Major Composer: Beethoven	4
MUS 110B	The Music of a Major Composer: Stravinsky	4
MUS 110C	The Music of a Major Composer: Bach	4
MUS 110D	The Music of a Major Composer: Mozart	4
MUS 110E	The Music of a Major Composer: Haydn	4
MUS 110F	American Masters	4
MUS 110G	Music of a Major Composer--Handel	4
MUS 113	Introduction to Conducting	2
MUS 114	Intermediate Conducting	2
MUS 115	History of Film Music	4
MUS 116	Introduction to the Music of The Beatles	4
MUS 117	The Broadway Musical	4
MUS 121	Topics in Music Scholarship	4
MUS 122	Topics in Analysis and Theory	4

MUS 126	American Music	4
MUS 127	Music from Latin America	4
MUS 129A	Musics of the Americas	4
MUS 129B	Musics of Africa, Middle East, Indian Subcontinent	4
MUS 129C	Musics of East and Southeast Asia	4
MUS 129D	Folk Musics of Europe	4
MUS 192	Internship in Music	1-4
MUS 198	Directed Group Study	1-5
MUS 199	Special Study for Advanced Undergraduates	1-5

Track 2: Music History, Theory, and Ethnomusicology

MUS 123	Music as Culture	3
MUS 124A	History of Western Music: Middle Ages to 1600	3
MUS 124B	History of Western Music: 1600-1750	3
MUS 121	Topics in Music Scholarship	4
MUS 122	Topics in Analysis and Theory	4

MUS 131 (three quarters)

MUS 131A	Applied Study of Music: Advanced (Individual)	2
MUS 131B	Applied Study of Music: Advanced (Individual); Piano	2
MUS 131C	Applied Study of Music: Advanced (Individual); Harpsichord	2
MUS 131D	Applied Study of Music: Advanced (Individual); Organ	2
MUS 131E	Applied Study of Music: Advanced (Individual); Violin	2
MUS 131F	Applied Study of Music: Advanced (Individual); Viola	2
MUS 131G	Applied Study of Music: Advanced (Individual); Cello	2
MUS 131H	Applied Study of Music; Advanced (Individual); Double Bass	2
MUS 131I	Applied Study of Music: Advanced (Individual); Flute	2
MUS 131J	Applied Study of Music: Advanced (Individual); Oboe	2
MUS 131K	Applied Study of Music: Advanced (Individual); Clarinet	2
MUS 131L	Applied Study of Music: Advanced (Individual); Bassoon	2
MUS 131M	Applied Study of Music: Advanced (Individual); French Horn	2
MUS 131N	Applied Study of Music: Advanced (Individual); Trumpet	2
MUS 131O	Applied Study of Music: Advanced (Individual);Trombone	2
MUS 131P	Applied Study of Music: Advanced (Individual); Tuba	2
MUS 131Q	Applied Study of Music: Advanced (Individual); Percussion	2
MUS 131R	Applied Study of Music: Advanced (Individual); Classical Guitar	2
MUS 131U	Applied Study of Music: Advanced (Individual); Saxophone	2

MUS 195	Senior Project	2

Choose at least six units:

MUS 140	University Jazz Band	2
MUS 141	University Symphony	2
MUS 142	University Chamber Singers	2
MUS 143	University Concert Band	2
MUS 144	University Chorus	2
MUS 145	Early Music Ensemble	2
MUS 146	Chamber Music Ensemble	1
MUS 147	University Wind Ensemble	2
MUS 148	Hindustani Vocal Ensemble	2
MUS 149	Indonesian Gamelan Ensemble	2
MUS 150	Brasilian Samba School	2
MUS 151	Korean Percussion Ensemble	2
MUS 152	Afro-Cuban Ensemble	2

Choose at least 12 units:

MUS 101A	Advanced Theory, Part 1	4
MUS 101B	Advanced Theory, Part 2	4
MUS 102	Tonal Counterpoint	4
MUS 103	Workshop in Composition	3
MUS 105	History and Analysis of Jazz	4
MUS 106	History of Rock Music	4
MUS 107A	Computer and Electronic Music	3
MUS 107B	Handmade Electronic Music	4
MUS 108A	Orchestration	2
MUS 108B	Orchestration	2
MUS 110A	The Music of a Major Composer: Beethoven	4
MUS 110B	The Music of a Major Composer: Stravinsky	4
MUS 110C	The Music of a Major Composer: Bach	4
MUS 110D	The Music of a Major Composer: Mozart	4
MUS 110E	The Music of a Major Composer: Haydn	4
MUS 110F	American Masters	4
MUS 110G	Music of a Major Composer--Handel	4
MUS 113	Introduction to Conducting	2
MUS 114	Intermediate Conducting	2
MUS 115	History of Film Music	4
MUS 116	Introduction to the Music of The Beatles	4
MUS 117	The Broadway Musical	4
MUS 121	Topics in Music Scholarship	4
MUS 122	Topics in Analysis and Theory	4
MUS 126	American Music	4
MUS 127	Music from Latin America	4
MUS 129A	Musics of the Americas	4
MUS 129B	Musics of Africa, Middle East, Indian Subcontinent	4
MUS 129C	Musics of East and Southeast Asia	4
MUS 129D	Folk Musics of Europe	4
MUS 192	Internship in Music	1-4
MUS 198	Directed Group Study	1-5
MUS 199	Special Study for Advanced Undergraduates	1-5

Track 3: Music Performance

MUS 123	Music as Culture	3
MUS 124A	History of Western Music: Middle Ages to 1600	3

MUS 124B	History of Western Music: 1600-1750	3
MUS 121	Topics in Music Scholarship	4
OR		
MUS 122	Topics in Analysis and Theory	4

MUS 131 (three quarters)

MUS 131A	Applied Study of Music: Advanced (Individual)	2
MUS 131B	Applied Study of Music: Advanced (Individual); Piano	2
MUS 131C	Applied Study of Music: Advanced (Individual); Harpsichord	2
MUS 131D	Applied Study of Music: Advanced (Individual); Organ	2
MUS 131E	Applied Study of Music: Advanced (Individual); Violin	2
MUS 131F	Applied Study of Music: Advanced (Individual); Viola	2
MUS 131G	Applied Study of Music: Advanced (Individual); Cello	2
MUS 131H	Applied Study of Music; Advanced (Individual); Double Bass	2
MUS 131I	Applied Study of Music: Advanced (Individual); Flute	2
MUS 131J	Applied Study of Music: Advanced (Individual); Oboe	2
MUS 131K	Applied Study of Music: Advanced (Individual); Clarinet	2
MUS 131L	Applied Study of Music: Advanced (Individual); Bassoon	2
MUS 131M	Applied Study of Music: Advanced (Individual); French Horn	2
MUS 131N	Applied Study of Music: Advanced (Individual); Trumpet	2
MUS 131O	Applied Study of Music: Advanced (Individual);Trombone	2
MUS 131P	Applied Study of Music: Advanced (Individual); Tuba	2
MUS 131Q	Applied Study of Music: Advanced (Individual); Percussion	2
MUS 131R	Applied Study of Music: Advanced (Individual); Classical Guitar	2
MUS 131U	Applied Study of Music: Advanced (Individual); Saxophone	2

MUS 195	Senior Project	2

Choose at least 13 units:

MUS 140	University Jazz Band	2
MUS 141	University Symphony	2
MUS 142	University Chamber Singers	2
MUS 143	University Concert Band	2
MUS 144	University Chorus	2
MUS 145	Early Music Ensemble	2
MUS 146	Chamber Music Ensemble	1
MUS 147	University Wind Ensemble	2

MUS 148	Hindustani Vocal Ensemble	2
MUS 149	Indonesian Gamelan Ensemble	2
MUS 150	Brasilian Samba School	2
MUS 151	Korean Percussion Ensemble	2
MUS 152	Afro-Cuban Ensemble	2

Choose at least six units:

MUS 101A	Advanced Theory, Part 1	4
MUS 101B	Advanced Theory, Part 2	4
MUS 102	Tonal Counterpoint	4
MUS 103	Workshop in Composition	3
MUS 105	History and Analysis of Jazz	4
MUS 106	History of Rock Music	4
MUS 107A	Computer and Electronic Music	3
MUS 107B	Handmade Electronic Music	4
MUS 108A	Orchestration	2
MUS 108B	Orchestration	2
MUS 110A	The Music of a Major Composer: Beethoven	4
MUS 110B	The Music of a Major Composer: Stravinsky	4
MUS 110C	The Music of a Major Composer: Bach	4
MUS 110D	The Music of a Major Composer: Mozart	4
MUS 110E	The Music of a Major Composer: Haydn	4
MUS 110F	American Masters	4
MUS 110G	Music of a Major Composer--Handel	4
MUS 113	Introduction to Conducting	2
MUS 114	Intermediate Conducting	2
MUS 115	History of Film Music	4
MUS 116	Introduction to the Music of The Beatles	4
MUS 117	The Broadway Musical	4
MUS 121	Topics in Music Scholarship	4
MUS 122	Topics in Analysis and Theory	4
MUS 126	American Music	4
MUS 127	Music from Latin America	4
MUS 129A	Musics of the Americas	4
MUS 129B	Musics of Africa, Middle East, Indian Subcontinent	4
MUS 129C	Musics of East and Southeast Asia	4
MUS 129D	Folk Musics of Europe	4
MUS 192	Internship in Music	1-4
MUS 198	Directed Group Study	1-5
MUS 199	Special Study for Advanced Undergraduates	1-5

Note: A maximum of 19 units in performance courses (MUS 131, MUS 140-151) apply toward the degree; see Unit Credit Guidelines, College of Letters and Science degree requirements section. Faculty of the College of Letters and Science bylaws makes it possible for students to take more than 19 units of performance classes without those additional units counting toward the 225-unit cap on units.

Composition Honors Track **Units:** 46-50

MUS 101A	Advanced Theory, Part 1	4
MUS 101B	Advanced Theory, Part 2	4
MUS 123	Music as Culture	3
MUS 124A	History of Western Music: Middle Ages to 1600	3
MUS 124B	History of Western Music: 1600-1750	3

MUS 103	Workshop in Composition	3
MUS 121	Topics in Music Scholarship	4
OR		
MUS 122	Topics in Analysis and Theory	4

MUS 131 (one year)

MUS 131A	Applied Study of Music: Advanced (Individual)	2
MUS 131B	Applied Study of Music: Advanced (Individual); Piano	2
MUS 131C	Applied Study of Music: Advanced (Individual); Harpsichord	2
MUS 131D	Applied Study of Music: Advanced (Individual); Organ	2
MUS 131E	Applied Study of Music: Advanced (Individual); Violin	2
MUS 131F	Applied Study of Music: Advanced (Individual); Viola	2
MUS 131G	Applied Study of Music: Advanced (Individual); Cello	2
MUS 131H	Applied Study of Music; Advanced (Individual); Double Bass	2
MUS 131I	Applied Study of Music: Advanced (Individual); Flute	2
MUS 131J	Applied Study of Music: Advanced (Individual); Oboe	2
MUS 131K	Applied Study of Music: Advanced (Individual); Clarinet	2
MUS 131L	Applied Study of Music: Advanced (Individual); Bassoon	2
MUS 131M	Applied Study of Music: Advanced (Individual); French Horn	2
MUS 131N	Applied Study of Music: Advanced (Individual); Trumpet	2
MUS 131O	Applied Study of Music: Advanced (Individual);Trombone	2
MUS 131P	Applied Study of Music: Advanced (Individual); Tuba	2
MUS 131Q	Applied Study of Music: Advanced (Individual); Percussion	2
MUS 131R	Applied Study of Music: Advanced (Individual); Classical Guitar	2
MUS 131U	Applied Study of Music: Advanced (Individual); Saxophone	2

Choose at least six units:

MUS 140	University Jazz Band	2
MUS 141	University Symphony	2
MUS 142	University Chamber Singers	2
MUS 143	University Concert Band	2
MUS 144	University Chorus	2
MUS 145	Early Music Ensemble	2
MUS 146	Chamber Music Ensemble	1
MUS 147	University Wind Ensemble	2
MUS 148	Hindustani Vocal Ensemble	2
MUS 149	Indonesian Gamelan Ensemble	2
MUS 150	Brasilian Samba School	2
MUS 151	Korean Percussion Ensemble	2
MUS 152	Afro-Cuban Ensemble	2

Two quarters of Music 194H for a total of at least six units resulting in a Senior thesis

MUS 194HA	Special Study for Honors Students	2-4
MUS 194HB	Special Study for Honors Students	2-4

Choose at least four-eight units:

MUS 102	Tonal Counterpoint	4

MUS 105	History and Analysis of Jazz	4
MUS 106	History of Rock Music	4
MUS 107A	Computer and Electronic Music	3
MUS 107B	Handmade Electronic Music	4
MUS 107C	Computer and Electronic Music (Discontinued)	3
MUS 108A	Orchestration	2
MUS 108B	Orchestration	2
MUS 110A	The Music of a Major Composer: Beethoven	4
MUS 110B	The Music of a Major Composer: Stravinsky	4
MUS 110C	The Music of a Major Composer: Bach	4
MUS 110D	The Music of a Major Composer: Mozart	4
MUS 110E	The Music of a Major Composer: Haydn	4
MUS 110F	American Masters	4
MUS 110G	Music of a Major Composer--Handel	4
MUS 113	Introduction to Conducting	2
MUS 114	Intermediate Conducting	2
MUS 115	History of Film Music	4
MUS 116	Introduction to the Music of The Beatles	4
MUS 117	The Broadway Musical	4
MUS 121	Topics in Music Scholarship	4
MUS 122	Topics in Analysis and Theory	4
MUS 126	American Music	4
MUS 127	Music from Latin America	4
MUS 129A	Musics of the Americas	4
MUS 129B	Musics of Africa, Middle East, Indian Subcontinent	4
MUS 129C	Musics of East and Southeast Asia	4
MUS 129D	Folk Musics of Europe	4
MUS 192	Internship in Music	1-4
MUS 198	Directed Group Study	1-5
MUS 199	Special Study for Advanced Undergraduates	1-5

Music History, Theory and Ethnomusicology Honors Track **Units:** 47

MUS 123	Music as Culture	3
MUS 124A	History of Western Music: Middle Ages to 1600	3
MUS 124B	History of Western Music: 1600-1750	3
MUS 121	Topics in Music Scholarship	4
OR		
MUS 122	Topics in Analysis and Theory	4

MUS 131 (three quarters)

MUS 131A	Applied Study of Music: Advanced (Individual)	2
MUS 131B	Applied Study of Music: Advanced (Individual); Piano	2
MUS 131C	Applied Study of Music: Advanced (Individual); Harpsichord	2
MUS 131D	Applied Study of Music: Advanced (Individual); Organ	2
MUS 131E	Applied Study of Music: Advanced (Individual); Violin	2
MUS 131F	Applied Study of Music: Advanced (Individual); Viola	2
MUS 131G	Applied Study of Music: Advanced (Individual); Cello	2
MUS 131H	Applied Study of Music; Advanced (Individual); Double Bass	2
MUS 131I	Applied Study of Music: Advanced (Individual); Flute	2
MUS 131J	Applied Study of Music: Advanced (Individual); Oboe	2
MUS 131K	Applied Study of Music: Advanced (Individual); Clarinet	2
MUS 131L	Applied Study of Music: Advanced (Individual); Bassoon	2

MUS 131M	Applied Study of Music: Advanced (Individual); French Horn	2
MUS 131N	Applied Study of Music: Advanced (Individual); Trumpet	2
MUS 131O	Applied Study of Music: Advanced (Individual);Trombone	2
MUS 131P	Applied Study of Music: Advanced (Individual); Tuba	2
MUS 131Q	Applied Study of Music: Advanced (Individual); Percussion	2
MUS 131R	Applied Study of Music: Advanced (Individual); Classical Guitar	2
MUS 131U	Applied Study of Music: Advanced (Individual); Saxophone	2

Choose at least six units:

MUS 140	University Jazz Band	2
MUS 141	University Symphony	2
MUS 142	University Chamber Singers	2
MUS 143	University Concert Band	2
MUS 145	Early Music Ensemble	2
MUS 146	Chamber Music Ensemble	1
MUS 147	University Wind Ensemble	2
MUS 148	Hindustani Vocal Ensemble	2
MUS 149	Indonesian Gamelan Ensemble	2
MUS 150	Brasilian Samba School	2
MUS 151	Korean Percussion Ensemble	2
MUS 152	Afro-Cuban Ensemble	2

Two quarters of Music 194H for a total of at least six units resulting in a Senior thesis.

MUS 194HA	Special Study for Honors Students	2-4
MUS 194HB	Special Study for Honors Students	2-4

Choose at least 12 units:

MUS 101A	Advanced Theory, Part 1	4
MUS 101B	Advanced Theory, Part 2	4
MUS 102	Tonal Counterpoint	4
MUS 103	Workshop in Composition	3
MUS 105	History and Analysis of Jazz	4
MUS 106	History of Rock Music	4
MUS 107A	Computer and Electronic Music	3
MUS 107B	Handmade Electronic Music	4
MUS 108A	Orchestration	2
MUS 108B	Orchestration	2
MUS 110A	The Music of a Major Composer: Beethoven	4
MUS 110B	The Music of a Major Composer: Stravinsky	4
MUS 110C	The Music of a Major Composer: Bach	4
MUS 110D	The Music of a Major Composer: Mozart	4
MUS 110E	The Music of a Major Composer: Haydn	4
MUS 110F	American Masters	4
MUS 110G	Music of a Major Composer--Handel	4
MUS 113	Introduction to Conducting	2
MUS 114	Intermediate Conducting	2
MUS 115	History of Film Music	4
MUS 116	Introduction to the Music of The Beatles	4
MUS 117	The Broadway Musical	4
MUS 121	Topics in Music Scholarship	4

MUS 122	Topics in Analysis and Theory	4
MUS 126	American Music	4
MUS 127	Music from Latin America	4
MUS 129A	Musics of the Americas	4
MUS 129B	Musics of Africa, Middle East, Indian Subcontinent	4
MUS 129C	Musics of East and Southeast Asia	4
MUS 129D	Folk Musics of Europe	4
MUS 192	Internship in Music	1-4
MUS 198	Directed Group Study	1-5
MUS 199	Special Study for Advanced Undergraduates	1-5

A student becomes eligible for graduation with honors by meeting the minimum GPA and course requirements established by the College of Letters and Science. To qualify for high or highest honors, students must also complete the Music Department honors program with a GPA of 3.500 or above and write a thesis or submit a portfolio that meets the criteria for high honors or highest honors. Students apply to participate in the department honors program during the latter part of their junior year. Admission to the program is based on GPA, a thesis proposal, examples of previous writing, and the recommendation of a faculty member who is willing to sponsor the student's project. Students who anticipate seeking admission to the honors program are urged to complete at least one offering of MUS 121 or MUS 122 before the end of their junior year. Interested students are urged to consult with faculty in their field early in their junior year.

Total: 64-85

Music | MUS M.A.

(College of Letters and Science)

Henry Spiller, Ph.D., Chairperson of the Department

Department Office. 112 Music Building; 530-752-5537; Fax 530-752-0983; http://music.ucdavis.edu

Faculty. http://arts.ucdavis.edu/music-faculty

Graduate Study. The Department of Music offers programs of study and research leading to the M.A. degree in composition/theory, musicology, ethnomusicology, and conducting, and the Ph.D. degree in composition/theory, musicology, and ethnomusicology. Detailed information regarding graduate study may be obtained from the Graduate Advisor.

Graduate Advisors. K. Rohde, C. Hess

Music | MUS Ph.D.

(College of Letters and Science)

Henry Spiller, Ph.D., Chairperson of the Department

Department Office. 112 Music Building; 530-752-5537; Fax 530-752-0983; http://music.ucdavis.edu

Faculty. http://arts.ucdavis.edu/music-faculty

Graduate Study. The Department of Music offers programs of study and research leading to the M.A. degree in composition/theory, musicology, ethnomusicology, and conducting, and the Ph.D. degree in composition/theory, musicology, and ethnomusicology. Detailed information regarding graduate study may be obtained from the Graduate Advisor.

Graduate Advisors. K. Rohde, C. Hess

Music | MUS Minor

(College of Letters and Science)

Henry Spiller, Ph.D., Chairperson of the Department

Department Office. 112 Music Building; 530-752-5537; Fax 530-752-0983; http://music.ucdavis.edu

Faculty. http://arts.ucdavis.edu/music-faculty

The Major Program

The Bachelor of Arts degree in music provides both a broad liberal arts education and the skills necessary to explore music through its history, composition, theory, and performance. Students majoring in music may choose from three tracks in the major: *(1)* composition, *(2)* music history, theory, and ethnomusicology, or *(3)* performance. After a common core of courses in the lower division, students pursue their chosen track with specialized courses leading to an appropriate senior project.

All majors are expected to complete a substantial project (composition, research presentation, recital) in the senior year (Music 195). Music majors who intend to pursue graduate studies in music are encouraged to satisfy the requirements of one of the honors programs in music.

Study Abroad and the Music Major. The department encourages students to pursue a portion of their studies abroad. In close collaboration with their undergraduate advisers, students plan a course of study abroad that complements their coursework at Davis. UC Davis Music Majors have completed upper division coursework at EAP partner institutions in Australia, England, France, Germany, and Italy; Music faculty members lead summer programs in Argentina and Austria.

The Program. A fundamental grounding in music theory, music history, and performance during the first two years of study leads to more specialized study of composition, music scholarship, or performance during the last two years of undergraduate work.

Career Alternatives. Students who graduate with a B.A. in music from UC Davis have gone on to careers as composers and performers, in academia, and in the concert, media, and computing industries. Others have continued in medicine, law and business.

Foreign Language. Students contemplating graduate study in music are advised to consider pursuing foreign language study beyond the elementary level.

Diagnostic Exams are given before admission into MUS 006A-006B-006C. As an alternative MUS 003A-003B may be recommended. Diagnostic exams are also given for MUS 016A-016B-016C and 017A-017B-017C at the beginning of each year. Transfer students should take the Music 6 diagnostic exam given during the first class meetings.

Beginning and transfer students are required to take MUS 002A-002B-002C (Keyboard Competence) unless they can pass out of one or more of the classes by demonstrating proficiency through a diagnostic exam given at the beginning of each quarter. Students learn (1) four-part keyboard harmony in all major and minor keys; (2) moderate fluency with figured bass at the keyboard; (3) major and minor scales with proper fingering; (4) ability to sight read simple piano music and Bach chorales.

Student Performing Activities. The Department of Music presents more than 100 concerts each year, offering performance opportunities for both majors and non-majors in the UC Davis Symphony Orchestra, University Chorus, Concert Band and Wind Ensemble, Early Music Ensemble, Baroque Chamber Orchestra, Jazz Band, world music ensembles (Gamelan, Samba School, Hindustani Vocal Ensemble, Korean Drumming Ensemble) and numerous chamber ensembles. There is a close relationship with the Robert and Margrit Mondavi Center for the Performing Arts, where several of the ensembles are resident.

Chamber ensembles perform frequently in the popular weekly Thursday Noon Concerts. Performance groups have collaborated with the Department of Theatre and Dance in productions of

musical theater and opera. Study of instruments and voice with professional performers and teachers is required of all majors. Similar opportunities exist for qualified non-majors.

Faculty and Facilities. The faculty is noted for its achievements in a variety of areas. The music scholars are active in research, writing, and performance; the music of the composers is performed and recorded nationally and internationally. The journal, *19th-Century Music*, is housed in the department.

The regular faculty is joined throughout the year by visiting Artists-in-Residence, distinguished performers who give public concerts and lectures and who work with students informally.

The Empyrean Ensemble, a professional new music ensemble, is in residence at UC Davis, where it performs concerts of new music and annually premieres the work of student composers.

The department's facilities include a collection of Renaissance, Baroque, and modern instruments, along with non-western instruments including a Sundanese gamelan. The arts quadrangle houses the Computer and Electronic Music Studio, practice and rehearsal rooms, and an music library with well over 12,000 CDs, several hundred videos and a collection of music reference materials. The newly-opened Ann E. Pitzer Center, next door to the Music Building, features a 399-seat state-of-the-art concert hall, six practice rooms, and four large teaching/rehearsal studios. Scores and music monographs are housed in the Peter J. Shields Library, adjacent to the Music Building. A partnership of campus libraries affords online access to more than 100,000 tracks of classical and world music by streaming audio.

Honors. A student becomes eligible for graduation with honors by meeting the minimum GPA and course requirements established by the College of Letters and Science. To qualify for high or highest honors, students must also complete the Music Department honors program with a GPA of 3.500 or above and write a thesis or submit a portfolio that meets the criteria for high honors or highest honors. Students apply to participate in the department honors program during the latter part of their junior year. Admission to the program is based on GPA, a thesis proposal, examples of previous writing, and the recommendation of a faculty member who is willing to sponsor the student's project. Students who anticipate seeking admission to the honors program are urged to complete at least one offering of MUS 121 or 122 before the end of their junior year. Interested students are urged to consult with faculty in their field early in their junior year.

Major Advisors. A. Triest, J. McGilvray, B. Olivier

Music **Units:** 22

Choose a minimum of 16 units:

MUS 105	History and Analysis of Jazz	4
MUS 106	History of Rock Music	4
MUS 107A	Computer and Electronic Music	3
MUS 107B	Handmade Electronic Music	4
MUS 110A	The Music of a Major Composer: Beethoven	4
MUS 110B	The Music of a Major Composer: Stravinsky	4
MUS 110C	The Music of a Major Composer: Bach	4
MUS 110D	The Music of a Major Composer: Mozart	4
MUS 110E	The Music of a Major Composer: Haydn	4
MUS 110F	American Masters	4
MUS 110G	Music of a Major Composer--Handel	4
MUS 115	History of Film Music	4
MUS 116	Introduction to the Music of The Beatles	4
MUS 117	The Broadway Musical	4
MUS 126	American Music	4
MUS 127	Music from Latin America	4
MUS 129A	Musics of the Americas	4
MUS 129B	Musics of Africa, Middle East, Indian Subcontinent	4

MUS 129C	Musics of East and Southeast Asia	4
MUS 129D	Folk Musics of Europe	4

Choose a minimum of six units:

MUS 140	University Jazz Band	2
MUS 141	University Symphony	2
MUS 142	University Chamber Singers	2
MUS 143	University Concert Band	2
MUS 144	University Chorus	2
MUS 145	Early Music Ensemble	2
MUS 146	Chamber Music Ensemble	1
MUS 147	University Wind Ensemble	2
MUS 148	Hindustani Vocal Ensemble	2
MUS 149	Indonesian Gamelan Ensemble	2
MUS 150	Brasilian Samba School	2
MUS 151	Korean Percussion Ensemble	2
MUS 152	Afro-Cuban Ensemble	2

Total: 22

Music | MUS Courses

Courses in MUS:

MUS 002A—Keyboard Competence, Part 1 (2)
Performance Instruction—2 hours. Prerequisite(s): MUS 006A (can be concurrent); MUS 016A (can be concurrent); Consent of Instructor. MUS 006A and MUS 016A required concurrently. Training to meet the minimum piano requirements for the major in music. Scales and simple harmonic progressions in twelve keys, both major and minor. (P/NP grading only.) GE credit: AH. Effective: 2016 Spring Quarter.

MUS 002B—Keyboard Competence, Part 2 (2)
Performance Instruction—2 hours. Prerequisite(s): MUS 002A; (MUS 006B (can be concurrent), MUS 016B (can be concurrent)); Consent of Instructor. MUS 006B and MUS 016B required concurrently. Completion of MUS 002A or demonstration of required keyboard proficiency level on diagnostic exam. Training to meet the minimum piano requirements for the major in music. Harmonic progressions, modulations and score reading at the piano. (P/NP grading only.) GE credit: AH. Effective: 2016 Spring Quarter.

MUS 002C—Keyboard Competence, Part 3 (2)
Performance Instruction—2 hours. Prerequisite(s): MUS 002B; (MUS 006C (can be concurrent), MUS 016C (can be concurrent)); Consent of Instructor. MUS 006C and MUS 016C required concurrently; completion of MUS 002B or demonstration of required keyboard proficiency level on diagnostic exam. Training to meet the minimum piano requirements for the major in music. Harmonic progressions, figured bass realization, sight reading and keyboard repertory. (P/NP grading only.) GE credit: AH. Effective: 2016 Spring Quarter.

MUS 003A—Introduction to Music Theory, Part 1 (4)
Lecture—1 hour; Recitation—3 hours. Fundamentals of music theory, ear-training, harmony, counterpoint, and analysis directed toward the development of listening and writing techniques. Intended for the general student. GE credit: AH. Effective: 2008 Fall Quarter.

MUS 003B—Introduction to Music Theory, Part 2 (4)
Lecture—1 hour; Recitation—3 hours. Prerequisite(s): MUS 003A; or Consent of Instructor. Continuation of course 3A. Development of melodic and harmonic writing skills. Basic analysis training. Intended for the general student. GE credit: AH. Effective: 2016 Spring Quarter.

MUS 006A—Elementary Theory, Part 1 (3)
Lecture—3 hours. Prerequisite(s): MUS 002A (can be concurrent); MUS 016A (can be concurrent); Courses required concurrently. Development of music writing and listening skills through the study of music fundamentals, species counterpoint, harmony, analysis of repertory. Intended primarily for music majors. GE credit: AH. Effective: 2016 Fall Quarter.

MUS 006B—Elementary Theory, Part 2 (3)
Lecture—3 hours. Prerequisite(s): MUS 002B (can be concurrent); MUS 016B (can be concurrent); Courses required concurrently. Completion of MUS 006A or demonstration of required proficiency level on diagnostic exam. Continuation of course 6A. GE credit: AH. Effective: 2016 Fall Quarter.

MUS 006C—Elementary Theory, Part 3 (3)
Lecture—3 hours. Prerequisite(s): MUS 002C (can be concurrent); MUS 016C (can be concurrent); Courses 002C and 016C required concurrently. Completion of MUS 006B or demonstration of required proficiency level on diagnostic exam. Continuation of courses 6A-B. GE credit: AH. Effective: 2016 Fall Quarter.

MUS 007A—Intermediate Theory, Part 1 (3)
Lecture—3 hours. Prerequisite(s): MUS 006C; MUS 017A (can be concurrent) Homophonic music of the Classical era with a focus on analysis of music by Haydn, Mozart, and Beethoven. Composition of pieces in the homophonic forms such as minuet and trio, theme and variations, rondo and sonata. Intended for music majors. GE credit: AH. Effective: 2016 Fall Quarter.

MUS 007B—Intermediate Theory, Part 2 (3)
Lecture—3 hours. Prerequisite(s): MUS 007A; MUS 017B (can be concurrent) Nineteenth-century harmony and voice leading through the music of the Romantic era. Focus on analysis of music by Chopin, Schumann, Brahms, Wagner, and Wolf. Composition of character pieces and songs. Intended for Music majors. GE credit: AH. Effective: 2016 Fall Quarter.

MUS 007C—Intermediate Theory, Part 3 (3)
Lecture—3 hours. Prerequisite(s): MUS 007B; MUS 017C (can be concurrent) Music of the first thirty years of the twentieth century and various analytical tools pertaining to it. Works of Debussy, Stravinsky, Schoenberg, Berg, and others. Composition of small pieces for solo instruments, voice and piano. Intended for music majors. GE credit: AH. Effective: 2016 Fall Quarter.

MUS 010—Introduction to Musical Literature (4)
Discussion—1 hour; Lecture—3 hours. Introduction to composers and major styles of Western music. Lectures, listening sections, and selected readings. For non-majors. GE credit: AH, VL, WC. Effective: 2018 Spring Quarter.

MUS 011—Musics of the World (4)
Lecture—3 hours; Listening—1 hour. Survey of selected art, folk, and popular music cultures from different parts of the world. Emphasis on understanding relationship of musical style, aesthetic principles, and performance practice to wider cultural contexts. GE credit: AH, VL, WC. Effective: 2008 Fall Quarter.

MUS 016A—Elementary Musicianship, Part 1 (2)
Lecture/Lab—2 hours. Prerequisite(s): MUS 002A (can be concurrent); MUS 006A (can be concurrent); MUS 002A and MUS 006A required concurrently. Melodic, rhythmic, and harmonic materials of Western music. Includes sight singing, explanations, drills, melodic/rhythmic/harmonic dictations, and listening analysis. GE credit: AH. Effective: 2016 Spring Quarter.

MUS 016B—Elementary Musicianship, Part 2 (2)
Lecture/Lab—2 hours. Prerequisite(s): MUS 016A; (MUS 002B (can be concurrent), MUS 006B (can be concurrent)); MUS 002B and MUS 006B required concurrently. Completion of MUS 016A or demonstration of required proficiency level on diagnostic exam. Melodic, rhythmic, and harmonic materials of Western music. Includes sight singing, explanations, drills, melodic/rhythmic/harmonic dictations, and listening analysis. GE credit: AH. Effective: 2016 Spring Quarter.

MUS 016C—Elementary Musicianship, Part 3 (2)
Lecture/Lab—2 hours. Prerequisite(s): MUS 016B; (MUS 002C (can be concurrent), MUS 006C (can be concurrent)); MUS 002C and MUS 006C required concurrently. Completion of MUS 016B or demonstration of required proficiency level on diagnostic exam. Melodic, rhythmic, and harmonic materials of Western music. Includes sight singing, explanations, drills, melodic/rhythmic/harmonic dictations, and listening analysis. GE credit: AH. Effective: 2016 Spring Quarter.

MUS 017A—Intermediate Musicianship, Part 1 (2)
Lecture/Lab—2 hours. Prerequisite(s): MUS 016C; MUS 007A (can be concurrent); Or demonstrate required proficiency level on diagnostic exam. Melodic, rhythmic, and harmonic materials of Western music. Includes sight singing, explanations, drills, melodic/rhythmic/harmonic dictations, and listening analysis. GE credit: AH. Effective: 2016 Fall Quarter.

MUS 017B—Intermediate Musicianship, Part 2 (2)
Lecture/Lab—2 hours. Prerequisite(s): MUS 017A; (MUS 007B (can be concurrent); MUS 007B required concurrently. Completion of MUS 017A or demonstration of required proficiency level on diagnostic exam. Melodic, rhythmic, and harmonic materials of Western music. Includes sight singing, explanations, drills, melodic/rhythmic/harmonic dictations, and listening analysis. GE credit: AH. Effective: 2017 Winter Quarter.

MUS 017C—Intermediate Musicianship, Part 3 (2)
Lecture/Lab—2 hours. Prerequisite(s): MUS 017B; Completion of MUS 017B or demonstration of required proficiency level on diagnostic exam; MUS 007C required concurrently. The melodic, rhythmic, and harmonic materials of Western music. Includes sight singing, explanations, drills, melodic/rhythmic/harmonic dictations, and listening analysis. GE credit: AH. Effective: 2006 Fall Quarter.

MUS 024A—Introduction to the History of Music I (3)
Lecture—3 hours. Prerequisite(s): MUS 006A (can be concurrent); or Consent of Instructor. History of music from the late Baroque to Beethoven. Intended primarily for majors in music. GE credit: AH, VL, WE. Effective: 2016 Spring Quarter.

MUS 024B—Introduction to the History of Music II (3)
Lecture—3 hours. Prerequisite(s): MUS 024A; or Consent of Instructor. History of music from the Romantic Period to the nineteenth century. Intended primarily for majors in Music. GE credit: AH, VL, WE. Effective: 2016 Spring Quarter.

MUS 024C—Introduction to the History of Music III (3)
Lecture—3 hours. Prerequisite(s): MUS 024B; or Consent of Instructor. History of music of the 20th century. Intended primarily for majors in music. GE credit: AH, VL, WE. Effective: 2016 Spring Quarter.

MUS 028—Introduction to African American Music (4)
Discussion—1 hour; Lecture/Discussion—3 hours; Listening; Project (Term Project). Survey of African American music, such as spirituals, blues, ragtime, jazz, theater, gospel, R&B, rap, and art music. Emphasis on historical and sociocultural contexts, as well as African roots. GE credit: ACGH, AH, DD, VL, WE. Effective: 2011 Fall Quarter.

MUS 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study. (P/NP grading only.) GE credit: AH. Effective: 2016 Spring Quarter.

MUS 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special study for undergraduates. (P/NP grading only.) GE credit: AH. Effective: 2016 Spring Quarter.

MUS 101A—Advanced Theory, Part 1 (4)
Lecture—3 hours; Lecture/Lab—1 hour. Prerequisite(s): MUS 007C Twentieth-century music from 1930 through 1950 and the various analytical tools pertaining to it. Works of Copland, Sessions, Schoenberg, Bartók, and Stravinsky. Composition of small pieces for piano and voice. GE credit: AH. Effective: 2017 Winter Quarter.

MUS 101B—Advanced Theory, Part 2 (4)
Lecture—3 hours; Lecture/Lab—1 hour. Prerequisite(s): MUS 101A Music from 1950 to the present and the analytical tools pertaining to it. Works of Babbit, Carter, Dallapiccola, Ligeti, Messiaen, Reich and others. Composition of small pieces for ensemble. GE credit: AH. Effective: 2016 Spring Quarter.

MUS 102—Tonal Counterpoint (4)
Lecture—3 hours; Practice—1 hour. Prerequisite(s): MUS 006C; or Consent of Instructor. Imitative tonal counterpoint with an analytical focus on the Two-Part Inventions and fugues from the The Well-Tempered Klavier by J. S. Bach. Composition of exercises and short pieces using contrapuntal techniques. Intended for music majors. GE credit: AH. Effective: 2017 Winter Quarter.

MUS 103—Workshop in Composition (3)
Workshop—3 hours. Prerequisite(s): MUS 006C; or Consent of Instructor. Workshop in musical composition for undergraduates who are interested in pursuing serious compositional studies and intending to follow the composition track of the major. Course will explore the techniques and materials of musical composition. May be repeated for credit. GE credit: AH. Effective: 2016 Spring Quarter.

MUS 105—History and Analysis of Jazz (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MUS 003A or MUS 010 or MUS 028; or Consent of Instructor. Jazz and the evolution of jazz styles in historical and cultural context. For non-majors. GE credit: ACGH, AH, DD, WE. Effective: 2017 Winter Quarter.

MUS 106—History of Rock Music (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MUS 003A or MUS 010 or MUS 028; or Consent of Instructor. Rock and the evolution of rock styles in historical and cultural context. For non-majors. GE credit: ACGH, AH, VL, WE. Effective: 2017 Winter Quarter.

MUS 107A—Computer and Electronic Music (3)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Limited enrollment. Studies in electronic and computer music composition. The principles and procedures of composition in various electronic media are explored through compositional exercises. Limited enrollment. GE credit: AH. Effective: 2016 Spring Quarter.

MUS 107B—Handmade Electronic Music (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): MUS 107A; Consent of Instructor. Hacking, bending, and creating electronic circuits to make sound. Learning to read circuit diagrams, to build prototypes, and to solder components together. Repertoire study. GE credit: AH. Effective: 2018 Winter Quarter.

MUS 108A—Orchestration (2)
Lecture—2 hours. Prerequisite(s): MUS 006C; or Consent of Instructor. Techniques of orchestration from study of basic instrumental techniques to analysis of orchestral scores and scoring for various instrumental combinations. GE credit: AH, VL. Effective: 2016 Spring Quarter.

MUS 108B—Orchestration (2)
Lecture—2 hours. Prerequisite(s): MUS 108A; or Consent of Instructor. Techniques of orchestration from study of basic instrumental techniques to analysis of orchestral scores and scoring for various instrumental combinations. GE credit: AH, VL. Effective: 2016 Spring Quarter.

MUS 110A—The Music of a Major Composer: Beethoven (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MUS 010 or MUS 003A; or Consent of Instructor. Work of Beethoven will be studied in the context of his time and his contemporaries. Lectures, discussion/guided listening sections, and selected readings. For non-majors. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

MUS 110B—The Music of a Major Composer: Stravinsky (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MUS 010 or MUS 003A; or Consent of Instructor. Work of Stravinsky will be studied in the context of his time and his contemporaries. Lectures, discussion/guided listening sections, and selected readings. For non-majors. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

MUS 110C—The Music of a Major Composer: Bach (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MUS 010 or MUS 003A; or Consent of Instructor. Work of Bach will be studied in the context of his time and his contemporaries. Lectures, discussion/guided listening sections, and selected readings. For non-majors. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

MUS 110D—The Music of a Major Composer: Mozart (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MUS 010 or MUS 003A; or Consent of Instructor. Work of Mozart will be studied in the context of his time and his contemporaries. Lectures, discussion/guided listening sections, and selected readings. For non-majors. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

MUS 110E—The Music of a Major Composer: Haydn (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MUS 010 or MUS 003A; or Consent of Instructor. Work of Haydn in the context of his time and his contemporaries. Lectures, discussion/guided listening sections, and selected readings. For non-majors. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

MUS 110F—American Masters (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MUS 010 or MUS 003A; or Consent of Instructor. Overview of American concert music by master composers from Charles Ives to the present. Lectures, discussion/guided listening sections, and selected readings. For non-majors. GE credit: ACGH, AH, DD, VL, WE. Effective: 2016 Spring Quarter.

MUS 110G—Music of a Major Composer--Handel (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MUS 010 or MUS 003A; or Consent of Instructor. Work of Handel in the context of his time and his contemporaries. Lectures, discussion/guided listening sections, and selected readings. For non-majors. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

MUS 112A—Jazz Fundamentals (2)
Lecture/Lab—2 hours. Prerequisite(s): MUS 003A C- or better; or Consent of Instructor. Concurrent enrollment with MUS 140 or MUS 146 required. Fundamentals of Jazz music theory, ear training, harmony and composition techniques. Designed to complement participation in Jazz Combo or Jazz Band. First course of a three course sequence. GE credit: AH. Effective: 2017 Winter Quarter.

MUS 112B—Jazz Theory (2)
Lecture/Lab—2 hours. Prerequisite(s): MUS 112A C- or better; Consent of Instructor. Concurrent enrollment in MUS 140 or MUS 146 required. Intermediate level Jazz music theory, ear training, harmony, and composition techniques including improvisation. Designed to complement participation in Jazz Combo or Jazz Band. Second course of a sequence. GE credit: AH. Effective: 2017 Winter Quarter.

MUS 112C—Jazz Composition (2)
Lecture/Lab—2 hours. Prerequisite(s): MUS 112B C- or better; Consent of Instructor. Concurrent enrollment in MUS 140 required. Jazz compositions and arranging in different styles using techniques of Jazz theory, harmony and improvisation. Third course of a sequence. GE credit: AH. Effective: 2017 Winter Quarter.

MUS 113—Introduction to Conducting (2)
Lecture—1 hour; Performance Instruction—1 hour. Prerequisite(s): MUS 006C; or Consent of Instructor. Principles and techniques of conducting as they apply to both choral and instrumental ensembles. GE credit: AH. Effective: 2016 Spring Quarter.

MUS 114—Intermediate Conducting (2)
Lecture—1 hour; Performance Instruction—1 hour. Prerequisite(s): MUS 113; or Consent of Instructor. Intermediate conducting with a continued focus on principles and techniques as they apply to both choral and instrumental ensembles. GE credit: AH. Effective: 2016 Spring Quarter.

MUS 115—History of Film Music (4)
Film Viewing—3 hours; Lecture—3 hours. Prerequisite(s): MUS 003A or MUS 010; or Consent of Instructor. Film music from silent films to movies of the past decade. How music supports and shapes film narrative and structure. Use of jazz, rock and classical music in film. GE credit: AH, VL, WE. Effective: 2016 Spring Quarter.

MUS 116—Introduction to the Music of The Beatles (4)
Lecture—3 hours; Listening—1 hour. Prerequisite(s): MUS 003A or MUS 010; or Consent of Instructor. Survey of music of The Beatles, focusing on the songs of Lennon and McCartney. Emphasis on understanding their evolution as musicians, composers and cultural figures. Discussion of their musical influences in wider cultural contexts. GE credit: AH, VL, WC. Effective: 2016 Spring Quarter.

MUS 117—The Broadway Musical (4)
Discussion—1 hour; Lecture—3 hours. Exploration of a variety of Broadway and film musicals from different time periods, and how musicals reflect and help create social reality, and the different aspects of the creative process as manifested through music, dance, scenery, and acting. GE credit: AH, DD, VL. Effective: 2018 Winter Quarter.

MUS 121—Topics in Music Scholarship (4)
Seminar—4 hours. Prerequisite(s): MUS 006C; MUS 024C; or Consent of Instructor. Sources and problems of a historical period or musical style selected by the instructor and announced in advance. May be repeated for credit. May be repeated for credit. GE credit: AH, OL. Effective: 2016 Spring Quarter.

MUS 122—Topics in Analysis and Theory (4)
Seminar—4 hours. Prerequisite(s): MUS 006C; MUS 024C; or Consent of Instructor. Analysis of works of a composer or musical style selected by the instructor and announced in advance. Consideration of theoretical issues. May be repeated for credit. May be repeated for credit. GE credit: AH, OL. Effective: 2016 Spring Quarter.

MUS 123—Music as Culture (3)
Lecture/Discussion—3 hours. Prerequisite(s): MUS 024C; or Consent of Instructor. Introduction to the study of music in cross-cultural perspective. Basic theories and frameworks of ethnomusicology; in-depth case studies of three musical traditions from around the world. Intended for music majors. GE credit: AH, WC, WE. Effective: 2017 Winter Quarter.

MUS 124A—History of Western Music: Middle Ages to 1600 (3)
Lecture—3 hours. Prerequisite(s): MUS 024C; or Consent of Instructor. Historical survey of composers and musical styles from the Middle Ages to the beginning of the 17th century. GE credit: AH, VL, WE. Effective: 2016 Spring Quarter.

MUS 124B—History of Western Music: 1600-1750 (3)
Lecture—3 hours. Prerequisite(s): MUS 124A; or Consent of Instructor. Historical survey of composers and musical styles from the late 1500s to the mid-18th century. GE credit: AH, VL, WE. Effective: 2016 Spring Quarter.

MUS 126—American Music (4)
Lecture—3 hours; Listening—1 hour. Prerequisite(s): MUS 010 or MUS 003A; or Consent of Instructor. Introductory survey of American musics, including Native American music, Hispanic polyphony, New England psalmody, and selected 20th-century composers and styles. GE credit: ACGH, AH, DD, WE. Effective: 2016 Spring Quarter.

MUS 127—Music from Latin America (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Examination of music from Latin America. Characteristic music (i.e., tango, bossa nova, salsa, musica motena, musica andina) as well as its implications in other musical genres. Taught in English or Spanish depending on instructor. May be repeated up to 1 time(s) when topic differs. Not open to students who have taken SPA 171S or MUS 127S. (Spanish 171) GE credit: AH, VL, WC, WE. Effective: 2018 Winter Quarter.

MUS 127S—Music from Latin America (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Examination of music from Latin America. Characteristic music (i.e. tango, bossa nova, salsa, musica motena, musica andina) as well as its implications in other musical genres. Taught in Spanish or English depending on instructor. May be repeated up to 1 time(s) when content differs. Not open to students who have taken SPA 171 or MUS 127. (Spanish 171S) GE credit: AH, VL, WC, WE. Effective: 2018 Winter Quarter.

MUS 129A—Musics of the Americas (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MUS 011 or MUS 003A or MUS 010; or Consent of Instructor. Survey of music cultures from North, Central, and South America, including the Caribbean, with emphasis on the role of music in society and on the elements of music (instruments, theory, genres and form, etc.). Introduction to ethnomusicological theory, methods, approaches. GE credit: AH, DD, VL, WC, WE. Effective: 2016 Spring Quarter.

MUS 129B—Musics of Africa, Middle East, Indian Subcontinent (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MUS 011 or MUS 003A or MUS 010; or Consent of Instructor. Survey of music cultures with special emphasis on the role of music in society and on the elements of music (instruments, theory, genres and form, etc.). Introduction to ethnomusicological theory, methods, approaches. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

MUS 129C—Musics of East and Southeast Asia (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MUS 011 or MUS 003A or MUS 010; or Consent of Instructor. Survey of music cultures from Japan, China, Korea, Vietnam, and Indonesia, with special emphasis on the role of music in society and on the elements of music (instruments, theory, genres and form, etc.). Introduction to ethnomusicological theory, methods, approaches. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

MUS 129D—Folk Musics of Europe (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MUS 011 or MUS 003A or MUS 010; or Consent of Instructor. Survey of folk musics from all of Europe, with emphasis on the role of music in society and on the elements of music (instruments, genres, form, etc.). Introduction to ethnomusicological theory, methods, approaches. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

MUS 130A—Applied Study of Music: Advanced; Voice (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; Voice. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130B—Applied Study of Music: Advanced; Piano (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; Piano. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130C—Applied Study of Music: Advanced; Harpsichord (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; Harpsichord. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130D—Applied Study of Music: Advanced; Organ (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; Organ. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130E—Applied Study of Music: Advanced: Violin (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; Violin. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130F—Applied Study of Music: Advanced; Viola (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; Viola. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130G—Applied Study of Music: Advanced; Cello (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; Cello. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130H—Appied Study of Music: Advanced; Double Bass (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; Double Bass. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130I—Applied Study of Music: Advanced; Flute (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; Flute. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130J—Applied Study of Music: Advanced; Oboe (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; Oboe. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130K—Applied Study of Music: Advanced; Clarinet (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; Clarinet. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130L—Applied Study of Music: Advanced; Bassoon (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; Bassoon. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130M—Applied Study of Music: Advanced; French Horn (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; French Horn. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130N—Applied Study of Music: Advanced; Trumpet (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; Trumpet. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130O—Applied Study of Music: Advanced; Trombone (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; Trombone. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130P—Applied Study of Music: Advanced; Tuba (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; Tuba. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130Q—Applied Study of Music: Advanced; Percussion (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; Percussion. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130R—Applied Study of Music: Advanced; Classical Guitar (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section. Offered as demand indicates. May be repeated for credit. Effective: 2016 Fall Quarter.

MUS 131A—Applied Study of Music: Advanced (Individual) (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in voice. May be repeated for credit. Effective: 2016 Fall Quarter.

MUS 131B—Applied Study of Music: Advanced (Individual); Piano (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in Piano. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 131C—Applied Study of Music: Advanced (Individual); Harpsichord (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in Harpsichord. May be repeated for credit. Effective: 2016 Winter Quarter.

MUS 131D—Applied Study of Music: Advanced (Individual); Organ (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in Organ. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 131E—Applied Study of Music: Advanced (Individual); Violin (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in Violin. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 131F—Applied Study of Music: Advanced (Individual); Viola (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Open to Music majors only; admission by audition. Individual instruction in Viola. May be repeated for credit. Effective: 1997 Fall Quarter.

MUS 131G—Applied Study of Music: Advanced (Individual); Cello (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in Cello. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 131H—Applied Study of Music; Advanced (Individual); Double Bass (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in Double Bass. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 131I—Applied Study of Music: Advanced (Individual); Flute (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in Flute. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 131J—Applied Study of Music: Advanced (Individual); Oboe (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in Oboe. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 131K—Applied Study of Music: Advanced (Individual); Clarinet (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in Clarinet. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 131L—Applied Study of Music: Advanced (Individual); Bassoon (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in Bassoon. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 131M—Applied Study of Music: Advanced (Individual); French Horn (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in French Horn. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 131N—Applied Study of Music: Advanced (Individual); Trumpet (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in Trumpet. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 131O—Applied Study of Music: Advanced (Individual);Trombone (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in Trombone. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 131P—Applied Study of Music: Advanced (Individual); Tuba (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in Tuba. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 131Q—Applied Study of Music: Advanced (Individual); Percussion (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in Percussion. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 131R—Applied Study of Music: Advanced (Individual); Classical Guitar (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in Classical Guitar. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 131U—Applied Study of Music: Advanced (Individual); Saxophone (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Open to Music majors only; admission by audition. Individual instruction in Saxophone. May be repeated for credit. Effective: 2016 Fall Quarter.

MUS 132—Singing for Actors (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Elements of basic singing techniques, through selected exercises, vocalises, and songs. May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: AH. Effective: 2016 Spring Quarter.

MUS 140—University Jazz Band (2)
Practice; Rehearsal—2 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Open to students in any major. rehearsal, study, and performance of jazz band music and full variety of jazz band style, including swing, be-bob, and contemporary jazz styles. May be repeated for credit. (P/NP grading only.) GE credit: AH. Effective: 2017 Spring Quarter.

MUS 141—University Symphony (2)
Rehearsal—4 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Open to any student in the University whose proficiency meets the requirements of concert performance. Sight-reading, rehearsal and performance of music from the orchestral literature. May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: AH. Effective: 2016 Spring Quarter.

MUS 142—University Chamber Singers (2)
Rehearsal—3 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Rehearsal and performance of works for small choral group. May be repeated for credit. (P/NP grading only.) GE credit: AH. Effective: 2016 Spring Quarter.

MUS 143—University Concert Band (2)
Rehearsal—4 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Open to any student in the University whose proficiency meets the
requirements of concert performance. Rehearsal and performance of music for band. May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: AH. Effective: 2016 Spring Quarter.

MUS 144—University Chorus (2)
Rehearsal—4 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Open to any student in the University. Rehearsal and performance of choral music. May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: AH. Effective: 2016 Spring Quarter.

MUS 145—Early Music Ensemble (2)
Rehearsal—4 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Rehearsal and performance of Medieval, Renaissance, and Baroque music for vocal ensemble and historical instruments. May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: AH. Effective: 2016 Fall Quarter.

MUS 146—Chamber Music Ensemble (1)
Practice—1 hour; Rehearsal—2 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Open to any student in the University whose proficiency meets the requirements of concert performance. Study, rehearsal, and performance of ensemble music for strings, winds, voice, piano, harpsichord, and organ. May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: AH. Effective: 2016 Fall Quarter.

MUS 147—University Wind Ensemble (2)
Rehearsal—4 hours. Prerequisite(s): Consent of Instructor. Rehearsal, study, and performance of a full variety of wind ensemble music; and to have students share their work in public performances. May be repeated for credit. (P/NP grading only.) GE credit: AH. Effective: 2016 Fall Quarter.

MUS 148—Hindustani Vocal Ensemble (2)
Rehearsal—2 hours. Prerequisite(s): Consent of Instructor. Basics of Hindustani music through theory and practice. Fundamentals of raga (mode) and tala (rhythms) with special emphasis on improvisation, a central feature of khyal (singing style). Five ragas each quarter. May be repeated up to 6 time(s). (P/NP grading only.) GE credit: AH. Effective: 2016 Fall Quarter.

MUS 149—Indonesian Gamelan Ensemble (2)
Rehearsal—2 hours. Prerequisite(s): Consent of Instructor. Indonesian music practice. Basic instrumental technique and repertory.
Focus on two styles of Sundanese gamelan (tuned percussion orchestras):
salendro and degung. May be repeated for credit. (P/NP grading only.) GE credit: AH. Effective: 2016 Spring Quarter.

MUS 150—Brasilian Samba School (2)
Rehearsal—2 hours. Prerequisite(s): Consent of Instructor. Practice of Brasilian music. Basic instrumental technique and repertory. Focus on the percussion traditions of Rio de Janeiro and Bahia. May be repeated up to 6 time(s). (P/NP grading only.) GE credit: AH. Effective: 2016 Spring Quarter.

MUS 151—Korean Percussion Ensemble (2)
Listening—2 hours; Practice—2 hours; Rehearsal—2 hours. Prerequisite(s): Consent of Instructor. Class size limited to 20 students. Practice of Korean percussion styles. Basic instrumental technique and repertory. Focus on the percussion traditions of samulnori and basic concepts of p'ungmul. May be repeated up to 6 time(s). (P/NP grading only.) GE credit: AH. Effective: 2016 Spring Quarter.

MUS 192—Internship in Music (1-4)
Internship—3-12 hours. Prerequisite(s): Consent of instructor or academic advisor. Student must submit a written proposal to an appropriate Music Department instructor. Internship outside the university related to music. May be repeated up to 8 unit(s). (P/NP grading only.) GE credit: AH. Effective: 2016 Fall Quarter.

MUS 194HA—Special Study for Honors Students (2-4)
Independent Study—6-12 hours. Prerequisite(s): MUS 007C; MUS 123; Consent of Instructor. Open only to students who qualify for the honors program and admission to music Senior Honors Program. Preparation and presentation of a culminating project, under the supervision of an instructor, in one of the creative or scholarly areas of music. GE credit: AH. Effective: 2016 Spring Quarter.

MUS 194HB—Special Study for Honors Students (2-4)
Independent Study—6-12 hours. Prerequisite(s): MUS 194HA; and Consent of Instructor. Open only to students who qualify for honors program and admission to Music Senior Honors Program. Preparation and presentation of a culminating project, under the supervision of an instructor, in one of the creative or scholarly areas of music. GE credit: AH. Effective: 2016 Spring Quarter.

MUS 195—Senior Project (2)
Project (Term Project)—6 hours. Prerequisite(s): MUS 007C; MUS 123; Consent of Instructor. Preparation of a senior project in music composition (public presentation of a new work), in music performance (a public recital), or in music history and theory (public presentation of research results). GE credit: AH. Effective: 2016 Fall Quarter.

MUS 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study. (P/NP grading only.) GE credit: AH. Effective: 2016 Spring Quarter.

MUS 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special study for advanced undergraduates. (P/NP grading only.) GE credit: AH. Effective: 2016 Spring Quarter.

MUS 202—Notation (4)
Seminar—3 hours; Term Paper. Open to graduate students in music; advanced undergraduates with consent of instructor. Study of musical notation; investigation of techniques for editing Medieval and Renaissance music. Effective: 2016 Spring Quarter.

MUS 203—Music Composition (4)
Seminar—3 hours; Term Paper. Open to graduate students in music; advanced undergraduates with consent of instructor. Technical projects that explore compositional problems, the skill and techniques with which to solve them, and free composition. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 204—Advanced Conducting (3)
Practice; Tutorial—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in conducting. Technical aspects of conducting and the broader issues in music history and analysis that conductors must face before leading a rehearsal or performance. May be repeated for credit. Effective: 2016 Fall Quarter.

MUS 207—Advanced Electronic and Computer Music (4)
Seminar—2 hours. Prerequisite(s): MUS 107A; MUS 107B; MUS 107C; Consent of Instructor. Advanced composition of computer and electronic music. Effective: 2016 Spring Quarter.

MUS 210A—Proseminar in Music (Theory and Analysis) (4)
Seminar—3 hours; Term Paper. Open to graduate students in music; advanced undergraduates with consent of instructor. Voice-leading analysis of tonal music derived from Schenker and pitchclass set theory. Recent work on compositional design, generalizations of the concept of interval, psychologically oriented music theory, and theories of durational structure and timbre. Effective: 2016 Spring Quarter.

MUS 210B—Proseminar in Music (Musicology and Criticism) (4)
Seminar—3 hours; Term Paper. Open to graduate students in music; advanced undergraduates with consent of instructor. Issues and concepts of music history, including performance practice questions for specific repertoires and periods; principles, aims, and methods of archival study; historical theory; evolution of musical styles; philosophical debates about goals and aims of the discipline in general. Effective: 2016 Spring Quarter.

MUS 210C—Proseminar in Music (Ethnomusicology) (4)
Seminar—3 hours; Term Paper. Open to graduate students in music; advanced undergraduates with consent of instructor. Introduction to ethnomusicology through its intellectual history, theoretical approaches, analytical techniques, and methodologies. Effective: 2016 Spring Quarter.

MUS 212—Ethics of Musical Ethnography (4)
Fieldwork; Seminar—3 hours. Open to graduate students in music. Advanced undergraduates with consent of instructor. Role, methodology, perception, and assumptions of the ethnomusicologist in ethnographic scholarship. Examination of complex ethical and political questions in relation to practical fieldwork techniques. Effective: 2016 Fall Quarter.

MUS 213—Transcription and Notation (4)
Project (Term Project); Seminar—3 hours. Open to graduate students in music. Advanced undergraduates with consent of instructor. Practical instruction in the transcription and analysis of primarily non-Western musics. Analytical and theoretical issues, the politics of representation, and the cultural values and ideologies implicit in notation. Effective: 2016 Fall Quarter.

MUS 214—Recent Issues in Ethnomusicology (4)
Seminar—3 hours; Term Paper. Open to graduate students in music; advanced undergraduates with consent of instructor. Issues, schools of thought, and basic literature in ethnomusicology from the 1980s to present. Emphasis on theory and methodology. Effective: 2016 Spring Quarter.

MUS 221—Topics in Music History (4)
Seminar—3 hours. Open to graduate students in music; advanced undergraduates with consent of instructor. Studies in selected areas of music history and theory. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 222—Techniques of Analysis (4)
Seminar—3 hours. Open to graduate students in music; advanced undergraduates with consent of instructor. Analysis and analytical techniques as applied to music of all historical style periods. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 223—Topics in Ethnomusicology (4)
Seminar—4 hours. Prerequisite(s): Open to graduate students in music. Advanced undergraduates with consent of instructor. Intended for graduate students in Music; Anthropology students may enroll with consent of instructor. In-depth ethnomusicological studies of selected cultures and their musics; study of historical, theoretical, contextual, and cultural features. May be repeated for credit. Effective: 2016 Fall Quarter.

MUS 299—Individual Study (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

MUS 396—Teaching Assistant Training Practicum (1-4)
Variable—3-12 hours. Prerequisite(s): Consent of Instructor. Teaching Assistant Training Practicum May be repeated for credit. (S/U grading only.) Effective: 1998 Winter Quarter.

Native American Studies

Native American Studies | NAS Information

(College of Letters and Science)

_____, Chairperson of the Department

Department Office. 2407 Hart Hall; 530-752-3237; http://nas.ucdavis.edu

Faculty. http://nas.ucdavis.edu/people/faculty

Native American Studies | NAS A.B.

(College of Letters and Science)

_____, Chairperson of the Department

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Faculty. http://nas.ucdavis.edu/people/faculty

The Major Program

Native American Studies provides a multi-disciplinary introduction to the indigenous cultures of North, Central, and South America. It challenges students to consider issues of cultural diversity, sovereignty, and indigenous knowledge systems in preparation for living in a world of constantly increasing social and cultural complexity.

The Program. Students electing a major in Native American Studies may complete Plan I, Plan II, or Plan III. Plan I enables students to concentrate chiefly upon the Native experience in North America (north of Mexico). Plan II encourages interested students to focus upon Meso-America with some course work integrating Meso-America with North America and South America. Plan III focuses upon South America with some course work integrating that region with areas to the north.

Major Advisor. http://nas.ucdavis.edu/undergraduate-advisor

Major Advising. All new and prospective Native American Studies majors are encouraged to see the Student Affairs Officer individually, once per year, at minimum.

Career Alternatives. Native American Studies is excellent preparation for a scholarly career or professional career such as teaching, law, human services, health, tribal administration, social work, and inter-ethnic relations. Graduate schools and agencies in these and related areas are looking for students with broad interdisciplinary preparation and who possess knowledge and sensitivity relating to ethnic issues and cultural diversity.

Study Off Campus. Majors have the option of spending one to three quarters elsewhere in the Americas or on or near a reservation as part of the fulfillment of the Area of Specialization. Each student's plan must be approved by the student's adviser and by the chairperson and may fulfill from 12 to 20 of the 28 units required for the emphasis. The courses or field internship taken elsewhere must be focused upon indigenous peoples or indigenous languages and the institution of study shall be located in an area with substantial indigenous population. Students must have upper division standing and, for Plan I, course 107 or the equivalent should have been completed; for Plan II, courses 107 and 133 should have been completed; and for Plan III, courses 107 and 120 should have been completed prior to departure. Several options may be used for receiving academic credit, including course 195. The department strongly encourages students to participate in the UC Education Abroad Program or Short-Term Programs Abroad.

Graduate Study. The Department offers a program of study leading to the M.A. and Ph.D. degrees in Native American Studies, as well as a designated emphasis in Native American Studies for graduate students in approved programs. Further information regarding graduate study may be obtained at the Department office and at Graduate Studies.

Graduate Advisor. http://nas.ucdavis.edu/graduate-program-advisor

Preparatory Subject Matter **Units:** 16-24

NAS 001	Introduction to Native American Studies	4
NAS 010	Native American Experience	4
OR		
NAS 012	Native American/Indigenous Film	4

Choose one or two:

NAS 005	Introduction to Native American Literature	4
NAS 012	Native American/Indigenous Film	4
NAS 032	Native American Music and Dance	4
NAS 033	Introduction to Native American Art	4
NAS 034	Native American Art Studio	4

Choose one or two:

AAS 012	Introduction to African Studies	4

AAS 052	African Traditional Religion	4
ANT 002	Cultural Anthropology	5
ANT 020	Comparative Cultures	4
ANT 024	Ancient Crops and People	4
ASA 001	Historical Experience of Asian Americans	4
ASA 002	Contemporary Issues of Asian Americans	4
ASA 004	Asian American Cultural Studies	4
CHI 010	Introduction to Chicana/o Studies	4
CHI 021	Chicana/o and Latina/o Health Care Issues	4
CHI 023	Qualitative Research Methods	4
COM 025	Ethnic Minority Writers in World Literature	4
CRD 002	Ethnicity and American Communities	4
ESP 010	Current Issues in the Environment	3
HIS 007A	History of Latin America to 1700	4
HIS 007B	History of Latin America, 1700-1900	4
HIS 007C	History of Latin America 1900-present	4
HIS 017A	History of the United States	4
LIN 001	Introduction to Linguistics	4

Depth Subject Matter **Units:** 24

NAS 130A	Native American Ethno-Historical Development	4
NAS 130B	Native American Ethno-Historical Development	4
OR		
NAS 130C	Native American Ethno-Historical Development	4
NAS 157	Native American Religion and Philosophy	4
NAS 180	Native American Women	4
OR		
NAS 135	Gender Construction in Native Societies	4

Choose three:

NAS 101	Contemporary Native American Art	4
NAS 107	Special Topics in Native American Languages	4
NAS 108	Indigenous Languages of California	4
NAS 115	Native Americans in the Contemporary World	4
NAS 119	Introduction to Federal Indian Law	4
NAS 122	Native American Community Development	4
NAS 125	Performance and Culture Among Native Americans	4
NAS 130A	Native American Ethno-Historical Development	4
NAS 130B	Native American Ethno-Historical Development	4
NAS 130C	Native American Ethno-Historical Development	4
NAS 133A	Ethnohistory of Native Peoples of Mexico and Central America to 1500	4
NAS 133B	Ethnohistory of Native Peoples of Mexico and Central America 1500 to 2000	4
NAS 135	Gender Construction in Native Societies	4
NAS 146	Orientation to Research in Native American Studies	4
NAS 161	California Indian Environmental Policy I	4
NAS 162	California Indian Environmental Policy II	4
NAS 180	Native American Women	4
NAS 181A	Native American Literature	4
NAS 181B	Native American Literature	4
NAS 181C	Contemporary Native American Poetry	4

NAS 185	Native American Literature in Performance	4
NAS 188	Special Topics in Native American Literary Studies	4
NAS 191	Topics in Native American Studies	4

Note: If a course is counted for either Plans I, II, or III (below), it cannot also be counted as part of the 24 units of Depth Subject Matter.

Areas of Specialization; complete one plan: **Units:** 20

Plan I—North American Emphasis **Units:** 20

NAS 107	Special Topics in Native American Languages	4
OR		
NAS 108	Indigenous Languages of California	4

Choose two:

NAS 101	Contemporary Native American Art	4
NAS 115	Native Americans in the Contemporary World	4
NAS 119	Introduction to Federal Indian Law	4
NAS 122	Native American Community Development	4
NAS 125	Performance and Culture Among Native Americans	4
NAS 130A	Native American Ethno-Historical Development	4
NAS 130B	Native American Ethno-Historical Development	4
NAS 130C	Native American Ethno-Historical Development	4
NAS 135	Gender Construction in Native Societies	4
NAS 146	Orientation to Research in Native American Studies	4
NAS 161	California Indian Environmental Policy I	4
NAS 162	California Indian Environmental Policy II	4
NAS 181A	Native American Literature	4
NAS 181B	Native American Literature	4
NAS 181C	Contemporary Native American Poetry	4
NAS 185	Native American Literature in Performance	4
NAS 188	Special Topics in Native American Literary Studies	4
NAS 191	Topics in Native American Studies	4

Choose one:

AMS 100	Methods in American Studies	4
ANT 103	Indigenous Peoples and Natural Resource Conservation	4
ANT 136	Ethnographic Film	4
ANT 172	New World Prehistory: The First Arrivals	4
ANT 173	New World Prehistory: Archaic Adaptations	4
ANT 175	Andean Prehistory: Archaeology of the Incas and their Ancestors	4
ANT 176	Prehistory of California and the Great Basin	4
AAS 100	Survey of Ethnicity in the US	4
AAS 107B	African Descent Communities and Culture in North America	4
AAS 145B	Black Intellectuals	4
AAS 152	Major Voices in Black World Literature	4
AAS 153	African Literature	4
AAS 163	African Religions in the Americas	4
AAS 172	Diaspora and New Black Identities	4
AAS 176	The Politics of Resources	4
AAS 181	Hip Hop in Urban America	4
ASA 102	Theoretical Perspective in Asian American Studies	4
ASA 112	Asian American Women	4

ASA 115	Multiracial Asian Pacific American Issues	4
ASA 121	Asian American Performance	4
CHI 100	Chicana/ Chicano Theoretical Perspective	4
CHI 110	Sociology of the Chicana/o Experience	4
SOC 128	Interracial Interpersonal Dynamics	4
WMS 102	Gender and Post Colonialism	4
WMS 160	Women, 'Race' and Sexuality in Postcolonial Cinema	4
WMS 162	Feminist Film Theory and Criticism	4
WMS 170	Queer Studies	4
WMS 178F	Transnationalism and Writing by Women of Color	4
WMS 180	Women of Color Writing in the United States	4
WMS 182	Globalization, Gender and Culture	4

One other upper division Native American Studies course, selected in consultation with advisor.

Plan II—Mexico-Central America Emphasis **Units:** 20

NAS 107	Special Topics in Native American Languages	4
NAS 133	Ethnohistory of Native People of Mexico and Central America	4
OR		
NAS 133B	Ethnohistory of Native Peoples of Mexico and Central America 1500 to 2000	4

Choose two:

AMS 100	Methods in American Studies	4
HIS 110A	Colonialism and the Making of the Modern World	4
HIS 160	Spain and America in the 16th century	4
HIS 165	Latin American Social Revolutions	4
HIS 166A	History of Mexico to 1848	4
HIS 166B	History of Mexico since 1848	4
AAS 107A	African Descent Communities and Culture in the Caribbean and Latin America	4
AAS 180	Race and Ethnicity in Latin America	4
ANT 144	Contemporary Societies and Cultures of Latin America	4
CHI 111	Chicanas/Mexicanas in Contemporary Society	4
CHI 112	Globalization, Transnational Migration, and Chicana/o and Latina/o Communities	4
CHI 125S	Latino Families in the Age of Globalization: Migration and Transculturation	4
CHI 130	United States-Mexican Border Relations	4
CHI 135S	Transnational Latina/o Political Economy	4
CHI 147S	Indigenous Healing and Biodiversity in Latin America	5
NAS 122	Native American Community Development	4
NAS 133A	Ethnohistory of Native Peoples of Mexico and Central America to 1500	4
NAS 184	Contemporary Indigenous Literature of Mexico	4
Study Abroad		
NAS 185	Native American Literature in Performance	4
POL 143B	Mexican Politics	4
SOC 158	Women's Social Movements in Latin America	4
SPA 177	California and Latin America	4

Choose one:

AHI 151	Arts of the Indians of the Americas	4

NAS 181B	Native American Literature	4
NAS 181C	Contemporary Native American Poetry	4

If student's work is specifically focused upon a Meso-American language or topic, then:

NAS 188	Special Topics in Native American Literary Studies	4
NAS 191	Topics in Native American Studies	4

Plan III—South American Emphasis **Units:** 20

Choose two:

NAS 107	Special Topics in Native American Languages	4
NAS 110A	Quechua Language and Society, Beginning Level 1	4
NAS 110B	Quechua Language and Society, Beginning Level 2	4
NAS 110C	Quechua Language and Society, Intermediate Level 1	4
NAS 110D	Quechua Language and Society, Intermediate Level 2	4
NAS 120	Ethnopolitics of South American Indians	4

Study Abroad

Choose two:

AAS 107A	African Descent Communities and Culture in the Caribbean and Latin America	4
AAS 155A	African-American Dance and Culture in the United States, Brazil and the Caribbean	4
AAS 163	African Religions in the Americas	4
AAS 180	Race and Ethnicity in Latin America	4
ANT 103	Indigenous Peoples and Natural Resource Conservation	4
ANT 144	Contemporary Societies and Cultures of Latin America	4
ANT 175	Andean Prehistory: Archaeology of the Incas and their Ancestors	4
HIS 162	History of the Andean Region	4
HIS 165	Latin American Social Revolutions	4
POL 143A	Latin American Politics	4
SOC 104	The Political Economy of International Migration	4
SPA 170	Introduction to Latin American Culture	4
SPA 170S	Introduction to Latin American Culture	4
SPA 171	Music from Latin America	4
SPA 171S	Music from Latin America	4

Summer Abroad

Choose one:

HIS 163B	History of Brazil	4
HIS 164	History of Chile	4
HIS 167	Modern Latin American Cultural and Intellectual History	4
POL 143A	Latin American Politics	4

Total: 60-68

Native American Studies | NAS M.A.

(College of Letters and Science)

_____, Chairperson of the Department

Department Office. 2407 Hart Hall; 530-752-3237; http://nas.ucdavis.edu

Faculty. http://nas.ucdavis.edu/people/faculty

Graduate Study. The Department offers a program of study leading to the M.A. and Ph.D. degrees in Native American Studies, as well as a designated emphasis in Native American Studies for graduate students in approved programs. Further information regarding graduate study may be obtained at the Department office and at Graduate Studies.

Graduate Advisor. http://nas.ucdavis.edu/graduate-program-advisor

Native American Studies | NAS Ph.D.

(College of Letters and Science)

_____, Chairperson of the Department

Department Office. 2407 Hart Hall; 530-752-3237; http://nas.ucdavis.edu

Faculty. http://nas.ucdavis.edu/people/faculty

Graduate Study. The Department offers a program of study leading to the M.A. and Ph.D. degrees in Native American Studies, as well as a designated emphasis in Native American Studies for graduate students in approved programs. Further information regarding graduate study may be obtained at the Department office and at Graduate Studies.

Graduate Advisor. http://nas.ucdavis.edu/graduate-program-advisor

Native American Studies | NAS Minor

(College of Letters and Science)

_____, Chairperson of the Department

Department Office. 2407 Hart Hall; 530-752-3237; http://nas.ucdavis.edu

Faculty. http://nas.ucdavis.edu/people/faculty

The Native American Studies minor provides an interdisciplinary introduction to the Native experience in the Americas through coursework in history, literature, art, performance, languages, values, philosophy, religion, current events, political economic, and the environment.

Native American Studies **Units:** 24

Choose one lower division Native American Studies course.

Choose five upper division Native American Studies courses.

Total: 24

Native American Studies | NAS Courses

Courses in NAS:

NAS 001—Introduction to Native American Studies (4)
Discussion—1 hour; Lecture—3 hours. Introduction to Native American Studies with emphasis upon basic concepts relating to Native American historical and political development. GE credit: ACGH, DD, SS, WC, WE. Effective: 2011 Fall Quarter.

NAS 005—Introduction to Native American Literature (4)
Lecture/Discussion—4 hours. Prerequisite(s): Completion of Subject A requirement. Intensive focus on analysis of Native American literary texts, with frequent writing assignments to develop critical thinking and composition skills. GE credit: AH, DD, OL, WE. Effective: 2011 Fall Quarter.

NAS 007—Indigenous and Minority Languages (4)
Discussion—1 hour; Lecture—3 hours. Survey of the status of indigenous, immigrant, and other minority languages in the Americas and around the world. Topics include linguistic diversity, language endangerment and revitalization, heritage language maintenance in immigrant communities, and language change due to transcultural interactions. GE credit: AH, DD, SS, WC, WE. Effective: 2015 Fall Quarter.

NAS 010—Native American Experience (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the diverse cultures of Native American peoples from North, Central, and South America. Emphasis on Native American voices in the expression of cultural views and in the experience of conflicting values. GE credit: AH, DD, SS, WC, WE. Effective: 2011 Fall Quarter.

NAS 012—Native American/Indigenous Film (4)
Discussion—1 hour; Film Viewing; Lecture—3 hours. Survey and analysis of the visual colonization of Native American peoples and the contemporary responses by Native American/Indigenous filmmakers claiming visual sovereignty. Examines a range of filmic genres including documentary, features, shorts, festivals, TV and Internet screening. GE credit: ACGH, AH, DD, SS, VL, WC, WE. Effective: 2011 Fall Quarter.

NAS 032—Native American Music and Dance (4)
Lecture/Discussion—4 hours. Introduction to the music and dance of the native peoples of the Americas. Students will study secular native music and dance from a cross-section of regions and tribes. Effective: 1997 Winter Quarter.

NAS 033—Introduction to Native American Art (4)
Lecture—4 hours. Introduction to Native American Art from throughout North America, inclusive of traditional forms, techniques and designs in a range of media including ceramics, basketry, fiberwork, carving, painting, sculpture and photography within a context of social and political history. GE credit: ACGH, AH, DD, OL, SS, VL, WE. Effective: 2012 Fall Quarter.

NAS 034—Native American Art Studio (4)
Lecture—2 hours; Studio—6 hours. Limited enrollment. Studio projects to be influenced by contemporary and traditional Native American arts. Examples of designs and media presented in lectures will be of indigenous origin. Introduction and familiarized with various materials and techniques. GE credit: ACGH, AH, DD, OL, VL, WC. Effective: 2011 Fall Quarter.

NAS 046—Orientation to Research in Native American Studies (4) ***Review all entries***
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Native American Studies major or minor, or consent of instructor. Limited enrollment. Introduces students to basic research resources pertinent to Native American subjects available in the region, including libraries, archives, museums, etc. Emphasis is upon learning to use documentary resources or other collections of data. Students will carry out individual projects. Effective: 1997 Winter Quarter.

NAS 046—Orientation to Research in Native American Studies (4) ***Review all entries Discontinued***
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Native American Studies major or minor, or consent of instructor. Limited enrollment. Introduces students to basic research resources pertinent to Native American subjects available in the region, including libraries, archives, museums, etc. Emphasis is upon learning to use documentary resources or other collections of data. Students will carry out individual projects. Effective: 2018 Fall Quarter.

NAS 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2007 Winter Quarter.

NAS 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

NAS 101—Contemporary Native American Art (4)
Extensive Writing; Lecture—3 hours. Examination of contemporary artworks by selected Native American and Indigenous Master artists, in a wide range of media, including ceramics, metal arts, photography, video, painting, installation and performance within a context of political and social histories. GE credit: ACGH, AH, DD, OL, SS, VL, WE. Effective: 2012 Fall Quarter.

NAS 107—Special Topics in Native American Languages (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Investigation of various subjects in contemporary and historical Native American language studies. May be repeated for credit when a different
topic is studied. May be repeated for credit. Effective: 1997 Winter Quarter.

NAS 108—Indigenous Languages of California (4)
Lecture/Discussion—3 hours; Term Paper. Survey of the indigenous languages of the California region: linguistic prehistory, languages at first European contact, subsequent language loss, current efforts at language and cultural revitalization, indigenous languages of recent immigrants to California. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Spring Quarter.

NAS 109—Native American Language Spotlight (4)
Discussion—1 hour; Lecture—3 hours. In-depth examination of the history, structure, and sociolinguistics of a particular Native American language or language family. Different language studied each time the course is offered. Oral proficiency component included in some years. May be repeated for credit May be repeated for credit when a different language/language family is the focus of the course. GE credit: AH, SS, WC, WE. Effective: 2018 Winter Quarter.

NAS 110A—Quechua Language and Society, Beginning Level 1 (4)
Lecture/Discussion—4 hours. Not open to students who took course 107 in the Fall quarter of 2007. Quechua language and society emphasizing the practical use of the language. Provides the student with some basic Quechua communication skills and with an initial knowledge about contemporary Andean society and the status of Quechua language today. GE credit: SS. Effective: 2012 Spring Quarter.

NAS 110B—Quechua Language and Society, Beginning Level 2 (4)
Lecture/Discussion—4 hours. Prerequisite(s): NAS 110A Second Level of the teaching of Quechua language and society. Emphasis on development of conversational and reading skills. Continuation of the study of aspects of contemporary Andean society and the status of Quechua language today. GE credit: SS. Effective: 2012 Fall Quarter.

NAS 110C—Quechua Language and Society, Intermediate Level 1 (4)
Lecture/Discussion—4 hours. Prerequisite(s): NAS 110A; NAS 110B Third level of the teaching of Quechua language and society. Emphasis on development of conversational and reading skills. Introduction to more complex grammatical structures. Continuing the study of contemporary Andean society and the status of Quechua language today. GE credit: SS. Effective: 2012 Fall Quarter.

NAS 110D—Quechua Language and Society, Intermediate Level 2 (4)
Lecture/Discussion—4 hours. Prerequisite(s): NAS 110A; NAS 110B; NAS 110C Fourth level of the teaching of Quechua language and society. Emphasis on complex structural patterns while emphasizing conversational skills and improving reading competence. Study of different sociopolitical processes that have affected Andean identity and the status of Quechua language. GE credit: SS. Effective: 2012 Fall Quarter.

NAS 115—Native Americans in the Contemporary World (4)
Lecture/Discussion—4 hours. Prerequisite(s): Upper division standing or consent of instructor. Important issues facing Native Americans in the contemporary world. Focus primarily on the diverse ways of life, histories and realities of indigenous people throughout the Americas as they develop their own cultural and political institutions. GE credit: ACGH, AH, DD, OL, SS, WE. Effective: 2016 Fall Quarter.

NAS 116—Native American Traditional Governments (4)
Lecture—4 hours. Prerequisite(s): NAS 001; ANT 002 Study of selected Native American Tribal Governments, confederations, leagues, and alliance systems. Effective: 1997 Winter Quarter.

NAS 117—Native American Governmental Decision Making (4)
Lecture—4 hours. Prerequisite(s): NAS 116; POL 002; ANT 123 recommended. Native American governmental and community decision making with emphasis on federal and state programs, tribal sovereignty, current political trends and funding for tribal services. Effective: 1997 Winter Quarter.

NAS 118—Native American Politics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Upper division standing or consent of instructor. Examination of the various interest groups and movements found among Native people and how they relate to the determination of Indian affairs. Study of political action available to Native groups, and local communities, along with relevant theory relating to underdevelopment. GE credit: ACGH, DD, SS, WC, WE. Effective: 2016 Spring Quarter.

NAS 119—Introduction to Federal Indian Law (4)
Lecture—3 hours; Term Paper. Introduction to the foundational cases and statutes of federal Indian law, from European Contact through the 20th century. GE credit: ACGH, SS, WE. Effective: 2011 Fall Quarter.

NAS 120—Ethnopolitics of South American Indians (4)
Lecture/Discussion—4 hours. Prerequisite(s): NAS 001; (NAS 010 or NAS 055) Social, political, cultural movements of indigenous South Americans in response to establishment, expansion of European colonialism, post-colonial nation-states. Ethnopolitical processes developed through interactions between Indians, Euroamericans. Socioethnographic analysis of main indigenous areas and the development of national societies. Effective: 1997 Winter Quarter.

NAS 121—Corporate Colonialism (4)
Lecture/Discussion—4 hours. Prerequisite(s): NAS 001, NAS 010 or NAS 012 encouraged, but not required. Price of progress and modernity for native and non-native people. History of the corporation and neoliberalism, military and intelligence agencies, debt, Taylorism, education institutions, media, and law. Discussion of alternatives advocated by contemporary and indigenous social movements. GE credit: ACGH, DD, SS, WC, WE. Effective: 2015 Fall Quarter.

NAS 122—Native American Community Development (4)
Lecture—4 hours. Prerequisite(s): NAS 001 or NAS 010 Application of community development theory and techniques to the
development problems of Native American communities. GE credit: ACGH, DD, OL, SS, WE. Effective: 2012 Fall Quarter.

NAS 123—Native Foods and Farming of the Americas (4)
Lecture/Discussion—4 hours. Crop domestication, agrodiversity, and cuisines of the Americas. Cultural and social history of native American foods like maize, potatoes, quinoa, chocolate, peppers, beans, avocados, etc. Discussion of socio-economic, environmental, legal challenges facing indigenous and peasant farmers today. GE credit: DD, OL, SE, SS, WC. Effective: 2016 Spring Quarter.

NAS 125—Performance and Culture Among Native Americans (4)
Film Viewing—3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Interdisciplinary study of public expressive forms among Native Americans. Comparison and analysis of music, dances, rituals, and dramas from throughout North, Central, and South America in their social and cultural contexts. Extensive film viewing. Not open for credit to students who have completed MUS 125. GE credit: AH, SS, WC, WE. Effective: 2018 Spring Quarter.

NAS 130A—Native American Ethno-Historical Development (4)
Lecture—4 hours. Prerequisite(s): Upper division standing or consent of instructor. Study of Native American ethno-history in North America before 1770s. GE credit: ACGH, DD, SS, WC, WE. Effective: 2016 Spring Quarter.

NAS 130B—Native American Ethno-Historical Development (4)
Lecture/Discussion—4 hours. Prerequisite(s): Upper division standing or consent of instructor. Study of Native American ethno-history in North America, 1770-1890. GE credit: ACGH, DD, SS, WE. Effective: 2016 Spring Quarter.

NAS 130C—Native American Ethno-Historical Development (4)
Lecture/Discussion—4 hours. Prerequisite(s): Upper division standing or consent of instructor. Study of Native American ethno-history in North America after 1890. GE credit: ACGH, DD, SS, WE. Effective: 2016 Spring Quarter.

NAS 133—Ethnohistory of Native People of Mexico and Central America (4)
Lecture/Discussion—4 hours. Ethnohistorical development of pre-colonial, colonial, post-colonial Mexican and Central American indigenous people; the impact of economic and political factors on the process of cultural adaptation. Attention is given to the questions of nation-building, forced assimilation, indigenous resistance, organized political responses. GE credit: SS. Effective: 2017 Winter Quarter.

NAS 133A—Ethnohistory of Native Peoples of Mexico and Central America to 1500 (4)
Lecture/Discussion—3 hours; Term Paper. Ethnohistorical development of the indigenous peoples of Mexico and Central America up to and including the earliest period of European contact. Focus is on indigenous written historical records of the Maya, Mixtec, and Nahuatl peoples. May be repeated up to 1 time(s). GE credit: SS. Effective: 2017 Winter Quarter.

NAS 133B—Ethnohistory of Native Peoples of Mexico and Central America 1500 to 2000 (4)
Lecture/Discussion—4 hours. Ethnohistory of indigenous peoples of Mexico and Central America from 1500 to contemporary times. Focus on social and cultural dynamics, particularly the role of indigenous people in the process of nation-state building in Mexico and Central America. GE credit: AH, OL, SS, WE. Effective: 2017 Winter Quarter.

NAS 134—Race, Culture, and Nation (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): Upper division standing or consent of instructor. Exploration of complexities of Native American racial, cultural and national identities and alliances. Study of tribal and federal citizenship, mixed descent and diasporic people(s), claims to resources, ethnic fraud and contemporary movements of cultural resurgence and political sovereignty and self-determination. GE credit: ACGH, DD, SS, WE. Effective: 2016 Spring Quarter.

NAS 134—Race, Culture, and Nation (4) ***Review all entries***
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Upper division standing or consent of instructor. NAS 001 or NAS 010 encouraged, but not required. Exploration of complexities of Native American racial, cultural and national identities and alliances. Study of tribal and federal citizenship, mixed descent and diasporic people(s), claims to resources, ethnic fraud and contemporary movements of cultural resurgence and political sovereignty and self-determination. GE credit: ACGH, DD, SS, WE. Effective: 2018 Fall Quarter.

NAS 135—Gender Construction in Native Societies (4)
Lecture—4 hours. Prerequisite(s): Upper division standing or consent of instructor. Historical and traditional Native American constructions of feminine and masculine genders as well as third, fourth, and fifth genders. Examines gender roles and statuses. Addresses the problems with contemporary terminologies and impacts of colonization on contemporary constructions of gender identities. GE credit: AH, DD, OL, SS, WE. Effective: 2016 Spring Quarter.

NAS 146—Orientation to Research in Native American Studies (4)
Lecture/Discussion—4 hours; Term Paper. Prerequisite(s): Native American Studies major or minor, or consent of instructor. Limited enrollment. Introduction to basic research resources pertinent to Native American subjects available in the region, including libraries, archives, museums, etc. Emphasis on learning to use documentary resources or other collections of data. Students will carry out individual projects. GE credit: ACGH, DD, SS, WE. Effective: 2011 Fall Quarter.

NAS 157—Native American Religion and Philosophy (4)
Lecture/Discussion—4 hours. Religious and philosophical traditions of Native American/indigenous peoples of the Americas. GE credit: AH, OL, WE. Effective: 2016 Fall Quarter.

NAS 161—California Indian Environmental Policy I (4)
Lecture/Discussion—4 hours; Term Paper. Contemporary California Indian environmental policy issues, with a focus on water, minerals, contamination, and alliance-building. Issues will be placed within historical and political context, drawing on theories of Native environmental ethics, environmental justice, and Federal Indian law. GE credit: ACGH, DD, SS, WE. Effective: 2012 Fall Quarter.

NAS 162—California Indian Environmental Policy II (4)
Lecture/Discussion—4 hours; Term Paper. Contemporary California Indian environmental policy issues, with a focus on planning, site protection, and collaborative structures. Issues will be placed within historical and political context, drawing on theories of Native environmental ethics, environmental justice, and Federal Indian law. GE credit: ACGH, DD, SS, WE. Effective: 2013 Spring Quarter.

NAS 180—Native American Women (4)
Lecture/Discussion—4 hours. Native American women's life experiences, cross-cultural comparisons of gender roles, and Native women's contemporary feminist thought. Utilizes texts from literature, social science, and autobiography/biography. GE credit: AH, DD, OL, SS, WE. Effective: 2016 Fall Quarter.

NAS 181A—Native American Literature (4)
Lecture/Discussion—4 hours. Prerequisite(s): NAS 005 or ENG 003 or COM 001 or COM 002 or COM 003 Works of fiction (short story, novel) by contemporary Native American authors, with an emphasis on writers from the United States. GE credit: ACGH, AH, DD, OL, WE. Effective: 2011 Fall Quarter.

NAS 181B—Native American Literature (4)
Lecture/Discussion—4 hours. Prerequisite(s): NAS 005 or ENG 003 or COM 001 or COM 002 or COM 003 Works by or about Native Americans including non-fiction novels, biographies and autobiographies. Explore ways Native Americans create and recreate their culture through the creative process in literature. Examine from a critical perspective autobiographies and testimonial literature. GE credit: AH, DD, OL, WE. Effective: 2011 Fall Quarter.

NAS 181C—Contemporary Native American Poetry (4)
Lecture—4 hours. Works of poetry by contemporary Native American/indigenous poets, with some attention to traditional cultural poetic expressions. GE credit: AH, DD, OL, WE. Effective: 2016 Fall Quarter.

NAS 184—Contemporary Indigenous Literature of Mexico (4)
Lecture/Discussion—4 hours. Prerequisite(s): NAS 001 or NAS 010; NAS 181A or NAS 181C recommended; reading knowledge of Spanish required. Contemporary indigenous literature of Mexico, with a focus on the genres (poetry, fiction, drama, essay); analysis of cultural, historical, and spiritual themes, imagery, styles and performances; biographies of and influences on the Native writers themselves. GE credit: AH, OL, SS, WC. Effective: 2011 Fall Quarter.

NAS 185—Native American Literature in Performance (4)
Performance Instruction—4 hours. Prerequisite(s): Consent of Instructor. Performance of contemporary Native American literature onstage, through adaptations of selected literature as well as the creation of original pieces. May be repeated up to 4 unit(s). GE credit: AH, DD, OL, WC. Effective: 2011 Fall Quarter.

NAS 188—Special Topics in Native American Literary Studies (4)
Lecture/Discussion—4 hours. Prerequisite(s): Upper division standing and one of the following recommended: NAS 005, NAS 010, NAS 181A, NAS 181C. Special topics drawn from Native American literature. May be repeated for credit when topic differs. GE credit: AH, DD, OL, WE. Effective: 2011 Fall Quarter.

NAS 190—Seminar in Native American Studies (2)
Discussion—2 hours. Prerequisite(s): Senior Standing. Seminar of critical issues faced by Native American people. (P/NP grading only.) Effective: 1997 Winter Quarter.

NAS 191—Topics in Native American Studies (4)
Lecture/Discussion—4 hours. Prerequisite(s): Upper division standing. Selected topics in Native American Studies related to indigenous knowledges and worldviews from a historical, cultural, hemispheric perspective. May be repeated for credit when topic differs and/or when offered by a different instructor. GE credit: AH, DD, OL, SS, WE. Effective: 2013 Spring Quarter.

NAS 192—Internship (1-12)
Internship—1 hour. Prerequisite(s): Consent of Instructor. Enrollment dependent on availability of intern position in Native American Studies or the CN Gorman Museum, with priority to Native American Studies minors/majors. Restricted to upper division standing. Supervised internship in the CN Gorman Museum, community, and institutional settings related to Native American concerns. May be repeated up to 12 unit(s) including course 192 and other interships taken in other departments and institutions. (P/NP grading only.) GE credit: AH. Effective: 2011 Fall Quarter.

NAS 194HA—Special Studies for Honors Students (4)
Independent Study—12 hours. Prerequisite(s): Senior qualifying for honors. Directed reading, research and writing culminating in the completion of a senior honors thesis or project under direction of faculty advisor. Effective: 1997 Winter Quarter.

NAS 194HB—Special Studies for Honors Students (4)
Independent Study—12 hours. Prerequisite(s): Senior qualifying for honors. Directed reading, research and writing culminating in the completion of a senior honors thesis or project under direction of faculty advisor. Effective: 1997 Winter Quarter.

NAS 195—Field Experience in Native American Studies (12)
Fieldwork—36 hours. Prerequisite(s): NAS 161; Senior standing and major in Native American Studies, completion of lower division major requirements. Field work with governmental and community groups, under supervision of faculty advisor and sponsor. Knowledge acquired in other courses to be applied in field work. (P/NP grading only.) Effective: 1997 Winter Quarter.

NAS 196—Senior Project in Native American Studies (4)
Discussion—1 hour; Independent Study—3 hours. Prerequisite(s): NAS 195 (can be concurrent); and Consent of Instructor. Senior standing and major in Native American Studies. Guided research project that enables student to apply the theory and research principles from major course work. Final product is to be a major senior project or thesis. (P/NP grading only.) Effective: 1997 Winter Quarter.

NAS 197TC—Community Tutoring in Native American Studies (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of major committee; upper division standing with major in Native American Studies. Supervise tutoring in community. (P/NP grading only.) Effective: 1997 Winter Quarter.

NAS 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

NAS 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

NAS 200—Basic Concepts in Native American Studies (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Analysis of the characteristics of the discipline of Native American Studies. Concentration is on both traditional and contemporary native scholarship and thought as well as the theoretical and methodological consequences derived from application of these ideas. Effective: 1997 Winter Quarter.

NAS 202—Advanced Topics in Native American Studies (4)
Seminar—4 hours. Prerequisite(s): Graduate standing. Advanced study of selected topics or themes relevant to the field of Native American studies. Topics will be announced at the time of offering. May be repeated for credit when topic differs. May be repeated for credit. Effective: 1997 Winter Quarter.

NAS 207—Leadership Skills and Strategies in California Language Documentation & Revitalization (4)
Seminar—3 hours; Term Paper. Introduction to the indigenous languages of the Americas, with a focus on California; an examination of how contemporary Native communities document and revitalize their heritage languages. Learn to assist and administer language programs. Effective: 2010 Fall Quarter.

NAS 212—Community Development for Sovereignty and Autonomy (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Examines a sample of contemporary indigenous communities from south, central and north America with the goal of understanding and evaluating the strategies adopted by Native American communities to develop and
implement forms of sovereignty or autonomous self-management. Effective: 1997 Winter Quarter.

NAS 213—Native Criminality and (4)
Seminar—4 hours. Prerequisite(s): Graduate standing. Examination of "deviance" in Native communities with focus on Native criminality in North America. Analysis of the concept of deviance from several different world views. Readings from a range of theories to incorporate varying theoretical perspective on criminality and deviance. Effective: 1998 Fall Quarter.

NAS 217—Public Law 83-280: Colonial Termination (4)
Seminar—4 hours. Prerequisite(s): Graduate standing, including school of law students. Examination of the signature law of the Termination Era, Public Law 83-280. Discussions to include termination, societal conformity, political consent, jurisdiction, self-determination & decolonization, and colonial relationship between Native Peoples and the United States. Effective: 2007 Spring Quarter.

NAS 220—Colonialism, Neoliberalism, and Indigenous Self-Determination (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. History, political economy and legacies of imperial/colonial systems. Continuities and discontinuities with corporate globalization and neoliberalism. Focus on resistance and self-determination of indigenous peoples, but with comparison to other groups. Effective: 2016 Winter Quarter.

NAS 224—Performance in the Americas (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Ethnomusicological and anthropological approaches to study of public performance in the Americas. New ways of looking at music, dance, rituals and other forms of public expressive forms normally called "folklore" or "popular culture." Not open for credit to students who have completed MUS 224. (Former course MUS 224.). Effective: 1999 Fall Quarter.

NAS 233—Visual Sovereignty (4)
Film Viewing—2 hours; Seminar—3 hours; Term Paper. Extensively examine the field of contemporary Native American and Indigenous photography, film and performance through research of artworks, writings by artists, theorists, and material in museum collections. May be repeated up to 2 time(s) when topic differs. Effective: 2011 Fall Quarter.

NAS 237—Native American Art Collections and Museums (4)
Seminar—3 hours; Term Paper. Research and examination of regional Native American art held in museums and other public institutions, as well as privately-held collections. Includes onsite viewing and research of museum collections and archives. Effective: 2012 Fall Quarter.

NAS 240—Native American Public Health: Topics and Issues (4)
Seminar—3 hours; Term Paper. Introduction to Native American public health issues and contributing causal factors (including environmental justice and historical trauma); the dimensions of cultural competency in diagnosis and service provision; the structure of Native health care institutions; and debates in Native treatment modalities. Effective: 2011 Fall Quarter.

NAS 246—Native American/Indigenous Research Methodologies (4)
Seminar—3 hours; Term Paper. Introduction to advanced methodologies currently influencing research in Native American Studies and amongst Indigenous communities. Students will develop an original project and course assignments will guide them through the process of research design and implementation. Effective: 2015 Fall Quarter.

NAS 250—Indigenous Critique of Classic Maya Ethnographies (4)
Seminar—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Construction of the Maya world through ethnographic writing during the
present century. Deconstruction of ethnographies about the Mayans considering the modern theories and social/anthropological critiques of modern ethnographies. Effective: 1998 Fall Quarter.

NAS 280—Ethnohistorical Theory and Method (4)
Seminar—3 hours; Term Paper. Discussion of the ethnohistorical method; the utilization of diverse types of data, especially documentary sources, to reconstruct socio-cultural history. Particular attention to the applied area of ethnohistory in the solution of contemporary social problems. Effective: 1997 Winter Quarter.

NAS 298—Group Study for Graduate Students (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

NAS 299—Special Study for Graduate Students (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

NAS 396—Teaching Assistant Training Practicum (1-4)
Internship. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Natural Sciences; Earth & Planetary Sciences

Natural Sciences; Earth & Planetary Sciences | Natural Sciences B.S.

(College of Letters and Science)

Department Office: Earth and Planetary Sciences; 2119 Earth and Physical Sciences; 530-752-0350; http://naturalsciences.ucdavis.edu/

Faculty: http://geology.ucdavis.edu/people/faculty/index.php

Admission consideration to the Natural Sciences major is closed to freshman and transfer applicants as the major has been discontinued effective fall 2018.

The Natural Sciences major is also closed to on-campus transfers beginning 2017-2018.

Natural Sciences; Earth & Planetary Sciences | GEL Courses

Courses in GEL:

GEL 001—The Earth (4)
Discussion—1 hour; Lecture—3 hours. Intoduction to the study of the Earth. Earth's physical and chemical structure;
internal and surface processes that mold the Earth; geological hazards and resources. Not open for credit to students who have taken GEL 050; only 2 credits for students who have taken GEL 002. GE credit: SE, SL, WE. Effective: 2013 Fall Quarter.

GEL 002—Earth System Science (3)
Lecture—3 hours. Solid and fluid earth and its place in the solar system. How the solid earth interacts with the atmosphere, hydrosphere, biosphere, and extraterrestrial environment. Only 2 units credit for students who have taken GEL 050; only 2 units credit for students who have taken GEL 001. GE credit: SE, SL. Effective: 2017 Winter Quarter.

GEL 002G—The Blue Planet: Introduction to Earth Science - Discussion (1) ***Review all entries***
Discussion—1 hour. Prerequisite(s): GEL 002 (can be concurrent); GEL 002 required concurrently. Small group discussion and preparation of short papers for course 2. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 002G—Earth System Science Discussion (1) ***Review all entries***
Discussion—1 hour. Prerequisite(s): GEL 002 (can be concurrent); GEL 002 required concurrently. Small group discussion and preparation of short papers for GEL 002. GE credit: SE. Effective: 2018 Fall Quarter.

GEL 003—History of Life (3)
Lecture—3 hours. Prerequisite(s): GEL 001 recommended. The history of life during the three and onehalf billion years from its origin to the present day. Origin of life and processes of evolution; how to visualize and understand living organisms from their fossil remains. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 003G—History of Life: Discussion (1)
Discussion—1 hour. Prerequisite(s): GEL 003 (can be concurrent); GEL 003 required concurrently. Small group discussion and preparation of short papers for course 3. GE credit with concurrent enrollment in course 3: Wrt. GE credit: SE, WE. Effective: 2013 Fall Quarter.

GEL 003L—History of Life Laboratory (1)
Laboratory—3 hours. Prerequisite(s): GEL 003 (can be concurrent); GEL 003 required concurrently. Exercises in understanding fossils as the clues to interpreting ancient life, including their functional morphology, paleoecology, and evolution. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 004—Evolution: Science and World View (3)
Discussion—1 hour; Lecture—2 hours. Introduction to biological evolution. Emphasis on historical development, major lines of evidence and causes of evolution; relationships between evolution and Earth history; the impact of evolutionary thought on other disciplines. GE credit: SE, SL, WE. Effective: 2013 Fall Quarter.

GEL 009—Geology Field Experience (1)
Fieldwork—1 session. Prerequisite(s): Consent of Instructor. At least one previous GEL class, or concurrent enrollment. Pass One open to non-Geology Majors only. Exposure to geologic features and earth processes in the field. Experiential instruction in earth-science concepts, spatial visualization, landscape evolution, deep time, critical thinking skills, and integrative scientific themes. One 4-5 day field trip. May be repeated up to 1 time(s) when field trip destination differs. (P/NP grading only.) GE credit: SE. Effective: 2018 Fall Quarter.

GEL 010—Modern and Ancient Global Environmental Change (3)
Lecture—3 hours. Fundamental scientific concepts underlying issues such as global warming, pollution, and the future of nonsustainable resources presented
in the context of anthropogenic processes as well as natural forcing of paleoenvironmental change throughout Earth's history. GE credit: SE, SL, VL. Effective: 2013 Fall Quarter.

GEL 012—Evolution and Paleobiology of Dinosaurs (2)
Lecture—2 hours. Introduction to evolutionary biology, paleobiology, ecology and paleoecology, using dinosaurs as case studies. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 016—The Oceans (3)
Lecture—3 hours. Introductory survey of the marine environment. Oceanic physical phenomena, chemical constituents and chemistry of water, geological history, the seas biota and human utilization of marine resources Not open for credit to students who have taken GEL 116. GE credit: SE, SL. Effective: 2013 Fall Quarter.

GEL 016G—The Oceans: Discussion (2)
Discussion/Laboratory—2 hours; Term Paper/Discussion—4 hours. Prerequisite(s): GEL 016 (can be concurrent) Scientific method applied to discovery of the processes, biota and history of the oceans. Group discussion and preparation of term paper. Not open for credit to students who have taken GEL 116G. GE credit: SE, WE. Effective: 2016 Fall Quarter.

GEL 017—Earthquakes and Other Earth Hazards (2)
Lecture—2 hours. Impact of earthquakes, tsunami, volcanoes, landslides, and floods on humans, structures, and the environment. Discussion of the causes and effects of disasters and catastrophes, and on prediction, preparation, and mitigation of natural hazards. GE credit: SE, SL. Effective: 2013 Fall Quarter.

GEL 018—Energy and the Environment (3)
Lecture—3 hours. Conventional and alternative energy resources and their environmental impacts. Basic principles, historical development, current advantages and disadvantages, future prospects. Oil, natural gas, coal, nuclear, wind, geothermal, water, tidal, solar, hydrogen, and other sources of energy for the 21st century. GE credit: SE, SL, WE. Effective: 2013 Fall Quarter.

GEL 018V—Energy and the Environment (3)
Web Electronic Discussion—1.5 hours; Web Virtual Lecture—1.5 hours. Conventional and alternative energy resources and their environmental impacts. Basic principles, historical development, current advantages and disadvantages, future prospects. Oil, natural gas, coal, nuclear, wind, geothermal, water, tidal, solar, hydrogen, and other sources of energy for the 21st century. GE credit: SE, SL, WE. Effective: 2015 Winter Quarter.

GEL 020—Geology of California (2)
Lecture—2 hours. The geologic history of California, the origin of rocks and the environments in which they were formed, the structure of the rocks and the interpretation of their structural history, mineral resources, and appreciation of the California landscape. Offered in alternate years. GE credit: SE, SL, VL. Effective: 2013 Fall Quarter.

GEL 025—Geology of National Parks (3)
Lecture—3 hours. Appreciation of the geologic framework underlying the inherent beauty of U.S. National Parks. Relationship of individual parks to geologic processes such as mountain building, volcanism, stream erosion, glacial action and landscape evolution. GE credit: SE, SL, VL. Effective: 2014 Winter Quarter.

GEL 025V—Geology of National Parks (3)
Web Electronic Discussion—2 hours; Web Virtual Lecture—1 hour. Appreciation of the geologic framework underlying the inherent beauty of U.S. National Parks. Relationship of individual parks to geologic processes such as mountain building, volcanism, stream erosion, glacial action and landscape evolution. No credit for students who have completed GEL 025. GE credit: SE. Effective: 2015 Spring Quarter.

GEL 028—Astrobiology (3)
Lecture—3 hours. Origin, evolution and distribution of life in our solar system and the Universe. Detecting habitable worlds, Drake equations, necessities and raw materials for life, philosophical implications of the search for life elsewhere. GE credit: SE, SL. Effective: 2013 Fall Quarter.

GEL 030—Fractals, Chaos and Complexity (3)
Lecture/Discussion—3 hours. Prerequisite(s): MAT 016A or MAT 021A Modern ideas about the unifying ideas of fractal geometry, chaos and complexity. Basic theory and applications with examples from physics, earth sciences, mathematics, population dynamics, ecology, history, economics, biology, computer science, art and architecture. Offered in alternate years. (PHY 030.) GE credit: QL, SE. Effective: 2013 Fall Quarter.

GEL 032—Volcanoes (3)
Lecture—3 hours. Role of eruptions, and eruptive products of volcanoes in shaping the planet's surface, influencing its environment, and providing essential human resources. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 035—Rivers (3)
Lecture—3 hours. Introduction to geomorphology, climate and geology of rivers and watersheds, with case examples from California. Assessment of impacts of logging, agriculture, mining, urbanization and water supply on river processes. Optional river field trips. GE credit: SE, SL. Effective: 2013 Fall Quarter.

GEL 036—The Solar System (4)
Discussion—1 hour; Lecture—3 hours. Nature of the sun, moon, and planets as determined by recent manned and unmanned exploration of the solar system.Comparison of terrestrial, lunar, and planetary geological processes. Search for life on other planets. Origin and evolution of the solar system. (Former course 113-113G.) GE credit: SE, VL, WE. Effective: 2013 Fall Quarter.

GEL 050—Physical Geology (3)
Lecture—3 hours. Prerequisite(s): High school physics and chemistry. The Earth, its materials, its internal and external processes, its development through time by sea-floor spreading and global plate tectonics. Students with credit for GEL 001 or the equivalent may receive only 2 units for GEL 050. GE credit: SE, SL. Effective: 2013 Fall Quarter.

GEL 050L—Physical Geology Laboratory (2)
Laboratory—6 hours. Prerequisite(s): GEL 050 (can be concurrent) Introduction to classification and recognition of minerals and rocks and to interpretation of topographic and geologic maps and aerial photographs. Students with credit for GEL 001L or the equivalent may receive only 1 unit for GEL 050L. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 060—Earth Materials: Introduction (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 002A; (MAT 016A or MAT 017A or MAT 021A); (GEL 001 or GEL 050, GEL 050L) Physical and chemical properties of rocks, minerals and other earth materials; structure and composition of rock-forming minerals; formation of minerals by precipitation from silicate liquids and aqueous fluids and by solid state transformations. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 062—Optical Mineralogy (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): GEL 060 (can be concurrent) Optical properties of inorganic crystals; techniques of mineral identification using the polarizing microscope; strategies for studying rocks in thin section. GE credit: SE, VL. Effective: 2016 Fall Quarter.

GEL 081—Learning in Science and Mathematics (2)
Fieldwork—2 hours; Lecture/Discussion—2 hours. Limited to 26 students per section. Exploration of how students learn and develop understanding in science and mathematics classrooms. Introduction to case studies and interview techniques and their use in K-6 classrooms to illuminate factors that affect student learning. (EDU 081.) (P/NP grading only.) GE credit: SS, VL, WE. Effective: 2013 Fall Quarter.

GEL 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Work-learn experience on and off campus in all subject areas offered by the department. Internships supervised by a member of the faculty. May be repeated up to 12 unit(s). (P/NP grading only.) GE credit: SE. Effective: 2013 Fall Quarter.

GEL 098—Directed Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Directed group study. May be repeated up to 3 time(s) content changes. (P/NP grading only.) GE credit: SE. Effective: 2013 Fall Quarter.

GEL 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. Special study for undergraduates. (P/NP grading only.) GE credit: SE. Effective: 2013 Fall Quarter.

GEL 101—Structural Geology (3)
Lecture—3 hours. Prerequisite(s): GEL 050; GEL 050L; (PHY 007A or PHY 009A); (MAT 016A or MAT 017A or MAT 021A); Consent of Instructor. Class size limited to 35 students. Study of processes and products of rock deformation. Introduction to structural geology through a survey of the features and geometries of faults and folds, techniques of strain analysis, and continuum mechanics of rock deformation. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 101L—Structural Geology Lab (2)
Fieldwork—2 hours; Laboratory—6 hours. Prerequisite(s): GEL 050; GEL 050L; (PHY 007A or PHY 009A); GEL 101 (can be concurrent); Consent of Instructor. Class size limited to 15 students per session. Laboratory study of the processes and products of rock deformation. Introduction to the practice of structural geology through observations and analysis of rock deformation, including field measurement techniques and geologic mapping. GE credit: SE, VL. Effective: 2016 Fall Quarter.

GEL 103—Field Geology (3)
Fieldwork; Laboratory. Prerequisite(s): GEL 101L; GEL 101; Consent of Instructor. Field mapping projects and writing geological reports. Weekly classroom meetings devoted to preparation of maps, cross sections, stratigraphic sections, rock descriptions, and reports. Seven-eight days on weekends during quarter. GE credit: SE, VL, WE. Effective: 2016 Fall Quarter.

GEL 105—Earth Materials: Igneous Rocks (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): GEL 060; GEL 062; (MAT 016A or MAT 017A or MAT 021A); CHE 002B (can be concurrent) Origin and occurrence of igneous rocks. Laboratory exercises emphasize the study of these rocks in hand specimen and thin section. GE credit: SE, WE. Effective: 2016 Fall Quarter.

GEL 106—Earth Materials: Metamorphic Rocks (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): GEL 105 Physical and chemical properties of metamorphic rocks; interpretation of metamorphic environments. Laboratory exercises emphasize the study of these rocks in hand specimen and thin section. GE credit: SE, WE. Effective: 2016 Fall Quarter.

GEL 107—Earth History: Paleobiology (3)
Lecture—3 hours. Prerequisite(s): GEL 003 or BIS 002A or BIS 010 Evolution and ecological structure of the biosphere from the origin of life to the present. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 107L—Earth History: Paleobiology Laboratory (2)
Laboratory—6 hours. Prerequisite(s): (GEL 003, GEL 003L) or BIS 002B; GEL 107 (can be concurrent) Exercises in determining the ecological functions and evolution of individuals, populations, and communities of fossil organisms in field and laboratory. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 108—Earth History: Paleoclimates (3)
Lecture—3 hours. Prerequisite(s): (GEL 001 or GEL 050 or GEL 116N or ESP 116N); CHE 002A; Consent of Instructor. Geological and environmental factors controlling climate change, the greenhouse effect with a detailed analysis of the history of Earth's climate fluctuations over the last 600 million years. Past and present climate records are used to examine potential future climatic scenarios. GE credit: SE, SL, WE. Effective: 2016 Fall Quarter.

GEL 109—Earth History: Sediments and Strata (2)
Lecture—2 hours. Prerequisite(s): GEL 050; GEL 050L Principles of stratigraphic and sedimentologic analysis. Evaluation of historical and modern global changes in sedimentation within terrestrial and marine environments. Examination of the plate tectonic, climatic and oceanographic factors controlling the distribution and exploitation of economic fluids within sedimentary rocks. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 109L—Earth History: Sediments and Strata Laboratory (2)
Laboratory—6 hours. Prerequisite(s): GEL 109 (can be concurrent) Methods of stratigraphic and sedimentologic analysis of modern and ancient sediments. Identification of major sediment and sedimentary rock types. Outcrop and subsurface analysis of sedimentary basins. GE credit with concurrent enrollment in course 109. Includes four one-day field trips. GE credit: SE, WE. Effective: 2016 Fall Quarter.

GEL 110—Summer Field Geology (8)
Fieldwork. Prerequisite(s): GEL 060; GEL 103; GEL 109; GEL 105 recommended. Advanced application of geologic and geophysical field methods to the study of rocks. Includes development and interpretation of geologic maps and cross sections; gravity, magnetic, electrical resistivity and seismic surveys; and field analysis of plutonic and volcanic rock suites. Eight hours/day, six days/week for six weeks. GE credit: SE, VL, WE. Effective: 2017 Spring Quarter.

GEL 115—Earth Science, History, and People (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): GEL 001 or GEL 050 Study of interplay between the Earth and its human inhabitants through history, including consideration of acute events such as earthquakes and eruptions as well as the geology of resources, topography, and water. GE credit: OL, SE, WE. Effective: 2017 Winter Quarter.

GEL 116N—Oceanography (3)
Fieldwork; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): GEL 001 or GEL 002 or GEL 016 or GEL 050 Advanced oceanographic topics: Chemical, physical, geological, and biological processes; research methods and data analysis; marine resources, anthropogenic impacts, and climate change; integrated earth/ocean/atmosphere systems; weekly lab and one weekend field trip. (ESP 116N.) GE credit: SE, SL. Effective: 2017 Winter Quarter.

GEL 120—Origins: From the Big Bang to Today (3)
Lecture—3 hours. Limited enrollment. Long-term and large-scale perspectives on the origins of the universe, stars and planets, life, human evolution, the rise of civilization and the modern world. Multi-disciplinary approach to 'Big History' involving cosmology, astronomy, geology, climatology, biology, anthropology, archeology and traditional history. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 130—Non-Renewable Natural Resources (3)
Lecture—3 hours. Prerequisite(s): GEL 001 or GEL 050 Origin, occurrence, and distribution of non-renewable resources, including metallic, nonmetallic, and energy-producing materials. Problems of discovery, production, and management. Estimations and limitations of reserves, and their sociological, political, and economic effects. GE credit: SE, SL. Effective: 2016 Fall Quarter.

GEL 131—Risk: Natural Hazards and Related Phenomena (3)
Lecture—3 hours. Risk, prediction, prevention and response for earthquakes, volcanic eruptions, landslides, floods, storms, fires, impacts, global warming. GE credit: SE, SL. Effective: 2016 Fall Quarter.

GEL 132—Introductory Inorganic Geochemistry (3)
Lecture—3 hours. Prerequisite(s): GEL 060 (can be concurrent); CHE 002B Nucleosynthesis of chemical elements, physical and chemical properties of elements, ionic substitution, elemental partition, distribution and transport among planetary materials, basic thermodynamics and phase diagrams, isotopic geochronometers, stable isotope fractionation, mixing and dilution, advection and diffusion, geochemical cycles. Effective: 2016 Fall Quarter.

GEL 134—Environmental Geology and Land Use Planning (3)
Lecture—3 hours. Prerequisite(s): GEL 001 or GEL 050; Consent of Instructor. One course in Geology. Geologic aspects of land use and development planning. Geologic problems concerning volcanic and earthquake hazards, land stability, floods, erosion, coastal hazards, non-renewable resource extraction, waste disposal, water resources. GE credit: SE, WE. Effective: 2016 Fall Quarter.

GEL 136—Ecogeomorphology of Rivers and Streams (5)
Discussion/Laboratory—2 hours; Fieldwork; Lecture—1 hour; Term Paper. Prerequisite(s): Consent of Instructor. Upper division or graduate standing in any physical science, biological science, or engineering. Restricted to advanced students in the physical sciences, biological sciences, or engineering. Integrative multidisciplinary field analysis of streams. Class project examines hydrology, geomorphology, water quality and aquatic and riparian ecology of degraded and pristine stream systems. Includes cooperative two-week field survey in remote wilderness settings with students from diverse scientific backgrounds. GE credit: SE, WE. Effective: 2013 Fall Quarter.

GEL 138—Introductory Volcanology (4)
Fieldwork—6 hours; Lecture—2 hours. Prerequisite(s): GEL 060; GEL 109; Consent of Instructor. Principles of physical and chemical volcanology. Taught in a volcanically active setting (e.g., Hawaii) with a strong field component. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 139—Rivers: Form, Function and Management (4)
Fieldwork—3 hours; Lecture—3 hours. Prerequisite(s): GEL 050 or GEL 050L; MAT 016B or 021B recommended. Analysis of river form and processes, emphasis on fluvial geomorphology, and river and stream restoration; case studies to illustrate concepts and applications. Two weekend field trips required. Offered irregularly. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 140—Introduction to Process Geomorphology (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (GEL 001 or GEL 050); (MAT 016B or MAT 021B) Quantitative description and interpretation of landscapes with emphasis on the relationships between physical processes, mass conservation, and landform evolution. Topics covered include physical and chemical weathering, hillslopes, debris flows, fluvial systems, alluvial fans, pedogenesis, eolian transport, glaciation and Quaternary geochronology. Effective: 2016 Fall Quarter.

GEL 141—Evolutionary History of Vertebrates (3)
Lecture—3 hours. Prerequisite(s): GEL 003 or BIS 002A Evolutionary history of vertebrates; fossil record and phylogeny; timing of major evolutionary events; appearance of major vertebrate groups; physical constraints in vertebrate evolution; paleobiogeography of vertebrates; effect of continental movement on vertebrate evolution; dinosaurs and other strange vertebrates. Offered in alternate years. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 141L—Evolutionary History of Vertebrates Laboratory (1)
Laboratory—3 hours. Prerequisite(s): GEL 141 (can be concurrent) Augments lecture course 141 through handling of specimens enabling in-person examination of three dimensional features observed in vertebrate skeletons, both fossil and living. Offered in alternate years. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 142—Basin Analysis (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): GEL 050; GEL 050L; GEL 109 Analysis of sedimentary basins from initiation to maturity, including controls on sedimentary fill, subsidence analysis, sequence stratigraphy, core logs, and applications to petroleum exploration and hydrology. One two-day field trip. Offered irregularly. GE credit: SE, VL. Effective: 2013 Fall Quarter.

GEL 143—Advanced Igneous Petrology (5)
Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): GEL 105; (MAT 016C or MAT 021C); CHE 002C Physical and chemical properties of magmatic environments and processes of igneous rock formation. Laboratory study of representative igneous rocks. Offered irregularly. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 144—Historical Ecology (3)
Lecture—3 hours. Prerequisite(s): Upper division course in environmental science or ecology, or an introductory course in paleobiology. Ancient ecosystems and the factors that caused them to change. Species, expansion, evolution of new modes of life, geologically induced variations in resource supply, and extinction provide historical perspective on the biosphere of future. GE credit: SE, WE. Effective: 2013 Fall Quarter.

GEL 145—Advanced Metamorphic Petrology (5)
Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): GEL 106; (HYD 134 or CHE 002C); (MAT 016C or MAT 021C) Metamorphic processes and the origin of metamorphic rocks. Laboratory study of representative rock suites. Offered irregularly. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 146—Radiogenic Isotope Geochemistry and Cosmochemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 002C; PHY 007C; MAT 016C Basic principles of nuclear chemistry and physics applied to geology to determine the ages of terrestrial rocks, meteorites, archeological objects, age of the Earth, to trace geological/environmental processes, and explain formation of the chemical elements in the Universe. Offered irregularly. GE credit: QL, SE. Effective: 2013 Fall Quarter.

GEL 147—Geology of Ore Deposits (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (CHE 002C or HYD 134); GEL 060; GEL 062; GEL 105 Tectonic, lithologic and geochemical setting of major metallic ore deposit types emphasizing ore deposit genesis, water/rock interaction and the environmental effects of mining. Offered irregularly. GE credit: QL, SE. Effective: 2013 Fall Quarter.

GEL 148—Stable Isotopes and Geochemical Tracers (3)
Lecture—3 hours. Prerequisite(s): (CHE 002C or HYD 134); GEL 050; GEL 050L; GEL 060 Use of oxygen and hydrogen isotopes in defining hydrologic processes; carbon, nitrogen, and sulfur isotopes as indicators of exchange between the lithosphere, hydrosphere, atmosphere and biosphere. Radiogenic, cosmogenic, and noble gas isotope tracers. Offered irregularly. GE credit: QL, SE. Effective: 2013 Fall Quarter.

GEL 149—Geothermal Systems (3)
Fieldwork; Lecture—3 hours. Prerequisite(s): GEL 050; GEL 050L; CHE 002B Geology, geochemistry, and geophysics of geothermal systems, including electrical power generation and direct use applications. Includes one day field trip on a weekend during the quarter. Offered irregularly. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 150A—Physical and Chemical Oceanography (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ESP 116N or GEL 116N); PHY 009B; MAT 021D; CHE 002C; and Consent of Instructor. Physical and chemical properties of seawater, fluid dynamics, air-sea interaction, currents, waves, tides, mixing, major oceanic geochemical cycles. (ESO 150A.) GE credit: QL, SE. Effective: 2017 Winter Quarter.

GEL 150B—Geological Oceanography (3)
Lecture—3 hours. Prerequisite(s): GEL 050 or (GEL 116N or ESP 116N) Introduction to the origin and geologic evolution of ocean basins. Composition and structure of oceanic crust; marine volcanism; and deposition of marine sediments. Interpretation of geologic history of the ocean floor in terms of sea-floor spreading theory. (ESP 150B.) GE credit: SE. Effective: 2017 Winter Quarter.

GEL 150C—Biological Oceanography (4)
Discussion—1 hour; Fieldwork; Lecture—3 hours. Prerequisite(s): BIS 002A; Consent of Instructor. A course in general ecology. Ecology of major marine habitats, including intertidal, shelf benthic, deep-sea and plankton communities. Existing knowledge and contemporary issues in research. Segment devoted to human use. One weekend field trip required. (ESP 150C.) GE credit: SE, SL. Effective: 2017 Winter Quarter.

GEL 152—Paleobiology of Protista (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): GEL 107 or BIS 002A; Consent of Instructor. Morphology, systematics, evolution, and ecology of single-celled organisms that are preserved in the fossil record. Offered irregularly. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 156—Hydrogeology and Contaminant Transport (5)
Laboratory—3 hours; Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): HYD 145; ECI 144; Or equivalent of ECI 144. Physical and chemical processes affecting groundwater flow and contaminant transport, with emphasis on realistic hydrogeologic systems. Groundwater geology and chemistry. Fundamentals of groundwater flow and transport analysis. Laboratory includes field pumping test and work with physical and computer models. (HYD 146.) GE credit: SE. Effective: 2013 Fall Quarter.

GEL 160—Geological Data Analysis (3)
Lecture/Discussion—3 hours. Prerequisite(s): MAT 021A Introduction to quantitative methods in analyzing geological data including basic principles of statistics and probability, error analysis, hypothesis testing, inverse theory, time series analysis and directional data analyses. Use of computer in lectures and homework. GE credit: QL, SE. Effective: 2016 Fall Quarter.

GEL 161—Geophysical Field Methods (3)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): MAT 021C; (GEL 001 or GEL 050); (PHY 007C or PHY 009C) Geophysical methods applied to determining subsurface structure in tectonics, hydrogeology, geotechnical engineering, hydrocarbon and mineral exploration. Theory, survey design and interpretation of gravity, electrical resistivity, electromagnetic, reflection and refraction seismology, and ground-penetrating radar measurements. GE credit: QL, SE. Effective: 2016 Fall Quarter.

GEL 162—Geophysics of the Solid Earth (3)
Lecture—3 hours. Prerequisite(s): MAT 021C; (PHY 007C or PHY 009C); Consent of Instructor. Theory and use of physics in the study of the solid earth. Gravity, magnetism, paleomagnetism, and heat flow. Application to the interpretation of the regional and large-scale structure of the earth and to plate tectonics. Offered irregularly. GE credit: QL, SE. Effective: 2016 Fall Quarter.

GEL 163—Planetary Geology and Geophysics (3)
Lecture—3 hours. Prerequisite(s): MAT 021C; (PHY 007C or PHY 009C); (GEL 050 or GEL 036 or AST 010G or AST 010L or AST 010S); Consent of Instructor. Principles of planetary science. Planetary dynamics, including orbital mechanics, tidal interactions and ring dynamics. Theory of planetary interiors, gravitational fields, rotational dynamics. Physics of planetary atmospheres. Geological processes, landforms and theirmodification. Methods of analysis from Earth-based observations and spacecraft. GE credit: QL, SE. Effective: 2016 Fall Quarter.

GEL 175— Advanced Field Geology (3)
Discussion—3 hours; Fieldwork—6 hours. Prerequisite(s): Consent of Instructor. Advanced field studies of selected geologic terrains, interpretation and discussion of field observations. Offered irregularly. May be repeated up to 2 time(s) when instructors varies. (P/NP grading only.) GE credit: SE. Effective: 2013 Fall Quarter.

GEL 181—Teaching in Science and Mathematics (2)
Fieldwork—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Major in mathematics, science, or engineering; or completion of a one-year sequence of science or calculus. Class size limited to 40 students per section. Exploration of effective teaching practices based on examination of how middle school students learn math and science. Selected readings, discussion and field experience in middle school classrooms. (EDU 181.) (P/NP grading only.) GE credit: SS, WE. Effective: 2013 Fall Quarter.

GEL 182—Field Studies in Marine Geochemistry (2-8)
Fieldwork—6-40 hours; Laboratory—1-3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Marine geochemistry with the opportunity of going to sea or into the field on land. Techniques of sea-floor mapping using bottom photography, marine geochemical sampling, and method of data reduction and sample analysis. Analysis of data/samples collected. Offered irregularly. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 183—Teaching High School Mathematics and Science (3) ***Review all entries***
Fieldwork; Lecture/Discussion—2 hours. Prerequisite(s): Major in mathematics, science, or engineering; or consent of instructor with completion of a one-year sequence of science or calculus. Limited to 40 students per section. Exploration and creation of effective teaching practices based on examination of how high school students learn mathematics and science. Field experience in high school classrooms. (Education 183.) GE credit: OL, SS, WE. Effective: 2017 Fall Quarter.

GEL 183—Teaching High School Mathematics and Science (3) ***Review all entries***
Fieldwork; Lecture/Discussion—2 hours. Prerequisite(s): Major in mathematics, science, or engineering; or completion of a one-year sequence of science or calculus and consent of the instructor. Limited to 40 students per section. Exploration and creation of effective teaching practices based on examination of how high school students learn mathematics and science. Field experience in high school classrooms. (EDU 183.) GE credit: OL, SS, WE. Effective: 2018 Fall Quarter.

GEL 185A—Conceptual Integrated Science for Non-Science Majors: The Physical World (2)
Discussion/Laboratory—3 hours; Lecture—1 hour. Conceptual, inquiry-based integrated science course. Topics in the Next Generation Science Standards. Elementary school level teaching practice. Physics, chemistry, and science inquiry. GE credit: SE, SL. Effective: 2017 Winter Quarter.

GEL 185B—Conceptual Integrated Science for Non-Science Majors: Earth System Science (2)
Discussion/Laboratory—3 hours; Lecture—1 hour. Conceptual, inquiry-based integrated science course. Topics in the Next Generation Science Standards. Elementary school level teaching practice. Earth, space and environmental science, and science inquiry. GE credit: SE, SL. Effective: 2016 Fall Quarter.

GEL 186—Facilitating Learning in STEM Classrooms (1)
Lecture/Discussion—1 hour. STEM Learning Assistant Seminar. Theoretical and practical issues of effective teaching in discussion/labs: student-centered, active, cooperative learning environments, responsive teaching, and differentiated classroom instruction. GE credit: SS. Effective: 2016 Fall Quarter.

GEL 190—Seminar in Geology (1)
Discussion—1 hour; Seminar—1 hour. Presentation and discussion of current topics in geology by visiting lecturers, staff, and students. Written abstracts. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 2016 Fall Quarter.

GEL 192—Internship in Geology (1-12)
Internship. Prerequisite(s): Upper division standing; project approval prior to internship. Supervised work experience in geology. May be repeated for credit for a total of 10 units. May be repeated up to 10 unit(s). (P/NP grading only.) GE credit: SE. Effective: 2013 Fall Quarter.

GEL 194A—Senior Thesis (3)
Variable. Prerequisite(s): Open to Geology majors who have completed 135 units and who do not qualify for the Honors Program. Guided independent study of a selected topic, leading to the writing of a senior thesis. GE credit: SE, WE. Effective: 2013 Fall Quarter.

GEL 194B—Senior Thesis (3)
Variable. Prerequisite(s): Open to Geology majors who have completed 135 units and who do not qualify for the Honors Program. Guided independent study of a selected topic, leading to the writing of a senior thesis. GE credit: SE, WE. Effective: 2013 Fall Quarter.

GEL 194HA—Senior Honors Project (3)
Independent Study—9 hours. Prerequisite(s): Open to Geology majors who have completed 135 units and who qualify for the Honors Program. Guided independent study of a selected topic, leading to the writing of an honors thesis. GE credit: SE, WE. Effective: 2013 Fall Quarter.

GEL 194HB—Senior Honors Project (3)
Independent Study—9 hours. Prerequisite(s): Open to Geology majors who have completed 135 units and who qualify for the Honors Program. Guided independent study of a selected topic, leading to the writing of an honors thesis. GE credit: SE, WE. Effective: 2013 Fall Quarter.

GEL 198—Directed Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Senior standing in Geology or consent of instructor. Group study focused on topics in Geology. (P/NP grading only.) GE credit: SE. Effective: 2016 Spring Quarter.

GEL 199—Special Study for Advanced Undergraduates (1-5)
Variable. Special study for advanced undergraduates. (P/NP grading only.) GE credit: SE. Effective: 2013 Fall Quarter.

GEL 205—Advanced Field Stratigraphy (3)
Fieldwork—2 hours; Lecture—1 hour. Prerequisite(s): GEL 109; GEL 110; or Consent of Instructor. GEL 206 recommended. Fieldwork over spring break. Application of stratigraphic techniques to research problems. Collection, compilation, and interpretation of field data. Integration of data with models for deposition and interpretations of Earth history. Topics will vary. Offered irregularly. May be repeated for credit. Effective: 2013 Fall Quarter.

GEL 206—Stratigraphic Analysis (3)
Lecture—3 hours. Prerequisite(s): GEL 109; GEL 109L; or Consent of Instructor. GEL 144 recommended. Topics in advanced methods of stratigraphic analysis, regional stratigraphy and sedimentation, and sedimentary basin analysis. Emphasis on techniques used to interpret stratigraphic record and on current issues in stratigraphy and sedimentation. Offered irregularly. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

GEL 214—Active Tectonics (3)
Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Active deformation associated with faults, landslides, and volcanoes. Geodetic measurement techniques such as triangulation, trilateration, leveling, Global Positioning System (GPS), and radar interferometry. GPS data acquisition and analysis. Inversion of geodetic data and mechanical models of crustal deformation. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 216—Tectonics (3)
Lecture/Discussion—3 hours. Prerequisite(s): GEL 101; or Consent of Instructor. Nature and evolution of tectonic features of the Earth. Causes, consequences, and evolution of plate motion, with selected examples from the Earth's deformed belts. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 217—Topics in Geophysics (3)
Lecture—1 hour; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Discussion and evaluation of current research in a given area of geophysics. Topic will change from year to year. Offered in alternate years. May be repeated for credit. Effective: 2013 Fall Quarter.

GEL 218—Analysis of Structures in Deformed Rocks (3)
Seminar—3 hours. Prerequisite(s): GEL 100; GEL 100L; GEL 101; GEL 101L; GEL 170; or Consent of Instructor. Recent advances in the understanding and analysis of structures in brittlely and ductilely deformed rocks. Detailed investigation of the characteristics of the structures, models for their formation, and applications to inferring the kinematics of larger scale tectonics. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 219—Fracture and Flow of Rocks (3)
Lecture—3 hours. Prerequisite(s): GEL 100; GEL 101; or Consent of Instructor. Origins of those structures in rocks associated with brittle and ductile deformation. Theoretical analysis, using continuum mechanics, and experimental evidence for the origin of the structures with emphasis on deformational processes in the earth. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 220—Mechanics of Geologic Structures (3)
Lecture—3 hours. Prerequisite(s): MAT 021C; (PHY 009A; or PHY 005A); GEL 170; or Consent of Instructor; MAT 021D and MAT 022A recommended. Development in tensor notation of the balance laws of continuum mechanics, and constitutive theories of elasticity, viscosity, and plasticity and their application to understanding development of geologic structures such as fractures, faults, dikes, folds, foliations,
and boudinage. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 226—Advanced Sedimentary Petrology (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): GEL 144; or Consent of Instructor. Advanced petrography and geochemistry of sediments and sedimentary rocks. Geochemical, textural and mineralogical evolution of sedimentary rocks reflecting depositional or burial processes. Laboratory work emphasizes thin section study of rocks. Offered irregularly. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

GEL 227—Stable Isotopes Biogeochemistry (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Discussion and application of stable isotope techniques for scientific research problems. Course emphasizes carbon, oxygen, nitrogen, hydrogen and sulfur isotopes. Laboratory will develop basic skills of cryogenic gas extraction and specific techniques for individual research using stable isotopes. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 228—Topics in Paleoceanography (3)
Lecture—3 hours. Prerequisite(s): GEL 108; GEL 150A; or Consent of Instructor. Critical discussion and review of selected topics in paleoceanography and paleoclimatology relating to the history of the processes controlling and affecting climate change and ocean circulation throughout the geologic record. Topics vary. Offered irregularly. May be repeated for credit. Effective: 2013 Fall Quarter.

GEL 230—Geomorphology and River Management (3)
Seminar—3 hours. Prerequisite(s): GEL 139; Or equivalent; graduate standing. Impacts of management and land use activities on the geomorphology of rivers and streams. Evaluation and use of analytical tools for river assessment. Assessment of river and stream restoration strategies and emerging issues in river management. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

GEL 232—The Oceans and Climate Change (3)
Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Modern climate change and linkages between the ocean-atmosphere-cryosphere-terrestrial climate system. Importance of the ocean in forcing climate change, and the impacts of anthropogenic processes on the ocean. Topics vary. Offered irregularly. May be repeated up to 3 time(s). Effective: 2013 Fall Quarter.

GEL 235—Surface Processes (3)
Seminar—3 hours. Prerequisite(s): GEL 050; GEL 050L; GEL 139; MAT 021B or MAT 016B recommended. Recent advances in the analysis of landforms and their evolution. Detailed investigation of the tools used to document surface processes. Evaluation of concepts and processes that govern landscape evolution. Offered irregularly. May be repeated for credit. Effective: 2013 Fall Quarter.

GEL 236—Inverse Theory in Geology and Geophysics (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Inversion of data for model parameters. Evaluation of parameter uncertainties. Linear and nonlinear problems for discrete and continuous models. Bakus-Gilbert inversion. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 238—Theoretical Seismology (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Elastodynamic wave equation. Greens functions and source representations. Ray theory. Plane and spherical waves and boundary conditions. Elastic wave propagation in stratified media. (P/F grading only.) Effective: 2013 Fall Quarter.

GEL 240—Geophysics of the Earth (3)
Lecture—3 hours. Prerequisite(s): PHY 009B; MAT 022B Physics of the earth's crust, mantle, and core. Laplace's equation and spherical harmonic expression of gravity and magnetic fields. Elastic wave equation in geologic media. Body and surface seismic waves. Equations of state, thermal structure of the earth. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 241—Geomagnetism (3)
Lecture—3 hours. Prerequisite(s): Graduate standing. Nature and origin of the Earth's magnetic field. Present field and recent secular variation. Spherical harmonic analysis. Paleosecular variation. Polarity transitions and geomagnetic excursions. Statistics of polarity intervals. Dynamo theory. Planetary magnetism. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 242—Paleomagnetism (3)
Lecture—3 hours. Prerequisite(s): Graduate standing. Principles and applications of paleomagnetism. Physical basis of rock and mineral magnetism. Field and laboratory techniques. Instrumentation. Analysis of paleomagnetic data. Statistical methods. Rock magnetic properties. Geological and geophysical applications. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 246—Physical Chemistry of Metamorphic Processes (3)
Lecture—3 hours. Prerequisite(s): GEL 145; CHE 110A; or Consent of Instructor. Physiochemical principles of metamorphic mineral assemblages and methods of interpreting the paragenesis of metamorphic rocks. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 247—Metamorphic Petrology Seminar (3)
Seminar—3 hours. Prerequisite(s): GEL 145; or Consent of Instructor. GEL 246 recommended. Selected topics in metamorphic petrology (e.g., mass transport processes, tectonic settings, geothermometry, thermal structure of metamorphic belts, regional studies). Offered irregularly. May be repeated for credit. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 250—Advanced Geochemistry Seminar (3)
Seminar—3 hours. Prerequisite(s): GEL 146; or Consent of Instructor. Critical review of selected topics in geochemistry including: ore genesis, hydrothermal and geothermal fluids, recent and ancient sediments, isotope geology, origin and chemistry of the oceans. Subject varies yearly depending on student interest. May be repeated for credit. May be repeated for credit. Effective: 2013 Fall Quarter.

GEL 251—Advanced Topics in Isotope Geochemistry and Cosmochemistry (3)
Lecture/Discussion—2 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Astrophysical context on origin of Solar System, synthesis of chemical elements, condensation sequence, star and planet formation, cosmochronology, building blocks of planets, development on planets' layered structure, atmosphere and hydrosphere and the role of comets/asteroids for volatile delivery. Offered irregularly. May be repeated up to 3 time(s) when topics differs. Effective: 2013 Fall Quarter.

GEL 253—Current Topics in Igneous Petrology (3)
Seminar—3 hours. Prerequisite(s): GEL 143; or Consent of Instructor. Graduate standing in Geology. Topical seminar designed to help graduate students develop and maintain familiarity with current and past literature related to igneous rock petrogenesis. May be repeated for credit when topic differs. May be repeated for credit when topic differs. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 254—Physical Chemistry of Igneous Processes (3)
Lecture—3 hours. Prerequisite(s): CHE 110A; GEL 143; and Consent of Instructor. GEL 143 or consent of instructor; CHE 110B and CHE 110C recommended. Introduction of modern concepts in chemical thermodynamics and kinetics, and fluid dynamics of magmatic systems for graduate students in petrology. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 255—Experimental Petrology (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): GEL 143; or Consent of Instructor. Introduction to techniques and methods of design and executing experiments on Earth-forming minerals and rocks. Problems and examples from igneous and metamorphic petrology will be utilized. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 260—Paleontology (3)
Seminar—3 hours. Prerequisite(s): Graduate standing in geology or a biological science. Selected problems in paleontology. Subject to be studied will be decided at an organizational meeting. Offered irregularly. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

GEL 261—Paleobiology Graduate Seminar 1: Evolutionary aspects (3)
Lecture—1 hour; Seminar—2 hours. Prerequisite(s): Graduate standing in Geology or a biological science; qualified undergraduates will be accepted on an exception-only basis. This course will treat one or more of several topics in paleobiology from a phylogenetic perspective, including major patterns in evolution, building the tree of life, extinction and phylogeny, phylogeny of major phyla, and the relation between taxonomy and phylogeny. May be repeated for credit when topic varies. Effective: 2013 Fall Quarter.

GEL 262—Paleobiology Graduate Seminar: Methodological aspects (3)
Lecture—1 hour; Seminar—2 hours. One or more major methods used in the study of fossils: Morphometrics and three-dimensional reconstruction of fossils, phylogenetic methodology, the application of geochemical techniques, and electron microscopy. May be repeated up to 4 time(s) topic varies. Effective: 2013 Fall Quarter.

GEL 281N—Instrumental Techniques for Earth Scientists (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): MAT 021A; MAT 021B; MAT 021C; ((PHY 007A, PHY 007B, PHY 007C) or (PHY 009A, PHY 009B, PHY 009C)); or Consent of Instructor. Laboratory research techniques for new graduate students in Geology. Demonstration of and exposure to appropriate techniques in research. Effective: 2013 Fall Quarter.

GEL 285—Field Studies in Marine Geochemistry (2-8)
Fieldwork—6-40 hours; Laboratory—1-3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Marine geochemistry with the opportunity of going to sea or into the field on land. Techniques of seafloor mapping using bottom photography, marine geochemical sampling, and method of data reduction and sample analysis. Analysis of data/samples collected. Effective: 2013 Fall Quarter.

GEL 290—Seminar in Geology (1)
Discussion—1 hour; Seminar—1 hour. Presentation and discussion of current topics in geology by visiting lecturers, staff, and students. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 291—Geology of the Sierra Nevada (1)
Seminar. Prerequisite(s): Consent of Instructor. Short oral presentations by students and faculty concerning results of their past work and plans for future work in the Sierra. A written abstract is required following the format required at professional meetings. Offered irregularly. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 292—River Forum (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Review and discussion of latest research and fundamental issues surrounding riverine systems, with emphasis on physical processes. Topics vary. Offered irregularly. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 293—Geologic Event of the Week (1)
Discussion—0.5 hours; Seminar—0.5 hours. Prerequisite(s): Graduate standing. Seminar/discussion group to review and discuss recent earthquakes, volcanic eruptions, and other significant geologic events. The focus is on understanding the available observations, the physical processes behind each event, the geological setting, and societal consequences. Offered irregularly. May be repeated up to 3 time(s) for up to 3 units. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 294—Structure/Tectonics Forum (1)
Seminar—1 hour. Prerequisite(s): Graduate student in geology or consent of instructor. Seminar/discussion group to review and discuss latest research in structural geology and tectonics, and on-going research of participants. Topics will vary each quarter depending on the interests of the group. Occasional field trips to areas of current interest. May be repeated for credit when topic differs. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 295—Geophysics Forum (1)
Discussion—0.5 hours; Seminar—0.5 hours. Prerequisite(s): GEL 100; GEL 101; or Consent of Instructor. Seminar/discussion group to review and discuss latest research in geophysics, and on-going research of participants. Topics will change each quarter depending on the interests of the group. Offered irregularly. May be repeated for credit when topic differs. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 296—Advanced Problems in Tectonics (3)
Seminar—3 hours. Prerequisite(s): GEL 101; and Consent of Instructor. Seminar dealing with current problems in tectonics of selected regions. Topics will change from year to year. Emphasis on study of recent literature. Offered irregularly. May be repeated for credit. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 297—Geophysics Forum (1)
Discussion—0.5 hours; Seminar—0.5 hours. Prerequisite(s): Graduate student status in the Geology Department, or consent of instructor. Seminar/discussion group to review and discuss latest research in geophysics, and on-going research of participants. Topics will change each quarter depending on the interests of the group. Offered irregularly. May be repeated up to 3 time(s). (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 298—Group Study (1-5)
Variable. Group study. Effective: 2013 Fall Quarter.

GEL 299—Research (1-12)
Variable. Research. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 390—Methods of Teaching Geology (2)
Extensive Writing/Discussion—2 hours. Prerequisite(s): Graduate student standing in Geology. Introduction to graduate-level writing and undergraduate-level teaching skills in geology. Persuasive (proposal) writing workshop; discussions on campus teaching resources, presenting information, managing classroom dynamics, evaluating student performance. Participation in teaching program required for Ph.D. in Geology. (S/U grading only.) Effective: 2014 Spring Quarter.

GEL 391—Ethical Issues in Earth Science (1)
Seminar—1 hour. Prerequisite(s): Graduate standing in Geology or consent of instructor. Reading and discussion of ethical issues arising in the earth sciences. Topics include scientific misconduct, gender equity in science, authorship of scientific papers, establishing priorities in research, and related issues. Offered irregularly. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 396—Teaching Assistant Training Practicum (1-4)
Variable. Teaching assistant training. May be repeated for credit. (P/NP grading only.) Effective: 2013 Fall Quarter.

Nematology Minor; Entomology & Nematology

Nematology Minor; Entomology & Nematology | Nematology Minor

For further information, see Entomology and Nematology.

(College of Agricultural and Environmental Sciences)

Steve Nadler, Ph.D., Chairperson of the Department

Joanna Chiu, Ph.D., Vice Chairperson of the Department

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Faculty. http://entomology.ucdavis.edu/Faculty/

Minor Advisor. S. Nadler

Graduate Study. Graduate degrees specializing in Nematology are offered through the Departments of Entomology and Plant Pathology, and through various Graduate Groups (Biochemistry, Ecology, Genetics, Plant Protection and Pest Management). Refer also to Graduate Studies.

Nematology **Units:** 18-20

NEM 100	General Plant Nematology	4
NEM 110	Introduction to Nematology	2
SSC 100	Principles of Soil Science	5

Choose two or three from one of the following areas:

(a) Plant Science:

MIC 102	Introductory Microbiology	3
ENT 100	General Entomology	4
ENT 135	Introduction to Biological Control	4
ENT 153	Medical Entomology	3
ENT 156	Biology of Parasitism	3
ENT 156L	Biology of Parasitism Laboratory	1
EVE 112	Biology of Invertebrates	3
PLP 120	Introduction to Plant Pathology	4
PLP 148	Introductory Mycology	4
PLB 121 (Discontinued 2006)		
SSC 111	Soil Microbiology	4
SSC 112	Soil Ecology	3

(b) Entomology:

One upper division Entomology course.

EVE 112	Biology of Invertebrates	3
MIC 102	Introductory Microbiology	3
PLB 121 (Discontinued 2006)		
PLP 120	Introduction to Plant Pathology	4
PLP 148	Introductory Mycology	4
SSC 102	Environmental Soil Chemistry	3
SSC 111	Soil Microbiology	4
SSC 112	Soil Ecology	3

Total: 18-20

Nematology Minor; Entomology & Nematology | NEM Courses

Courses in NEM:

NEM 010V—General Biology (4)
Web Electronic Discussion—1 hour; Web Virtual Lecture—3 hours. Concepts and issues in biology. Emphasis on composition and structure of organisms; regulation and signaling; heredity, evolution and the interaction and interdependence among life forms and their environments. Significant writing is required. Designed for students not specializing in biology. Not open for credit to students who have completed course BIS 001A, BIS 001B, BIS 001C, BIS 002A, BIS 002B, BIS 002C, BIS 010 or BIS 010V. GE credit: SE, SL, WE. Effective: 2015 Fall Quarter.

NEM 100—General Plant Nematology (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): BIS 001B or BIS 010 An introduction to the classification, morphology, biology, and control of the nematodes attacking cultivated crops. GE credit: SE. Effective: 2013 Fall Quarter.

NEM 110—Introduction to Nematology (2)
Lecture—2 hours. Prerequisite(s): BIS 001B; or Consent of Instructor. Or the equivalent. The relationship of nematodes to human environment. Classification, morphology, ecology, distribution, and importance of nematodes occurring in water and soil as parasites of plants and animals. Effective: 2013 Fall Quarter.

NEM 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2013 Fall Quarter.

NEM 201—Molecular and Physiological Plant Nematology (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): BIS 101; PLP 120; (NEM 100 or NEM 110) Molecular biology and physiology of nematodes using Caenorhabditis elegans as a model, but with emphasis on plant-parasitic species. Plant responses to nematodes. Discussion of current literature emphasized. Effective: 2013 Summer Quarter.

NEM 203—Ecology of Parasitic Nematodes (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): (NEM 100 or NEM 110 or ENT 156); (EVE 101 or PLB 117) Major concepts in population and community ecology of animal- and plant-parasitic nematodes. Current advances in techniques, theory, and basic information about nematode-host dynamics, and application to management of nematode diseases. Effective: 2013 Fall Quarter.

NEM 204—Management of Plant-Parasitic Nematodes (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): NEM 100 or NEM 110 Theory, foundation, principles and practices of nematode management. Techniques and equipment used to manage nematodes and methods used to analyze their effectiveness. Effective: 2013 Fall Quarter.

NEM 205—Insect Nematology and Biological Control (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): NEM 100; NEM 110; (ENT 100 or ENT 110) The biology of insect-parasitic nematodes, their effect on the host, and their potential as biological control agents of insect and other invertebrate pests. Application of ecological theory in classical and augmentative biological control. Effective: 2013 Fall Quarter.

NEM 206—Nematode Systematics and Evolution (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): NEM 100 or NEM 110 or ENT 156; EVE 100 recommended. Nematode diversity as revealed by morphological and molecular evidence. Laboratory experience focuses on structural features used in taxonomy. Phylogenetic relationships based on morphological and molecular data used to consider patterns of character change among taxa. Effective: 2013 Fall Quarter.

NEM 210—Molecular Phylogenetic Analysis (3)
Laboratory—3 hours; Lecture—2 hours. Theory and practice of inferring phylogenetic trees using molecular sequence data. Practical techniques for obtaining sequence data, advantages and disadvantages of common approaches for inferring trees, statistical methods for comparing alternative hypotheses. (Evolution and Ecology 210.) Effective: 2013 Fall Quarter.

NEM 245—Field Nematology (1)
Fieldwork. Prerequisite(s): NEM 100 Sixday demonstration and field study in applied nematology including diagnosis and prediction of nematode field problem strategies for control field plot design, and establishment in association with diverse California crops. (S/U grading only.) Effective: 2013 Fall Quarter.

NEM 290—Seminar (1)
Seminar—1 hour. (S/U grading only.) Effective: 2013 Fall Quarter.

NEM 290C—Advanced Research Conference (1)
Discussion—1 hour. Prerequisite(s): Graduate standing and consent of instructor. Planning and results of research programs, proposals, and experiments. Discussion and critical evaluation of original research being conducted by the group. Discussion led by individual research instructors for research group. (S/U grading only.) Effective: 2013 Fall Quarter.

NEM 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 2013 Fall Quarter.

NEM 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 2013 Fall Quarter.

Nematology Minor; Entomology & Nematology | ENT Courses

Courses in ENT:

ENT 001—Art, Science and the World of Insects (3)
Laboratory—3 hours; Lecture—3 hours. Fusion of entomology and art to create an appreciation of insect biology, ecology, interactions with humans and importance in human culture. Multidisciplinary approaches in education and career paths in entomology and art will be highlighted. GE credit: AH, OL, SE, SS, VL, WE. Effective: 2013 Fall Quarter.

ENT 002—Biodiversity (3)
Lecture—2 hours; Lecture/Discussion—1 hour. Introduction to nature, scope and geographical distribution of biodiversity (diversity of life, with emphasis on plants and animals, especially insects).Humans and biodiversity - domestication, aesthetics, ethics and valuation.Species richness and "success".Biodiversity through time; monitoring, evaluation and conservation.Biomes-global, continental and Californian. (EVE 002.) GE credit: SE, SL, WE. Effective: 2013 Fall Quarter.

ENT 010—Natural History of Insects (3)
Lecture—3 hours. Introduction to the insects detailing their great variety, structures and functions, habits, and their significance in relation to plants and animals including man. Designed for students not specializing in entomology. Not open for credit to students who have had ENT 100, but students who have taken this course may take ENT 100 for credit. GE credit: SE, SL. Effective: 2013 Fall Quarter.

ENT 090X—Special Topics in Entomology (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. Freshman seminar course for indepth examination of a special topic within the subject area. May be repeated up to 2 time(s). (P/NP grading only.) Effective: 2013 Fall Quarter.

ENT 092—Internship (1-12)
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. Work-learn experience on and off campus in all subject areas offered by the department, supervised by a member of the faculty. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2013 Fall Quarter.

ENT 099—Special Study for Undergraduates (1-5)
Effective: 2013 Fall Quarter.

ENT 100—General Entomology (4)
Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): BIS 001B Biology, anatomy, physiology, development, classification, ecology and relation of insects to human welfare. GE credit: WE. Effective: 2013 Fall Quarter.

ENT 100L—General Entomology Laboratory (2)
Laboratory—6 hours. Prerequisite(s): ENT 100 (can be concurrent) Anatomy, development, population ecology, methods of collecting, classification and identification of insects of all orders and of major families. GE credit: VL. Effective: 2013 Fall Quarter.

ENT 101—Functional Insect Morphology (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): ENT 100 Study of the basic external and internal structures, organs and tissues of insects, with emphasis on functional systems. Functional anatomy, histology and fine structures of important organs and tissues will be discussed. Effective: 2013 Fall Quarter.

ENT 102—Insect Physiology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENT 100; Or course in physiology or invertebrate zoology. Processes by which insects maintain themselves, reproduce, and adapt to environment. Insects as models for basic/applied research through detailed analysis of metabolic, physiological, and behavioral processes. Emphasis on analysis of methodology, fact, and theory. GE credit: SE, WE. Effective: 2013 Fall Quarter.

ENT 103—Insects Systematics (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): Introductory course in zoology or entomology. Principles and methods of systematics, with particular reference to insects. Emphasis on different theories of classification, and analysis of phylogenetic relationships. Effective: 2013 Fall Quarter.

ENT 104—Behavioral Ecology of Insects (3)
Lecture—3 hours. Prerequisite(s): Introductory biology or zoology. Basic principles and mechanisms of insect behavior and ecology. An evolutionary approach to understanding behavioral ecology of insects. Effective: 2013 Fall Quarter.

ENT 105—Insect Ecology (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): BIS 002B (can be concurrent); Consent of Instructor. Introduction to insect ecology combining fundamental concepts and questions in ecology with ideas, hypotheses and insights from insects. Integrates aspects of individual, population, community and ecosystem ecology. GE credit: OL, SE, SL, WE. Effective: 2017 Fall Quarter.

ENT 107—California Insect Diversity (5)
Fieldwork—6 hours; Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): An introductory course in entomology. Survey of the diversity of insects from selected ecological zones in California with emphasis on collection, identification, and natural history. GE credit: SE. Effective: 2013 Fall Quarter.

ENT 109—Field Taxonomy and Ecology (7)
Laboratory—36 hours; Lecture—2 hours. Prerequisite(s): An introductory course in entomology or consent of instructor. GE credit: SE. Effective: 2013 Fall Quarter.

ENT 110—Arthropod Pest Management (5)
Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): BIS 001B Development of the ecological basis for the integrated pest management paradigm with emphasis on agriculture. Ecological and practical aspects of control tactics. Laboratory emphasizes identification of pests and beneficials of agriculture and urban situations. GE credit: SE, WE. Effective: 2013 Fall Quarter.

ENT 116—Freshwater Macroinvertebrates (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): BIS 002B; Or equivalent. Limited enrollment. Biology, ecology and taxonomy of freshwater macroinvertebrates, including insects, crustaceans, molluscs, worms, leeches, flatworms and others. Adaptations to life in freshwater. Aquatic food webs. Uses of macroinvertebrates in water quality monitoring. Field trips during regular lab hours. GE credit: SE, SL. Effective: 2013 Fall Quarter.

ENT 116L—Aquatic Insect Collection (2)
Fieldwork—2 hours; Laboratory—4 hours. Prerequisite(s): ENT 100L or ENT 116 (can be concurrent); Or prior experience with insect/arthropod identification to Family level. Restricted to 25 students. Collection of aquatic insects and identification to the Family level. Collections will require two, one-day weekend field trips (by arrangement). Collection requirement is 40 Families. Effective: 2016 Fall Quarter.

ENT 117—Longevity (4)
Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): Upper division standing or consent of instructor. Nature, origin, determinants, and limits of longevity with particular reference to humans; emphasis on implications of findings from non-human model systems including natural history, ecology and evolution of life span; description of basic demographic techniques including life table methods. (HDE 117.) GE credit: SE, SL, WE. Effective: 2013 Fall Quarter.

ENT 119—Apiculture (3)
Lecture—3 hours. Biology and behavior of honeybees; communication, orientation, social organization, foraging activities, honey production, pollination activities. GE credit: OL, SE, VL, WE. Effective: 2016 Fall Quarter.

ENT 123—Plant-Virus-Vector Interaction (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 101; PLB 105, PLP 120, and ENT 100 recommended. Analysis of interactions necessary for viruses to infect plants.Interactions among insect vectors and host plants involved in the plant-virus life cycle. Evolutionary aspects of the molecular components in viral infection and modern approaches to the interdiction of viral movement. (PBI 123 and PLP 123.) GE credit: SE, SL, WE. Effective: 2014 Winter Quarter.

ENT 135—Introduction to Biological Control (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENT 100 or ENT 110 Effective: 2013 Fall Quarter.

ENT 153—Medical Entomology (3)
Lecture—3 hours. Prerequisite(s): BIS 001A; BIS 001B; Upper division standing in one of the biological sciences, or consent of instructor. Basic biology and classification of medically important arthropods with special emphasis on the ecology of arthropodborne diseases and principles of their control. Relationships of arthropods to human health. GE credit: SE, SL, WE. Effective: 2013 Fall Quarter.

ENT 156—Biology of Parasitism (3)
Lecture/Discussion—3 hours. Prerequisite(s): BIS 001A; or Consent of Instructor. Lectures on the biological and ecological aspects affecting host-parasite relationships using selected examples from protozoan and metazoan fauna. GE credit: SE. Effective: 2013 Fall Quarter.

ENT 156L—Biology of Parasitism Laboratory (1)
Laboratory—3 hours. Prerequisite(s): ENT 156 (can be concurrent); ENT 156 required concurrently or consent of instructor. Laboratory demonstrations using selected examples of protozoan and metazoan organisms along with various techniques used in parasitology to exemplify concepts presented in the lecture course. GE credit: SE. Effective: 2013 Fall Quarter.

ENT 158—Forensic Entomology (3)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): BIS 001B or ENT 100; Upper division standing. Arthropods, their general biology, succession, developmental cycles and population biology in matters of criminal prosecution and civil litigation. Emphasis on basic arthropod biology, ecological and developmental concepts and methods, development of reasoning abilities, implication, development of opinions and evidence. GE credit: WE. Effective: 2013 Fall Quarter.

ENT 180A—Experimental Ecology and Evolution in the Field (4)
Fieldwork—3 hours; Lecture/Lab—3 hours. Prerequisite(s): (ENT 105 or ESP 100); EVE 100; EVE 101 Experimental design in field ecology. Examination of primary literature, experimental design, independent and collaborative research, analysis of data, development of original research paper based on field experiments. (EVE 180A.) GE credit: QL, SE, VL. Effective: 2014 Winter Quarter.

ENT 180B—Experimental Ecology and Evolution in the Field (4)
Fieldwork—3 hours; Lecture/Lab—3 hours. Prerequisite(s): (EVE 180A or ENT 180A); (EVE 100 or EVE 101 or ESP 100); ENT 105 Experimental design in field ecology. Examination of primary literature, experimental design, independent and collaborative research, analysis of data, development of original research paper based on field experiments. (EVE 180B.) GE credit: QL, SE, VL, WE. Effective: 2014 Winter Quarter.

ENT 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Laboratory experience or fieldwork off and on campus in all subject areas offered in the Department of Entomology. Internships supervised by a member of the faculty. (P/NP grading only.) Effective: 2013 Fall Quarter.

ENT 197T—Tutoring in Entomology (1-3)
Discussion—1-3 hours. Leading small discussion groups. Preview assignments and prepare guidelines for discussion. (P/NP grading only.) Effective: 2013 Fall Quarter.

ENT 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2013 Fall Quarter.

ENT 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 2013 Fall Quarter.

ENT 212—Molecular Biology of Insects and Insect Viruses (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. A molecular biological analysis of insect systematics, physiology, and defense mechanisms. Molecular biology of insect viruses. Baculovirus expresion vectors and post-translation modification of expressed polypeptides. Biological control of using neuropeptides and toxin genes in insect viruses. Effective: 2013 Fall Quarter.

ENT 214—Vector-borne Infectious Diseases: Changing Patterns (2)
Lecture/Discussion—2 hours. Prerequisite(s): Open to graduate students, MPVM and MPH students, DVM and medical students with second- or third-year standing. Open to upper division undergraduate students with consent of instructor(s). Vector-borne infectious diseases especially as they relate to changing patterns associated with climatic changes, trade and population movement. (PMI 214.) Effective: 2013 Fall Quarter.

ENT 225—Terrestrial Field Ecology (4)
Fieldwork—12 hours; Seminar—1 hour. Prerequisite(s): Introductory ecology and introductory statistics or consent of instructor. A field course conducted over spring break and four weekends at Bodega Bay, emphasizing student projects. Ecological hypothesis testing, data gathering, analysis and written and oral presentation of results. (ECK 225 and PBG 225.) Effective: 2013 Fall Quarter.

ENT 230—Advanced Biological Control (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): Graduate or upper division standing in biological science or consent of instructor. Principles and current issues in biological control of arthropod pests and weeds; laboratory devoted to identification and life history of the major groups of parasitic and predaceous arthropods. Effective: 2013 Fall Quarter.

ENT 253—Advanced Medical Entolomogy (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): One upper division course in Entomology (other than ENT 153) and one course in Microbiology: ENT 153 strongly recommended. An analysis of several anthropod-borne human diseases with emphasis on the relationships of the biology of the vector to the ecology of the disease. Discussion includes demonstration of vectors and techniques. Effective: 2013 Fall Quarter.

ENT 290—Exploratory Topics in Entomology (2)
Seminar—2 hours. Interdisciplinary topics in entomology, including innovative applications of entomological concepts to other fields of research and human endeavor (e.g. medicine, technology, art, criminology). May be repeated up to 8 unit(s) when topic differs. Effective: 2013 Fall Quarter.

ENT 291—Current topics in Medical and Veterinary Entomology (2)
Seminar—2 hours. Prerequisite(s): ENT 153 Discussions of parasitology, ecology and epidemiology related to vectors of pathogens causing disease in humans and animals. May be repeated up to 1 time(s). Effective: 2013 Fall Quarter.

ENT 292—Current Topics in Insect Physiology and Behavior (2)
Seminar—2 hours. Prerequisite(s): ENT 102 if topic is physiology, a course in behavior if topic is behavior, or either if topic bridges both. Analysis of contemporary advances in insect physiology, biochemistry and/or behavior. Interpretation and description of physiological and behavioral mechanisms and functions. Application of general principles to solution of problems in the laboratory and field. May be repeated up to 8 unit(s) topic differs. Effective: 2013 Fall Quarter.

ENT 293N—Current Topics in Insect Biotechnology and Genomics (2)
Seminar—2 hours. Prerequisite(s): ENT 212 Discussion of advances in insect biotechnology, including genetic engineering and genomics. May be repeated up to 6 unit(s) topic differs. Effective: 2013 Fall Quarter.

ENT 294—Current topics in Insect Ecology, Evolution, and Systematics (2)
Seminar—2 hours. Prerequisite(s): ENT 103; General course in ecology or evolution. Discussions of advanced topics in ecology, evolution and systematics with emphasis on analysis of factors influencing the distribution, abundance, adaptations and evolutionary relationships of insects. Includes consideration of applications of basic theory (e.g. biological control). May be repeated up to 8 unit(s) topic differs. Effective: 2013 Fall Quarter.

ENT 295—Current Topics in Agricultural Entomology and Bee Biology (2)
Seminar—2 hours. Prerequisite(s): ENT 110 if topic relates to pests and beneficial predators; ENT 119 if topic is bee biology; either if topic bridges both. Discussion of advanced topics about the biology, ecology, behavior, and management of pest and beneficial insects. May be repeated up to 8 unit(s) if topic differs. Effective: 2013 Fall Quarter.

ENT 297N—Seminar in Entomology (1)
Seminar—1 hour. Weekly Entomology seminar. May be repeated up to 9 unit(s) topic differs. (S/U grading only.) Effective: 2013 Summer Quarter.

ENT 298—Group Study (1-5)
Variable. (S/U grading only.) Effective: 2013 Fall Quarter.

ENT 299—Research (1-12)
Variable. (S/U grading only.) Effective: 2013 Fall Quarter.

Neurobiology, Physiology, & Behavior

Neurobiology, Physiology, & Behavior | NPB B.S.

(College of Biological Sciences)

W. Martin Usrey, Ph.D., Chairperson of the Department

Department Office. 196 Briggs Hall; 530-752-0203; http://www.npb.ucdavis.edu

Faculty. http://npb.ucdavis.edu/facultyresearch/

The Neurobiology, Physiology, and Behavior Major Program

Neurobiology, Physiology, and Behavior is a major that emphasizes the understanding of vital functions common to all animals. All animals perform certain basic functions—they grow, reproduce, move, respond to stimuli, and maintain homeostasis. The physiological mechanisms upon which these functions depend are precisely regulated and highly integrated. Actions of the nervous and endocrine systems determine behavior and the interaction between organisms and their physical and social environments. Students in this major study functional mechanisms; the control, regulation, and integration of these mechanisms; and the behavior that relates to those mechanisms. They do so at the level of the cell, the organ system, and the organism.

The Program. In the freshman and sophomore years, students majoring in Neurobiology, Physiology, and Behavior build a broad scientific background, taking courses in chemistry, biology, physics, and mathematics. As juniors or seniors, students can enroll in a variety of Neurobiology, Physiology, and Behavior courses and related upper division courses. The NPB major contains three tracks: the Neurobiology track, the Physiology track, and the Organism-Environmental Interactions track.

Master Advisor. Dr. Hwai-Jong Cheng, M.D., Ph.D., Dr. Lee Miller, Ph.D.

Advising Center. Biology Academic Success Center (BASC); 1023 Sciences Laboratory Building; 530-752-0410; http://basc.ucdavis.edu/

Career Alternatives. Completion of the Neurobiology, Physiology, and Behavior major provides the foundation for advanced study leading to careers in high school teaching, college level teaching or research. It also serves as the basis for further training in the health professions, including but not limited to human and veterinary medicine, medical technology, physical therapy, pharmacy, nursing, dentistry and optometry. The major is also appropriate for those intending to seek careers in biotechnology or other biologically related industries.

Graduate Study. Information on graduate study in neuroscience, physiology or behavior may be obtained by writing the Graduate Adviser, College of Biological Sciences, Graduate Academic Programs. See also the graduate course offerings listed under Animal Behavior (Graduate Group), Molecular, Cellular, and Integrative Physiology (Graduate Group), Neuroscience (Graduate Group). See also Graduate Studies.

Preparatory Subject Matter **Units:** 56-66

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
BIS 002C	Introduction to Biology: Biodiversity and the Tree of Life	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 002C	General Chemistry	5
OR		
CHE 003A	Chemistry for Life Sciences: Determining Structure and Predicting Properties	5
CHE 003B	Chemistry for Life Sciences: Predicting and Characterizing Chemical Change	5
CHE 003C	Chemistry for Life Sciences: Controlling Processes and Synthetic Pathways	5
CHE 008A	Organic Chemistry: Brief Course	2
CHE 008B	Organic Chemistry: Brief Course	4
OR		
CHE 118A	Organic Chemistry for Health and Life Sciences	4
CHE 118B	Organic Chemistry for Health and Life Sciences	4
CHE 118C	Organic Chemistry for Health and Life Sciences	4
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
MAT 017C	Calculus for Biology and Medicine	4
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
PHY 007A	General Physics	4
PHY 007B	General Physics	4
PHY 007C	General Physics	4

Depth Subject Matter **Units:** 41-49

BIS 101	Genes and Gene Expression	4
BIS 105	Biomolecules and Metabolism	3
OR		
BIS 102	Structure and Function of Biomolecules	3
BIS 103	Bioenergetics and Metabolism	3
NPB 110A	Foundations 1: From Molecules to Individuals	5
NPB 110B	Foundations 2: Neurobiology	5
NPB 110C	Foundations 3: Physiology	5

Choose three units of laboratory work from the track-specific list:

Neurobiology Track:

NPB 100L	Neurobiology Laboratory	3

Physiology Track:

NPB 101L	Systemic Physiology Laboratory	3

Organism-Environmental Interactions Track:

NPB 101L	Systemic Physiology Laboratory	3

Integrative Track:

NPB 101L	Systemic Physiology Laboratory	3
OR		
NPB 100L	Neurobiology Laboratory	3

STA 100	Applied Statistics for Biological Sciences	4

All students must do a minimum of four depth electives; three track-specific depth electives, and one Additional Depth Elective. At least two of these electives must be NPB courses. Up to four units of NPB 199 may be substituted for a single track-specific elective. Substitution must be pre-approved by NPB master advisor.

Neurobiology Track:

NPB 124	Comparative Neuroanatomy	3
OR		
PSC 124	Comparative Neuroanatomy	3
NPB 101L	Systemic Physiology Laboratory	3
NPB 106	Experiments in Neurobiology, Physiology, and Behavior: Design and Execution	3
NPB 107	Cell Signaling in Health and Disease	3
NPB 161	Developmental Neurobiology	3
NPB 162	Neural Mechanisms of Behavior	3
NPB 163	Systems Neuroscience	4
NPB 164	Mammalian Vision	4
NPB 165	Neurobiology of Speech Perception	3
NPB 166	Math Tools for Neuroscience	4
NPB 167	Computational Neuroscience	5
NPB 168	Neurobiology of Addictive Drugs	4
NPB 169	Frontiers in Neurobiology	3
NPB 171	Physiology of Neuroimmune Interactions	4
NPB 172	Map Formation in the Brain	3
NPB 173	Neurobiology of Brain Disorders	3
PSC 130	Human Learning and Memory	4
PSC 135	Cognitive Neuroscience: The Biological Foundations of the Mind	4
PSC 137	Neurobiology of Learning & Memory	4

Physiology Track:

ANS 123	Animal Growth and Development	4
EXB 106	Human Gross Anatomy	4
OR		
CHA 101	Human Gross Anatomy	4
EXB 106L	Human Gross Anatomy Laboratory	3

OR		
CHA 101L	Human Gross Anatomy Laboratory	3
EXB 101	Exercise Physiology	4
EXB 104L	Exercise Biology Laboratory	3
EXB 110	Exercise Metabolism	3
EXB 117	Exercise and Aging in Health and Disease	3
EXB 124	Physiology of Maximal Human Performance	4
MMI 188	Human Immunology	3
PMI 126	Fundamentals of Immunology	3
MCB 150	Developmental Biology	4
NPB 123	Comparative Vertebrate Organology	4
OR		
APC 100	Comparative Vertebrate Organology	4
NPB 152	Hormones and Behavior	3
OR		
PSC 123	Hormones and Behavior	3
NPB 106	Experiments in Neurobiology, Physiology, and Behavior: Design and Execution	3
NPB 107	Cell Signaling in Health and Disease	3
NPB 109	Kinesiology—Analysis and Control of Human Movement	4
NPB 111L	Advanced Systemic Physiology Laboratory	4
NPB 113	Cardiovascular, Respiratory, and Renal Physiology	4
NPB 114	Gastrointestinal Physiology	3
NPB 121	Physiology of Reproduction	4
NPB 121L	Physiology of Reproduction Laboratory	1
NPB 128	Comparative Physiology: Endrocrinology	3
NPB 130	Physiology of the Endocrine Glands	4
NPB 132	Nature vs. Nurture: Physiological Interactions Among Genes, Nutrients and Health	3
NPB 134	General Immunology for Physiologists	3
NPB 139	Frontiers in Physiology	3
NPB 140	Principles of Environmental Physiology	3
NPB 141	Physiological Adaptation of Marine Organisms	3
NPB 141P	Physiological Adaptation of Marine Organisms/Advanced Laboratory Topics	5
NPB 142	Environmental Endocrinology: Mechanisms for Life Cycles	3
NPB 157	Advanced Physiology of Animal/Human Disease	3
OR		
HPH 157	Advanced Physiology of Animal/Human Disease	3
NPB 168	Neurobiology of Addictive Drugs	4

Organism-Environmental Interactions Track:

ANS 106	Domestic Animal Behavior Laboratory	2
ANS 123	Animal Growth and Development	4
EVE 105	Phylogenetic Analysis of Vertebrate Structure	4
EVE 106	Mechanical Design in Organisms	3
EVE 107	Animal Communication	4

EVE 110	Running, Swimming and Flying	3
EVE 147	Biogeography	4
NPB 123	Comparative Vertebrate Organology	4
OR		
APC 100	Comparative Vertebrate Organology	4
NPB 150	Advanced Animal Behavior	4
OR		
PSC 122	Advanced Animal Behavior	4
NPB 152	Hormones and Behavior	3
OR		
PSC 123	Hormones and Behavior	3
NPB 100L	Neurobiology Laboratory	3
NPB 102	Animal Behavior	3
NPB 106	Experiments in Neurobiology, Physiology, and Behavior: Design and Execution	3
NPB 111L	Advanced Systemic Physiology Laboratory	4
NPB 113	Cardiovascular, Respiratory, and Renal Physiology	4
NPB 117	Avian Physiology	3
NPB 126	Comparative Physiology: Sensory Systems	3
NPB 128	Comparative Physiology: Endrocrinology	3
NPB 132	Nature vs. Nurture: Physiological Interactions Among Genes, Nutrients and Health	3
NPB 140	Principles of Environmental Physiology	3
NPB 141	Physiological Adaptation of Marine Organisms	3
NPB 141P	Physiological Adaptation of Marine Organisms/Advanced Laboratory Topics	5
NPB 142	Environmental Endocrinology: Mechanisms for Life Cycles	3
NPB 152	Hormones and Behavior	3
NPB 159	Frontiers in Behavior	3
NPB 162	Neural Mechanisms of Behavior	3
PMI 126	Fundamentals of Immunology	3
WFC 130	Physiological Ecology of Wildlife	4
WFC 141	Behavioral Ecology	4
WFC 153	Wildlife Ecotoxicology	4

Integrative Principles Track:

Needs to be approved by a Master Advisor or BASC Advisor. Any courses in the Neurobiology, Physiology and Organism-Environment Interactions tracks.

One additional Neurobiology, Physiology, and Behavior depth unit requirement.

All other NPB or EXB courses not used in satisfaction of any other requirement, except NPB 100, 101, 102, and EXB 120; ENT 104; EVE 100; or MIC 102, can be used as additional depth electives. Courses 192, 197T may not be used to satisfy the depth unit requirement.

Total: 100-115

Neurobiology, Physiology, & Behavior | EXB Courses

Courses in EXB:

EXB 010—Exercise and Fitness: Principles and Practice (3)
Lecture—3 hours. Human movement from physiological, psychological, sociological, and historical perspectives. Biology and psychology of exercise across the human lifespan. Not open for credit to students who have taken an upper division EXB course. GE credit: SE, SL. Effective: 2004 Winter Quarter.

EXB 090C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): EXB 099 (can be concurrent); Lower division standing in Exercise Biology or related biological science and consent of instructor; EXB 099 required concurrently. Research findings and methods in exercise biology. Presentation and discussion of research by faculty and students. May be repeated for credit. (P/NP grading only.) Effective: 2006 Fall Quarter.

EXB 090X—Lower Division Seminar (1-2)
Lecture—1-2 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Gives freshman or sophomore level students the opportunity to study a special topic in the general area of Exercise Biology in a small class setting. GE credit: SE. Effective: 1997 Winter Quarter.

EXB 092—Exercise Biology Internship (1-5)
Internship—3-15 hours. Prerequisite(s): Consent of Instructor. Enrollment dependent on availability of intern positions. Work experience in the application of physical activity programs to teaching, recreational, clinical or research situations under department faculty supervision. May be repeated up to 1 time(s). No internship units will be counted towards the Exercise Biology major. (P/NP grading only.) Effective: 2003 Spring Quarter.

EXB 097T—Tutoring in Exercise Biology (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Assisting the professor by tutoring students in exercise biology course-related projects. May be repeated up to 10 unit(s) including courses EXB 097TC, EXB 197T and EXB 197TC. No tutorial units will be counted towards the Exercise Biology major. (P/NP grading only.) Effective: 2004 Fall Quarter.

EXB 097TC—Tutoring Exercise Biology in the Community (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of instructor and chairperson. Tutoring in the community in exercise biology related projects under the guidance of the faculty. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 2003 Spring Quarter.

EXB 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of instructor and chairperson. (P/NP grading only.) Effective: 1997 Winter Quarter.

EXB 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

EXB 101—Exercise Physiology (4)
Lecture—4 hours. Prerequisite(s): NPB 101 or NPB 110C Physiologic responses to acute exercise, and physiologic adaptations to both chronic exercise (training) and selected environmental stresses. Emphasis is placed on the muscular, metabolic, cardiovascular, respiratory and renal responses and adaptations to exercise. Only 1 unit of credit allowed to students who have completed EXS 101; only 3 units of credit allowed to students who have completed EXS 102; not open for credit to students who have completed EXS 101 and EXS 102. GE credit: SE, SL. Effective: 2018 Winter Quarter.

EXB 102—Introduction to Motor Learning and the Psychology of Sport and Exercise (4)
Lecture—4 hours. Prerequisite(s): PSC 001 recommended. Theoretical and practical issues in motor learning, sport psychology, and exercise psychology are examined. Emphasis is placed on how motor skills are acquired and retained, and on the application of social psychology and human motivation studies to human performance. Only 2 units of credit allowed for students who have completed EXB 104; only 2 units of credit allowed for students who have completed EXB 105; not open for credit to students who have completed EXS 104 and EXS 105. GE credit: SS. Effective: 2002 Winter Quarter.

EXB 104L—Exercise Biology Laboratory (3)
Discussion—1 hour; Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): EXB 101 (can be concurrent); EXB 102 (can be concurrent); EXB 103 (can be concurrent); The last taken of the three courses may be taken concurrently. Principles and analytical procedures for assessing fundamental physiological, biomechanical, motor learning and motor control factors which underlie human movement and performance. Only 1 unit of credit allowed to students who have completed EXS 101L; only 1 unit of credit allowed to students who have completed EXS 103; not open for credit to students who have completed EXS 101L and EXS 103. (Former EXS 101L and EXS 103.). GE credit: SE, WE. Effective: 2004 Winter Quarter.

EXB 106—Human Gross Anatomy (4)
Lecture—4 hours. Prerequisite(s): BIS 002A; Concurrent enrollment in EXB 106L or CHA 101L strongly recommended. Upper division students only; Pass One open to upper division Exercise Biology or Anthropology majors only; Pass Two open to Seniors in any major; open enrollment at the start of the quarter for upper division students in any major. Detailed study of the gross anatomical structure of the human body, with emphasis on function and clinical relevance to students entering health care professions. (CHA 101.) GE credit: SE. Effective: 2010 Fall Quarter.

EXB 106L—Human Gross Anatomy Laboratory (3)
Laboratory—9 hours. Prerequisite(s): BIS 002A; EXB 106 (can be concurrent) or CHA 101 (can be concurrent); Must have completed EXB 106 or CHA 101 or required concurrently. Upper division students only; Pass One open to upper division Exercise Biology or Anthropology majors only; Pass Two open to Seniors in any major; open enrollment at the start of the quarter for upper division students in any major; mandatory attendance on first day of lab. Detailed study of prosected human cadavers in small group format with extensive hands-on experience. (CHA 101L.) GE credit: SE. Effective: 2010 Fall Quarter.

EXB 110—Exercise Metabolism (3)
Lecture—3 hours. Prerequisite(s): EXB 101 or NPB 101 or NPB 110C Exercise metabolism, with emphasis on skeletal muscle and cardiac muscle metabolism during activity and inactivity. Basics of bioenergetics, substrate utilization, and cell signaling; mechanisms that regulate these properties, and differences between skeletal muscle and cardiac muscle metabolism. GE credit: SE. Effective: 2018 Winter Quarter.

EXB 111—Environmental Effects on Physical Performance (3)
Discussion/Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): EXB 101; or Consent of Instructor. The effects of thermal, barometric and gravitational conditions on physiological function and physical performance of humans. Acute and chronic effects, emphasizing physiological adaptations and limitations, will be studied. GE credit: QL, SE. Effective: 2007 Winter Quarter.

EXB 112—Clinical Exercise Physiology (4)
Discussion/Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EXB 101; or Consent of Instructor. Physical activity as a therapeutic modality in normal and diseased populations (cardiovascular, pulmonary, diabetic). Effects of exercise and inactivity in terms of normal physiology, pathophysiology, and therapeutic benefit. Exercise fitness and disease assessment methods. GE credit: SE, SL. Effective: 2009 Spring Quarter.

EXB 115—Biomechanical Bases of Movement (3)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): EXB 103; or Consent of Instructor. Biomechanical bases of human movement investigated; topics include musculo-skeletal mechanics, tissue mechanics, electromyography,
and measurement and analysis techniques. Application made to sport, clinical, and work environments, including extensive analysis of
locomotion. GE credit: QL, SE, VL, WE. Effective: 1997 Winter Quarter.

EXB 116—Nutrition for Physically Active Persons (3)
Lecture—3 hours. Prerequisite(s): EXB 101; NPB 101 The role of nutrition and exercise in modifying metabolism, body composition, performance and health of humans. GE credit: SE. Effective: 1997 Winter Quarter.

EXB 117—Exercise and Aging in Health and Disease (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): EXB 101 or EXB 113 (can be concurrent) Etiology of and standard therapy for various diseases associated with aging (e.g., cardiovascular, pulmonary, and renal diseases, diabetes, obesity, lipemias, etc.). Exercise will then be considered as a protective and/or therapeutic modality. GE credit: SE. Effective: 2007 Spring Quarter.

EXB 120—Sport in American Society (3)
Lecture—3 hours. Sociological approaches to the study of sport and contemporary American culture, including sport interaction with politics, economics, religion, gender, race, media and ethics. Socialization factors involving youth, scholastic, collegiate, and Olympic sport. (PHE 120.) GE credit: SS. Effective: 2009 Summer Session 1.

EXB 121—Advanced Sport Psychology (3)
Lecture—3 hours. Prerequisite(s): EXB 102; PSC 001 recommended. Advanced study and consideration of major theoretical and practical issues in sport psychology. Emphasis on practical application to sport and human performance. Effective: 2010 Winter Quarter.

EXB 122—Psychological Effects of Physical Activity (3)
Lecture—3 hours. Prerequisite(s): PSC 001 or PSC 001Y Upper division standing. Physical activity is evaluated in terms of its ability to enhance the quality of life. Topics studied include: individual factors (self concept, type A); special populations (elderly, cardiovascular); and mental health changes (depression, anxiety). Effective: 2018 Spring Quarter.

EXB 124—Physiology of Maximal Human Performance (4)
Lecture—3 hours; Practice—4 hours. Prerequisite(s): EXB 101; or Consent of Instructor. BIS 101, BIS 102, and BIS 103 recommended. Molecular mechanisms underlying adaptation to training. Learn how to exercise to maximize their own performance as well as learning how the frequency, intensity and timing of exercise and nutrition affect the molecular signals that underlie performance. GE credit: SE. Effective: 2011 Winter Quarter.

EXB 125—Neuromuscular and Behavioral Aspects of Motor Control (3)
Discussion/Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): EXB 101 Factors which affect control of movement from neuropsychological, physiological, behavioral, and mechanical viewpoints. Topics include central vs. peripheral control mechanisms, open and closed loop theories, motor programming, cognitive learning strategies, and the effects of biochemical and biomechanical influences. GE credit: SE. Effective: 2006 Fall Quarter.

EXB 148—Theory and Practice of Exercise Testing (1)
Lecture/Discussion—1 hour. Prerequisite(s): EXB 112 (can be concurrent) Theory and practice of exercise testing applied to older adult populations. Physiological responses to and limitations of exercise testing. Application of exercise testing and training to healthy and diseased populations. (P/NP grading only.) GE credit: SE. Effective: 2006 Fall Quarter.

EXB 148L—Adult Fitness Testing Laboratory (1)
Laboratory—3 hours. Prerequisite(s): EXB 148 (can be concurrent); EXB 148 required concurrently. Testing symptomatic and asymptomatic older adults for functional aerobic capacity, body composition, blood lipids, pulmonary function, and cardiovascular disease risk. Counseling adults in appropriate exercise programs and lifestyle modifications. Two quarters minimum; third quarter permitted. (Former course Physical Education 148L). May be repeated up to 2 time(s). (P/NP grading only.) GE credit: QL, SE. Effective: 2006 Fall Quarter.

EXB 179—Frontiers in Exercise Biology (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): EXB 101; EXB 102; EXB 103 (can be concurrent); EXB 104L recommended. Lectures by leading authorities and discussion of the latest research in newly emerging areas in exercise biology. Offered every fourth year. GE credit: SE. Effective: 2007 Spring Quarter.

EXB 189—International Perspectives in Exercise Biology (4)
Lecture—4 hours. Prerequisite(s): EXB 010; Or upper division standing in Exercise Biology; consent of instructor: students will be accepted based upon academic merit, personal experience, and academic discipline in order to provide multidisciplinary perspectives. Restricted to 22 students. Compare and contrast exercise science issues between the US and an international location. Identify political, economic, cultural, technological and environmental issues that impact human exercise, physical activity, wellness, and sport from a global perspective. Effective: 2009 Summer Session 1.

EXB 190C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): EXB 099 (can be concurrent); Upper division standing in Exercise Biology or related biological science and consent of instructor; EXB 199 required concurrently. Restricted to upper division students. Research findings and methods in exercise biology. Presentation and discussion of research by faculty and students. May be repeated for credit. (P/NP grading only.) Effective: 2006 Fall Quarter.

EXB 192—Exercise Biology Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Enrollment dependent on availability of intern positions. Work experience in the application of physical activity programs to teaching, recreational, clinical or research situations under program faculty supervision. Written report required. May be repeated up to 15 unit(s) including course 92. (P/NP grading only.) Effective: 2003 Spring Quarter.

EXB 194H—Research Honors (2)
Independent Study—6 hours. Prerequisite(s): Senior standing, minimum of 6 units of EXB 199, 3.50 GPA or greater in major courses, consent of honors thesis advisor. Completion of individual honors research project in Exercise Biology, under the guidance of an Exercise Biology faculty advisor, culminating in written honors thesis. (P/NP grading only.) GE credit: SE. Effective: 2004 Fall Quarter.

EXB 197T—Tutoring in Exercise Biology (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Assisting the instructor by tutoring students in exercise biology course-related projects. May be repeated up to 10 unit(s) including courses EXB 097T, EXB 097TC and EXB 197TC. No tutorial units will be counted towards the Exercise Biology major. (P/NP grading only.) Effective: 2004 Fall Quarter.

EXB 197TC—Tutoring Exercise Biology in the Community (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of instructor and chairperson. Tutoring in the community in exercise biology related projects under the guidance of the faculty. May be repeated up to 10 unit(s) including courses 97T, 97TC and 197T. (P/NP grading only.) Effective: 2003 Spring Quarter.

EXB 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of instructor and chairperson. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

EXB 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of chairperson. (P/NP grading only.) Effective: 1997 Winter Quarter.

Neurobiology, Physiology, & Behavior | NPB Courses

Courses in NPB:

NPB 010—Elementary Human Physiology (3)
Lecture—3 hours. Introduction to physiology for non-science majors. Includes basic cell physiology and survey of major organ systems and how they function in homeostasis and human health. Not open for credit to students who have completed NPB 101. GE credit: SE. Effective: 2016 Winter Quarter.

NPB 012—The Human Brain and Disease (3)
Lecture—3 hours. Normal function and diseases of the human brain and nervous system. Diseases discussed include Parkinson's, Alzheimer's, leprosy, amnesia and schizophrenia. Intended for non-science majors. Not open for credit for students who have completed NPB 100, NPB 101, NPB 112, or PSC 121. GE credit: SL. Effective: 1997 Spring Quarter.

NPB 014—Illusions: Fooling the Brain (3)
Lecture—3 hours. Introduction to perceptual processing in the human nervous system; illusions. GE credit: QL, SE, SL. Effective: 2012 Winter Quarter.

NPB 015—The Biology and Physiology of Aging (4)
Discussion—1 hour; Lecture—3 hours. Broad examination of age-associated changes in body functions. Includes basic cell physiology, a survey of major organ systems and the age-induced alterations in system function. Some age-associated diseases will also be examined. Intended for non-science majors. Not open for credit to students who have completed NPB 15V. GE credit: SE. Effective: 2012 Fall Quarter.

NPB 015V—The Biology and Physiology of Aging (4)
Web Electronic Discussion—1 hour; Web Virtual Lecture—3 hours. Broad examination of the biological and physiological basis of aging in animals and plants. Concepts in demographic, evolutionary, genetic, and cell aging. Major human organ systems, age-related alterations in system function, and age-related diseases. Intended for non-science majors. Not open for credit to students who have completed NPB 15. GE credit: SE, SL. Effective: 2012 Fall Quarter.

NPB 017—The Path to Cyborgs: Introduction to Prostheses and Human Machine Interfaces (3)
Lecture—3 hours. Interface of biology and technology. Mind-controlled prosthetic limbs, artificial organs, and implantable devices. Emphasis on basic physiological functions and how they can be replaced by devices. Suitable for majors and non-majors. GE credit: SE, SL. Effective: 2016 Winter Quarter.

NPB 018—Biological Science for Social Justice (3)
Lecture—3 hours. Broad survey of the many ways one can use the biological sciences to better the lives of others and break down barriers that have restricted social mobility. GE credit: DD, SE, SL, SS. Effective: 2018 Spring Quarter.

NPB 068—Biology of Drug Addiction and Abuse (3)
Lecture—3 hours. Broad examination of addictive substances and their use/abuse. Topics include historical perspective, physiological effects, etiology, neurobiology of addiction and the impact of drugs on contemporary society. Intended for non-science majors. Not open for credit to students having completed NPB 168. Effective: 2008 Spring Quarter.

NPB 090A—Lower Division Seminar: Issues in Body Weight Regulation (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Limited enrollment. Critical examination of issues in body weight regulation through shared readings, discussions, written assignments, debates and oral presentations. Limited enrollment. Effective: 2000 Winter Quarter.

NPB 090B—Human Color Perception (2)
Seminar—2 hours; Term Paper. Prerequisite(s): Lower division standing. Class size limited to 15 students with lower division standing. Neural determinants of color appearance, and why we see the world in the way we do. Discussions center around demonstrations of color phenomena and what they tell us about the human brain. Effective: 2008 Spring Quarter.

NPB 090C—Current Issues in Animal Behavior (2)
Seminar—2 hours. Prerequisite(s): Lower division standing. Limited enrollment. The mechanisms and outcomes of sexual selection (mate choice and mate competition). Theory, current models and evidence that supports or refutes the models. Effective: 2003 Winter Quarter.

NPB 090D—Lower Division Seminar: Current Issues in Reproductive Endocrinology (2)
Seminar—2 hours. Prerequisite(s): Lower division standing. The integrative roles of reproductive hormones in mammalian reproduction and health. Current theory and models regarding hormone function and use in reproductive health and contraception, and evidence that supports or refutes the models. Effective: 2002 Fall Quarter.

NPB 090E—Biology of Aging (2)
Seminar—2 hours. Prerequisite(s): Freshman standing. Current theories on the biology of aging covering genetic, biochemical, and physiological aspects. Emphasis on critical evaluation of controversial and contemporary issues. Effective: 2003 Fall Quarter.

NPB 090F—Visual Impairment and Blindness: A World Wide Problem (2)
Seminar—2 hours. Prerequisite(s): Lower division standing. Examination of various abnormalities of the eye and the important geographic and cultural factors that influence the epidemiology of those abnormalities. Effective: 2007 Winter Quarter.

NPB 091C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): NPB 099 (can be concurrent); and Consent of Instructor. Lower division standing in Neurobiology, Physiology and Behavior or related biological science; NPB 099 required concurrently. Restricted to lower division students. Research findings and methods in neurobiology, physiology, and/or behavior. Presentation and discussion of research by faculty and students. May be repeated for credit. (P/NP grading only.) Effective: 2003 Fall Quarter.

NPB 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Work experience off and on campus in all subject areas offered in the
Department of Neurobiology, Physiology, and Behavior. Internships supervised by a member of the faculty. May be repeated for credit. (P/NP grading only.) Effective: 2008 Fall Quarter.

NPB 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) Effective: 2000 Winter Quarter.

NPB 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) Effective: 1999 Winter Quarter.

NPB 100—Neurobiology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 002A; PHY 009A, PHY 009B or PHY 007A, PHY 007B recommended. Brains and nervous systems, neurons and neural circuits. Coordination of movement. Development of nervous systems. Vision, hearing, and feature extraction by the central nervous system. The cell biology of learning and memory. Perception, cognition, and disorders of the brain. Not open for credit to students who have completed NPB 110B, NPB 112, NPB 160, NPB 161 or NPB 162, or NSC 221 or NSC 222. GE credit: QL, SE. Effective: 2018 Spring Quarter.

NPB 100L—Neurobiology Laboratory (3)
Extensive Writing/Discussion; Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): NPB 100 (can be concurrent) or NPB 110B (can be concurrent) Experimental basis of neurobiology principles discussed in course 100. Topics include neurophysiology, sensory systems, motor systems, cellular neuroscience, cognitive neuroscience, and quantitative data analysis and modeling techniques. GE credit: SE. Effective: 2017 Winter Quarter.

NPB 100Q—Quantitative Foundations of Neurobiology (1)
Auto Tutorial—1.5 hours; Extensive Problem Solving—1.5 hours. Prerequisite(s): NPB 100 (can be concurrent) Computational methods and mathematical models used to study phenomena in neurobiology. GE credit: QL, VL. Effective: 2010 Spring Quarter.

NPB 101—Systemic Physiology (5)
Lecture—5 hours. Prerequisite(s): BIS 001A or BIS 002A; CHE 002B; PHY 001B or PHY 007C strongly recommended. Systemic physiology with emphasis on aspects of human physiology. Functions of major organ systems, with the structure of those systems described as a basis for understanding the functions. Not open for credit to students who have completed NSC 110C. GE credit: SE. Effective: 2017 Winter Quarter.

NPB 101D—Systemic Physiology Discussion (1.5)
Discussion—1.5 hours. Prerequisite(s): NPB 101 (can be concurrent); Consent of Instructor. Discussion and problem solving related to fundamental principles of systemic physiology as presented in course 101. (P/NP grading only.) Effective: 2017 Spring Quarter.

NPB 101L—Systemic Physiology Laboratory (3)
Discussion—2 hours; Laboratory—3 hours; Term Paper. Prerequisite(s): NPB 101 or NPB 110C Selected experiments to illustrate functional characteristics of organ systems discussed in course 101. Effective: 2017 Winter Quarter.

NPB 102—Animal Behavior (3)
Lecture—3 hours. Prerequisite(s): (BIS 001A, BIS 001B, BIS 001C) or (BIS 002A, BIS 002B, BIS 002C) Basic principles of behavioral organization in vertebrate and invertebrate animals. Underlying physiological and ethological mechanisms. The evolution of behavior, with special emphasis on behavior under natural conditions. Not open for credit to students who have completed NPB 155. (Former NPB 155.). GE credit: SL. Effective: 2008 Fall Quarter.

NPB 102Q—Quantitative Topics in Animal Behavior (1)
Auto Tutorial—1.5 hours; Extensive Problem Solving—1.5 hours. Prerequisite(s): MAT 016B; NPB 102 (can be concurrent) Study of the quantitative concepts and exemplar models used in animal behavior. Effective: 2009 Spring Quarter.

NPB 103—Cellular Physiology/Neurobiology (3)
Lecture—3 hours. Prerequisite(s): (BIS 103 or BIS 105); BIS 104; PHY 007C recommended. Cellular physiology with emphasis on membrane transport processes and neuronal physiology. Fundamental physical-chemical and biological mechanisms of membrane transport will be considered in relation to
cytoplasmic homeostasis, communication between cells,and the cellular mechanisms of sensory and motor transduction. Not open for credit to students who have completed NPB 100B. (Former NPB 100B.). Effective: 2008 Spring Quarter.

NPB 104L—Cellular Physiology/Neurobiology Laboratory (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—1 hour; Term Paper/Discussion. Prerequisite(s): NPB 101L; (BIS 103 or BIS 105) Experiments in the physical and chemical processes of cells and tissues. Effective: 2018 Winter Quarter.

NPB 105—Introduction to Computer Models (4)
Lecture—3 hours; Lecture/Lab—1 hour. Prerequisite(s): CHE 002C; PHY 007C; (NPB 100 or NPB 101); MAT 016C; Or the equivalent to MAT 016C. Introduction to the ideas, mathematical techniques and computer tools required for developing models of cellular processes in physiology and neurobiology. Applications include membrane transport, ionic channels, action potentials, Ca2+ oscillations, respiration, and muscle contraction. Effective: 1997 Winter Quarter.

NPB 106—Experiments in Neurobiology, Physiology, and Behavior: Design and Execution (3)
Discussion—0.5 hours; Laboratory—7.5 hours. Prerequisite(s): (NPB 110A or NPB 100 or NPB 101 or NPB 102); NPB 199; and Consent of Instructor. Design and execution of experiments in neurobiology, physiology, and/or behavior. Students choose and design a project in consultation with the sponsoring faculty member. May be repeated once for credit to complete the project, with consent of instructor. May be repeated up to 1 time(s). (P/NP grading only.) GE credit: OL, QL, VL, WE. Effective: 2018 Winter Quarter.

NPB 107—Cell Signaling in Health and Disease (3)
Lecture—3 hours. Prerequisite(s): BIS 102 or BIS 105 Basics of cell signaling pathways, their disruption in disease, and their current utility and future potential as therapeutic targets. Focus is on signaling pathways specific to nervous, endocrine and immune systems, and those fundamental to all cells. GE credit: SL. Effective: 2009 Winter Quarter.

NPB 108Y—Animal Behavior Laboratory (3)
Lecture—3 hours; Web Electronic Discussion—12 hours. Hybrid course, consisting of limited in-person lectures and the rest laboratory exercises. The laboratory exercises will be online, and will require students to view and score videos of animal behavior in order to test behavioral hypotheses. Effective: 2016 Summer Session 2.

NPB 109—Kinesiology—Analysis and Control of Human Movement (4)
Lecture—4 hours. Prerequisite(s): PHY 007A; PHY 007B; NPB 101 or NPB 110C recommended; CHA 101 and CHA 101L (same as EXB 106 and EXB 106L) or equivalent recommended. Functional anatomy, motor control, and biomechanics of human movement understood in the context of body structures, basic principles of physics, and functional characteristics of muscle. GE credit: SE. Effective: 2018 Spring Quarter.

NPB 110A—Foundations 1: From Molecules to Individuals (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): (BIS 002A, BIS 002B); (CHE 002B or CHE 003A); PHY 007A and PHY 007B recommended; BIS 002C recommended. Pass One restricted to majors in Neurobiology, Physiology and Behavior. Major concepts in cell biology with special emphasis on connections between cell biology and behavior. Includes: cellular metabolism, cellular sensing and signaling, membrane structure-function, molecular switches, electrical and chemical signaling, endocrine signaling, cell cycle and differentiation, cytoskeleton, and integrative examples. Credit limited to 3 units for students who have taken BIS 104. GE credit: SE. Effective: 2018 Winter Quarter.

NPB 110B—Foundations 2: Neurobiology (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): NPB 110A C- or better; PHY 007A and PHY 007B recommended. Open to declared NPB majors only. Core concepts of neurobiology including single-neuron biophysics, synapses and transmitters, neuronal development, motor systems, central pattern generation, neuronal circuits, intracellular signal transduction, sensory processing, multisensory integration, autonomic nervous system, neuromodulation, learning and memory, and higher cognition and disease. Credit limited to 2 units for students who have taken NPB 100. GE credit: SE. Effective: 2017 Winter Quarter.

NPB 110C—Foundations 3: Physiology (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): NPB 110A C- or better; PHY 007A; PHY 007B and PHY 007C recommended. Open to declared NPB majors only. Focuses on the structure, function, and interactions of animal organ systems in homeostasis and reproduction, and the response to perturbations of homeostasis; neural and endocrine signaling; skeletal muscle and movement; cardiovascular and respiratory systems; renal, digestive, immune, and reproductive physiology. Credit limited to 2 units for students who have taken NPB 101. GE credit: SE. Effective: 2018 Winter Quarter.

NPB 111L—Advanced Systemic Physiology Laboratory (4)
Discussion—2 hours; Laboratory—6 hours; Lecture—1 hour; Term Paper. Prerequisite(s): NPB 101L Selected comprehensive experiments in the autonomic nervous system and the cardiovascular, respiratory, and neuromuscular systems. Emphasis on conceptual and methodological approaches in demonstrating the physiology of organ systems. Effective: 2018 Winter Quarter.

NPB 113—Cardiovascular, Respiratory, and Renal Physiology (4)
Lecture—4 hours. Prerequisite(s): (NPB 110C or NPB 101); CHE 008B, PHY 007B and PHY 007C recommended. An intense and advanced presentation of concepts in cardiovascular, respiratory, and renal physiology including discussion of acid-base balance. Effective: 2018 Winter Quarter.

NPB 114—Gastrointestinal Physiology (3)
Lecture—3 hours. Prerequisite(s): (NPB 110C or NPB 101); BIS 105 or BIS 103 recommended, BIS 105 preferred. Gastrointestinal anatomy and physiology. Digestion, secretion, absorption, motility, comparative physiology and pathology. Strong emphasis on neural and hormonal regulation and on cellular mechanisms of secretion and absorption. Effective: 2018 Winter Quarter.

NPB 117—Avian Physiology (3)
Lecture—3 hours. Prerequisite(s): (BIS 002A, BIS 002B); CHE 002B; NPB 101 or NPB 110C strongly recommended. Physiology of the various systems of birds with emphasis on digestion, respiration, excretion, and endocrine systems. Effective: 2018 Spring Quarter.

NPB 121—Physiology of Reproduction (4)
Lecture/Discussion—4 hours. Prerequisite(s): NPB 101 or NPB 110C or ANS 100 Physiological mechanisms related to reproduction, breeding efficiency and fertility, with special reference to domestic animals. GE credit: QL, SL. Effective: 2018 Spring Quarter.

NPB 121L—Physiology of Reproduction Laboratory (1)
Laboratory—3 hours. Prerequisite(s): NPB 121 (can be concurrent) Experiments on the reproductive systems of domestic animals including male and female gametes. (P/NP grading only.) Effective: 2017 Spring Quarter.

NPB 122—Developmental Endocrinology (3)
Lecture—3 hours. Prerequisite(s): NPB 101 Restricted to upper division standing. Hormonal control of development, maturation and senescence from the cellular to organismal level, with emphasis on the human. Prenatal and neonatal life, childhood and adolescence, adulthood and pregnancy, as well as the endocrinology of aging. Effective: 2003 Spring Quarter.

NPB 123—Comparative Vertebrate Organology (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (BIS 001A, BIS 001B) or (BIS 002A, BIS 002B) Functional anatomy of major organ systems in vertebrates. Each system examined from cellular to gross level in fish, birds, and mammals. Emphasis on how differentiated cell types are integrated into tissues and organs to perform diverse physiological functions. (Anatomy, Physiology and cell Biology 100.) Effective: 2008 Winter Quarter.

NPB 124—Comparative Neuroanatomy (4) ***Review all entries***
Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): PSC 101 or NPB 100 or NPB 101 Overview of the neuroanatomy of the nervous system in a variety of mammalian and non-mammalian vertebrates. Examine changes or modifications to neural structures as a result of morphological or behavioral specializations. (Psychology 124) GE credit: SL. Effective: 1997 Fall Quarter.

NPB 124—Comparative Neuroanatomy (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): NPB 101 or NPB 100 or NPB 110B or PSC 121 Overview of the neuroanatomy in mammalian vertebrates, focusing on the cerebral cortex and experimental techniques. Examine changes or modifications to neural structures as a result of morphological or behavioral specializations. (PSC 124.) Effective: 2018 Fall Quarter.

NPB 124L—Comparative Neuroanatomy Laboratory (2)
Laboratory—6 hours. Prerequisite(s): NPB 124 (can be concurrent) Pass One restricted to PSC and NPB majors; must be concurrently enrolled in NPB 124. Comparative neuroanatomy laboratory illustrating modern neuroanatomical techniques in determining neural connections within the mammalian brain. Includes experimentation and presentation of results. (PSC 124L.) Effective: 2018 Fall Quarter.

NPB 126—Comparative Physiology: Sensory Systems (3)
Lecture—3 hours. Prerequisite(s): NPB 100 or NPB 101 Basic physiological mechanisms involved in sensory systems. Comparative approach to considerations of mechanosensitive systems (audition, lateral lines, touch, echolocation, equilibrium), chemosensitive systems (olfaction, taste, pheromones), photosensitive systems (vision, infrared detection, UV detection), electroreception, and pain. Emphasis on receptors. Effective: 1997 Winter Quarter.

NPB 128—Comparative Physiology: Endrocrinology (3)
Lecture—3 hours. Prerequisite(s): NPB 101 Comparison of physiological functions in the animal kingdom: animal hormones and their functions. Effective: 1997 Winter Quarter.

NPB 130—Physiology of the Endocrine Glands (4)
Lecture—4 hours. Prerequisite(s): NPB 110C or NPB 101 Advanced presentation of concepts in endocrinology with emphasis on the role of hormones in reproduction, metabolism, and disease. GE credit: VL. Effective: 2018 Winter Quarter.

NPB 132—Nature vs. Nurture: Physiological Interactions Among Genes, Nutrients and Health (3)
Lecture—3 hours. Prerequisite(s): BIS 001A or BIS 002A; or Consent of Instructor. Biochemical, physiological, genetic, and nutritional causes of important medical problems such as obesity, anorexia, heart disease and diabetes. One unit of credit allowed to students who have completed NPB 131. Effective: 2008 Fall Quarter.

NPB 134—General Immunology for Physiologists (3)
Lecture—2 hours; Lecture/Discussion—1 hour. Prerequisite(s): NPB 101 C- or better or NPB 110C C- or better; or Consent of Instructor. Immunology for undergrads interested in physiology aimed at understanding the physiological role of immune responses. Illustrated with examples of human diseases including diabetes, allergies and asthma, and emerging diseases such as Ebola and Zika. GE credit: SE. Effective: 2017 Fall Quarter.

NPB 139—Frontiers in Physiology (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): NPB 100; NPB 101; NPB 102 (can be concurrent) Lectures by leading authorities and discussion of the latest research in newly emerging areas in physiology. Offered every fourth year. GE credit: QL, SE. Effective: 2010 Fall Quarter.

NPB 140—Principles of Environmental Physiology (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): NPB 101; BIS 102 recommended. Physiological aspects of interactions of organisms and environmental,
cellular, system, and organismal levels. Emphasis on regulatory responses/mechanisms to thermal, pressure, gravity and light environmental variables. Not open for credit to students who have completed course 148. (Former course 148.). GE credit: WE. Effective: 1997 Winter Quarter.

NPB 140—Principles of Environmental Physiology (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): NPB 101 or NPB 110C; BIS 102 recommended. Physiological aspects of interactions of organisms and environmental, cellular, system, and organismal levels. Emphasis on regulatory responses/mechanisms to thermal, pressure, gravity and light environmental variables. Not open for credit to students who have completed NPB 148. (Former NPB 148.). GE credit: WE. Effective: 2018 Fall Quarter.

NPB 141—Physiological Adaptation of Marine Organisms (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Upper division standing; residence at Bodega Marine Laboratory required. Students must submit application available at http://www.bml.ucdavis.edu. Physiological adaptation to the environment among organisms in marine and estuarine habitats. GE credit: QL, VL, WE. Effective: 2006 Summer Session 1.

NPB 141P—Physiological Adaptation of Marine Organisms/Advanced Laboratory Topics (5)
Discussion—1 hour; Laboratory—12 hours. Prerequisite(s): NPB 141 (can be concurrent); Residence at Bodega Marine Laboratory required; NPB 141 required concurrently. Students must submit application available at http://www.bml.ucdavis.edu. Training in scientific research from hypothesis to publication, including methods of library research. Research related to a topic covered in course 141. GE credit: VL, WE. Effective: 2006 Spring Quarter.

NPB 142—Environmental Endocrinology: Mechanisms for Life Cycles (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B; BIS 002C Effects of environmental factors on endocrine responses that affect vertebrate life history and fitness. Introduction to finite state machine theory and allostasis in life histories and coping strategies. Focus on life history stages including non-breeding, hibernation, reproduction, migration and moult. GE credit: SE, WE. Effective: 2015 Winter Quarter.

NPB 150—Advanced Animal Behavior (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): NPB 102 or PSC 101; or Consent of Instructor. Advanced integrative survey of biological principles of behavioral organization, emphasizing historical roots, current research directions, conceptual issues and controversies. Laboratory exercises on the description and analysis of the behavior of captive and free-living animals. (Psychology 122) Effective: 2018 Winter Quarter.

NPB 152—Hormones and Behavior (3)
Lecture—3 hours. Prerequisite(s): (NPB 101 or NPB 110C); (NPB 102 or PSC 101) Endocrine physiology with an emphasis on the principles of behavior. Fundamental relationships between hormones and various behaviors engaged in by the organism during its lifetime. Role of hormones in behavioral homeostasis, social behavior, reproductive behavior, parental behavior, adaptation to stress. (Psychology 123) Effective: 2018 Winter Quarter.

NPB 157—Advanced Physiology of Animal/Human Disease (3)
Lecture—1 hour; Lecture/Discussion—2 hours. Prerequisite(s): NPB 101 B+ or better or NPB 110C B+ or better; Consent of Instructor. Limited to 35 students initially. Centers on fundamental mechanisms and pathophysiological basis for animal and human diseases. Course is case-based and uses animal and human diseases to help exemplify the physiological consequences of organ dysfunction. (HPH 157.
) Effective: 2017 Spring Quarter.

NPB 159—Frontiers in Behavior (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): NPB 100; NPB 101; NPB 102 Lectures by leading authorities and discussion of the latest research in newly emerging areas in behavioral biology. Offered every fourth year. GE credit: QL, SE. Effective: 2010 Fall Quarter.

NPB 161—Developmental Neurobiology (3)
Lecture—3 hours. Prerequisite(s): NPB 100 or NPB 101 or NPB 110B Issues, theoretical concepts, and methodologies in developmental neurobiology. Topics include prenatal and postnatal differentiation of neurons, and plasticity in the mature and aging brain. Integration of neurochemical, structural, physiological and behavioral perspectives. GE credit: SE. Effective: 2018 Winter Quarter.

NPB 162—Neural Mechanisms of Behavior (3)
Lecture—3 hours. Prerequisite(s): NPB 100 or NPB 101 or NPB 110B Relationship between brain and behavior. Identification and analysis of the relevant neural circuits involved. Examples of systems to be considered are birdsong, locomotion, echolocation. Effective: 2018 Winter Quarter.

NPB 163—Systems Neuroscience (4)
Lecture—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): NPB 100 or NPB 110B; Or equivalent basic neuroscience training with consent of instructor. Concepts and techniques in systems neuroscience: e.g., measuring and manipulating neural activity, structure of neocortex, sensory processing, motor control, storage of information, neural codes, neural mechanisms underlying cognitive functions. GE credit: SE. Effective: 2017 Spring Quarter.

NPB 164—Mammalian Vision (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): NPB 100 or NPB 110B or PSC 101 Structure and function of the mammalian visual system, from the formation of images on the retina through visually guided behavior and perception. Emphasis on biological mechanisms underlying vision. Effective: 2017 Spring Quarter.

NPB 165—Neurobiology of Speech Perception (3)
Lecture—3 hours. Prerequisite(s): NPB 110B or NPB 100 or NPB 101; or Consent of Instructor. Interdisciplinary approach to speech perception with emphasis on functional neuroanatomy and behavior. Topics include auditory processing in time and space, intelligibility in noisy environments, visual speech, evolution of vocal communication, models of speech perception, development, and hearing impairment. GE credit: SL. Effective: 2018 Winter Quarter.

NPB 166—Math Tools for Neuroscience (4)
Lecture—4 hours. Prerequisite(s): (NPB 100 or NPB 110B); (MAT 016A, MAT 016B, MAT 016C) or (MAT 017A, MAT 017B, MAT 017C) or (MAT 021A, MAT 021B, MAT 021C); or Consent of Instructor. Introduction to mathematics techniques used in neuroscience. Applications to neuroscience of differential equations, linear algebra, Fourier transforms, correlation and convolution, and probability theory. GE credit: QL. Effective: 2018 Winter Quarter.

NPB 167—Computational Neuroscience (5)
Lecture—4 hours; Lecture/Lab—3 hours. Prerequisite(s): (NPB 100 or NPB 110B); (MAT 016A, MAT 016B, MAT 016C) or (MAT 017A, MAT 017B, MAT 017C) or (MAT 021A, MAT 021B, MAT 021C); or Consent of Instructor. PHY 007A, PHY 007B or equivalent recommended. Mathematical models and data analysis techniques used to describe computations performed by nervous systems. Lecture topics include single neuron biophysics, neural coding, network dynamics, memory, plasticity, and learning. Lab topics include programming mathematical models and data analysis techniques in MATLAB. GE credit: QL, SE. Effective: 2018 Winter Quarter.

NPB 168—Neurobiology of Addictive Drugs (4)
Lecture/Discussion—4 hours. Prerequisite(s): NPB 100 or NPB 110B or NPB 110C or NPB 101; Or equivalents. Neurobiological basis for the effects and mechanisms of action of drugs with addictive potential, including opiates (morphine, heroin, methadone), amphetamines, cocaine, nicotine, marijuana (cannabinoids), alcohol, caffeine, and mind-altering drugs such as LSD and antidepressants. GE credit: SL, VL. Effective: 2018 Winter Quarter.

NPB 169—Frontiers in Neurobiology (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): NPB 100; NPB 101; NPB 102 (can be concurrent) Lectures by leading authorities and discussion of the latest research in newly emerging areas in neurobiology. Offered every fourth year. GE credit: QL. Effective: 2010 Fall Quarter.

NPB 171—Physiology of Neuroimmune Interactions (4)
Lecture—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): BIS 002A; (NPB 012 (can be concurrent) or NPB 100 (can be concurrent) or NPB 110B (can be concurrent)); or Consent of Instructor. Completion of PMI 126 or MMI 188 recommended prior to this course. Explores the complex interactions of the nervous and immune systems, and examine how the systems function together to serve homeostasis, behavior, and disease (such as Alzheimer's, autism, and multiple sclerosis). GE credit: SL. Effective: 2017 Fall Quarter.

NPB 172—Map Formation in the Brain (3)
Lecture—3 hours. Prerequisite(s): NPB 100 C- or better or NPB 110B C- or better; or equivalent basic neuroscience training with consent of instructor. Topographic map connection is a fundamental principle for establishing neural network in the brain. This course will provide comprehensive understanding of the current concepts of map formation in various sensory and motor nervous systems. GE credit: SE. Effective: 2017 Spring Quarter.

NPB 173—Neurobiology of Brain Disorders (3)
Lecture—3 hours. Prerequisite(s): NPB 110B or NPB 100; or Consent of Instructor. Examination of brain disorders from a basic science perspective to gain insights into the mechanisms of their action. Genetic, molecular, cellular, circuit, and environmental basis of a variety of brain disorders. How insights about underlying mechanisms may lead to the development of improved therapies. Effective: 2018 Spring Quarter.

NPB 190C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): NPB 199 (can be concurrent); and Consent of Instructor. Upper division standing in Neurobiology, Physiology, and Behavior or related biological science; NPB 199 required concurrently. Research findings and methods in neurobiology, physiology, and/or behavior. Presentation and discussion of research by faculty and students. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 1999 Spring Quarter.

NPB 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Work experience off and on campus in all subject areas offered in neurobiology, physiology, & behavior. May be repeated for credit. (P/NP grading only.) Effective: 2008 Fall Quarter.

NPB 194HA—Neurobiology, Physiology, and Behavior–Honors (1)
Laboratory—12 hours. Prerequisite(s): Senior standing; minimum 3.500 GPA in courses counted toward major; approval by the master advisor. Honors project in Neurobiology, Physiology, and Behavior. Laboratory research on a specific question. The project is developed with the sponsoring faculty member and approved by the student's Honors Thesis Committee. Honors thesis to be submitted upon completion of the project. (P/NP grading only.) Effective: 1997 Winter Quarter.

NPB 194HB—Neurobiology, Physiology and Behavior–Honors (4)
Laboratory—12 hours. Prerequisite(s): Senior standing; minimum 3.500 GPA in courses counted toward major; approval by the master advisor. Honors project in Neurobiology, Physiology, and Behavior. Laboratory research on a specific question. The project is developed with the sponsoring faculty member and approved by the student's Honors Thesis Committee. Honors thesis to be submitted upon completion of the project. (P/NP grading only.) Effective: 2003 Spring Quarter.

NPB 194HC—Neurobiology, Physiology, and Behavior–Honors (2)
Laboratory—12 hours. Prerequisite(s): Senior standing; minimum 3.500 GPA in courses counted toward major; approval by the master advisor. Honors project in Neurobiology, Physiology, and Behavior. Laboratory research on a specific question. The project is developed with the sponsoring faculty member and approved by the student's Honors Thesis Committee. Honors thesis to be submitted upon completion of the project. (P/NP grading only.) Effective: 1997 Winter Quarter.

NPB 197T—Tutoring in Neurobiology, Physiology, and Behavior (1-5)
Discussion—2-6 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Assisting the instructor by tutoring students in one of the Department's regular courses. May be repeated for credit. (P/NP grading only.) Effective: 2008 Fall Quarter.

NPB 198—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

NPB 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

NPB 211—Advanced Topics in Neuroimaging (3)
Laboratory—1 hour; Seminar—2 hours. Prerequisite(s): PSC 210; or Consent of Instructor. Restricted to 16 students. Critical presentation and discussion of the most influential advanced issues in neuroimaging, emphasizing fMRI design/analysis and the integration of fMRI with EEG/MEG. May be repeated for credit Course may be repeated when topics differ. (Neuroscience 211 and Psychology 211.) (S/U grading only.) Effective: 2017 Spring Quarter.

NPB 212—Light and Fluorescence Microscopy (3)
Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Restricted to maximum 16 students. Theory and practical application of light and fluorescence microscopy in the biological sciences. Laboratory component will focus on an optics bench, where we build simple compound and confocal microscopes on an optical rail. Effective: 2017 Spring Quarter.

NPB 217—Advanced Avian Physiology (1)
Project (Term Project)—1 hour. Prerequisite(s): NPB 117; and Consent of Instructor. Graduate standing; NPB 117 required concurrently. Study in depth of a topic in avian physiology through development of a lecture with associated instructional materials such as lesson plan, readings, presentation, and evaluation aids. Effective: 2009 Summer Session 1.

NPB 221—Cellular Neuroscience (4)
Discussion—1.5 hours; Lecture—3 hours. Advanced course on cellular and subcellular organization of the nervous system. Membrane channels, sensory transduction, synaptic transmission and cellular aspects of development and learning. Effective: 2015 Winter Quarter.

NPB 222—Systems Neuroscience (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Integrative and information-processing aspects of nervous system organization. Topics include sensory systems, motor function, sensorimotor integration, the limbic system, and the neurobiology of learning and memory. (Neuroscience 222.) Effective: 2002 Winter Quarter.

NPB 245—Computational Models of Cellular Signaling (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Computational and mathematical techniques in modeling of regulatory and signaling phenomena in neurobiology and cell physiology, focusing on linear and nonlinear ordinary differential equation models. Applications include ion channel kinetics, electrical activity, signal transduction, calcium oscillations, and simple neural circuits. Effective: 1997 Winter Quarter.

NPB 247—Topics in Functional Neurogenomics (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): Graduate standing or consent of instructor. The theory, methods and principles of functional neurogenomics with emphasis on the relationship to molecular mechanisms involved in development and disease of the nervous system. (Neuroscience 247.) Effective: 2003 Spring Quarter.

NPB 261A—Topics in Vision: Eyes and Retinal Mechanisms (2)
Lecture/Discussion—2 hours. Prerequisite(s): NPB 100 or NPB 112; Or the equivalent; graduate standing. Structure and function of the visual system, with emphasis on the eye and retina, including optics, anatomy, transduction, retinal synapses, adaptation, and parallel processing. (Neuroscience 261A and Molecular, Cellular, and Integrative Physiology 261A.) (S/U grading only.) Effective: 2004 Winter Quarter.

NPB 261B—Topics in Vision: Systems, Psychophysics, Computational Models (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. NPB 261A recommended. Functions of the central visual pathways and their underlying mechanisms. Recent research on aspects of anatomy, biochemistry, electrophysiology, psychophysics, development, and genetics of the visual system. (Neuroscience 261B and Molecular, Cellular, and Integrative Physiology 261B.) (S/U grading only.) Effective: 2004 Winter Quarter.

NPB 261C—Topics in Vision: Clinical Vision Science (2)
Lecture/Discussion—2 hours. Prerequisite(s): NPB 261A; NPB 261B; or Consent of Instructor. Causes and mechanistic bases of major blinding diseases. Recent research on aspects of anatomy, biochemistry, electrophysiology, psychophysics, development, and genetics of the visual system related to disease. (Neuroscience 261C and Molecular, Cellular, and integrative Physiology 261C.) (S/U grading only.) Effective: 2005 Spring Quarter.

NPB 263—Modeling in Systems Neuroscience (4)
Lecture—3 hours; Lecture/Lab—1 hour. Prerequisite(s): Consent of Instructor. Modeling as a tool in systems neuroscience. Mathematical techniques will be introduced and used to explore advanced topics in echolocation, sound localization, electroreception, communications, and motor systems. Other topics include transforms, modeling assumptions, scales and linearity. Effective: 1997 Winter Quarter.

NPB 267—Computational Neuroscience (5)
Lecture—4 hours; Lecture/Lab—3 hours. Prerequisite(s): One course in general Neuroscience at the level of NPB 100 or NPB 110B; one year college-level Calculus at the level of MAT 016A, MAT 016B, MAT 016C or higher; one year Physics at the level of PHY 007A, PHY 007B, PHY 007C recommended; or Consent of Instructor. Mathematical models and data analysis techniques used to describe computations performed by nervous systems. Lecture topics include single-neuron biophysics, neural coding, network dynamics, memory, plasticity, and learning. Lab topics include programming mathematical models and data analysis techniques in MATLAB. (Neuroscience 267.) Effective: 2018 Winter Quarter.

NPB 270—How to Write a Fundable Grant Proposal in the Biomedical Sciences (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Restricted to members of the Neuroscience and BMCDB graduate groups; graduate students in other biomedical programs may enroll with instructor permission. Teaches the do’s and don’ts of writing grants in the biomedical sciences and the mechanisms of the review process. May be repeated for credit. (Neuroscience 270.
) Effective: 2016 Spring Quarter.

NPB 285—Literature in Visual Neuroscience (2)
Seminar—2 hours. May be repeated for credit. (Neuroscience 285.) (S/U grading only.) Effective: 2008 Fall Quarter.

NPB 287A—Topics in Theoretical Neuroscience (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. In-depth exploration of topics in theoretical neuroscience. Topic varies each year. Fall quarter (287A): foundational material from books and review articles. Spring quarter (287B): continuation of year's topic through readings of seminal articles from the primary literature. May be repeated for credit. (Neuroscience 287A.) (S/U grading only.) Effective: 2017 Spring Quarter.

NPB 287B—Topics in Theoretical Neuroscience (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. In-depth exploration of topics in theoretical neuroscience. Topic varies each year. Fall quarter (287A): foundational material from books and review articles. Spring quarter (287B): continuation of year's topic through readings of seminal articles from the primary literature. May be repeated for credit. (Neuroscience 287B.) (S/U grading only.) Effective: 2009 Spring Quarter.

NPB 291—Auditory Neuroscience (1)
Discussion—0.5 hours; Seminar—0.5 hours. Prerequisite(s): NPB 100 or NPB 112 or NSC 222; Or the equivalent. Exploration of various important aspects of auditory physiology, behavior and psychophysics through review of original literature. New topic each quarter. May be repeated for credit with consent of instructor. May be repeated for credit. (S/U grading only.) Effective: 1998 Spring Quarter.

Neuroscience (Graduate Group)

Neuroscience (Graduate Group) | NSC Ph.D.

W. Martin Usrey, Ph.D., Chairperson of the Group

Group Office. 150 Center for Neuroscience; 530-757-8520; http://neuroscience.ucdavis.edu/grad

Faculty. http://neuroscience.ucdavis.edu/grad/people/faculty/index.html

Graduate Study. The Graduate Group in Neuroscience offers programs of study leading to the Ph.D. degree. Neuroscience is a broad, interdepartmental program with faculty interests ranging from molecular biophysics of channels to cortical organization and cognition. A major goal of the program is to prepare students for careers as research scientists. Details of the program may be obtained from the Group office.

The Master of Science degree is offered only en route to the Ph.D.

Graduate Advisors. E. Diaz (Pharmacology), W. M. Usrey (Neurobiology, Physiology, and Behavior), G. Gurkoff (Neurological Surgery), J. Geng (Psychology), H.J. Cheng (Neurobiology, Physiology, and Behavior; Pathology-Medicine)

Neuroscience (Graduate Group) | NSC Courses

Courses in NSC:

NSC 200LA—Laboratory Methods in Neurobiology (6)
Laboratory—18 hours. Prerequisite(s): Graduate standing in the Neuroscience Graduate Group. Individual research in the laboratory of a faculty member. Research problems emphasize the use of contemporary methods and good experimental design. May be repeated three times for credit. May be repeated up to 3 time(s). (S/U grading only.) Effective: 1997 Winter Quarter.

NSC 200LB—Laboratory Methods in Neurobiology (3)
Laboratory—9 hours. Prerequisite(s): Graduate standing in the Neuroscience Graduate Group. Individual research in the laboratory of a faculty member. Research problems emphasize the use of contemporary methods and good experimental design. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

NSC 201—Neuroanatomy (3)
Discussion/Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Mix of lectures, demonstrations, and dissections, emphasizing functional significance of neuroanatomy from a biological perspective, with comparisons between human and non-human brains. Emphasis placed on functional anatomy of the nervous system, integrated with cellular, molecular, cognitive, and developmental concepts. Effective: 2005 Fall Quarter.

NSC 211—Advaced Topics in Neuroimaging (3)
Laboratory—1 hour; Seminar—2 hours. Prerequisite(s): PSC 210; or Consent of Instructor. Restricted to 16 students. Critical presentation and discussion of the most influential advanced issues in neuroimaging, emphasizing fMRI design/analysis and the integration of fMRI with EEG/MEG. May be repeated for credit Course may be repeated when topics differ. (Neurobiology, Physiology, and Behavior 211 and Psychology 211.) (S/U grading only.) Effective: 2017 Spring Quarter.

NSC 220—How to Give a Scientific Seminar (3)
Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Presentation of effective seminars. Student presentations of selected neuroscience topics in seminar format. Must be taken in two consecutive quarters. May be repeated up to 1 time(s). Effective: 2002 Spring Quarter.

NSC 221—Cellular Neurophysiology (4)
Lecture—4.5 hours. Prerequisite(s): Graduate standing or consent of instructor. Physiological aspects of cellular and subcellular organization of the nervous system. Neuronal cell biology, the structure and function of ion channels, electrical excitability, signaling cascades, sensory transduction and, mechanisms of synaptic transmission, and the cellular basis of learning and memory. Effective: 2009 Fall Quarter.

NSC 222—Systems Neuroscience (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Integrative and information-processing aspects of nervous system organization. Topics include sensory systems, motor function, sensorimotor integration, the limbic system, and the neurobiology of learning and memory. (Neurobiology, Physiology, and Behavior 222.) Effective: 2006 Winter Quarter.

NSC 223—Cognitive Neuroscience (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Graduate student standing in Psychology or Neuroscience or consent of instructor. Graduate core course for neuroscience. Neurobiological bases of higher mental function including attention, memory, language. One of three in three-quarter sequence. (Psychology 261) Effective: 1997 Winter Quarter.

NSC 224A—Molecular and Developmental Neurobiology (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Key issues in developmental and molecular neurobiology. Discussion emphasis on critical evaluation of the experiments and methods described in research papers. Readings of seminal, primary research papers, reviews, and book chapters. Reading materials will be distributed one week in advance. Effective: 2006 Winter Quarter.

NSC 224B—Molecular and Developmental Neurobiology (2)
Lecture/Discussion—2 hours. Prerequisite(s): NSC 224A; or Consent of Instructor. Continuation of NSC 224A: Key issues in developmental and molecular neurobiology, focusing on developmental topics. Discussion emphasis on critical evaluation of experiments and methods described in associated literature. Effective: 2006 Spring Quarter.

NSC 225—Translational Research in the Neurobiology of Disease (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): NSC 221 (can be concurrent); NSC 222 (can be concurrent); NSC 223 (can be concurrent); or Consent of Instructor. Past or concurrent enrollment in all courses. Provides an overview of major neuropsychiatric and neurological disorders from both the clinical and fundamental science perspectives. Effective: 2008 Spring Quarter.

NSC 226—Molecular and Developmental Neurobiology (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Introduction to molecular and developmental neurobiology for graduate students. Topics will range from neurulation to development of sensory systems and will include modern molecular methods and their application in developmental neuroscience. Effective: 2003 Winter Quarter.

NSC 243—Topics in Cellular and Behavioral Neurobiology (2)
Discussion—1 hour; Seminar—1 hour. Prerequisite(s): Consent of Instructor. An advanced examination of several currrent problems in neurobiology. Topics will vary in different years; may be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

NSC 247—Topics in Functional Neurogenomics (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): Graduate standing or consent of instructor. The theory, methods and principles of functional neurogenomics with emphasis on the relationship to molecular mechanisms involved in development and disease of the nervous system. (Same Course as Neurobiology, Physiology, and Behavior 247.) Effective: 2003 Spring Quarter.

NSC 250—Biology of Neuroglia (2)
Lecture/Discussion—1.5 hours. Prerequisite(s): Consent of Instructor. The properties and functions of non-neuronal or neuroglial cells in the mammalian central nervous system with relevance to neuronal development, physiology and injury response. (S/U grading only.) Effective: 1997 Winter Quarter.

NSC 261A—Topics in Vision: Eyes and Retinal Mechanisms (2)
Lecture/Discussion—2 hours. Prerequisite(s): NPB 100 or NPB 112; Or the equivalent; graduate standing. Structure and function of the visual system, with emphasis on the eye and retina, including optics, anatomy, transduction, retinal synapses, adaptation, and parallel processing. (Neurobiology, Physiology, and Behavior 261A and Molecular, Cellular, and Integrative Physiology 261A.) (S/U grading only.) Effective: 2004 Winter Quarter.

NSC 261B—Topics in Vision: Systems, Psychophysics, Computational Models (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. NSC 261A recommended. Functions of the central visual pathways and their underlying mechanisms. Recent research on aspects of anatomy, biochemistry, electrophysiology, psychophysics, development, and genetics of the visual system. (Neurobiology, Physiology, and Behavior 261B and Molecular, Cellular, and Integrative Physiology 261B.) (S/U grading only.) Effective: 2004 Winter Quarter.

NSC 261C—Topics in Vision: Clinical Vision Science (2)
Lecture/Discussion—2 hours. Prerequisite(s): NSC 261A; NSC 261B; or Consent of Instructor. Causes and mechanistic bases of major blinding diseases. Recent research on aspects of anatomy, biochemistry, electrophysiology, psychophysics, development, and genetics of the visual system related to disease. (NPB 261C and MCP 261C) (S/U grading only.) Effective: 2005 Spring Quarter.

NSC 267—Computational Neuroscience (5)
Lecture—4 hours; Lecture/Lab—3 hours. Prerequisite(s): Consent of Instructor. One course in general Neuroscience at the level of NSC 100; or NPB 110B; one year college-level Calculus at level of MAT 016A, MAT 016B, MAT 016C or higher; one year Physics at the level of PHY 007A, PHY 007B, PHY 007C, recommended; or Consent of Instructor. Mathematical models and data analysis techniques used to describe computations performed by nervous systems. Lecture topics include single neuron biophysics, neural coding, network dynamics, memory, plasticity, and learning. Lab topics include programming mathematical models and data analysis techniques in MATLAB. (Neurobiology, Physiology & Behavior 267.) Effective: 2018 Winter Quarter.

NSC 270—How to Write a Fundable Grant Proposal in the Biomedical Sciences (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Restricted to members of the Neuroscience and BMCDB graduate groups; graduate students in other biomedical programs may enroll with instructor permission. Teaches the do's and don'ts of writing grants in the biomedical sciences and the mechanisms of the review process. May be repeated for credit. (Neurobiology, Physiology and Behavior 270.) Effective: 2016 Spring Quarter.

NSC 283—Neurobiological Literature (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Critical presentation and analysis of recent journal articles in neurobiology. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

NSC 284—Development of Sensory Systems (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Presentation and discussion of recent literature on the development of sensory systems. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1998 Winter Quarter.

NSC 285—Literature in Visual Neuroscience (2)
Seminar—2 hours. Critical presentation and discussion of current literature in visual neuroscience. May be repeated for credit when topic differs. (Neurobiology, Physiology, and Behavior 285.) (S/U grading only.) Effective: 2004 Spring Quarter.

NSC 287A—Topics in Theoretical Neuroscience (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. In-depth exploration of topics in theoretical neuroscience. Topic varies each year. Fall quarter (287A): foundational material from books and review articles. Spring quarter (287B): continuation of year's topic through readings of seminal articles from the primary literature. May be repeated for credit. (Neurobiology, Physiology & Behavior 287A.) (S/U grading only.) Effective: 2017 Spring Quarter.

NSC 287B—Topics in Theoretical Neuroscience (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. In-depth exploration of topics in theoretical neuroscience. Topic varies each year. Fall quarter (287A): foundational material from books and review articles. Spring quarter (287B): continuation of year's topic through readings of seminal articles from the primary literature. May be repeated for credit. (Neurobiology, Physiology & Behavior 287B) (S/U grading only.) Effective: 2009 Spring Quarter.

NSC 289—Topics in Molecular and Developmental Neurobiology (2)
Seminar—2 hours. Analysis and discussion of seminal and current research papers in molecular and developmental neurobiology. Different topics will be covered each quarter. In the past topics have included, "Synaptic vesicle dynamics," "Neuronal polarity," and "Glutamate receptors." May be repeated up to 10 time(s) when topic differs. (S/U grading only.) Effective: 2011 Spring Quarter.

NSC 290C—Research Conference in Neurobiology (1)
Discussion—1 hour. Prerequisite(s): NSC 299 (can be concurrent); Graduate standing in Neuroscience or consent of instructor; NSC 299 required concurrently. Presentation and discussion of faculty and graduate student research in neurobiology. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

NSC 292—Cortical Plasticity and Perception (2)
Lecture/Discussion—2 hours. Prerequisite(s): NPB 100 or NPB 112; Or equivalent or consent of instructor. Examination of research articles on cortical plasticity and changes in perception. Examples drawn from studies of the somatosensory, visual, auditory, and motor cortex. (S/U grading only.) Effective: 2000 Winter Quarter.

NSC 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

NSC 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

Neuroscience Minor; Neurobiology, Physiology, & Behavior

Neuroscience Minor; Neurobiology, Physiology, & Behavior | Neuroscience Minor

(College of Biological Sciences)

W. Martin Usrey, Ph.D., Chairperson of the Department

Department Office. 196 Briggs Hall; 530-752-0203; http://www.npb.ucdavis.edu

Faculty. http://basc.ucdavis.edu/

Master Advisor. Dr. Hwai-Jong Cheng, M.D., Ph.D., Dr. Lee Miller, Ph.D.

Advising Center. Biology Academic Success Center (BASC); 1023 Sciences Laboratory Building; 530-752-0410; http://basc.ucdavis.edu/

Neuroscience **Units:** 18

NPB 100	Neurobiology	4

Choose a minimum of 14 units from:

NPB 100L	Neurobiology Laboratory	3
NPB 107	Cell Signaling in Health and Disease	3
NPB 124	Comparative Neuroanatomy	3
NPB 126	Comparative Physiology: Sensory Systems	3
NPB 161	Developmental Neurobiology	3
NPB 162	Neural Mechanisms of Behavior	3
NPB 163	Systems Neuroscience	4

NPB 164	Mammalian Vision	4
NPB 165	Neurobiology of Speech Perception	3
NPB 166	Math Tools for Neuroscience	4
NPB 167	Computational Neuroscience	5
NPB 168	Neurobiology of Addictive Drugs	4
NPB 169	Frontiers in Neurobiology	3

One of the following may be completed to reach the unit requirement:

PSC 113	Developmental Psychobiology	4
PSC 121	Physiological Psychology	4
PSC 135	Cognitive Neuroscience: The Biological Foundations of the Mind	4
PSC 137	Neurobiology of Learning & Memory	4
LIN 175	Biological Basis of Language	4
PHI 103	Philosophy on Mind	4
HDE 163	Cognitive Neuropsychology in Adulthood and Aging	4

The following are cross-listed and either offering can be used to fulfill the course requirement:

NPB 124	Comparative Neuroanatomy	3
OR		
PSC 124	Comparative Neuroanatomy	3

Total: 18

Neuroscience Minor; Neurobiology, Physiology, & Behavior | NPB Courses

Courses in NPB:

NPB 010—Elementary Human Physiology (3)
Lecture—3 hours. Introduction to physiology for non-science majors. Includes basic cell physiology and survey of major organ systems and how they function in homeostasis and human health. Not open for credit to students who have completed NPB 101. GE credit: SE. Effective: 2016 Winter Quarter.

NPB 012—The Human Brain and Disease (3)
Lecture—3 hours. Normal function and diseases of the human brain and nervous system. Diseases discussed include Parkinson's, Alzheimer's, leprosy, amnesia and schizophrenia. Intended for non-science majors. Not open for credit for students who have completed NPB 100, NPB 101, NPB 112, or PSC 121. GE credit: SL. Effective: 1997 Spring Quarter.

NPB 014—Illusions: Fooling the Brain (3)
Lecture—3 hours. Introduction to perceptual processing in the human nervous system; illusions. GE credit: QL, SE, SL. Effective: 2012 Winter Quarter.

NPB 015—The Biology and Physiology of Aging (4)
Discussion—1 hour; Lecture—3 hours. Broad examination of age-associated changes in body functions. Includes basic cell physiology, a survey of major organ systems and the age-induced alterations in system function. Some age-associated diseases will also be examined. Intended for non-science majors. Not open for credit to students who have completed NPB 15V. GE credit: SE. Effective: 2012 Fall Quarter.

NPB 015V—The Biology and Physiology of Aging (4)
Web Electronic Discussion—1 hour; Web Virtual Lecture—3 hours. Broad examination of the biological and physiological basis of aging in animals and plants. Concepts in demographic, evolutionary, genetic, and cell aging. Major human organ systems, age-related alterations in system function, and age-related diseases. Intended for non-science majors. Not open for credit to students who have completed NPB 15. GE credit: SE, SL. Effective: 2012 Fall Quarter.

NPB 017—The Path to Cyborgs: Introduction to Prostheses and Human Machine Interfaces (3)
Lecture—3 hours. Interface of biology and technology. Mind-controlled prosthetic limbs, artificial organs, and implantable devices. Emphasis on basic physiological functions and how they can be replaced by devices. Suitable for majors and non-majors. GE credit: SE, SL. Effective: 2016 Winter Quarter.

NPB 018—Biological Science for Social Justice (3)
Lecture—3 hours. Broad survey of the many ways one can use the biological sciences to better the lives of others and break down barriers that have restricted social mobility. GE credit: DD, SE, SL, SS. Effective: 2018 Spring Quarter.

NPB 068—Biology of Drug Addiction and Abuse (3)
Lecture—3 hours. Broad examination of addictive substances and their use/abuse. Topics include historical perspective, physiological effects, etiology, neurobiology of addiction and the impact of drugs on contemporary society. Intended for non-science majors. Not open for credit to students having completed NPB 168. Effective: 2008 Spring Quarter.

NPB 090A—Lower Division Seminar: Issues in Body Weight Regulation (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Limited enrollment. Critical examination of issues in body weight regulation through shared readings, discussions, written assignments, debates and oral presentations. Limited enrollment. Effective: 2000 Winter Quarter.

NPB 090B—Human Color Perception (2)
Seminar—2 hours; Term Paper. Prerequisite(s): Lower division standing. Class size limited to 15 students with lower division standing. Neural determinants of color appearance, and why we see the world in the way we do. Discussions center around demonstrations of color phenomena and what they tell us about the human brain. Effective: 2008 Spring Quarter.

NPB 090C—Current Issues in Animal Behavior (2)
Seminar—2 hours. Prerequisite(s): Lower division standing. Limited enrollment. The mechanisms and outcomes of sexual selection (mate choice and mate competition). Theory, current models and evidence that supports or refutes the models. Effective: 2003 Winter Quarter.

NPB 090D—Lower Division Seminar: Current Issues in Reproductive Endocrinology (2)
Seminar—2 hours. Prerequisite(s): Lower division standing. The integrative roles of reproductive hormones in mammalian reproduction and health. Current theory and models regarding hormone function and use in reproductive health and contraception, and evidence that supports or refutes the models. Effective: 2002 Fall Quarter.

NPB 090E—Biology of Aging (2)
Seminar—2 hours. Prerequisite(s): Freshman standing. Current theories on the biology of aging covering genetic, biochemical, and physiological aspects. Emphasis on critical evaluation of controversial and contemporary issues. Effective: 2003 Fall Quarter.

NPB 090F—Visual Impairment and Blindness: A World Wide Problem (2)
Seminar—2 hours. Prerequisite(s): Lower division standing. Examination of various abnormalities of the eye and the important geographic and cultural factors that influence the epidemiology of those abnormalities. Effective: 2007 Winter Quarter.

NPB 091C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): NPB 099 (can be concurrent); and Consent of Instructor. Lower division standing in Neurobiology, Physiology and Behavior or related biological science; NPB 099 required concurrently. Restricted to lower division students. Research findings and methods in neurobiology, physiology, and/or behavior. Presentation and discussion of research by faculty and students. May be repeated for credit. (P/NP grading only.) Effective: 2003 Fall Quarter.

NPB 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Work experience off and on campus in all subject areas offered in the
Department of Neurobiology, Physiology, and Behavior. Internships supervised by a member of the faculty. May be repeated for credit. (P/NP grading only.) Effective: 2008 Fall Quarter.

NPB 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) Effective: 2000 Winter Quarter.

NPB 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) Effective: 1999 Winter Quarter.

NPB 100—Neurobiology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 002A; PHY 009A, PHY 009B or PHY 007A, PHY 007B recommended. Brains and nervous systems, neurons and neural circuits. Coordination of movement. Development of nervous systems. Vision, hearing, and feature extraction by the central nervous system. The cell biology of learning and memory. Perception, cognition, and disorders of the brain. Not open for credit to students who have completed NPB 110B, NPB 112, NPB 160, NPB 161 or NPB 162, or NSC 221 or NSC 222. GE credit: QL, SE. Effective: 2018 Spring Quarter.

NPB 100L—Neurobiology Laboratory (3)
Extensive Writing/Discussion; Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): NPB 100 (can be concurrent) or NPB 110B (can be concurrent) Experimental basis of neurobiology principles discussed in course 100. Topics include neurophysiology, sensory systems, motor systems, cellular neuroscience, cognitive neuroscience, and quantitative data analysis and modeling techniques. GE credit: SE. Effective: 2017 Winter Quarter.

NPB 100Q—Quantitative Foundations of Neurobiology (1)
Auto Tutorial—1.5 hours; Extensive Problem Solving—1.5 hours. Prerequisite(s): NPB 100 (can be concurrent) Computational methods and mathematical models used to study phenomena in neurobiology. GE credit: QL, VL. Effective: 2010 Spring Quarter.

NPB 101—Systemic Physiology (5)
Lecture—5 hours. Prerequisite(s): BIS 001A or BIS 002A; CHE 002B; PHY 001B or PHY 007C strongly recommended. Systemic physiology with emphasis on aspects of human physiology. Functions of major organ systems, with the structure of those systems described as a basis for understanding the functions. Not open for credit to students who have completed NSC 110C. GE credit: SE. Effective: 2017 Winter Quarter.

NPB 101D—Systemic Physiology Discussion (1.5)
Discussion—1.5 hours. Prerequisite(s): NPB 101 (can be concurrent); Consent of Instructor. Discussion and problem solving related to fundamental principles of systemic physiology as presented in course 101. (P/NP grading only.) Effective: 2017 Spring Quarter.

NPB 101L—Systemic Physiology Laboratory (3)
Discussion—2 hours; Laboratory—3 hours; Term Paper. Prerequisite(s): NPB 101 or NPB 110C Selected experiments to illustrate functional characteristics of organ systems discussed in course 101. Effective: 2017 Winter Quarter.

NPB 102—Animal Behavior (3)
Lecture—3 hours. Prerequisite(s): (BIS 001A, BIS 001B, BIS 001C) or (BIS 002A, BIS 002B, BIS 002C) Basic principles of behavioral organization in vertebrate and invertebrate animals. Underlying physiological and ethological mechanisms. The evolution of behavior, with special emphasis on behavior under natural conditions. Not open for credit to students who have completed NPB 155. (Former NPB 155.). GE credit: SL. Effective: 2008 Fall Quarter.

NPB 102Q—Quantitative Topics in Animal Behavior (1)
Auto Tutorial—1.5 hours; Extensive Problem Solving—1.5 hours. Prerequisite(s): MAT 016B; NPB 102 (can be concurrent) Study of the quantitative concepts and exemplar models used in animal behavior. Effective: 2009 Spring Quarter.

NPB 103—Cellular Physiology/Neurobiology (3)
Lecture—3 hours. Prerequisite(s): (BIS 103 or BIS 105); BIS 104; PHY 007C recommended. Cellular physiology with emphasis on membrane transport processes and neuronal physiology. Fundamental physical-chemical and biological mechanisms of membrane transport will be considered in relation to
cytoplasmic homeostasis, communication between cells,and the cellular mechanisms of sensory and motor transduction. Not open for credit to students who have completed NPB 100B. (Former NPB 100B.). Effective: 2008 Spring Quarter.

NPB 104L—Cellular Physiology/Neurobiology Laboratory (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—1 hour; Term Paper/Discussion. Prerequisite(s): NPB 101L; (BIS 103 or BIS 105) Experiments in the physical and chemical processes of cells and tissues. Effective: 2018 Winter Quarter.

NPB 105—Introduction to Computer Models (4)
Lecture—3 hours; Lecture/Lab—1 hour. Prerequisite(s): CHE 002C; PHY 007C; (NPB 100 or NPB 101); MAT 016C; Or the equivalent to MAT 016C. Introduction to the ideas, mathematical techniques and computer tools required for developing models of cellular processes in physiology and neurobiology. Applications include membrane transport, ionic channels, action potentials, Ca2+ oscillations, respiration, and muscle contraction. Effective: 1997 Winter Quarter.

NPB 106—Experiments in Neurobiology, Physiology, and Behavior: Design and Execution (3)
Discussion—0.5 hours; Laboratory—7.5 hours. Prerequisite(s): (NPB 110A or NPB 100 or NPB 101 or NPB 102); NPB 199; and Consent of Instructor. Design and execution of experiments in neurobiology, physiology, and/or behavior. Students choose and design a project in consultation with the sponsoring faculty member. May be repeated once for credit to complete the project, with consent of instructor. May be repeated up to 1 time(s). (P/NP grading only.) GE credit: OL, QL, VL, WE. Effective: 2018 Winter Quarter.

NPB 107—Cell Signaling in Health and Disease (3)
Lecture—3 hours. Prerequisite(s): BIS 102 or BIS 105 Basics of cell signaling pathways, their disruption in disease, and their current utility and future potential as therapeutic targets. Focus is on signaling pathways specific to nervous, endocrine and immune systems, and those fundamental to all cells. GE credit: SL. Effective: 2009 Winter Quarter.

NPB 108Y—Animal Behavior Laboratory (3)
Lecture—3 hours; Web Electronic Discussion—12 hours. Hybrid course, consisting of limited in-person lectures and the rest laboratory exercises. The laboratory exercises will be online, and will require students to view and score videos of animal behavior in order to test behavioral hypotheses. Effective: 2016 Summer Session 2.

NPB 109—Kinesiology—Analysis and Control of Human Movement (4)
Lecture—4 hours. Prerequisite(s): PHY 007A; PHY 007B; NPB 101 or NPB 110C recommended; CHA 101 and CHA 101L (same as EXB 106 and EXB 106L) or equivalent recommended. Functional anatomy, motor control, and biomechanics of human movement understood in the context of body structures, basic principles of physics, and functional characteristics of muscle. GE credit: SE. Effective: 2018 Spring Quarter.

NPB 110A—Foundations 1: From Molecules to Individuals (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): (BIS 002A, BIS 002B); (CHE 002B or CHE 003A); PHY 007A and PHY 007B recommended; BIS 002C recommended. Pass One restricted to majors in Neurobiology, Physiology and Behavior. Major concepts in cell biology with special emphasis on connections between cell biology and behavior. Includes: cellular metabolism, cellular sensing and signaling, membrane structure-function, molecular switches, electrical and chemical signaling, endocrine signaling, cell cycle and differentiation, cytoskeleton, and integrative examples. Credit limited to 3 units for students who have taken BIS 104. GE credit: SE. Effective: 2018 Winter Quarter.

NPB 110B—Foundations 2: Neurobiology (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): NPB 110A C- or better; PHY 007A and PHY 007B recommended. Open to declared NPB majors only. Core concepts of neurobiology including single-neuron biophysics, synapses and transmitters, neuronal development, motor systems, central pattern generation, neuronal circuits, intracellular signal transduction, sensory processing, multisensory integration, autonomic nervous system, neuromodulation, learning and memory, and higher cognition and disease. Credit limited to 2 units for students who have taken NPB 100. GE credit: SE. Effective: 2017 Winter Quarter.

NPB 110C—Foundations 3: Physiology (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): NPB 110A C- or better; PHY 007A; PHY 007B and PHY 007C recommended. Open to declared NPB majors only. Focuses on the structure, function, and interactions of animal organ systems in homeostasis and reproduction, and the response to perturbations of homeostasis; neural and endocrine signaling; skeletal muscle and movement; cardiovascular and respiratory systems; renal, digestive, immune, and reproductive physiology. Credit limited to 2 units for students who have taken NPB 101. GE credit: SE. Effective: 2018 Winter Quarter.

NPB 111L—Advanced Systemic Physiology Laboratory (4)
Discussion—2 hours; Laboratory—6 hours; Lecture—1 hour; Term Paper. Prerequisite(s): NPB 101L Selected comprehensive experiments in the autonomic nervous system and the cardiovascular, respiratory, and neuromuscular systems. Emphasis on conceptual and methodological approaches in demonstrating the physiology of organ systems. Effective: 2018 Winter Quarter.

NPB 113—Cardiovascular, Respiratory, and Renal Physiology (4)
Lecture—4 hours. Prerequisite(s): (NPB 110C or NPB 101); CHE 008B, PHY 007B and PHY 007C recommended. An intense and advanced presentation of concepts in cardiovascular, respiratory, and renal physiology including discussion of acid-base balance. Effective: 2018 Winter Quarter.

NPB 114—Gastrointestinal Physiology (3)
Lecture—3 hours. Prerequisite(s): (NPB 110C or NPB 101); BIS 105 or BIS 103 recommended, BIS 105 preferred. Gastrointestinal anatomy and physiology. Digestion, secretion, absorption, motility, comparative physiology and pathology. Strong emphasis on neural and hormonal regulation and on cellular mechanisms of secretion and absorption. Effective: 2018 Winter Quarter.

NPB 117—Avian Physiology (3)
Lecture—3 hours. Prerequisite(s): (BIS 002A, BIS 002B); CHE 002B; NPB 101 or NPB 110C strongly recommended. Physiology of the various systems of birds with emphasis on digestion, respiration, excretion, and endocrine systems. Effective: 2018 Spring Quarter.

NPB 121—Physiology of Reproduction (4)
Lecture/Discussion—4 hours. Prerequisite(s): NPB 101 or NPB 110C or ANS 100 Physiological mechanisms related to reproduction, breeding efficiency and fertility, with special reference to domestic animals. GE credit: QL, SL. Effective: 2018 Spring Quarter.

NPB 121L—Physiology of Reproduction Laboratory (1)
Laboratory—3 hours. Prerequisite(s): NPB 121 (can be concurrent) Experiments on the reproductive systems of domestic animals including male and female gametes. (P/NP grading only.) Effective: 2017 Spring Quarter.

NPB 122—Developmental Endocrinology (3)
Lecture—3 hours. Prerequisite(s): NPB 101 Restricted to upper division standing. Hormonal control of development, maturation and senescence from the cellular to organismal level, with emphasis on the human. Prenatal and neonatal life, childhood and adolescence, adulthood and pregnancy, as well as the endocrinology of aging. Effective: 2003 Spring Quarter.

NPB 123—Comparative Vertebrate Organology (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (BIS 001A, BIS 001B) or (BIS 002A, BIS 002B) Functional anatomy of major organ systems in vertebrates. Each system examined from cellular to gross level in fish, birds, and mammals. Emphasis on how differentiated cell types are integrated into tissues and organs to perform diverse physiological functions. (Anatomy, Physiology and cell Biology 100.) Effective: 2008 Winter Quarter.

NPB 124—Comparative Neuroanatomy (4) ***Review all entries***
Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): PSC 101 or NPB 100 or NPB 101 Overview of the neuroanatomy of the nervous system in a variety of mammalian and non-mammalian vertebrates. Examine changes or modifications to neural structures as a result of morphological or behavioral specializations. (Psychology 124) GE credit: SL. Effective: 1997 Fall Quarter.

NPB 124—Comparative Neuroanatomy (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): NPB 101 or NPB 100 or NPB 110B or PSC 121 Overview of the neuroanatomy in mammalian vertebrates, focusing on the cerebral cortex and experimental techniques. Examine changes or modifications to neural structures as a result of morphological or behavioral specializations. (PSC 124.) Effective: 2018 Fall Quarter.

NPB 124L—Comparative Neuroanatomy Laboratory (2)
Laboratory—6 hours. Prerequisite(s): NPB 124 (can be concurrent) Pass One restricted to PSC and NPB majors; must be concurrently enrolled in NPB 124. Comparative neuroanatomy laboratory illustrating modern neuroanatomical techniques in determining neural connections within the mammalian brain. Includes experimentation and presentation of results. (PSC 124L.) Effective: 2018 Fall Quarter.

NPB 126—Comparative Physiology: Sensory Systems (3)
Lecture—3 hours. Prerequisite(s): NPB 100 or NPB 101 Basic physiological mechanisms involved in sensory systems. Comparative approach to considerations of mechanosensitive systems (audition, lateral lines, touch, echolocation, equilibrium), chemosensitive systems (olfaction, taste, pheromones), photosensitive systems (vision, infrared detection, UV detection), electroreception, and pain. Emphasis on receptors. Effective: 1997 Winter Quarter.

NPB 128—Comparative Physiology: Endrocrinology (3)
Lecture—3 hours. Prerequisite(s): NPB 101 Comparison of physiological functions in the animal kingdom: animal hormones and their functions. Effective: 1997 Winter Quarter.

NPB 130—Physiology of the Endocrine Glands (4)
Lecture—4 hours. Prerequisite(s): NPB 110C or NPB 101 Advanced presentation of concepts in endocrinology with emphasis on the role of hormones in reproduction, metabolism, and disease. GE credit: VL. Effective: 2018 Winter Quarter.

NPB 132—Nature vs. Nurture: Physiological Interactions Among Genes, Nutrients and Health (3)
Lecture—3 hours. Prerequisite(s): BIS 001A or BIS 002A; or Consent of Instructor. Biochemical, physiological, genetic, and nutritional causes of important medical problems such as obesity, anorexia, heart disease and diabetes. One unit of credit allowed to students who have completed NPB 131. Effective: 2008 Fall Quarter.

NPB 134—General Immunology for Physiologists (3)
Lecture—2 hours; Lecture/Discussion—1 hour. Prerequisite(s): NPB 101 C- or better or NPB 110C C- or better; or Consent of Instructor. Immunology for undergrads interested in physiology aimed at understanding the physiological role of immune responses. Illustrated with examples of human diseases including diabetes, allergies and asthma, and emerging diseases such as Ebola and Zika. GE credit: SE. Effective: 2017 Fall Quarter.

NPB 139—Frontiers in Physiology (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): NPB 100; NPB 101; NPB 102 (can be concurrent) Lectures by leading authorities and discussion of the latest research in newly emerging areas in physiology. Offered every fourth year. GE credit: QL, SE. Effective: 2010 Fall Quarter.

NPB 140—Principles of Environmental Physiology (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): NPB 101; BIS 102 recommended. Physiological aspects of interactions of organisms and environmental,
cellular, system, and organismal levels. Emphasis on regulatory responses/mechanisms to thermal, pressure, gravity and light environmental variables. Not open for credit to students who have completed course 148. (Former course 148.). GE credit: WE. Effective: 1997 Winter Quarter.

NPB 140—Principles of Environmental Physiology (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): NPB 101 or NPB 110C; BIS 102 recommended. Physiological aspects of interactions of organisms and environmental, cellular, system, and organismal levels. Emphasis on regulatory responses/mechanisms to thermal, pressure, gravity and light environmental variables. Not open for credit to students who have completed NPB 148. (Former NPB 148.). GE credit: WE. Effective: 2018 Fall Quarter.

NPB 141—Physiological Adaptation of Marine Organisms (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Upper division standing; residence at Bodega Marine Laboratory required. Students must submit application available at http://www.bml.ucdavis.edu. Physiological adaptation to the environment among organisms in marine and estuarine habitats. GE credit: QL, VL, WE. Effective: 2006 Summer Session 1.

NPB 141P—Physiological Adaptation of Marine Organisms/Advanced Laboratory Topics (5)
Discussion—1 hour; Laboratory—12 hours. Prerequisite(s): NPB 141 (can be concurrent); Residence at Bodega Marine Laboratory required; NPB 141 required concurrently. Students must submit application available at http://www.bml.ucdavis.edu. Training in scientific research from hypothesis to publication, including methods of library research. Research related to a topic covered in course 141. GE credit: VL, WE. Effective: 2006 Spring Quarter.

NPB 142—Environmental Endocrinology: Mechanisms for Life Cycles (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B; BIS 002C Effects of environmental factors on endocrine responses that affect vertebrate life history and fitness. Introduction to finite state machine theory and allostasis in life histories and coping strategies. Focus on life history stages including non-breeding, hibernation, reproduction, migration and moult. GE credit: SE, WE. Effective: 2015 Winter Quarter.

NPB 150—Advanced Animal Behavior (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): NPB 102 or PSC 101; or Consent of Instructor. Advanced integrative survey of biological principles of behavioral organization, emphasizing historical roots, current research directions, conceptual issues and controversies. Laboratory exercises on the description and analysis of the behavior of captive and free-living animals. (Psychology 122) Effective: 2018 Winter Quarter.

NPB 152—Hormones and Behavior (3)
Lecture—3 hours. Prerequisite(s): (NPB 101 or NPB 110C); (NPB 102 or PSC 101) Endocrine physiology with an emphasis on the principles of behavior. Fundamental relationships between hormones and various behaviors engaged in by the organism during its lifetime. Role of hormones in behavioral homeostasis, social behavior, reproductive behavior, parental behavior, adaptation to stress. (Psychology 123) Effective: 2018 Winter Quarter.

NPB 157—Advanced Physiology of Animal/Human Disease (3)
Lecture—1 hour; Lecture/Discussion—2 hours. Prerequisite(s): NPB 101 B+ or better or NPB 110C B+ or better; Consent of Instructor. Limited to 35 students initially. Centers on fundamental mechanisms and pathophysiological basis for animal and human diseases. Course is case-based and uses animal and human diseases to help exemplify the physiological consequences of organ dysfunction. (HPH 157.
) Effective: 2017 Spring Quarter.

NPB 159—Frontiers in Behavior (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): NPB 100; NPB 101; NPB 102 Lectures by leading authorities and discussion of the latest research in newly emerging areas in behavioral biology. Offered every fourth year. GE credit: QL, SE. Effective: 2010 Fall Quarter.

NPB 161—Developmental Neurobiology (3)
Lecture—3 hours. Prerequisite(s): NPB 100 or NPB 101 or NPB 110B Issues, theoretical concepts, and methodologies in developmental neurobiology. Topics include prenatal and postnatal differentiation of neurons, and plasticity in the mature and aging brain. Integration of neurochemical, structural, physiological and behavioral perspectives. GE credit: SE. Effective: 2018 Winter Quarter.

NPB 162—Neural Mechanisms of Behavior (3)
Lecture—3 hours. Prerequisite(s): NPB 100 or NPB 101 or NPB 110B Relationship between brain and behavior. Identification and analysis of the relevant neural circuits involved. Examples of systems to be considered are birdsong, locomotion, echolocation. Effective: 2018 Winter Quarter.

NPB 163—Systems Neuroscience (4)
Lecture—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): NPB 100 or NPB 110B; Or equivalent basic neuroscience training with consent of instructor. Concepts and techniques in systems neuroscience: e.g., measuring and manipulating neural activity, structure of neocortex, sensory processing, motor control, storage of information, neural codes, neural mechanisms underlying cognitive functions. GE credit: SE. Effective: 2017 Spring Quarter.

NPB 164—Mammalian Vision (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): NPB 100 or NPB 110B or PSC 101 Structure and function of the mammalian visual system, from the formation of images on the retina through visually guided behavior and perception. Emphasis on biological mechanisms underlying vision. Effective: 2017 Spring Quarter.

NPB 165—Neurobiology of Speech Perception (3)
Lecture—3 hours. Prerequisite(s): NPB 110B or NPB 100 or NPB 101; or Consent of Instructor. Interdisciplinary approach to speech perception with emphasis on functional neuroanatomy and behavior. Topics include auditory processing in time and space, intelligibility in noisy environments, visual speech, evolution of vocal communication, models of speech perception, development, and hearing impairment. GE credit: SL. Effective: 2018 Winter Quarter.

NPB 166—Math Tools for Neuroscience (4)
Lecture—4 hours. Prerequisite(s): (NPB 100 or NPB 110B); (MAT 016A, MAT 016B, MAT 016C) or (MAT 017A, MAT 017B, MAT 017C) or (MAT 021A, MAT 021B, MAT 021C); or Consent of Instructor. Introduction to mathematics techniques used in neuroscience. Applications to neuroscience of differential equations, linear algebra, Fourier transforms, correlation and convolution, and probability theory. GE credit: QL. Effective: 2018 Winter Quarter.

NPB 167—Computational Neuroscience (5)
Lecture—4 hours; Lecture/Lab—3 hours. Prerequisite(s): (NPB 100 or NPB 110B); (MAT 016A, MAT 016B, MAT 016C) or (MAT 017A, MAT 017B, MAT 017C) or (MAT 021A, MAT 021B, MAT 021C); or Consent of Instructor. PHY 007A, PHY 007B or equivalent recommended. Mathematical models and data analysis techniques used to describe computations performed by nervous systems. Lecture topics include single neuron biophysics, neural coding, network dynamics, memory, plasticity, and learning. Lab topics include programming mathematical models and data analysis techniques in MATLAB. GE credit: QL, SE. Effective: 2018 Winter Quarter.

NPB 168—Neurobiology of Addictive Drugs (4)
Lecture/Discussion—4 hours. Prerequisite(s): NPB 100 or NPB 110B or NPB 110C or NPB 101; Or equivalents. Neurobiological basis for the effects and mechanisms of action of drugs with addictive potential, including opiates (morphine, heroin, methadone), amphetamines, cocaine, nicotine, marijuana (cannabinoids), alcohol, caffeine, and mind-altering drugs such as LSD and antidepressants. GE credit: SL, VL. Effective: 2018 Winter Quarter.

NPB 169—Frontiers in Neurobiology (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): NPB 100; NPB 101; NPB 102 (can be concurrent) Lectures by leading authorities and discussion of the latest research in newly emerging areas in neurobiology. Offered every fourth year. GE credit: QL. Effective: 2010 Fall Quarter.

NPB 171—Physiology of Neuroimmune Interactions (4)
Lecture—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): BIS 002A; (NPB 012 (can be concurrent) or NPB 100 (can be concurrent) or NPB 110B (can be concurrent)); or Consent of Instructor. Completion of PMI 126 or MMI 188 recommended prior to this course. Explores the complex interactions of the nervous and immune systems, and examine how the systems function together to serve homeostasis, behavior, and disease (such as Alzheimer's, autism, and multiple sclerosis). GE credit: SL. Effective: 2017 Fall Quarter.

NPB 172—Map Formation in the Brain (3)
Lecture—3 hours. Prerequisite(s): NPB 100 C- or better or NPB 110B C- or better; or equivalent basic neuroscience training with consent of instructor. Topographic map connection is a fundamental principle for establishing neural network in the brain. This course will provide comprehensive understanding of the current concepts of map formation in various sensory and motor nervous systems. GE credit: SE. Effective: 2017 Spring Quarter.

NPB 173—Neurobiology of Brain Disorders (3)
Lecture—3 hours. Prerequisite(s): NPB 110B or NPB 100; or Consent of Instructor. Examination of brain disorders from a basic science perspective to gain insights into the mechanisms of their action. Genetic, molecular, cellular, circuit, and environmental basis of a variety of brain disorders. How insights about underlying mechanisms may lead to the development of improved therapies. Effective: 2018 Spring Quarter.

NPB 190C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): NPB 199 (can be concurrent); and Consent of Instructor. Upper division standing in Neurobiology, Physiology, and Behavior or related biological science; NPB 199 required concurrently. Research findings and methods in neurobiology, physiology, and/or behavior. Presentation and discussion of research by faculty and students. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 1999 Spring Quarter.

NPB 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Work experience off and on campus in all subject areas offered in neurobiology, physiology, & behavior. May be repeated for credit. (P/NP grading only.) Effective: 2008 Fall Quarter.

NPB 194HA—Neurobiology, Physiology, and Behavior–Honors (1)
Laboratory—12 hours. Prerequisite(s): Senior standing; minimum 3.500 GPA in courses counted toward major; approval by the master advisor. Honors project in Neurobiology, Physiology, and Behavior. Laboratory research on a specific question. The project is developed with the sponsoring faculty member and approved by the student’s Honors Thesis Committee. Honors thesis to be submitted upon completion of the project. (P/NP grading only.) Effective: 1997 Winter Quarter.

NPB 194HB—Neurobiology, Physiology and Behavior–Honors (4)
Laboratory—12 hours. Prerequisite(s): Senior standing; minimum 3.500 GPA in courses counted toward major; approval by the master advisor. Honors project in Neurobiology, Physiology, and Behavior. Laboratory research on a specific question. The project is developed with the sponsoring faculty member and approved by the student’s Honors Thesis Committee. Honors thesis to be submitted upon completion of the project. (P/NP grading only.) Effective: 2003 Spring Quarter.

NPB 194HC—Neurobiology, Physiology, and Behavior–Honors (2)
Laboratory—12 hours. Prerequisite(s): Senior standing; minimum 3.500 GPA in courses counted toward major; approval by the master advisor. Honors project in Neurobiology, Physiology, and Behavior. Laboratory research on a specific question. The project is developed with the sponsoring faculty member and approved by the student's Honors Thesis Committee. Honors thesis to be submitted upon completion of the project. (P/NP grading only.) Effective: 1997 Winter Quarter.

NPB 197T—Tutoring in Neurobiology, Physiology, and Behavior (1-5)
Discussion—2-6 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Assisting the instructor by tutoring students in one of the Department's regular courses. May be repeated for credit. (P/NP grading only.) Effective: 2008 Fall Quarter.

NPB 198—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

NPB 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

NPB 211—Advanced Topics in Neuroimaging (3)
Laboratory—1 hour; Seminar—2 hours. Prerequisite(s): PSC 210; or Consent of Instructor. Restricted to 16 students. Critical presentation and discussion of the most influential advanced issues in neuroimaging, emphasizing fMRI design/analysis and the integration of fMRI with EEG/MEG. May be repeated for credit Course may be repeated when topics differ. (Neuroscience 211 and Psychology 211.) (S/U grading only.) Effective: 2017 Spring Quarter.

NPB 212—Light and Fluorescence Microscopy (3)
Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Restricted to maximum 16 students. Theory and practical application of light and fluorescence microscopy in the biological sciences. Laboratory component will focus on an optics bench, where we build simple compound and confocal microscopes on an optical rail. Effective: 2017 Spring Quarter.

NPB 217—Advanced Avian Physiology (1)
Project (Term Project)—1 hour. Prerequisite(s): NPB 117; and Consent of Instructor. Graduate standing; NPB 117 required concurrently. Study in depth of a topic in avian physiology through development of a lecture with associated instructional materials such as lesson plan, readings, presentation, and evaluation aids. Effective: 2009 Summer Session 1.

NPB 221—Cellular Neuroscience (4)
Discussion—1.5 hours; Lecture—3 hours. Advanced course on cellular and subcellular organization of the nervous system. Membrane channels, sensory transduction, synaptic transmission and cellular aspects of development and learning. Effective: 2015 Winter Quarter.

NPB 222—Systems Neuroscience (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Integrative and information-processing aspects of nervous system organization. Topics include sensory systems, motor function, sensorimotor integration, the limbic system, and the neurobiology of learning and memory. (Neuroscience 222.) Effective: 2002 Winter Quarter.

NPB 245—Computational Models of Cellular Signaling (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Computational and mathematical techniques in modeling of regulatory and signaling phenomena in neurobiology and cell physiology, focusing on linear and nonlinear ordinary differential equation models. Applications include ion channel kinetics, electrical activity, signal transduction, calcium oscillations, and simple neural circuits. Effective: 1997 Winter Quarter.

NPB 247—Topics in Functional Neurogenomics (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): Graduate standing or consent of instructor. The theory, methods and principles of functional neurogenomics with emphasis on the relationship to molecular mechanisms involved in development and disease of the nervous system. (Neuroscience 247.) Effective: 2003 Spring Quarter.

NPB 261A—Topics in Vision: Eyes and Retinal Mechanisms (2)
Lecture/Discussion—2 hours. Prerequisite(s): NPB 100 or NPB 112; Or the equivalent; graduate standing. Structure and function of the visual system, with emphasis on the eye and retina, including optics, anatomy, transduction, retinal synapses, adaptation, and parallel processing. (Neuroscience 261A and Molecular, Cellular, and Integrative Physiology 261A.) (S/U grading only.) Effective: 2004 Winter Quarter.

NPB 261B—Topics in Vision: Systems, Psychophysics, Computational Models (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. NPB 261A recommended. Functions of the central visual pathways and their underlying mechanisms. Recent research on aspects of anatomy, biochemistry, electrophysiology, psychophysics, development, and genetics of the visual system. (Neuroscience 261B and Molecular, Cellular, and Integrative Physiology 261B.) (S/U grading only.) Effective: 2004 Winter Quarter.

NPB 261C—Topics in Vision: Clinical Vision Science (2)
Lecture/Discussion—2 hours. Prerequisite(s): NPB 261A; NPB 261B; or Consent of Instructor. Causes and mechanistic bases of major blinding diseases. Recent research on aspects of anatomy, biochemistry, electrophysiology, psychophysics, development, and genetics of the visual system related to disease. (Neuroscience 261C and Molecular, Cellular, and integrative Physiology 261C.) (S/U grading only.) Effective: 2005 Spring Quarter.

NPB 263—Modeling in Systems Neuroscience (4)
Lecture—3 hours; Lecture/Lab—1 hour. Prerequisite(s): Consent of Instructor. Modeling as a tool in systems neuroscience. Mathematical techniques will be introduced and used to explore advanced topics in echolocation, sound localization, electroreception, communications, and motor systems. Other topics include transforms, modeling assumptions, scales and linearity. Effective: 1997 Winter Quarter.

NPB 267—Computational Neuroscience (5)
Lecture—4 hours; Lecture/Lab—3 hours. Prerequisite(s): One course in general Neuroscience at the level of NPB 100 or NPB 110B; one year college-level Calculus at the level of MAT 016A, MAT 016B, MAT 016C or higher; one year Physics at the level of PHY 007A, PHY 007B, PHY 007C recommended; or Consent of Instructor. Mathematical models and data analysis techniques used to describe computations performed by nervous systems. Lecture topics include single-neuron biophysics, neural coding, network dynamics, memory, plasticity, and learning. Lab topics include programming mathematical models and data analysis techniques in MATLAB. (Neuroscience 267.) Effective: 2018 Winter Quarter.

NPB 270—How to Write a Fundable Grant Proposal in the Biomedical Sciences (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Restricted to members of the Neuroscience and BMCDB graduate groups; graduate students in other biomedical programs may enroll with instructor permission. Teaches the do’s and don’ts of writing grants in the biomedical sciences and the mechanisms of the review process. May be repeated for credit. (Neuroscience 270.
) Effective: 2016 Spring Quarter.

NPB 285—Literature in Visual Neuroscience (2)
Seminar—2 hours. May be repeated for credit. (Neuroscience 285.) (S/U grading only.) Effective: 2008 Fall Quarter.

NPB 287A—Topics in Theoretical Neuroscience (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. In-depth exploration of topics in theoretical neuroscience. Topic varies each year. Fall quarter (287A): foundational material from books and review articles. Spring quarter (287B): continuation of year's topic through readings of seminal articles from the primary literature. May be repeated for credit. (Neuroscience 287A.) (S/U grading only.) Effective: 2017 Spring Quarter.

NPB 287B—Topics in Theoretical Neuroscience (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. In-depth exploration of topics in theoretical neuroscience. Topic varies each year. Fall quarter (287A): foundational material from books and review articles. Spring quarter (287B): continuation of year's topic through readings of seminal articles from the primary literature. May be repeated for credit. (Neuroscience 287B.) (S/U grading only.) Effective: 2009 Spring Quarter.

NPB 291—Auditory Neuroscience (1)
Discussion—0.5 hours; Seminar—0.5 hours. Prerequisite(s): NPB 100 or NPB 112 or NSC 222; Or the equivalent. Exploration of various important aspects of auditory physiology, behavior and psychophysics through review of original literature. New topic each quarter. May be repeated for credit with consent of instructor. May be repeated for credit. (S/U grading only.) Effective: 1998 Spring Quarter.

Nursing Science & Health-Care Leadership; Nursing

Nursing Science & Health-Care Leadership; Nursing | Nursing Science & Health-Care Leadership M.S.

Heather M. Young, Ph.D., R.N., F.A.A.N.; Associate Vice Chancellor for Nursing, UC Davis; Dean and Professor, Betty Irene Moore School of Nursing

Theresa A. Harvath, Ph.D., R.N., F.A.A.N.; Executive Associate Dean

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Mission Statement

The Betty Irene Moore School of Nursing at UC Davis cultivates academic excellence through immersive, interprofessional and interdisciplinary education and research in partnership with the communities serves. Faculty, staff and students discover and disseminate knowledge to advance health, improve quality of care and shape policy.

Nursing Science and Health-Care Leadership Graduate Degree Program

Hosted by the Betty Irene Moore School of Nursing at UC Davis, the Nursing Science and Health-Care Leadership Graduate Degree Programs prepare nurse leaders, physician assistants, nurse practitioners, researchers and faculty in a unique interdisciplinary and interprofessional environment. The full-time, academic, doctoral program prepares graduates as leaders in health care, health policy and nurse faculty/researchers at the university level. The master's degree Physician Assistant Studies program prepares graduates to deliver care as physician assistants. Graduates of the professional master's degree leadership program are prepared for health-care leadership roles in a variety of organizations and as nurse faculty at the community college and prelicensure education levels. Graduates of the master's degree Nurse Practitioner Program are prepared to deliver care as nurse practitioners.

Faculty

The UC Davis Nursing Science and Health-Care Leadership Graduate Group includes a wide cross-section of academic disciplines with faculty from the Betty Irene Moore School of Nursing as well as UC Davis Health System and other UC Davis schools, colleges, and departments. Within the graduate group faculty are experts in nursing, medicine, health informatics, nutrition, biostatistics, public health and other fields.

Ideal students for the Nursing Science and Health-Care Leadership Master of Science — Leadership Track are those with experience or interest in transforming health care through nursing education and research. They want to focus on important societal health issues through the work of advancing health and improving the systems that provide health services.

Graduates of this program are prepared for academic and leadership positions. Graduates exercise leadership through scientific thinking, responsibility, initiative, cultural inclusiveness, knowledge of organizations and system change, teamwork and a commitment to healthy communities.

The M.S.—Leadership Track program is a full-time, professional degree program that prepares graduates for health-care leadership roles in a variety of organizations and as nurse faculty at the community-college level. Some examples include:

- Leaders of health organizations and agencies—such as community clinics, trade associations, advocacy groups—improving quality of care and work environments, and advancing health outcomes and health-care effectiveness and efficiency
- Community college and other prelicensure nursing faculty—teaching the next generation of nurses
- Legislative and governmental agency staff and leadership developing, influencing and implementing policy to improve access and outcomes (not limited to health agencies but other organizations that provide public infrastructure such as transportation, planning or parks and recreation)
- Careers across the health-care sector, such as insurance, pharmaceutical, hospital, home health, aging support services, adoption services, chronic illness support services and medical equipment industries fostering the integration of excellence in clinical care, management, policy, education and research

Master of Science students take core courses plus electives and must complete a thesis. This is a five-quarter program. Core courses are offered fall, winter and spring quarters (not summer) on the UC Davis Sacramento campus. Students in the master's-degree leadership program should expect to be on campus at least two days a week. The majority of the program's core classes are conducted all-day Thursdays and Fridays. Students should expect that some quarters they need to be available on certain weekends and nights. Electives are offered on different days for all students and may be located on either the Sacramento or Davis campus.

A mandatory Leadership Immersion Week serves as an orientation for students. This full-time, three-day experience runs Wednesday through Friday the week before fall quarter begins. Throughout the week, students experience nursing leadership, team building and develop faculty relationships. The coursework provided that week serves as the foundation for the Nursing Science and Health-Care Leadership Graduate program curriculum.

Nursing Science & Health-Care Leadership; Nursing | Nursing Science & Health-Care Leadership Ph.D.

Heather M. Young, Ph.D., R.N., F.A.A.N.; Associate Vice Chancellor for Nursing, UC Davis; Dean and Professor, Betty Irene Moore School of Nursing

Theresa A. Harvath, Ph.D., R.N., F.A.A.N.; Executive Associate Dean

Elizabeth Rice, Ph.D., P.M.H.N.P.-B.C., R.N.; Associate Dean for Clinical Education and Practice, Director for the Master of Science—Family Nurse Practitioner Degree Program

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Mission Statement

The Betty Irene Moore School of Nursing at UC Davis cultivates academic excellence through immersive, interprofessional and interdisciplinary education and research in partnership with the communities serves. Faculty, staff and students discover and disseminate knowledge to advance health, improve quality of care and shape policy.

Nursing Science and Health-Care Leadership Graduate Degree Program

Hosted by the Betty Irene Moore School of Nursing at UC Davis, the Nursing Science and Health-Care Leadership Graduate Degree Programs prepare nurse leaders, physician assistants, nurse practitioners, researchers and faculty in a unique interdisciplinary and interprofessional environment. The full-time, academic, doctoral program prepares graduates as leaders in health care, health policy and nurse faculty/researchers at the university level. The master's degree Physician Assistant Studies program prepares graduates to deliver care as physician assistants. Graduates of the professional master's degree leadership program are prepared for health-care leadership roles in a variety of organizations and as nurse faculty at the community college and prelicensure education levels. Graduates of the master's degree Nurse Practitioner Program are prepared to deliver care as nurse practitioners.

Faculty

The UC Davis Nursing Science and Health-Care Leadership Graduate Group includes a wide cross-section of academic disciplines with faculty from the Betty Irene Moore School of Nursing as well as UC Davis Health System and other UC Davis schools, colleges, and departments. Within the graduate group faculty are experts in nursing, medicine, health informatics, nutrition, biostatistics, public health and other fields.

Nursing Science & Health-Care Leadership; Nursing | NRS Courses

Courses in NRS:

NRS 201—Health Status and Care Systems (4)
Discussion/Laboratory; Lecture/Discussion—3 hours; Project (Term Project). Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Comparative health status data, major current health issues globally, nationally, regionally. Theoretical perspectives on social, political, economic determinants of health. Health-care systems examined, linked to data, and evaluated in regards to outcomes. Aging, rural, ethnic minority populations highlighted. Effective: 2010 Fall Quarter.

NRS 202—Implementation Science (4)
Lecture/Discussion—4 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Change processes in health care from political, historic, economic and sociologic frameworks. Historic and current examples of transformative change in the health-care system. Skills for system transformation through health policy, practice, research and education are emphasized. Effective: 2010 Winter Quarter.

NRS 203—Leadership in Health Care (4)
Fieldwork; Lecture/Discussion—3 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Critical examination of leadership from a variety of theoretical and philosophical perspectives and focuses on specific challenges in health care and leadership at various levels, e.g., patient, organizational, and policy levels. Effective: 2010 Fall Quarter.

NRS 204—Research Skills for Nursing Science and Health-Care Leadership (4)
Discussion/Laboratory—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Foundation for analyzing research, health, and systems data to answer clinical, systems, or policy questions. Use and examine multiple sources of data and information as a basis for planned change and transformation in health care. Effective: 2014 Winter Quarter.

NRS 205—Research Design in Nursing and Health Care (4)
Lecture/Discussion—4 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Major types of quantitative and qualitative research design and their application to nursing and health-care research. Implications of choosing alternative research designs and critical analysis of philosophical underpinnings. Evaluation of control and validity, sampling, instruments to measure health concepts. Effective: 2010 Fall Quarter.

NRS 205A—Overview of Research in Nursing Science and Health Care (2)
Lecture—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Provides an overview of quantitative and qualitative paradigms in scientific inquiry and the major designs related to each paradigm. First of a three-course series on research design and methods in nursing science and healthcare research. Effective: 2015 Fall Quarter.

NRS 205B—Quantitative Research in Nursing Science and Health Care (4)
Lecture—4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Introduces principles of quantitative data collection and analysis as applied to major study designs in nursing and health-care research. Provides a basic foundation for producing, interpreting, and applying quantitative research findings to answer clinical, system, and policy questions. Effective: 2015 Fall Quarter.

NRS 205C—Qualitative Research in Nursing Science and Health Care (4)
Lecture—4 hours. Prerequisite(s): Consent of Instructor. Restricted to current Ph.D. students in NSHL program or consent of instructor. Introduces principles of qualitative data collection and analysis as applied to major study designs in nursing and health-care research. Provides a basic foundation for producing, interpreting, and applying qualitative research findings to answer clinical, system, and policy questions. Effective: 2015 Fall Quarter.

NRS 206—Community Connections (2-5)
Variable—6 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Open to NSHL MS students only. Community-based learning and experiences including community participation, assessment, data collection and analysis using multiple approaches, community health improvement projects, collaborative leadership practice, all with the guidance of community members and nursing faculty. May be repeated for credit. (S/U grading only.) Effective: 2010 Fall Quarter.

NRS 210Y—Applied Health Informatics (4)
Lecture/Discussion—1 hour; Web Virtual Lecture—3 hours. Prerequisite(s): Consent of Instructor. Open to current student in NSHL graduate programs or consent of instructor. Within the conceptual framework of the Foundation of Knowledge model, this course integrates nursing science, information science, computer science and cognitive science to acquire, process, generate and disseminate knowledge. Effective: 2014 Winter Quarter.

NRS 211Y—Rural Health (2-3)
Fieldwork—1 hour; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Interprofessional graduate course provides an introduction to rural health theory, research, policy, and practice, with an emphasis on rural health assets and disparities. Effective: 2015 Spring Quarter.

NRS 212—Technology & Innovations in Health Care (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Multidisciplinary approach to stimulate new thinking in the practice, process, and delivery of health care. Focus on improving overall health outcomes. Effective: 2017 Winter Quarter.

NRS 220—Social, Cultural, and Behavioral Determinants of Health (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Effects of globalization, political systems, local and global economies, culture, race, class, gender, and sexuality on population health. Effective: 2016 Summer Quarter.

NRS 221—Biophysical Concepts in Nursing (3)
Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Pathophysiological processes that contribute to different disease states across the lifespan; case studies; selective clinical decisions using current, reliable sources of pathophysiology information. Effective: 2016 Summer Quarter.

NRS 222A—Research Quality Improvement and Evidence Based Practice (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Introduction to providing safe, competent and compassionate care in a highly technical and digital environment. Emphasis on safety, quality and research to clinical practice. Accessing and analyzing reliable sources of evidence for integration in care-plan. Effective: 2016 Summer Quarter.

NRS 222B—Research Quality Improvement and Evidence Based Practice (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Introduction to providing safe, competent and compassionate care in a highly technical and digital environment. Emphasis on safety, quality and research to clinical practice. Accessing and analyzing reliable sources of evidence for integration in care-plan. Effective: 2016 Fall Quarter.

NRS 223—Quality and Safety Education in Health Care (2)
Lecture/Discussion—2 hours. Prerequisite(s): NRS 221; NRS 272; NRS 420; NRS 421; NRS 273; NRS 422; NRS 423; NRS 425; Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Implementing best practices alongside technological tools and focusing on continuous quality improvement. Emphasis on providing safe, competent care in a highly technical and digital environment. Building capacity to apply concepts related to safety, quality and research to clinical practice. Effective: 2017 Spring Quarter.

NRS 224—Developing Future Nurse Leaders (2)
Lecture/Discussion—2 hours. Prerequisite(s): NRS 221; NRS 272; NRS 420; NRS 421; NRS 273; NRS 422; NRS 423; NRS 425; NRS 223; NRS 426; Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Develop skills around effective decision making, fiscal and environmental stewardship, initiating and maintaining effective working relationships, using mutually respectful communication and collaboration, care coordination, delegation and supervision. Emphasis on conflict resolution, leadership and interprofessional teamwork. Effective: 2017 Summer Quarter.

NRS 225—Professional Nursing Role Formation (3)
Lecture/Discussion—3 hours. Prerequisite(s): NRS 220; NRS 221; NRS 222A; NRS 272; NRS 420; NRS 421; NRS 429A; NRS 222B; NRS 273; NRS 422; NRS 423; NRS 429B; NRS 203; NRS 212; NRS 425; NRS 429C; NRS 202; NRS 223; NRS 426; NRS 429D; NRS 224; NRS 424; NRS 427; NRS 429E; Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Transition from nursing student to professional nurse. Focus on ethical comportment, professional values of social justice, autonomy, advocacy, altruism, human dignity, and integrity. Students must pass a mastery exit examination and complete a capstone project. Effective: 2017 Fall Quarter.

NRS 242A—Implementation Science for Clinicians (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course focuses on identification of relevant research or improvement questions specific to patient care and evaluating the pertinent research literature related to the implementation of evidence based care. The course is 1st of a 3-course series. Effective: 2014 Summer Quarter.

NRS 242B—Implementation Science for Clinicians (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course is a continuation of course 242A, Implementation Science for Clinicians, with a focus on implementing and evaluating a change. Effective: 2014 Summer Quarter.

NRS 242C—Implementation Science for Clinicians (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Advanced skills in application of implementation science into systems based practice and incorporating quality improvement and patient safety knowledge with particular focus on prevention of medical errors. Effective: 2014 Spring Quarter.

NRS 243A—Leadership in Professional Practice (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course is a critical examination of leadership using theoretical and philosophical perspectives with an applied approach applicable to clinical practice. The 3 course series is conducted across three quarters in the 1st, 3rd and 8th quarters. Effective: 2013 Summer Quarter.

NRS 243B—Leadership in Professional Practice (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course introduces professional role topics including history of the profession, the role in interprofessional teams and the health care system, transitioning to the role from other health professions, scope of practice, certification and licensure and professional organizations. Effective: 2014 Winter Quarter.

NRS 243C—Leadership in Professional Practice (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course expands upon the leadership role as it relates to their clinical practice and professional role. Professional role topics including: transitioning from student to practicing professional, scope of practice, the physician relationship, and more advanced concepts in ethics. Effective: 2014 Spring Quarter.

NRS 250—Foundations of Primary Health Care (7)
Laboratory—3 hours; Lecture/Discussion—6 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course is designed to promote the understanding and clinical application of human anatomy, physiology, histology, immunology and pathology. Effective: 2013 Summer Quarter.

NRS 251A—Primary Health Care (8)
Lecture/Discussion—8 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course introduces primary health care concepts essential to the care of common medical problems seen in primary care settings. Module content will focus on various organ systems and specialty areas. Effective: 2013 Fall Quarter.

NRS 251B—Foundations of Primary Health Care (8)
Lecture/Discussion—8 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course introduces primary health care concepts essential to the care of common medical problems seen in primary care settings. Effective: 2014 Winter Quarter.

NRS 251C—Primary Heath Care (8)
Lecture/Discussion—8 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course introduces primary health care concepts essential to the care of common medical problems seen in primary care settings. Effective: 2014 Spring Quarter.

NRS 251D—Primary Heath Care (6)
Lecture/Discussion—6 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course introduces primary health care concepts essential to the care of common medical problems seen in primary care settings. Effective: 2014 Summer Quarter.

NRS 260—Foundations of Behavioral Health (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course focuses on the spectrum of normal psychological development over the lifespan for children, adults and elders. Theories of stress and coping mechanism are presented as a framework for the assessment of individuals. Effective: 2013 Summer Quarter.

NRS 270—Foundations of Pharmacology (2)
Laboratory—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course introduces the student to the major concepts in pharmacology and relevant human physiology related to pharmacotherapeutics and toxicology. Effective: 2013 Summer Quarter.

NRS 271A—Pharmacology (2)
Laboratory—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Systems based pharmacology focused on classes of drugs used to treat disorders in specialty systems. Effective: 2013 Fall Quarter.

NRS 271B—Pharmacology (2)
Laboratory—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Systems based pharmacology focused on classes of drugs used to treat disorders in specialty systems. Effective: 2013 Fall Quarter.

NRS 271C—Pharmacology (2)
Laboratory—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Systems based pharmacology focused on classes of drugs used to treat disorders in specialty systems. Effective: 2014 Spring Quarter.

NRS 272—Foundations of Pharmacology (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Theoretical background to providing safe and effective care related to drugs and natural products. Effective: 2016 Summer Quarter.

NRS 273—Pharmacology Concepts in Nursing (2)
Lecture/Discussion—2 hours. Prerequisite(s): NRS 221; NRS 272; NRS 420; NRS 421; Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Application of principles for safe and effective use of medications and natural products; use of current, reliable information to make clinical decisions. Effective: 2016 Fall Quarter.

NRS 290—Master's Seminar (2)
Discussion—2 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Open to NSHL MS students only or by consent of course instructor. Subject varies from quarter to quarter. Current knowledge and issues relevant to one of two fields of emphasis: population health or health systems. May be repeated up to 10 time(s). Effective: 2010 Fall Quarter.

NRS 291—Doctoral Seminar (2)
Discussion—2 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Focus on the theory, research and knowledge relevant to one of two fields of emphasis: population health or health systems. Emphasis placed on reading, critique and synthesis of classic and cutting-edge research in nursing and health care. May be repeated up to 10 time(s). Effective: 2010 Fall Quarter.

NRS 291D—Doctoral Seminar (2)
Discussion—2 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Focus on the theory, research and knowledge relevant to one of two fields of emphasis: population health or health systems. Emphasis placed on reading, critique and synthesis of classic and cutting-edge research in nursing and health care. May be repeated up to 10 time(s). (S/U grading only.) Effective: 2014 Winter Quarter.

NRS 298—Special Topics in Nursing Science and Health-Care Leadership (1-4)
Lecture/Discussion—1-2 hours; Variable—1-3 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. In-depth study of topics in Nursing Science and Health-Care Leadership, selected from: policy and politics in health care, health-care disparities, current issues in health care, approaches to the conduct of science, or other related areas, with year to year variation. May be repeated for credit. Effective: 2014 Spring Quarter.

NRS 298V—Online Special Topics in Nursing Science and Health-Care Leadership (1-4)
Web Electronic Discussion—1-4 hours; Web Virtual Lecture—1-4 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. In-depth study of topics in Nursing Science and Health-Care Leadership, selected from: policy and politics in health care, health-care disparities, current issues in health care, approaches to the conduct of science, or other related areas, with year to year variation. May be repeated for credit. Effective: 2014 Winter Quarter.

NRS 299—Research and Writing (1-12)
Extensive Writing/Discussion—3-36 hours. Prerequisite(s): Consent of Instructor. Students in the Nursing Science and Health-Care Leadership graduate programs conduct research and writing under the supervision of a faculty member. May be repeated for credit. (S/U grading only.) Effective: 2011 Winter Quarter.

NRS 299D—Dissertation Research and Writing (1-12)
Extensive Writing/Discussion—3-36 hours. Prerequisite(s): Consent of Instructor. Students in the Nursing Science and Health-Care Leadership graduate programs conduct dissertation research and writing under the supervision of a faculty member. May be repeated for credit. (S/U grading only.) Effective: 2011 Winter Quarter.

NRS 301—Learner Centered Teaching (3-4)
Lecture/Discussion—3 hours; Practice—1 hour. Prerequisite(s): Consent of Instructor. Open to current students in the Nursing Science and Health-care Leadership graduate programs; outside students with prior educational or work experience in education may register for this class with the consent of instructor. Students will explore best practices in learner-centered teaching, performance-based curriculum models, instructional design, and assessing/evaluating student learning. Students will have experience in planning learner-centered activities that are engaging and effective in achieving desired student performance. Effective: 2016 Spring Quarter.

NRS 302—Teaching Methods - Use of Emerging Technologies to Improve Student Learning (4)
Lecture/Discussion—3 hours; Practice—1 hour. Prerequisite(s): Consent of Instructor. Open to current students in the Nursing Science and Health-care Leadership graduate programs; outside students with prior educational or work experience in education may register for this class with the consent of instructor. Students will examine, design and develop instructional strategies that use innovative and emerging technologies to promote motivation, performance and learning in health professions education. Research findings associated with use of various emerging technologies will be examined. Effective: 2016 Fall Quarter.

NRS 303—Professional Role Formation (2-4)
Laboratory—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to current students in the Nursing Science and Health-care Leadership graduate programs; outside students with prior educational or work experience in education may register for this class with the consent of instructor. Exploration of the educator role. Topics include Role Expectations, Legal and Regulatory Issues, Professional Ethics, Educational Scholarship, Individual Differences, Learning Environments, and Lifelong Learning. Placements for the optional practicum are arranged in a wide variety of settings. Effective: 2017 Winter Quarter.

NRS 400—Basic Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Instruction and practice of the fundamental clinical skills necessary for patient care comprise this course with a primary focus on principles of effective communication in establishing the therapeutic provider-patient relationship. Effective: 2013 Summer Quarter.

NRS 401—Basic Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content. Effective: 2013 Fall Quarter.

NRS 410A—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content. Effective: 2014 Winter Quarter.

NRS 410B—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related specified systems. Effective: 2014 Spring Quarter.

NRS 410C—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related specified systems. Effective: 2014 Summer Quarter.

NRS 410D—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related to specified systems. Effective: 2013 Fall Quarter.

NRS 410E—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related to specified systems. Effective: 2013 Fall Quarter.

NRS 410F—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related to specified specialty systems. Effective: 2014 Spring Quarter.

NRS 410G—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related to specified specialty systems. Effective: 2015 Fall Quarter.

NRS 420—Foundations of Clinical Nursing Practice (3)
Clinical Activity—9 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Foundational course introduces students to core concepts of clinical nursing, including clinical reasoning, professional ethics, therapeutic communication and activities of daily living. Develop skills for the provision of safe, high quality, culturally-sensitive, person-centered care across the lifespan. Effective: 2016 Summer Quarter.

NRS 421—Health Assessment Across the Lifespan (3)
Clinical Activity—6 hours; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Prepares students to conduct a health history assessment using developmentally and culturally appropriate approaches for individuals across the lifespan. Acquire the knowledge, understanding, and skills needed to perform, interpret and communicate a health history. Effective: 2016 Summer Quarter.

NRS 422—Care of Adults with Chronic Conditions (6)
Clinical Activity—9 hours; Lecture/Discussion—3 hours. Prerequisite(s): NRS 221; NRS 272; NRS 420; NRS 421; Consent of Instructor. This course is open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Learn concepts central to the effective management of a variety of common chronic illness and disabling conditions across the lifespan in a variety of different settings. Practice conducting in-depth health assessments of individuals with chronic conditions. Effective: 2016 Fall Quarter.

NRS 423—Psychosocial Wellness & Illness (5)
Clinical Activity—6 hours; Lecture/Discussion—3 hours. Prerequisite(s): NRS 221; NRS 272; NRS 420; NRS 421; Consent of Instructor. This course is open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Explore the biological, psychological, cultural, societal, and environmental factors that affect psychological wellness and illness. Practice providing care to individuals and families experiencing disruptions in mental health secondary to physical or psychiatric illness, trauma or loss. Effective: 2016 Fall Quarter.

NRS 424—Nursing Care of Older Adults (3)
Clinical Activity—3 hours; Lecture/Discussion—2 hours. Prerequisite(s): NRS 221; NRS 272; NRS 420; NRS 421; NRS 273; NRS 422; NRS 423; NRS 425; NRS 223; NRS 426; Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Build skills for situations involving older adults, such as in the management of complex clinical and administering and interpreting standardized assessment tools. Develop plans of care for older adults experiencing a variety of geriatric syndromes. Effective: 2017 Summer Quarter.

NRS 425—Family Focused Nursing (9)
Clinical Activity—12 hours; Lecture/Discussion—5 hours. Prerequisite(s): NRS 221; NRS 272; NRS 420; NRS 421; NRS 273; NRS 422; NRS 423; Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Focuses on family as the unit of nursing and interprofessional care. Includes influences of family on health and illness, reproductive and gender/sexuality issues, pregnancy, birth and child-rearing, and the health and illness in children and youth. Effective: 2017 Winter Quarter.

NRS 426—Nursing Care of Adults with Complex Illness or Injury (8)
Clinical Activity—12 hours; Lecture/Discussion—4 hours. Prerequisite(s): NRS 221; NRS 272; NRS 420; NRS 421; NRS 273; NRS 422; NRS 423; NRS 425; Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Prepares students to provide comprehensive, patient-centered nursing care for patients with acute or complex illness and injury. Theory portion focuses on concepts associated with complex physiological alterations. Effective: 2017 Spring Quarter.

NRS 427—Fostering Healthy Communities (7)
Clinical Activity—9 hours; Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Focuses on populations & communities, and emphasizes working with diverse communities in providing health promotion, chronic disease management, transitional support and crisis intervention. Develop skills to critically analyze and shape health policy and develop accessible community resources. Effective: 2017 Summer Quarter.

NRS 428—Capstone Clinical Nursing Practicum (8)
Clinical Activity—24 hours. Prerequisite(s): NRS 220; NRS 221; NRS 222A; NRS 272; NRS 420; NRS 421; NRS 429A; NRS 222B; NRS 273; NRS 422; NRS 423; NRS 429B; NRS 203; NRS 212; NRS 425; NRS 429C; NRS 202; NRS 223; NRS 426; NRS 429D; NRS 224; NRS 424; NRS 427; NRS 429E; Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Practicum experience is designed to facilitate transition to professional practice. Opportunity to choose a clinical practice area of interest and to work with a preceptor with expertise in that area. Effective: 2017 Fall Quarter.

NRS 429A—Collaborative Practice A (1)
Clinical Activity—3 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Interprofessional course uses experiential learning activities including simulation, role play, and case studies. Concepts include but are not limited to; communication, person-centered care, ethical decision making, end-of-life decisions, culturally appropriate care, quality and safety, social justice, and professionalism. Effective: 2016 Summer Quarter.

NRS 429B—Collaborative Practice B (1)
Clinical Activity—3 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Interprofessional course uses experiential learning activities including simulation, role play, and case studies. Concepts include but are not limited to; communication, person-centered care, ethical decision making, end-of-life decisions, culturally appropriate care, quality and safety, social justice, and professionalism. Effective: 2016 Fall Quarter.

NRS 429C—Collaborative Practice C (1)
Clinical Activity—3 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Interprofessional course uses experiential learning activities including simulation, role play, and case studies. Concepts include but are not limited to; communication, person-centered care, ethical decision making, end-of-life decisions, culturally appropriate care, quality and safety, social justice, and professionalism. Effective: 2017 Winter Quarter.

NRS 429D—Collaborative Practice D (1)
Clinical Activity—3 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Interprofessional course uses experiential learning activities including simulation, role play, and case studies. Concepts include but are not limited to; communication, person-centered care, ethical decision making, end-of-life decisions, culturally appropriate care, quality and safety, social justice, and professionalism. Effective: 2017 Spring Quarter.

NRS 429E—Collaborative Practice E (1)
Clinical Activity—3 hours. Prerequisite(s): Consent of Instructor. This course is open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Interprofessional course uses experiential learning activities including simulation, role play, and case studies. Concepts include but are not limited to; communication, person-centered care, ethical decision making, end-of-life decisions, culturally appropriate care, quality and safety, social justice, and professionalism. Effective: 2017 Summer Quarter.

NRS 429F—Collaborative Practice F (1)
Clinical Activity—3 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Interprofessional course uses experiential learning activities including simulation, role play, and case studies. Concepts include but are not limited to; communication, person-centered care, ethical decision making, end-of-life decisions, culturally appropriate care, quality and safety, social justice, and professionalism. Effective: 2017 Fall Quarter.

NRS 440—Preparation for Clinical Practice (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Students are placed in clinical settings and/or clinical simulation laboratories to observe and practice the integration of clinical skills with direct supervision by faculty. Effective: 2016 Winter Quarter.

NRS 450A—Supervised Clinical Practice-Primary Health Care (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Each of the required primary care rotations is a four-week supervised clinical practice experience in primary care, under the supervision of an appropriate community-based primary care provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 450B—Supervised Clinical Practice-Primary Health Care (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Each of the required primary care rotations is a four-week supervised clinical practice experience in primary care, under the supervision of an appropriate community-based primary care provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 450C—Supervised Clinical Practice-Primary Health Care (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Each of the required primary care rotations is a four-week supervised clinical practice experience in primary care, under the supervision of an appropriate community-based primary care provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 450D—Supervised Clinical Practice-Primary Health Care (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Each of the required primary care rotations is a four-week supervised clinical practice experience in primary care, under the supervision of an appropriate community-based primary care provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 450E—Supervised Clinical Practice-Primary Health Care (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Each of the required primary care rotations is a four-week supervised clinical practice experience in primary care, under the supervision of an appropriate community-based primary care provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 451—Supervised Clinical Practice-Pediatrics (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical rotation under the supervision of an appropriate community-based Pediatric Medicine provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 452—Supervised Clinical Practice-Women's Health (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical rotation under the supervision of an appropriate community-based women’s health and prenatal care provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 453—Supervised Clinical Practice-Mental Health (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical rotation under the supervision of an appropriate community-based psychiatrist, psychiatric/mental health provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 454—Supervised Clinical Practice-Emergency Medicine (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical rotation under the supervision of an appropriate Emergency Medicine provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 455—Supervised Clinical Practice-Inpatient Surgery (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical experience under the supervision of an appropriate surgical provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 456—Supervised Clinical Practice-Inpatient Medicine (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical rotation under the supervision of an appropriate inpatient provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 459—Supervised Clinical Practice-Other Specialties (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Two four-week selective rotations are available to accommodate student interest and/or accommodate a student's clinical deficits identified by the program. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 470—Health Care Ethics (3-9)
Discussion/Laboratory—1 hour; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Guided independent study of issues in biomedical ethics, with discussion of readings that are based on student interests and needs. Participation in ethics rounds. (General Medicine 470.) (S/U grading only.) Effective: 2012 Spring Quarter.

NRS 471—Supervised Clinical Practice-Geriatrics (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical rotation under the supervision of an appropriate community-based Geriatric Medicine provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 475—Supervised Clinical Practice-Acute Care (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Two- to four-week rotation focus on providing acute care in inpatient settings. Students will work directly with specific inpatient units. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 480—Supervised Clinical Practice-Rural Health (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Rural health rotations focus on providing care in medically underserved rural sites. Students will experience care across the continuum in ambulatory, inpatient, and community based settings. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 490—Supervised Clinical Practice-Quality and Safety (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Clinical rotation that allow students to work directly with patient safety and quality improvement committees in various organizations. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 493A—Improving Quality in Health Care (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Open to Nursing Science and Health-Care Leadership Students. Working in interdisciplinary teams, will explore the theory and practical methods being employed to make improvement in health care systems while providing an opportunity for interprofessional educational experience. Effective: 2017 Fall Quarter.

NRS 493B—Improving Quality in Health Care (4)
Lecture/Discussion—4 hours. Prerequisite(s): NRS 493A; Consent of Instructor. Open to Nursing Science and Health-Care Leadership Students. Working in interdisciplinary teams, will explore advanced theory and practical methods being employed to make improvement in health care systems while providing an opportunity for interprofessional educational experience. Effective: 2018 Winter Quarter.

NRS 493C—Enhancing Patient Safety in Health Care (3)
Clinical Activity—1 hour; Discussion—1 hour; Seminar—1 hour. Prerequisite(s): Consent of Instructor. Nursing Science and Health-Care Leadership graduate students. Inter-professional module is designed to explore the theory and practical methods being employed to improve patient safety in health care while providing an opportunity for inter-professional educational experience. Effective: 2017 Spring Quarter.

Nutrition & Food Minor; Nutrition

Nutrition & Food Minor; Nutrition | Nutrition & Food Minor

(College of Agricultural and Environmental Sciences)

Francene M. Steinberg, Ph.D., RD., Chair of the Department

Sheri Zidenberg-Cherr, Ph.D., Vice Chairperson of the Department

Department Office. 3135 Meyer Hall; 530-752-4630; http://nutrition.ucdavis.edu

Faculty. http://nutrition.ucdavis.edu/people/faculty/index.html

The Department of Nutrition offers four minor programs open to students majoring in other disciplines who wish to complement their study programs with a concentration in the area of food and nutrition.

Graduate Study. Programs of study leading to the M.S. and Ph.D. degrees are available in Nutrition. For information on graduate study contact the Nutrition Graduate Group.

Minor Advisor. 3202 Meyer Hall; 530-752-2512

Nutrition and Food **Units:** 22

Preparation.
Plan in advance to include the required course prerequisites.

NUT 111AY	Introduction to Nutrition and Metabolism	3
NUT 111B	Recommendations and Standards for Human Nutrition	2
NUT 120AN	Nutritional Anthropology	4
OR		
NUT 120BN	Nutritional Geography	4
FST 100A	Food Chemistry	4
FST 100B	Food Properties	4
NPB 101	Systemic Physiology	5

Replacement courses:
Note: If the student's major program requires the same course in biochemistry and physiology, only one of the courses may duplicate credit toward the minor. Each program below lists replacement courses to fulfill the minimum unit requirement.

NUT 114	Developmental Nutrition	4
NUT 116A	Clinical Nutrition	3
NUT 116B	Clinical Nutrition	3
NUT 116AL	Clinical Nutrition Practicum	3
NUT 116BL	Clinical Nutrition Practicum	3

Total: 22

Nutrition & Food Minor; Nutrition | NUT Courses

Courses in NUT:

NUT 010—Discoveries and Concepts in Nutrition (3)
Lecture—3 hours; Project (Term Project). Nutrition as a science; historical development of nutrition concepts; properties of nutrients and foods. Not open for credit to students who have taken an upper division course in nutrition. No credit will be granted to students who have completed NUT 010Y or NUT 010V or an upper-division nutrition course. GE credit: SE, SL. Effective: 2018 Winter Quarter.

NUT 010V—Discoveries and Concepts in Nutrition (3)
Project (Term Project); Web Virtual Lecture—3 hours. Nutrition as a science; historical development of nutrition concepts; properties of nutrients and foods. Not open for credit to students who have taken an upper division course in nutrition. No credit will be granted to students who have completed NUT 010 or NUT 010Y or an upper-division nutrition course. GE credit: SE, SL. Effective: 2018 Winter Quarter.

NUT 010Y—Discoveries and Concepts in Nutrition (3)
Project (Term Project); Web Virtual Lecture—3 hours. Nutrition as a science; historical development of nutrition concepts; properties of nutrients and foods. Not open for credit to students who have taken an upper division course in nutrition. No credit will be granted to students who have completed NUT 010 or NUT 010V or an upper-division nutrition course. GE credit: SE, SL. Effective: 2018 Winter Quarter.

NUT 011—Current Topics and Controversies in Nutrition (2)
Discussion—1.5 hours; Term Paper. Exploration of current applications and controversies in nutrition. Students read scientific journal articles and write summaries, as well as give brief oral presentations. Topics change to reflect current interests and issues. GE credit: OL, SE, WE. Effective: 2010 Winter Quarter.

NUT 099—Individual Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

NUT 104—Environmental & Nutritional Factors in Cellular Regulation and Nutritional Toxicants (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 101; (BIS 103 or ABI 103) Cellular regulation from nutritional/toxicological perspective. Emphasis: role of biofactors on modulation of signal transduction pathways, role of specific organelles in organization/regulation of metabolic transformations, major cofactor functions, principles of pharmacology/toxicology important to understanding nutrient/toxicant metabolism. (Environmental Toxicology 104.) GE credit: OL, SE, SL. Effective: 2008 Fall Quarter.

NUT 105—Nutrition and Aging (3)
Lecture—3 hours. Prerequisite(s): (NUT 111AV or NUT 111AY); ABI 103; Or the equivalent course to ABI 103. Role of nutrition in the aging process from both an organismal/cell perspective, including demographics, theories of aging, nutrition and evolution, nutritional manipulation and life-span extension, and nutrition's impact on the diseases of aging. GE credit: SE. Effective: 2017 Spring Quarter.

NUT 111AY—Introduction to Nutrition and Metabolism (3)
Lecture/Discussion—1 hour; Web Virtual Lecture—2 hours. Prerequisite(s): CHE 008B; NPB 101; Or the equivalent of NPB 101. Restricted to upper division or graduate level students only. Introduction to metabolism of protein, fat and carbohydrate: the biological role of vitamins and minerals; nutrient requirements during the life cycle; assessment of dietary intake and nutritional status. Not open for credit to students who have completed NUT 101 or NUT 111AV. GE credit: SE. Effective: 2016 Fall Quarter.

NUT 111B—Recommendations and Standards for Human Nutrition (2)
Lecture—2 hours. Prerequisite(s): CHE 008B; NPB 101; (NUT 111AV or NUT 111AY); Or the equivalent of NPB 101. Critical analysis of the development of nutritional recommendations for humans. Topics include: history of modern recommendations, development of the Recommended Dietary Allowance (RDA) and other food guides; the Dietary Reference Intakes (DRI); administrative structure of regulatory agencies pertinent to nutrition recommendations; introduction to scientific methods used to determine the recommendations; food labeling laws; nutrition recommendations in other countries and cultures. Not open for credit to students who have completed NUT 111. Effective: 2017 Spring Quarter.

NUT 112—Nutritional Assessment (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ((ABI 102, ABI 103) or (BIS 102, BIS 103)); NUT 111AY; (STA 013 or STA 013Y or PLS 120) Restricted to upper division or graduate level Nutrition students only. Methods of human nutritional assessment, including dietary, anthropometric, biochemical methods. Principles of precision, accuracy, and interpretation of results for individuals and populations. GE credit: QL, SE. Effective: 2018 Spring Quarter.

NUT 113—Principles of Epidemiology in Nutrition (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): PLS 120; Or equivalent. Introduction to epidemiology as it relates to the field of nutrition, including study design, principles of epidemiologic inference, criteria for causality, and interpreting measures of disease risk. GE credit: QL, SE. Effective: 2014 Fall Quarter.

NUT 113—Principles of Epidemiology in Nutrition (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): STA 013 or STA 013Y or PLS 120 or STA 100 Introduction to epidemiology as it relates to the field of nutrition, including study design, principles of epidemiologic inference, criteria for causality, and interpreting measures of disease risk. GE credit: QL, SE. Effective: 2018 Fall Quarter.

NUT 114—Developmental Nutrition (4)
Lecture—4 hours. Prerequisite(s): ABI 102; ABI 103; (NUT 111AV or NUT 111AY); NUT 111B Role of nutritional factors in embryonic and postnatal development. GE credit: SE. Effective: 2017 Winter Quarter.

NUT 115—Animal Nutrition (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 008B or CHE 118B; or Consent of Instructor. Comparative differences among animals in digestion and metabolism of nutrients. Nutrient composition of feeds, digestive systems, digestion, absorption, feeding strategies. GE credit: OL, QL, SE, SL, VL, WE. Effective: 2017 Winter Quarter.

NUT 116A—Clinical Nutrition (3)
Lecture—3 hours. Prerequisite(s): (NUT 111AV or NUT 111AY); NUT 111B; NUT 112; NPB 101; Or the equivalent to NPB 101. Biochemical and physiological bases for therapeutic diets. Problems in planning diets for normal and pathological conditions. GE credit: SE. Effective: 2016 Fall Quarter.

NUT 116AL—Clinical Nutrition Practicum (3)
Discussion—1 hour; Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): NUT 116A (can be concurrent) Fundamental principles of planning and evaluating therapeutic diets and patient education for pathological conditions covered in 116A. GE credit: SE. Effective: 1997 Fall Quarter.

NUT 116B—Clinical Nutrition (3)
Lecture—3 hours. Prerequisite(s): (NUT 111AV or NUT 111AY); NUT 111B; NUT 112; NPB 101; Or the equivalent to NPB 101. Biochemical and physiological bases for therapeutic diets. Problems in planning diets for normal and pathological conditions. GE credit: SE. Effective: 2017 Winter Quarter.

NUT 116BL—Clinical Nutrition Practicum (3)
Discussion—1 hour; Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): NUT 116AL; NUT 116B (can be concurrent) Fundamental principles of planning and evaluating therapeutic diets and patient education for pathological conditions covered in 116B. Continuation of course 116AL. GE credit: SE. Effective: 2017 Winter Quarter.

NUT 117—Experimental Nutrition (6)
Extensive Writing; Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): (NUT 111AV or NUT 111AY); NUT 111B; NUT 112; BIS 102; BIS 103; MCB 120L or other laboratory course in biochemistry is recommended. Methods of assessing nutritional status. Application of chemical, microbiological, chromatographic and enzymatic techniques to current problems in nutrition. GE credit: SE, WE. Effective: 2016 Fall Quarter.

NUT 118—Community Nutrition (4)
Lecture—4 hours. Prerequisite(s): NUT 116A; (NUT 111AV or NUT 111AY); NUT 111B Nutrition problems in contemporary communities and of selected target groups in the United States and in developing countries. Nutrition programs and policy, principles of nutrition education. GE credit: SE, SL. Effective: 2017 Winter Quarter.

NUT 119A—International, community-based nutritional assessment. (1)
Lecture/Discussion—1 hour. Prerequisite(s): NUT 112 (can be concurrent); and Consent of Instructor. Issues and problems related to community-based nutritional assessment in a low-income country, major nutritional problems in low-income countries; ethical issues in human investigation; survey design, data collection techniques, and data analysis; preparation for international travel; cross-cultural communication, health, and safety while living abroad. Effective: 2002 Spring Quarter.

NUT 119B—International, Community-Based Nutritional Assessment (6)
Fieldwork—12 hours; Lecture—2 hours. Prerequisite(s): NUT 119A; and Consent of Instructor. Restricted to upper division students in Clinical Nutrition, Community Nutrition, Dietetics, and Nutrition Science. A six-week summer course in Peru. Implementation of a community-based nutritional assessment survey, including development of the survey instrument, selection. Effective: 2002 Summer Special Session.

NUT 120AN—Nutritional Anthropology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): NUT 010 and ANT 002 recommended. Nutritional anthropology from historical and contemporary perspectives; the anthropological approach to food and diet; field work methods; case histories that explore food patterns and their nutritional implications. GE credit: SE, SS. Effective: 2017 Spring Quarter.

NUT 120BN—Nutritional Geography (4)
Discussion—1 hour; Lecture—3 hours. Nutritional geography from historical and contemporary perspectives; the geographical approach to food and diet; cultural and environmental factors that influence dietary practices; food-related landscapes and patterns. GE credit: SE, SS. Effective: 2016 Fall Quarter.

NUT 122—Ruminant Nutrition and Digestive Physiology (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (ABI 103 or BIS 103); BIS 002A; BIS 002B; BIS 002C; (ANS 100 or NPB 101); or Consent of Instructor. MAT 016B recommended. Study of nutrient utilization as influenced by the unique aspects of digestion and fermentation in ruminants, both domestic and wild. Laboratories include comparative anatomy, feed evaluation, digestion kinetics using fistulated cows, computer modeling, and microbial exercises. GE credit: QL, SE. Effective: 2017 Spring Quarter.

NUT 123—Comparative Animal Nutrition (3)
Lecture—3 hours. Prerequisite(s): ABI 103 or BIS 103 Restricted to upper division and graduate level students. Comparative nutrition of animals; including laboratory, companion, zoo, and wild, animals. Digestion and metabolic adaptations required for animal species to consume diverse diets. Relation of nutrition to metabolic adaptations and physiological states, including growth, reproduction, and diseases. GE credit: SE. Effective: 2017 Spring Quarter.

NUT 123L—Comparative Animal Nutrition Laboratory (1)
Laboratory—3 hours. Prerequisite(s): ABI 103 or BIS 103 Laboratory exercises leading to written reports on establishment of nutritional requirements and formulation of complete diets for laboratory, companion, zoo and wild animals. Effective: 2017 Spring Quarter.

NUT 124—Nutrition and Feeding of Finfishes (3)
Lecture—3 hours. Prerequisite(s): BIS 103 or ABI 103 Principles of nutrition and feeding of fishes under commercial situations; implication of fish nutrition to the environment and conservation of endangered species. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

NUT 127—Environmental Stress and Development in Marine Organisms (10)
Discussion—2 hours; Laboratory—12 hours; Lecture—4 hours. Prerequisite(s): ETX 101 or BIS 102 or BIS 104; or equivalent course. ETX 114A or NUT 114 recommended. Course taught at Bodega Marine Laboratory. Effects of environmental and nutritional stress, including pollutants, on development and function in embryos and larvae of marine organisms. Emphasis on advanced experimental methods. (Environmental Toxicology 127.) GE credit: OL, QL, SE, SL, VL, WE. Effective: 2002 Summer Session 1.

NUT 129—Journalistic Practicum in Nutrition (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): (NUT 111AV or NUT 111AY); NUT 111B; or Consent of Instructor. A course in written or oral expression. Critical analysis and discussion of current, controversial issues in nutrition; use of journalistic techniques to interpret scientific findings for the lay public. Students required to write several articles for campus media. May be repeated up to 1 time(s). GE credit: OL, SE, SL, WE. Effective: 2017 Spring Quarter.

NUT 130—Experiments in Nutrition: Design and Execution (2)
Laboratory—6 hours. Prerequisite(s): Consent of Instructor. NUT 111AV, NUT 111AY, NUT 111B or NUT 114 recommended. Experiments in current nutritional problems. Experimental design:students choose project and, independently or in groups of two-three, design a protocol, complete the project, and report findings. May be repeated for credit up to six times(three times per instructor)with consent of instructor. May be repeated up to 6 time(s) three times per instructor with consent of instructor. GE credit: SE. Effective: 2016 Fall Quarter.

NUT 190—Proseminar in Nutrition (1)
Seminar—1 hour. Prerequisite(s): (NUT 111AV or NUT 111AY); NUT 111B Restricted to senior standing. Discussion of human nutrition problems. Each term will involve a different emphasis among experimental, clinical, and dietetic problems of community, national and international scope. May be repeated twice for credit with consent of instructor. May be repeated up to 2 time(s). GE credit: OL, SE, VL. Effective: 2016 Fall Quarter.

NUT 190C—Nutrition Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing in Nutrition or related biological science. Introduction to research findings and methods in nutrition. Presentation and discussion of research by faculty and students. May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

NUT 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. One upper division course in nutrition. Work experience on or off campus in practical application of nutrition, supervised by a faculty member. (P/NP grading only.) Effective: 1997 Winter Quarter.

NUT 197T—Tutoring in Nutrition (1-2)
Discussion/Laboratory—3-6 hours. Prerequisite(s): Consent of Instructor. Nutrition Science, Clinical Nutrition or related major. Tutoring of students in nutrition courses, assistance with discussion groups or laboratory sections, weekly conference with instructor in charge of course: written evaluations. May be repeated if tutoring a different course. May be repeated for credit. (P/NP grading only.) Effective: 2016 Fall Quarter.

NUT 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

NUT 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

NUT 219A—International Nutrition (3)
Lecture—3 hours. Prerequisite(s): NUT 111AV; NUT 111AY; Graduate Standing; undergraduates only admitted with consent of instructor. Epidemiology, etiology, and consequences of undernutrition, with particular focus on the nutritional problems of children and women in low income populations. Effective: 2018 Spring Quarter.

NUT 219B—International Nutrition (3)
Lecture—3 hours. Prerequisite(s): NUT 219A Intervention programs to prevent or ameliorate nutritional problems in low-income populations. Planning, implementing, and evaluating nutrition intervention programs. Effective: 2004 Fall Quarter.

NUT 230—Experiments in Nutrition: Design and Execution (2)
Laboratory—6 hours. Prerequisite(s): Consent of Instructor. NUT 201, NUT 202, NUT 203, NUT 204, or the equivalent recommended. Student selected projects to enhance laboratory skills. Independently, or in groups of two-three students, design a protocol, carry out the project, analyze the results and report the findings. May be repeated up to 6 time(s) with consent of instructor (limit of three times per instructor). Effective: 1999 Fall Quarter.

NUT 250—Metabolic Homeostasis (3)
Discussion—1.5 hours; Lecture—2 hours. Prerequisite(s): Passing the Nutrition Graduate Group Preliminary Examination or consent of instructor. Preference given to students in advanced standing in the Nutrition Graduate Group. Regulatory mechanisms of carbohydrate, lipid, and protein homeostasis; mechanisms of metabolic enzyme regulation and of the metabolic hormones; homeostatic mechanisms and interactions; fuel-fuel interactions; nutrition-energy balance. Effective: 2001 Spring Quarter.

NUT 251—Nutrition and Immunity (2)
Lecture/Discussion—2 hours. Prerequisite(s): PMI 126; ABI 102; MMI 107; Or the equivalent to MMI 107. Cellular and molecular mechanisms underlying interactions of nutrition and immune function, including modulation of immunocompetence by diet and effects of immune responses on nutritional needs. Lectures and discussion explore implications for resistance to infection, autoimmunity and cancer. Effective: 2000 Winter Quarter.

NUT 252—Nutrition and Development (3)
Lecture—3 hours. Prerequisite(s): NUB 210A, NUB 210B, and NUB 210C recommended. Relationship of nutrition to prenatal and early postnatal development. Effective: 2018 Spring Quarter.

NUT 253—Control of Energy Balance and Body Weight (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Comprehensive study of the biochemical, nutritional and physiological mechanisms controlling food intake, body composition and energy expenditure. Subject matter will be approached through lectures and discussions where students and staff will critically evaluate the literature. Effective: 2016 Spring Quarter.

NUT 254—Applications of Systems Analysis in Nutrition (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): NUT 202; Or the equivalent. Quantitative aspects of digestion and metabolism; principles of systems analysis. Evolution of models of energy metabolism as applied in current
feeding systems. Critical evaluations of mechanistic models used analytically in support of nutritional research. Effective: 1997 Winter Quarter.

NUT 258—Field Research Methods in International Nutrition (3)
Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Issues and problems related to implementation of nutrition field research in less-developed countries, including ethics; relationships with local governments, communities, and scientists; data collection techniques and quality assurance; field logistics; research budgets; and other administrative and personal issues. Effective: 1997 Winter Quarter.

NUT 259—Nutrition and Aging (2)
Lecture—2 hours. Prerequisite(s): NUT 201; NUT 202; NUT 203; NUT 204; Three courses. Interaction between nutrition and aging. Topics include physiological/biochemical basis of aging, age-related changes affecting
nutritional requirements, nutrition and mortality rate, assessment of nutritional status in the elderly, and relationship between developmental nutrition and the rate of aging. Effective: 1997 Fall Quarter.

NUT 270—Scientific Ethics in Biomedical Studies: Emphasis on Nutrition (3)
Discussion—1 hour; Lecture—1 hour; Term Paper. Restricted to graduate standing or consent of instructor. Scientific ethics in biomedical studies, especially nutrition. Discussion and case study presentations on scientific integrity, fraud, misconduct, conflict of interest, human and animal research protections. Not open for credit to students who have completed NUT 492B. Effective: 2003 Spring Quarter.

NUT 290—Beginning Nutrition Seminar (2)
Lecture/Discussion—1 hour; Seminar—1 hour. Prerequisite(s): First-year graduate standing. Discussion and critical evaluation of topics in nutrition with emphasis on literature review and evaluation in this field. Students give oral presentations on relevant topics. Effective: 1997 Fall Quarter.

NUT 290C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Major professors lead research discussions with their graduate students.
Research papers are reviewed and project proposals presented and evaluated. Format will combine seminar and discussion style. (S/U grading only.) Effective: 1997 Winter Quarter.

NUT 291—Advanced Nutrition Seminar (1)
Seminar—1 hour. Prerequisite(s): Second-year graduate standing. Advanced topics in nutrition research. Multiple sections may be taken concurrently for credit. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

NUT 293A—Current Topics in Obesity, Food Intake and Energy Balance (3)
Discussion—1 hour; Lecture—1 hour; Seminar—1 hour. Prerequisite(s): NUT 129; Or graduate standing; Undergraduates with upper division standing with at least one writing course may enroll with consent of instructor. Current research and its evaluation. Principles of experimental design and scientific background for given article. Articles summarized for
posting on Internet for use by healthcare professionals. May be repeated for credit with consent of instructor. May be repeated for credit. Effective: 1997 Fall Quarter.

NUT 293B—Current Topics in Obesity, Food Intake, and Energy Balance with Special Topics (3)
Discussion—1 hour; Lecture—1 hour; Seminar—1 hour. Prerequisite(s): NUT 129; Graduate standing. Undergraduates with upper division standing with at least one writing course may enroll with consent of instructor. A continuation of course 293A, with additional special topics. May be repeated for credit up to 3 times with consent of instructor. May be repeated up to 3 time(s). Effective: 1997 Fall Quarter.

NUT 294A—Current Topics in Developmental Nutrition (2)
Seminar—2 hours. Prerequisite(s): NUT 114 or NUT 252; or Consent of Instructor. Restricted to graduate standing or consent of instructor. Effects of nutrition on embryology, morphogenesis, and developmental mechanisms. May be repeated for credit when topic differs. Effective: 2004 Winter Quarter.

NUT 297T—Supervised Teaching in Nutrition (1-3)
Variable. Prerequisite(s): Graduate standing in nutrition or consent of instructor. Practical experience in teaching nutrition at the university level; curriculum design and evaluation; preparation and presentation of material. Assistance in laboratories, discussion sections, and evaluation of student work. (S/U grading only.) Effective: 1997 Winter Quarter.

NUT 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Effective: 1997 Winter Quarter.

NUT 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

NUT 492A—Professionalism: An Academic Perspective (2)
Lecture/Discussion—2 hours. Prerequisite(s): Graduate standing. For graduate students in their initial quarter of residence. Professionalism topics are presented and examples drawn from both the biological and social sciences. Effective: 1997 Fall Quarter.

NUT 492C—Grant Writing (3)
Discussion—1.5 hours; Lecture—1.5 hours. Prerequisite(s): Graduate standing in Nutrition or consent of instructor. Preparation of grants for governmental agencies (particularly NIH and USDA) and private foundations. Students will write a research grant or
fellowship application. May be repeated once for credit with consent of instructor. May be repeated up to 1 time(s). Effective: 1997 Fall Quarter.

Nutrition Science

Nutrition Science | Nutrition Science Information

(College of Agricultural and Environmental Sciences)

Faculty. http://nutrition.ucdavis.edu/people/faculty/

Nutrition Science | Nutrition Science B.S.

(College of Agricultural and Environmental Sciences)

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The Major Program

The study of nutrition encompasses all aspects of the consumption and utilization of food and its constituents. Key areas of study include: the biochemical reactions important to the utilization of nutrients and food constituents; the impact of diet on health and disease; and, nutrition-related policy and public health issues. The nutrition science major includes two options for studying these areas: nutritional biology and nutrition in public health.

The Program. Nutrition, as it is taught on the Davis campus, is a biological science and requires a complete background in chemistry and biology, along with calculus and physics (nutritional biology option) or economics (nutrition in public health option). These courses are generally completed during the first two years, and along with biochemistry, must be completed before most nutrition classes can be taken. During their junior and senior years, students in the nutritional biology option take additional course work in biochemistry, physiology, and toxicology. Students in the nutrition in public health option take additional course work in social and health-related sciences.

Career Alternatives. Both options are excellent preparation for professional or graduate training in medicine, public health, or other health sciences. The nutritional biology option also provides preparation for technical work in nutrition in the animal, food, and pharmaceutical industries. The nutrition in public health option prepares students for jobs in administrative, teaching, or public health/public service positions.

Dietetics Internship. To fulfill the academic requirements for an internship in Dietetics, students are strongly advised to declare the Clinical Nutrition major. Within the Nutrition in Public Health option, students should also take: ENL 003 or UWP 001 and CMN 001. The following courses must also be added (some of which may meet restricted elective requirements): ARE 112; NUT 116B, 116AL-BL; FSM 120, 120L, 122. Students intending to apply for admission to a dietetic internship

should contact the Advising Center no later than the first quarter of the junior year for information on procedures.

Graduate Study. The Department of Nutrition offers programs of study and research leading to the M.S. and Ph.D. degrees in Nutrition. For information on graduate study contact the graduate advisor. See Graduate Studies.

Major Advisor. Carl Keen

Advising Center for the major is located in 3202 Meyer Hall; 530-752-2512.

Preparatory Subject Matter **Units:** 63-66

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
BIS 002C	Introduction to Biology: Biodiversity and the Tree of Life	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 002C	General Chemistry	5
CHE 008A	Organic Chemistry: Brief Course	2
CHE 008B	Organic Chemistry: Brief Course	4
OR		
CHE 118A	Organic Chemistry for Health and Life Sciences	4
CHE 118B	Organic Chemistry for Health and Life Sciences	4
OR		
CHE 128A	Organic Chemistry	3
CHE 128B	Organic Chemistry	3
CHE 129A	Organic Chemistry Laboratory	2
NUT 010	Discoveries and Concepts in Nutrition	3
PLS 120	Applied Statistics in Agricultural Sciences	4
SOC 046A	Introduction to Social Research	4
OR		
PSC 041	Research Methods in Psychology	4

The remaining preparatory subject matter is based on which major option you choose.

Nutritional Biology Option:

ANT 002	Cultural Anthropology	5
OR		
PSC 001	General Psychology	4
OR		
SOC 001	Introduction to Sociology	5
OR		
SOC 003	Social Problems	4
MAT 016A	Short Calculus	3
MAT 016B	Short Calculus	3
PHY 001A	Principles of Physics	3
PHY 001B	Principles of Physics	3

Nutrition in Public Health Option:

ANT 002	Cultural Anthropology	5
OR		

SOC 001	Introduction to Sociology	5
OR		
SOC 003	Social Problems	4
ECN 001A	Principles of Microeconomics	4
ECN 001B	Principles of Macroeconomics	4
PSC 001	General Psychology	4

Depth Subject Matter **Units:** 77-82

BIS 101	Genes and Gene Expression	4
FST 100A	Food Chemistry	4
FST 100B	Food Properties	4
MIC 102	Introductory Microbiology	3
MIC 103L	Introductory Microbiology Laboratory	2
NPB 101	Systemic Physiology	5
NPB 101L	Systemic Physiology Laboratory	3
NUT 111AY	Introduction to Nutrition and Metabolism	3
NUT 111B	Recommendations and Standards for Human Nutrition	2
NUT 112	Nutritional Assessment	4
NUT 116A	Clinical Nutrition	3

The remaining depth subject matter is based on which major option you chose when completing your preparatory courses.

Nutritional Biology Option:

BIS 102	Structure and Function of Biomolecules	3
BIS 103	Bioenergetics and Metabolism	3
MCB 120L	Molecular Biology and Biochemistry Laboratory	3
NPB 114	Gastrointestinal Physiology	3
NUT 104	Environmental & Nutritional Factors in Cellular Regulation and Nutritional Toxicants	4
NUT 117	Experimental Nutrition	6

Nutrition Restricted Electives

Selection of courses must be made in consultation with a faculty advisor prior to or upon reaching the 120 unit level:

EXB 110	Exercise Metabolism	3
NUT 099	Individual Study for Undergraduates	1-5
NUT 105	Nutrition and Aging	3
NUT 113	Principles of Epidemiology in Nutrition	4
NUT 114	Developmental Nutrition	4
NUT 115	Animal Nutrition	4
NUT 116B	Clinical Nutrition	3
NUT 118	Community Nutrition	4
NUT 120AN	Nutritional Anthropology	4
NUT 120BN	Nutritional Geography	4
NUT 122	Ruminant Nutrition and Digestive Physiology	4
NUT 123	Comparative Animal Nutrition	3
NUT 124	Nutrition and Feeding of Finfishes	3
NUT 127	Environmental Stress and Development in Marine Organisms	10
NUT 130	Experiments in Nutrition: Design and Execution	2
NUT 190	Proseminar in Nutrition	1
NUT 192	Internship	1-12

NUT 199	Special Study for Advanced Undergraduates	1-5

Nutrition in Public Health Option:

ABI 102	Animal Biochemistry and Metabolism	5
ABI 103	Animal Biochemistry and Metabolism	5
EXB 110	Exercise Metabolism	3
NUT 118	Community Nutrition	4

Nutrition Restricted Electives
Selection of courses must be made in consultation with a faculty advisor prior to or upon reaching the 120 unit level:

FSM 120	Principles of Quantity Food Production	4
FSM 122	Food Service Systems Management	3
NUT 099	Individual Study for Undergraduates	1-5
NUT 104	Environmental & Nutritional Factors in Cellular Regulation and Nutritional Toxicants	4
NUT 105	Nutrition and Aging	3
NUT 113	Principles of Epidemiology in Nutrition	4
NUT 114	Developmental Nutrition	4
NUT 116B	Clinical Nutrition	3
NUT 117	Experimental Nutrition	6
NUT 120AN	Nutritional Anthropology	4
NUT 120BN	Nutritional Geography	4
NUT 129	Journalistic Practicum in Nutrition	3
NUT 130	Experiments in Nutrition: Design and Execution	2
NUT 190	Proseminar in Nutrition	1
NUT 192	Internship	1-12
NUT 199	Special Study for Advanced Undergraduates	1-5

Restricted Electives
Choose one of the following areas to complete the restricted elective units:

Agricultural and Health Policy:

ARE 015	Population, Environment and World Agriculture	4
ARE 120	Agricultural Policy	4
OR		
POL 109	Public Policy and the Governmental Process	4

Cultural Diversity & Community Change:

AAS 100	Survey of Ethnicity in the US	4
AMS 055	Food in American Culture	4
ARE 112	Fundamentals of Organization Management	4
CMN 136	Organizational Communication	4
CRD 002	Ethnicity and American Communities	4
CRD 152	Community Development	4
CRD 176	Comparative Ethnicity	4
IAD 010	Introduction to International Agricultural Development	4
IAD 103	Social Change and Agricultural Development	4
SAS 130	Contemporary Leadership	4

OR		
SOC 181	Social Change Organization	4

Community Health and Education:

CMN 165	Media and Health	4
EDU 110	Educational Psychology: General	4
EDU 120	Philosophical and Social Foundations of Education	4
EDU 153	Diversity in the K-12 Classroom	2
PSC 126	Health Psychology	4
PSC 130	Human Learning and Memory	4
OR		
SOC 154	Health and Illness	4

Natural and Applied Sciences:

CHI 140A	Quantitative Methods: Chicano/Latino Health Research	4
CRD 020	Food Systems	4
ETX 101	Principles of Environmental Toxicology	4
ETX 128	Food Toxicology	3
EXB 101	Exercise Physiology	4
EXB 102	Introduction to Motor Learning and the Psychology of Sport and Exercise	4
EXB 117	Exercise and Aging in Health and Disease	3
HDE 100A	Infancy and Early Childhood	4
HDE 100B	Middle Childhood and Adolescence	4
HDE 100C	Adulthood and Aging	4
NPB 132	Nature vs. Nurture: Physiological Interactions Among Genes, Nutrients and Health	3
PHI 015	Introduction to Bioethics	4
SAS 002	Feeding the Planet: Influences on the Global Food Supply	3
OR		
SAS 090F	Food Distribution in a Hungry World	2

Total: 140-148

Nutrition Science | Nutrition Science Minor

(College of Agricultural and Environmental Sciences)

Francene M. Steinberg, Ph.D., RD., Chair of the Department

Sheri Zidenberg-Cherr, Ph.D., Vice Chairperson of the Department

Department Office. 3135 Meyer Hall; 530-752-4630; http://nutrition.ucdavis.edu

Faculty. http://nutrition.ucdavis.edu/people/faculty/index.html

The Department of Nutrition offers four minor programs open to students majoring in other disciplines who wish to complement their study programs with a concentration in the area of food and nutrition.

Graduate Study. Programs of study leading to the M.S. and Ph.D. degrees are available in Nutrition. For information on graduate study contact the Nutrition Graduate Group.

Minor Advisor. 3202 Meyer Hall; 530-752-2512

Nutrition Science **Units:** 20

Preparation.
Plan in advance to include the required course prerequisites.

ABI 102	Animal Biochemistry and Metabolism	5
ABI 103	Animal Biochemistry and Metabolism	5
BIS 102	Structure and Function of Biomolecules	3
BIS 103	Bioenergetics and Metabolism	3
NUT 111AY	Introduction to Nutrition and Metabolism	3
NUT 111B	Recommendations and Standards for Human Nutrition	2
NPB 101	Systemic Physiology	5

Replacement courses:
Note: If the student's major program requires the same course in biochemistry and physiology, only one of the courses may duplicate credit toward the minor. Each program below lists replacement courses to fulfill the minimum unit requirement.

NUT 114	Developmental Nutrition	4
NUT 115	Animal Nutrition	4
NUT 116A	Clinical Nutrition	3
NUT 116B	Clinical Nutrition	3
NUT 117	Experimental Nutrition	6
NUT 120AN	Nutritional Anthropology	4
OR		
NUT 120BN	Nutritional Geography	4
NUT 122	Ruminant Nutrition and Digestive Physiology	4
NUT 123	Comparative Animal Nutrition	3
NUT 124	Nutrition and Feeding of Finfishes	3
NUT 201	Vitamin and Cofactor Metabolism (Discontinued)	3
NUT 204	Mineral Metabolism (Discontinued)	2

Total: 20

Nutrition Science | NUT Courses

Courses in NUT:

NUT 010—Discoveries and Concepts in Nutrition (3)
Lecture—3 hours; Project (Term Project). Nutrition as a science; historical development of nutrition concepts; properties of nutrients and foods. Not open for credit to students who have taken an upper division course in nutrition. No credit will be granted to students who have completed NUT 010Y or NUT 010V or an upper-division nutrition course. GE credit: SE, SL. Effective: 2018 Winter Quarter.

NUT 010V—Discoveries and Concepts in Nutrition (3)
Project (Term Project); Web Virtual Lecture—3 hours. Nutrition as a science; historical development of nutrition concepts; properties of nutrients and foods. Not open for credit to students who have taken an upper division course in nutrition. No credit will be granted to students who have completed NUT 010 or NUT 010Y or an upper-division nutrition course. GE credit: SE, SL. Effective: 2018 Winter Quarter.

NUT 010Y—Discoveries and Concepts in Nutrition (3)
Project (Term Project); Web Virtual Lecture—3 hours. Nutrition as a science; historical development of nutrition concepts; properties of nutrients and foods. Not open for credit to students who have taken an upper division course in nutrition. No credit will be granted to students who have completed NUT 010 or NUT 010V or an upper-division nutrition course. GE credit: SE, SL. Effective: 2018 Winter Quarter.

NUT 011—Current Topics and Controversies in Nutrition (2)
Discussion—1.5 hours; Term Paper. Exploration of current applications and controversies in nutrition. Students read scientific journal articles and write summaries, as well as give brief oral presentations. Topics change to reflect current interests and issues. GE credit: OL, SE, WE. Effective: 2010 Winter Quarter.

NUT 099—Individual Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

NUT 104—Environmental & Nutritional Factors in Cellular Regulation and Nutritional Toxicants (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 101; (BIS 103 or ABI 103) Cellular regulation from nutritional/toxicological perspective. Emphasis: role of biofactors on modulation of signal transduction pathways, role of specific organelles in organization/regulation of metabolic transformations, major cofactor functions, principles of pharmacology/toxicology important to understanding nutrient/toxicant metabolism. (Environmental Toxicology 104.) GE credit: OL, SE, SL. Effective: 2008 Fall Quarter.

NUT 105—Nutrition and Aging (3)
Lecture—3 hours. Prerequisite(s): (NUT 111AV or NUT 111AY); ABI 103; Or the equivalent course to ABI 103. Role of nutrition in the aging process from both an organismal/cell perspective, including demographics, theories of aging, nutrition and evolution, nutritional manipulation and life-span extension, and nutrition's impact on the diseases of aging. GE credit: SE. Effective: 2017 Spring Quarter.

NUT 111AY—Introduction to Nutrition and Metabolism (3)
Lecture/Discussion—1 hour; Web Virtual Lecture—2 hours. Prerequisite(s): CHE 008B; NPB 101; Or the equivalent of NPB 101. Restricted to upper division or graduate level students only. Introduction to metabolism of protein, fat and carbohydrate: the biological role of vitamins and minerals; nutrient requirements during the life cycle; assessment of dietary intake and nutritional status. Not open for credit to students who have completed NUT 101 or NUT 111AV. GE credit: SE. Effective: 2016 Fall Quarter.

NUT 111B—Recommendations and Standards for Human Nutrition (2)
Lecture—2 hours. Prerequisite(s): CHE 008B; NPB 101; (NUT 111AV or NUT 111AY); Or the equivalent of NPB 101. Critical analysis of the development of nutritional recommendations for humans. Topics include: history of modern recommendations, development of the Recommended Dietary Allowance (RDA) and other food guides; the Dietary Reference Intakes (DRI); administrative structure of regulatory agencies pertinent to nutrition recommendations; introduction to scientific methods used to determine the recommendations; food labeling laws; nutrition recommendations in other countries and cultures. Not open for credit to students who have completed NUT 111. Effective: 2017 Spring Quarter.

NUT 112—Nutritional Assessment (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ((ABI 102, ABI 103) or (BIS 102, BIS 103)); NUT 111AY; (STA 013 or STA 013Y or PLS 120) Restricted to upper division or graduate level Nutrition students only. Methods of human nutritional assessment, including dietary, anthropometric, biochemical methods. Principles of precision, accuracy, and interpretation of results for individuals and populations. GE credit: QL, SE. Effective: 2018 Spring Quarter.

NUT 113—Principles of Epidemiology in Nutrition (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): PLS 120; Or equivalent. Introduction to epidemiology as it relates to the field of nutrition, including study design, principles of epidemiologic inference, criteria for causality, and interpreting measures of disease risk. GE credit: QL, SE. Effective: 2014 Fall Quarter.

NUT 113—Principles of Epidemiology in Nutrition (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): STA 013 or STA 013Y or PLS 120 or STA 100 Introduction to epidemiology as it relates to the field of nutrition, including study design, principles of epidemiologic inference, criteria for causality, and interpreting measures of disease risk. GE credit: QL, SE. Effective: 2018 Fall Quarter.

NUT 114—Developmental Nutrition (4)
Lecture—4 hours. Prerequisite(s): ABI 102; ABI 103; (NUT 111AV or NUT 111AY); NUT 111B Role of nutritional factors in embryonic and postnatal development. GE credit: SE. Effective: 2017 Winter Quarter.

NUT 115—Animal Nutrition (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 008B or CHE 118B; or Consent of Instructor. Comparative differences among animals in digestion and metabolism of nutrients. Nutrient composition of feeds, digestive systems, digestion, absorption, feeding strategies. GE credit: OL, QL, SE, SL, VL, WE. Effective: 2017 Winter Quarter.

NUT 116A—Clinical Nutrition (3)
Lecture—3 hours. Prerequisite(s): (NUT 111AV or NUT 111AY); NUT 111B; NUT 112; NPB 101; Or the equivalent to NPB 101. Biochemical and physiological bases for therapeutic diets. Problems in planning diets for normal and pathological conditions. GE credit: SE. Effective: 2016 Fall Quarter.

NUT 116AL—Clinical Nutrition Practicum (3)
Discussion—1 hour; Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): NUT 116A (can be concurrent) Fundamental principles of planning and evaluating therapeutic diets and patient education for pathological conditions covered in 116A. GE credit: SE. Effective: 1997 Fall Quarter.

NUT 116B—Clinical Nutrition (3)
Lecture—3 hours. Prerequisite(s): (NUT 111AV or NUT 111AY); NUT 111B; NUT 112; NPB 101; Or the equivalent to NPB 101. Biochemical and physiological bases for therapeutic diets. Problems in planning diets for normal and pathological conditions. GE credit: SE. Effective: 2017 Winter Quarter.

NUT 116BL—Clinical Nutrition Practicum (3)
Discussion—1 hour; Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): NUT 116AL; NUT 116B (can be concurrent) Fundamental principles of planning and evaluating therapeutic diets and patient education for pathological conditions covered in 116B. Continuation of course 116AL. GE credit: SE. Effective: 2017 Winter Quarter.

NUT 117—Experimental Nutrition (6)
Extensive Writing; Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): (NUT 111AV or NUT 111AY); NUT 111B; NUT 112; BIS 102; BIS 103; MCB 120L or other laboratory course in biochemistry is recommended. Methods of assessing nutritional status. Application of chemical, microbiological, chromatographic and enzymatic techniques to current problems in nutrition. GE credit: SE, WE. Effective: 2016 Fall Quarter.

NUT 118—Community Nutrition (4)
Lecture—4 hours. Prerequisite(s): NUT 116A; (NUT 111AV or NUT 111AY); NUT 111B Nutrition problems in contemporary communities and of selected target groups in the United States and in developing countries. Nutrition programs and policy, principles of nutrition education. GE credit: SE, SL. Effective: 2017 Winter Quarter.

NUT 119A—International, community-based nutritional assessment. (1)
Lecture/Discussion—1 hour. Prerequisite(s): NUT 112 (can be concurrent); and Consent of Instructor. Issues and problems related to community-based nutritional assessment in a low-income country, major nutritional problems in low-income countries; ethical issues in human investigation; survey design, data collection techniques, and data analysis; preparation for international travel; cross-cultural communication, health, and safety while living abroad. Effective: 2002 Spring Quarter.

NUT 119B—International, Community-Based Nutritional Assessment (6)
Fieldwork—12 hours; Lecture—2 hours. Prerequisite(s): NUT 119A; and Consent of Instructor. Restricted to upper division students in Clinical Nutrition, Community Nutrition, Dietetics, and Nutrition Science. A six-week summer course in Peru. Implementation of a community-based nutritional assessment survey, including development of the survey instrument, selection. Effective: 2002 Summer Special Session.

NUT 120AN—Nutritional Anthropology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): NUT 010 and ANT 002 recommended. Nutritional anthropology from historical and contemporary perspectives; the anthropological approach to food and diet; field work methods; case histories that explore food patterns and their nutritional implications. GE credit: SE, SS. Effective: 2017 Spring Quarter.

NUT 120BN—Nutritional Geography (4)
Discussion—1 hour; Lecture—3 hours. Nutritional geography from historical and contemporary perspectives; the geographical approach to food and diet; cultural and environmental factors that influence dietary practices; food-related landscapes and patterns. GE credit: SE, SS. Effective: 2016 Fall Quarter.

NUT 122—Ruminant Nutrition and Digestive Physiology (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (ABI 103 or BIS 103); BIS 002A; BIS 002B; BIS 002C; (ANS 100 or NPB 101); or Consent of Instructor. MAT 016B recommended. Study of nutrient utilization as influenced by the unique aspects of digestion and fermentation in ruminants, both domestic and wild. Laboratories include comparative anatomy, feed evaluation, digestion kinetics using fistulated cows, computer modeling, and microbial exercises. GE credit: QL, SE. Effective: 2017 Spring Quarter.

NUT 123—Comparative Animal Nutrition (3)
Lecture—3 hours. Prerequisite(s): ABI 103 or BIS 103 Restricted to upper division and graduate level students. Comparative nutrition of animals; including laboratory, companion, zoo, and wild, animals. Digestion and metabolic adaptations required for animal species to consume diverse diets. Relation of nutrition to metabolic adaptations and physiological states, including growth, reproduction, and diseases. GE credit: SE. Effective: 2017 Spring Quarter.

NUT 123L—Comparative Animal Nutrition Laboratory (1)
Laboratory—3 hours. Prerequisite(s): ABI 103 or BIS 103 Laboratory exercises leading to written reports on establishment of nutritional requirements and formulation of complete diets for laboratory, companion, zoo and wild animals. Effective: 2017 Spring Quarter.

NUT 124—Nutrition and Feeding of Finfishes (3)
Lecture—3 hours. Prerequisite(s): BIS 103 or ABI 103 Principles of nutrition and feeding of fishes under commercial situations; implication of fish nutrition to the environment and conservation of endangered species. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

NUT 127—Environmental Stress and Development in Marine Organisms (10)
Discussion—2 hours; Laboratory—12 hours; Lecture—4 hours. Prerequisite(s): ETX 101 or BIS 102 or BIS 104; or equivalent course. ETX 114A or NUT 114 recommended. Course taught at Bodega Marine Laboratory. Effects of environmental and nutritional stress, including pollutants, on development and function in embryos and larvae of marine organisms. Emphasis on advanced experimental methods. (Environmental Toxicology 127.) GE credit: OL, QL, SE, SL, VL, WE. Effective: 2002 Summer Session 1.

NUT 129—Journalistic Practicum in Nutrition (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): (NUT 111AV or NUT 111AY); NUT 111B; or Consent of Instructor. A course in written or oral expression. Critical analysis and discussion of current, controversial issues in nutrition; use of journalistic techniques to interpret scientific findings for the lay public. Students required to write several articles for campus media. May be repeated up to 1 time(s). GE credit: OL, SE, SL, WE. Effective: 2017 Spring Quarter.

NUT 130—Experiments in Nutrition: Design and Execution (2)
Laboratory—6 hours. Prerequisite(s): Consent of Instructor. NUT 111AV, NUT 111AY, NUT 111B or NUT 114 recommended. Experiments in current nutritional problems. Experimental design:students choose project and, independently or in groups of two-three, design a protocol, complete the project, and report findings. May be repeated for credit up to six times(three times per instructor)with consent of instructor. May be repeated up to 6 time(s) three times per instructor with consent of instructor. GE credit: SE. Effective: 2016 Fall Quarter.

NUT 190—Proseminar in Nutrition (1)
Seminar—1 hour. Prerequisite(s): (NUT 111AV or NUT 111AY); NUT 111B Restricted to senior standing. Discussion of human nutrition problems. Each term will involve a different emphasis among experimental, clinical, and dietetic problems of community, national and international scope. May be repeated twice for credit with consent of instructor. May be repeated up to 2 time(s). GE credit: OL, SE, VL. Effective: 2016 Fall Quarter.

NUT 190C—Nutrition Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing in Nutrition or related biological science. Introduction to research findings and methods in nutrition. Presentation and discussion of research by faculty and students. May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

NUT 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. One upper division course in nutrition. Work experience on or off campus in practical application of nutrition, supervised by a faculty member. (P/NP grading only.) Effective: 1997 Winter Quarter.

NUT 197T—Tutoring in Nutrition (1-2)
Discussion/Laboratory—3-6 hours. Prerequisite(s): Consent of Instructor. Nutrition Science, Clinical Nutrition or related major. Tutoring of students in nutrition courses, assistance with discussion groups or laboratory sections, weekly conference with instructor in charge of course: written evaluations. May be repeated if tutoring a different course. May be repeated for credit. (P/NP grading only.) Effective: 2016 Fall Quarter.

NUT 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

NUT 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

NUT 219A—International Nutrition (3)
Lecture—3 hours. Prerequisite(s): NUT 111AV; NUT 111AY; Graduate Standing; undergraduates only admitted with consent of instructor. Epidemiology, etiology, and consequences of undernutrition, with particular focus on the nutritional problems of children and women in low income populations. Effective: 2018 Spring Quarter.

NUT 219B—International Nutrition (3)
Lecture—3 hours. Prerequisite(s): NUT 219A Intervention programs to prevent or ameliorate nutritional problems in low-income populations. Planning, implementing, and evaluating nutrition intervention programs. Effective: 2004 Fall Quarter.

NUT 230—Experiments in Nutrition: Design and Execution (2)
Laboratory—6 hours. Prerequisite(s): Consent of Instructor. NUT 201, NUT 202, NUT 203, NUT 204, or the equivalent recommended. Student selected projects to enhance laboratory skills. Independently, or in groups of two-three students, design a protocol, carry out the project, analyze the results and report the findings. May be repeated up to 6 time(s) with consent of instructor (limit of three times per instructor). Effective: 1999 Fall Quarter.

NUT 250—Metabolic Homeostasis (3)
Discussion—1.5 hours; Lecture—2 hours. Prerequisite(s): Passing the Nutrition Graduate Group Preliminary Examination or consent of instructor. Preference given to students in advanced standing in the Nutrition Graduate Group. Regulatory mechanisms of carbohydrate, lipid, and protein homeostasis; mechanisms of metabolic enzyme regulation and of the metabolic hormones; homeostatic mechanisms and interactions; fuel-fuel interactions; nutrition-energy balance. Effective: 2001 Spring Quarter.

NUT 251—Nutrition and Immunity (2)
Lecture/Discussion—2 hours. Prerequisite(s): PMI 126; ABI 102; MMI 107; Or the equivalent to MMI 107. Cellular and molecular mechanisms underlying interactions of nutrition and immune function, including modulation of immunocompetence by diet and effects of immune responses on nutritional needs. Lectures and discussion explore implications for resistance to infection, autoimmunity and cancer. Effective: 2000 Winter Quarter.

NUT 252—Nutrition and Development (3)
Lecture—3 hours. Prerequisite(s): NUB 210A, NUB 210B, and NUB 210C recommended. Relationship of nutrition to prenatal and early postnatal development. Effective: 2018 Spring Quarter.

NUT 253—Control of Energy Balance and Body Weight (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Comprehensive study of the biochemical, nutritional and physiological mechanisms controlling food intake, body composition and energy expenditure. Subject matter will be approached through lectures and discussions where students and staff will critically evaluate the literature. Effective: 2016 Spring Quarter.

NUT 254—Applications of Systems Analysis in Nutrition (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): NUT 202; Or the equivalent. Quantitative aspects of digestion and metabolism; principles of systems analysis. Evolution of models of energy metabolism as applied in current
feeding systems. Critical evaluations of mechanistic models used analytically in support of nutritional research. Effective: 1997 Winter Quarter.

NUT 258—Field Research Methods in International Nutrition (3)
Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Issues and problems related to implementation of nutrition field research in less-developed countries, including ethics; relationships with local governments, communities, and scientists; data collection techniques and quality assurance; field logistics; research budgets; and other administrative and personal issues. Effective: 1997 Winter Quarter.

NUT 259—Nutrition and Aging (2)
Lecture—2 hours. Prerequisite(s): NUT 201; NUT 202; NUT 203; NUT 204; Three courses. Interaction between nutrition and aging. Topics include physiological/biochemical basis of aging, age-related changes affecting
nutritional requirements, nutrition and mortality rate, assessment of nutritional status in the elderly, and relationship between developmental nutrition and the rate of aging. Effective: 1997 Fall Quarter.

NUT 270—Scientific Ethics in Biomedical Studies: Emphasis on Nutrition (3)
Discussion—1 hour; Lecture—1 hour; Term Paper. Restricted to graduate standing or consent of instructor. Scientific ethics in biomedical studies, especially nutrition. Discussion and case study presentations on scientific integrity, fraud, misconduct, conflict of interest, human and animal research protections. Not open for credit to students who have completed NUT 492B. Effective: 2003 Spring Quarter.

NUT 290—Beginning Nutrition Seminar (2)
Lecture/Discussion—1 hour; Seminar—1 hour. Prerequisite(s): First-year graduate standing. Discussion and critical evaluation of topics in nutrition with emphasis on literature review and evaluation in this field. Students give oral presentations on relevant topics. Effective: 1997 Fall Quarter.

NUT 290C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Major professors lead research discussions with their graduate students.
Research papers are reviewed and project proposals presented and evaluated. Format will combine seminar and discussion style. (S/U grading only.) Effective: 1997 Winter Quarter.

NUT 291—Advanced Nutrition Seminar (1)
Seminar—1 hour. Prerequisite(s): Second-year graduate standing. Advanced topics in nutrition research. Multiple sections may be taken concurrently for credit. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

NUT 293A—Current Topics in Obesity, Food Intake and Energy Balance (3)
Discussion—1 hour; Lecture—1 hour; Seminar—1 hour. Prerequisite(s): NUT 129; Or graduate standing; Undergraduates with upper division standing with at least one writing course may enroll with consent of instructor. Current research and its evaluation. Principles of experimental design and scientific background for given article. Articles summarized for
posting on Internet for use by healthcare professionals. May be repeated for credit with consent of instructor. May be repeated for credit. Effective: 1997 Fall Quarter.

NUT 293B—Current Topics in Obesity, Food Intake, and Energy Balance with Special Topics (3)
Discussion—1 hour; Lecture—1 hour; Seminar—1 hour. Prerequisite(s): NUT 129; Graduate standing. Undergraduates with upper division standing with at least one writing course may enroll with consent of instructor. A continuation of course 293A, with additional special topics. May be repeated for credit up to 3 times with consent of instructor. May be repeated up to 3 time(s). Effective: 1997 Fall Quarter.

NUT 294A—Current Topics in Developmental Nutrition (2)
Seminar—2 hours. Prerequisite(s): NUT 114 or NUT 252; or Consent of Instructor. Restricted to graduate standing or consent of instructor. Effects of nutrition on embryology, morphogenesis, and developmental mechanisms. May be repeated for credit when topic differs. Effective: 2004 Winter Quarter.

NUT 297T—Supervised Teaching in Nutrition (1-3)
Variable. Prerequisite(s): Graduate standing in nutrition or consent of instructor. Practical experience in teaching nutrition at the university level; curriculum design and evaluation; preparation and presentation of material. Assistance in laboratories, discussion sections, and evaluation of student work. (S/U grading only.) Effective: 1997 Winter Quarter.

NUT 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Effective: 1997 Winter Quarter.

NUT 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

NUT 492A—Professionalism: An Academic Perspective (2)
Lecture/Discussion—2 hours. Prerequisite(s): Graduate standing. For graduate students in their initial quarter of residence. Professionalism topics are presented and examples drawn from both the biological and social sciences. Effective: 1997 Fall Quarter.

NUT 492C—Grant Writing (3)
Discussion—1.5 hours; Lecture—1.5 hours. Prerequisite(s): Graduate standing in Nutrition or consent of instructor. Preparation of grants for governmental agencies (particularly NIH and USDA) and private foundations. Students will write a research grant or
fellowship application. May be repeated once for credit with consent of instructor. May be repeated up to 1 time(s). Effective: 1997 Fall Quarter.

Nutritional Biology (Graduate Group)

Nutritional Biology (Graduate Group) | NUB Information

Nutritional Biology (A Graduate Group)

Carolyn Slupsky, Ph.D., Chairperson of the Group

Graduate Group Office. 1249 Meyer Hall; 530-754-7684; http://nutritionalbiology.ucdavis.edu

Faculty. http://ggnb.ucdavis.edu/people/faculty/index.html

Nutritional Biology (Graduate Group) | NUB M.S.

Carolyn Slupsky, Ph.D., Chairperson of the Group

Graduate Group Office. 1249 Meyer Hall; 530-754-7684; http://nutritionalbiology.ucdavis.edu

Faculty. http://ggnb.ucdavis.edu/people/faculty/index.html

Graduate Study. The Graduate Group in Nutritional Biology offers programs of study and research leading to the M.S. and Ph.D. degrees. The great diversity of research interests represented by the faculty members allows students to choose from a wide variety of themes: nutritional biochemistry, animal nutrition, nutrition and development, nutrient bioavailability, human/clinical nutrition, nutrition and behavior, nutritional energetics, community nutrition, community health, maternal and child nutrition, nutrition and endocrinology, international nutrition, obesity/body composition, physiology of digestion, nutrition and chronic disease, culture and nutrition, nutrition and gene expression, nutrition and aging, food preferences, nutrition and immunity, diet and exercise, dietary assessment, protein and lipid metabolism, food intake regulation, nutrition education, and more.

Graduate Advisors. Consult the Nutritional Biology Graduate Group office.

Nutritional Biology (Graduate Group) | NUB Ph.D.

Carolyn Slupsky, Ph.D., Chairperson of the Group

Graduate Group Office. 1249 Meyer Hall; 530-754-7684; http://nutritionalbiology.ucdavis.edu

Faculty. http://ggnb.ucdavis.edu/people/faculty/index.html

Graduate Study. The Graduate Group in Nutritional Biology offers programs of study and research leading to the M.S. and Ph.D. degrees. The great diversity of research interests represented by the faculty members allows students to choose from a wide variety of themes: nutritional biochemistry, animal nutrition, nutrition and development, nutrient bioavailability, human/clinical nutrition, nutrition and behavior, nutritional energetics, community nutrition, community health, maternal and child nutrition, nutrition and endocrinology, international nutrition, obesity/body composition, physiology of digestion, nutrition and chronic disease, culture and nutrition, nutrition and gene expression, nutrition and aging, food preferences, nutrition and immunity, diet and exercise, dietary assessment, protein and lipid metabolism, food intake regulation, nutrition education, and more.

Graduate Advisors. Consult the Nutritional Biology Graduate Group office.

Nutritional Biology (Graduate Group) | NUB Courses

Courses in NUB:

NUB 210A—Advanced Nutrition I: Nutrition and Metabolism, Macronutrients (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): Admission to the Nutritional Biology Graduate Group or consent of instructor. Class size limited to 30 students. Advanced general nutritional concepts. Integrating nutrition with biological systems, population nutrition issues, and research approaches. Advanced concepts on lipid and protein metabolism. Effective: 2014 Winter Quarter.

NUB 210B—Advanced Nutrition II: Nutrition and Cell Biology, Micronutrients (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): Admission to the Nutritional Biology Graduate Group or consent of instructor. Class size limited to 30 students. Effects of nutrients at the cellular level. Principles of cell signaling and signaling modulation by nutrients. Advanced concepts of mineral and vitamin metabolism. Mineral and vitamin deviencies and associated pathologies. Effective: 2014 Fall Quarter.

NUB 210C—Advanced Nutrition III: Nutrition in Health and Disease (5)
Discussion—1 hour; Lecture—4 hours. Integration of biochemical, physiological, and genetic aspects of nutrition in the context of clinical and epidemiological observations related to health and disease, including obesity and diabetes, cancer, vascular and neurodegenerative diseases, osteoporosis, and birth defects. Review and consideration of governmental. Effective: 2014 Winter Quarter.

NUB 290C—Research Group Conference (1)
Discussion—1 hour. Prerequisite(s): Graduate standing. Weekly conference on research problems, progress and techniques in animal sciences. May be repeated for credit. (S/U grading only.) Effective: 2013 Fall Quarter.

NUB 298—Directed Group Study (1-5)
Variable. Prerequisite(s): Graduate standing in Nutritional Biology Graduate Group or consent of instructor. May be repeated up to 3 time(s) when topics differs and consent of instructor. Effective: 2013 Fall Quarter.

NUB 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. May be repeated for credit. (S/U grading only.) Effective: 2013 Fall Quarter.

Oceanography Minor; Earth & Planetary Sciences

Oceanography Minor; Earth & Planetary Sciences | Oceanography Minor

(College of Letters and Science)

Michael E. Oskin, Ph.D., Chairperson of the Department

David A. Osleger, Ph.D., Vice-Chairperson, Undergraduate Program

Sujoy Mukhopadhyay, Pd.D., Vice-Chairperson, Graduate Program

Department Office. 2119 Earth and Physical Sciences Building; 530-752-0350; http://www.geology.ucdavis.edu

Faculty. http://geology.ucdavis.edu/people/faculty/index.php

Oceanography is the study of the earth's oceans, investigating connections between geological, biological, chemical and physical processes in the marine realm, and the interactions between the Earth's ocean/atmosphere system. The interdisciplinary minor in oceanography is for students with backgrounds in any of these fields, as well as those interested in marine policy and conservation. The curriculum reflects the integrative nature of oceanography, with core courses covering the

major disciplines in oceanography and elective courses that allow students to cater the minor to their interests. The oceanography minor includes courses taught at the Davis campus and courses offered at Bodega Marine Laboratory.

The minor is sponsored by the Department of Earth and Planetary Sciences.

Minor Advisor. T.M. Hill (Earth and Planetary Sciences).

Oceanography **Units:** 22-24

GEL 150A	Physical and Chemical Oceanography	4
OR		
ESP 150A	Physical and Chemical Oceanography	4
GEL 150B	Geological Oceanography	3
OR		
ESP 150B	Geological Oceanography	3
GEL 150C	Biological Oceanography	4
OR		
ESP 150C	Biological Oceanography	4
ESP 152	Coastal Oceanography	3

Choose an electives sequence, with one course from group (a) and one to two additional electives from either groups (a) or (b):

(a)

GEL 116N	Oceanography	3
OR		
ESP 116N	Oceanography	3
ATM 158	Boundary-Layer Meteorology	4
WFC 120	Biology and Conservation of Fishes	3
WFC 157	Coastal Ecosystems	4
ETX 120	Perspectives in Aquatic Toxicology	4
EVE 112	Biology of Invertebrates	3
EVE 115	Marine Ecology	4

(b)

ATM 121A	Atmospheric Dynamics	4
ATM 121B	Atmospheric Dynamics	4
GEL 108	Earth History: Paleoclimates	3
GEL 109	Earth History: Sediments and Strata	2
GEL 152	Paleobiology of Protista	4
EVE 106	Mechanical Design in Organisms	3
EVE 114	Experimental Invertebrate Biology	3
ESP 124	Marine and Coastal Field Ecology	3
ETX 127	Environmental Stress and Development in Marine Organisms	10

Courses taught at Bodega Marine Laboratory:

GEL 150C	Biological Oceanography	4
ESP 150C	Biological Oceanography	4
ESP 124	Marine and Coastal Field Ecology	3
ESP 152	Coastal Oceanography	3
ETX 127	Environmental Stress and Development in Marine Organisms	10

EVE 106	Mechanical Design in Organisms	3
EVE 114	Experimental Invertebrate Biology	3

Total: 22-24

Performance Studies (Graduate Group)

Performance Studies (Graduate Group) | PFS Information

Joe Dumit, Chairperson

Marian Bilheimer, Graduate Coordinator

Arts Group Graduate Office. 216B Art Building; 530-754-6973; mlbilheimer@ucdavis.edu; http://performancestudies.ucdavis.edu/

Faculty.http://arts.ucdavis.edu/theatre-dance-faculty; there are over 45 affiliated faculty in departments throughout HArCS and other faculty, all of whom offer courses relevant to the discipline.

Performance Studies (Graduate Group) | PFS M.A.

Joe Dumit, Chairperson

Marian Bilheimer, Graduate Coordinator

Arts Group Graduate Office. 216B Art Building; 530-754-6973; mlbilheimer@ucdavis.edu; http://performancestudies.ucdavis.edu/

Faculty. http://arts.ucdavis.edu/theatre-dance-faculty; there are over 45 affiliated faculty in departments throughout HArCS and other faculty, all of whom offer courses relevant to the discipline.

Graduate Study. The Ph.D. in Performance Studies is a four-year program. In the first two years of study, students develop an understanding of performance by drawing from a range of regular course offerings in the field to identify, explore, and define a field or fields of research. Students are required to complete four core courses out of five in performance studies, and one colloquium course. Each individual program is then built from seminar and/or practice as research courses, as well as independent or group studies, developing one or more of the four strands of the program: Comparative Medias, Embodiments, Cultures/Ecologies, and History/Text. A wide range of affiliated faculty offer courses throughout the HArCS faculty, and Designated Emphases are available in Studies in Performance and Practice, African American and African Studies, Critical Theory, Feminist Theory and Research, Native American Studies, and Writing, Rhetoric and Composition Studies. Students are required to complete a minimum of 60 units before taking the qualifying examination. No more than 12 units may be taken below the graduate level unless specifically approved by the Ph.D. graduate program advisor.

The Master of Arts degree is offered only in route to the Ph.D.

Main Program Advisor. Lynette Hunter (Theatre and Dance)

Graduate Advisors. Moradewun Adejunmobi (African American and African Studies), Emily Albu (Spanish & Classics), Susan Avila (Design), Gina Bloom (English), Maxine Craig (Gender, Sexuality, and Women's Studies), Kriss Ravetto (Cinema and Digital Media), Henry Spiller (Music), Archana Venkatesan (Comparative Literature, Religious Studies), Hegnar Watenpaugh (Art, Art History)

Performance Studies (Graduate Group) | PFS Ph.D.

Joe Dumit, Chairperson

Marian Bilheimer, Graduate Coordinator

Arts Group Graduate Office. 216B Art Building; 530-754-6973; mlbilheimer@ucdavis.edu; http://performancestudies.ucdavis.edu/

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Performance Studies (Graduate Group) | PFS Courses

Courses in PFS:

PFS 200—Methods and Materials in Theatre Research (4)
Seminar—3 hours; Term Paper. Essential research tools in theatre and related fields; bibliographies,
primary sources; methods of evaluating and presenting evidence; delineating research areas in the field. Effective: 2012 Fall Quarter.

PFS 259—Topics in Contemporary Theatre and Performance (4)
Seminar—3 hours; Term Paper. Special topics designed to study in depth aspects of contemporary performance including performance analysis, cultural and historical context, modes of production, theoretical and political entailments, and issues of spectatorship; e.g., "Brecht and After," "British Theater," "Race and Gender in Performance." May be repeated up to 5 time(s). Effective: 2012 Fall Quarter.

PFS 265A—Performance Studies: Modes of Production (4)
Seminar—3 hours; Term Paper. Introduction to the literature of performance production in a variety of media: theatre, dance, film, video, computer-based, looking at cultural, aesthetic, rhetorical and political theory. May be repeated up to 3 time(s) when topic differs. Effective: 2012 Fall Quarter.

PFS 265B—Performance Studies: Signification and the Body (4)
Seminar—3 hours; Term Paper. Introduction to analysis of the body in performance, drawing on theoretical models from several fields. May be repeated up to 3 time(s) when topic differs. Effective: 2012 Fall Quarter.

PFS 265C—Performance Studies: Performance and Society (4)
Seminar—3 hours; Term Paper. Introduction to the role of performance (broadly defined), in everyday life, sociopolitical negotiation, identity, social movements, the media, and the state. May be repeated up to 3 time(s) when topic differs. Effective: 2012 Fall Quarter.

PFS 265D— Performance Studies: Theory, History, Criticism (4)
Seminar—3 hours; Term Paper. Introduction to the theory, history and criticism, informing performance studies. May be repeated up to 3 time(s) when topic differs. Effective: 2012 Fall Quarter.

PFS 270A—Individually Guided Research in Performance Studies (4)
Discussion—1 hour; Extensive Writing; Independent Study. Prerequisite(s): PFS 200; (PFS 265A or PFS 265B or PFS 265C or PFS 265D); and Consent of Instructor. Restricted to students in the Graduate Group PhD in Performance Studies. Individually guided research, under the supervision of a faculty member, on a Performance Studies topic related to the student's proposed dissertation project to produce a dissertation prospectus. Effective: 2012 Fall Quarter.

PFS 270B—Individually Guided Research in Performance Studies (4)
Discussion—1 hour; Extensive Writing; Independent Study. Prerequisite(s): PFS 200; (PFS 265A or PFS 265B or PFS 265C or PFS 265D); and Consent of Instructor. Restricted to students in the Graduate Group PhD in Performance Studies. Individually guided research, under the supervision of a faculty member, on a Performance Studies topic related to the student's proposed dissertation project, to produce a dissertation prospectus. Effective: 2012 Fall Quarter.

PFS 270C—Individually Guided Research in Performance Studies (4)
Discussion/Laboratory—2 hours; Fieldwork—2 hours; Term Paper. Prerequisite(s): PFS 200; (PFS 265A or PFS 265B or PFS 265C or PFS 265D); and Consent of Instructor. Restricted to students in the Graduate Group PhD in Performance Studies. Individually guided research, under the supervision of a faculty member, on a Performance Studies topic related to the student's proposed dissertation project to produce a dissertation prospectus. Effective: 2012 Fall Quarter.

PFS 290—Colloquia in Performance Studies (4)
Discussion/Laboratory—1 hour; Lecture/Discussion—2 hours; Term Paper. Prerequisite(s): Registration in Performance Studies Graduate Group and prior to Qualifying Examination. Designed to provide cohort identity and faculty exchange. Opportunity to present papers, hear guest lecturers, and see faculty presentations, gather for organizational and administrative new, exchange of information and make announcements. Course must be taken every year that a Performance Studies graduate is registered, prior to taking the Qualifying Examination. May be repeated up to 4 time(s). Limited to four units per year. (S/U grading only.) Effective: 2011 Fall Quarter.

PFS 298—Group Study (1-5)
Independent Study—1-5 hours. Prerequisite(s): Consent of Instructor. Effective: 2012 Fall Quarter.

PFS 299—Individual Study (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 2012 Fall Quarter.

PFS 299D—Dissertation Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Advancement to Candidacy. May be repeated for credit. (S/U grading only.) Effective: 2012 Fall Quarter.

PFS 459—Approaches to Theatre and Dance (4)
Project (Term Project); Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Advanced graduate students. Work on approaches to theatre, dance, film/video, design and performance, with a focus on methodology and professional development. May be repeated up to 5 time(s). Effective: 2012 Fall Quarter.

Pharmaceutical Chemistry; Chemistry

Pharmaceutical Chemistry; Chemistry | Pharmaceutical Chemistry Information

(College of Letters and Science)

Department Administration. For a complete list of department administration, see https://chemistry.ucdavis.edu/people.

Department Office. 108 Chemistry Building; 530-752-8900; Fax 530-752-8995; https://chemistry.ucdavis.edu/

Faculty. https://chemistry.ucdavis.edu/people

Pharmaceutical Chemistry; Chemistry | Pharmaceutical Chemistry B.S.

(College of Letters and Science)

Department Administration. For a complete list of department administration, see https://chemistry.ucdavis.edu/people.

Department Office. 108 Chemistry Building; 530-752-8900; Fax 530-752-8995; https://chemistry.ucdavis.edu/

Faculty. https://chemistry.ucdavis.edu/people

The Major Programs

Chemistry studies the composition of matter, its structure, and the means by which it is converted from one form to another.

The Program. We offer several degree programs leading to the Bachelor of Arts (A.B.) and the Bachelor of Science (B.S.). To meet and discuss these programs with our staff advisors, see https://chemistry.ucdavis.edu/undergraduate/academic-advising.

The B.S. in Pharmaceutical Chemistry is strongly focused on basic science while providing students with a greater understanding of the experimental and computational processes and societal issues that surround the synthesis, discovery and design of modern pharmaceuticals. Important relevant topics include potential drug targets, physical principles of drug action, drug synthesis and screening, computational drug design, drug delivery and ethical concerns. The demand for pharmaceutical chemists is high and anticipated to grow, as modern chemistry allows a wide range of choices for drug synthesis and our growing knowledge of biological processes presents challenging targets for novel therapeutics.

Career Alternatives. Graduates in Pharmaceutical Chemistry will be able to successfully pursue their career objectives in advanced education in professional and/or graduate schools and in a range of scientific careers in academia, government or industry including the pharmaceutical, medicinal and biological sciences, medicine, pharmacy, pharmacology and biotechnology.

Major Advisor. To contact a major advisor in the Department of Chemistry, see https://chemistry.ucdavis.edu/undergraduate/academic-advising.

Honors and Honors Program. The student must take courses 194HA, 194HB, and 194HC.

Graduate Study. The Department of Chemistry offers programs of study and research leading to the M.S. and Ph.D. degrees in Chemistry. Detailed information regarding graduate study may be obtained by contacting the Graduate Advisor, Department of Chemistry. See also Graduate Studies.

Preparatory Subject Matter **Units:** 48-55

CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 002C	General Chemistry	5
OR		
CHE 002AH	Honors General Chemistry	5
CHE 002BH	Honors General Chemistry	5
CHE 002CH	Honors General Chemistry	5
PHY 007A	General Physics	4
PHY 007B	General Physics	4
PHY 007C	General Physics	4
OR		
PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5

MAT 016A	Short Calculus	3
MAT 016B	Short Calculus	3
MAT 016C	Short Calculus	3
OR		
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
MAT 017C	Calculus for Biology and Medicine	4
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
OR		
BIS 002C	Introduction to Biology: Biodiversity and the Tree of Life	5
STA 013	Elementary Statistics	4
OR		
STA 032	Gateway to Statistical Data Science	4
STA 100	Applied Statistics for Biological Sciences	4

Depth Subject Matter **Units:** 48-64

CHE 124A	Inorganic Chemistry: Fundamentals	3
CHE 130A	Pharmaceutical Chemistry	3
CHE 130B	Pharmaceutical Chemistry	3
CHE 135	Advanced Bio-organic Chemistry Laboratory	3
CHE 107A	Physical Chemistry for the Life Sciences	3
CHE 107B	Physical Chemistry for the Life Sciences	3
OR		
CHE 110A	Physical Chemistry: Introduction to Quantum Mechanics	4
CHE 110B	Physical Chemistry: Properties of Atoms and Molecules	4
CHE 110C	Physical Chemistry: Thermodynamics, Equilibria and Kinetics	4
CHE 118A	Organic Chemistry for Health and Life Sciences	4
CHE 118B	Organic Chemistry for Health and Life Sciences	4
CHE 118C	Organic Chemistry for Health and Life Sciences	4
OR		
CHE 128A	Organic Chemistry	3
CHE 128B	Organic Chemistry	3
CHE 128C	Organic Chemistry	3
CHE 129A	Organic Chemistry Laboratory	2
CHE 129B	Organic Chemistry Laboratory	2
CHE 129C	Organic Chemistry Laboratory	2

Choose two:

BIS 102	Structure and Function of Biomolecules	3
OR		
CHE 131	Modern Methods of Organic Synthesis	3
OR		
CHE 150	Chemistry of Natural Products	3

Choose at least four; not used to satisfy the above requirements:

BIS 102	Structure and Function of Biomolecules	3
BIS 103	Bioenergetics and Metabolism	3
BIT 171	Professionalism and Ethics in Genomics and Biotechnology	3
CHE 131	Modern Methods of Organic Synthesis	3
CHE 199	Special Study for Advanced Undergraduates For a minimum 3 units	1-5
OR		
CHE 194HA	Undergraduate Honors Research	2
ETX 103A	Biological Effects of Toxicants	4
NPB 100	Neurobiology	4
NPB 101	Systemic Physiology	5
PLB 126	Plant Biochemistry	3

Total: 96-119

Pharmaceutical Chemistry; Chemistry | Pharmaceutical Chemistry M.S.

(College of Letters and Science)

Department Administration. For a complete list of department administration, see https://chemistry.ucdavis.edu/people.

Department Office. 108 Chemistry Building; 530-752-8900; Fax 530-752-8995; https://chemistry.ucdavis.edu/

Faculty. https://chemistry.ucdavis.edu/people

Graduate Study. The Department of Chemistry offers programs of study and research leading to the M.S. and Ph.D. degrees in Chemistry. Detailed information regarding graduate study may be obtained by contacting the Graduate Advisor, Department of Chemistry. See also Graduate Studies.

Pharmaceutical Chemistry; Chemistry | CHE Courses

Chemistry Placement Requirement. Students who enroll in Chemistry 002A, 002AH or Workload Chemistry 041C must satisfy the Chemistry Placement Requirement. Students who do not meet the placement requirements will be administratively dropped from these Chemistry courses. For more information about the placement requirements, see https://chemistry.ucdavis.edu/undergraduate/general-chemistry-series/chemistry-placement-requirements.

The Student Academic Success Center (SASC) provides review materials, workshops, drop-in and group tutoring, and additional resources.

Chemistry Graduate Students Tutors are also listed on the Department of Chemistry website at https://chemistry.ucdavis.edu/undergraduate/tutors-chemistry.

Courses in CHE:

CHE 002A—General Chemistry (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): High school chemistry and physics, and concurrent enrollment in mathematics at or above the level of MAT 012 strongly recommended; any one of the following: (A) SAT Mathematics score = 600+; (B) ACT Mathematics score = 27+; (C) AP Chemistry exam score of = 3+; (D) SAT Chemistry subject test score = 700+; (E) UC Davis Chemistry Placement Examination score = 24+ on first attempt; in lieu of A-E, either completion of ALEKS online Preparatory Chemistry course with 100% Pie Mastery or completion of Workload 41C with a grade of C or better (Workload 41C offered in fall quarter only to students who do not meet A-E). Periodic table, stoichiometry, chemical equations, physical properties and kinetic theory of gases, atomic and molecular structure and chemical bonding. Laboratory experiments in stoichiometric relations, properties and collection of gases, atomic spectroscopy, and introductory quantitative analysis. Not open for credit to students who have taken CHE 002AH. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

CHE 002AH—Honors General Chemistry (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. High school chemistry and physics. Any ONE of the following: (A) SAT Mathematics score = 670+; (B) ACT Mathematics score = 30+; (C) AP Chemistry exam score = 4+; (D) SAT Chemistry subject test score = 700+; (E) UC Davis Chemistry Placement Examination score = 33+ on first attempt; (F) UC Davis Chemistry Placement Examination score = 30+ AND UC Davis Mathematics Placement Examination score = 45+, both on first attempts; consent of instructor. Limited enrollment course with a more rigorous treatment of material covered in course 2A. Students completing course 2AH can continue with course 2BH or 2B. Not open for credit to students who have taken CHE 002A. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

CHE 002B—General Chemistry (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): CHE 002A C- or better or CHE 002AH C- or better Continuation of course 2A. Condensed phases and intermolecular forces, chemical thermodynamics, chemical equilibria, acids and bases, solubility. Laboratory experiments in thermochemistry, equilibria, and quantitative analysis using volumetric methods. Not open for credit to students who have taken CHE 002BH. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

CHE 002BH—Honors General Chemistry (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): CHE 002A or CHE 002AH C or better; MAT 021B (can be concurrent); or Consent of Instructor. CHE 2A with consent of instructor. Limited enrollment course with a more rigorous treatment of material covered in course 2B. Students completing course 2BH can continue with course 2CH or 2C. Not open for credit to students who have taken CHE 002B. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

CHE 002C—General Chemistry (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): CHE 002B C- or better or CHE 002BH C- or better Continuation of course 2B. Kinetics, electrochemistry, spectroscopy, structure and bonding in transition metal compounds, application of principles to chemical reactions. Laboratory experiments in selected analytical methods and syntheses. Not open for credit to students who have taken CHE 002CH. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

CHE 002CH—Honors General Chemistry (5)
Discussion/Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): CHE 002B or CHE 002BH C or better; MAT 021C (can be concurrent); or Consent of Instructor. CHE 002B with consent of instructor Limited enrollment course with a more rigorous treatment of material covered in course 2C. Not open for credit to students who have taken CHE 002C. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

CHE 003A—Chemistry for Life Sciences: Determining Structure and Predicting Properties (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): High high school chemistry and physics strongly recommended; satisfactory score on the Chemistry and Mathematics Placement Examinations or satisfactory completion of the ALEKS Summer Chemistry Prep Course; a satisfactory grade in WKL 041C ('P' or 'C' or better) will suffice in lieu of a satisfactory Chemistry Placement Examination score. Concurrent enrollment with course 2A, 2B, 2C, 2AH, 2BH, 2CH prohibited; not open for enrollment to students who have completed CHE 2C or 2CH with a C- or better. Integrated General and Organic Chemistry intended for majors in the life sciences. Core concepts of chemical composition, structure and properties. Includes phase changes, separation methods, composition, spectroscopy, atomic and molecular structure, periodicity, bonding, charge distribution, intermolecular forces, and physical properties. Only 3 units credit for students who have completed CHE 002A or CHE 002AH with a C- or better; only 1 unit of credit to students who have completed CHE 002B or CHE 002BH with a C- or better. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

CHE 003B—Chemistry for Life Sciences: Predicting and Characterizing Chemical Change (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 003A C- or better; Note: C- or better in CHE 002A or 002AH does not satisfy the prerequisite requirement. Concurrent enrollment with course 2A, 2B, 2C, 2AH, 2BH, 2CH prohibited. Continuation of course 3A covering core concepts of characterization of chemical processes and predicting chemical changes. Includes modeling chemical reactions, understanding proportions/stoichiometry, tracking energy, activation energy, reaction kinetics, thermodynamics, and equilibrium. Only 3 units credit for students who have completed CHE 002B or CHE 002BH with a C- or better. GE credit: QL, SE, SL. Effective: 2017 Winter Quarter.

CHE 003C—Chemistry for Life Sciences: Controlling Processes and Synthetic Pathways (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 003B C- or better; Note: C- or better in CHE 002B or 002BH does not satisfy the prerequisite requirement. Concurrent enrollment with course 2A, 2B, 2C, 2AH, 2BH, 2CH prohibited. Continuation of course 3B covering core concepts of harnessing energy, controlling reaction extent, and organic chemistry synthetic pathways. Includes acids and bases, thermodynamics, chemical equilibria, organic chemistry terminology and mechanisms. Only 3 units credit for students who have completed CHE 002C or CHE 002CH with a C- or better. GE credit: QL, SE, SL. Effective: 2017 Spring Quarter.

CHE 008A—Organic Chemistry: Brief Course (2)
Lecture—2 hours. Prerequisite(s): CHE 002B C- or better or CHE 002BH C- or better With course 8B, an introduction to the nomenclature, structure, chemistry, and reaction mechanisms of organic compounds. Intended for students majoring in areas other than organic chemistry. No credit to students who have completed CHE 118A or 128A. GE credit: SE. Effective: 2016 Fall Quarter.

CHE 008B—Organic Chemistry: Brief Course (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 008A or CHE 118A or CHE 128A Laboratory concerned primarily with organic laboratory techniques and the chemistry of the common classes of organic compounds. Lecture portion a continuation of course 8A. Varying credit hours according to courses taken previously and corresponding expected workload for this course; full credit to students who complete CHE 118A or 128A; 3 units credit to students who have completed CHE 128A and CHE 129A (students who have completed CHE 129A are exempt from the laboratory portion of CHE 008B); 2 units credit to students who have completed CHE 128B; 1 unit credit to students who have completed CHE 118B or CHE 128B and CHE 129A (students who have completed CHE 118B are exempt from the laboratory portion of CHE 008B). GE credit: SE. Effective: 2016 Fall Quarter.

CHE 010—Concept of Chemistry (4)
Lecture—4 hours. Survey of basic concepts and contemporary applications of chemistry. Designed for non-science majors and not as preparation for Chemistry 2A. Not open for credit to students who have had CHE 002A; but students with credit for CHE 010 may take CHE 002A for full credit. GE credit: SE, SL. Effective: 1997 Winter Quarter.

CHE 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Primarily for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHE 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHE 100—Environmental Water Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 002C or CHE 002CH Practical aspects of water chemistry in the environment, including thermodynamic relations, coordination chemistry, solubility calculations, redox reactions and rate laws. Computer modeling of the evolution in water chemistry from contact with minerals and gases. Effective: 2016 Winter Quarter.

CHE 103A—Chemistry for Life Sciences: Determining Organic Structures and Properties (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 002C C- or better or CHE 002CH C- or better; (CHE 008A or CHE 118A or CHE 128A) Not open for enrollment to students who have completed course 008B, 118B, 118C, 128B, 128C with a C- or better. Continuation of course 3C. Core concepts of organic structure, nomenclature, functional groups, organic acids and bases, resonance and delocalization, aromaticity, intermolecular forces, three-dimensional structure and conformational analysis, spectroscopy. Only 3 Units of credit for students who have completed CHE 008A with a C- or better; only 2 units of credit for students who have completed CHE 118A or CHE 128A with a C- or better; not open for credit to students who have completed CHE 008B, CHE 118B, CHE 118C, CHE 128B, CHE 128C with a C- or better. GE credit: SE, SL. Effective: 2017 Fall Quarter.

CHE 103B—Chemistry for Life Sciences: Predicting and Controlling Organic Pathways (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 103A C- or better Not open for enrollment to students who have completed course 008B, 118B, 118C, 128B, or 128C with a C- or better. Continuation of course 103A. Core concepts of functional group transformations, synthesis, mechanisms, sustainable chemistry, structure and function of biomolecules, organic reactions in biological systems, molecular design, detection, separation, and identification of organic molecules. Not open for credit to students who have completed CHE 008B, CHE 118B, CHE 118C, CHE 128B, or CHE 128C. GE credit: SE, SL. Effective: 2018 Winter Quarter.

CHE 104—Forensic Applications of Analytical Chemistry (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): CHE 002C or CHE 002CH Theory and application of standard methods of chemical analysis to evidentiary samples. Use and evaluation of results from screening tests, FTIR, GC and GCMS to various sample types encountered in forensics. Effective: 2016 Winter Quarter.

CHE 105—Analytical and Physical Chemical Methods (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): CHE 110A (can be concurrent) or CHE 107B (can be concurrent) Fundamental theory and laboratory techniques in; analytical and physical chemistry, errors and data analysis methods, basic electrical circuits in instruments, advanced solution equilibria, potentiometric analysis, chromatographic separations, UV-visible spectroscopy, lasers. GE credit: QL, SE, SL. Effective: 2016 Spring Quarter.

CHE 107A—Physical Chemistry for the Life Sciences (3)
Lecture—3 hours. Prerequisite(s): CHE 002C or CHE 002CH; (MAT 016C or MAT 017C or MAT 021C); (PHY 007C or PHY 009C or PHY 009HC) Physical chemistry intended for majors in the life science area. Introductory development of classical and statistical thermodynamics including equilibrium processes and solutions of both non-electrolytes and electrolytes. The thermodynamic basis of electrochemistry and membrane potentials. GE credit: SE. Effective: 2017 Spring Quarter.

CHE 107B—Physical Chemistry for the Life Sciences (3)
Lecture—3 hours. Prerequisite(s): CHE 107A Continuation of course 107A. Kinetic theory of gases and transport processes in liquids. Chemical kinetics, enzyme kinetics and theories of reaction rates. Introduction to quantum theory, atomic and molecular structure, and spectroscopy. Application to problems in the biological sciences. GE credit: SE. Effective: 2016 Fall Quarter.

CHE 108—Molecular Biochemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 128C or CHE 118C Pass One open to Chemistry majors. Chemical principles and experimental methods applied to the biological sciences to understand the molecular structure and function of proteins, nucleic acids, carbohydrates, and membrane lipids. Effective: 2016 Winter Quarter.

CHE 110A—Physical Chemistry: Introduction to Quantum Mechanics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (PHY 007C or PHY 009C or PHY 009HC); (CHE 002C or CHE 002CH); (MAT 016C or MAT 017C or MAT 021C); Completion of Mathematics 21D, 22A, and 22AL, and Physics 9C or 9HC, strongly recommended. Introduction to the postulates and general principles of quantum mechanics. Approximations based on variational method and time independent perturbation theory. Application to harmonic oscillator, rigid rotor, one-electron and many-electron atoms, and homo-and hetero-nuclear diatomic molecules. GE credit: QL, SE. Effective: 2017 Spring Quarter.

CHE 110B—Physical Chemistry: Properties of Atoms and Molecules (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 110A Group theory. Application of quantum mechanics to polyatomic molecules and molecular spectroscopy. Intermolecular forces and the gas, liquid
and solid states. Distributions, ensembles and partition functions. Transport properties. Effective: 1999 Fall Quarter.

CHE 110C—Physical Chemistry: Thermodynamics, Equilibria and Kinetics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 110B Development and application of the general principles of thermodynamics and statistical thermodynamics. Chemical kinetics, rate laws for chemical reactions and reaction mechanisms. Effective: 1999 Fall Quarter.

CHE 115—Instrumental Analysis (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): CHE 105; (CHE 110B (can be concurrent) or (CHE 107A, CHE 107B)) Intermediate theory and laboratory techniques in analytical and physical chemistry. Advanced data analysis methods and goodness-of-fit criteria. Fourier-transform spectroscopic methods and instrumentation. Mass spectrometry. Electrochemistry. Liquid chromatography. GE credit: QL, SE, WE. Effective: 2006 Fall Quarter.

CHE 118A—Organic Chemistry for Health and Life Sciences (4)
Discussion/Laboratory—1.5 hours; Lecture—3 hours. Prerequisite(s): CHE 002C C- or better or CHE 002CH C- or better The 118A, 118B, 118C series is for students planning professional school studies in health and life sciences. A rigorous, in-depth presentation of basic principles with emphasis on stereochemistry and spectroscopy and preparations and reactions of nonaromatic hydrocarbons, haloalkanes, alcohols and ethers. Only 2 units credit for students who have completed course CHE 008A; not open for credit to students who have completed CHE 008B or CHE 128A. GE credit: SE, SL. Effective: 2017 Spring Quarter.

CHE 118B—Organic Chemistry for Health and Life Sciences (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 118A or CHE 128A Continuation of course 118A, with emphasis on spectroscopy and the preparation and reactions of aromatic hydrocarbons, organometallic
compounds, aldehydes and ketones. Only one unit of credit to students who completed course CHE 128B.; not open for credit to students who have completed 8 or more units of CHE 128 and CHE 129 courses. GE credit: SE, SL. Effective: 2017 Fall Quarter.

CHE 118C—Organic Chemistry for Health and Life Sciences (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 118B or (CHE 128B, CHE 129A) Open to students changing from the CHE 128 course sequence only if they have completed prior organic laboratory work (at least course CHE 129A). Continuation of course 118B, with emphasis on the preparation, reactions and identification of carboxylic acids and their derivatives, alkyl and acyl amines, ß-dicarbonyl compounds, and various classes of naturally occurring, biologically important compounds. Not open for credit to students who have completed course CHE 128C. GE credit: SE, SL. Effective: 2018 Winter Quarter.

CHE 121—Introduction to Molecular Structure and Spectra (4)
Lecture—4 hours. Prerequisite(s): CHE 110B Modern theoretical and experimental methods used to study problems of molecular structure and bonding; emphasis on spectroscopic techniques. Effective: 1997 Winter Quarter.

CHE 122—Chemistry of Nanoparticles (3)
Lecture—3 hours. Prerequisite(s): CHE 110C (can be concurrent) or CHE 107B (can be concurrent) Chemical and physical aspects of inorganic nanoparticles. Topics include synthesis, structure, colloidal behavior, catalytic activity, size and shape dependency of physical properties, analytical methods and applications. Effective: 2016 Winter Quarter.

CHE 124A—Inorganic Chemistry: Fundamentals (3)
Lecture—3 hours. Prerequisite(s): CHE 002C or CHE 002CH Symmetry, molecular geometry and structure, molecular orbital theory of bonding (polyatomic molecules and transition metals), solid state chemistry, energetics and spectroscopy of inorganic compounds. GE credit: SE. Effective: 2016 Fall Quarter.

CHE 124B—Inorganic Chemistry: Main Group Elements (3)
Lecture—3 hours. Prerequisite(s): CHE 124A Synthesis, structure and reactivity of inorganic and heteroorganic
molecules containing the main group elements. Effective: 1997 Winter Quarter.

CHE 124C—Inorganic Chemistry: d and f Block Elements (3)
Lecture—3 hours. Prerequisite(s): CHE 124A Synthesis, structure and reactivity of transition metal complexes,
organometallic and bioinorganic chemistry, the lanthanides and actinides. Effective: 1997 Winter Quarter.

CHE 124L—Laboratory Methods in Inorganic Chemistry (2)
Laboratory—6 hours. Prerequisite(s): CHE 124B or CHE 124C (can be concurrent) The preparation, purification and characterization of main group and
transition metal inorganic and organometallic compounds. Effective: 2000 Spring Quarter.

CHE 125—Advanced Methods in Physical Chemistry (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): CHE 110C (can be concurrent); CHE 115 Advanced theory and laboratory techniques in analytical and physical chemistry. Advanced spectroscopic methods. Thermodynamics. Kinetics.
Chemical literature. Digital electronics and computer interfacing. Laboratory measurements and vacuum techniques. GE credit: QL, SE, WE. Effective: 2000 Spring Quarter.

CHE 128A—Organic Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 002C C or better or CHE 002CH C or better Introduction to the basic concepts of organic chemistry with emphasis on stereochemistry and the chemistry of hydrocarbons. Designed primarily for majors in chemistry. Chemistry majors should enroll in course 129A concurrently. Only two units credit allowed for students who have completed CHE 008A; not open for credit to students who have completed courses CHE 008B or 118A. GE credit: SE. Effective: 2017 Winter Quarter.

CHE 128B—Organic Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 128A; or Consent of Instructor. Continuation of course 128A with emphasis on the chemistry of alcohols, ethers, their sulfur analogs, and carbonyl compounds. Introduction to the application of spectroscopic methods to organic chemistry. Introduction to synthesis of moderately complex organic molecules. Full credit to students who completed CHE 008B or CHE 118A; not open for credit to students who have completed CHE 118B. GE credit: SE. Effective: 2017 Winter Quarter.

CHE 128C—Organic Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 128B Continuation of course 128B with emphasis on enolate condensations and the chemistry of amines, phenols, and sugars; selected biologically important compounds. Full credit to students who completed CHE 118B; Not open for credit to students who have completed CHE 118C. GE credit: SE. Effective: 2017 Winter Quarter.

CHE 129A—Organic Chemistry Laboratory (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): (CHE 002C C or better or CHE 002CH C or better); CHE 128A (can be concurrent) Introduction to laboratory techniques of organic chemistry. Emphasis on methods used for separation and purification of organic compounds. Full credit to students who completed CHE 008B; not open for credit to students who have completed CHE 118B. GE credit: SE. Effective: 2017 Winter Quarter.

CHE 129B—Organic Chemistry Laboratory (2)
Laboratory—6 hours. Prerequisite(s): CHE 129A; CHE 128B (can be concurrent) Continuation of course 129A. Emphasis on methods used for synthesis and isolation of organic compounds. Not open for credit to students who have completed CHE 118C. GE credit: SE. Effective: 2017 Winter Quarter.

CHE 129C—Organic Chemistry Laboratory (2)
Laboratory—6 hours. Prerequisite(s): CHE 128C (can be concurrent); CHE 129B continuation of course 129B Effective: 1997 Winter Quarter.

CHE 130A—Pharmaceutical Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 118C or CHE 128C Examination of the design principles and experimental methods used in pharmaceutical and medicinal chemistry. Effective: 2006 Fall Quarter.

CHE 130B—Pharmaceutical Chemistry (3)
Lecture—2 hours; Lecture/Lab—1 hour. Prerequisite(s): CHE 130A (can be concurrent) Continuation of course 130A with emphasis on case studies of various drugs and the use of computational methods in drug design. Effective: 2017 Spring Quarter.

CHE 130C—Case Studies in Pharmaceutical Chemistry (1)
Independent Study; Seminar—2 hours. Prerequisite(s): CHE 130A (can be concurrent); CHE 130B (can be concurrent) Seminar. Exploration of medicinal and pharmaceutical chemistry topics through seminars presented by professional chemists (and allied professionals). Designed to highlight career opportunities for students with a degree in pharmaceutical chemistry. (P/NP grading only.) Effective: 2017 Spring Quarter.

CHE 131—Modern Methods of Organic Synthesis (3)
Lecture—3 hours. Prerequisite(s): CHE 128C or CHE 118C Introduction to modern synthetic methodology in organic chemistry with emphasis on retrosynthetic analysis, reaction mechanisms, and application to multistep syntheses of pharmaceuticals and natural products. GE credit: SE. Effective: 2016 Fall Quarter.

CHE 135—Advanced Bio-organic Chemistry Laboratory (3)
Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): CHE 130B (can be concurrent) Separation, purification, identification and biological evaluation of organic compounds using modern methods of synthesis, computational chemistry and instrumentation. Emphasis on pharmaceutical and medicinal substances. Effective: 2017 Fall Quarter.

CHE 145—Good Quality Practices (3)
Discussion—1 hour; Laboratory—6 hours. Prerequisite(s): CHE 118B or CHE 129B Open to Chemistry and science majors. Preparation for work in GQP laboratories in both research and industry. Context within GQP-Good Quality Practices (GMP Good Manufacturing Practice, GCP Good Clinical Practices). Lab practice in GQP skills. GE credit: SE. Effective: 2016 Winter Quarter.

CHE 150—Chemistry of Natural Products (3)
Lecture—3 hours. Prerequisite(s): CHE 118C or CHE 128C Chemistry of terpenes, steroids, acetogenins, and alkaloids: isolation, structure determination, biosynthesis, chemical transformations, and total synthesis. GE credit: SE. Effective: 2017 Winter Quarter.

CHE 192—Internship in Chemistry (1-6)
Internship—3-18 hours. Prerequisite(s): Upper division standing; project approval by faculty sponsor prior to enrollment. Supervised internship in chemistry; requires a final written report. May be repeated up to 6 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

CHE 194HA—Undergraduate Honors Research (2)
Independent Study—2 hours. Prerequisite(s): Open only to chemistry majors who have completed 135 units and who qualify for the honors program. Original research under the guidance of a faculty advisor, culminating in the writing of an extensive report. Effective: 1997 Winter Quarter.

CHE 194HB—Undergraduate Honors Research (2)
Independent Study—2 hours. Prerequisite(s): Open only to chemistry majors who have completed 135 units and who qualify for the honors program. Original research under the guidance of a faculty advisor, culminating in the writing of an extensive report. Effective: 1997 Winter Quarter.

CHE 194HC—Undergraduate Honors Research (2)
Independent Study—2 hours. Prerequisite(s): Open only to chemistry majors who have completed 135 units and who qualify for the honors program. Original research under the guidance of a faculty advisor, culminating in the writing of an extensive report. Effective: 2005 Fall Quarter.

CHE 195—Careers in Chemistry (1)
Seminar—2 hours. Prerequisite(s): Junior or senior standing in Chemistry. Designed to give Chemistry undergraduate students an in-depth appreciation of career opportunities with a bachelors degree in chemistry. Professional chemists (and allied professionals) describe research and provide career insights. (P/NP grading only.) Effective: 2001 Fall Quarter.

CHE 197—Projects in Chemical Education (1-4)
Discussion/Laboratory. Prerequisite(s): Consent of Instructor. Participation may include development of laboratory experiments, lecture demonstrations, autotutorial modules or assistance with laboratory sessions. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

CHE 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of instructor based upon adequate preparation in chemistry, mathematics and physics. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHE 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of instructor based upon adequate preparation in chemistry, mathematics, and physics. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHE 201—Chemical Uses of Symmetry and Group Theory (3)
Lecture—3 hours. Prerequisite(s): CHE 124A; CHE 110B; or Consent of Instructor. Symmetry elements and operations, point groups, representations of
groups. Applications to molecular orbital theory, ligand field theory, molecular vibrations, and angular momentum. Crystallographic symmetry. Effective: 1997 Winter Quarter.

CHE 204—Mathematical Methods in Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 110C Graduate standing in Chemistry. Introduction to mathematical and numerical methods in chemistry. Real and complex functions. Methods of integration. Differential equations. Linear algebra and matrices. Special functions. Integral transforms. Statistics. Effective: 2005 Fall Quarter.

CHE 205—Symmetry, Spectroscopy, and Structure (3)
Lecture—3 hours. Prerequisite(s): CHE 201; Or equivalent. Vibrational and rotational spectra; electronic spectra and photoelectron spectroscopy; magnetism; electron spin and nuclear quadrapole resonance spectroscopy; nuclear magnetic resonance spectroscopy; other spectroscopic methods. Effective: 1997 Winter Quarter.

CHE 209—Special Topics in Physical Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 210A; CHE 211A Graduate standing in Chemistry. Advanced topics in physical chemistry, biophysical chemistry or chemical physics chosen from areas of current research interest. May be repeated for credit when topics differ. Effective: 2005 Fall Quarter.

CHE 210A—Quantum Chemistry: Introduction and Stationary-State Properties (3)
Lecture—3 hours. Prerequisite(s): CHE 110B; CHE 110C; or Consent of Instructor. Stationary-state quantum chemistry: postulates of quantum mechanics,
simple solutions, central field problems and angular momenta, hydrogen atom, perturbation theory, variational theory, atoms and molecules. Effective: 1997 Winter Quarter.

CHE 210B—Quantum Chemistry: Time-Dependent Systems (3)
Lecture—3 hours. Prerequisite(s): CHE 210A Matrix mechanics and time-dependent quantum chemistry: matrix formulation of quantum mechanics, Heisenberg representation, time-dependent perturbation theory, selection rules, density matrices, and miscellaneous molecular properties. Effective: 1997 Winter Quarter.

CHE 210C—Quantum Chemistry: Molecular Spectroscopy (3)
Lecture—3 hours. Prerequisite(s): CHE 210B Molecular spectroscopy: Born-Oppenheimer approximation, rotational, vibrational and electronic spectroscopy, spin systems, and molecular photophysics. Effective: 1997 Winter Quarter.

CHE 211A—Advanced Physical Chemistry: Statistical Thermodynamics (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Principles and applications of statistical mechanics; ensemble theory; statistical thermodynamics of gases, solids, liquids, electrolyte solutions and polymers; chemical equilibrium. Effective: 1997 Winter Quarter.

CHE 211B—Statistical Mechanics (3)
Lecture—3 hours. Prerequisite(s): CHE 211A Statistical mechanics of nonequilibrium systems, including the rigorous kinetic theory of gases, continuum mechanics transport in dense fluids, stochastic processes, brownian motion and linear response theory. Effective: 1997 Winter Quarter.

CHE 212—Chemical Dynamics (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Introduction to modern concepts in chemical reaction dynamics for graduate students in chemistry. Emphasis will be placed on experimental techniques as well as emerging physical models for characterizing chemical reactivity at a microscopic level. Effective: 1997 Winter Quarter.

CHE 215—Theoretical and Computational Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 211A; CHE 210B; or Consent of Instructor. Mathematics of wide utility in chemistry, computational methods for guidance or alternative to experiment, and modern formulations of chemical theory. Emphasis will vary in successive years. May be repeated for credit. Effective: 1997 Winter Quarter.

CHE 216—Magnetic Resonance Spectroscopy (3)
Lecture—3 hours. Prerequisite(s): CHE 210A; CHE 210B (can be concurrent) Quantum mechanics of spin and orbital angular momentum, nuclear magnetic resonance, theory of chemical shift and multiplet structures, electron spin resonance, theory of gtensor in organic and transition ions, spin Hamiltonians, nuclear quadrupolar resonance, spin relaxation processes. Effective: 1997 Winter Quarter.

CHE 217—X-Ray Structure Determination (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Introduction to x-ray structure determination; crystals, symmetry, diffraction geometry, sample preparation and handling, diffraction apparatus and data collection, methods of structure solution and refinement, presentation of results, text, tables and graphics,
crystallographic literature. Effective: 1997 Winter Quarter.

CHE 218—Macromolecules: Physical Principles (3)
Lecture—3 hours. Prerequisite(s): CHE 110A; CHE 110B; CHE 110C; Or equivalent. Relationship of higher order macromolecular structure to subunit composition; equilibrium properties and macromolecular dynamics; physical chemical determination of macromolecular structure. Effective: 2001 Winter Quarter.

CHE 219—Spectroscopy of Organic Compounds (4)
Laboratory—2.5 hours; Lecture—3 hours. Prerequisite(s): CHE 128C; Or equivalent. Identification of organic compounds and investigation of stereochemical and reaction mechanism phenomena using spectroscopic methods--principally NMR, IR and MS. Effective: 2006 Fall Quarter.

CHE 219L—Laboratory in Spectroscopy of Organic Compounds (1)
Laboratory—2.5 hours. Prerequisite(s): CHE 219 (can be concurrent) Restricted to Chemistry graduate students only or consent of instructor Practical application of NMR, IR and MS techniques for organic molecules. Effective: 2009 Summer Session 1.

CHE 221A—Special Topics in Organic Chemistry (3)
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. Effective: 1997 Winter Quarter.

CHE 221B—Special Topics in Organic Chemistry (3)
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. Effective: 1997 Winter Quarter.

CHE 221C—Special Topics in Organic Chemistry (3)
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. Effective: 1997 Winter Quarter.

CHE 221D—Special Topics in Organic Chemistry (3)
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. Effective: 1997 Winter Quarter.

CHE 221E—Special Topics in Organic Chemistry (3)
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. Effective: 1997 Winter Quarter.

CHE 221F—Special Topics in Organic Chemistry (3)
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. Effective: 1997 Winter Quarter.

CHE 221G—Special Topics in Organic Chemistry (3)
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. Effective: 1997 Winter Quarter.

CHE 221H—Special Topics in Organic Chemistry (3)
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. Effective: 1997 Winter Quarter.

CHE 222—Chemistry of Nanoparticles (3)
Lecture/Discussion—3 hours. Prerequisite(s): CHE 110C; Or equivalent. Chemical and physical aspects of inorganic nanoparticles, including synthesis, purification, reactivity, characterization, and applications for technology. Emphasis is on problems from the current literature. Not open for credit to students who have taken CHE 122. Effective: 2009 Winter Quarter.

CHE 226—Principles of Transition Metal Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 124A; or equivalent. Electronic structures, bonding, and reactivity of transition metal compounds. Effective: 1997 Winter Quarter.

CHE 228A—Bio-inorganic Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 226; or Consent of Instructor. Defines role of inorganic chemistry in the functioning of biological systems by identifying the functions of metal ions and main group compounds in biological systems and discussing the chemistry of model and isolated biological compounds. Offered every third year. Effective: 1997 Winter Quarter.

CHE 228B—Main Group Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 226; or Consent of Instructor. Synthesis, physical properties, reactions and bonding of main group compounds. Discussions of concepts of electron deficiency, hypervalency,
and non-classical bonding. Chemistry of the main group elements will be treated systematically. Offered every third year. Effective: 1997 Winter Quarter.

CHE 228C—Solid-State Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 124A; CHE 110B; CHE 226; Or equivalent. Design and synthesis, structure and bonding of solid-state compounds; physical properties and characterization of solids; topics of current interest such as low-dimensional materials, inorganic polymers, materials for catalysis. Offered every third year. Effective: 1997 Winter Quarter.

CHE 228D—Homogeneous Catalysis (3)
Lecture—3 hours. Prerequisite(s): CHE 226 Overview of homogeneous catalysis and related methods, with emphasis on kinetics, mechanisms, and applications for organic synthesis. The related methods may include cluster, colloid, phase transfer, enzymatic, heterogeneous and polymer-supported catalysis. Offered every third year. Effective: 2001 Fall Quarter.

CHE 228E—Magnetochemistry (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): CHE 124A or CHE 201; Or an equivalent class from either Physics or Chemical Engineering and Materials Science. Covers the basic principles and concepts of magnetism, methods used for characterization of magnetic properties, as well as specific state-of-the-art magnetic materials and topics from the recent chemistry literature. Effective: 2016 Winter Quarter.

CHE 231A—Organic Synthesis: Methods and Strategies (4)
Discussion/Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 128C; Or equivalent. Current strategies and methods in synthetic organic chemistry. Focus on construction of carbon frameworks, control of relative and absolute stereochemistry and retrosynthetic strategies. Use of databases and molecular modeling software in multistep strategies. Effective: 2017 Winter Quarter.

CHE 231B—Advanced Organic Synthesis (3)
Lecture—3 hours. Prerequisite(s): CHE 231A Current strategies and methods in synthetic organic chemistry. Continuation of course 231A. Organic synthesis of complex target molecules. Stereochemical considerations and asymmetric synthesis. Organometallics for selective transformations. Carbocyclic and heterocyclic ring formation. Effective: 2016 Fall Quarter.

CHE 233—Physical-Organic Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 128A; CHE 128B; CHE 128C; CHE 110A; CHE 110B; CHE 110C; Or equivalent. Introduction to elementary concepts in physicalorganic chemistry including the application of simple numerical techniques in characterizing and modeling organic reactions. Effective: 1997 Winter Quarter.

CHE 235—Organometallic Chemistry in Organic Synthesis (3)
Lecture—3 hours. Prerequisite(s): CHE 128C Current trends in use of organometallics for organic synthesis; preparations, properties, applications, and limitations of organometallic reagents derived from transition and/or main group metals. Effective: 1997 Winter Quarter.

CHE 236—Chemistry of Natural Products (3)
Lecture—3 hours. Prerequisite(s): CHE 128C; Or equivalent. Advanced treatment of chemistry of naturally occurring compounds isolated from a variety of sources. Topics will include isolation, structure determination, chemical transformations, total synthesis,
biological activity, and biosynthesis. Biosynthetic origin will be used as a unifying theme. Effective: 1997 Winter Quarter.

CHE 237—Bio-organic Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 128C; Or equivalent. Structure and function of biomolecules; molecular recognition; enzyme reaction mechanisms; design of suicide substrates for enzymes; enzyme engineering; design of artificial enzymes and application of enzymes in organic synthesis. Effective: 1997 Winter Quarter.

CHE 238—Introduction to Chemical Biology (3)
Lecture—3 hours. Prerequisite(s): CHE 118C or CHE 128C; Or equivalent; CHE 130A, CHE 130B and BIS 102, BIS 103, and BIS 104, or the equivalents recommended. Synthesis of complex molecules in nature. Use of biosynthetic pathways in synthesis of new chemical entities. Applications of small molecules in chemical genetics and structural biology. Solving biological problems using synthetic biomolecules. Effective: 2009 Winter Quarter.

CHE 240—Advanced Analytical Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 110A; CHE 115; Or equivalent. Numerical treatment of experimental data; thermodynamics of electrolyte and non-electrolyte solutions; complex equilibria in aqueous and non-aqueous solutions; potentiometry and specific ion electrodes; mass transfer in liquid solutions; fundamentals of separation science, including column, gas and liquid chromatography. Effective: 1997 Winter Quarter.

CHE 241A—Surface Analytical Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 110C; Or equivalent. Concepts of surfaces and interfaces: physical properties, unique chemistry and electronic effects. Focus on gas-solid interfaces, with some discussion of liquid-solid interfaces. Effective: 2002 Fall Quarter.

CHE 241B—Laser and X-ray Spectroscopy (3)
Lecture—3 hours. Prerequisite(s): CHE 110B; Or equivalent. Concepts and mechanisms of light-matter interactions. Chemical applications of modern spectroscopic methods, including multiphoton spectroscopy, time-resolved laser and x-ray photolysis, and phase-contrast x-ray imaging. Effective: 2002 Fall Quarter.

CHE 241C—Mass Spectrometry (3)
Lecture—3 hours. Prerequisite(s): CHE 110C; CHE 115; Or equivalent. Mass spectrometry and related methods with emphasis on ionization methods, mass analyzers, and detectors. Related methods may include ion-molecule reactions, unimolecular dissociation of organic and bio-organic compounds, and applications in biological and environmental analysis. Effective: 2002 Winter Quarter.

CHE 241D—Electroanalytical Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 110C; CHE 115; Or equivalent. Electroanalytical chemistry with consideration of mass transfer and electrode kinetics for polarizable electrodes. Current-potential curves for a variety of conditions, including both potentiostatic and galvanostatic control, and their application in chemical analysis. Effective: 2002 Winter Quarter.

CHE 241E— Microscopy and Imaging Techniques (3)
Lecture—3 hours. Prerequisite(s): CHE 110C; CHE 115; Or equivalent. Introduction to modern microscopy and imaging techniques: scanning tunneling, atomic force, far-field optical, fluorescence, scanning near-field optical, and scanning electron microscopy. Application to nanoscience and analytical and bioanalytical chemistry. Some laboratory demonstrations. Effective: 2002 Fall Quarter.

CHE 245—Mechanistic Enzymology (3)
Lecture—3 hours. Advanced topics in chemical kinetics relevant to enzymes, enzyme kinetics, theory of enzyme catalysis, and the analysis of a selection of organic enzyme reaction mechanisms by the tools introduced in the first part of the course. Effective: 2013 Fall Quarter.

CHE 261—Current Topics in Chemical Research (2)
Lecture—2 hours. Prerequisite(s): Graduate standing in Chemistry or consent of instructor. Designed to help chemistry graduate students develop and maintain
familiarity with the current and past literature in their immediate field of research and related areas. May be repeated for credit when topics differ. Effective: 1997 Winter Quarter.

CHE 263—Introduction to Chemical Research Methodology (3)
Discussion/Laboratory—9 hours. Prerequisite(s): CHE 293; and Consent of Instructor. Graduate student standing in Chemistry. Introduction to identification, formulation, and solution of meaningful
scientific problems including experimental design and/or theoretical analyses of new and prevailing techniques, theories and hypotheses. May be repeated for credit when topic differs. (S/U grading only.) Effective: 1997 Winter Quarter.

CHE 264—Advanced Chemical Research Methodology (6)
Discussion/Laboratory—18 hours. Prerequisite(s): CHE 263; or Consent of Instructor. Applications of the methodology developed in course 263 to experimental and theoretical studies. Advanced methods of interpretation of results are developed. Includes the preparation of manuscripts for publication. May be repeated for credit for credit when topic differs. (S/U grading only.) Effective: 1997 Winter Quarter.

CHE 290—Seminar (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

CHE 293—Introduction to Chemistry Research (1)
Discussion—2 hours. Designed for incoming graduate students preparing for higher degrees in chemistry. Group and individual discussion of research activities in the Department and research topic selection. (S/U grading only.) Effective: 1997 Winter Quarter.

CHE 294—Presentation of Chemistry Research (1)
Seminar—2 hours. Prerequisite(s): Graduate standing. Restricted to graduate students in Chemistry who have not yet given their departmental presentation. Introduces first- and second-year Chemistry graduate students to the process of giving an effective research presentation. Advanced Ph.D. students give formal seminars describing the design and execution of their research projects. May be repeated up to 3 time(s). (S/U grading only.) Effective: 2009 Winter Quarter.

CHE 295—Careers in Chemistry (1)
Seminar—2 hours. Prerequisite(s): Graduate standing in Chemistry. Designed to give Chemistry graduate students an in-depth appreciation of career opportunities with a M.S. or Ph.D. degree in chemistry. Professional chemists (and allied professionals) give seminars describing both research and career insights. May be repeated up to 3 time(s). (S/U grading only.) Effective: 2001 Fall Quarter.

CHE 296—Research in Pharmaceutical Chemistry (6)
Laboratory—18 hours. Prerequisite(s): CHE 130A; CHE 130B; CHE 135; CHE 233 (can be concurrent); and Consent of Instructor. Restricted to students in the Integrated B.S./M.S. Program in Chemistry. Laboratory provides qualified graduate students with the opportunity to pursue original investigation in Pharmaceutical Chemistry and allied fields in order to fulfill the letter-graded research requirement of the Integrated B.S./M.S. Program in Chemistry (Pharmaceutical Chemistry Emphasis). May be repeated up to 3 time(s) when topic differs. Effective: 2009 Fall Quarter.

CHE 298—Group Study (1-5)
Variable. Effective: 1997 Winter Quarter.

CHE 299—Research (1-12)
Variable. The laboratory is open to qualified graduate students who wish to pursue original investigation. Students wishing to enroll should communicate with the department well in advance of the quarter in which the work is to be undertaken. (S/U grading only.) Effective: 1997 Winter Quarter.

CHE 390—Methods of Teaching Chemistry (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): Consent of Instructor. Graduate student standing in Chemistry. Practical experience in methods and problems of teaching chemistry. Includes analyses of texts and supporting material, discussion of teaching techniques, preparing for and conducting of discussion sessions and student laboratories. Participation in the teaching program required for Ph.D. in chemistry. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

CHE 392—Advanced Methods of Teaching Chemistry (2)
Lecture—2 hours. Prerequisite(s): CHE 390 Advanced topics in teaching chemistry. Analysis and discussion of curricular design, curricula materials, teaching methods and evaluation. For students who are planning a career in teaching chemistry. (S/U grading only.) Effective: 1997 Winter Quarter.

Pharmacology & Toxicology (Graduate Group)

Pharmacology & Toxicology (Graduate Group) | PTX M.S

Kermit L. Carraway, Chairperson of the Group

Group Office. 4139 Meyer Hall (Department of Environmental Toxicology; 530-752-4516; http://ptx.ucdavis.edu/

Faculty. The more than 90 faculty in the graduate group represent at least 25 academic departments and organized research units within the College of Agricultural and Environmental Sciences, the College of Biological Sciences, the School of Medicine and the School of Veterinary Medicine.

Graduate Study. The program, which offers both the M.S. and Ph.D. degree, emphasizes an interdisciplinary approach that combines coursework and experimental training in modern approaches to pharmacological and toxicological problems. Areas of research span fundamental and translational research in a broad spectrum of areas within pharmacology and toxicology, including cardiovascular pharmacology, cancer therapeutics, neuropharmacology, drug discovery and design, neurotoxicology, pulmonary toxicology and environmental toxicology. Students complete core courses in pharmacology and toxicology and carry out research rotations during their first year of study. All Ph.D. students receive financial support. For detailed information on the program, contact the Group office, graduate advisors, or the Group chairperson.

Graduate Advisors. K. Carraway (Biochemistry & Molecular Medicine), A. Gelli (Pharmacology), R. Harper (Pulmonary Medicine), P. Henderson (Hematology & Oncology), M. Horne (Pharmacology), H. Knych (Molecular Biosciences), J.A. Last (Pulmonary Medicine), P. Lein (Molecular Biosciences), L. Miller (Anatomy, Physiology & Cell Biology), K. Pinkerton (Center for Health and Environment), B. Puschner (Molecular Biosciences), H. Wulff (Pharmacology)

Pharmacology & Toxicology (Graduate Group) | PTX Ph.D.

Kermit L. Carraway, Chairperson of the Group

Group Office. 4139 Meyer Hall (Department of Environmental Toxicology; 530-752-4516; http://ptx.ucdavis.edu/

Faculty. The more than 90 faculty in the graduate group represent at least 25 academic departments and organized research units within the College of Agricultural and Environmental Sciences, the College of Biological Sciences, the School of Medicine and the School of Veterinary Medicine.

Graduate Study. The program, which offers both the M.S. and Ph.D. degree, emphasizes an interdisciplinary approach that combines coursework and experimental training in modern approaches to pharmacological and toxicological problems. Areas of research span fundamental and translational research in a broad spectrum of areas within pharmacology and toxicology, including cardiovascular pharmacology, cancer therapeutics, neuropharmacology, drug discovery and design, neurotoxicology, pulmonary toxicology and environmental toxicology. Students complete core courses in pharmacology and toxicology and carry out research rotations during their first year of study. All Ph.D. students receive financial support. For detailed information on the program, contact the Group office, graduate advisors, or the Group chairperson.

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Pharmacology & Toxicology (Graduate Group) | PTX Courses

Additional courses that satisfy the breadth and depth requirements of the program are taught under departments of faculty in the group.

Courses in PTX:

PTX 201—Principles of Pharmacology and Toxicology I (5)
Lecture—5 hours. Prerequisite(s): BIS 102; NPB 101 First of three courses presenting fundamental principles of pharmacology and toxicology. Introductory overview of basic concepts in pharmacology/toxicology, followed by in-depth blocks on fate processes of chemicals in the body, fate processes in tissue selective responses, selective toxicity employed therapeutically. Effective: 1997 Fall Quarter.

PTX 202—Principles of Pharmacology and Toxicology II (4)
Lecture—4 hours. Prerequisite(s): PTX 201 The second of three courses presenting fundamental principles of pharmacology and toxicology. Principles of pharmacodynamics and mechanisms of drug/toxicant actions. Effective: 1999 Winter Quarter.

PTX 203—Principles of Pharmacology and Toxicology III (4)
Lecture—4 hours. Prerequisite(s): PTX 201; PTX 202 Integrated physiological systems, cardiovascular and nervous systems and how drugs and toxicants act to perturb function. Effective: 1999 Spring Quarter.

PTX 215—Electrophysiology Techniques and Applications (3)
Discussion—1.5 hours; Lecture—1.5 hours. Broad scope of topics in electrophysiology techniques and applications. (Molecular, Cellular and Integrative Physiology 215.) (S/U grading only.) Effective: 2015 Spring Quarter.

PTX 230—Advanced Topics in Pharmacology and Toxicology (1-3)
Discussion—1 hour; Lecture—1 hour; Seminar—1 hour. Prerequisite(s): PTX 201; and Consent of Instructor. In-depth coverage of selected topics for graduate students in Pharmacology-Toxicology and related disciplines. Topics determined by instructor in charge for each quarter. Effective: 1997 Winter Quarter.

PTX 277—Molecular Mechanisms in Cancer and other Diseases (3)
Lecture/Discussion—2 hours; Project (Term Project). Prerequisite(s): MCB 121 or MCB 122; Undergraduate or graduate introductory course in cell biology (such as BIS 104), and general biochemistry (MCB 121 or MCB 122) required; PTX 202 recommended. Restricted to graduate standing or consent of instructor. Exploration of cutting edge investigations on the underlying mechanisms of cancer biology, cancer therapy and other diseases. Current medical research in Cancer and other diseases, as it spans the bench to bedside. Effective: 2015 Winter Quarter.

PTX 290—Seminar (1)
Variable. Current topics in pharmacology and toxicology. (S/U grading only.) Effective: 1997 Winter Quarter.

PTX 290C—Advanced Research Conference (1)
Lecture/Discussion. Provide credit for participation in and attendance at research conferences. May be repeated up to 3 time(s). (S/U grading only.) Effective: 2011 Fall Quarter.

PTX 299—Research (1-12)
Research with a faculty member in the Pharmacology & Toxicology Graduate Group. May be repeated for credit. (S/U grading only.) Effective: 2003 Winter Quarter.

Philosophy

Philosophy | PHI Information

(College of Letters and Science)

James Griesemer, Ph.D., Chairperson of the Department

Department Office. 1240 Social Sciences & Humanities; philadmin@ucdavis.edu; http://philosophy.ucdavis.edu

Advising Office. 101 Young Hall; philadvising@ucdavis.edu; http://philosophy.ucdavis.edu

Faculty. http://philosophy.ucdavis.edu/directory-of-people/phi-faculty#c4=all&b_start=0

Philosophy | PHI A.B.

(College of Letters and Science)

James Griesemer, Ph.D., Chairperson of the Department

Department Office. 1240 Social Sciences & Humanities; philadmin@ucdavis.edu; http://philosophy.ucdavis.edu

Advising Office. 101 Young Hall; philadvising@ucdavis.edu; http://philosophy.ucdavis.edu

Faculty. http://philosophy.ucdavis.edu/directory-of-people/phi-faculty#c4=all&b_start=0

The Major Program

Philosophy addresses problems and questions that arise in all areas of human thought and experience and in all disciplines. Recurring questions about the nature of value, the good life, right conduct, knowledge, truth, language, mind, and reality are central to philosophical study. Philosophy also investigates the methodologies and assumptions of the major disciplines in the university in order to deepen our understanding of the sciences, of mathematics, art, literature, and history, and of religion and morality. It leads us to address issues about the nature of these subjects, about the methods of reasoning characteristic of them, and about the contributions they make to our understanding of ourselves and our world.

Philosophy contributes to the liberal education of its students. The department emphasizes an analytic approach to philosophical questions, which trains students to understand and evaluate arguments and to think and write precisely and clearly. These skills are of immense value in a variety of careers.

The Program. The Department of Philosophy offers its majors a choice among three options. The General Emphasis provides a broad view of the field of philosophy. It includes a breadth requirement at the lower division level while providing students wide choice in more advanced courses. The Pre-Law and Pre-Med Emphases include courses that provide philosophical perspective on law and medicine respectively and that also provide important preparation for professional school.

The Department offers courses in most areas of contemporary analytic philosophy including the theory of knowledge, metaphysics, logic, ethics, and political philosophy. In addition, upper division courses are offered in moral and political philosophy, and aesthetics, and in the philosophy of religion, of mind, of language, of mathematics, of law, and of the physical, biological and social sciences. The problems of philosophy have important roots in past. The history of philosophy is important not only as part of the heritage of educated persons, but also because it is relevant to contemporary issues. For these reasons, the department places great emphasis on the history of philosophy, providing courses on the major figures and traditions of western philosophy.

Faculty Advisor. Jan Szaif, Ph.D.

Career Alternatives. Students of philosophy learn to understand and evaluate arguments and to think and write precisely and clearly. These analytical skills are assets in any career. Many of our majors have pursued graduate study in philosophy and have become philosophers in their own right. Others have pursued academic careers in related disciplines in the humanities and social sciences. Philosophy majors are well prepared for law, business, or other professional schools and have found careers in computer programming, government service, teaching, the ministry, and social work. Those wishing to attend law school or medical school should considering pursuing the Pre-Law and Pre-Med emphases, respectively.

Honors Program. The department offers an honors program, which gives qualifying majors the opportunity to work closely with faculty and graduate students. Information can be obtained on the department website.

Courses for Non-Majors. Students majoring in most disciplines in the university will find courses relevant to their educational or career goals. PHI 001 is the introductory course for both majors and non-majors. PHI 005 teaches critical thinking. The following courses are recommended:

(1) Pre-law: 012, 014, 024,0 30, 102, 112, 115, 116, 118 and, especially, 119;
(2) Pre-medical: 014, 015, 030, 038, 108, 114, 115, 116;
(3) Business: 014, 102, 112, 114, 115, 116, 117, 118, 119;
(4) Social Policy: 014, 024, 101, 102, 114, 115, 116, 117, 118, 119, 120;
(5) Social Sciences: 012, 030, 031, 032, 101, 102, 103, 109, 118, 131;
(6) Physical Sciences: 012, 030, 031, 032, 101, 102, 107, 112, 131;
(7) Biological Sciences: 030, 031, 032, 038, 101, 102, 108, 120;
(8) Humanities and the Arts: 014, 021, 022, 024, 101, 102, 103, 105, 114, 116, 118, 123, 141 through 175;
(9) Agricultural and Environmental Science and Policy: 005, 014, 024, 030, 031, 114, 115, 116, 118, 120.

Department Activities. The Philosophy department sponsors a lecture series with well-known philosophers who present papers in their fields of expertise. The department also operates ongoing faculty and graduate student workshops. Undergraduate students are welcome to attend and join these discussions. Information can be obtained on the department website.

Graduate Study. The Department of Philosophy offers programs of study leading to the M.A. and Ph.D. degree. Detailed information may be obtained by writing to the Graduate Advisor.

Graduate Advisor. Cody Gilmore, Ph.D.

General Emphasis **Units:** 52

Preparatory Subject Matter

Choose one from any three areas:

(a) General Philosophy:

PHI 001	Introduction to Philosophy	4

(b) Ancient Philosophy:

PHI 021	Philosophical Classics of the Ancient Era	4

(c) Early Modern Philosophy:

PHI 022	Philosophical Classics of the Modern Era	4

(d) Philosophy of Mind:

PHI 013G	Minds, Brains, and Computers with Discussion	4

(e) Ethics

PHI 014	Ethical and Social Problems in Contemporary Society	4
PHI 015	Introduction to Bioethics	4
PHI 024	Introduction to Ethics	4

(f) Philosophy of Science:

PHI 030	Introduction to Philosophy of Science	4
PHI 031	Appraising Scientific Reasoning	4
PHI 032	Understanding Scientific Change	4
PHI 038	Introduction to Philosophy of Biology	4

(g) Philosophy of Language:

PHI 017	Language, Thought, and World	4

(h) Metaphysics:

PHI 101	Metaphysics	4

(i) Theory of Knowledge:

PHI 102	Theory of Knowledge	4

PHI 012	Introduction to Symbolic Logic	4

Depth Subject Matter

Upper division units in Philosophy

Note: PHI 101 and PHI 102 may not be counted toward both preparatory and depth subject matter units.

Pre-Law Emphasis **Units:** 52

Preparatory Subject Matter

Choose one:

PHI 014	Ethical and Social Problems in Contemporary Society	4
PHI 015	Introduction to Bioethics	4
PHI 016	Philosophical Foundations of American Democracy	4

PHI 005	Critical Reasoning	4
PHI 012	Introduction to Symbolic Logic	4
PHI 024	Introduction to Ethics	4

Depth Subject Matter

Choose three:

PHI 102	Theory of Knowledge	4
PHI 116	Ethical Theories	4
PHI 118	Political Philosophy	4
PHI 128	Rationality	4
PHI 189C	Special Topics in Philosophy; Theory of Knowledge	4
PHI 189F	Special Topics in Philosophy; Philosophy of Law	4

PHI 112	Intermediate Symbolic Logic	4
PHI 119	Philosophy of Law	4

Additional upper division elective units in philosophy.

Pre-Med Emphasis **Units:** 52

Preparatory Subject Matter

Choose one:

PHI 024	Introduction to Ethics	4
PHI 030	Introduction to Philosophy of Science	4
PHI 031	Appraising Scientific Reasoning	4
PHI 032	Understanding Scientific Change	4

PHI 012	Introduction to Symbolic Logic	4
PHI 015	Introduction to Bioethics	4
PHI 038	Introduction to Philosophy of Biology	4

Depth Subject Matter

Choose one:

PHI 107	Philosophy of the Physical Sciences	4
PHI 108	Philosophy of the Biological Sciences	4
PHI 128	Rationality	4
PHI 189I	Special Topics in Philosophy; Philosophy of Science	4

PHI 112	Intermediate Symbolic Logic	4
PHI 121	Bioethics	4

Additional upper division elective units in philosophy.

Note: Admission to medical schools requires additional coursework not included in the Pre-Med Emphasis.

Total: 52

Philosophy | PHI M.A.

(College of Letters and Science)

James Griesemer, Ph.D., Chairperson of the Department

Department Office. 1240 Social Sciences & Humanities; http://philosophy.ucdavis.edu

Graduate Advising Office. 1241 Social Sciences & Humanities; http://philosophy.ucdavis.edu

Faculty. http://philosophy.ucdavis.edu/directory-of-people/phi-faculty#c4=all&b_start=0

Graduate Study. The Department of Philosophy graduate program has both M.A. and Ph.D. "tracks." The M.A. track is designed for students who do not intend to pursue a Ph.D. in philosophy or who would benefit from enrolling first in a master's degree program. Students who enroll in the M.A. track may, however, later petition for admission to the Ph.D. track if they so desire.

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Graduate Advisor. Cody Gilmore, Ph.D.

Philosophy | PHI Ph.D.

(College of Letters and Science)

James Griesemer, Ph.D., Chairperson of the Department

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Graduate Study. The Department of Philosophy graduate program has both M.A. and Ph.D. "tracks." Students who aim to complete a Ph.D. should apply directly to the Ph.D. track, even if they have not yet earned an M.A. in philosophy. Ph.D. students may earn the M.A. while progressing toward completion of the Ph.D. requirements.

Graduate Advisor. Cody Gilmore, Ph.D.

Philosophy | PHI Minor

(College of Letters and Science)

James Griesemer, Ph.D., Chairperson of the Department

Department Office. 1240 Social Sciences & Humanities; philadmin@ucdavis.edu; http://philosophy.ucdavis.edu

Advising Office. 101 Young Hall; philadvising@ucdavis.edu; http://philosophy.ucdavis.edu

Faculty. http://philosophy.ucdavis.edu/directory-of-people/phi-faculty#c4=all&b_start=0

Students wishing to minor in Philosophy may choose a general minor or a minor specializing in logic. There are no specific courses required for the general minor, so students may create a program to suit their own interests. The range of choice in the logic specialization is limited to the courses listed.

Minor Advisor. Jan Szaif, Ph.D.

Philosophy—General **Units:** 20

Upper division units in philosophy.

PHI 012 may be substituted for four of the upper division units.

Philosophy—Logic **Units:** 20

PHI 012	Introduction to Symbolic Logic	4
OR		
MAT 108	Introduction to Abstract Mathematics	4
PHI 112	Intermediate Symbolic Logic	4

Choose 12 units:

PHI 113	Metalogic	4
PHI 131	Philosophy of Logic and Mathematics	4
PHI 134	Modal Logic	4

PHI 135	Alternative Logics	4
PHI 189K	Special Topics in Philosophy; Logic	4

Total: 20

Philosophy | PHI Courses

Courses in PHI:

PHI 001—Introduction to Philosophy (4)
Discussion—1 hour; Lecture—3 hours. Problems of philosophy through major writings from various periods.
Problems are drawn from political, aesthetic, religious, metaphysical, and epistemological concerns of philosophy. GE credit: AH, WE. Effective: 1997 Winter Quarter.

PHI 005—Critical Reasoning (4)
Discussion—1 hour; Lecture—3 hours. Criteria of good reasoning in everyday life and in science. Topics to be covered may include basic principles of deduction and induction; fallacies in reasoning; techniques and aids to reasoning; principles of scientific investigation; aids to clarity. Not open for credit to students who have completed PHI 006. GE credit: WE. Effective: 1997 Winter Quarter.

PHI 007—Philosophical Perspectives on Sexuality (3)
Lecture—3 hours. Philosophical issues related to sexuality, including, but not limited to, ethical and social issues regarding sexual practice, orientation, classification and identity. GE credit: AH. Effective: 2013 Winter Quarter.

PHI 007Y—Philosophical Perspectives on Sexuality (3)
Discussion—1 hour; Web Virtual Lecture—1.5 hours. Philosophical issues related to sexuality, including, but not limited to, ethical and social issues regarding sexual practice, orientation, classification and identity. Not open for credit to students who have completed PHI 007. GE credit: AH, DD. Effective: 2015 Winter Quarter.

PHI 010—Introduction to Cognitive Science (4)
Lecture/Discussion—4 hours. Pass One open to Cognitive Science majors only. Introduction to the interdisciplinary cognitive scientific approach to the study of mind, drawing concepts and methods from psychology, philosophy, linguistics, artificial intelligence, and other disciplines. (CGS 001) GE credit: SE, SL. Effective: 2017 Fall Quarter.

PHI 011—Asian Philosophy (4)
Discussion—1 hour; Lecture—3 hours. Survey of the main philosophical systems of south and east Asia: Hinduism, Buddhism, Confucianism, and Taoism. Topics include the nature of reality, including God, the universe and the human self, human knowledge, and the proper conduct of human life. GE credit: AH, WC, WE. Effective: 2014 Fall Quarter.

PHI 012—Introduction to Symbolic Logic (4)
Discussion—1 hour; Lecture—3 hours. Syntax and semantics of the symbolic language sentence logic. Symbols of sentence logic. Translation between sentence logic and English. Truth table interpretation of sentence logic. Proof techniques. Application of truth tables and proof techniques to arguments in English. Not open for credit to students who have taken PHI 112, PHI 113, PHI 134, or PHI 135 and passed with a grade of C or better. GE credit: AH. Effective: 2011 Summer Session 1.

PHI 013—Minds, Brains, and Computers (3)
Lecture—3 hours. Computational theories of the nature of the mind. The mind as a computer process. The possibility of machine intelligence, consciousness, and mentality. Not open for credit for students who have completed PHI 013G for four units. GE credit: SE, SL, SS. Effective: 2014 Fall Quarter.

PHI 013G—Minds, Brains, and Computers with Discussion (4)
Discussion—1 hour; Lecture—3 hours. Computational theories of the nature of the mind. The mind as a computer process. The possibility of machine intelligence, consciousness, and mentality. Not open for credit for students who have completed PHI 013. GE credit: AH, SE, SL, WE. Effective: 2014 Fall Quarter.

PHI 014—Ethical and Social Problems in Contemporary Society (4)
Discussion—1 hour; Lecture—3 hours. Philosophical issues and positions involved in contemporary moral and social problems. Possible topics include civil disobedience and revolution, racial and sex discrimination, environment, population control, technology and human values, sexual morality, freedom in society. GE credit: AH, WE. Effective: 1997 Spring Quarter.

PHI 015—Introduction to Bioethics (4)
Discussion—1 hour; Lecture—3 hours. Critical analysis of normative issues raised by contemporary medicine and biology. Possible topics include euthanasia, reproductive technologies, genetic engineering, informed consent and patient autonomy, experimentation on human subjects and non-human animals. GE credit: AH, WE. Effective: 2016 Spring Quarter.

PHI 016—Philosophical Foundations of American Democracy (4)
Discussion—1 hour; Lecture—3 hours. The philosophical underpinnings of democratic government and the tension between the goals of providing security and of preserving democracy and civil liberties. Illustration of the tension through focus on issues related to war and terrorism. GE credit: ACGH, AH, WE. Effective: 2009 Fall Quarter.

PHI 017—Language, Thought, and World (4)
Discussion—1 hour; Lecture—3 hours. Puzzles in the philosophy of language, such as what language is, how language conveys thoughts, whether we each speak our own private language, and what we can learn about the world by studying language. GE credit: SS, WE. Effective: 2007 Fall Quarter.

PHI 021—Philosophical Classics of the Ancient Era (4)
Discussion—1 hour; Lecture—3 hours. Survey of ancient Western philosophy with special attention to the Pre-Socratics, Plato, Aristotle, and the Sceptics. GE credit: AH, WE. Effective: 2017 Spring Quarter.

PHI 022—Philosophical Classics of the Modern Era (4)
Discussion—1 hour; Lecture—3 hours. Survey of modern Western philosophy, including Descartes, Locke, Hume, and Kant. GE credit: AH, WE. Effective: 2017 Spring Quarter.

PHI 024—Introduction to Ethics (4)
Discussion—1 hour; Lecture—3 hours. Reading of historical and contemporary philosophical works in ethics. Topics include the nature of morality, the justification of moral claims, and major ethical theories, such as consequentialist, deontological, and virtue theories. GE credit: AH, WE. Effective: 2014 Fall Quarter.

PHI 030—Introduction to Philosophy of Science (4)
Discussion—1 hour; Lecture—3 hours. Not open for credit to students who have taken course 104. Basic problems in the philosophy of science, common to the physical, biological, and social sciences. Analysis of explanation, confirmation theory, observational and theoretical terms, the nature of theories, operationalism and behaviorism, realism, reduction. GE credit: AH, SE, SL, WE. Effective: 2000 Fall Quarter.

PHI 031—Appraising Scientific Reasoning (4)
Discussion—1 hour; Lecture—3 hours. Introduction to scientific hypotheses and the kinds of reasoning used to justify such hypotheses. Emphasis on adequate justification, criteria, and strategies for distinguishing scientific from pseudoscientific theories. Concrete historical and contemporary cases. GE credit: AH, SE, SL, WE. Effective: 1997 Winter Quarter.

PHI 032—Understanding Scientific Change (4)
Discussion—1 hour; Lecture—3 hours. Concepts of scientific change in historical and philosophical perspective. Survey of models of growth of knowledge, 17th century to present. Relationship between logic of theories and theory choice. Kuhns revolution model. Examples from various sciences. GE credit: AH, SE, WE. Effective: 1997 Winter Quarter.

PHI 038—Introduction to Philosophy of Biology (4)
Discussion—1 hour; Lecture—3 hours. Non-technical introduction to philosophical, social, and scientific ideas, methods and technologies in contemporary biological fields such as evolution, genetics, molecular biology, ecology, behavior. Philosophical consideration of determinism, reductionism, explanation, theory, modeling, observation, experimentation. Evaluation of scientific explanations of human nature. GE credit: AH, SE, SL, WE. Effective: 2001 Spring Quarter.

PHI 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHI 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHI 101—Metaphysics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): One course in Philosophy recommended. Theories of being. Such topics as reality, substance, universals, space, time, causality, becoming, body, experience, persons, freedom, and determinism. Views of the nature and method of metaphysics. Anti-metaphysical arguments. GE credit: AH, WE. Effective: 1997 Winter Quarter.

PHI 102—Theory of Knowledge (4)
Discussion; Extensive Writing; Lecture—3 hours. Prerequisite(s): One course in philosophy recommended. Analysis of the concept of knowledge. The relation between knowledge, belief and truth. Development of foundationalist, coherentist and externalist theories of justified belief. Examination of skepticism. GE credit: AH, WE. Effective: 2016 Fall Quarter.

PHI 103—Philosophy on Mind (4)
Lecture/Discussion—3 hours; Term Paper. The relation between mind and body, our knowledge of other minds, and the explanation of mental acts. Discussion of such concepts as action, intention, and causation. GE credit: AH, WE. Effective: 1997 Winter Quarter.

PHI 104—The Evolution of Mind (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): One previous course in Philosophy recommended. Interpretation of human thought and behavior through the lens of evolutionary theory. Topics include the nature/nurture debate concerning cognitive and other mental capacities and traits, and the interaction between evolution, learning and development. GE credit: SS, WE. Effective: 2016 Fall Quarter.

PHI 105—Philosophy of Religion (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): One course in Philosophy recommended. Logical, metaphysical, epistemological, and existential aspects of selected religious concepts and problems. GE credit: AH, WE. Effective: 1997 Winter Quarter.

PHI 107—Philosophy of the Physical Sciences (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): One Philosophy course or a science background recommended. Nature of testability and confirmation of scientific hypotheses; nature of scientific laws, theories, explanations, and models. Problems of causality, determininism, induction, and probability; the structure of scientific revolutions. GE credit: AH, SE, WE. Effective: 1997 Winter Quarter.

PHI 108—Philosophy of the Biological Sciences (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): One course in Biology or one course in Philosophy recommended. Scientific method in biology. Nature of biological theories, explanations, and models. Problems of evolutionary theory, ecology, genetics, and sociobiology. Science and human values. GE credit: AH, SE, SL, WE. Effective: 2016 Fall Quarter.

PHI 109—Philosophy of the Social Sciences (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): One course in Philosophy or a social science recommended. The nature of the social sciences, their subject matter and methods. Similarities to and differences from natural and life sciences. Predicting and explaining human behavior. Behaviorism. Reduction, holism, and individualism. Related moral issues. The social sciences and philosophy. GE credit: AH, SS, WE. Effective: 1997 Winter Quarter.

PHI 111—Philosophy of Space and Time (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): One upper division Philosophy course recommended. Philosophical problems of space and time. The philosophical implications of space-time theories, such as those of Newton and Einstein. Topics may
include the nature of geometry, conventionalism, absolutist versus relationist views of space and time, philosophical impact of relativity theory. GE credit: AH, WE. Effective: 2016 Fall Quarter.

PHI 112—Intermediate Symbolic Logic (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PHI 012 C- or better; or Consent of Instructor. Predicate logic syntax and semantics. Transcription between predicate logic and English. Models, truth-trees, and derivations. Identity, functions, and definite descriptions. Introduction to concepts of metatheory. GE credit: AH. Effective: 2018 Winter Quarter.

PHI 113—Metalogic (4)
Lecture/Discussion—4 hours. Prerequisite(s): PHI 112; MAT 108; Or the equivalent. The metalogic of classical propositional and first-order predicate logic. Consistency, soundness and completeness of both propositional and predicate logic. The Löwenheim-Skolem theorem for predicate logic. Undecidablity of predicate logic. GE credit: AH. Effective: 2006 Fall Quarter.

PHI 114—History of Ethics (4)
Lecture/Discussion—4 hours. Prerequisite(s): One previous Philosophy course recommended. Study of some classic texts from the history of philosophical writing on central problems of ethics, taking the form either of a survey or concentrated examination of selected historical figures. Readings from such philosophers as Aristotle, Butler, Hume, Kant, Mill. GE credit: AH, WE. Effective: 2016 Fall Quarter.

PHI 115—Problems in Normative Ethics (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): One previous course in Philosophy recommended. Moral philosophy studied through examination of moral problems and the moral principles and common sense intuitions that bear on them. Problems discussed may include: animal rights, fetal rights, euthanasia, justice and health care, war, nuclear deterrence, world hunger, environmental protection. GE credit: AH, WE. Effective: 2016 Fall Quarter.

PHI 116—Ethical Theories (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): One course in ethics recommended. Study of fundamental concepts and problems in ethical theory through an examination of classical and contemporary philosophical theories of ethics. Among the theories that may be discussed are utilitarianism, virtue theory, theories of natural rights, Kantian ethical theory, and contractarianism. GE credit: AH, WE. Effective: 2016 Fall Quarter.

PHI 117—Foundations of Ethics (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): PHI 114, 115, 116, 101, or 137 recommended. Advanced investigation of questions about the nature and foundations of morality. Among the topics that may be discussed are moral realism and
anti-realism, cognitivism and non-cognitivism, types of relativism, moral skepticism, normative language and normative belief. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 118—Political Philosophy (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): One course in philosophy recommended. Intensive examination of some central concepts of political thought such as the state, sovereignty, rights, obligation, freedom, law, authority, and responsibility. GE credit: AH, SS, WE. Effective: 2017 Winter Quarter.

PHI 119—Philosophy of Law (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. One course in philosophy recommended. Philosophical theories of the nature of law, legal obligation, the relation of law and morals. Problems for law involving liberty and justice: freedom of expression, privacy, rights, discrimination and fairness, responsibility, and punishment. GE credit: AH, SS, WE. Effective: 2017 Winter Quarter.

PHI 120—Environmental Ethics (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One course in Philosophy recommended. Conceptual and ethical issues concerning the environment. Extension of ethical theory to animals, all life, and ecosystem wholes. Topics may include contemporary environmental issues such as global warming, sustainability and biodiversity. Not open for credit for students who have completed PHI 115 prior to fall 2011. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 121—Bioethics (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): PHI 015 recommended. In-depth coverage of topics in bioethics including resource allocation, measures of health and disease/disability, public health, and ethical issues related to research on human subjects and emerging technologies. GE credit: AH, WE. Effective: 2016 Spring Quarter.

PHI 123—Aesthetics (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): One course in Philosophy recommended. Nature of art, of artistic creation, of the work of art, and of aesthetic experience; nature and validity of criticism; relations of art to its environment. GE credit: AH, WE. Effective: 1997 Winter Quarter.

PHI 125—Theory of Action (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): One course in Philosophy recommended. Survey of prominent contemporary approaches to leading problems in action theory. Problems include issues about the nature of intentional action and the conceptual character of explanations of actions in terms of the agent's reasons. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 128—Rationality (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One course in Philosophy recommended. Philosophical issues concerning rationality in its various forms. Focus is on theoretical and practical reasoning and conditions for rational belief, choice, and action. Possible additional topics include rationality and human limitations; paradoxes of rationality; varieties of irrationality; rationality and objectivity. GE credit: AH. Effective: 2017 Winter Quarter.

PHI 129—Knowledge and the A Priori (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One course in Philosophy recommended. Self-evidence, intuition, the (in)fallibility and (in)defeasibility of a priori methods. Analytic, formalist and Kantian accounts of how knowledge can be acquired through reasoning and intuition alone, without recourse to empirical methods. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 131—Philosophy of Logic and Mathematics (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): PHI 012; Or one course for credit in mathematics. Nature of formal systems and mathematical theories. Selected topics include logical and semantical paradoxes; foundations of mathematics; set theory, type theory, and intuitionistic theory; philosophy of geometry; philosophical implications of Gödels incompleteness results. GE credit: AH, WE. Effective: 1997 Winter Quarter.

PHI 133—Logic, Probability, and Artificial Intelligence (4)
Lecture/Discussion—4 hours. Prerequisite(s): PHI 012; PHI 112 Introduction to theoretical artificial intelligence with a focus on nonmonotonic logic, Bayesian networks, and learning theory. Effective: 2016 Fall Quarter.

PHI 134—Modal Logic (4)
Lecture/Discussion—4 hours. Prerequisite(s): PHI 112 or MAT 108; Or the equivalent. Survey of the main systems of modal logic, including Lewis systems S4 and S5. Possible worlds semantics and formal proofs. Applications to epistemology, ethics, or temporality. GE credit: AH. Effective: 1998 Spring Quarter.

PHI 135—Alternative Logics (4)
Lecture/Discussion—4 hours. Prerequisite(s): PHI 012 or MAT 108; Or the equivalent. Alternatives to standard truth-functional logic, including many-valued logics, intuitionist logics, relevance logics, and non-monotonic logics. GE credit: AH. Effective: 1997 Winter Quarter.

PHI 136—Formal Epistemology (4)
Lecture/Discussion—4 hours. Prerequisite(s): PHI 012 Formal (mathematical) approaches to belief revision, knowledge and deduction, meta-knowledge, (multi-agent) epistemic logic, Bayesian confirmation, Bayes nets, epistemic and probabilistic paradoxes. GE credit: AH. Effective: 2014 Fall Quarter.

PHI 137A—Philosophy of Language: Theory of Reference (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One course in Philosophy or Linguistics recommended. Survey of issues and views concerning reference, or how words refer to things. Topics include names and descriptions, the distinction between sense and reference, the puzzle of non-referring terms, causal theories of reference, and possibility and necessity. Only two units of credit for students who have taken PHI 137. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 137B—Philosophy of Language: Truth and Meaning (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One course in Philosophy or Linguistics recommended. Comparative treatment of theories about the relationship between truth and meaning. Topics include: the identification of meaning with truth conditions, the nature of propositions, theories of linguistic understanding, the roles of mind and world in determining meaning. Only two units of credit for students who have taken PHI 137. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 137C—Philosophy of Language: Semantics and Pragmatics (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One course in Philosophy or Linguistics recommended. Philosophical issues and positions concerning the meaning and use of language. Topics include the distinction between meaning and implication, the roles of context and convention in language use, speaker meaning versus linguistic meaning and speech act theory. Only two units of credit for students who have taken PHI 137. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 141—Socrates and the Socratic Dialogue (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): PHI 021 recommended. Philosophy of Socrates as found in the Socratic dialogues of Plato. Topics include the Socratic practice of refutation, its method, epistemological foundation, and moral purpose; Socratic eudaimonism and Socratic virtue theory; the paradoxes of Socratic intellectualism. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 143—Hellenistic Philosophy (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): PHI 021 recommended. Positions and arguments of the major philosophical schools of the Hellenistic period: Stoicism, Epicureanism, and Scepticism. Focus is on ethical, epistemological and metaphysical questions and their interconnectedness. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 145—Christian, Islamic, and Jewish Philosophers of the Middle Ages (4)
Lecture/Discussion—4 hours. Prerequisite(s): PHI 021 recommended. Major Christian, Islamic, and Jewish philosophers of the Middle Ages. GE credit: AH, WC. Effective: 2018 Winter Quarter.

PHI 151—Nineteenth Century European Philosophy (4)
Lecture/Discussion—4 hours. Prerequisite(s): PHI 022 recommended. Survey of the main movements in nineteenth century philosophy on the European continent. Idealism in Schopenhauer and Hegel, dialectical materialism in Marx, irrationalism in Kierkegaard, Nietzsche and Dostoevsky. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 156—Contemporary Analytic Philosophy (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): One course in Philosophy recommended. Consideration of central issues such as meaning/reference, analytic/synthetic, reductionism, formal and ordinary language, essential properties, ontological commitment, possible world semantics; influential works by philosophers such as Russell, Moore, Wittgenstein, Austin, Carnap, Quine, Putnam, Kripke, van Fraassen. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 157—Twentieth Century European Philosophy (4)
Lecture/Discussion—4 hours. Prerequisite(s): One course in Philosophy recommended. Survey of the main movements in twentieth century philosophy on the European continent, including phenomenology, existentialism, post-structuralism and post-modernism. Philosophers covered are Husserl, Heidegger, Sartre, Foucault, Derrida. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 160—Pre-Socratics (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): PHI 021 recommended. Study of the metaphysical views of such pre-Socratic figures as the Milesians, the Pythagoreans, Heracleitus, Parmenides, Empedocles, Anaxagoras, and the atomists. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 161—Plato (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): PHI 021 recommended. Examines Platos most important contributions in metaphysics, epistemology, psychology, cosmology, ethics and political philosophy. Dialogues will be selected from Platos middle and later writings. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 162—Aristotle (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): PHI 021 recommended. Overview of Aristotles most central and influential writings. Topics selected from fields such as metaphysics, physics, ethics, logic, and psychology. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 168—Descartes (4)
Lecture/Discussion—4 hours. Prerequisite(s): PHI 022 recommended. Philosophical writings of René Descartes. Topics include the refutation of skepticism, the nature and existence of mind and body, the existence of God, and the foundations of science. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 170—Spinoza and Leibniz (4)
Lecture/Discussion—4 hours. Prerequisite(s): PHI 022 recommended. Seventeenth-century philosophical writings of Spinoza and Leibniz. Topics drawn from both philosophers include: the nature and existence of God, the nature of mind, the relation between mind and body, human freedom, metaphysical monism vs. pluralism. GE credit: AH, WE. Effective: 2016 Fall Quarter.

PHI 172—Locke and Berkeley (4)
Lecture/Discussion—4 hours. Prerequisite(s): PHI 022 recommended. Principal metaphysical works of John Locke and George Berkeley. Topics include abstract ideas, existence of matter, primary and secondary qualities, essence, substance, the existence of God, and the nature of scientific knowledge. May be repeated for credit. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 174—Hume (4)
Lecture/Discussion—4 hours. Prerequisite(s): PHI 022N David Hume's Treatise of Human Nature and related writings. Topics include empiricism, space, causality, belief, skepticism, the passions, and morality. GE credit: AH, WE. Effective: 2003 Fall Quarter.

PHI 175—Kant (4)
Lecture/Discussion—4 hours. Prerequisite(s): PHI 022 recommended. Immanuel Kant's Critique of Pure Reason and related writings. Topics include the nature of human cognition, space and time, a priori concepts, substance, causality, human freedom, and the existence of God. GE credit: AH, WE. Effective: 2016 Fall Quarter.

PHI 178—Frege (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. One upper division course in Philosophy recommended. Development of Gottlob Frege's views about language and logic. Formulation of his grand mathematical idea known as logicism and how it led to the philosophy of language. GE credit: AH, WE. Effective: 2016 Fall Quarter.

PHI 189A—Special Topics in Philosophy; History of Philosophy (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One course in the area of the special topic recommended. Special topics in History of Philosophy. May be repeated up to 8 unit(s). GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 189B—Special Topics in Philosophy; Metaphysics (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One course in the area of the special topic recommended. Special topics in Metaphysics. May be repeated up to 8 unit(s). GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 189C—Special Topics in Philosophy; Theory of Knowledge (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One course in the area of the special topic recommended. Special topics in Theory of Knowledge. May be repeated up to 8 unit(s). GE credit: WE. Effective: 2017 Winter Quarter.

PHI 189D—Special Topics in Philosophy; Ethics (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One course in the area of the special topic recommended. Special topics in Ethics. May be repeated up to 8 unit(s). GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 189E—Special Topics in Philosophy; Political Philosophy (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One course in the area of the special topic recommended. Special topics in Political Philosophy. May be repeated up to 8 unit(s). GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 189F—Special Topics in Philosophy; Philosophy of Law (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One course in the area of the special topic recommended. Special topics in Philosophy of Law. May be repeated up to 8 unit(s). GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 189G—Special Topics in Philosophy; Aesthetics (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One course in the area of the special topic recommended. Special topics in Aesthetics. May be repeated up to 8 unit(s). GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 189H—Special Topics in Philosophy; Philosophy of Mind (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One course in the area of the special topic recommended. Special topics in Philosophy of Mind. May be repeated up to 8 unit(s). GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 189I—Special Topics in Philosophy; Philosophy of Science (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One course in the area of the special topic recommended. Special Topics in Philosophy of Science. May be repeated up to 8 unit(s). GE credit: AH, SE, WE. Effective: 2017 Winter Quarter.

PHI 189J—Special Topics in Philosophy; Philosophy of Language (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One course in the area of the special topic recommended. Special topics in Philosophy of Language. May be repeated up to 8 unit(s). GE credit: AH. Effective: 2017 Winter Quarter.

PHI 189K—Special Topics in Philosophy; Logic (4)
Lecture/Discussion—4 hours. Prerequisite(s): One course in the area of the special topic recommended. Special topics in Logic. May be repeated up to 8 unit(s). GE credit: AH. Effective: 2017 Winter Quarter.

PHI 194HA—Honors Research Project (4)
Term Paper; Tutorial—3 hours. Prerequisite(s): Consent of Instructor. Open to students who are members of the honors program in Philosophy. Completion of honors research project under direction of an instructor. Consult departmental major advisor for list of instructors available in a given quarter. Effective: 1997 Winter Quarter.

PHI 194HB—Research Project (4)
Term Paper; Tutorial—3 hours. Prerequisite(s): Consent of Instructor. Open to students who are members of the honors program in Philosophy. Completion of honors research project under direction of an instructor. Consult departmental major advisor for list of instructors available in a given quarter. Effective: 1997 Winter Quarter.

PHI 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHI 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHI 200A—Proseminar I (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Open only to students in their first quarter of the Philosophy Ph.D. program. Intensive study of core works in a selected area of philosophy. Intensive experience in philosophical writing, discussion, and presentation of written work. Effective: 2007 Fall Quarter.

PHI 200B—Proseminar II (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Open only to students in their first quarter of the Philosophy Ph.D. program. Intensive study of core works in a selected area of philosophy. Intensive experience in philosophical writing, discussion, and presentation of written work. Effective: 2007 Winter Quarter.

PHI 201—Metaphysics (4)
Seminar—3 hours; Term Paper—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Topics vary from quarter to quarter and may include the following: What are things? Do names refer to things? If so, how? Do things have essential properties? What is the nature of necessity? May be repeated for credit topic differs and with consent of instructor. Effective: 2000 Fall Quarter.

PHI 202—Theory of Knowledge (4)
Seminar—3 hours; Term Paper—1 hour. Prerequisite(s): Graduate standing in Philosophy or consent of instructor. Topics vary from quarter to quarter. Sample topics include belief, skepticism, justification, externalism, naturalized epistemology. Course may be repeated for credit with consent of instructor. May be repeated for credit topic is sufficiently distinct. Effective: 2000 Fall Quarter.

PHI 203—Philosophy of Mind (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Topics in the philosophy of mind, such as the mind-body problem, mental representation, consciousness, intentionality. Course may be repeated for credit with consent of instructor. May be repeated for credit with consent of instructor. Effective: 2000 Winter Quarter.

PHI 203P—Philosophy of Mind Practicum (4)
Practice—12 hours. Prerequisite(s): Consent of Instructor. Specific research conducted and prepared for publication by advanced students in a team setting. Topics include knowledge representation and learning in neural networks, the nature and formal properties of mental representation. May be repeated for credit topic differs and with consent of instructor. (S/U grading only.) Effective: 2001 Spring Quarter.

PHI 207—Philosophy of Physics (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing in Philosophy or consent of instructor. Intensive treatment of one (or more) topic(s) in the philosophy of physics, such as foundations of spacetime theories, the interpretation of quantum mechanics, or foundations of statistical mechanics. May be repeated for credit topic differs and with consent of instructor. Effective: 2001 Winter Quarter.

PHI 208—Philosophy of Biology (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Intensive treatment of one (or more) topic(s) in the philosophy of biology, such as foundations of evolutionary theories, reductionism in biology, sociobiology and cultural evolution. May be repeated for credit topic differs and with consent of instructor. Effective: 2001 Spring Quarter.

PHI 210—Philosophy of Science (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Treatment of one or more general topics of current interest in philosophy of science. Topics may include scientific explanation, theories of confirmation, scientific realism, reduction in physics and biology. May be repeated for credit topic differs and with consent of instructor. Effective: 2001 Winter Quarter.

PHI 212—Philosophy of Logic and Mathematics (4)
Seminar—3 hours; Term Paper. Prerequisite(s): PHI 112 or PHI 113 or MAT 108; or MAT 125 or the equivalent. Philosophical issues in logic and math. Topics may include nature of logical and mathematical truth or knowledge, correctness of logical systems, foundations of mathematics, metaphysical and epistemological presuppositions, applications to philosophical problems and formalization of philosophical theories May be repeated for credit topic differs and with consent of instructor. Effective: 2001 Winter Quarter.

PHI 213—Advanced Logic for Graduate Students (4)
Extensive Problem Solving; Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing in Philosophy. Enrollment in the Philosophy Ph.D. program. Intensive study of advanced logic, including set theory, metatheory of predicate logic, and modal logic. May be repeated up to 2 time(s) when topic differs. Effective: 2011 Fall Quarter.

PHI 214—Ethics (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing in Philosophy or consent of instructor. Topics may include morality and motivation, objectivity in ethics, the relationship between the factual and the moral. Topics vary from quarter to quarter. May be repeated for credit topic differ and with consent of instructor. Effective: 2001 Winter Quarter.

PHI 217—Political Philosophy (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Advanced studies in political philosophy. Topics vary but may include distributive justice, enforcement of morality by the state, equality, obligation to obey the law, social contract theory. May be repeated for credit topic differs and with consent of instructor. Effective: 2000 Fall Quarter.

PHI 220—Environmental Ethics (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Intensive treatment of one or more topic(s) in environmental ethics, such as biodiversity, sustainability, composition of the moral community, invasive species, endangered species, applications of ethical theories to contemporary environmental issues. Effective: 2012 Winter Quarter.

PHI 237—Philosophy of Language (4)
Seminar—3 hours; Term Paper—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Study of philosophical issues raised by language, such as the nature of semantic content, proper semantics for verbs of propositional attitude, feasibility and limitations of formal semantics and pragmatics for natural languages. May be repeated for credit if topic differs and consent of instructor. Effective: 2000 Fall Quarter.

PHI 238—Philosophy of Language Workshop (4)
Extensive Writing; Seminar—3 hours. Open to graduate students only. Discussion of recently published, unpublished and in-progress research in philosophy of language, including work on the relation of language and mind, of language and logic, and linguistic theory. May be repeated for credit when topic differs. Effective: 2007 Fall Quarter.

PHI 261—Plato (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Advanced seminar designed for analysis of arguments, doctrines, and texts from Plato's works. Methods of argumentation and interpretation are especially stressed. Topics vary according to instructor. May be repeated for credit with consent of instructor. Effective: 2000 Winter Quarter.

PHI 262—Aristotle (4)
Seminar—3 hours; Term Paper—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Advanced seminar designed for analysis of arguments, doctrines, and texts from Aristotle's works. Methods of argumentation and interpretation are especially stressed. Topics vary according to instructor. Course may be repeated for credit with consent of instructor. May be repeated for credit with consent of instructor. Effective: 2001 Spring Quarter.

PHI 275—Kant (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing in Philosophy or consent of instructor. Intensive study of a topic in the philosophy of Kant, in such areas as metaphyics, theory of knowledge, ethics. May be repeated for credit with consent of instructor. Effective: 2000 Winter Quarter.

PHI 290—History of Philosophy (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Topics in the history of philosophy. Topics vary according to instructor from quarter to quarter. May be repeated for credit when topic differs and with consent of instructor. Effective: 2001 Winter Quarter.

PHI 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Effective: 1997 Winter Quarter.

PHI 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

PHI 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Physical Education

Physical Education | Physical Education Information

(College of Letters and Science)

Barbara Jahn, M.S., Program Director

Program Office. 264 Hickey Gymnasium; 530-752-1111

Faculty. http://pe.ucdavis.edu/faculty-and-staff

The Program of Study

The Program in Physical Education facilitates the development and offering of non-major courses related to physical activities and education, fitness and health, athletic training, teacher education, and organized sport. The Program is available as part of a student's general educational experience to enhance and broaden the understanding and experience of physical activity in the maintenance of lifetime health and fitness.

The basic activities series includes Physical Education 1, fitness, lifetime, and sports skills. The PE 1 activity courses are instructional in nature, designed to introduce new skills to beginners or to improve existing skills. Physical Education 6 is offered for students participating in intercollegiate athletics. Additional lower division courses include those in special skill areas, such as life-saving and water safety, health and fitness, and athletic training. Upper division courses include advanced classes in coaching, and sociology of sports.

Class and Recreational Use of Facilities. The incidental fee payable by all students at the time of registration entitles students to the use of the gymnasium, pool, showers, tennis courts, and athletic fields. Fines are imposed for each formal transaction necessitated by failure of the student to comply with the regulations of the program.

Physical Education | PHE Courses

Courses in PHE:

PHE 001—Physical Activities (0.5)
Laboratory—2 hours. Physical Education Activities classes offered in the following areas: aquatics, personal fitness, martial arts, individual sports, and team sports. These academic classes are instructional rather than recreational and are intended to improve activity specific skills and knowledge. May be repeated up to 6 unit(s) along with PHE 6, for a combined total of 6 units. Credit limited to 6 units in combination with PHE 6. (P/NP grading only.) Effective: 2016 Winter Quarter.

PHE 001A—Physical Activity-Archery (0.5)
Laboratory—2 hours. Physical Education Activity classes in Archery. The academic classes are instructional rather than recreational and are intended to improve activity specific skills and knowledge. May be repeated up to 6 unit(s) along with course 6, for a combination total of 6 units. Credit limited to 6 units in combination with course 6. (P/NP grading only.) Effective: 2018 Fall Quarter.

PHE 001AQ—Physical Activity-Aquatic Family (0.5)
Laboratory—2 hours. Physical Education Activity classes in Aquatics. The academic classes are instructional rather than recreational and are intended to improve activity specific skills and knowledge. May be repeated up to 6 unit(s) along with course 6, for a combination total of 6 units. Credit limited to 6 units in combination with course 6. (P/NP grading only.) Effective: 2018 Fall Quarter.

PHE 001F—Physical Activity-Fitness Family (0.5)
Laboratory—2 hours. Physical Education Activity classes in personal fitness. The academic classes are instructional rather than recreational and are intended to improve activity specific skills and knowledge. May be repeated up to 6 unit(s) along with course 6, for a combination total of 6 units. Credit limited to 6 units in combination with course 6. (P/NP grading only.) Effective: 2018 Fall Quarter.

PHE 001G—Physical Activity-Golf (0.5)
Laboratory—2 hours. Physical Education Activity classes in Golf. These academic classes are instructional rather than recreational and are intended to improve activity specific skills and knowledge. May be repeated up to 6 unit(s) along with course 6, for a combination total of 6 units. Credit limited to 6 units in combination with course 6. (P/NP grading only.) Effective: 2018 Fall Quarter.

PHE 001I—Physical Activity-Individual Sport Family (0.5)
Laboratory—2 hours. Physical Education Activity classes in Individual Sports. The academic classes are instructional rather than recreational and are intended to improve activity specific skills and knowledge. May be repeated up to 6 unit(s) along with course 6, for a combination total of 6 units. Credit limited to 6 units in combination with course 6. (P/NP grading only.) Effective: 2018 Fall Quarter.

PHE 001M—Physical Activity-Martial Arts Family (0.5)
Laboratory—2 hours. Physical Education Activity classes in Martial Arts. The academic classes are instructional rather than recreational and are intended to improve activity specific skills and knowledge. May be repeated up to 6 unit(s) along with course 6, for a combination total of 6 units. Credit limited to 6 units in combination with course 6. (P/NP grading only.) Effective: 2018 Fall Quarter.

PHE 001R—Physical Activity-Racquet Family (0.5)
Laboratory—2 hours. Physical Education Activity classes in Racquet sports. The academic classes are instructional rather than recreational and are intended to improve activity specific skills and knowledge. May be repeated up to 6 unit(s) along with course 6, for a combination total of 6 units. Credit limited to 6 units in combination with course 6. (P/NP grading only.) Effective: 2018 Fall Quarter.

PHE 001RC—Physical Activity-Rock Climbing (0.5)
Laboratory—2 hours. Physical Education Activity classes in Rock Climbing. The academic classes are instructional rather than recreational and are intended to improve activity specific skills and knowledge. May be repeated up to 6 unit(s) along with course 6, for a combination total of 6 units. Credit limited to 6 units in combination with course 6. (P/NP grading only.) Effective: 2018 Fall Quarter.

PHE 001S—Physical Activity-Self Defense for Women (0.5)
Laboratory—2 hours. Physical Education Activity classes in Self Defense for Women. The academic classes are instructional rather than recreational and are intended to improve activity specific skills and knowledge. May be repeated up to 6 unit(s) along with course 6, for a combination total of 6 units. Credit limited to 6 units in combination with course 6. (P/NP grading only.) Effective: 2018 Fall Quarter.

PHE 001T—Physical Activity-Team Sports Family (0.5)
Laboratory—2 hours. Physical Education Activity classes in Team Sports. The academic classes are instructional rather than recreational and are intended to improve activity specific skills and knowledge May be repeated up to 6 unit(s) along with course 6, for a combination total of 6 units. Credit limited to 6 units in combination with course 6. (P/NP grading only.) Effective: 2018 Fall Quarter.

PHE 006—Preparation and Participation in ICA Competition (1) ***Review all entries***
Practice—3 hours. Prerequisite(s): Consent of instructor (head coach). Classes offered in all UC Davis intercollegiate athletic sports and are restricted to student-athletes who are members. May be repeated up to 6 unit(s) , along with course 1, for a combined total of 6 units. (P/NP grading only.) Effective: 2016 Winter Quarter.

PHE 006—Preparation and Participation in ICA Competition (1) ***Review all entries***
Practice—3 hours. Prerequisite(s): Consent of instructor (head coach). Sport specific advanced comprehensive training, instruction, and practice for the highly skilled collegiate varsity athlete. Development and improvement of performance skills utilizing motor-learning, nutritional science, and motivational theory. Classes offered in all UC Davis intercollegiate athletic sports and are restricted to student-athletes who are members. May be repeated up to 6 unit(s) Course 6 and course 1 may be repeated for a combined total of 6 units. (P/NP grading only.) Effective: 2018 Fall Quarter.

PHE 007—Professional Physical Education Activities: Men and Women (1)
Laboratory—2 hours; Lecture—1 hour. Fundamental skills for: (a) coaching competitive athletics; (b) classroom teaching and coaching, and (c) classroom teaching and officiating. May be repeated for a total of six units. May be repeated up to 6 unit(s). Effective: 1997 Winter Quarter.

PHE 008—Student-Athlete Life Skills (1)
Lecture—1 hour. Prerequisite(s): Consent of Instructor. Open to intercollegiate student-athletes only. For intercollegiate student-athletes. Balancing academic and athletic demands. Academic, psychological, and sociocultural issues which influence success as a college student-athlete. (P/NP grading only.) Effective: 2012 Fall Quarter.

PHE 015—Administration of Intramural Sports (2)
Lecture—2 hours. Planning and administering intramural sports programs at the high school and college level. Effective: 1997 Winter Quarter.

PHE 025—Theory of Lifesaving and Water Safety (2)
Laboratory—2 hours; Lecture—1 hour. Prerequisite(s): Sound physical condition, and no physical handicap that would render student unable to perform the required skills and ability to pass preliminary swimming test. Provides the student with the knowledge, organizational procedures, and skill development necessary to provide for water safety and save his/her own life or the life of another in an aquatic emergency. Effective: 1997 Winter Quarter.

PHE 027—Training Course for Water Safety Instructors (2)
Laboratory—2 hours; Lecture—1 hour. Prerequisite(s): PHE 001; Advanced swimming (PHE 001) or consent of instructor; and current Advanced Life-Saving Certificate. Theoretical knowledge and practical experience necessary for the organization and teaching of swimming and lifesaving classes. (American
Red Cross Water Safety Instructors Certificate awarded upon successful completion of necessary requirements.) Effective: 1997 Winter Quarter.

PHE 040—Drugs and Society (2)
Fieldwork—2 hours; Film Viewing—5 hours; Lecture—2 hours. Pharmacology, methods of use, and effects of use of psychoactive and performance-enhancing drugs. Historical overview of drug use. Identification of behavior of at-risk and user populations. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHE 044—Principles of Healthful Living (2)
Lecture—2 hours. Application of scientific and empirical knowledge to personal, family, and community health problems. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHE 092—Physical Education Internship (1-5)
Internship—3-15 hours. Prerequisite(s): Consent of Instructor. Enrollment dependent on availability of intern positions, with priority given to Exercise Biology majors. Work experience in the application of physical activity programs to teaching, recreational, clinical or research situations under department faculty supervision. May be repeated for credit once but no internship units will be counted toward Exercise Biology major. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

PHE 097T—Tutoring in Physical Education (1-5)
Tutorial—1-5 hours. Prerequisite(s): Lower division standing and consent of Program Director. Tutoring of students in lower division physical activity courses. Weekly meetings with instructor in charge of courses. Written reports on methods and materials required. May be repeated once for credit. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

PHE 097TC—Tutoring in the Community (1-5)
Discussion—1 hour; Tutorial—2-15 hours. Prerequisite(s): Lower division standing and consent of Program Director. Tutoring in the community in physical activity related projects under the guidance of the Physical Education faculty. Regular meetings with
instructor in charge and written report required. May be repeated once for credit. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

PHE 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of instructor and Program Director. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHE 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2002 Fall Quarter.

PHE 100—Field Experience in Teaching Physical Education (2)
Discussion—1 hour; Fieldwork—4 hours. Prerequisite(s): PHE 001 or PHE 007; Upper division standing. Tutoring or teachers aide in physical education activities, including athletic coaching, in public schools under the guidance of a regular teacher with supervision by a departmental faculty person. May be repeated once for credit. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

PHE 120—Sport in American Society (3)
Lecture—3 hours. Sociological approaches to the study of sport and contemporary American culture, including sport's interaction with politics, economics, religion, gender, race, media and ethics. Socialization factors involving youth, scholastic, collegiate, and Olympic sport. (Exercise Biology 120.) GE credit: SS. Effective: 2009 Summer Session 1.

PHE 131—Physical Activity and the Disabled (4)
Laboratory—3 hours; Lecture—3 hours. The study of the diverse and complex nature of individuals with disabilities and how they adapt to their disabilities in daily living. Integration of individuals with disabilities into the community, schools, and physical activity and recreational programs. Not open for credit to students who have taken EXB 131. Effective: 2002 Fall Quarter.

PHE 133—Prevention and Care of Sports Injuries (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): CHA 101 (can be concurrent) Prevention, care, and rehabilitation of injuries incurred by athletes. Laboratory on anatomy, emergency care, physical therapy methods, and taping techniques. Not open for credit to students who have previously taken EXB 133. Effective: 2003 Spring Quarter.

PHE 135—Advanced Procedures in Evaluation & Management of Athletic Injuries (3)
Lecture—3 hours. Prerequisite(s): PHE 133 or EXB 133; (CHA 101); and Consent of Instructor. Advanced study of the evaluation and management of athletic injuries, including mechanism of injury, biomechanics and pathophysiology. Current topics in athletic training. Not open for credit to students who have completed EXB 135. Effective: 2003 Fall Quarter.

PHE 141—Coaching Principles and Methods (3)
Lecture/Discussion—3 hours. Prerequisite(s): PHE 143; Upper division standing. Technical, tactical, and strategic aspects of coaching. Methods for organizing and delivering effective information in coaching. Biomechanical basis of motor skills and motor learning principles applied to coaching. Classroom development of coaching skills and outside observations of coaching required. Effective: 2012 Spring Quarter.

PHE 142—Physical Education in the Public Schools (3)
Lecture—3 hours. Analysis and study of the principles and methods basic to teaching physical education at the elementary and secondary levels. Effective: 1997 Winter Quarter.

PHE 143—Coaching Effectiveness (3)
Lecture—3 hours. Prerequisite(s): Upper division standing; 3.0 units of PHE 001 and PHE 006 combined. Synthesis and application of basic components of sport psychology, sport pedagogy, and sport physiology and basic management and administration of athletics in public high schools. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHE 144—Principles of Health Education (2)
Lecture—2 hours. Prerequisite(s): PHE 044; Upper division standing or consent of instructor. Principles of teaching health education in the public schools. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHE 150—Recreation in the Community (3)
Discussion—1 hour; Lecture—2 hours. The nature and scope of community recreation programs in California emphasizing low income, highly populated areas, and poor rural communities. Effective: 1997 Winter Quarter.

PHE 192—Physical Education Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing and consent of instructor; enrollment dependent on availability of intern positions, with priority given to Exercise Science majors. Work experience in the application of physical activity programs to teaching, recreational, clinical or research situations under department faculty supervision. May be repeated up to 12 unit(s) (including course 92) but no internship units will be counted toward Exercise Science major. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHE 197T—Tutoring in Physical Education (1-5)
Tutorial—1-5 hours. Prerequisite(s): Consent of chairperson. Tutoring of students in lower division physical activity courses. Written reports on methods and materials required. May be repeated once for credit. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

PHE 197TC—Tutoring in the Community (1-5)
Discussion—1 hour; Tutorial—2-15 hours. Prerequisite(s): Upper division standing and consent of Department Chairperson. Tutoring in the community in physical education related projects under the guidance of the Physical Education faculty. Regular meetings with instructor in charge and written report required. May be repeated once for credit. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

PHE 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of instructor and Department Chairperson. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHE 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2002 Fall Quarter.

PHE 300—The Elementary Physical Education Program (2)
Laboratory—2 hours; Lecture—1 hour. Prerequisite(s): Consent of Instructor. Restricted to senior standing or credential student. Introduction to principles, theories, material, and practices of elementary school physical education program. Effective: 2014 Spring Quarter.

PHE 380—Methods of Teaching Physical Education (3)
Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): PHE 142; or Consent of Instructor. Six units of PHE 007. The methods of teaching group and individual activities for grades K-12; program planning, class management, organization, and evaluation. (P/NP grading only.) Effective: 1997 Winter Quarter.

Physics

Physics | PHY Information

(College of Letters and Science)

Robert Svoboda, Ph.D., Chairperson of the Department

Lori Lubin, Ph.D., Vice Chairperson of the Department (Administration and Undergraduate Matters)

Rajiv Singh, Ph.D., Vice Chairperson of the Department (Graduate Matters)

Department Office. 174 Physics Building; 530-752-1500; http://www.physics.ucdavis.edu

Faculty. http://physics.ucdavis.edu/people/faculty

Physics | PHY A.B.

(College of Letters and Science)

Robert Svoboda, Ph.D., Chairperson of the Department

Lori Lubin, Ph.D., Vice Chairperson of the Department (Administration and Undergraduate Matters)

Rajiv Singh, Ph.D., Vice Chairperson of the Department (Graduate Matters)

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The Major Program

From the smallest subatomic particles to atoms, molecules, stars, and galaxies, the study of physics is the study of what makes the universe work. Knowledge gained using atomic-scale microscopes and high-energy particle accelerators and nuclear reactors teaches us not only what holds the atomic nucleus together but also how proteins function and why stars shine.

The Program. The Department of Physics offers a Bachelor of Arts in Physics and two Bachelor of Science degree programs: in Physics (which also offers an emphasis in Astrophysics), and in Applied Physics. The A.B. degree provides a broad coverage of classical and modern physics while permitting a broader liberal arts education than is possible with the other two programs. The B.S. degree in either Physics or Applied Physics should be followed by the student who plans to enter physics as a profession, and also provides excellent training for a wide variety of technical career options. The B.S. in Applied Physics provides the student with a solid introduction to a particular applied physics specialty. For the student who plans to enter the job market upon completing a B.S. degree, the applied physics orientation would be an asset. Either B.S. program provides a solid foundation in physics for the student interested in graduate work in either pure or applied physics.

Career Alternatives. Careers in physics and applied physics include research and development, either in universities, government laboratories, or industry; teaching in high schools, junior colleges, and universities; management and administration in industrial laboratories and in government agencies; and in production and sales in industry. A major in physics also provides a strong base for graduate-level work in such interdisciplinary areas as chemical physics, biophysics and medical physics, geophysics and environmental physics, astrophysics and astronomy, computer science, and materials science.

Program Variance. Similar courses from other departments may be substituted for courses in the depth subject matter requirements by obtaining prior written permission from the Undergraduate Curriculum Committee Chairperson.

Graduate Study. The Department of Physics offers programs of study and research leading to the M.S. and Ph.D. degrees. Further information regarding requirements for these three degrees, graduate research, teaching assistantships, and research assistantships may be obtained by writing to the Chairperson, Department of Physics, One Shields Avenue, University of California, Davis, CA 95616.

Astronomy. In addition to the introductory Astronomy courses listed, upper division and graduate courses in Astronomy, Astrophysics and Cosmology are listed under Physics.

Preparatory Subject Matter **Units:** 45-51

PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5
PHY 009D	Modern Physics	4
OR		
PHY 009HA	Honors Physics	5
PHY 009HB	Honors Physics	5
PHY 009HC	Honors Physics	5
PHY 009HD	Honors Physics	5
PHY 009HE	Honors Physics	5

MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3
MAT 022B	Differential Equations	3
PHY 080	Experimental Techniques	4

Depth Subject Matter **Units:** 36-40

PHY 104A	Introductory Methods of Mathematical Physics	4
PHY 105A	Analytical Mechanics	4
PHY 110A	Electricity and Magnetism	4
PHY 110B	Electricity and Magnetism	4
PHY 112	Thermodynamics and Statistical Mechanics	4
PHY 115A	Foundation of Quantum Mechanics	4
PHY 122A	Advanced Laboratory in Condensed Matter Physics	4
OR		
PHY 122B	Advanced Laboratory in Particle Physics	4

Choose at least one:

PHY 129A	Introduction to Nuclear Physics	4
PHY 130A	Elementary Particle Physics	4
PHY 140A	Introduction to Solid State Physics	4
PHY 151	Stellar Structure and Evolution	4
PHY 152	Galactic Structure and the Interstellar Medium	4
PHY 153	Extragalactic Astrophysics	4

PHY 102	Computational Laboratory in Physics	0-1

PHY 102 waived if PHY 104B taken.

Choose at least one additional fixed-unit upper division Physics course; excluding PHY 160.

Total: 81-91

Physics | PHY B.S.

(College of Letters and Science)

Robert Svoboda, Ph.D., Chairperson of the Department

Lori Lubin, Ph.D., Vice Chairperson of the Department (Administration and Undergraduate Matters)

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Faculty. http://physics.ucdavis.edu/people/faculty

The Major Program

From the smallest subatomic particles to atoms, molecules, stars, and galaxies, the study of physics is the study of what makes the universe work. Knowledge gained using atomic-scale microscopes and high-energy particle accelerators and nuclear reactors teaches us not only what holds the atomic nucleus together but also how proteins function and why stars shine.

The Program. The Department of Physics offers a Bachelor of Arts in Physics and two Bachelor of Science degree programs: in Physics (which also offers an emphasis in Astrophysics), and in

Applied Physics. The A.B. degree provides a broad coverage of classical and modern physics while permitting a broader liberal arts education than is possible with the other two programs. The B.S. degree in either Physics or Applied Physics should be followed by the student who plans to enter physics as a profession, and also provides excellent training for a wide variety of technical career options. The B.S. in Applied Physics provides the student with a solid introduction to a particular applied physics specialty. For the student who plans to enter the job market upon completing a B.S. degree, the applied physics orientation would be an asset. Either B.S. program provides a solid foundation in physics for the student interested in graduate work in either pure or applied physics.

Career Alternatives. Careers in physics and applied physics include research and development, either in universities, government laboratories, or industry; teaching in high schools, junior colleges, and universities; management and administration in industrial laboratories and in government agencies; and in production and sales in industry. A major in physics also provides a strong base for graduate-level work in such interdisciplinary areas as chemical physics, biophysics and medical physics, geophysics and environmental physics, astrophysics and astronomy, computer science, and materials science.

Program Variance. Similar courses from other departments may be substituted for courses in the depth subject matter requirements by obtaining prior written permission from the Undergraduate Curriculum Committee Chairperson.

Graduate Study. The Department of Physics offers programs of study and research leading to the M.S. and Ph.D. degrees. Further information regarding requirements for these three degrees, graduate research, teaching assistantships, and research assistantships may be obtained by writing to the Chairperson, Department of Physics, One Shields Avenue, University of California, Davis, CA 95616.

Astronomy. In addition to the introductory Astronomy courses listed, upper division and graduate courses in Astronomy, Astrophysics and Cosmology are listed under Physics.

Physics **Units:** 108-119

Preparatory Subject Matter

PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5
OR		
PHY 009HA	Honors Physics	5
PHY 009HB	Honors Physics	5
PHY 009HC	Honors Physics	5
PHY 009HD	Honors Physics	5
PHY 009HE	Honors Physics	5
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3
MAT 022B	Differential Equations	3
PHY 040	Introduction to Physics Computation	4
PHY 080	Experimental Techniques	4

Depth Subject Matter

PHY 104A	Introductory Methods of Mathematical Physics	4
PHY 105A	Analytical Mechanics	4

PHY 105B	Analytical Mechanics	4
PHY 110A	Electricity and Magnetism	4
PHY 110B	Electricity and Magnetism	4
PHY 110C	Electricity and Magnetism	4
PHY 112	Thermodynamics and Statistical Mechanics	4
PHY 115A	Foundation of Quantum Mechanics	4
PHY 115B	Applications of Quantum Mechanics	4
PHY 102 (1 unit)	Computational Laboratory in Physics	1
OR		
PHY 104B	Computational Methods of Mathematical Physics	4

Laboratory Requirement

PHY 122A	Advanced Laboratory in Condensed Matter Physics	4
OR		
PHY 122B	Advanced Laboratory in Particle Physics	4
OR		
PHY 116A	Electronic Instrumentation	4
PHY 116B	Electronic Instrumentation	4
PHY 116C	Introduction to Computer-Based Experiments in Physics	4

Concentration Courses

Two courses from one specialty (General Relativity/Astrophysical Applications, Condensed Matter, or Nuclear/Particle Physics) and one course from a different specialty. Lists of courses in each specialty are available from the department

Additional upper division Physics courses excluding PHY160, for a total of 15 upper division Physics courses of three or more units each. With prior departmental approval, one course from mathematics, engineering, or natural science may be used to meet this requirement. May include only one from:

PHY 194H (Discontinued 1993)		
PHY 195	Senior Thesis	5
PHY 198	Directed Group Study	1-5
PHY 199	Special Study for Advanced Undergraduates	1-5

Astrophysics Emphasis **Units:** 108-120

Preparatory Subject Matter

PHY 009A	Classical Physics	5
PHY 009B	Classical Physics	5
PHY 009C	Classical Physics	5
PHY 009D	Modern Physics	4
OR		
PHY 009HA	Honors Physics	5
PHY 009HB	Honors Physics	5
PHY 009HC	Honors Physics	5
PHY 009HD	Honors Physics	5
PHY 009HE	Honors Physics	5
MAT 021A	Calculus	4
MAT 021B	Calculus	4

MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3
MAT 022B	Differential Equations	3
PHY 040	Introduction to Physics Computation	4
PHY 080	Experimental Techniques	4

Depth Subject Matter

PHY 104A	Introductory Methods of Mathematical Physics	4
PHY 105A	Analytical Mechanics	4
PHY 108	Optics	3
PHY 108L	Optics Laboratory	1
PHY 110A	Electricity and Magnetism	4
PHY 110B	Electricity and Magnetism	4
PHY 112	Thermodynamics and Statistical Mechanics	4
PHY 115A	Foundation of Quantum Mechanics	4
PHY 115B	Applications of Quantum Mechanics	4
PHY 102	Computational Laboratory in Physics	1
OR		
PHY 104B	Computational Methods of Mathematical Physics	4

Laboratory Requirement

PHY 122A	Advanced Laboratory in Condensed Matter Physics	4
OR		
PHY 122B	Advanced Laboratory in Particle Physics	4
OR		
PHY 157	Astronomy Instrumentation and Data Analysis Laboratory	4

PHY 151	Stellar Structure and Evolution	4
PHY 152	Galactic Structure and the Interstellar Medium	4
PHY 153	Extragalactic Astrophysics	4
PHY 156	Introduction to Cosmology	4

Choose two electives:

PHY 105B	Analytical Mechanics	4
PHY 110C	Electricity and Magnetism	4
PHY 116A	Electronic Instrumentation	4
PHY 129A	Introduction to Nuclear Physics	4
PHY 130A	Elementary Particle Physics	4
PHY 130B	Elementary Particle Physics	4
PHY 150	Special Topics in Physics	4
PHY 154	Astrophysical Applications of Physics	4
PHY 155	General Relativity	4

May include only one from:

PHY 194H (Discontinued 1993)		
PHY 195	Senior Thesis	5
PHY 199	Special Study for Advanced Undergraduates	1-5

Recommended

AST 025	Introduction to Modern Astronomy and Astrophysics	4

-

Total: 108-120

Physics | PHY M.A.

(College of Letters and Science)

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Physics | PHY Ph.D.

(College of Letters and Science)

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Physics | PHY Minor

(College of Letters and Science)

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Department Office. 174 Physics Building; 530-752-1500; http://www.physics.ucdavis.edu

Faculty. http://physics.ucdavis.edu/people/faculty

All courses in the minor have prerequisites equivalent to MAT 021A-021B-021C-021D and 022A-022B and PHY 009A-009B-009C-009D. Students considering the possibility of a minor should consult with a Physics major advisor before beginning course work in the minor program.

Physics **Units:** 24

Choose at least six upper division courses in Physics; excluding:

PHY 160	Environmental Physics and Society	3
PHY 197T	Tutoring in Physics and Astronomy	1-5

PHY 199 Special Study for Advanced Undergraduates 1-5

Total: 24

Physics | PHY Courses

Physics 001 is a two-quarter sequence requiring some mathematics (trigonometry). Either 001A alone or both quarters may be taken. The sequence is not intended to satisfy entrance requirements of a year of physics for professional schools, but will satisfy requirements of 3 or 6 units of physics.

Physics 007 is a one-year (three-quarter) introductory physics course with laboratory intended for students majoring in the biological sciences. It has a calculus prerequisite. If you don't want a full year of introductory physics, you should take one or two quarters of Physics 1 instead. Read the following information carefully if you are using Physics 007 to complete an introductory course you have already begun.

The sequence of material in Physics 007 is different from that in most traditionally taught introductory physics courses. Physics 007B is most like the first quarter or semester of traditionally taught courses which treat classical mechanics. Physics 007C is most like the last quarter or semester which, in traditionally taught courses, treats optics, electricity and magnetism, and modern physics. The content and sequence of Physics 007A is unlike that of most other traditionally taught courses.

If you have completed one introductory quarter or semester of a traditionally taught physics course and want to continue with Physics 007, you should first take (and will receive full credit for) Physics 007A. Then, either skip 007B, but self-study the last three weeks of material, or take 007B and receive reduced credit. Finally, take 007C for full credit.

If you have taken two quarters of a year-long introductory physics course and have not had extensive work in optics, electricity and magnetism, and modern physics, you should take Physics 007C. In no case should you take Physics 007B without first taking Physics 007A. All other situations should be discussed directly with a Physics 007 instructor.

Students not intending to take the entire sequence should instead take Physics 001.

Physics 009 is a four-quarter sequence using calculus throughout and including laboratory work as an integral component. The course is primarily for students in the physical sciences and engineering.

Physics 009H is a five-quarter honors physics sequence, which may be taken instead of Physics 009. It is intended primarily for first-year students with a strong interest in physics and with advanced placement in mathematics to Mathematics 021B. Students who plan to major in physics, and also motivated non-majors, should take Physics 009H instead of Physics 009 if they are ready to begin Mathematics 021B in fall quarter. In course requirements and prerequisites, Physics 009HA-009HE can be substituted for Physics 009A-009D. Students may not switch between the 009H and 009 series beyond 009HA or 009A.

Physics 010 is primarily a concept-oriented one-quarter lecture/discussion course requiring relatively little mathematical background.

Courses in PHY:

PHY 001A—Principles of Physics (3)
Lecture—3 hours. Prerequisite(s): Trigonometry or consent of instructor. Mechanics. Introduction to general principles and analytical methods used in physics with emphasis on applications in applied agricultural and biological sciences and in physical education. Not open to students who have received credit for PHY 007B or PHY 009A. GE credit: SE. Effective: 1997 Winter Quarter.

PHY 001B—Principles of Physics (3)
Lecture—3 hours. Prerequisite(s): PHY 001A or PHY 009A Not open for credit to students who have received credit for course 7A, 7B, 7C, 9B, 9C, or 9D. Continuation of course 1A. Heat, optics, electricity, modern physics. Not open for credit to students who have received credit for course 7A, 7B, 7C, 9B, 9C, or 9D. GE credit: SE. Effective: 1997 Winter Quarter.

PHY 007A—General Physics (4)
Discussion/Laboratory—5 hours; Lecture—1.5 hours. Prerequisite(s): MAT 016B (can be concurrent) or MAT 017B (can be concurrent) or MAT 021B (can be concurrent); Completion or concurrent enrollment in MAT 016B or MAT 017B or MAT 021B. Introduction to general principles and analytical methods used in physics for students majoring in a biological science. Only two units of credit allowed to students who have completed PHY 001B or PHY 009B. GE credit: SE. Effective: 2010 Winter Quarter.

PHY 007B—General Physics (4)
Discussion/Laboratory—5 hours; Lecture—1.5 hours. Prerequisite(s): PHY 007A Continuation of course 7A. Only two units of credit allowed to students who have completed course 9A, or 1A. GE credit: SE. Effective: 1997 Winter Quarter.

PHY 007C—General Physics (4)
Discussion/Laboratory—5 hours; Lecture—1.5 hours. Prerequisite(s): PHY 007B Continuation of course 7B. Only two units of credit allowed to students who have completed course 9C or 5C. GE credit: SE. Effective: 1997 Winter Quarter.

PHY 009A—Classical Physics (5) ***Review all entries***
Discussion—1 hour; Laboratory—2.5 hours; Lecture—3 hours. Prerequisite(s): MAT 021B; MAT 021M Introduction to general principles and analytical methods used in physics for physical science and engineering majors. Classical mechanics. Only 2 units of credit for students who have completed 1A or 7B. Not open for credit to students who have completed course 9HA. GE credit: SE. Effective: 2018 Winter Quarter.

PHY 009A—Classical Physics (5) ***Review all entries***
Discussion—1 hour; Laboratory—2.5 hours; Lecture—3 hours. Prerequisite(s): MAT 021B or MAT 021M; or Consent of Instructor. Introduction to general principles and analytical methods used in physics for physical science and engineering majors. Classical mechanics. Only 2 units of credit for students who have completed PHY 001A or PHY 007B; not open for credit to students who have completed course PHY 009HA. GE credit: SE. Effective: 2018 Summer Session 1.

PHY 009B—Classical Physics (5)
Discussion—1 hour; Laboratory—2.5 hours; Lecture—3 hours. Prerequisite(s): PHY 009A; MAT 021C; MAT 021D (can be concurrent) Continuation of course 9A. Fluid mechanics, thermodynamics, wave phenomena, optics. Only two units of credit for students who have completed PHY 007A; not open for credit to students who have completed PHY 009HB, PHY 009HC, or ENG 105. GE credit: SE. Effective: 2004 Fall Quarter.

PHY 009C—Classical Physics (5)
Discussion—1 hour; Laboratory—2.5 hours; Lecture—3 hours. Prerequisite(s): PHY 009B; MAT 021D; MAT 022A (can be concurrent) Electricity and magnetism including circuits and Maxwell's equations. Only 3 units of credit for students who have completed PHY 007C; not open for credit to students who have completed PHY 009HD. GE credit: SE. Effective: 2005 Winter Quarter.

PHY 009D—Modern Physics (4)
Discussion—1.5 hours; Lecture—3 hours. Prerequisite(s): PHY 009C; MAT 022A; MAT 022B recommended (may be taken concurrently). Not open for credit to students who have completed course 9HB, 9HC, or 9HE. Introduction to physics concepts developed since 1900. Special relativity, quantum mechanics, atoms, molecules, condensed matter, nuclear and particle physics. Not open for credit to students who have completed course 9HB, 9HC, or 9HE. GE credit: SE. Effective: 1999 Spring Quarter.

PHY 009HA—Honors Physics (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): MAT 021B (can be concurrent); or Consent of Instructor. Classical mechanics. Same material as course 9A in greater depth. For students in physical sciences, mathematics, and engineering. Only 2 units of credit for students who have completed PHY 007B; not open for credit to students who have completed PHY 009A. GE credit: SE. Effective: 2003 Fall Quarter.

PHY 009HB—Honors Physics (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): (PHY 009HA or PHY 009A); MAT 021C (can be concurrent) Special relativity, thermal physics. Continuation of course 9HA. Only 2 units of credit for students who have completed PHY 007A; not open for credit to students who have completed PHY 009B or PHY 009D. GE credit: SE. Effective: 2004 Winter Quarter.

PHY 009HC—Honors Physics (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): PHY 009HB; MAT 021D (can be concurrent) Waves, sound, optics, quantum physics. Continuation of Physics 9HB. Only 2 units of credit for students who have completed PHY 007C; not open for credit to students who have completed PHY 009B or PHY 009D. GE credit: SE. Effective: 2004 Spring Quarter.

PHY 009HD—Honors Physics (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): PHY 009HC; MAT 021D Electricity and magnetism. Continuation of Physics 9HC. Not open for credit to students who have completed PHY 009C. GE credit: SE. Effective: 2003 Fall Quarter.

PHY 009HE—Honors Physics (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): PHY 009HD; MAT 022B (can be concurrent) Application of quantum mechanics. Not open for credit to students who have completed PHY 009D. GE credit: SE. Effective: 2004 Winter Quarter.

PHY 010—Topics in Physics for Nonscientists (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): High school algebra. Emphasis varies: survey of basic principles or a deeper exploration of some particular branch. Past topics included black holes, space time, and relativity; physics of music; history and philosophy; energy and the environment; and natural phenomena. No units of credit allowed if taken after any other PHY course. GE credit: SE. Effective: 1997 Winter Quarter.

PHY 010C—Physics of California (3)
Lecture—3 hours. Atmospheric phenomena common in CA, local weather patterns and microclimes. Applications to CA energy, water, and resource management policies. Physics underlying regional sports in CA. Not open for credit to students who have completed any quarter of PHY 009 or PHY 009H, or any upper division PHY course. GE credit: SE, SL, VL. Effective: 2014 Fall Quarter.

PHY 010CY—Physics of California (3)
Discussion—1.5 hours; Web Electronic Discussion—0.5 hours; Web Virtual Lecture—1 hour. Conceptual understanding of the physics underlying regional sports in CA. Focus on skiing, surfing, and scuba diving. Atmospheric phenomena common in CA, local weather patterns and microclimes, applications to CA energy, and water are also discussed. Not open for credit to students who have completed PHY 010C, any quarter of PHY 09A, PHY 009B, PHY 009C, PHY 009D, PHY 009HA, PHY 009HB, PHY 009HC, PHY 009HD, or PHY 009HE, or any upper division PHY course. GE credit: SE, SL, VL. Effective: 2017 Winter Quarter.

PHY 012—Visualization in Science (3)
Lecture—3 hours. Production, interpretation, and use of images in physics, astronomy, biology, and chemistry as scientific evidence and for communication of research results. GE credit: SE, SL, VL. Effective: 2017 Winter Quarter.

PHY 030—Fractals, Chaos and Complexity (3)
Lecture/Discussion—3 hours. Prerequisite(s): MAT 016A or MAT 021A Modern ideas about the unifying ideas of fractal geometry, chaos and complexity. Basic theory and applications with examples from physics, earth sciences, mathematics, population dynamics, ecology, history, economics, biology, computer science, art and architecture. (Geology 30.) GE credit: QL, SE. Effective: 2010 Winter Quarter.

PHY 049—Supplementary Work in Lower Division Physics (1-3)
Variable. Students with partial credit in lower division physics courses may, with consent of instructor, complete the credit under this heading. May be repeated for credit. May be repeated for credit. GE credit: SE. Effective: 1999 Fall Quarter.

PHY 080—Experimental Techniques (4)
Laboratory—5 hours; Lecture—2 hours. Prerequisite(s): PHY 009D or PHY 009HD Open to Physics and Applied Physics majors only. Experimental techniques. Design of circuits. Data analysis, sources of noise, statistical and systematic uncertainties. Light sources, detection, and measurement in basic optical systems. Effective: 2017 Fall Quarter.

PHY 090X—Lower Division Seminar (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Limited enrollment. Examination of a special topic in Physics through shared readings, discussions, written assignments, or special activities such as laboratory work. May be repeated for credit. GE credit: SE. Effective: 1998 Fall Quarter.

PHY 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Primary for lower division students. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

PHY 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

PHY 102—Computational Laboratory in Physics (1)
Laboratory—4 hours. Prerequisite(s): MAT 021D; ECS 030; (PHY 009D or PHY 009HD); PHY 104A (can be concurrent); MAT 22AB; PHY 104A required concurrently. Introduction to computational physics and to the computational resources in the physics department. Preparation for brief programming assignments required in other upper division physics classes. Not open to students who have completed PHY 104B or PHY 105AL. GE credit: SE. Effective: 2008 Summer Session 1.

PHY 104A—Introductory Methods of Mathematical Physics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): (PHY 009B C- or better, PHY 009C C- or better, PHY 009D C- or better); (MAT 021D C- or better, MAT 022A C- or better, MAT 022B C- or better); or Consent of Instructor. Introduction to the mathematics used in upper-division physics courses, including applications of vector spaces, Fourier analysis, partial differential equations. Effective: 2000 Fall Quarter.

PHY 104B—Computational Methods of Mathematical Physics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): PHY 104A C- or better; PHY 105AL; or Consent of Instructor. Introduction to the use of computational techniques to solve the mathematical problems that arise in advanced physics courses, complementing the analytical approaches emphasized in course 104A. GE credit: SE. Effective: 2000 Fall Quarter.

PHY 104C—Intermediate Methods of Mathematical Physics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): PHY 104A C- or better; or Consent of Instructor. Applications of complex analysis, conditional probability, integral transformations and other advanced topics. Effective: 2000 Fall Quarter.

PHY 105A—Analytical Mechanics (4)
Lecture—3 hours. Prerequisite(s): (PHY 009B C or better, PHY 009C C or better, PHY 009D C or better); (MAT 021D C or better, MAT 022A C or better, MAT 022B C or better); Or consent of department for any of the courses. Principles and applications of Newtonian mechanics; introduction to Lagrange's and Hamilton's equations GE credit: SE. Effective: 1999 Fall Quarter.

PHY 105B—Analytical Mechanics (4)
Lecture—3 hours. Prerequisite(s): PHY 104A C or better; PHY 105A C or better; Or consent of department for any of the courses. Principles and applications of Newtonian mechanics; introduction to Lagrange's and Hamilton's equations GE credit: SE. Effective: 1999 Fall Quarter.

PHY 105C—Continuum Mechanics (4)
Lecture—3 hours. Prerequisite(s): PHY 104A C- or better; PHY 105A C- or better; or Consent of Instructor. The continuum hypothesis and limitations, tensors, isotropic constitutive equations, and wave propagation. Applications such as elastic solids,heat flow, aerodynamics, and ocean waves. GE credit: SE. Effective: 2006 Spring Quarter.

PHY 108—Optics (3)
Lecture—3 hours. Prerequisite(s): ((PHY 009A, PHY 009B, PHY 009C, PHY 009D) or (PHY 007A, PHY 007B, PHY 007C)); (MAT 021A, MAT 021B, MAT 021C, MAT 021D); or Consent of Instructor. The phenomena of diffraction, interference, and polarization of light, with applications to current problems in astrophysics, material science,
and atmospheric science. Study of modern optical instrumentation. Open to non-majors. GE credit: SE. Effective: 1997 Winter Quarter.

PHY 108L—Optics Laboratory (1)
Laboratory—3 hours. Prerequisite(s): PHY 108 (can be concurrent); PHY 108 required concurrently. The laboratory will consist of one major project pursued throughout the quarter, based on modern applications of optical techniques. GE credit: SE. Effective: 1997 Winter Quarter.

PHY 110A—Electricity and Magnetism (4)
Lecture—3 hours. Prerequisite(s): PHY 009B C- or better; PHY 009C C- or better; PHY 009D C- or better; MAT 021D C- or better; MAT 022A C- or better; MAT 022B C- or better; PHY 104A; PHY 105A; Or consent of department. Theory of electrostatics, electromagnetism, Maxwell's equations, electromagnetic waves. GE credit: SE. Effective: 2018 Winter Quarter.

PHY 110B—Electricity and Magnetism (4)
Lecture—3 hours. Prerequisite(s): PHY 110A C- or better; PHY 104A C- or better; Or consent of department. Theory of electrostatics, electromagnetism, Maxwell's equations, electromagnetic waves. GE credit: SE. Effective: 2010 Winter Quarter.

PHY 110C—Electricity and Magnetism (4)
Lecture—3 hours. Prerequisite(s): PHY 110B C- or better; Or consent of department. Theory of electrostatics, electromagnetism, Maxwell's equations, electromagnetic waves. GE credit: SE. Effective: 2010 Winter Quarter.

PHY 112—Thermodynamics and Statistical Mechanics (4)
Lecture—3 hours. Prerequisite(s): PHY 115A; Or the equivalent. Introduction to classical and quantum statistical mechanics and their
connections with thermodynamics. The theory is developed for the ideal gas model and simple magnetic models and then extended to studies of solids, quantum fluids, and chemical equilibria. GE credit: SE. Effective: 2000 Winter Quarter.

PHY 115A—Foundation of Quantum Mechanics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): PHY 104A C- or better; PHY 105A C- or better; Or consent of department. Introduction to the methods of quantum mechanics with applications to atomic, molecular, solid state, nuclear and elementary particle physics. Extensive problem solving. GE credit: SE. Effective: 2007 Winter Quarter.

PHY 115B—Applications of Quantum Mechanics (4)
Lecture—3 hours. Prerequisite(s): PHY 115A C- or better; Or consent of department. Angular momentum and spin; hydrogen atom and atomic spectra; perturbation theory; scattering theory. GE credit: SE. Effective: 1999 Fall Quarter.

PHY 116A—Electronic Instrumentation (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): PHY 009C; MAT 022B; or Consent of Instructor. Experimental and theoretical study of important analog electronic circuits. Linear circuits, transmission lines, input impedance, feedback, amplifiers, oscillators, noise. GE credit: SE, VL. Effective: 2008 Fall Quarter.

PHY 116B—Electronic Instrumentation (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): PHY 009C or PHY 009HD; or Consent of Instructor. Continuation of course 116A. Introduction to the use of digital electronics and microcomputers in experimental physics. Nonlinear electronics, integrated circuits, analog-to-digital and digital-to-analog converters, transducers, actuators. GE credit: SE. Effective: 2008 Spring Quarter.

PHY 116C—Introduction to Computer-Based Experiments in Physics (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (PHY 009D or PHY 009HD); PHY 116B; MAT 022B; or Consent of Instructor. Introduction to techniques for making physical measurements using computer-based instrumentation. GE credit: SE, WE. Effective: 2004 Spring Quarter.

PHY 122A—Advanced Laboratory in Condensed Matter Physics (4)
Laboratory—8 hours. Prerequisite(s): PHY 104A; PHY 105A; PHY 110B; PHY 115A; PHY 112 (can be concurrent); Or consent of the department. Registration by Permission to Add (PTA) number only; priority given to graduating PHY and APP majors. Experimental techniques and measurements in solid-state physics. Student performs three to six experiments depending on difficulty. Individual work is stressed. Thorough write-ups of the experiments are required. GE credit: SE, WE. Effective: 2018 Winter Quarter.

PHY 122B—Advanced Laboratory in Particle Physics (4)
Laboratory—8 hours. Prerequisite(s): PHY 104A; PHY 105A; PHY 110B; PHY 115A; PHY 112 (can be concurrent); Or consent of the department. Registration by Permission to Add (PTA) number only; priority given to graduating PHY and APP majors. Experimental techniques and measurements in nuclear and particle physics. Students perform three to six experiments depending on difficulty. Individual work is stressed. Thorough write-ups of the experiments are required. GE credit: SE, WE. Effective: 2018 Winter Quarter.

PHY 123—Signals and Noise in Physics (4)
Lecture—3 hours; Project (Term Project)—1 hour. Prerequisite(s): PHY 009A; PHY 009B; PHY 009C; PHY 009D; PHY 104A; or Consent of Instructor. Not open to students who have taken this course previously as course 198. Techniques of measurement and analysis designed to avoid systematic error and maximize signal/noise ratio. Illustrative examples of optimal filters ranging from condensed matter to cosmology. GE credit: SE. Effective: 2007 Winter Quarter.

PHY 129A—Introduction to Nuclear Physics (4)
Lecture—3 hours. Prerequisite(s): PHY 115A C- or better; or Consent of Instructor. Survey of basic nuclear properties and concepts requiring introductory
knowledge of quantum mechanics: nuclear models and forces, radioactive decay and detecting nuclear radiation and nuclear reaction products,
alpha, beta and gamma decay. GE credit: SE. Effective: 2000 Winter Quarter.

PHY 129B—Nuclear Physics, Extensions and Applications (4)
Lecture—3 hours; Term Paper. Prerequisite(s): PHY 129A Continuation of course 129A. Nuclear reactions, neutrons, fission, fusion accelerators, introduction to meson and particle physics, nuclear

astrophysics, and applications of nuclear physics and techniques to mass spectrometry, nuclear medicine, trace element analysis. GE credit: SE. Effective: 1997 Winter Quarter.

PHY 130A—Elementary Particle Physics (4)
Lecture—3 hours. Prerequisite(s): PHY 115A C- or better; or Consent of Instructor. Properties and classification of elementary particles and their interactions. Experimental techniques. Conservation laws and symmetries. Strong, electromagnetic, and weak interactions. Introduction to Feynman calculus. GE credit: SE. Effective: 2000 Winter Quarter.

PHY 130B—Elementary Particle Physics (4)
Lecture—3 hours. Prerequisite(s): PHY 115A C- or better; or Consent of Instructor. Properties and classification of elementary particles and their interactions. Experimental techniques. Conservation laws and symmetries. Strong, electromagnetic, and weak interactions. Introduction to Feynman calculus. GE credit: SE. Effective: 2000 Winter Quarter.

PHY 140A—Introduction to Solid State Physics (4)
Lecture—3 hours. Prerequisite(s): PHY 115A C- or better; or Consent of Instructor. Or equivalent course passed with C- or better. Survey of fundamental ideas in the physics of solids, with selected device applications. Crystal structure, x-ray and neutron diffraction, phonons, simple metals, energy bands and Fermi surfaces, semiconductors, optical properties, magnetism, superconductivity. GE credit: SE. Effective: 2000 Winter Quarter.

PHY 140B—Introduction to Solid State Physics (4)
Lecture—3 hours. Prerequisite(s): PHY 115A C- or better; or Consent of Instructor. Or equivalent course passed with C- or better. Survey of fundamental ideas in the physics of solids, with selected device applications. Crystal structure, x-ray and neutron diffraction, phonons, simple metals, energy bands and Fermi surfaces, semiconductors, optical properties, magnetism, superconductivity. GE credit: SE. Effective: 2000 Winter Quarter.

PHY 150—Special Topics in Physics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): (PHY 009A, PHY 009B, PHY 009C, PHY 009D) or (PHY 009HA, PHY 009HB, PHY 009HC, PHY 009HD, PHY 009HE); or Consent of Instructor. Topics vary, covering areas of contemporary research in physics. May be repeated for credit. GE credit: SE. Effective: 2007 Fall Quarter.

PHY 151—Stellar Structure and Evolution (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): PHY 009A; PHY 009B; PHY 009C; PHY 009D; or Consent of Instructor. The chemical composition, structure, energy sources and evolutionary history of stars, with equal emphasis on both the observational data and theoretical models, including black holes, neutron stars and white dwarfs and the formation of substellar masses. GE credit: SE. Effective: 2007 Fall Quarter.

PHY 152—Galactic Structure and the Interstellar Medium (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): PHY 009A; PHY 009B; PHY 009C; PHY 009D; PHY 105A (can be concurrent); or Consent of Instructor. PHY 105A required concurrently. The structure, contents, and formation of our Milky Way galaxy, viz. its shape and size, the nature of the interstellar medium, stellar populations, rotation curves, mass determination and evidence of dark matter. GE credit: SE. Effective: 2007 Spring Quarter.

PHY 153—Extragalactic Astrophysics (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): PHY 009A; PHY 009B; PHY 009C; PHY 009D; PHY 104A; PHY 105A; or Consent of Instructor. Structure and evolution of galaxies and clusters of galaxies, including distance and mass determination, galaxy types and environments, active galactic nuclei and quasars, gravitational lensing and dark matter, global cosmological properties. Not open to students who have taken PHY 127. GE credit: SE. Effective: 2007 Winter Quarter.

PHY 154—Astrophysical Applications of Physics (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): PHY 105A; PHY 105B; PHY 110B (can be concurrent); PHY 115A (can be concurrent); PHY 112; PHY 112 or consent of instructor; PHY 110B and 115A required concurrently. Not open to students who have taken this course previously as course 198. Applications of classical and quantum mechanics, thermodynamics, statistical mechanics, and electricity and magnetism to astrophysical settings such as the Big Bang, degenerate white dwarf and neutron stars, and solar neutrinos. GE credit: SE. Effective: 2007 Spring Quarter.

PHY 155—General Relativity (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): PHY 104A; PHY 105A; PHY 105B; PHY 110A; PHY 105B and PHY 110A or consent of instructor. Definition of the mathematical frame work for the description of the gravitational field, introduction of the dynamical equations of Einstein governing its evolution and review of the key solutions, including black holes and expanding universes. GE credit: SE. Effective: 2007 Fall Quarter.

PHY 156—Introduction to Cosmology (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): PHY 009A; PHY 009B; PHY 009C; PHY 009D; PHY 105A (can be concurrent); or Consent of Instructor. PHY 105A required concurrently. Contemporary knowledge regarding the origin of the universe, including the Big Bang and nucleosynthesis, microwave background radiation, formation of cosmic structure, cosmic inflation, cosmic acceleration and dark energy. Not open to students who have completed PHY 126. GE credit: SE. Effective: 2007 Fall Quarter.

PHY 157—Astronomy Instrumentation and Data Analysis Laboratory (4)
Laboratory—8 hours. Prerequisite(s): PHY 104A; PHY 105A; PHY 110A; PHY 115A (can be concurrent); PHY 110B (can be concurrent); and Consent of Instructor. Registration by Permission to Add (PTA) number only; priority given to graduating PHY astrophysics emphasis seniors. Experimental techniques, data acquisition and analysis involving laboratory astrophysics plus stellar, nebular and galaxy digital imaging, photometry and/or spectroscopy. Students perform three experiments. Individual work stressed. Minimum 10-15 page journal style articles of two experiments are required. GE credit: SE, WE. Effective: 2018 Winter Quarter.

PHY 160—Environmental Physics and Society (3)
Lecture—3 hours. Prerequisite(s): (PHY 009D or PHY 007C); (PHY 010 or PHY 001B); MAT 016B; Or the equivalent. Impact of humankind on the environment will be discussed from the point of view of the physical sciences. Calculations based on physical principles will be made, and the resulting policy implications will be considered. (Engineering 160.) GE credit: SE, SL. Effective: 1997 Winter Quarter.

PHY 185—Alumni Seminar Series (1)
Seminar—1 hour. Weekly guest speakers (usually a physics alumnus or alumna) tell students about their careers. Speakers use their experience to give students valuable perspectives on life after a degree in physics. May be repeated up to 2 time(s). (P/NP grading only.) GE credit: SE. Effective: 2013 Fall Quarter.

PHY 190—Careers in Physics (1)
Seminar—2 hours. Restricted to Physics and Applied Physics majors only. Overview of important research areas in physics, discussions of research opportunities and internships, strategies for graduate school and industrial careers, the fellowship and assistantship selection process, preparation of resumes, personal statements, and letters of recommendation. (P/NP grading only.) GE credit: SE. Effective: 2007 Fall Quarter.

PHY 194HA—Special Study for Honors Students (4)
Independent Study—12 hours. Prerequisite(s): Consent of Instructor. Open only to Physics and Applied Physics majors who satisfy the College of Letters and Science requirements for entrance into the Honors Program. Independent research project at a level significantly beyond that defined by the normal physics curriculum. GE credit: SE. Effective: 1997 Winter Quarter.

PHY 194HB—Special Study for Honors Students (4)
Independent Study—12 hours. Prerequisite(s): Consent of Instructor. Open only to Physics and Applied Physics majors who satisfy the College of Letters and Science requirements for entrance into the Honors Program. Independent research project at a level significantly beyond that defined by the normal physics curriculum. GE credit: SE. Effective: 1997 Winter Quarter.

PHY 195—Senior Thesis (5)
Independent Study—15 hours. Prerequisite(s): Consent of Instructor. Open only to Physics and Applied Physics majors with senior standing. Preparation of a senior thesis on a topic selected by the student with approval of the department. May be repeated for a total of 15 units. May be repeated up to 15 unit(s). GE credit: SE. Effective: 1997 Winter Quarter.

PHY 197T—Tutoring in Physics and Astronomy (1-5)
Tutorial. Tutoring of students in lower division courses. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. Weekly meeting with instructor (P/NP grading only.) GE credit: SE. Effective: 2004 Spring Quarter.

PHY 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

PHY 199—Special Study for Advanced Undergraduates (1-5)
Variable. June 2012: GE2 Topical Breadth updated per Davis Division of the Academic Senate May 18th announcement of an administrative correction "To allow Topical Breadth designations of GE3 to apply to GE2." (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

PHY 200A—Theory of Mechanics and Electromagnetics (4)
Independent Study—1 hour; Lecture—3 hours. Prerequisite(s): PHY 204A (can be concurrent); PHY 104B; PHY 105B; PHY 110C; Or equivalent to PHY 110C; PHY 204A required concurrently. Theoretical approaches in classical mechanics including the use of generalized coordinates and virtual work; variational calculus; Lagrange equations; symmetries, conservation laws, and Noether theorem; Lagrangian density; Hamilton formalism; canonical transformations; Poisson brackets; and Hamilton-Jacobi equations. Effective: 1997 Winter Quarter.

PHY 200B—Theory of Mechnics and Electromagnetics (4)
Independent Study—1 hour; Lecture—3 hours. Prerequisite(s): PHY 200A; PHY 204B (can be concurrent); PHY 204B concurrently. Theoretical approaches in electromagnetics including static electromagnetic fields; Maxwell's equations; plane waves in various media; magnetohydrodynamics; diffraction theory; radiating systems; and special relativity. Effective: 1997 Winter Quarter.

PHY 200C—Theory of Mechanics and Electromagnetics (4)
Independent Study—1 hour; Lecture—3 hours. Prerequisite(s): PHY 200A; PHY 204B (can be concurrent); PHY 204B concurrently. Theoretical approaches in electromagnetics including static electromagnetic fields; Maxwell's equations; plane waves in various media; magnetohydrodynamics; diffraction theory; radiating systems; and special relativity. Effective: 1997 Winter Quarter.

PHY 204A—Methods of Mathematical Physics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): PHY 104A; Or the equivalent. Linear vector spaces, operators and their spectral analysis, complete sets of functions, complex variables, functional analysis, Greens functions, calculus of variations, introduction to numerical analysis. Effective: 2016 Spring Quarter.

PHY 204B—Methods of Mathematical Physics (4)
Independent Study—1 hour; Lecture—3 hours. Prerequisite(s): PHY 104A; PHY 104B; Or the equivalent. Linear vector spaces, operators and their spectral analysis, complete sets of functions, complex variables, functional analysis, Green's functions, calculus of variations, introduction to numerical analysis. Effective: 1997 Winter Quarter.

PHY 210—Computational Physics (3)
Lecture—3 hours. Prerequisite(s): Knowledge of Fortran or C. Analytic techniques to solve differential equations and eignevalue problems. Physics content of course will be self-contained, and adjusted according to background of students. Effective: 1999 Spring Quarter.

PHY 215A—Quantum Mechanics (4)
Independent Study—1 hour; Lecture—3 hours. Prerequisite(s): PHY 115B; Or the equivalent. Formal development and interpretation of non-relativistic quantum mechanics; its application to atomic, nuclear, molecular, and solid-state problems; brief introduction to relativistic quantum mechanics and the Dirac equation. Effective: 1997 Winter Quarter.

PHY 215B—Quantum Mechanics (4)
Independent Study—1 hour; Lecture—3 hours. Prerequisite(s): PHY 115B; Or the equivalent. Formal development and interpretation of non-relativistic quantum mechanics; its application to atomic, nuclear, molecular, and solid-state problems; brief introduction to relativistic quantum mechanics and the Dirac equation. Effective: 1997 Winter Quarter.

PHY 215C—Quantum Mechanics (4)
Independent Study—1 hour; Lecture—3 hours. Prerequisite(s): PHY 115B; Or the equivalent. Formal development and interpretation of non-relativistic quantum mechanics; its application to atomic, nuclear, molecular, and solid-state problems; brief introduction to relativistic quantum mechanics and the Dirac equation. Effective: 1997 Winter Quarter.

PHY 219A—Statistical Mechanics (4)
Extensive Problem Solving—1 hour; Lecture—3 hours. Prerequisite(s): PHY 215B; Or equivalent. Foundations of thermodynamics and classical and quantum statistical mechanics with simple applications to properties of solids, real gases, nuclear matter, etc. and a brief introduction to phase transitions. Effective: 2002 Winter Quarter.

PHY 219B—Statistical Mechanics (4)
Extensive Problem Solving—1 hour; Lecture—3 hours. Prerequisite(s): PHY 219A Further applications of thermodynamics and classical and quantum statistical mechanics. The modern theory of fluctuations about the equilibrium state, phase transitions and critical phenomena. Effective: 2002 Winter Quarter.

PHY 223A—Group Theoretical Methods of Physics-Condensed Matter (3)
Lecture—3 hours. Prerequisite(s): PHY 215A; PHY 215B; PHY 215C (can be concurrent); or Consent of Instructor. PHY 215C required concurrently. Theory of groups and their representations with applications in condensed matter. Effective: 1997 Winter Quarter.

PHY 223B—Group Theoretical Methods of Physics-Elementary Particles (3)
Lecture—3 hours. Prerequisite(s): PHY 215A; PHY 215B; PHY 215C (can be concurrent); or Consent of Instructor. PHY 215C required concurrently. Theory of groups and their representations with applications in elementary particle physics. Effective: 1997 Winter Quarter.

PHY 224A—Nuclear Physics (3)
Lecture—3 hours. Prerequisite(s): PHY 215B Comprehensive study of the nucleon-nucleon interaction including the deuteron, nucleon-nucleon scattering, polarization, determination of real parameters of Smatrix, and related topics. Effective: 1997 Winter Quarter.

PHY 224B—Nuclear Physics (3)
Lecture—3 hours. Prerequisite(s): PHY 224A Study of nuclear models, including shell model, collective model, unified model. Energy level spectra, static momenta, and electromagnetic transition rates. Effective: 1997 Winter Quarter.

PHY 224C—Nuclear Physics (3)
Lecture—3 hours. Prerequisite(s): PHY 224B Study of nuclear scattering and reactions including the optical model and direct interactions. Beta decay and an introduction to weak interactions. Effective: 1997 Winter Quarter.

PHY 229A—Advanced Nuclear Theory (3)
Lecture—3 hours. Prerequisite(s): PHY 224C Advanced topics in nuclear theory; theory of quantum-mechanical scattering processes. Exact formal theory and models for two-body scattering. Effective: 1997 Winter Quarter.

PHY 229B—Advanced Nuclear Theory (3)
Lecture—3 hours. Prerequisite(s): PHY 229A Advanced topics in nuclear theory; theory of quantum-mechanical scattering processes. Exact formal theory and models for three-body scattering. Effective: 1997 Winter Quarter.

PHY 230A—Quantum Theory of Fields (3)
Lecture—3 hours. Prerequisite(s): PHY 215C Relativistic quantum mechanics of particles; techniques and applications of second quantization; Feynman diagrams; renormalization. Effective: 1997 Winter Quarter.

PHY 230B—Quantum Theory of Fields (3)
Lecture—3 hours. Prerequisite(s): PHY 230A Continuation of 230A, with selected advanced topics, such as S-matrix theory, dispersion relations, axiomatic formulations. Effective: 1997 Winter Quarter.

PHY 230C—Quantum Theory of Fields (3)
Lecture—3 hours. Prerequisite(s): PHY 230A; PHY 230B; or Consent of Instructor. Renormalization theory and applications, including dimensional regularization, Ward identities, renormalization group equations, coupling constant unification, and precision electroweak calculations. May be repeated for credit with consent of instructor. Effective: 2007 Winter Quarter.

PHY 240A— Condensed Matter Physics A (3)
Lecture—3 hours. Prerequisite(s): PHY 215C; PHY 219A; PHY 140A and PHY 140B or equivalent recommended. Topics in condensed matter physics: Crystal structure; one-electron theory; transport and optical properties of semiconductors; phonons, electron-phonon scattering. Effective: 2007 Fall Quarter.

PHY 240B—Condensed Matter Physics B (3)
Lecture—3 hours. Prerequisite(s): PHY 240A Topics in condensed matter physics: transport and optical properties of metals and quantum structures; experimental measurement the Fermi surface and of phonon spectra. Effective: 2008 Spring Quarter.

PHY 240C—Condensed Matter Physics (3)
Lecture—3 hours. Prerequisite(s): PHY 240A; PHY 240B Review of second quantization. Interacting electron gas, electron-phonon interaction and effects, including instabilities of electronic systems. Topics in the theory of superconductivity and magnetism. Effective: 2005 Spring Quarter.

PHY 241—Advanced Topics in Magnetism (3)
Lecture—3 hours. Prerequisite(s): PHY 240A; PHY 240B; PHY 240C; PHY 240D; or Consent of Instructor. Topics chosen from areas of current research interest. Effective: 1997 Winter Quarter.

PHY 242—Advanced Topics in Superconductivity (3)
Lecture—3 hours. Prerequisite(s): PHY 240A; PHY 240B; PHY 240C; PHY 240D; or Consent of Instructor. Topics chosen from areas of current research interest. Effective: 1997 Winter Quarter.

PHY 243A—Surface Physics of Materials (3)
Lecture—3 hours. Prerequisite(s): PHY 140A; PHY 140B; PHY 115A; PHY 115B; Or the equivalent to any; PHY 215A, PHY 240A, or the equivalents recommended. Experimental and theoretical fundamentals of surface and interface physics and chemistry, including electronic and magnetic structure, thermodynamics, adsorption kinetics, epitaxial growth, and a discussion of various spectroscopic and structural probes based on photons, electrons, ions, and scanning probes. Effective: 1999 Winter Quarter.

PHY 243B—Surface Physics of Materials (3)
Lecture—3 hours. Prerequisite(s): PHY 140A; PHY 140B; PHY 115A; PHY 115B; Or the equivalent to any; PHY 215A, PHY 240A, or the equivalents recommended. Experimental and theoretical fundamentals of surface and interface physics and chemistry, including electronic and magnetic structure, thermodynamics, adsorption kinetics, epitaxial growth, and a discussion of various spectroscopic and structural probes based on photons, electrons, ions, and scanning probes. Effective: 1999 Winter Quarter.

PHY 243C—Surface Physics of Materials (3)
Lecture—3 hours. Prerequisite(s): PHY 140A; PHY 140B; PHY 115A; PHY 115B; Or the equivalent to any; PHY 215A, PHY 240A, or equivalents recommended. Experimental and theoretical fundamentals of surface and interface physics and chemistry, including electronic and magnetic structure, thermodynamics, adsorption kinetics, epitaxial growth, and a discussion of various spectroscopic and structural probes based on photons, electrons, ions, and scanning probes. Effective: 2000 Spring Quarter.

PHY 245A—High-Energy Physics (3)
Lecture—3 hours. Prerequisite(s): PHY 230A Phenomenology and systematics of strong, electromagnetic, and weak interactions of hadrons and leptons; determination of quantum numbers; quarks and quarkonia; deep inelastic scattering; the quark parton model; experiments at hadron colliders and electron-positron colliders. Effective: 1997 Winter Quarter.

PHY 245B—High-Energy Physics (3)
Lecture—3 hours. Prerequisite(s): PHY 245A Electroweak interactions; phenomenology of the Standard Model of SU(2)LxU(1); weak interaction experiments; properties of and experiments with W and Z vector bosons; Glashow-Weinberg-Salam model and the Higgs boson; introduction to supersymmetry and other speculations. Effective: 1997 Winter Quarter.

PHY 245C—Collider Physics (3)
Lecture—3 hours. Prerequisite(s): PHY 245A; PHY 252B (can be concurrent); or Consent of Instructor. PHY 252B taken previously or concurrently. Collider physics. Topics include quark and gluon distribution functions and the computation of cross sections; Large Hadron Collider and International Linear Collider phenomenology; collider and detector characteristics; extracting models from data; software tools for analyzing experimental data. May be repeated for credit with consent of instructor. Effective: 2008 Spring Quarter.

PHY 246—Supersymmetry: Theory and Phenomenology (3)
Lecture—3 hours. Prerequisite(s): PHY 230A, PHY 230B, PHY 245A, PHY 245B recommended, or consent of instructor. Construction of supersymmetric models of particle physics; superfields; supersymmetry breaking the minimal supersymmetric standard model; supergravity. Collider phenomenology of supersymmetry. Dark matter phenomenology. Effective: 1998 Spring Quarter.

PHY 246A—Supersymmetry: Theory and Phenomenology (3)
Lecture—3 hours. Prerequisite(s): PHY 230A; PHY 230B; PHY 245A, PHY 245B recommended or consent of instructor. Construction of supersymmetric models of particle physics; superfields; supersymmetry breaking the minimal supersymmetric standard model; supergravity. Collider phenomenology of supersymmetry. Dark matter phenomenology. Not offered every year. Effective: 2008 Spring Quarter.

PHY 246B—Advanced Supersymmetry (3)
Lecture—3 hours. Prerequisite(s): PHY 246A Advanced topics in supersymmetry. Topics include holomorphy, the Affleck-Dine-Seiberg superpotential, Seiberg duality for SUSY QCD, dynamical SUSY breaking, Seiberg-Witten theory, superconformal field theories, supergravity, anomaly and gaugino mediation, and the AdS/CFT correspondence. Effective: 2007 Fall Quarter.

PHY 250—Special Topics in Physics (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Topic varies. May be repeated for credit. Effective: 1997 Fall Quarter.

PHY 252A—Techniques of Experimental Physics (3)
Lecture—3 hours. Introduction to techniques and methods of designing and executing experiments. Problems and examples from condensed matter research will be utilized. Effective: 1997 Winter Quarter.

PHY 252B—Techniques of Experimental Physics (3)
Lecture—3 hours. Introduction to techniques and methods of designing and executing experiments. Problems and examples from nuclear and particle research will be utilized. Effective: 1997 Winter Quarter.

PHY 252C—Statistics and Data Analysis for Particle Physics (3)
Lecture—3 hours. Introduction to statistical data analysis methods in particle physics. Theoretical lectures combined with practical computer laboratory work. Effective: 2007 Spring Quarter.

PHY 253—Signals and Noise in Physics (3)
Lecture—3 hours. Techniques for extracting signals from noise, systematic error. Effective: 2007 Winter Quarter.

PHY 256A—Physics of Information (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Advanced undergraduate or introductory graduate differential equations, applied linear algebra, and probability theory; e.g., Mathematics 119A/B or 207A, 167 or 226A, and 135A/B or 235A, respectively; or in Physics 104A/C or 204A/B. Class size limited to 30 students. Nonlinear dynamics, deterministic chaos, bifurcations, pattern formation, symbolic dynamics, measurement theory, stochastic processes, elementary information theory, information in complex systems, computational laboratory. Effective: 2017 Spring Quarter.

PHY 256B—Physics of Computation (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): PHY 256A; Consent of Instructor. Advanced undergraduate or introductory graduate differential equations, applied linear algebra, and probability theory; e.g., Mathematics 119A/B or 207A, 167 or 226A, and 135A/B or 235A, respectively; or in Physics 104A/C or 204A/B. Class size limited to 30 students. Structural complexity, computational mechanics, information measures, causal inference, applications to complex materials, quantum dynamics, and nonequilibrium thermodynamics, computational laboratory. Effective: 2017 Spring Quarter.

PHY 260—Introduction to General Relativity (3)
Lecture—3 hours. Prerequisite(s): PHY 200A; PHY 200B An introduction to general relativity. Differential geometry and curved spacetime; the Einstein field equations; gravitational fields of stars and black holes; weak fields and gravitational radiation; experimental tests; Big Bang cosmology. Effective: 1999 Spring Quarter.

PHY 262—Early Universe Cosmology (3)
Lecture—3 hours. Prerequisite(s): Second year standing in Physics Graduate Program or consent of instructor. Introduction to early universe cosmology: the Big Bang, inflation, primordial nucleosynthesis, dark matter, dark energy, and other topics of current interest Effective: 2005 Spring Quarter.

PHY 263—Cosmic Structure Formation (3)
Lecture—3 hours. Prerequisite(s): PHY 260 Growth of structure from small density inhomogeneities in the early universe to the diverse structures observable today. Use of observable properties (cosmic microwave background, gravitational lensing, peculiar velocities, number density, etc.) to constrain models of structure formation and fundamental physics. Effective: 2005 Spring Quarter.

PHY 265—High Energy Astrophysics and Radiative Processes (3)
Lecture—3 hours. Prerequisite(s): Graduate standing in Physics or consent of instructor. Survey course covering galactic and extragalactic X-ray and gamma-ray astronomy, radiative processes, and techniques of high-energy astrophysics. Effective: 2004 Fall Quarter.

PHY 266—Data Analysis for Astrophysics (3)
Lecture—3 hours. Prerequisite(s): Graduate standing in Physics or consent of instructor. Survey course covering measurement and signal analysis techniques for astrophysics and cosmology throughout the electromagnetic spectrum. Effective: 2005 Winter Quarter.

PHY 267—Observational Extragalactic Astronomy & Cosmology (3)
Lecture—3 hours. Prerequisite(s): Graduate standing in Physics or consent of instructor. Survey course covering current areas of research on extragalactic objects, their physical properties, origin, evolution, and distribution in space. Effective: 2005 Spring Quarter.

PHY 270—Current Topics in Physics Research (3)
Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing in Physics or consent of instructor. Reading and discussion to help physics graduate students develop and maintain familiarity with the current and past literature in their immediate field of research and related areas. May be repeated for credit. (S/U grading only.) Effective: 2013 Fall Quarter.

PHY 285—Careers in Physics (1)
Seminar—1.5 hours. Prerequisite(s): Graduate standing in Physics. Designed to give Physics graduate students an in-depth appreciation of career opportunities with a graduate degree in physics. Professional physicists, mainly from outside academia, will give seminars describing both research and career insights. May be repeated for credit. (S/U grading only.) Effective: 2005 Winter Quarter.

PHY 290—Seminar in Physics (1)
Seminar. Prerequisite(s): Graduate standing in Physics or consent of instructor. Presentation and discussion of topics of current research interest in physics. Topics will vary weekly and will cover a broad spectrum of the active fields of physics research at a level accessible to all physics graduate students. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

PHY 291—Seminar in Nuclear Physics (1)
Seminar—1 hour. Prerequisite(s): Graduate standing in Physics or consent of instructor. Presentation and discussion of topics of current research interest in nuclear physics. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

PHY 292A—Seminar in Elementary Particle Physics (1)
Seminar—1 hour. Prerequisite(s): Graduate standing in Physics or consent of instructor. Presentation and discussion of topics of current research interest in elementary particle physics. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 2008 Fall Quarter.

PHY 292B—High Energy Frontier Initiative And Cosmology Theory Seminar (1)
Seminar—1 hour. Prerequisite(s): Physics graduate students. May be repeated up to 5 time(s). (S/U grading only.) Effective: 2007 Fall Quarter.

PHY 293—Seminar in Condensed Matter Physics (1)
Seminar—1 hour. Prerequisite(s): Graduate standing in Physics or consent of instructor. Presentation and discussion of topics of current research interest in condensed matter physics. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

PHY 294—Seminar in Cosmology (1)
Seminar—1 hour. Prerequisite(s): Graduate standing in Physics or consent of instructor. Presentation and discussion of topics of current research interest in Cosmology. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1999 Winter Quarter.

PHY 295—Introduction to Departmental Research (1)
Seminar—1 hour. Seminar to introduce first- and second-year physics graduate students to the fields of specialty and research of the Physics staff. (S/U grading only.) Effective: 1997 Winter Quarter.

PHY 297—Research on the Teaching and Learning of Physics (3)
Seminar—3 hours. Prerequisite(s): Graduate standing in Physics or consent of instructor. Discussion and analysis of recent research in how students construct understanding of physics and other science concepts and the implications of this research for instruction. Effective: 1997 Winter Quarter.

PHY 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

PHY 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

PHY 371—Teaching in an Active-Engagement Physics Discussion/Lab Setting (1)
Lecture/Discussion—1 hour. Prerequisite(s): PHY 009D; Or equivalent. Open to graduate students only. Analysis of recent research on science/physics teaching and learning and its implications for teaching labs, discussions, and discussion/labs with an emphasis on differences between conventional and active-engagement instructional settings. The appropriate role of the instructor in specific instructional settings. May be repeated up to 2 time(s). Effective: 2008 Summer Session 1.

PHY 390—Methods of Teaching Physics (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing in Physics. Practical experience in methods and problems related to teaching physics laboratories at the university level, including discussion of teaching techniques, analysis of quizzes and laboratory reports and related topics. Required of all Physics Teaching Assistants. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

PHY 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Physics | AST Courses

Courses in AST:

AST 010G—Introduction to Stars, Galaxies, and the Universe (3)
Lecture—3 hours. Non-mathematical introduction to astrophysics of the Universe beyond our solar system using concepts of modern physics. Not open for credit to students who have taken AST 002, the former AST 010, any quarter of PHY 009 or PHY 009H, or any upper-division physics course (other than PHY 137 or PHY 160). GE credit: SE, SL, VL. Effective: 2007 Summer Session 1.

AST 010L—Observational Astronomy Lab (1)
Laboratory—2.5 hours. Introduction to observations of the night sky using small telescopes in nighttime laboratory. Not open for credit to students who have taken AST 002 or AST 010. GE credit: SE, VL. Effective: 2018 Winter Quarter.

AST 010S—Astronomy of the Solar System (3)
Lecture—3 hours. Introduction to naked eye and telescopic observations of events in the night sky: positions of sun, moon, planets throughout the year. Historical perspective on how our understanding of the solar system evolved to current non-mathematical astrophysical interpretation of planetary systems. Not open for credit to students who have taken AST 002, any quarter of PHY 009 or PHY 009H, or any upper-division physics course (other than PHY 137 or PHY 160). GE credit: SE, SL, VL. Effective: 2007 Summer Session 1.

AST 025—Introduction to Modern Astronomy and Astrophysics (4)
Discussion/Laboratory—2.5 hours; Lecture—3 hours. Prerequisite(s): Good facility in high school physics and mathematics (algebra and trigonometry). Description and interpretation of astronomical phenomena using the laws of modern physics and observations by modern astronomical instruments. Gravity, relativity, electromagnetic radiation, atomic and nuclear processes in relation to the structure and evolution of stars, galaxies and the universe. Not open to students who have received credit for AST 002, AST 010G, or AST 010L. GE credit: SE, SL, VL. Effective: 2007 Fall Quarter.

Plant Biology

Plant Biology | PLB Information

(College of Biological Sciences)

Savithramma P. Dinesh-Kumar, Ph.D., Chairperson of the Department

Steven Theg, Ph.D., Vice Chairperson of the Department

Graduate Program. See Plant Biology (A Graduate Group).

Department Office. 1002 Life Sciences; 530-752-0617; http://www-plb.ucdavis.edu

Advising. 1023 Sciences Laboratory Building; 530-752-0410; http://basc.ucdavis.edu/

Faculty. http://www-plb.ucdavis.edu/faculty/

Plant Biology | PLB A.B.

(College of Biological Sciences)

Savithramma P. Dinesh-Kumar, Ph.D., Chairperson of the Department

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The Major Program

As organisms that sequester carbon and convert solar energy to usable forms, plants are the primary source of food on the planet as well as important buffers against climate change. The Plant Biology major focuses on fundamental aspects of how plants function as organisms and interact with their environment. A wide variety of scientific disciplines are integrated within the Plant Biology major, including physiology, cell and molecular biology, development, genetics and genomics.

The Program. The Plant Biology major consists of a biological sciences core covering the general principles of biology plus four plant-specific classes dealing with advanced aspects of plant biology including physiology, development, and anatomy. Electives allow students to tailor the degree to suit their interests. Independent research in a laboratory setting is a requirement, and majors in Plant Biology are guaranteed this opportunity. Because of the value of plants as a model system for research in molecular genetics, cell biology, and biochemistry, Plant Biology makes an excellent minor or second major for student in these fields.

Career Alternatives. A degree in Plant Biology serves as an excellent launching point for a wide range of career options, including domestic and international opportunities in business, research and teaching in both governmental and private sectors. The program is excellent preparation for students wishing to enter graduate or other professional schools, including medicine, law (particularly environmental or patent law) or journalism. Plant biologists can work in the laboratory, in the field, in the forest, in botanical gardens or nurseries, in agricultural companies, or in biotechnology, pharmaceutical, energy or chemical industries, or in the area of environmental protection.

Honors and Honors Programs. Students on the honors list may elect to include a maximum of 5 units of 194H in their major programs. Refer to the Academic Information chapter and the appropriate College section for Dean's Honors List information.

Graduate Study. Consult the Plant Biology (Graduate Group) listing.

Master Advisor. Siobhan Brady, Plant Biology Department and Genome Center office in 4513 Genome and Biomedical Sciences Facility.

Preparatory Subject Matter **Units:** 35

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
BIS 002C	Introduction to Biology: Biodiversity and the Tree of Life	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5

OR

CHE 003A	Chemistry for Life Sciences: Determining Structure and Predicting Properties	5
CHE 003B	Chemistry for Life Sciences: Predicting and Characterizing Chemical Change	5
CHE 008A	Organic Chemistry: Brief Course	2
CHE 008B	Organic Chemistry: Brief Course	4

Choose one:

STA 013	Elementary Statistics	4
STA 100	Applied Statistics for Biological Sciences	4
PLS 120	Applied Statistics in Agricultural Sciences	4

Depth Subject Matter **Units:** 41-42

BIS 101	Genes and Gene Expression	4
PLB 102	California Floristics	5
OR		
PLB 108	Systematics and Evolution of Angiosperms	5
EVE 140	Paleobotany	4
OR		
PLB 116	Plant Morphology and Evolution	5
PLB 105	Developmental Plant Anatomy	5
PLB 111	Plant Physiology	3
PLB 112	Plant Growth and Development	3
PLB 117	Plant Ecology	4

Choose additional upper division units in Plant Biology or related natural science courses.

Recommended

CHE 002C	General Chemistry	5
CHE 003C	Chemistry for Life Sciences: Controlling Processes and Synthetic Pathways	5
EVE 100	Introduction to Evolution	4
PLB 148	Introductory Mycology	4

For students with interests in specialized areas of plant biology (e.g. agricultural botany, ecology, systematics and evolution, morphology, plant physiology, etc.), certain substitutions, including courses in other departments, may be allowed upon prior consultation with a BASC advisor.

Total: 76-77

Plant Biology | PLB B.S.

(College of Biological Sciences)

Savithramma P. Dinesh-Kumar, Ph.D., Chairperson of the Department

Steven Theg, Ph.D., Vice Chairperson of the Department

Graduate Program. See Plant Biology (A Graduate Group).

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The Major Program

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Career Alternatives. A degree in Plant Biology serves as an excellent launching point for a wide range of career options, including domestic and international opportunities in business, research and teaching in both governmental and private sectors. The program is excellent preparation for students wishing to enter graduate or other professional schools, including medicine, law (particularly environmental or patent law) or journalism. Plant biologists can work in the laboratory, in the field, in the forest, in botanical gardens or nurseries, in agricultural companies, or in biotechnology, pharmaceutical, energy or chemical industries, or in the area of environmental protection.

Honors and Honors Programs. Students on the honors list may elect to include a maximum of 5 units of 194H in their major programs. Refer to the Academic Information chapter and the appropriate College section for Dean's Honors List information.

Graduate Study. Consult the Plant Biology (Graduate Group) listing.

Master Advisor. Siobhan Brady, Plant Biology Department and Genome Center office in 4513 Genome and Biomedical Sciences Facility.

Preparatory Subject Matter **Units:** 56-66

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
BIS 002C	Introduction to Biology: Biodiversity and the Tree of Life	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 002C	General Chemistry	5
OR		
CHE 003A	Chemistry for Life Sciences: Determining Structure and Predicting Properties	5
CHE 003B	Chemistry for Life Sciences: Predicting and Characterizing Chemical Change	5
CHE 003C	Chemistry for Life Sciences: Controlling Processes and Synthetic Pathways	5
CHE 008A	Organic Chemistry: Brief Course	2
CHE 008B	Organic Chemistry: Brief Course	4
OR		
CHE 118A	Organic Chemistry for Health and Life Sciences	4

CHE 118B	Organic Chemistry for Health and Life Sciences	4
CHE 118C	Organic Chemistry for Health and Life Sciences	4
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
MAT 017C	Calculus for Biology and Medicine	4
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
PHY 007A	General Physics	4
PHY 007B	General Physics	4
PHY 007C	General Physics	4

Recommended

BIS 020Q	Modeling in Biology	2
MAT 021C	Calculus	4

Depth Subject Matter **Units:** 42-45

BIS 101	Genes and Gene Expression	4
BIS 105	Biomolecules and Metabolism	3
OR		
BIS 102	Structure and Function of Biomolecules	3
BIS 103	Bioenergetics and Metabolism	3
BIS 104	Cell Biology	3
STA 100	Applied Statistics for Biological Sciences	4
PLB 105	Developmental Plant Anatomy	5
PLB 111	Plant Physiology	3
PLB 112	Plant Growth and Development	3

Research internship:

PLB 092	Internship	1-12
PLB 099	Special Study for Undergraduates	1-5
PLB 189	Experiments in Plant Biology: Design and Execution	3
PLB 192	Internship	1-12
PLB 199	Special Study for Advanced Undergraduates	1-5

OR

Equivalent.

Restricted electives

Upper division courses in plant biology or other fields relevant to the student's interest chosen from the course lists below. Students should consult with a BASC advisor for approval of courses that may qualify as "restricted electives" in consultation with the faculty master advisor who will grant approval or denial at their discretion.

Course Lists **Units:** 0

Ecology

ESP 121	Population Ecology	4
ESP 123	Introduction to Field and Laboratory Methods in Ecology	4
ESP 124	Marine and Coastal Field Ecology	3
ESP 150C	Biological Oceanography	4
ESP 151	Limnology	4

ESP 151L	Limnology Laboratory	3
ESP 155	Wetland Ecology	4
ESP 155L	Wetland Ecology Laboratory	3
EVE 101	Introduction to Ecology	4
EVE 131	Human Genetic Variation and Evolution	3
EVE 138	Ecology of Tropical Latitudes	5
HYD 124	Plant-Water-Soil Relationships	4
PLB 117	Plant Ecology	4
PLB 119	Population Biology of Invasive Plants and Weeds	3
PLP 150	Fungal Ecology	3
PLS 112	Forage Crop Production	3
PLS 130	Rangelands: Ecology, Conservation and Restoration	3
PLS 131	Identification and Ecology of Grasses	2
PLS 135	Ecology and Community Structure of Grassland and Savannah Herbivores	3
PLS 144	Trees and Forests	4

Evolution and Diversity

BIS 180L	Genomics Laboratory	5
BIS 181	Comparative Genomics	3
EVE 100	Introduction to Evolution	4
EVE 102	Population and Quantitative Genetics	4
EVE 108	Systematics and Evolution of Angiosperms	5
EVE 140	Paleobotany	4
EVE 149	Evolution of Ecological Systems	4
PLB 102	California Floristics	5
PLB 108	Systematics and Evolution of Angiosperms	5
PLB 116	Plant Morphology and Evolution	5
PLB 143	Evolution of Crop Plants	4
PLB 148	Introductory Mycology	4

Plant Genetics

BIS 180L	Genomics Laboratory	5
BIS 181	Comparative Genomics	3
BIS 183	Functional Genomics	3
EVE 100	Introduction to Evolution	4
EVE 102	Population and Quantitative Genetics	4
MCB 164	Advanced Eukaryotic Genetics	3
PLB 113	Molecular and Cellular Biology of Plants	3
PLP 123	Plant-Virus-Vector Interaction	3
PLS 152	Plant Genetics	4

Plant Physiology, Development, and Molecular Biology

BIS 180L	Genomics Laboratory	5
BIS 181	Comparative Genomics	3
BIS 183	Functional Genomics	3
BIT 160	Principles of Plant Biotechnology	3
BIT 161A	Genetics and Biotechnology Laboratory	6
BIT 161B	Plant Genetics and Biotechnology Laboratory	4
MCB 126	Plant Biochemistry	3
PLB 113	Molecular and Cellular Biology of Plants	3
PLB 126	Plant Biochemistry	3
PLP 123	Plant-Virus-Vector Interaction	3
PLP 130	Fungal Biotechnology and Biochemistry	3
PLS 153	Plant, Cell, Tissue and Organ Culture	4
PLS 157	Physiology of Environmental Stresses in Plants	4

PLS 158	Mineral Nutrition of Plants	4

Total: 99-112

Plant Biology | PLB Minor

(College of Biological Sciences)

Savithramma P. Dinesh-Kumar, Ph.D., Chairperson of the Department

Steven Theg, Ph.D., Vice Chairperson of the Department

Graduate Program. See Plant Biology (A Graduate Group).

Department Office. 1002 Life Sciences; 530-752-0617; http://www-plb.ucdavis.edu

Advising. 1023 Sciences Laboratory Building; 530-752-0410; http://basc.ucdavis.edu/

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Minor Advisor. Siobhan Brady, Plant Biology Department and Genome Center office in 4513 Genome and Biomedical Sciences Facility.

Plant Biology **Units:** 18

Upper division units, including at least one course from each of the following four groups

(a) Anatomy and Morphology:

EVE 140	Paleobotany	4
PLB 105	Developmental Plant Anatomy	5
PLB 116	Plant Morphology and Evolution	5

(b) Physiology and Development:

PLB 111	Plant Physiology	3
PLB 112	Plant Growth and Development	3
PLB 123	Plant-Virus-Vector Interaction	3
PLP 130	Fungal Biotechnology and Biochemistry	3

(c) Evolution and Ecology:

EVE 100	Introduction to Evolution	4
PLB 102	California Floristics	5
PLB 108	Systematics and Evolution of Angiosperms	5
PLB 117	Plant Ecology	4
PLB 143	Evolution of Crop Plants	4

(d) Biochemistry and Molecular Genetics:

BIT 160	Principles of Plant Biotechnology	3
PLB 113	Molecular and Cellular Biology of Plants	3
PLB 126	Plant Biochemistry	3
PLS 152	Plant Genetics	4
PLS 154	Introduction to Plant Breeding	4
PLS 171	Principles and Practices of Plant Propagation	4
PLS 172	Postharvest Physiology and Technology	4

Total: 18

Plant Biology | PLB Courses

Courses in PLB:

PLB 010—Plant Biology (3)
Lecture—3 hours. The social and natural science of plants. Cultural history and socioeconomic importance of plants. Biology of plants reproduction, including flowers, seeds and fruits. Historical, cultural, religious and medicinal uses of plants. Plants in the visual arts, music and literature. GE credit: SE, SL. Effective: 2016 Winter Quarter.

PLB 090X—Plant Science Seminar (1-4)
Variable. Prerequisite(s): Consent of Instructor. Examination of a special topic in a small group setting. Not open for
credit to students who have completed course Plant Science 90X. Not open for credit to students who have completed PLS 090X. Effective: 1997 Winter Quarter.

PLB 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Technical and/or professional experience on or off campus. Supervised by a member of the Plant Biology faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

PLB 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Primarily for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

PLB 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

PLB 102—California Floristics (5)
Fieldwork; Laboratory—5 hours; Lecture—2 hours. Prerequisite(s): PLS 002 or BIS 002C; Or equivalent course in Plant Science. Survey of the California flora, emphasizing recognition of important plant families and genera and use of taxonomic keys to identify species. Phylogenetic relationships among families. Principles of systematics and taxonomy. Two Saturday field trips. (Plant Sciences 102.) GE credit: SE, VL. Effective: 2017 Fall Quarter.

PLB 105—Developmental Plant Anatomy (5)
Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): BIS 002C; Or other similar preparation in plant biology. Restricted to 50 students; split equally into two lab groups. Structural anatomy of vascular plants. Training in basic tissue sectioning, staining, and use of the compound microscope. GE credit: SE. Effective: 2011 Fall Quarter.

PLB 108—Systematics and Evolution of Angiosperms (5)
Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): (BIS 001A, BIS 001B, BIS 001C) or (BIS 002A, BIS 002B, BIS 002C) Diversity and classification of angiosperms (flowering plants) on a world scale, and current understanding of the origin of angiosperms and evolutionary relationships and trends within them based on morphological and molecular evidence. (Evolution and Ecology 108) Effective: 2008 Spring Quarter.

PLB 111—Plant Physiology (3)
Lecture—3 hours. Prerequisite(s): (BIS 002A, BIS 002B, BIS 002C); (CHE 008B (can be concurrent) or CHE 118B (can be concurrent)); PHY 007C (can be concurrent); PLB 105 recommended. Plant cell as a functional unit. The processes of absorption, movement, and utilization of water and minerals. Water loss, translocation, photosynthesis, respiration. Effective: 2016 Fall Quarter.

PLB 111D—Problems in Plant Physiology (1)
Discussion—1 hour. Prerequisite(s): PLB 111 (can be concurrent); PLB 111 required concurrently. Discussion of problems and applications relating to principles presented in course 111. Students will be assigned problems each week showing novel applications of principles described in course 111 and will prepare answers to be delivered orally during the class period. (P/NP grading only.) Effective: 1997 Winter Quarter.

PLB 112—Plant Growth and Development (3)
Lecture—3 hours. Prerequisite(s): (BIS 002A, BIS 002B, BIS 002C); (CHE 008B or CHE 118B); BIS 101 Introduction to the mechanisms and control systems that govern plant growth and development and the responses of plants to the environment. Strong emphasis on vegetative development of flowering plants. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

PLB 112D—Problems in Plant Growth and Development (1)
Discussion—1 hour. Prerequisite(s): PLB 112 (can be concurrent); PLB 112 required concurrently. Discussion of problems and applications relating to principles presented in course 112. Students will be assigned problems each week showing novel applications of the principles described in course 112 and will prepare answers to be delivered orally during class period. (P/NP grading only.) Effective: 1997 Winter Quarter.

PLB 113—Molecular and Cellular Biology of Plants (3)
Lecture—3 hours. Prerequisite(s): (BIS 002A, BIS 002B, BIS 002C); BIS 101 Molecular and cellular aspects of the growth and development of plants and their response to biological and environmental stresses. Primary focus on processes unique to plants. Experimental approaches will be emphasized. GE credit: QL, SL, VL. Effective: 2016 Fall Quarter.

PLB 113D—Problems in Molecular and Cellular Biology of Plants (1)
Discussion—1 hour. Prerequisite(s): PLB 113 (can be concurrent); PLB 113 required concurrently. Discussion of topics and applications related to principles presented in course 113. Assigned topics each week show novel applications of the principles described in course 113; discussion of topics during class period. (P/NP grading only.) Effective: 1997 Winter Quarter.

PLB 116—Plant Morphology and Evolution (5)
Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): Introductory Plant Biology (e.g., BIS 002C, PLS 002). Introduction to the form, development and evolution of vascular plants. Emphasis given to the form and development of reproductive structures in ferns and seed-producing plants as a basis for determining evolutionary relationships. Not open for credit to students who have completed PLS 116. (Plant Sciences 116.) GE credit: SE, VL. Effective: 2015 Winter Quarter.

PLB 117—Plant Ecology (4)
Fieldwork—3 hours; Lecture—3 hours. Prerequisite(s): (BIS 001A, BIS 001B, BIS 001C) or (BIS 002A, BIS 002B, BIS 002C); PLB 111 recommended. The study of the interactions between plants, plant populations or vegetation types and their physical and biological environment. Special emphasis on California. Four full-day field trips and brief write-up of class project required. (Evolution and Ecology 117.) Effective: 2008 Fall Quarter.

PLB 119—Population Biology of Invasive Plants and Weeds (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): (BIS 001A, BIS 001B, BIS 001C) or (BIS 002A, BIS 002B, BIS 002C); Introductory statistics recommended. Origin and evolution of invasive plant species and weeds, reproduction and dispersal, seed ecology, modeling of population dynamics, interactions between invasive species, native species, and crops, biological control. Laboratories emphasize design of competition experiments and identification of weedy species. (Evolution and Ecology 119.) GE credit: SE. Effective: 2011 Spring Quarter.

PLB 123—Plant-Virus-Vector Interaction (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 101; PLB 105, PLP 120, and ENT 100 recommended. Analysis of interactions necessary for viruses to infect plants.Interactions among insect vectors and host plants involved in the plant-virus life cycle. Evolutionary aspects of the molecular components in viral infection and modern approaches to the interdiction of viral movement. (Entomology 123 and Plant Pathology 123.) GE credit: SE, SL, WE. Effective: 2014 Winter Quarter.

PLB 126—Plant Biochemistry (3)
Lecture—3 hours. Prerequisite(s): BIS 103 or BIS 105 The biochemistry of important plant processes and metabolic pathways. Discussion of methods used to understand plant processes, including use of transgenic plants. (Molecular and Cellular Biology 126) GE credit: SE, SL. Effective: 2008 Spring Quarter.

PLB 143—Evolution of Crop Plants (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PLS 002 or BIS 001C or BIS 002C Origins of crops and agriculture, including main methodological approaches, centers of crop biodiversity, dispersal of crops, genetic and physiological differences between crops and their wild progenitors, agriculture practiced by other organisms, and role and ownership of crop biodiversity. GE credit: SE, SL, SS, WE. Effective: 2009 Spring Quarter.

PLB 148—Introductory Mycology (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): BIS 001A; BIS 001B; BIS 001C Limited enrollment. Systematics, ecology, evolution, and morphology of fungi. Importance of fungi to humans. (Plant Pathology 148.) GE credit: SE. Effective: 2001 Fall Quarter.

PLB 189—Experiments in Plant Biology: Design and Execution (3)
Discussion/Laboratory—6 hours. Prerequisite(s): (BIS 001A, BIS 001B, BIS 001C) or (BIS 002A, BIS 002B, BIS 002C); and Consent of Instructor. Or the equivalent courses in Plant Sciences. Provides an opportunity for undergraduate students to formulate experimental approaches to current questions in plant biology and to carry out their proposed experiments. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2008 Fall Quarter.

PLB 190C—Research Conference in Plant Biology (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing in Plant Biology or related discipline. Introduction to research methods in plant biology. Design of field or laboratory research projects, survey of appropriate literature, and discussion of research by faculty and students. May be repeated for credit. (P/NP grading only.) Effective: 2007 Fall Quarter.

PLB 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Technical and/or professional experience on or off campus. Supervised by a member of the Plant Biology Department faculty. May be repeated for credit. (P/NP grading only.) Effective: 2008 Fall Quarter.

PLB 194H—Special Study for Honors Students (1-5)
Variable. Prerequisite(s): Consent of Instructor. Open only to majors of senior standing on honors list. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior
thesis. (P/NP grading only.) Effective: 1997 Winter Quarter.

PLB 197T—Tutoring in Plant Biology (1-5)
Discussion—2-6 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Assisting the instructor by tutoring students in one of the Department's regular courses. May be repeated for credit. (P/NP grading only.) Effective: 2008 Fall Quarter.

PLB 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

PLB 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

PLB 396—Teaching Assistant Training Practicum (1-4)
Variable—3-20 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Practical experience in acting as teaching assistant in Plant Biology courses. Learning activity: hands on experience in preparing for and conducting discussions, guiding student laboratory work, and the formulation of questions and topics for examinations. May be repeated for credit. (S/U grading only.) Effective: 2013 Fall Quarter.

Plant Biology (Graduate Group)

Plant Biology (Graduate Group) | PBI Information

Neelima Sinha, Ph.D., Chairperson of the Group

Group Office. 227A Life Sciences; 530-752-2981; Fax 530-752-8822; http://pbi.ucdavis.edu/

Faculty. http://pbi.ucdavis.edu/faculty/

Plant Biology (Graduate Group) | PBI M.S.

Neelima Sinha, Ph.D., Chairperson of the Group

Group Office. 227A Life Sciences; 530-752-2981; Fax 530-752-8822; http://pbi.ucdavis.edu/

Faculty. http://pbi.ucdavis.edu/faculty/

Graduate Study. The Graduate Group in Plant Biology offers programs of study and research leading to the M.S. and Ph.D. degrees. The program prepares students for careers in teaching and research at universities and colleges, government and industrial laboratories. The graduate curriculum provides both a breadth in the discipline and in-depth study and research in one of four areas of specialization: cell and developmental biology; environmental and integrative biology; molecular biology, biochemistry and genomics; and systematics and evolutionary biology. These areas of specialization permit individual study and research into diverse aspects of plant biology, including anatomy, biochemistry, biotechnology, cell biology, cytology, developmental biology, ecology, genetics, genomics, molecular biology, morphology, paleo-botany, physiology, population biology, systematics, and weed science. The graduate advisor, the major professor, and the student will design a program of advanced courses to meet individual academic needs within one of the specializations.

Preparation. For both the M.S. and Ph.D. programs, a level of scholastic development equivalent to a Bachelor's degree in biological sciences from a recognized college or university is required. Courses in the following areas are considered to be prerequisite to the advanced degrees in Plant Biology: biology, inorganic chemistry, organic chemistry, introductory physics, genetics, plant development and structure, biochemistry, introductory plant physiology, calculus, introductory statistics, ecology/systematics/evolution, and cell/molecular biology. Limited deficiencies can be made up after admission.

Graduate Advisor. Contact the Group office.

Plant Biology (Graduate Group) | PBI Ph.D.

Neelima Sinha, Ph.D., Chairperson of the Group

Group Office. 227A Life Sciences; 530-752-2981; Fax 530-752-8822; http://pbi.ucdavis.edu/

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Graduate Study. The Graduate Group in Plant Biology offers programs of study and research leading to the M.S. and Ph.D. degrees. The program prepares students for careers in teaching and research at universities and colleges, government and industrial laboratories. The graduate curriculum provides both a breadth in the discipline and in-depth study and research in one of four areas of specialization: cell and developmental biology; environmental and integrative biology; molecular biology, biochemistry and genomics; and systematics and evolutionary biology. These areas of specialization permit individual study and research into diverse aspects of plant biology, including anatomy, biochemistry, biotechnology, cell biology, cytology, developmental biology, ecology, genetics, genomics, molecular biology, morphology, paleo-botany, physiology, population biology, systematics, and weed science. The graduate advisor, the major professor, and the student will design a program of advanced courses to meet individual academic needs within one of the specializations.

Preparation. For both the M.S. and Ph.D. programs, a level of scholastic development equivalent to a Bachelor's degree in biological sciences from a recognized college or university is required. Courses in the following areas are considered to be prerequisite to the advanced degrees in Plant Biology: biology, inorganic chemistry, organic chemistry, introductory physics, genetics, plant development and structure, biochemistry, introductory plant physiology, calculus, introductory statistics, ecology/systematics/evolution, and cell/molecular biology. Limited deficiencies can be made up after admission.

Graduate Advisor. Contact the Group office.

Plant Biology (Graduate Group) | PBI Courses

Courses in PBI:

PBI 200A—PBGG Core Course Series - Fall quarter (5)
Discussion—2 hours; Lecture—3 hours. Prerequisite(s): Graduate standing; a broad background of undergraduate level coursework in Plant Biology is recommended. The first of three PBGG graduate core courses. Coverage includes (1) plant genes, (2) biotechnology, (3) genomes and gene flow, (4) principles of plant systematics, and (5) the evolution of flowering plants. Effective: 2005 Fall Quarter.

PBI 200B—PBGG Core Course Series - Winter quarter (5)
Discussion—2 hours; Lecture—3 hours. Prerequisite(s): PBI 200A The second of three PBGG graduate core courses. Coverage includes (1) embryo development, (2) cytoskeleton and vesicle trafficking, (3) cell walls, (4) cell growth, (5) secondary metabolism, (6) plastids and (7) senescence. Effective: 2006 Winter Quarter.

PBI 200C—PBGG Core Course Series - Spring quarter (5)
Discussion—2 hours; Lecture—3 hours. Prerequisite(s): PBI 200A; PBI 200B The third of three PBGG graduate core courses. Coverage includes (1) plant water relations, (2) cellular & long distance transport processes, (3) mineral nutrition, (4) environmental impacts on growth & development, (5) stress perception & responses, (6) canopy processes, and (7) plant interactions with other organisms. Effective: 2006 Spring Quarter.

PBI 203N—Biology of the Plant Cell (4)
Discussion/Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): PLB 111 or BIS 104; Or the equivalent. Open to senior undergraduate students in Plant Biology major. Recent progresses in plant cell biology. Intracellular motility in plant cells. Common techniques associated with the progress of plant cell biology. Effective: 2006 Fall Quarter.

PBI 210—Plant Ecophysiology (3)
Lecture—3 hours. Prerequisite(s): PLB 111; PLB 112; PLB 117 Study of the mechanisms of physiological adaptation of plants to their environment. Effective: 1997 Winter Quarter.

PBI 212—Physiology of Herbicidal Action (3)
Lecture—3 hours. Prerequisite(s): PLB 112 Study of the fundamental processes involved in the physiological action of herbicides. Detailed consideration of the fate of herbicides in plants. Effective: 1997 Spring Quarter.

PBI 214—Higher Plant Cell Walls (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): PLB 112; A course in Biochemistry. Lectures focus on the structure, analysis, synthesis, and development-related metabolism of cell walls. Discussions center on analysis of scientific papers related to lecture topics. Effective: 1997 Winter Quarter.

PBI 220—Plant Developmental Biology (4)
Discussion—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): Plant Anatomy, Physiology, and Biochemistry. A survey of the concepts of plant development and organization. Examines plant cells, tissues, and organs with special emphasis on experimental
evidence for mechanisms regulating developmental processes. Effective: 1997 Winter Quarter.

PBI 223—Special Topics in Scientific Method (2)
Discussion—2 hours. Examine the historical and philosophical background of the scientific method. Analyze the rational, perceptual, causal, creative and social aspects of scientific knowledge. Clarify the roles of reason, experimentation and creativity in scientific research. (S/U grading only.) Effective: 1997 Winter Quarter.

PBI 227—Plant Molecular Biology (4)
Lecture/Discussion—4 hours. Prerequisite(s): MCB 121 or MCB 161 Molecular aspects of higher plant biology with emphasis on gene expression. Plant nuclear and organelle genome organization, gene structure, mechanisms of gene regulation, gene transfer, and special topics related to development and response to biological and environmental stimuli. Effective: 1997 Winter Quarter.

PBI 229—Molecular Biology of Plant Reproduction (3)
Lecture—3 hours. Molecular genetic basis of plant reproduction. Emphasis on understanding developmentally regulated gene expression as it relates to the major changes that occur during plant reproduction and on the genetic control of flowering. Effective: 1997 Winter Quarter.

PBI 290A—Faculty Seminar (1)
Discussion—1 hour. Restricted to Plant Biology (PBGG) graduate students. Discussion of research area of seminar speakers in Plant Biology Graduate Group Seminar Series. May be repeated up to 6 time(s). (S/U grading only.) Effective: 2006 Winter Quarter.

PBI 290B—Seminar (1)
Seminar—1 hour. Seminars presented by visiting scientists on research topics of current interest. (S/U grading only.) Effective: 1997 Winter Quarter.

PBI 290C—Research Conference in Botany (1)
Discussion—1 hour. Prerequisite(s): Graduate standing and/or consent of instructor. Presentation and discussion by faculty and graduate students of research
projects in botany. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

PBI 291—Graduate Student Seminar in Plant Biology (1)
Seminar—1 hour. Prerequisite(s): Graduate student standing. Student-given seminars on topics in plant biology, with critiques by instructor and peers. How to give a seminar, including preparation of visual and other teaching aids. Topic determined by instructor in charge. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Summer Session 1.

PBI 292—Seminars in Plants Biology (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Review of current literature in botanical disciplines. Disciplines and special subjects to be announced quarterly. Students present and analyze assigned topics. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

PBI 293—Seminar in Postharvest Biology (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to advanced undergraduates. Intensive study of selected topics in the postharvest biology of fruits, vegetables, and ornamentals. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

PBI 297T—Tutoring in Plant Biology (1-5)
Tutorial—3-15 hours. Offers graduate students, particularly those not serving as teaching assistants, the opportunity to gain teaching experience. (S/U grading only.) Effective: 1997 Winter Quarter.

PBI 298—Group Study (1-5)
Variable. May be repeated up to 4 time(s). (S/U grading only.) Effective: 2001 Fall Quarter.

PBI 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

PBI 390—The Teaching of Plant Biology (2)
Discussion—2 hours. Prerequisite(s): Graduate standing; concurrent appointment as a teaching assistant in Plant Biology. Consideration of the problems of teaching botany, especially of preparing for and conducting discussions, guiding student laboratory work, and the formulation of questions and topics for examinations. (S/U grading only.) Effective: 1997 Winter Quarter.

Plant Pathology

Plant Pathology | PLP Information

(College of Agricultural and Environmental Sciences)

David M. Rizzo, Ph.D., Chairperson of the Department

Department Office. 354 Hutchison Hall; 530-752-0300; http://plantpathology.ucdavis.edu/

Faculty. http://plantpathology.ucdavis.edu/faculty/

Plant Pathology | PLP M.S.

(College of Agricultural and Environmental Sciences)

David M. Rizzo, Ph.D., Chairperson of the Department

Department Office. 354 Hutchison Hall; 530-752-0300; http://plantpathology.ucdavis.edu/

Faculty. http://plantpathology.ucdavis.edu/faculty/

Related Major Program. See the major in Global Disease Biology.

Graduate Study. The Department of Plant Pathology offers programs of study and research leading to the M.S. and Ph.D. degrees. Information can be obtained from the graduate advisor. See also the Graduate Studies.

Graduate Advisors. G.L. Coaker, R.M. Bostock, D.N. McRoberts, I. Stergiopoulos

Plant Pathology | PLP Ph.D.

(College of Agricultural and Environmental Sciences)

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Graduate Advisors. G.L. Coaker, R.M. Bostock, D.N. McRoberts, I. Stergiopoulos

Plant Pathology | PLP Courses

Courses in PLP:

PLP 040—Edible Mushroom Cultivation (2)
Discussion/Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): BIS 010 or MIC 020 recommended. Principles and practices of growing edible mushrooms, including culture maintenance, basic mushroom substrate preparation, composting, spawn generation techniques, inoculation methods, harvesting, and pests and pest management. Effective: 1998 Winter Quarter.

PLP 120—Introduction to Plant Pathology (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): BIS 001C; MIC 102 recommended. The nature, cause, and control of plant diseases. Effective: 1997 Winter Quarter.

PLP 123—Plant-Virus-Vector Interaction (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 101; PLB 105, PLP 120, and ENT 100 recommended. Analysis of interactions necessary for viruses to infect plants.Interactions among insect vectors and host plants involved in the plant-virus life cycle. Evolutionary aspects of the molecular components in viral infection and modern approaches to the interdiction of viral movement. (Entomology 123 and Plant Biology 123.) GE credit: SE, SL, WE. Effective: 2014 Winter Quarter.

PLP 130—Fungal Biotechnology and Biochemistry (3)
Lecture—3 hours. Prerequisite(s): PLB 119; BIS 103 How fundamental physiological and biochemical activities of fungi impact the destructive and beneficial roles of these organisms in nature. Utilization and manipulation of fungi for biotechnological and industrial applications. Effective: 1997 Winter Quarter.

PLP 135—Field Identification of Mushrooms (1)
Fieldwork. Prerequisite(s): Introductory course in Biological Sciences; course in mycology recommended. Collection and identification of mushrooms and other fleshy fungi based on macro and microscopic features. (P/NP grading only.) Effective: 1999 Winter Quarter.

PLP 140—Agricultural Biotechnology and Public Policy (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): High school level biology, including genetics; BIS 010 is recommended. Examination of the development and deployment of agricultural biotechnologies, particularly transgenic crop plants, microorganisms and animals, with consideration of conventional agriculture, public perceptions of technologies, food safety, environmental impact, public policies and regulations. GE credit: SL. Effective: 2005 Spring Quarter.

PLP 148—Introductory Mycology (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): BIS 001A; BIS 001B; BIS 001C Limited enrollment. Systematics, ecology, evolution, and morphology of fungi. Importance of fungi to humans. (Plant Biology 148.) GE credit: SE. Effective: 2001 Fall Quarter.

PLP 150—Fungal Ecology (3)
Lecture—3 hours. Prerequisite(s): BIS 001C; Or equivalent. The ecological roles of fungi as saprobes, mutualists and parasites in native and managed ecosystems. Physiological and reproductive strategies associated with adaptations to diverse habitats. Effective: 1999 Winter Quarter.

PLP 185—Advanced Mushroom Taxonomy (2)
Discussion/Laboratory—3 hours; Fieldwork—1 hour. Prerequisite(s): (PLP 135 or PLP 148); BIS 101; Or the equivalent to BIS 101. Class size limited to 12 students. Microscopic and molecular methods used in the identification of mushroom species; molecular characterization including PCR-amplification of ribosomal nuclear DNA, digestion of the product with restriction enzymes, and DNA sequencing; a one-day field trip is required. Effective: 2002 Fall Quarter.

PLP 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): PLP 120; and Consent of Instructor. Work experience off and on campus, supervised by a member of the faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

PLP 198—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

PLP 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

PLP 201A—Impacts, Mechanisms and Control of Plant Disease (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PLP 120; Graduate student status in the Plant Pathology Graduate Program or consent of instructor. A case-studies approach to analysis of plant diseases caused by bacteria, fungi, oomycetes, and viruses, including impacts, etiology, pathogen taxonomy and epidemiology, biochemical and genetic aspects of pathogen-host interactions, virulence and resistance, and approaches to disease control. Effective: 2009 Winter Quarter.

PLP 201B—Impacts, Mechanisms and Control of Plant Disease (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): PLP 120; PLP 201A; Graduate student status in the Plant Pathology Graduate Program or consent of instructor. A case-studies approach to analysis of plant diseases, including emerging diseases, caused by bacteria, fungi, nematodes, and oomycetes: impacts, etiology, pathogen taxonomy, epidemiology, biochemical and genetic aspects of pathogen-host interactions, virulence, resistance, disease control and statistical analysis. Effective: 2009 Spring Quarter.

PLP 205A—Diseases of Vegetable and Field Crops (3)
Fieldwork—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): PLP 120 Clinical study of diseases of vegetable and field crops with emphasis on etiology, epidemiology, diagnosis, and control. Field trips required. Effective: 2006 Spring Quarter.

PLP 205B—Diseases of Vegetable and Field Crops - Summer Field Trip (1)
Fieldwork—3 hours. Prerequisite(s): PLP 120; PLP 205A Continuation of Course 205A- four-day field trip investigating diseases of vegetable and field crops. (S/U grading only.) Effective: 2004 Summer Session 1.

PLP 206A—Diseases of Fruit, Nut, and Vine Crop (3)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): PLP 120; PLB 119; and Consent of Instructor. Course 205 may be taken concurrently. Clinical study of fruit, nut, and vine crops diseases with emphasis on etiology, epidemiology, diagnosis, and control. Effective: 1997 Winter Quarter.

PLP 206B—Diseases of Fruit, Nut, and Vine Crop (1)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): PLP 120; PLB 119; and Consent of Instructor. Course 205 may be taken concurrently. Clinical study of fruit, nut, and vine crops diseases with emphasis on etiology, epidemiology, diagnosis, and control. Effective: 1997 Winter Quarter.

PLP 210—Biochemistry and Molecular Biology of Plant-Microbe Interaction (4)
Lecture/Discussion—4 hours. Prerequisite(s): BIS 101; BIS 102; BIS 103; BIS 104; Or the equivalent. Discussion of plantmicrobe interactions, focused on the underlying cellular, biochemical, and molecular events that determine the diseased state. Effective: 1997 Winter Quarter.

PLP 217—Molecular Genetics of Fungi (3)
Lecture—3 hours. Prerequisite(s): BIS 101; BIS 103; MCB 161; PLB 119; PLP 130; PLP 215X; Graduate standing in a Biological Science; MIC 215 recommended. Advanced treatment of molecular biology and genetics of filamentous fungi and yeasts, including gene structure, organization and regulation;
plant pathogenesis; secretion; control of reproduction; reproduction; molecular evolution; transformation; and gene manipulation. (Biological Chemistry 217) Effective: 1997 Winter Quarter.

PLP 224—Advanced Mycology (4) ***Review all entries***
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): PLP 148 or PLB 148; or Consent of Instructor. Systematics, evolution, and ecology of the fungi. Topics include modern techniques and theories on classification of fungi, species concepts, sexual compatibility and vegetative compatibility. Laboratories will emphasize various approaches to fungal identification. Effective: 2002 Spring Quarter.

PLP 224—Advanced Mycology (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): PLP 148 or PLB 148; PLP 120; or Consent of Instructor. Physiology, cell biology and biochemistry of fungi. Topics include mycotoxins, epidemiology and nature of emerging and re-emerging fungal diseases, fungicides, and fungicide resistance. Effective: 2018 Fall Quarter.

PLP 228—Plant Bacteriology (5) ***Review all entries***
Laboratory—9 hours; Lecture—2 hours. Prerequisite(s): PLP 120; BIS 102; BIS 103; MIC 002 or the equivalent. Study of bacteria which have a saprophytic, symbiotic, or parasitic association with higher and lower plants. Clinical and molecular methods for identification and classification of these bacteria. Effective: 1997 Winter Quarter.

PLP 228—Plant Bacteriology (3) ***Review all entries***
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): PLP 120; or equivalent or consent of instructor. Study of plant pathogenic microorganisms including taxonomy, biology, molecular mechanisms of disease, and plant disease management. Topics include quorum sensing, rhizosphere biology, genomics, virulence factors, and host plant resistance genes. Effective: 2019 Winter Quarter.

PLP 230—Plant Virology (3)
Lecture—3 hours. Prerequisite(s): Upper division or graduate course in Molecular Biology or graduate student in Plant Pathology. Viruses as causal agents of plant disease and as tools for manipulating plants; structures of virus particles; mechanisms of transmission, replication, and spread in the plant; cytology and molecular biology in susceptible and resistant reactions to virus infection; virus disease control. Only two units of credit to students who complete MIC 262; not open for credit to students who have completed PLP 226. Effective: 2003 Spring Quarter.

PLP 290—Seminar (1)
Seminar—1 hour. Review and evaluation of current research in plant pathology. (S/U grading only.) Effective: 1997 Winter Quarter.

PLP 290C—Advanced Research Conference (1)
Seminar—1 hour. Prerequisite(s): PLP 120; or Consent of Instructor. Presentation, evaluation, and critical discussions of research activities in the area of advanced plant pathology; primarily designed for graduate students. (S/U grading only.) Effective: 1997 Winter Quarter.

PLP 291—Seminar in Molecular Plant Pathology (1)
Seminar—1 hour. Prerequisite(s): PLP 120; or Consent of Instructor. Review and evaluation of current literature and research in biochemistry and molecular biology of plant microbe interactions. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

PLP 295—Seminar in Mycology (1)
Seminar—1 hour. Review and evaluation of current literature and research in mycology. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

PLP 298—Special Group Study (1-5)
Variable. Effective: 1997 Winter Quarter.

PLP 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

Plant Sciences

Plant Sciences | PLS B.S.

(College of Agricultural and Environmental Sciences)

Chris van Kessel, Ph.D., Chairperson of the Department

Department Office. 1210 Plant and Environmental Sciences; 530-752-1703; http://www.plantsciences.ucdavis.edu/

Faculty. http://www.plantsciences.ucdavis.edu/plantsciences/databases/directory/faculty.aspx

Major Programs. Biotechnology, Ecological Management & Restoration, and Environmental Horticulture & Urban Forestry.

Related Courses. See the Biotechnology, Environmental Horticulture, Horticulture & Agronomy, and Plant Biology course listings.

Graduate Study. For related graduate study, see the M.S. degree program in International Agricultural Development, and the M.S. and Ph.D. degree programs in the graduate groups of Horticulture & Agronomy, Plant Biology, Ecology, Genetics, Geography, and Soils & Biogeochemistry. See also Graduate Studies.

The Major Program

The Plant Sciences major is designed for students who are interested in a scientific understanding of how plants grow and develop in managed agricultural ecosystems and how plant products are utilized for food, fiber and environmental enhancement. Advances in science and technology have provided new insights and options for using plants to address the issues associated with providing renewable food, fiber and energy resources for a growing global population while minimizing adverse impacts on the natural environment. Graduates in Plant Sciences are able to apply their skills and knowledge to a diverse range of agricultural and environmental goals or pursue advanced degrees in plant sciences.

The Program. The curriculum provides depth in the biological and physical sciences and a sound understanding of how plants obtain and utilize resources from their environment to sustain their growth and development. The influences of genetics, management systems and environmental inputs on crop development and productivity are emphasized along with the postharvest preservation and marketing of plant products. Students will develop an area of specialization with options in Crop Production, Plant Genetics and Breeding, or Postharvest Biology and Technology. An Individual option is also available to match specific subject matter or career goal interests in the plant sciences. All students gain practical experience through a combination of practical laboratory courses and internships. Students may also pursue an Honors thesis in their senior year.

Major Advisor. Daniel Potter

Advising Center for the major is located in 1220 Plant and Environmental Sciences 530-752-1715.

Career Alternatives. Graduates from this program are prepared to pursue a wide range of careers, including various technical and management positions in agricultural and business enterprises, farming, or consulting; public, private, and non-profit agencies; Cooperative Extension; international development; teaching; or agricultural and environmental journalism and communication services. Graduates are qualified to pursue graduate studies in the natural and agricultural sciences, such as plant biology, genetics, breeding, horticulture, agronomy, biotechnology, ecology, environmental studies, pest management, education, or business management.

Preparatory Subject Matter **Units:** 51-68

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
PLS 002	Botany and Physiology of Cultivated Plants	4
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 002C	General Chemistry	5
CHE 008A	Organic Chemistry: Brief Course	2
CHE 008B	Organic Chemistry: Brief Course	4
OR		
CHE 118A	Organic Chemistry for Health and Life Sciences	4
CHE 118B	Organic Chemistry for Health and Life Sciences	4

CHE 118C	Organic Chemistry for Health and Life Sciences	4
PHY 001A	Principles of Physics	3
PHY 001B	Principles of Physics	3
OR		
PHY 007A	General Physics	4
PHY 007B	General Physics	4
PHY 007C	General Physics	4
MAT 016A	Short Calculus	3
MAT 016B	Short Calculus	3
OR		
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
PLS 120	Applied Statistics in Agricultural Sciences	4
ABT 049	Field Equipment Operation	2
OR		
PLS 049	Organic Crop Production Practices	3

PLS 049 recommended.

Depth Subject Matter **Units:** 36-39

PLS 100A	Metabolic Processes of Cultivated Plants	3
PLS 100B	Growth and Yield of Cultivated Plants	3
PLS 100C	Environmental Interactions of Cultivated Plants	3
PLS 100AL	Metabolic Processes of Cultivated Plants Laboratory	2
PLS 100BL	Growth and Yield of Cultivated Plants Laboratory	2
PLS 100CL	Environmental Interactions of Cultivated Plants Laboratory	2
PLS 101	Agriculture and the Environment	3
PLS 152	Plant Genetics	4

Choose one:

EVE 100	Introduction to Evolution	4
PLB 102	California Floristics	5
PLB 108	Systematics and Evolution of Angiosperms	5
PLB 143	Evolution of Crop Plants	4

Choose one:

PLB 117	Plant Ecology	4
PLS 147	California Plant Communities	3
AND		
PLS 147L	California Plant Communities Field Study	1
PLS 150	Sustainability and Agroecosystem Management	4
ENH 160	Restoration Ecology	3
AND		
ENH 160L	Restoration Ecology Laboratory	1

Choose one:

PLP 120	Introduction to Plant Pathology	4
ENT 110	Arthropod Pest Management	5
NEM 100	General Plant Nematology	4

PLS 105	Concepts in Pest Management	3
PLS 176	Introduction to Weed Science	4

Internship or research; must be approved by master advisor.

Areas of Specialization (choose one)

Crop Production Option **Units:** 23-28

Complete the two courses in pest management not completed for the depth subject matter:

PLP 120	Introduction to Plant Pathology	4
ENT 110	Arthropod Pest Management	5
NEM 100	General Plant Nematology	4
OR		
PLS 105	Concepts in Pest Management	3
OR		
PLS 176	Introduction to Weed Science	4
VEN 118	Grapevine Pests, Diseases and Disorders	3

SSC 100	Principles of Soil Science	5
PLS 171	Principles and Practices of Plant Propagation	4
ARE 015	Population, Environment and World Agriculture	4
OR		
ECN 001A	Principles of Microeconomics	4

Choose two:

PLS 110	Crop Management Systems for Vegetable Production	4
PLS 111	Principles of Agronomic Crop Production Systems	4
PLS 112	Forage Crop Production	3
PLS 113	Biological Applications in Fruit Tree Management	2
PLS 114	Biological Applications in Fruit Production	2
PLS 170A	Fruit and Nut Cropping Systems	2
PLS 170B	Fruit and Nut Cropping Systems	2
ENH 125	Greenhouse and Nursery Crop Production	5

Plant Breeding and Genetics Option **Units:** 23-28

BIS 101	Genes and Gene Expression	4
PLS 154	Introduction to Plant Breeding	4
BIT 160	Principles of Plant Biotechnology	3
BIT 161B	Plant Genetics and Biotechnology Laboratory	4
PLS 171	Principles and Practices of Plant Propagation	4

Restricted Electives

Choose two:

PLS 110	Crop Management Systems for Vegetable Production	4
PLS 111	Principles of Agronomic Crop Production Systems	4
PLS 112	Forage Crop Production	3
PLS 113	Biological Applications in Fruit Tree Management	2
PLS 114	Biological Applications in Fruit Production	2
PLS 141	Ethnobotany	4

PLS 158	Mineral Nutrition of Plants	4
PLS 170A	Fruit and Nut Cropping Systems	2
PLS 170B	Fruit and Nut Cropping Systems	2
ENH 125	Greenhouse and Nursery Crop Production	5
ENH 150	Genetics and Plant Conservation: The Biodiversity Crisis	3
IAD 170	Program Development for International Agriculture	4
ARE 100A	Intermediate Microeconomics: Theory of Production and Consumption	4
ARE 130	Agricultural Markets	4
ARE 138	International Commodity and Resource Markets	4
BIT 150	Applied Bioinformatics	4
HYD 124	Plant-Water-Soil Relationships	4

Postharvest Biology and Technology Option **Units:** 23

PLS 172	Postharvest Physiology and Technology	4
PLS 173	Molecular and Cellular Aspects of Postharvest Biology	3
PLS 174	Microbiology and Safety of Fresh Fruits and Vegetables	3
PLS 196	Postharvest Technology of Horticultural Crops	3

Restricted Electives

Choose from:

ARE 100A	Intermediate Microeconomics: Theory of Production and Consumption	4
ARE 130	Agricultural Markets	4
FST 107	Food Sensory Science	4
FST 109	Principles of Quality Assurance in Food Processing	3
FST 131	Food Packaging	4
PLS 212	Postharvest Biology and Biotechnology of Fruits and Nuts	3

Individual Option **Units:** 23

Choose a minimum of 25 upper division units, with approval from a faculty advisor, to form a coherent program of study resulting in expertise and competence in a sub-discipline of plant sciences.

Total: 110-135

Plant Sciences | PLS Courses

Courses in PLS:

PLS 001—Agriculture, Nature and Society (3)
Discussion/Laboratory—1 hour; Lecture—2 hours. Multiple perspectives and connections between natural sciences,
social sciences, and agriculture. Emphasizes agriculture's central position between nature and society and its key role in our search for a productive, lasting and hospitable environment. Several full-period field trips provide hands-on learning. Not open for credit to students who have completed AMR 001. (Former course AMR 001.). GE credit: SE. Effective: 2007 Fall Quarter.

PLS 002—Botany and Physiology of Cultivated Plants (4)
Discussion/Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): High school course in biology and chemistry recommended. A holistic introduction to the underlying botanical and physiological principles of cultivated plants and their response to the environment. Includes concepts behind plant selection, cultivation, and utilization. Laboratories include discussion and interactive demonstrations. Not open for credit to students who have complete AMR 002. (Former course AMR 002.). GE credit: SE, SL. Effective: 2007 Winter Quarter.

PLS 005—Plants for Garden, Orchard and Landscape (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): For non-majors. Hands-on experience with plants cultivated for food, environmental enhancement and personal satisfaction. Topics include establishing a vegetable garden, pruning and propagation activities, growing flowers and ornamental plants, and the role of plants in human health and well-being. Not open for credit to students who have completed Plant Biology 1 or Plant Sciences 2. (Former course Plant Biology 1.). (P/NP grading only.) GE credit: SE. Effective: 2008 Fall Quarter.

PLS 006—Flower Power--Art and Science of Flowers and Their Uses (2)
Lecture/Discussion—2 hours. Prerequisite(s): High school biology. Introduction to the art and science of using and growing flowers to harness the power that is represented by their aesthetic beauty. Handling, production, arranging, breeding and marketing of flowers. Emphasis on potted plants and cut-flowers. (P/NP grading only.) Effective: 2010 Spring Quarter.

PLS 007—Just Coffee: The Biology, Ecology and Socioeconomic Impacts of the World's Favorite Drink (4)
Discussion—1 hour; Lecture—3 hours. Coffee used as a case study to examine biological, ecological and social factors influencing sustainability of farming systems and how food production systems impact human well-being. GE credit: SE, SS, WE. Effective: 2017 Fall Quarter.

PLS 012—Plants and Society (4)
Extensive Writing—3 hours; Lecture—3 hours. Prerequisite(s): High school biology. Dependence of human societies on plant and plant products. Plants as resources for food, fiber, health, enjoyment and environmental services. Sustainable uses of plants for food production, raw materials, bioenergy, and environmental conservation. Global population growth and future food supplies. Not open for credit to students who have complete PLB 012. (Former course PLB 012.). (Science and Society 012.) GE credit: SE, SS, WE. Effective: 2007 Fall Quarter.

PLS 014—Introduction to Current Topics in Plant Biology (4)
Discussion—3 hours. Introduction to scientific methods and current understanding of genetics, metabolism, and cellular structure in plants, with special emphasis on topics related to societal issues, such as herbal medicines and genetically modified organisms. Designed for students not specializing in biology. Not open for credit to students who have completed PLB 011. GE credit: SE, SL. Effective: 2007 Fall Quarter.

PLS 015—Introduction to Sustainable Agriculture (4)
Laboratory—3 hours; Lecture—3 hours. Multidisciplinary introduction to agricultural sustainability with a natural sciences emphasis. Sustainability concepts and perspectives. Agricultural evolution, history, resources and functions. Diverse agricultural systems and practices and their relative sustainability. Laboratories provide direct experience with selected agricultural practices and systems. GE credit: SE. Effective: 2009 Spring Quarter.

PLS 021—Application of Computers in Technology (3)
Discussion/Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): High school algebra. Not open for students who have completed Agricultural Management and Rangeland Resources 21. (Former course Agricultural Management and Rangeland Resources 21.) Concepts of computing and applications using personal computers, spreadsheets, database management, word processing and communications. GE credit: SE, VL. Effective: 2009 Winter Quarter.

PLS 049—Organic Crop Production Practices (3)
Discussion—1 hour; Laboratory—3 hours; Lecture—1 hour. Principles and practices of organic production of annual crops. Including organic crops, soil, and pest management, cover cropping, composting, seeding, transplanting, irrigation, harvesting and marketing. Not open for credit to students who have completed AMR 049. (Former course AMR 049.). (P/NP grading only.) GE credit: SE. Effective: 2007 Fall Quarter.

PLS 092—Internship (1-12)
Internship—3-36 hours. Work experience on or off campus in subject areas pertaining to plant and environmental sciences. Internship supervised by a faculty member. May be repeated for credit. (P/NP grading only.) Effective: 2007 Winter Quarter.

PLS 098—Directed Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Primarily for lower division students. May be repeated for credit. (P/NP grading only.) Effective: 2007 Winter Quarter.

PLS 099—Special Study for Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Primarily for lower division students. (P/NP grading only.) Effective: 2007 Winter Quarter.

PLS 100A—Metabolic Processes of Cultivated Plants (3)
Lecture—3 hours. Prerequisite(s): PLS 002 or BIS 002C; or Consent of Instructor. Principles of energy capture and photosynthesis, water use, and nutrient cycling. Conversion of these resources into products (carbohydrates, proteins, lipids, and other chemicals) by plants. Emphasis on the relationships between environmental resources, plant metabolism and plant growth. GE credit: SE. Effective: 2017 Spring Quarter.

PLS 100AL—Metabolic Processes of Cultivated Plants Laboratory (2)
Discussion/Laboratory—3 hours. Prerequisite(s): PLS 100A (can be concurrent); Or the equivalent. Techniques and instruments used to study plant metabolic processes, including water relations, respiration, photosynthesis, enzyme kinetics, microscopy, immunochemistry, and nitrogen fixation. Quantitative methods, problem solving, and practical applications are emphasized. GE credit: SE. Effective: 2007 Fall Quarter.

PLS 100B—Growth and Yield of Cultivated Plants (3)
Lecture—3 hours. Prerequisite(s): PLS 100A; Or the equivalent of PLS 100A. Principles of the cellular mechanisms and hormonal regulation underlying plant growth, development, and reproduction. Emphasis on how these processes contribute to the harvestable yield of cultivated plants and can be managed to increase crop productivity and quality. GE credit: SE. Effective: 2017 Spring Quarter.

PLS 100BL—Growth and Yield of Cultivated Plants Laboratory (2)
Discussion/Laboratory—3 hours. Prerequisite(s): PLS 100B (can be concurrent); Or equivalent. Laboratory exercises in plant growth and development and their regulation, including photomorphogenesis, plant growth regulators, plant anatomy, seed germination, fruit ripening and senescence. Includes field trips to illustrate relationships to cropping and marketing systems. GE credit: SE. Effective: 2007 Fall Quarter.

PLS 100C—Environmental Interactions of Cultivated Plants (3)
Lecture—3 hours. Prerequisite(s): PLS 100A; Or the equivalent of PLS 100A. Principles of plant interactions with their physical and biological environments and their acquisition of the resources needed for growth and reproduction. Emphasis on how management practices and environmental conditions affect crop productivity. GE credit: SE. Effective: 2017 Spring Quarter.

PLS 100CL—Environmental Interactions of Cultivated Plants Laboratory (2)
Discussion/Laboratory—3 hours. Prerequisite(s): PLS 100C (can be concurrent) Techniques and instruments used to study plant interactions with their physical and biological environments, including light responses, transpiration, microclimatology, nutrient availability and utilization, biomass accumulation. Quantitative methods and modeling are emphasized. GE credit: SE. Effective: 2007 Fall Quarter.

PLS 101—Agriculture and the Environment (3)
Lecture—3 hours. Prerequisite(s): PLS 002; or Consent of Instructor. Focus on the interaction between agriculture and the environment to address the principles required to analyze conflict and develop solutions to complex problems facing society. Not open for credit to students who have completed AMR 101. (Former course AMR 101.). GE credit: SE, SL. Effective: 2007 Fall Quarter.

PLS 102—California Floristics (5)
Fieldwork; Laboratory—5 hours; Lecture—2 hours. Prerequisite(s): PLS 002 or BIS 002C; Or equivalent course in Plant Science. Survey of the California flora, emphasizing recognition of important plant families and genera and use of taxonomic keys to identify species. Phylogenetic relationships among families. Principles of systematics and taxonomy. Two Saturday field trips. (Plant Biology 102.) GE credit: SE, VL. Effective: 2017 Fall Quarter.

PLS 105—Concepts in Pest Management (3)
Discussion/Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): CHE 008B; PLS 002 or BIS 002B or BIS 002C Introduction to the ecological principles of integrated pest management, biology of different classes of pests and the types of losses they cause, population assessment, evaluation of advantages and disadvantages of different techniques used for pest management, IPM programs. Not open for credit to students who have completed AMR 105. (Former course AMR 105.). GE credit: SE. Effective: 2017 Winter Quarter.

PLS 110—Crop Management Systems for Vegetable Production (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): PLS 002 or (BIS 002A, BIS 002B, BIS 002C) Horticultural principles applied to production and management systems for vegetable crops. Laboratory and discussion illustrate efficient field management and resource use practices. Not open for credit to students who have completed PLS 110C. (Former course PLS 110C.). GE credit: SE. Effective: 2017 Winter Quarter.

PLS 112—Forage Crop Production (3)
Lecture—3 hours. Prerequisite(s): PLS 002 or BIS 001C or BIS 002C; or Consent of Instructor. Forages as a world resource in food production. Ecological principles governing the adaptation, establishment, growth and management of perennial and annual forages, including pastures, rangelands and hay; aspects of forage quality which affect feeding value to livestock. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 112. (Former course Agricultural Management and Rangeland Resources 112.). GE credit: SE. Effective: 2008 Spring Quarter.

PLS 113—Biological Applications in Fruit Tree Management (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): PLS 002 or BIS 001C or BIS 002C; Or equivalent. Physiology, growth, development and environmental requirements of fruit trees and the cultural practices used to maintain them. Emphasis on the application of biological principles in the culture of commercially important temperate zone fruit tree species. Not open for credit to students that have completed PLB 173. (Former course PLB 173.). GE credit: SE. Effective: 2007 Fall Quarter.

PLS 114—Biological Applications in Fruit Production (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): PLS 002 or BIS 001C or BIS 002C; PLS 113 recommended. Reproductive biology of tree crop species. Biological principles of fruit production, tree nutrition and orchard management for optimizing cropping. Laboratories emphasize hands-on work with orchard tree systems that are done specifically to produce the crop. Not open for credit to students who have completed PLB 174. (Former course PLB 174.). GE credit: SE. Effective: 2007 Fall Quarter.

PLS 116—Plant Morphology and Evolution (5)
Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): Introductory Plant Biology (e.g., BIS 002C, PLS 002). Introduction to the form, development, and evolution of vascular plants. Emphasis given to the form and development of reproductive structures in ferns and seed-producing plants as a basis for determining evolutionary relationships. Not open for credit to students who have completed PLB 116. (Plant Biology 116.) GE credit: SE, VL. Effective: 2015 Winter Quarter.

PLS 120—Applied Statistics in Agricultural Sciences (4)
Discussion/Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Upper division standing. Application of statistical methods to design and analysis of research trials for plant, animal, behavioral, nutritional, and consumer sciences. Basic concepts and statistical methods are presented in lectures, laboratories emphasize data processing techniques, problem solving, and interpretation in specialized fields. Not open for credit for students who have completed AMR 120. (Former course AMR 120.). GE credit: QL. Effective: 2008 Spring Quarter.

PLS 130—Rangelands: Ecology, Conservation and Restoration (3)
Lecture—3 hours. Prerequisite(s): PLS 002 or BIS 002B or BIS 002C; or Consent of Instructor. Upper division standing Introduction to the ecological principles and processes important for an understanding of the dynamics of range ecosystems. Emphasis on ecological and evolutionary concepts underlying management strategies for conserving biological diversity and environmental quality in rangelands. Not open for credit to students who have completed AMR 130. (Former course AMR 130.). GE credit: SE. Effective: 2017 Winter Quarter.

PLS 131—Identification and Ecology of Grasses (2)
Discussion—5 hours; Laboratory—20 hours; Lecture—7.5 hours. Prerequisite(s): PLS 130 or PLS 102 or PLS 147 recommended. Taxonomy and identification of western grasses. Development of skills in using plant identification keys. Ecology and evolution of grasses in grazing ecosystems. Given the week following spring quarter. Not open for credit to students who have completed AMR 131. (Former course AMR 131.). GE credit: SE, VL. Effective: 2017 Spring Quarter.

PLS 135—Ecology and Community Structure of Grassland and Savannah Herbivores (3)
Lecture—3 hours. Prerequisite(s): (BIS 001A or BIS 001B); (PLS 002 or BIS 001C); General ecology course (ESP 100) recommended. Feeding ecology of grassland herbivores and its importance in evolution of herbivore communities and social systems. Optimal foraging, interspecific interactions, and primary productivity are considered as factors structuring natural and managed grassland and savannah systems. Not open for credit to students who have completed AMR 135. (Former course AMR 135.). Effective: 2007 Winter Quarter.

PLS 141—Ethnobotany (4)
Discussion/Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): PLS 002 or BIS 001C or BIS 002C Relationships and interactions between plants and people, including human perceptions, management, and uses of plants, influences of plants on human cultures, and effects of human activity on plant ecology and evolution. Concepts, questions, methods, and ethical considerations in ethnobotanical research. Not open for credit to students who have completed PLB 141. (Former course PLB 141.). GE credit: OL, SE, SS, WE. Effective: 2008 Winter Quarter.

PLS 144—Trees and Forests (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PLS 002 or BIS 001C or BIS 002C Biological structure and function of trees as organisms; understanding of forests as communities and as ecosystems; use of forests by humans; tree phenology, photosynthesis, respiration, soil processes, life histories, dormancy, forest biodiversity, and agroforestry. Not open for credit to students who have completed PLB 144 or ENH 144 or ERS 144. (Former course PLB 144, ENH 144, ERS 144.). (Environmental Science and Management 144.) GE credit: SE, VL. Effective: 2011 Fall Quarter.

PLS 147—California Plant Communities (3)
Lecture/Discussion—3 hours. Prerequisite(s): PLS 002 or BIS 002C Ecology, distribution, and species of California's plant communities. Environmental forces that determine these communities, the threats they face, and their conservation and restoration opportunities. Not open for credit to students who have completed PLB 147. (Former course PLB 147.). GE credit: SE, VL. Effective: 2012 Spring Quarter.

PLS 147L—California Plant Communities Field Study (1)
Discussion/Laboratory—3 hours. Prerequisite(s): (PLS 002 or BIS 002C); PLS 147 (can be concurrent); Concurrent or previous enrollment in PLS 147. Visits to many of northern California's plant communities, from the north coast to the Central Valley to the Sierras. Discussion of community ecology and hands-on identification of species. Two Saturday and two three-day field trips required. Not open for credit to students who have completed PLB 147. (Former course PLB 147.). GE credit: SE, VL. Effective: 2012 Spring Quarter.

PLS 150—Sustainability and Agroecosystem Management (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): SSC 010; CHE 002A; (PLS 002 or BIS 001C or BIS 002C) Interdisciplinary analysis of agricultural production and food systems with primary emphasis on biophysical processes. General concepts governing the functioning of temperate and tropical agroecosystems in relation to resource availability, ecological sustainability, and socio-economic viability. Comparative ecological analyses of agroecosystems. Not open for credit to students who have completed AMR 150. (Former course AMR 150.). GE credit: OL, SE, SL. Effective: 2008 Spring Quarter.

PLS 152—Plant Genetics (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): BIS 001A or BIS 002A; or Consent of Instructor. Basic principles of transmission genetics, cytogenetics, population and quantitative genetics, and molecular genetics. Practical aspects of genetic crosses and analysis of segregating populations. Not open to students who have completed PLB 152. (Former course PLB 152.). GE credit: SE. Effective: 2007 Fall Quarter.

PLS 153—Plant, Cell, Tissue and Organ Culture (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): PLS 002 or BIS 001C or BIS 002C Basic and applied aspects of plant tissue culture including media preparation, micropropagation, organogenesis, embryogenesis, anther culture, protoplast culture and transformation. Not open for credit to students who have completed PLB 153. (Former course PLB 153.). GE credit: SE. Effective: 2007 Fall Quarter.

PLS 154—Introduction to Plant Breeding (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): PLS 152 or BIS 101; or Consent of Instructor. Principles, methods and applications of plant breeding and genetics to the improvement of crop plants. Illustration of how plant breeding is a dynamic, multidisciplinary, constantly-evolving science. Laboratory emphasizes hands-on experience in the basics of breeding through experiments. Not open for credit to students who have completed PLB 154. (Former course PLB 154.). GE credit: SE. Effective: 2007 Fall Quarter.

PLS 157—Physiology of Environmental Stresses in Plants (4)
Discussion—2 hours; Lecture—2 hours. Prerequisite(s): PLS 100C or PLB 111 or PLB 112 or ENH 102 or VEN 110 Stress concepts and principles; molecular, physiological, developmental and morphological characteristics enabling plants to avoid or tolerate environmental stresses; stress acclimation and adaptation processes; responses of wild and cultivated species to drought, flooding, nutrient deficiencies, salinity, toxic ions, extreme temperatures, etc. Not open for credit to students who have completed PLB 157. (Former course PLB 157.). GE credit: SE. Effective: 2007 Fall Quarter.

PLS 158—Mineral Nutrition of Plants (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): PLS 100A or PLB 111 or ENH 102 or VEN 110 Evolution and scope of plant nutrition; essential elements; mechanisms of absorption and membrane transporters; translocation and allocation processes; mineral metabolism; deficiencies and toxicities; genetic variation in plant nutrition; applications to management and understanding ecological effects of nutrient availability or deficiency. Not open for credit to students who have completed PLB 158. (Former course PLB 158.). GE credit: SE. Effective: 2007 Fall Quarter.

PLS 160—Agroforestry: Global and Local Perspectives (3)
Lecture/Discussion—3 hours. Prerequisite(s): (PLS 002 or BIS 001C or BIS 002C); (PLS 142 or PLS 150 or BIS 002B); Or general ecology course in lieu of PLS 142 or PLS 150 or BIS 002B. Traditional and evolving use of trees in agricultural ecosystems; their multiple roles in environmental stabilization and production of food, fuel, and fiber; and socioeconomic barriers to the adoption and implementation of agroforestry practices. Not open for credit to students who have previously taken AMR 160. (Former course AMR 160.). (International Agricultural Development 160.) GE credit: SE. Effective: 2011 Spring Quarter.

PLS 162—Urban Ecology (3)
Lecture/Discussion—3 hours. Prerequisite(s): Course in general or plant ecology such as PLB 117, ESP 100, EVE 101, EVE 120 or PLS 163. Application of fundamental concepts and approaches in landscape and ecosystem ecology to urban ecosystems. Ecological and social drivers and responses. Landscape heterogeneity, nutrient dynamics, invasive species, altered hydrology and climate, and pollution. Discussion of primary literature. GE credit: SE, SL. Effective: 2017 Winter Quarter.

PLS 163—Ecosystem and Landscape Ecology (4)
Lecture/Discussion—4 hours. Prerequisite(s): Course in general, plant, or soil ecology such as EVE 117, PLB 117, ESP 100, EVE 101, or SSC 112. Integration of concepts to understand and manage ecosystems in a complex and changing world. Emphasis on interactions among biotic, abiotic and human factors and changes over space/time. Local to global controls over water, carbon and nutrients across ecosystems/landscapes. Not open for credit to students who have completed ECL 201. Effective: 2010 Winter Quarter.

PLS 164—Practicum in Ecological Restoration (1)
Fieldwork—3 hours. Prerequisite(s): ENH 160 recommended. Hands-on field course that exposes students to various aspects of ecological restoration throughout the seasonal restoration cycle with real-world practitioners. Emphasis on grassland/rangeland, riparian, and oak woodland communities. May be repeated up to 3 time(s). (P/NP grading only.) Effective: 2014 Spring Quarter.

PLS 170A—Fruit and Nut Cropping Systems (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): PLS 002 or BIS 002C; or Consent of Instructor. Overview of production and handling systems of major pomological crops, analysis of current cultural and harvesting problems and concerns associated with commercial fruit growing. Not open for credit to students who have completed AMR 170A. (Former course AMR 170A.). GE credit: SE. Effective: 2017 Spring Quarter.

PLS 170B—Fruit and Nut Cropping Systems (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): PLS 002 or BIS 002C; or Consent of Instructor. Overview of production and handling systems of major pomological crops, including analysis of current cultural and harvesting problems and concerns associated with commercial fruit growing. Not open for credit to students who have completed AMR 170B. (Former course AMR 170B.). GE credit: SE. Effective: 2017 Spring Quarter.

PLS 171—Principles and Practices of Plant Propagation (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): PLS 002 or BIS 001C or BIS 002C Principles and practices of propagating plants covering anatomical, physiological, and practical aspects. Not open for credit to students who have completed PLB 171. (Former course PLB 171.). GE credit: SE. Effective: 2007 Fall Quarter.

PLS 172—Postharvest Physiology and Technology (4)
Discussion/Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): General plant science background (e.g., PLS 002, PLS 012); PLS 196 recommended. Overview of physiological processes related to maturation and senescence of plant products and their responses to postharvest stresses. Targeted approaches and technologies to maintain product quality and limit postharvest disorders. Not open for credit to students who have completed PLB 172. (Former course PLB 172.). GE credit: SE. Effective: 2008 Fall Quarter.

PLS 173—Molecular and Cellular Aspects of Postharvest Biology (3)
Lecture/Discussion—3 hours. Prerequisite(s): PLS 002 or BIS 001C or BIS 002C; Or equivalent. Basic concepts and current knowledge of issues relevant to postharvest biology. Mechanisms of fruit ripening, senescence, programmed cell death. Metabolism and functions of phytohormones, carbohydrates, lipids, pigments, flavor compounds, and phytonutrients at molecular and cellular levels. GE credit: SE. Effective: 2017 Spring Quarter.

PLS 174—Microbiology and Safety of Fresh Fruits and Vegetables (3)
Lecture—3 hours. Prerequisite(s): PLS 002 or BIS 001C or BIS 002C; Or equivalent. Overview of microorganisms on fresh produce, pre- and postharvest factors influencing risk of microbial contamination, attachment of microorganisms to produce, multiplication during postharvest handling and storage, and methods of detection. Mock outbreak trial and presentation of science-based forensic discovery. GE credit: SE. Effective: 2008 Fall Quarter.

PLS 176—Introduction to Weed Science (4)
Discussion/Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): PLS 002 or BIS 001C or BIS 002C Weed biology and ecology, methods of weed management, biological control, herbicides and herbicide resistance. Weed control in managed and natural ecosystems; invasive species. Laws and regulations. Application of herbicides. Sight and software-assisted identification of common weeds. Not open for credit to students who have completed PLB 176. (Former course PLB 176.). GE credit: SE, VL. Effective: 2011 Fall Quarter.

PLS 178—Biology and Management of Aquatic Plants (3)
Lecture—3 hours. Prerequisite(s): (PLS 002 or BIS 001C or BIS 002C); (CHE 008B or CHE 118B); PLS 100C, PLB 111, ENH 102, or HYD 122 recommended. Brief survey of common and invasive fresh water plants and macroalgae, their reproductive modes, physiology, growth (photosynthesis, nutrient utilization), development (hormonal interactions), ecology, modes and impacts of invasion, and management. Two Saturday field trips required. Not open for credit to students who have completed former course PLB 178. (Former course PLB 178.). GE credit: SE. Effective: 2007 Fall Quarter.

PLS 188—Undergraduate Research Proposal (3)
Lecture/Discussion—3 hours. Prerequisite(s): Upper division standing. Preparation and review of a scientific proposal. Problem definition, identification of objectives, literature survey, hypothesis generation, design of experiments, data analysis planning, proposal outline and preparation. (Biotechnology 188) GE credit: OL, SE, WE. Effective: 2008 Summer Quarter.

PLS 189L—Laboratory Research in Plant Sciences (2-5)
Discussion—1 hour; Laboratory—3-12 hours. Prerequisite(s): PLS 188; and Consent of Instructor. Formulating experimental approaches to current questions in plant science; performance of proposed experiments. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2008 Spring Quarter.

PLS 190—Seminar on Alternatives in Agriculture (2)
Discussion—1 hour; Seminar—1 hour. Prerequisite(s): Upper division standing or consent of instructor. Seminar on topics related to alternative theories, practices and systems of agriculture and the relationship of agriculture to the environment and society. Scientific, technological, social, political and economic perspectives. May be repeated up to 2 time(s) for a total of three times. (P/NP grading only.) GE credit: SE. Effective: 2017 Winter Quarter.

PLS 190C—Research Group Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Advanced standing. Weekly conference on research problems, progress and techniques in the plant sciences. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 2007 Fall Quarter.

PLS 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Work experience on or off campus in subject areas pertaining to plant and environmental sciences. Internship supervised by a faculty member. May be repeated for credit. (P/NP grading only.) Effective: 2007 Winter Quarter.

PLS 193—Garden and Farm-Based Experiential Education Methods (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): Upper division standing or consent of instructor. Methods of teaching children and youth about fruit and vegetable production and consumption. Lesson and activity planning for garden and farm field trips. Basic biology, ecology, plant science, and crop management practices. Mentorship in experiential learning. Preparation of garden site. (P/NP grading only.) GE credit: OL, SE. Effective: 2015 Winter Quarter.

PLS 194H—Senior Honors Thesis (1-2)
Independent Study—3-6 hours. Prerequisite(s): Senior standing; overall GPA of 3.250 or higher and consent of master advisor. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis. (P/NP grading only.) GE credit: SE, WE. Effective: 2016 Fall Quarter.

PLS 196—Postharvest Technology of Horticultural Crops (3)
Fieldwork—45 hours; Lecture/Discussion—45 hours. Prerequisite(s): Upper division or graduate student standing. Intensive study of postharvest considerations and current procedures and challenges in postharvest handling for fruits, nuts, vegetables, and ornamentals in California. Scheduled first two weeks immediately following last day of spring quarter. Not open for credit to students who have completed PLB 196. (Former course PLB 196.). (P/NP grading only.) GE credit: SE. Effective: 2007 Fall Quarter.

PLS 197T—Tutoring in Plant Sciences (1-5)
Tutorial—1-5 hours. Prerequisite(s): Consent of Instructor. Upper division standing, completion of course being tutored or the equivalent. Leading small voluntary discussion or lab groups affiliated with one of the department's regular courses. May be repeated up to 8 unit(s). (P/NP grading only.) Effective: 2007 Winter Quarter.

PLS 198—Directed Group Study (1-5)
Variable—3-15 hours. May be repeated for credit. (P/NP grading only.) Effective: 2007 Winter Quarter.

PLS 199—Special Study for Advanced Undergraduates (1-5)
Variable—3-15 hours. May be repeated for credit. (P/NP grading only.) Effective: 2007 Winter Quarter.

PLS 205—Experimental Design and Analysis (5)
Discussion/Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): PLS 120; Or equivalent. Introduction to the research process and statistical methods to plan, conduct and interpret experiments. Not open for credit to students who have completed AGR 205. (Former course AGR 205.). Effective: 2010 Winter Quarter.

PLS 206—Applied Multivariate Modeling in Agricultural and Environmental Sciences (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PLS 120; (STA 106 or STA 108 or PLS 205) Multivariate linear and nonlinear models. Model selection and parameter estimation. Analysis of manipulative and observational agroecological experiments. Discriminant, principal component, and path analyses. Logistic and biased regression. Bootstrapping. Exercises based on actual research by UCD students. Not open for credit to students who have complete AGR 206. (Former course AGR 206.). Effective: 2017 Winter Quarter.

PLS 212—Postharvest Biology and Biotechnology of Fruits and Nuts (3)
Lecture—3 hours. Prerequisite(s): PLS 172 Review of postharvest biology of fruits and nuts and biotechnological approaches to address postharvest challenges. Morphology, biology and postharvest handling of fruits and nuts are presented along with current research, including biotechnology, and discussion of future research needs and approaches. Not open for credit to students who have completed POM 212. Effective: 2008 Spring Quarter.

PLS 213—Postharvest Physiology of Vegetables (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): PLS 172 or PLS 100B or PLB 112 Comparative physiology of harvest vegetables; emphasis on maturation, senescence, compositional changes, physiological disorders and effects of environmental factors. Concepts and research procedures. Not open for credit to students who have completed VCR 212. (Former course VCR 212.). Effective: 2010 Spring Quarter.

PLS 220—Genomics and Biotechnology of Plant Improvement (3)
Lecture—3 hours. Prerequisite(s): BIS 101; Or the equivalent. Integration of modern biotechnology and classical plant breeding including the impact of structural, comparative and functional genomics on gene discovery, characterization and exploitation. Also covers molecular markers, plant transformation, hybrid production, disease resistance, and novel output traits. Not open for credit to students who have completed VCR 220. (Former course VCR 220.). (Genetics 220.) Effective: 2007 Winter Quarter.

PLS 221—Genomics and Breeding of Vegetable Crops (3)
Lecture—3 hours. Prerequisite(s): BIS 101; Or equivalent. Preview of genome structure, mapping, gene tagging and development of other genetic resources applied to improvement of major vegetables. For graduate students contemplating a career in modern vegetable breeding and biotechnology. Not open for credit to students who have completed VCR 221. (Former course VCR 221.). Effective: 2007 Winter Quarter.

PLS 222—Advanced Plant Breeding (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): PLS 154; PLS 205; GGG 201D or ANG 107 recommended. Philosophy, methods, and problems in developing improved plant species. Topics include: inbreeding, heterosis, progeny testing, breeding methodology, index selection, germplasm conservation, and breeding for stress resistance. Laboratories include tours of breeding facilities and calculation and interpretation of quantitative data. Effective: 2014 Winter Quarter.

PLS 230—Forest Biology (4)
Lecture—3 hours; Seminar—1 hour. Prerequisite(s): Graduate standing or advanced undergraduate with consent of instructor. Cross-disciplinary review of forest biology, including physiology, genetics, pathology, ecology, and silviculture. Effective: 2014 Spring Quarter.

PLS 290—Seminar (1-2)
Seminar—1-2 hours. Topics of current interest related to Plant Sciences. (S/U grading only.) Effective: 2007 Winter Quarter.

PLS 290C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. May be repeated for credit. (S/U grading only.) Effective: 2007 Winter Quarter.

PLS 297T—Tutoring in Plant Sciences (1-5)
Tutorial—1-5 hours. Prerequisite(s): Consent of Instructor. Graduate standing; completion of course to be tutored or the equivalent. Designed for graduate students who desire teaching experience but are not teaching assistants. May be repeated up to 5 unit(s) Same course may not be tutored more than one time. (S/U grading only.) Effective: 2007 Winter Quarter.

PLS 298—Group Study (1-5)
Variable. Effective: 2007 Winter Quarter.

PLS 299—Research (1-12)
Variable—3-36 hours. May be repeated for credit. (S/U grading only.) Effective: 2007 Winter Quarter.

PLS 396—Teaching Assistant Training Practicum (1-4)
Variable—3-12 hours. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit. (S/U grading only.) Effective: 2007 Winter Quarter.

Political Science

Political Science | POL Information

(College of Letters and Science)

Erik J. Engstrom, Ph.D., Chairperson of the Department

Department Office. 469 Kerr Hall; 530-752-0966

Political Science Undergraduate Student Matters. 468 Kerr Hall; 530-752-6241

International Relations Undergraduate Student Matters. 464 Kerr Hall; 530-754-8098

Graduate Student Matters. 472 Kerr Hall; 530-752-0969, http://ps.ucdavis.edu

Faculty. http://ps.ucdavis.edu/directory-of-people/ps-faculty#c4=all&b_start=0

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The Political Science Major Program

Political science is the study of politics and political systems at the local, national, and international levels. It concerns not only the institutions of government but also the analysis of such phenomena as political behavior, political values, political change and stability, parties, pressure groups, bureaucracies, administrative behavior, justice, national security, and international affairs.

The Program. The Department of Political Science offers two major programs: political science and political science-public service. The political science major aims to provide the student with a broad understanding of political concepts, political institutions, political behavior, and political processes. The political science-public service major is for students who desire opportunities for practical hands-on experience in their major. It differs in particular from the political science major in its internship requirement and its focus on the American political system.

Major Advisor. Consult Department office.

Internships and Career Alternatives. Both the proximity of UC Davis to the state capitol and the programs offered by the UC Washington Center afford exceptional internship possibilities in local, state, and national government offices, providing students with actual experience in politics and government service while still attending school. A student who majors in political science acquires research and analytic skills relevant to many professional fields. Consequently, the majors offered in political science are valuable not only in providing students with a better understanding of politics and political systems, but also as a first step toward careers in teaching, law, management, government, urban planning, journalism, politics, administration, or for graduate studies in numerous fields.

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Graduate Study. The Department of Political Science offers a program of graduate study and research leading to a Ph.D. degree or an M.A./J.D. joint degree. The M.A./J.D. joint degree is done only in conjunction with UC Davis School of Law. Information concerning admission to these programs and requirements for completion are available in the Graduate Program Coordinator office.

Graduate Advisor. Consult Graduate Program Coordinator office.

American History and Institutions. This University requirement may be satisfied by passing any one of the following Political Science courses: 001, 005, 100, 102, 104, 105, 106, 108, 109, 113, 130, 131, 160, 163; see also under American History and Institutions requirements.

Preparatory Subject Matter **Units:** 24

Choose three:

POL 001	American National Government	4
POL 002	Introduction to Comparative Politics	4
POL 003	International Relations	4
POL 004	Basic Concepts in Political Theory	4

Choose one:

POL 001	American National Government	4
POL 002	Introduction to Comparative Politics	4
POL 003	International Relations	4
POL 004	Basic Concepts in Political Theory	4
POL 005	Contemporary Problems of the American Political System	4
POL 007	Contemporary Issues in Law and Politics	4
POL 011A	America Decides: Who Will Win This Year's Election?	4
POL 011B	Citizen Lawmaking: Direct Democracy, Public Policy & Political Representation in America	4
POL 011C	Politics and Film	4
POL 011D	Political Persuasion	4
POL 012A	Politics and Sports	4
POL 012B	Climate Change and Politics	4

POL 051 Scientific Study of Politics 4
POL 051 required.

Choose one:

STA 013	Elementary Statistics	4
STA 032	Gateway to Statistical Data Science	4
POL 012Y	Data Visualization in the Social Sciences	4

Depth Subject Matter **Units:** 44-45

Four courses in one of the fields of concentration listed below.

Three courses in another field of concentration listed below.

Two courses in another field of concentration listed below.

Two other upper division courses in Political Science. Only five units of POL 192 may be counted toward the depth subject matter.

Fields of Concentration

American Politics; courses with POL 001 recommended:

POL 100	Local Government and Politics	4
POL 102	Urban Public Policy	4
POL 104	California State Government and Politics	4
POL 105	The Legislative Process	4
POL 106	The Presidency	4
POL 107	Environmental Politics and Administration	4
POL 108	Policy Making in the Public Sector	4

POL 109	Public Policy and the Governmental Process	4
POL 150	Judicial Politics and Constitutional Interpretation	4
POL 151	The Constitutional Politics of the First Amendment and the Right to Privacy.	4
POL 152	The Constitutional Politics of the Equality	4
POL 153	The Constitutional Politics of the Justice System	4
POL 154	Legal Philosophy	4
POL 155	Judicial Process and Behavior	4
POL 160	American Political Parties	4
POL 162	Elections and Voting Behavior	4
POL 163	Group Politics	4
POL 164	Public Opinion	4
POL 165	Mass Media and Politics	4
POL 166	Women in Politics	4
POL 168	Chicano Politics	4
POL 170	Political Psychology	4
POL 171	The Politics of Energy	4
POL 172	American Political Development	4
POL 174	Government and the Economy	4
POL 175	Science, Technology, and Policy	4
POL 176	Racial Politics	4
POL 180	Bureaucracy in Modern Society	4
POL 183	Administrative Behavior	4
POL 187	Administrative Theory	4
POL 195	Special Studies in American Politics	4
POL 196A	Seminar in American Politics	4

Comparative Politics: courses with POL 002 recommended:

POL 126	Ethnic Self-Determination and International Conflict	4
POL 140A	Comparative Political Institutions: Electoral Systems	4
POL 140B	Comparative Political Institutions: Parties	4
POL 140C	Comparative Political Institutions: Legislatures	4
POL 140D	When Institutions Fail	4
POL 140E	Policy-Making Processes	4
POL 142A	Comparative Development: Political Development in Modernizing Societies	4
POL 142B	Comparative Development: Politics and Inequality	4
POL 142C	Comparative Political Development: Democracy and Democratization	4
POL 143A	Latin American Politics	4
POL 143B	Mexican Politics	4
POL 144A	Politics of Post-Communist Countries: East European Politics	4
POL 144B	Politics of Post-Communist Countries: Russia	4
POL 146A	Politics of Africa: Issues in Contemporary African Politics	4
POL 146B	Politics of Africa: Development in Africa	4
POL 147A	West European Politics	4
POL 147B	West European Politics: British Politics	4
POL 147C	West European Politics: French Politics	4
POL 147D	West European Politics: German Politics	4
POL 148A	Government and Politics of East Asia: China	4
POL 148B	Government and Politics in East Asia: Japan	4

POL 148C	Government and Politics in East Asia: Southeast Asia	4
POL 179	Special Studies in Comparative Politics	4
POL 196B	Seminar in Comparative Politics	4

International Relations; courses with POL 003 recommended:

POL 120	Theories of International Politics	4
POL 121	Scientific Study of War	4
POL 122	International Law	4
POL 123	The Politics of Interdependence	4
POL 124	The Politics of Global Inequality	4
POL 126	Ethnic Self-Determination and International Conflict	4
POL 129	Special Studies in International Politics	4
POL 130	Recent U.S. Foreign Policy	4
POL 131	Analysis of U.S. Foreign Policy	4
POL 132	National Security Policy	4
POL 134	Africa and U.S. Foreign Policy	4
POL 135	International Politics of the Middle East	4
POL 136	The Arab-Israeli Conflict	4
POL 137	International Relations in Western Europe	4
POL 139	Special Studies in Foreign Policy	4
POL 190	International Relations	4
POL 196C	Seminar in International Relations	4

Political Theory; courses with POL 004 recommended:

POL 110	The Strategy of Politics	4
POL 112	Contemporary Democratic Theory	4
POL 113	American Political Thought	4
POL 114	Quantitative Analysis of Political Data	4
POL 115	Medieval Political Thought	4
POL 116	Foundations of Political Thought	4
POL 117	Topics in the History of Political Thought	4
POL 118A	History of Political Theory: Ancient	4
POL 118B	History of Political Theory: Early Modern	4
POL 118C	History of Political Theory: Late Modern	4
POL 119	Contemporary Political Thought	4
POL 187	Administrative Theory	4
POL 196D	Seminar in Political Theory	4

Total: 68-69

Political Science | POL; Public Service A.B.

(College of Letters and Science)

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Preparatory Subject Matter **Units:** 24

POL 001	American National Government	4
Choose three:		
POL 002	Introduction to Comparative Politics	4
POL 003	International Relations	4
POL 004	Basic Concepts in Political Theory	4
POL 005	Contemporary Problems of the American Political System	4
POL 007	Contemporary Issues in Law and Politics	4
Choose one:		
POL 012Y	Data Visualization in the Social Sciences	4
STA 032	Gateway to Statistical Data Science	4
STA 013	Elementary Statistics	4
Equivalent of STA 013.		
POL 051	Scientific Study of Politics	4
POL 051 Required.		

Depth Subject Matter **Units:** 44-46

Core program

Choose three:

POL 100	Local Government and Politics	4
POL 102	Urban Public Policy	4
POL 104	California State Government and Politics	4
POL 105	The Legislative Process	4
POL 106	The Presidency	4
POL 108	Policy Making in the Public Sector	4
POL 109	Public Policy and the Governmental Process	4
POL 113	American Political Thought	4
POL 114	Quantitative Analysis of Political Data	4
POL 180	Bureaucracy in Modern Society	4

Internship, choose one:

POL 192A	Internship in Public Affairs	5
POL 192B	Internship in Public Affairs	5
WAS 192	Internship in the UC Davis Washington Program	8

Research Paper

POL 193	Research in Practical Politics	2

Fields of Concentration

Select six upper division courses from two or three fields of concentration listed below with at least two courses in each field selected; at least 16 of the units must be in political science; Core Program courses may not be counted toward this requirement.

Fields of Concentration

Field (1) Policy Process:

POL 100	Local Government and Politics	4
POL 102	Urban Public Policy	4
POL 104	California State Government and Politics	4
POL 105	The Legislative Process	4
POL 106	The Presidency	4
POL 108	Policy Making in the Public Sector	4
POL 109	Public Policy and the Governmental Process	4
POL 140A	Comparative Political Institutions: Electoral Systems	4
POL 160	American Political Parties	4
POL 162	Elections and Voting Behavior	4
POL 163	Group Politics	4
POL 164	Public Opinion	4
POL 165	Mass Media and Politics	4
POL 166	Women in Politics	4
POL 168	Chicano Politics	4
POL 170	Political Psychology	4
POL 171	The Politics of Energy	4
POL 172	American Political Development	4
POL 174	Government and the Economy	4
POL 175	Science, Technology, and Policy	4
POL 180	Bureaucracy in Modern Society	4
POL 183	Administrative Behavior	4
POL 187	Administrative Theory	4

POL 195	Special Studies in American Politics	4
ECN 130	Public Microeconomics	4
ECN 131	Public Finance	4

Field (2) Policy Interpretation (public/pre-law):

POL 119	Contemporary Political Thought	4
POL 150	Judicial Politics and Constitutional Interpretation	4
POL 151	The Constitutional Politics of the First Amendment and the Right to Privacy.	4
POL 152	The Constitutional Politics of the Equality	4
POL 153	The Constitutional Politics of the Justice System	4
POL 155	Judicial Process and Behavior	4

Field (3) State & Local Policy:

POL 100	Local Government and Politics	4
POL 102	Urban Public Policy	4
POL 104	California State Government and Politics	4
ESP 173	Land Use and Growth Controls	4
SOC 143A	Urban Society	4

Field (4) Foreign Policy:

POL 122	International Law	4
POL 130	Recent U.S. Foreign Policy	4
POL 131	Analysis of U.S. Foreign Policy	4
POL 132	National Security Policy	4
POL 134	Africa and U.S. Foreign Policy	4
POL 139	Special Studies in Foreign Policy	4

Field (5) Environmental Policy:

POL 107	Environmental Politics and Administration	4
ESP 160	The Policy Process	4
ESP 161	Environmental Law	4
ESP 162	Environmental Policy	4
ESP 166	Ocean and Coastal Policy	3
ESP 168A	Methods of Environmental Policy Evaluation	5
ESP 168B	Methods of Environmental Policy Analysis	4
ESP 169	Water Policy and Politics	3
ESP 171	Urban and Regional Planning	4
ESP 172	Public Lands Management	4
ESP 173	Land Use and Growth Controls	4
ESP 179	Environmental Impact Assessment	4

Field (6) Economic Policy:

ECN 100A	Intermediate Micro Theory: Consumer and Producer Theory	4
ECN 130	Public Microeconomics	4
ECN 131	Public Finance	4
ECN 151A	Economics of the Labor Market	4
ECN 151B	Economics of Human Resources	4

Field (7) Social Policy:

SOC 104	The Political Economy of International Migration	4
SOC 124	Education and Inequality in the U.S.	4
SOC 141	Industrialization and Social Change	4
SOC 150	Criminology	4
SOC 151	The Criminal Justice System	4

SOC 154	Health and Illness	4
SOC 155	Sociology of Law	4
SOC 175	Mass Communication	4
SOC 181	Social Change Organization	4

Field (8) Policy Analysis Tools:

ECN 102	Analysis of Economic Data	4
ECN 140	Econometrics	4
POL 114	Quantitative Analysis of Political Data	4

Field (9)

POL 194HA	Special Study for Honors Students	4
POL 194HB	Special Study for Honors Students	4

Total: 68-70

Political Science | POL M.A.

(College of Letters and Science)

Erik J. Engstrom, Ph.D., Chairperson of the Department

Department Office. 469 Kerr Hall; 530-752-0966

Political Science Undergraduate Student Matters. 468 Kerr Hall; 530-752-6241

International Relations Undergraduate Student Matters. 464 Kerr Hall; 530-754-8098

Graduate Student Matters. 472 Kerr Hall; 530-752-0969, http://ps.ucdavis.edu

Faculty. http://ps.ucdavis.edu/directory-of-people/ps-faculty#c4=all&b_start=0

The Political Science Major Program

Political science is the study of politics and political systems at the local, national, and international levels. It concerns not only the institutions of government but also the analysis of such phenomena as political behavior, political values, political change and stability, parties, pressure groups, bureaucracies, administrative behavior, justice, national security, and international affairs.

Graduate Study. The Department of Political Science offers a program of graduate study and research leading to a Ph.D. degree or an M.A./J.D. joint degree. The M.A./J.D. joint degree is done only in conjunction with UC Davis School of Law. Information concerning admission to these programs and requirements for completion are available in the Graduate Program Coordinator office.

The Master of Arts degree is offered only en route to the Ph.D.

Graduate Advisor. Consult Graduate Program Coordinator office.

Political Science | POL M.A./J.D.

(College of Letters and Science)

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Graduate Advisor. Consult Graduate Program Coordinator office.

Political Science | POL Ph.D.

(College of Letters and Science)

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Graduate Advisor. Consult Graduate Program Coordinator office.

Political Science | POL Minor

(College of Letters and Science)

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Internships and Career Alternatives. Both the proximity of UC Davis to the state capitol and the programs offered by the UC Washington Center afford exceptional internship possibilities in

local, state, and national government offices, providing students with actual experience in politics and government service while still attending school. A student who majors in political science acquires research and analytic skills relevant to many professional fields. Consequently, the majors offered in political science are valuable not only in providing students with a better understanding of politics and political systems, but also as a first step toward careers in teaching, law, management, government, urban planning, journalism, politics, administration, or for graduate studies in numerous fields.

Public Affairs Internship Program. This program is open to upper division students in any major who want to obtain an internship in the area of government and public service. Information and applications are available from the Political Science Department in 467 Kerr Hall.

Political Science **Units:** 24

Choose six upper division Political Science courses.

Total: 24

Political Science | POL Courses

Courses in POL:

POL 001—American National Government (4)
Discussion—1 hour; Lecture—3 hours. Survey of American national government, including the constitutional system, political culture, parties, elections, the presidency, Congress, and the courts. GE credit: ACGH, SS, WE. Effective: 1997 Winter Quarter.

POL 002—Introduction to Comparative Politics (4)
Discussion—1 hour; Lecture—3 hours. Introduction to basic concepts in political analysis and application of them in comparative studies of selected countries. Coverage is given to cultural and other informal dimensions of politics as well as to more formal political and governmental structures. GE credit: SS, WC, WE. Effective: 1997 Winter Quarter.

POL 003—International Relations (4)
Discussion—1 hour; Lecture—3 hours. International conflict and cooperation, including the Cold War, nuclear weapons, and new techniques for understanding international politics. GE credit: SS, WC, WE. Effective: 2011 Fall Quarter.

POL 004—Basic Concepts in Political Theory (4)
Discussion—1 hour; Lecture—3 hours. Analysis of such concepts as the individual, community, liberty, equality, justice, and natural law as developed in the works of the major political philosophers. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

POL 005—Contemporary Problems of the American Political System (4)
Discussion—1 hour; Lecture—3 hours. In-depth treatment of selected problems and issues of American politics, governmental institutions, and policies. GE credit: ACGH, SS, WE. Effective: 1997 Winter Quarter.

POL 007—Contemporary Issues in Law and Politics (4)
Seminar—4 hours. Limited enrollment; open to students having no more than 40.1 units. Seminar focusing on the political dimensions of American law and institutions. Examines the role of courts in resolving contemporary issues of law and politics including abortion, capital punishment, and civil rights. GE credit: ACGH, SS, WE. Effective: 1997 Winter Quarter.

POL 011A—America Decides: Who Will Win This Year's Election? (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Survey of factors influencing presidential and congressional elections. Analysis of candidate nominations, campaign strategy, campaign finance, media coverage, and voter decision-making. GE credit: ACGH, SS, WE. Effective: 2016 Fall Quarter.

POL 011B—Citizen Lawmaking: Direct Democracy, Public Policy & Political Representation in America (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Analysis of direct participation by citizens in the lawmaking process. GE credit: ACGH, SS, WE. Effective: 2016 Fall Quarter.

POL 011C—Politics and Film (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Survey of portrayals of politics and policy issues in moving pictures. Analysis of political processes, policy development, social mores, and historical periods as highlighted in Hollywood movies, television, and/or documentary films. GE credit: ACGH, SS, VL, WE. Effective: 2016 Fall Quarter.

POL 011D—Political Persuasion (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Examination of political influence and persuasion. GE credit: SS, WE. Effective: 2016 Fall Quarter.

POL 012A—Politics and Sports (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Core issues in American and world politics through the lens of sports and the athletes who play them. The introduction of American civil rights movement, the Cold War, Middle East Tensions, and democratization. GE credit: SS, WE. Effective: 2016 Fall Quarter.

POL 012B—Climate Change and Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Analysis of political institutions' response and adaptation to climate change. GE credit: SS, WE. Effective: 2016 Fall Quarter.

POL 012Y—Data Visualization in the Social Sciences (4)
Laboratory—1.5 hours; Lecture—2 hours; Web Virtual Lecture—1.5 hours. Introduction to quantitative data across the social sciences (Communications, Political Science, Psychology, Sociology, and other disciplines). Transforming data, describing data, producing graphs, visual reasoning, and interpretations. (Same course as Communications 12Y, Sociology 12Y, Psychology 12Y.) GE credit: QL, VL. Effective: 2016 Spring Quarter.

POL 051—Scientific Study of Politics (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the basic principles of the scientific study of politics. Research design and empirical analysis of data with applications to different methodological approaches and different substantive areas in political science. GE credit: AH, QL, SE, SS, VL, WE. Effective: 2006 Fall Quarter.

POL 090X—Lower Division Seminar (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Limited enrollment. Examines fundamental issues and concepts that shape the study and practice of politics. Students will read, discuss and write about some of the most significant texts in political science in order to develop a foundation for the study of politics. Effective: 1997 Winter Quarter.

POL 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

POL 100—Local Government and Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Politics and government of local communities in the United States, including cities, counties and special districts. Emphasizes sources and varieties of community conflict, legislative and executive patterns, expertise, decision making and the politics of structure. Observation of local governing boards. GE credit: ACGH, SS, WE. Effective: 2016 Spring Quarter.

POL 102—Urban Public Policy (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 001 recommended. Political and economic relationships among central cities, suburbs, and regional, state, and federal governments. Focuses upon policy areas such as poverty, transportation, welfare, and housing, and upon who governs and who benefits from the policies in these areas. GE credit: ACGH, DD, QL, SS, WE. Effective: 2016 Spring Quarter.

POL 104—California State Government and Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 001 recommended. California political system. Political culture, constitution, elections and parties, direct democracy, legislature, governor, executive branch, courts, finances, state-local relations and policy issues. GE credit: ACGH, SS, WE. Effective: 2016 Spring Quarter.

POL 105—The Legislative Process (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Legislative process with emphasis on the United States Congress; legislative organization and procedures, legislative leadership and policy making, legislators and constituents, relations between Congress and other agencies. GE credit: ACGH, SS, WE. Effective: 2016 Spring Quarter.

POL 106—The Presidency (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. American presidencies origins and development; presidential power and influence as manifest in relationships with Congress, courts, parties, and the public in the formulation and administration of foreign and domestic policy; nominations, campaigns, and elections. GE credit: ACGH, SS, WE. Effective: 2016 Spring Quarter.

POL 107—Environmental Politics and Administration (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Environment as a political issue in the United States. Development of administrative mechanisms for handling environmental problems. Changing role of Congress, the presidency, the bureaucracy and the courts in environmental policy formulation and implementation. GE credit: ACGH, QL, SS, WE. Effective: 2016 Spring Quarter.

POL 108—Policy Making in the Public Sector (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 001 recommended. Theoretical rationale for governmental activity, program evaluation, PPBS, positive theories of policy making, the quantitative study of policy determinants, implementation, and proposals for improved decision making. GE credit: ACGH, QL, SS, WE. Effective: 2016 Spring Quarter.

POL 109—Public Policy and the Governmental Process (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Processes of formulating public policy, including individual and collective decision making, political exchange, competition, bargaining, coalition formation and the allocation of public goods, resources and opportunities. GE credit: ACGH, QL, SS, WE. Effective: 2016 Spring Quarter.

POL 110—The Strategy of Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Introduction to game theory. Explanation of the behavior of individuals in strategic interaction. Rational and behavioral approaches. Applications to political science and other fields. GE credit: QL, SS, WE. Effective: 2016 Spring Quarter.

POL 112—Contemporary Democratic Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 004 recommended. Major contemporary attempts to reformulate traditional democratic theory, attempts to replace traditional theory by conceptual models derived from modern social science findings. GE credit: AH, SS, WE. Effective: 2016 Spring Quarter.

POL 113—American Political Thought (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 004 recommended. Origins and nature of American political thought. Principles of American thought as they emerge from the founding period to the present. GE credit: ACGH, AH, SS, WE. Effective: 2016 Spring Quarter.

POL 114—Quantitative Analysis of Political Data (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 051 recommended. Logic and methods of analyzing quantitative political data. Topics covered include central tendency, probability, correlation, and non-parametric statistics. Particular emphasis will be placed on understanding the use of statistics in political science research. GE credit: AH, QL, SE, SS, VL, WE. Effective: 2016 Spring Quarter.

POL 115—Medieval Political Thought (4)
Lecture—3 hours; Term Paper. Prerequisite(s): POL 004 recommended. Examination of the ideas central to medieval political thinking. Emphasis will be upon the thoughts of the major political thinkers of the period, rather than upon political history. GE credit: AH, SS, WE. Effective: 2016 Spring Quarter.

POL 116—Foundations of Political Thought (4)
Lecture/Discussion—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 004 recommended. Analysis and evaluation of the seminal works of a major political philosopher or of a major problem in political philosophy. May be repeated up to 1 time(s) when topic differs. GE credit: AH, SS, WC, WE. Effective: 2016 Spring Quarter.

POL 117—Topics in the History of Political Thought (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 004 recommended. Political thought of a specific historical period. Topics may include: Ancient Athens, the Italian Renaissance, the Enlightenment, or Nineteenth Century Germany. May be repeated up to 1 time(s) when topics differ. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 118A—History of Political Theory: Ancient (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 004 recommended. Critical analyses of classical and medieval political philosophers such as Plato, Aristotle, Cicero and St. Thomas. GE credit: AH, SS, WC, WE. Effective: 2016 Spring Quarter.

POL 118B—History of Political Theory: Early Modern (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 004 recommended. Critical analysis of the works of early modern political philosophers such as Machiavelli, Montaigne, Hobbes, Locke and Hume. GE credit: AH, SS, WC, WE. Effective: 2016 Spring Quarter.

POL 118C—History of Political Theory: Late Modern (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 004 recommended. Critical analyses of the works of late modern political philosophers such as Rousseau, Kant, Hegel, Tocqueville, Mill, Marx and Nietzsche. GE credit: AH, SS, WC, WE. Effective: 2016 Spring Quarter.

POL 119—Contemporary Political Thought (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 004 recommended. Contemporary political thought from the end of the nineteenth century to the present. Emphasis upon an individual philosopher, concept, or philosophical movement; e.g., Nietzsche, Continental political thought, Rawls and critics, theories of distributive justice, feminist theory. GE credit: AH, SS, WC, WE. Effective: 2016 Spring Quarter.

POL 120—Theories of International Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 003 recommended. Major contemporary approaches to the study of international politics, including balance of power, game theory, Marxist-Leninist theory, systems theory, and decision-making analysis. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 121—Scientific Study of War (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 003 recommended. Analysis of political processes involved in the initiation, conduct and termination of modern interstate warfare. GE credit: QL, SS, WE. Effective: 2016 Spring Quarter.

POL 122—International Law (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 003 recommended. Selected topics in international law; territory, sovereign immunity, responsibility, the peaceful settlement or nonsettlement of international disputes. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 123—The Politics of Interdependence (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 003 recommended. In the past several decades, growing economic interdependence has generated new problems in international relations. Course deals with difficulties in managing complex interdependence and its implication on national policies and politics. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 124—The Politics of Global Inequality (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 003 recommended. Analysis of current economic and political international relations resulting from a long standing division of the global system into rich and poor regions. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 126—Ethnic Self-Determination and International Conflict (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 003 recommended. Compares the claims of the state and ethnic peoples in countries undergoing internal conflicts; e.g., South Africa, Northern Ireland. Analyzes the role of the international community in facilitating the peaceful resolution of conflicts. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 129—Special Studies in International Politics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): POL 003 recommended. Intensive examination of one or more special problems in international politics. May be repeated once for credit when different topic is studied. May be repeated up to 1 time(s). GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 130—Recent U.S. Foreign Policy (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 003 recommended. Broad survey of the development of U.S. foreign policy in twentieth century with emphasis on transformation of policy during and after World War II, and the introduction to analytic tools and concepts useful for understanding of current foreign policy issues. GE credit: ACGH, SS, WE. Effective: 2016 Spring Quarter.

POL 131—Analysis of U.S. Foreign Policy (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. POL 003 recommended. Detailed presentation and examination of the formulation of execution of U.S. foreign policy. Survey of numerous factors influencing policy outcomes and how such determinants vary according to policy issue areas. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 132—National Security Policy (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 003 recommended. Development of national security policies since 1945. Analysis of deterrence and assumptions upon which it is based. Effects of nuclear weapons upon conduct of war, alliance systems, and the international system. Prospects of security and stability through arms control. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 134—Africa and U.S. Foreign Policy (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. POL 003 recommended. Overview of American foreign policy toward Africa. Relationship to global adversaries. Legacies of colonialism. Challenge of national self-determination and white racism. Policies on non-alignment, producer cartels, multinational corporations, continental integration and trade and aid relations. Effective: 2016 Spring Quarter.

POL 135—International Politics of the Middle East (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 003 recommended. International politics of the Middle East as a microcosm of world politics. The Middle East as a regional system. Domestic and International Politics in the Middle East. Changing Political Structures in the Middle East. Superpower involvement in the Middle East. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 136—The Arab-Israeli Conflict (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 003 recommended. Causes, course, and implications of Arab-Israeli conflict. Competing Israeli and Arab narratives, politics of force, diplomacy. Domestic politics and A-I conflict, the superpowers and the A-I conflict, A-I conflict and world politics, potential solutions. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 137—International Relations in Western Europe (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 003 recommended. Analysis of European unity, problems of the Atlantic alliance, Atlantic political economy, East-West relations, communism in Western Europe and the relationship between domestic politics and foreign policy. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 139—Special Studies in Foreign Policy (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. POL 003 recommended. Extensive examination of one or more special problems in foreign policy. May be repeated up to 1 time(s) when topic differs. Effective: 2016 Spring Quarter.

POL 140A—Comparative Political Institutions: Electoral Systems (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 002 recommended. Workings of electoral institutions, focusing on systems used to elect presidents and assemblies, pass laws, and generally make decisions. Examples from systems throughout the world, including cases from both the advanced industrial and developing worlds. GE credit: QL, SS, WE. Effective: 2016 Spring Quarter.

POL 140B—Comparative Political Institutions: Parties (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 002 recommended. Factors shaping political parties and their role in democratic representation. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 140C—Comparative Political Institutions: Legislatures (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 002 recommended. Examination of legislatures from a comparative perspective. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 140D—When Institutions Fail (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 002 recommended. Examination of factors contributing to the success and failure of political institutions. GE credit: QL, SS, WE. Effective: 2016 Spring Quarter.

POL 140E—Policy-Making Processes (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 002 recommended. Comparative analysis of policy-making in the U.S. and other countries. GE credit: QL, SS, WE. Effective: 2016 Spring Quarter.

POL 142A—Comparative Development: Political Development in Modernizing Societies (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 002 recommended. Nature and sequence of political development; its economic and social concomitants; role of elites, military, bureaucracy, and party systems; social stratification and group politics; social mobilization and political participation; instability, violence, and the politics of integration. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 142B—Comparative Development: Politics and Inequality (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 002 recommended. Linkages between politics and the distribution of social and economic goods. Impact of civil rights legislation, the politics of welfare states, and the effects of political participation on the distribution of goods. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 142C—Comparative Political Development: Democracy and Democratization (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 002 recommended. Examination of conditions promoting democratization and democratic stability. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 143A—Latin American Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 002 recommended. Issues related to democratic consolidation in Latin America, with a regional focus on South America. Topics include transitions to democracy, the role of the military, political economy, and political behavior. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 143B—Mexican Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 002 recommended. Introduction to the politics of contemporary Mexico. Focus on rise, fall, and aftermath of Mexico's one-party dominant system. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 144A—Politics of Post-Communist Countries: East European Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 002 recommended. Post-war democratization, state-building and economic reform in East European states. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 144B—Politics of Post-Communist Countries: Russia (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 002 recommended. Democratization, state-building and economic reform; creation of new institutions; impacts of Soviet rule. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 146A—Politics of Africa: Issues in Contemporary African Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 002 recommended. African politics since the end of the Cold War. Topics include: Strategic Security Approach, Democratization, Human Rights, HIV/AIDS, African Peacekeeping, Terrorism, Religious and Ethnic Conflict, Debt and Stalled Development. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 146B—Politics of Africa: Development in Africa (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 002 recommended. Political and economic development within Sub-Saharan Africa. States and institutions, democracy, party systems, military coups/rule, bureaucracy/corruption, race/ethnicity, national/regional integrations, trade unions, economic development strategies, class formation, and women's roles and ideology. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 147A—West European Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 002 recommended. Evolution, politics, and contemporary problems of selected political systems of Western Europe. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 147B—West European Politics: British Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 002 recommended. Evolution, politics, and contemporary problems of Britain's political system. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 147C—West European Politics: French Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 002 recommended. Evolution, politics and contemporary problems of France's political system. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 147D—West European Politics: German Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 002 recommended. Evolution, politics and contemporary problems of Germany's political system. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 148A—Government and Politics of East Asia: China (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 002 recommended. Evolution of political institutions and political culture in China with emphasis on the post-1949 period. Primary attention to nationalism, modernization and political efficacy. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 148B—Government and Politics in East Asia: Japan (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 002 recommended. Japanese politics, with an emphasis on the postwar period. Particular emphasis on political parties, elections, political economy, and social problems. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 148C—Government and Politics in East Asia: Southeast Asia (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 002 recommended. Evolution of political institutions and economy of selected nations in Southeast Asia. Emphasis on imperialist legacy, nation building in multi-ethnic communities, and contrasts in economic performance. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 150—Judicial Politics and Constitutional Interpretation (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Politics of judicial policy making , issues surrounding constitutional interpretation and decision making, prerequisite for courses on the politics of constitutional law. GE credit: ACGH, DD, SS, WE. Effective: 2016 Spring Quarter.

POL 151—The Constitutional Politics of the First Amendment and the Right to Privacy. (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Constitutional politics surrounding such issues as the right to free expression, associational rights, the right to free exercise of religious beliefs and the right to privacy. GE credit: ACGH, DD, SS, WE. Effective: 2016 Spring Quarter.

POL 152—The Constitutional Politics of the Equality (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Constitutional politics of equality in the American political system; issues surrounding constitutional doctrine and judicial policymaking; special attention on racial and sexual equality. GE credit: ACGH, DD, SS, WE. Effective: 2016 Fall Quarter.

POL 153—The Constitutional Politics of the Justice System (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Constitutional politics of the American criminal justice system. Issues surrounding constitutional doctrine and judicial policymaking on issues such as search and seizure. Arrest, trial, incarceration and other issues of due process. GE credit: ACGH, DD, SS, WE. Effective: 2016 Spring Quarter.

POL 154—Legal Philosophy (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Analysis of the nature and functions of law; law as an instrument of social control and the relationship between law and morality. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 155—Judicial Process and Behavior (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Analysis of the behavior of judges and courts in the political process.
Techniques of judicial decision making. Relationships among courts and other decision-making bodies. GE credit: ACGH, SS, WE. Effective: 2016 Spring Quarter.

POL 160—American Political Parties (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Analysis of the structured operations of the party system in the United States; party functions and organizations, nomination processes, campaigns and elections, party trends and reforms. GE credit: ACGH, DD, QL, SS, WE. Effective: 2016 Fall Quarter.

POL 162—Elections and Voting Behavior (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Analysis of American elections and partisan behavior; political socialization, political participation, partisanship and individual and group determinants of voting. GE credit: ACGH, DD, SS, WE. Effective: 2016 Spring Quarter.

POL 163—Group Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Groups, institutions and individuals, especially in American politics. Historical and analytical treatment of group theories as applied to interest groups (especially labor, business, agriculture, science, military); to racial, ethnic and sectional groups; to parties, public and legislative groups, bureaucracies. GE credit: ACGH, DD, SS, WE. Effective: 2016 Spring Quarter.

POL 164—Public Opinion (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 001 recommended. Nature of public opinion in America as it is supposed to be and as it is. Distribution of opinions among different publics and the significance of that distribution for system stability and institutions. Opinion polling and its problems. GE credit: ACGH, DD, SS, WE. Effective: 2016 Spring Quarter.

POL 165—Mass Media and Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Organization of and decision making within the media; media audiences and the effect of the media on attitudes and behavior; the relationship of the government to the media (censorship, secrecy, freedom of the press, government regulation);the media in election campaigns. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 166—Women in Politics (4)
Discussion—1 hour; Lecture—3 hours; Seminar—1 hour. Prerequisite(s): POL 001 recommended. Role of women in American politics. Historical experiences; contemporary organizations and strategies; areas of legislative concern; the impact of differences in social class, race, and ethnicity upon the involvement of women in politics. GE credit: ACGH, DD, SS, WE. Effective: 2016 Fall Quarter.

POL 168—Chicano Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Political aspects of Chicano life in America; examines the Chicano's political role as it has been historically defined by different groups in society and the Chicano's responses to his/her political environment. GE credit: ACGH, DD, SS, WE. Effective: 2016 Spring Quarter.

POL 170—Political Psychology (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Overview to the growing literature on political psychology. Introduction to how psychological concepts (personality, attitudes, stereotypes, heuristics, affect, identity, group dynamics) help us understand how citizens think about politics. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 171—The Politics of Energy (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Nature and performance of political processes for making energy choices at the international, national and state levels. Interaction of energy policy with other political goals and the ability of governmental institutions to overcome constraints on policy innovation. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 172—American Political Development (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Systematic analysis of contemporary issues in American political development: historical determinants of political change; the timing and character of institutional development; conditions for successful political action. Democratization, cultural change, party formation, state-building, constitutionalism, race relations. GE credit: ACGH, DD, SS, WE. Effective: 2016 Spring Quarter.

POL 174—Government and the Economy (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Political basis of economic policy (taxation, spending and regulation); impact of prices, employment and growth on political demands; elite responses to economic conditions; policy alternatives and the public interest. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 175—Science, Technology, and Policy (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 001 recommended. Analysis of policymaking for science and the use of scientific expertise for making decisions about technology. Topics include funding of basic research, relationship of science to technological development, science and military policy, technological risks, technology assessment and scientists and politics. GE credit: QL, SS, WE. Effective: 2016 Spring Quarter.

POL 176—Racial Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Race, racial attitudes and racial policies in the United States with a specific emphasis on African Americans. GE credit: ACGH, DD, SS, WE. Effective: 2016 Spring Quarter.

POL 179—Special Studies in Comparative Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 002 recommended. Intensive examination of one or more special problems appropriate to comparative politics. Coverage is given to formal and informal political institutions, economically developing and developed countries, and non-democratic, democratic, and democratizing countries. May be repeated up to 1 time(s). GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 180—Bureaucracy in Modern Society (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 001 or POL 002 recommended. Role of bureaucracy in a complex society, with emphasis upon changing relationships between government and the economy; consequences of rapid technological and social change for bureaucratic structures and processes; the problems of reconciling expertise and democracy and increasing the responsiveness of public bureaucracy. GE credit: ACGH, SS, WE. Effective: 2016 Spring Quarter.

POL 183—Administrative Behavior (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Implications for American public administration of evolving concepts about behavior in organizations. GE credit: ACGH, SS, WE. Effective: 2016 Spring Quarter.

POL 187—Administrative Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 004 recommended. Historical and critical analysis of the principal theories of organization and management of public agencies in light of such concepts as decision making, bureaucracy, authority and power, communication and control; examination of role of government bureaucracies in the total society. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 190—International Relations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 003 recommended. Analysis and evaluation of substantive issues in contemporary international relations. Readings drawn from current academic and non-academic periodicals. GE credit: SS, WE. Effective: 2016 Fall Quarter.

POL 192A—Internship in Public Affairs (5)
Variable. Prerequisite(s): Enrollment dependent on availability of intern positions with highest priority assigned to students with Political Science Public Service major; upper division standing. Supervised internship and study in political, governmental, or related organizations. (P/NP grading only.) GE credit: ACGH, SS, WE. Effective: 1997 Winter Quarter.

POL 192B—Internship in Public Affairs (5)
Variable. Prerequisite(s): POL 192A; Enrollment dependent on availability of intern positions with highest priority assigned to students with Political Science-Public Service major; upper division standing. Supervised internship and study in political, governmental, or related organizations. (P/NP grading only.) GE credit: ACGH, SS, WE. Effective: 1997 Winter Quarter.

POL 193—Research in Practical Politics (2)
Project (Term Project)—6 hours. Prerequisite(s): POL 192A; POL 192B; Open only to Political Science-Public Service majors, for whom it is required. Supervised preparation of an extensive paper relating internship experience to concepts, literature, and theory of political science. GE credit: SS, WE. Effective: 1997 Winter Quarter.

POL 193W—Washington Center Research Seminar (4)
Independent Study—3 hours; Lecture/Discussion—1 hour; Tutorial—0.5 hours. Prerequisite(s): POL 192W (can be concurrent); POL 192W required concurrently. Core academic component of Washington Program. Topics coordinated with internships. Research draws on resources uniquely available in Washington, DC. Supervised preparation of extensive paper. (Same course as UC Davis Washington Center 193.) GE credit: OL, SS, WE. Effective: 2002 Spring Quarter.

POL 194HA—Special Study for Honors Students (4)
Independent Study—2 hours; Seminar—2 hours. Prerequisite(s): Major in Politcal Science with upper division standing and a GPA of 3.500 in the major. Directed reading, research and writing culminating in preparation of a senior honors thesis under the direction of faculty advisor. GE credit: OL, SS, VL, WE. Effective: 2002 Fall Quarter.

POL 194HB—Special Study for Honors Students (4)
Independent Study—2 hours; Seminar—2 hours. Prerequisite(s): Major in Political Science with upper division standing and a GPA of 3.500 in the major. Directed reading, research and writing culminating in preparation of a senior honors thesis under the direction of faculty advisor. GE credit: OL, SS, VL, WE. Effective: 2002 Fall Quarter.

POL 195—Special Studies in American Politics (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Intensive examination of one or more special problems appropriate to
American politics. May be repeated up to 1 time(s) when topic differs. GE credit: ACGH, SS, WE. Effective: 1997 Winter Quarter.

POL 196A—Seminar in American Politics (4)
Seminar—3 hours; Term Paper—1 hour. Prerequisite(s): Upper division Political Science majors or consent of instructor. Intensive reading, discussion, research, writing in American politics. Topics may include Congress, the Presidency, the Supreme Court, federalism, voting behavior, interest groups, ethnic groups or other topics with a more specialized content than normal course offerings. May be repeated up to 1 time(s) when topic differs. GE credit: ACGH, SS, WE. Effective: 2002 Fall Quarter.

POL 196B—Seminar in Comparative Politics (4)
Seminar—3 hours; Term Paper—1 hour. Prerequisite(s): Upper division Political Science majors or consent of instructor. Intensive reading, discussion, research, writing in comparative politics. Topics may include one country or geographical area, political institutions or behavior across countries, political development, or other topics that are more specialized than normal course offerings. May be repeated up to 1 time(s) topic differs. GE credit: SS, WE. Effective: 2002 Fall Quarter.

POL 196C—Seminar in International Relations (4)
Seminar—3 hours; Term Paper—1 hour. Prerequisite(s): Upper division Political Science majors or consent of instructor. Intensive reading, discussion, research, writing in international relations including study of international political institutions (UN, EU, or NATO) or interstate relations (war, trade, immigration) and other topics with more specialized content than normal course offerings. May be repeated up to 1 time(s) topic differs. GE credit: SS, WE. Effective: 2002 Fall Quarter.

POL 196D—Seminar in Political Theory (4)
Seminar—3 hours; Term Paper—1 hour. Prerequisite(s): Upper division Political Science majors or consent of instructor. Intensive reading, discussion, research, writing in political theory. Topics may include study of a single political thinker, a group of related thinkers, development of political concepts, or other topics with more specialized content than normal course offerings. May be repeated up to 1 time(s) topic differs. GE credit: SS, WE. Effective: 2002 Fall Quarter.

POL 196E—Seminar in Research Methods (4)
Seminar—3 hours; Term Paper—1 hour. Prerequisite(s): Upper division Political Science majors or consent of instructor. Intensive reading, discussion, research, and writing in selected topics in Research Methods such as research design, statistics, game theory, etc. May be repeated up to 1 time(s) topic differs. GE credit: QL, SS, VL, WE. Effective: 2002 Fall Quarter.

POL 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Fall Quarter.

POL 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

POL 201—Urban Government and Politics (4)
Seminar—4 hours. Survey and analysis of the literature in the field of local government and politics in the United States. Approaches to the study of political
reform, local autonomy, community power, representation, expertise, service delivery, policymaking and political change. Effective: 1997 Winter Quarter.

POL 202—American State Government and Politics (4)
Seminar—4 hours. Survey and analysis of the literature in the field of state government, politics, and policy. Approaches to the study of the American states as political systems, including their governing institutions and processes and their role in the Federal system. Effective: 1997 Winter Quarter.

POL 203A—American Government: The Presidency (4)
Seminar—3 hours; Term Paper. Restricted to graduate students only. Thorough overview of the current research on political executives, with particular emphasis on the American presidency. Two principal goals: the development of important and innovative student research programs; and adequate preparation for qualifying examinations. Effective: 2011 Spring Quarter.

POL 203B—American Government: Congress (4)
Seminar—3 hours; Term Paper. Restricted to graduate students only. Thorough overview of the current research on Congress, with particular emphasis on political representation. Two principal goals: the development of important and innovative student research programs; and adequate preparation for qualifying examinations. Effective: 2011 Spring Quarter.

POL 203C—American Government: Courts (4)
Seminar—4 hours. Survey and analysis of the literature in the field of American government with a focus on courts. Emphasis on the development and testing of theories of behavior and processes. Effective: 1997 Winter Quarter.

POL 207—Environmental Public Policy (4)
Seminar—4 hours. Analysis of the interface between the world of academic reflection about ecological and environmental problems and the world of political action. Evaluation of alternative approaches to policy analysis and recommendation. Individual research, including field research, will parallel discussion of the literature. Effective: 1997 Winter Quarter.

POL 208—Policy Analysis (4)
Seminar—4 hours. Social science techniques applied to public policy formation and evaluation. Effective: 1997 Winter Quarter.

POL 209—The American Political System (4)
Seminar—3 hours; Term Paper. Restricted to graduate students only. Analysis of selected theoretical and empirical issues posed by contemporary research in American government and politics. Effective: 2011 Spring Quarter.

POL 210—Research Design in Political Science (4)
Discussion/Laboratory—1 hour; Seminar—3 hours. Prerequisite(s): Graduate standing. Introduction to philosophy of science and research design for political science. Topics include: logic of empirical research, overview of research design approaches for political science research. Effective: 2006 Winter Quarter.

POL 211—Research Methods in Political Science (4)
Discussion/Laboratory—1 hour; Seminar—3 hours. Prerequisite(s): Graduate standing. Pass One open to graduate majors; Pass Two open to graduate students. Introductory seminar on the foundations of probability theory and mathematical statistics that are critical to empirical investigations in political science. Effective: 2015 Winter Quarter.

POL 212—Quantitative Analysis in Political Science I (4)
Discussion/Laboratory—1 hour; Seminar—3 hours. Prerequisite(s): POL 211 Pass One open to graduate majors; Pass Two open to graduate students. Seminar provides students with an introduction to the linear regression model. Students who complete the course will have a working knowledge of basic regression techniques and problems. Effective: 2015 Winter Quarter.

POL 213—Quantitative Analysis in Political Science II (4)
Seminar—3 hours; Term Paper. Prerequisite(s): POL 211; POL 212 Pass One open to graduate majors; pass 2 open to graduate students. More advanced topics in the use of statistical methods, with emphasis on political applications. Topics include: properties of least squares estimates, problems in multiple regression, and advanced topics (probit analysis, simultaneous models, time-series analysis, etc.). Effective: 2011 Fall Quarter.

POL 214A—Research in Political Science (4)
Discussion—2 hours; Lecture—1 hour; Term Paper. Prerequisite(s): POL 213 Advanced level graduate students in the Department of Political Science only. Research seminar sequence required of all PhD students. Design, execution, and defense of an original piece of research in political science, culminating in a paper of publishable quality. Effective: 2004 Spring Quarter.

POL 214B—Research in Political Science (4)
Discussion—2 hours; Lecture—1 hour; Term Paper. Prerequisite(s): POL 212; POL 214A Advanced level graduate students in the Department of Political Science only. Research seminar sequence required of all PhD students. Design, execution, and defense of an original piece of research in political science, culminating in a paper of publishable quality. Effective: 2006 Winter Quarter.

POL 215—Introduction to Modeling Political Behavior (4)
Seminar—3 hours; Term Paper. Prerequisite(s): POL 211; POL 212 Pass One open to graduate majors; pass 2 open to graduate students. Introduction to formal and game theoretic analyses of politics. Students will learn basic game theory and modeling skills. We examine the benefits of modeling, and look at examples of formal analysis in a variety of political science sub-fields. Effective: 2011 Fall Quarter.

POL 216—Qualitative Research Methods (4)
Seminar—3 hours; Term Paper—1 hour. Methodology for utilizing theoretically-oriented case studies and controlled comparison of a small number of cases to develop and test theories. Examination of how the case study method compliments experimental, statistical and deductive modes of research. Effective: 2000 Winter Quarter.

POL 217—Social Choice Theory and Spatial Modeling (4)
Seminar—4 hours. Introduction to social choice theory and formal spatial modeling including Arrows Theorem, the paradox of voting, cycling and agenda control. Focus on mastering modeling techniques as well as interpretation of classic works. Effective: 1998 Winter Quarter.

POL 218—Topics in Political Theory (4)
Seminar—3 hours; Term Paper. Topics vary and may be the work of a single theorist, time period, or political concept, such as justice. May be repeated up to 3 time(s) when topic differs. Effective: 2011 Fall Quarter.

POL 219A—Political Theory Sequence (4) ***Review all entries***
Seminar—3 hours; Term Paper. Survey of the great works in ancient and medieval political theory including such writers as Plato, Aristotle, Cicero, St. Augustine, Aquinas, Alfarabi and Marsilius. Discussion of various interpretations of these authors. Effective: 1997 Winter Quarter.

POL 219A—Political Theory Sequence (4) ***Review all entries***
Seminar—3 hours; Term Paper. Survey of the great works in ancient and medieval political theory including such writers as Plato, Aristotle, Cicero, St. Augustine, Aquinas, Alfarabi and Marsilius. Discussions of various interpretations of these authors. May be repeated for credit if topic differs. Effective: 2018 Fall Quarter.

POL 219B—Political Theory Sequence (4) ***Review all entries***
Seminar—3 hours; Term Paper. Survey of the great works in early modern to contemporary political theory including such writers as Machiavelli, Hobbes, Locke, Rousseau, Marx, Mill, Nietzsche, and Rawls. Discussion of various interpretations of these authors. Effective: 1997 Winter Quarter.

POL 219B—Political Theory Sequence (4) ***Review all entries***
Seminar—3 hours; Term Paper. Survey of the great works in early modern to contemporary political theory including such writers as Machiavelli, Hobbes, Locke, Rousseau, Marx, Mill, Nietzsche, and Rawls. Discussion of various interpretations of these authors. May be repeated for credit if topic differs. Effective: 2018 Fall Quarter.

POL 219C—Contemporary Political Theory (4)
Seminar—3 hours; Term Paper—1 hour. Survey of important works in contemporary political theory including such writers as Nietzsche, Heidegger, Arendt, Rawls, Nozick, Sandel. May be repeated for credit topic differs. Effective: 2004 Fall Quarter.

POL 220—Seminar in Political Theory (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Open to graduate students only. Introduction to political theory and current debates over its study. Readings from and textual interpretations of political theory including the Federalist Papers and major works by thinkers such as Plato, Aristotle, Machiavelli, Hobbes, Locke, Rousseau, and Rawls. Other readings addressing issues of textual interpretation. Effective: 2003 Fall Quarter.

POL 223—International Relations (4)
Seminar—3 hours; Term Paper. Effective: 1997 Winter Quarter.

POL 225—The International System (4)
Seminar—3 hours; Term Paper. Analysis of the international system by means of theory formulation and
integration; critique of research designs; use of various techniques of data generation and analysis. Effective: 1997 Winter Quarter.

POL 226—Seminar in International Political Economy (4)
Seminar—3 hours; Term Paper. Restricted to graduate students. Research in international political economy. Structure of the global economy, as well as specific dimensions of international economic relations, including trade, capital flows, global production structures, and migration. Effective: 2011 Spring Quarter.

POL 230—American Foreign Policy (4)
Seminar—3 hours; Term Paper. Effective: 1997 Winter Quarter.

POL 231—U.S. Political Culture and Foreign Relations (4)
Seminar—3 hours; Term Paper. Relates U.S. political culture to formulation of foreign policy. Analyzes American ideological preferences in historical perspective, contemporary public opinion, decision making and implementation. Concludes by examining linkages between foreign policy behavior and
democratic process. Effective: 1997 Winter Quarter.

POL 241—Communist Political Systems (4)
Seminar—4 hours. Prerequisite(s): or Consent of Instructor. Or the equivalent. Systematic analysis of selected topics dealing with the political process of communist political systems. Effective: 1997 Winter Quarter.

POL 242—Seminar in Comparative Politics (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Systematic survey of theories and methods used in the study of comparative politics. Effective: 1997 Winter Quarter.

POL 243—Comparative Institutional Change (4)
Seminar—3 hours; Term Paper. Restricted to graduate students. Comparison of institutional changes in countries of the former Soviet Union and Eastern Europe during the period of transition to democracy. Special attention to institutions of mass representation - electoral and party systems and national legislatures. Effective: 2011 Spring Quarter.

POL 246—Policymaking in Third-World Societies (4)
Seminar—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Included in an analysis of policymaking process in Third-World countries are such topics as political resources, institutional resources, decision making, resource allocations, planning, and budgeting, implementation, and distribution of world resources. Effective: 1997 Winter Quarter.

POL 250—Policy Development and Impact in U.S. Courts (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Thorough overview of the literature regarding courts as policymaking institutions of government, with emphasis on the formation and implementation of judicial policy. Differences and similarities across the judicial, congressional, and executive branch policy processes. Effective: 1997 Winter Quarter.

POL 260—Political Parties (4)
Seminar—3 hours; Term Paper. Survey of selected topics in American and comparative parties. Effective: 1997 Winter Quarter.

POL 261—Political Behavior (4)
Seminar—3 hours; Term Paper. Survey of selected topics in political behavior and public opinion. May be repeated up to 3 time(s) when topic differs. Effective: 2011 Fall Quarter.

POL 274—Political Economy (4)
Seminar—3 hours; Term Paper. Restricted to graduate students. Politics of economic policy as reflected in taxation, spending and regulation; impact of prices, employment, and growth on political demands; government responses to economic conditions; electoral politics and the political business cycle. Effective: 2011 Spring Quarter.

POL 279—Political Networks: Methods and Applications (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Structure of political networks, socio-matrices and affiliation networks; general networks characteristics: density, centralization, polarization, interdependence, dyadic and triadic characteristics: structural and role equivalence; subsets of networks: cliques, blocks and bloc modeling; characteristics of individuals in networks: centrality and prestige. Effective: 2007 Fall Quarter.

POL 280—Bayesian Methods: for Social and Behavioral Sciences (4)
Seminar—3 hours; Term Paper. Prerequisite(s): POL 212; Or equivalent to course. Pass One open to graduate majors only; Pass Two open to graduate students. Methodology seminar introducing Bayesian quantitative methods to issues and problems in political science and other social and behavioral sciences. Effective: 2011 Fall Quarter.

POL 281—Statistical Computing Issues in Political Science (4)
Discussion/Laboratory—1 hour; Seminar—3 hours. Prerequisite(s): POL 213; Or equivalent to course. Restricted to graduate standing. Methodology seminar introducing computing issues in empirical models for political science and other social and behavioral sciences. Effective: 2005 Fall Quarter.

POL 282—Advanced Modeling of Political Behavior (4)
Seminar—3 hours; Term Paper—1 hour. Prerequisite(s): POL 215; Or equivalent to course. Restricted to graduate standing or with instructors permission. Applications of formal theory to political science. Review of relevant contributions in other social sciences. Consideration of advanced techniques in game theory. Rational and behavioral approaches. Effective: 2005 Fall Quarter.

POL 283—Organizational Behavior (4)
Seminar—4 hours. Organizational behavior as it relates to public sector decision making. Effective: 1997 Winter Quarter.

POL 284—Advanced Network Analysis (4)
Seminar—3 hours; Term Paper. Prerequisite(s): POL 211; POL 212; POL 279 Exponential Random Graph Models (ERGMS) of networks, game theoretic models of network formation and network dynamics, diffusion processes, shocks and network collapse, percolation, cross-network spillover processes, social and political applications of advanced network models. Effective: 2013 Fall Quarter.

POL 290A—Research in American Government and Public Policy (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Restricted to graduate students. Special research seminar on problems and issues in the study of American government and public policy. May be repeated up to 6 time(s) if topic differs. Effective: 2011 Spring Quarter.

POL 290B—Research in Political Theory (4)
Lecture—3 hours; Term Paper. Restricted to graduate students only. Special research seminar on problems and issues in the study of political theory. May be repeated up to 6 time(s) if topic varies. Effective: 2010 Spring Quarter.

POL 290C—Research in International Relations (4)
Lecture—3 hours; Term Paper. Restricted to graduate students only. Special research seminar on select problems and issues in the study of international relations. May be repeated up to 6 time(s) if topic varies. Effective: 2010 Spring Quarter.

POL 290D—Research in Judicial Politics (4)
Seminar—4 hours. Prerequisite(s): Graduate standing in Political Science or consent of instructor. Contemporary research on judicial politics, judicial institutions, jurisprudence, and judicial behavior. Effective: 1997 Winter Quarter.

POL 290E—Research in Political Parties, Politics, and Political Behavior (4)
Seminar—4 hours. Special research seminar on selected problems and issues in the study of political parties, politics, and political behavior. Effective: 1997 Winter Quarter.

POL 290F—Research in Comparative Government and Policy (4)
Lecture—3 hours; Term Paper. Restricted to graduate students only. Special research seminar on select problems and issues in the study of comparative government and policy. May be repeated up to 6 time(s) if topic varies. Effective: 2010 Spring Quarter.

POL 290G—Research in Methodology (4)
Lecture—3 hours; Term Paper. Prerequisite(s): POL 212 Special research seminar on selected problems and issues in methods in political science. May be repeated up to 3 time(s) topics vary. Effective: 2005 Fall Quarter.

POL 297—Internships in Political Science (2)
Seminar—2 hours. Prerequisite(s): Open only to persons who have internships or other positions in governmental agencies, political parties, etc. Application and evaluation of theoretical concepts through work experience or systematic observation in public and political agencies. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

POL 298—Group Study (1-5)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

POL 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

POL 299D—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

POL 390—The Teaching of Political Science (1)
Seminar—1 hour. Prerequisite(s): Graduate student standing in Political Science. Methods and problems of teaching political science at the undergraduate
level. (S/U grading only.) Effective: 1997 Winter Quarter.

POL 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Political Science | IRE Courses

Courses in IRE:

IRE 001—Global Interdependence (4)
Discussion—1 hour; Lecture—3 hours. Development of the concept of global interdependence along its
political, economic, demographic, cultural, technological, and environmental dimensions. Focus on the ways societies and states interact. Course provides the foundation for upper division multidisciplinary work in international relations. GE credit: SS, WE. Effective: 1997 Winter Quarter.

IRE 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

IRE 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

IRE 104—The Political Economy of International Migration (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, SOC 003, or SOC 004 recommended. Analysis of worldwide migration patterns, and social scientific theories of international and transnational migration. Focus in economical, political, and social impact of immigration and potential for international and regional cooperation. (Sociology 104.) GE credit: SS, WC. Effective: 2016 Fall Quarter.

IRE 190—Topics in International Relations (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Selected topics in international relations. Variable content. May be repeated for credit when topic differs. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

IRE 192—International Relations Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Work experience in international relations, with term paper summarizing the practical experience of the student. (P/NP grading only.) GE credit: SS, WE. Effective: 1997 Winter Quarter.

IRE 194HA—Special Study for Honors Students (4)
Seminar—2 hours; Term Paper. Prerequisite(s): Open only to majors of senior standing who qualify for Honors Program. Directed reading, research, and writing on topics selected by students and instructor culminating in preparation of a senior honors thesis under direction of a faculty advisor. GE credit: OL, SS, WE. Effective: 1997 Winter Quarter.

IRE 194HB—Special Study for Honors Students (4)
Seminar—2 hours; Term Paper. Prerequisite(s): Open only to majors of senior standing who qualify for Honors Program. Directed reading, research, and writing on topics selected by students and instructor culminating in preparation of a senior honors thesis under direction of a faculty advisor. GE credit: OL, SS, WE. Effective: 1997 Winter Quarter.

IRE 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

IRE 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

Population Biology (Graduate Group)

Population Biology (Graduate Group) | PBG Information

Alan M. Hastings, Ph.D., Chairperson of the Group (term ends 6/30/2018)

Group Office. 2320 Storer Hall; 530-752-1274; http://www.eve.ucdavis.edu/eve/pbg/

Faculty. http://www.eve.ucdavis.edu/eve/pbg/People_Faculty.html

Population Biology (Graduate Group) | PBG M.S.

Alan M. Hastings, Ph.D., Chairperson of the Group (term ends 6/30/2018)

Group Office. 2320 Storer Hall; 530-752-1274; http://www.eve.ucdavis.edu/eve/pbg/

Faculty. http://www.eve.ucdavis.edu/eve/pbg/People_Faculty.html

Graduate Study. The Graduate Group in Population Biology emphasizes programs of study and research leading to the Ph.D. degree. The Group concentrates on population biology as the broad discipline that blends ecology, evolution, population genetics and systematics into a unified field. The course curriculum consists of first-year core courses offered by the Group faculty, seminars, and advanced courses in population biology, and related disciplines, chosen in consultation with a guiding committee.

The Master of Science degree is offered only en route to the Ph.D.

Graduate Advisor. Consult the Population Biology Graduate Group office or website.

Population Biology (Graduate Group) | PBG Ph.D.

Alan M. Hastings, Ph.D., Chairperson of the Group (term ends 6/30/2018)

Group Office. 2320 Storer Hall; 530-752-1274; http://www.eve.ucdavis.edu/eve/pbg/

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Graduate Advisor. Consult the Population Biology Graduate Group office or website.

Population Biology (Graduate Group) | PBG Courses

Courses in PBG:

PBG 200A—Principles of Population Biology (5)
Discussion—2 hours; Lecture—3 hours. Prerequisite(s): PBG 231 (can be concurrent); and Consent of Instructor. PBG 231 required concurrently. Principles of single-species ecology and evolution. Topics include ecology of individuals, population growth models, structured populations, life history strategies, stochastic populations, basic population genetics theory, deleterious alleles in natural populations,
and molecular population genetics. Effective: 1997 Winter Quarter.

PBG 200B—Principles of Population Biology (6)
Discussion—1 hour; Lecture—5 hours. Prerequisite(s): PBG 200A; PBG 231 Principles of multi-species communities. Topics include competition, mutualism, metapopulations, food webs and trophic cascades, interactions between simple ecological communities, island biogeography, succession, and large-scale patterns. Effective: 1998 Winter Quarter.

PBG 200C—Principles of Population Biology (6)
Discussion—1 hour; Lecture—5 hours. Prerequisite(s): PBG 200B Principles of microevolution and macroevolution. Topics include evolutionary quantitative genetics, analysis of hybrid zones, speciation, the fossil record, biogeography, and phylogeny reconstruction. Effective: 1998 Spring Quarter.

PBG 203—Advanced Evolution (3)
Discussion—2 hours; Lecture—1 hour. Prerequisite(s): Graduate standing. Adaptation and speciation, and biochemical and morphological evolution in plants and animals with emphasis on the appropriateness of different methods of analysis. Effective: 1997 Winter Quarter.

PBG 206—Ecology of Insect Parasitoids (4)
Lecture—3 hours; Seminar—1 hour. Prerequisite(s): Introductory animal ecology or behavior. Insect parasitoids will be investigated as model systems to address current topics in behavioral, population, and evolutionary ecology. Theory will be synthesized and critical empirical tests of ecological
hypotheses emphasized. Effective: 1997 Winter Quarter.

PBG 207—Plant Population Biology (3)
Discussion/Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): Advanced undergraduate ecology course (e.g., ESP 100, EVE 101, ENT 104, PLB 117), and advanced undergraduate course in genetics and/or evolution (e.g., BIS 101 or EVE 100). Introduction to theoretical and empirical research in plant population biology. Emphasis placed on linking ecological and genetic approaches to plant population biology. (Ecology 207) Effective: 2000 Winter Quarter.

PBG 212—Topics in INvertebrate Evolution (2)
Seminar—2 hours. Prerequisite(s): Graduate standing or consent of instructor; courses in evolutionary biology, systematics, and ecology highly recommended. Advanced seminar that critically examines problems relevant to evolutionary patterns among the invertebrates. May be repeated for credit when topic differs. (S/U grading only.) Effective: 1997 Winter Quarter.

PBG 221—Animal Behavior, Ecology and Evolution (3)
Lecture—3 hours. Prerequisite(s): NPB 102; EVE 100; EVE 101; and Consent of Instructor. Or the equivalent, graduate standing. The interface between animal behavior, ecology and evolution. New developments in behavioral ecology development and testing of hypotheses in this discipline. (Animal Behavior 221.) Effective: 2002 Winter Quarter.

PBG 224—Field Reconnaissance for Population Biologists (2)
Fieldwork—6 hours. Prerequisite(s): Graduate student in Population Biology, or consent of instructor. Biweekly field trips to acquaint students with plant and animal communities, biodiversity, and ecological and evolutionary research opportunities in northern and central California. May be repeated for
credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Fall Quarter.

PBG 225—Terrestrial Field Ecology (4)
Fieldwork—12 hours; Seminar—1 hour. Prerequisite(s): Introductory ecology and introductory statistics, or consent of instructor. A field course conducted over spring break and four weekends at Bodega
Bay emphasizing student projects. Ecological hypothesis testing, data gathering, analysis, and written and oral presentation of results will be stressed. (Ecology/Entomology 225) Effective: 1997 Spring Quarter.

PBG 231—Mathematical Methods in Population Biology (3)
Lecture—3 hours. Prerequisite(s): MAT 016C or MAT 021C; Or the equivalent. Mathematical methods used in population biology. Linear and nonlinear difference equation and differential equation models are studied, using stability analysis and qualitative methods. Partial differential equation models are introduced. Applications to population biology models are stressed. (Ecology 231) Effective: 1997 Winter Quarter.

PBG 233—Computational Methods in Population Biology (3)
Discussion/Laboratory—1 hour; Lecture/Lab—2 hours. Prerequisite(s): A course in theoretical ecology (e.g., ECL 231 or an equivalent to ESP 121 from your undergraduate institution) or consent of instructor; no programming experience required. Numerical methods for simulating population dynamics using the computational software package R. Emphasis placed on model formulation and development, theoretical concepts and philosophical principles to guide simulation efforts, model parameterization, and implementing simulations with R. (Ecology 233.) (S/U grading only.) Effective: 2013 Fall Quarter.

PBG 250A—Interdisciplinary Approaches to Biological Invasions (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing. An integrative consideration of biological invasions, including an overview of concepts from ecology, ecological theory, evolution, genetics, philosophy, and other areas. Emphasis on potential contributions of each area for interdisciplinary problem-solving. Effective: 2004 Fall Quarter.

PBG 250B—Interdisciplinary Approaches to Biological Invasions (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing. An integrative consideration of biological invasions, including an overview of concepts from history, sociology, communications, law, policy, management, and other areas. Emphasis on potential contributions of each area for interdisciplinary problem-solving. Effective: 2004 Fall Quarter.

PBG 251—Collaborative Project in Biological Invasions (3)
Discussion—1 hour; Project (Term Project). Prerequisite(s): PBG 250A; PBG 250B; and Consent of Instructor. Or equivalent courses. A year-long interdisciplinary collaborative project focusing on biological invasions, resulting in a paper or other suitable product presented at a symposium at the conclusion of the project. May be repeated up to 5 time(s). (S/U grading only.) Effective: 2004 Fall Quarter.

PBG 270—Research Conference in Evolutionary Biology (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Critical presentation and evaluation of current literature and ongoing research in evolutionary biology. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

PBG 271—Research Conference in Ecology (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Critical presentation and evaluation of current literature and ongoing research in ecology. Requirements include active participation in weekly discussions and the presentation of a paper or chapter once per quarter. May be repeated for credit. (Ecology 271.) (S/U grading only.) Effective: 2014 Winter Quarter.

PBG 287—Advanced Animal Behavior (2)
Seminar—2 hours. Prerequisite(s): NPB 102; (EVE 100; and Consent of Instructor. or ECL 101); or the equivalents; graduate standing; Consent of Instructor. Reading, reports and discussion on current topics in animal behavior, with a focus on topics that lie at the interface between animal behavior, ecology and evolution. May be repeated up to 2 time(s). (Animal Behavior 287.) Effective: 2002 Spring Quarter.

PBG 290—Seminar (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Seminars presented by visiting lecturers, UC Davis graduate students and faculty. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

PBG 290C—Research Conference in Population Biology (1)
Discussion—1 hour. Prerequisite(s): PBG 299 (can be concurrent); and Consent of Instructor. Graduate standing; PBG 299 required concurrently. Presentation and discussion of faculty and graduate student research in population biology. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

PBG 292—Topics in Ecology and Evolution (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Seminar presented by visiting lecturers, UC Davis faculty and graduate students. May be repeated for credit. May be repeated for credit. (Ecology 296) (S/U grading only.) Effective: 1997 Winter Quarter.

PBG 296—Seminar in Geographical Ecology (2)
Seminar—2 hours. Prerequisite(s): EVE 100 or EVE 101; or Consent of Instructor. Recent developments in theoretical and experimental biogeography, historical biogeography and related themes in systematics, the biology of colonizing species, and related topics. May be repeated for credit. (Geography 214.) (S/U grading only.) Effective: 2012 Fall Quarter.

PBG 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

PBG 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

Precision Agriculture Minor; Biological & Agricultural Engineering

Precision Agriculture Minor; Biological & Agricultural Engineering | Precision Agriculture Minor

(College of Agricultural and Environmental Sciences)

The Department of Biological and Agricultural Engineering offers a minor in Precision Agriculture, the latest farming concept that optimizes fertilizer, pesticide and water use, while minimizing environmental concerns.

Minor Requirements:

This minor acquaints students with recent developments and their applications to agriculture, in geographic information systems (GIS), global positioning systems (GPS), variable rate technologies (VRT), crop and soil sensors, and remote sensing. The minor prepares students for challenging positions in site-specific crop management as we enter the "information age" in agriculture.

Minor Advisors. S.K. Upadhyaya, D.K. Giles

Precision Agriculture **Units:** 18

ABT 150	Introduction to Geographic Information Systems	4
OR		
LDA 150	Introduction to Geographic Information Systems	4
ESM 186	Environmental Remote Sensing	5
AND		
ESM 186L	Environmental Remote Sensing Laboratory (Discontinued)	2

Choose nine or more units:

ABT 181N	Concepts and Methods in Geographic Information Systems	4
ABT 182	Environmental Analysis using GIS	4
PLS 100A	Metabolic Processes of Cultivated Plants	3
PLS 100AL	Metabolic Processes of Cultivated Plants Laboratory	2
PLS 100B	Growth and Yield of Cultivated Plants	3
PLS 100BL	Growth and Yield of Cultivated Plants Laboratory	2
PLS 100C	Environmental Interactions of Cultivated Plants	3
PLS 100CL	Environmental Interactions of Cultivated Plants Laboratory	2
PLS 110A	Principles of Agronomic Crop Production in Temperate and Tropical Systems (Discontinued)	3
PLS 110B	Management of Agronomic Crops in Temperate and Tropical Systems (Discontinued)	3
PLS 110BL (Nonexistent)		
PLS 110C	Crop Management Systems for Vegetable Production (Discontinued)	4
PLS 120	Applied Statistics in Agricultural Sciences	4
OR		
STA 100	Applied Statistics for Biological Sciences	4
ERS 186	Environmental Remote Sensing (Discontinued)	3
SSC 109	Sustainable Nutrient Management	4

Total: 18

Professional Writing Minor; University Writing Program

Professional Writing Minor; University Writing Program | Professional Writing Minor

(College of Letters & Science)

Carl Whithaus, Ph.D., Program Director

Program Office. 109 Voorhies Hall 530-752-6283; http://writing.ucdavis.edu

Faculty. http://writing.ucdavis.edu/people/ directory/faculty

The Program

The University Writing Program (UWP) offers writing courses and seeks to improve writing instruction across campus through a variety of programs. The UWP coordinates first year, intermediate, and advanced writing courses that satisfy college composition requirements and offers courses in writing across the curriculum, writing in specific disciplines, and writing in the professions. The Professional Writing Minor serves students from all majors who are planning careers as professional writers or editors, as well as those whose academic and professional careers demand advanced writing skills. The Program offers graduate courses in the teaching of writing and in composition theory, history, and research. The Designated Emphasis in Writing, Rhetoric, and Composition Studies offers Ph.D. students in affiliated programs the opportunity to prepare for leadership roles in writing research, teaching, and program administration. The UWP also administers the English Composition Examination, an alternative way to satisfy the advanced writing requirement. The UWP publishes an annual anthology of exemplary student writing, Prized Writing, and a journal for writing instructors, Writing on the Edge. The Writing in the Disciplines Workshop Program presents workshops on teaching writing for faculty and TAs and workshops on writing for students. The Writing Ambassadors Program trains advanced undergraduates and places them as interns in K-12 classrooms to improve writing instruction.

Professional Writing **Units:** 20

Choose one from each of the four groups:

Group A:

ENL 100NF	Creative Writing: Non-Fiction	4
UWP 101	Advanced Composition	4
UWP 102A	Writing in the Disciplines: Special Topics	4
UWP 102B	Writing in the Disciplines: Biology	4
UWP 102C	Writing in the Disciplines: History	4
UWP 102D	Writing in the Disciplines: International Relations	4
UWP 102E	Writing in the Disciplines: Engineering	4
UWP 102F	Writing in the Disciplines: Food Science and Technology	4
UWP 102G	Writing in the Disciplines: Environmental Writing	4
UWP 102H	Writing in the Disciplines: Human Development and Psychology	4
UWP 102I	Writing in the Disciplines: Ethnic Studies	4
UWP 102J	Writing in the Disciplines: Fine Arts	4
UWP 102K	Writing in the Disciplines: Sociology	4
UWP 102L	Writing in the Disciplines: Film Studies	4
UWP 102M	Writing in the Disciplines: Community and Regional Development	4

Group B:

UWP 104A	Writing in the Professions: Business Writing	4
UWP 104B	Writing in the Professions: Law	4
UWP 104C	Writing in the Professions: Journalism	4
UWP 104D	Writing in the Professions: Elementary and Secondary Education	4
UWP 104E	Writing in the Professions: Science	4
UWP 104F	Writing in the Professions: Health	4
UWP 104I	Writing in the Professions: Internships	4
UWP 104J	Writing in the Professions: Writing for Social Justice	4
UWP 104T	Writing in the Professions: Technical Writing	4
UWP 110	Specialized Genres in Professional Writing	4
UWP 111A	Specialized Topics in Journalism	4
UWP 111B	Specialized Topics in Journalism: Investigative Journalism	4
UWP 111C	Specialized Topics in Journalism: Science Journalism	4

Group C:

ANT 110	Language and Sociocultural Anthropology	4
ANT 120	Language and Culture	4
CLA 110	Origins of Rhetoric	4
CMN 101	Communication Theories	4
CMN 105	Semantic and Pragmatic Functions of Language (Discontinued)	4
CMN 152	Theories of Persuasion (Discontinued)	4
DES 145	History of Visual Communication	4
DES 149	Information Design: Principles and Practice	4
ENL 105	History of the English Language	4
ENL 106	English Grammar	4
OR		
LIN 106	English Grammar	4

OR		
UWP 106	English Grammar	4
ENL 164	Writing Science	4
OR		
STS 164	Writing Science	4
HIS 101	Introduction to Historical Thought and Writing	5
PHI 137A	Philosophy of Language: Theory of Reference	4
PHI 137B	Philosophy of Language: Truth and Meaning	4
PHI 137C	Philosophy of Language: Semantics and Pragmatics	4
TCS 191	Writing Across Media	4
UWP 101	Advanced Composition	4
UWP 112A	Introduction to Professional Editing	4
UWP 120	Rhetorical Approaches to Scientific and Technological Issues	4
UWP 121	History of Scientific Writing	4

Group D:

UWP 192	Internship in Writing	1-12
OR		
Equivalent.		

Additional units to achieve a total of 20 upper division units.
One additional course from Groups A, B, or C above.

Note: At least twelve units must be from University Writing Program courses.

Total: 20

Professional Writing Minor; University Writing Program | UWP Courses

Courses in UWP:

UWP 001—Expository Writing (4)
Lecture/Discussion—4 hours. Prerequisite(s): Completion of Entry-Level Writing Requirement. Composition, the essay, paragraph structure, diction, and related topics. Frequent writing assignments. Not open for credit to students who have taken courses 1 or 1Y or 1V. GE credit: AH, WE. Effective: 2010 Fall Quarter.

UWP 001V—Expository Writing (4)
Web Electronic Discussion—2 hours; Web Virtual Lecture—2 hours. Prerequisite(s): Completion of Entry-Level Writing Requirement. Composition, the essay, paragraph structure, diction, and related topics. Frequent writing assignments. Not open to students who have taken course 1 or 1Y. GE credit: AH, WE. Effective: 2013 Spring Quarter.

UWP 001Y—Expository Writing (4)
Lecture/Discussion—2 hours; Web Electronic Discussion—2 hours. Prerequisite(s): Completion of Entry-Level Writing Requirement. Composition, the essay, paragraph structure, diction, and related topics. Frequent writing assignments. Not open to students who have taken course 1 or 1V. GE credit: AH, WE. Effective: 2013 Fall Quarter.

UWP 010—Introduction to Professional Writing Studies (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Introduction to writing as an object of study and to theories and research in the field. Survey of how writing is created, disseminated, and used in private, public, and academic contexts. GE credit: AH, WE. Effective: 2018 Spring Quarter.

UWP 011—Popular Science and Technology Writing (4)
Discussion—1 hour; Lecture/Discussion—3 hours. Positioning of science and technology in society as reflected and constructed in popular texts. Topics include genre theory, demarcation, rhetorical figures, forms of qualitative and quantitative reasoning, and the epistemic role of popularization in science. GE credit: AH, WE. Effective: 2014 Winter Quarter.

UWP 012—Writing and Visual Rhetoric (4)
Discussion—1 hour; Lecture/Discussion—3 hours. Introduction to writing needs, conventions, and genres in design contexts. Emphasis on applying critical reading, analysis, and writing skills to designed products, such as graphics, visual communications, and clothes, and designed spaces, such as exhibitions and interior architecture. GE credit: AH, VL, WE. Effective: 2014 Fall Quarter.

UWP 013—Video Game Rhetorics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better Examination of video games as rhetorical texts whose meaning is produced through complex interplay of procedures, narratives, rules, and context. Writing about video games using critical perspectives and analytic methods. GE credit: AH, VL, WE. Effective: 2018 Spring Quarter.

UWP 018—Style in the Essay (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better Style, language, and structure in the essay. Analyzing style, developing a voice in writing, revising sentences, developing effective paragraphs and arguments, and writing with force and clarity. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 018—Style in the Essay (4) ***Review all entries Discontinued***
Lecture/Discussion—4 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better Style, language, and structure in the essay. Analyzing style, developing a voice in writing, revising sentences, developing effective paragraphs and arguments, and writing with force and clarity. GE credit: AH, WE. Effective: 2018 Fall Quarter.

UWP 019—Writing Research Papers (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better Critical reading, analysis, documentation, and writing research-based assignments. Formulation of research topics and development of effective arguments. Reading and writing assignments may focus on a single theme. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 019—Writing Research Papers (4) ***Review all entries Discontinued***
Lecture/Discussion—4 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better Critical reading, analysis, documentation, and writing research-based assignments. Formulation of research topics and development of effective arguments. Reading and writing assignments may focus on a single theme. GE credit: AH, WE. Effective: 2018 Fall Quarter.

UWP 020—Oral English for International Students (3)
Lecture/Discussion—3 hours. Open to non-native speakers of English with priority enrollment to international teaching assistants with qualifying placement exam scores. Intensive work in oral English for international students, to increase fluency, accuracy, and use of appropriate discourse strategies in academic settings (e.g., seminar, discussion, laboratory). Training in segmental features of English sounds, intonation, stress, non-verbal cues, and register. May be repeated for credit. (P/NP grading only.) Effective: 2018 Fall Quarter.

UWP 021—Introduction to Academic Reading and Writing for Multilingual Students (4)
Lecture/Discussion—4 hours. Pass One placed in the course via the English Language Placement Examination (ELPE) offered by the UWP; students receiving scores below 70 are placed in course 21, the first course in the sequence. Reading and writing paragraphs and short multi-paragraph texts for academic purposes. Suitable for students whose primary home language was not English. Effective: 2016 Fall Quarter.

UWP 022—Intermediate Academic Reading and Writing for Multilingual Students (4)
Lecture/Discussion—4 hours. Prerequisite(s): UWP 021 Pass One passed course 21 with C- or better OR a score of 70-79 on the English Language Placement Examination (ELPE) offered by the UWP. Reading and writing short multi-paragraph texts for academic purposes. Suitable for students whose primary home language was not English. Effective: 2016 Fall Quarter.

UWP 023—Advanced Academic Reading and Writing for Multilingual Students (4)
Lecture/Discussion—4 hours. Prerequisite(s): UWP 022 Pass One passed course 22 with a C- or better OR a score of 80-89 on the English Language Placement Examination (ELPE) offered by the UWP. Reading and writing source/research-based texts for academic purposes. Suitable for students whose primary home language was not English. Effective: 2016 Fall Quarter.

UWP 025—Academic Writing for ESL Students (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Writing skills necessary for upper division courses, including skills crucial to writing lab and project reports, summaries, critiques, abstracts, and responses to exam questions. Includes practice with the syntax, grammar, and vocabulary characteristics of academic writing. Not open for credit to students who have taken LIN 027. Effective: 2018 Spring Quarter.

UWP 026—Reading in Scientific and Technical Subjects for ESL Students (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Instruction and practice in reading scientific and technical texts. Techniques for comprehending and analyzing grammatical and organizational patterns. Notetaking skills, summarizing, vocabulary enrichment. Not open for credit to students who have taken LIN 028. (P/NP grading only.) Effective: 2018 Spring Quarter.

UWP 027—Persuasive Writing for Multilingual Students (4)
Lecture/Discussion—4 hours. Prerequisite(s): UWP 001; Or equivalent. Not open to students with C- (P) or better in courses 101, 102, and 104; class size limited to 18 students. Instruction in analyzing style of persuasive texts, using appropriate vocabulary, and applying English grammatical structures for argumentative purposes. Suitable for multilingual students desiring additional instruction in the linguistic and rhetorical features of persuasive English writing for academic purposes. GE credit: WE. Effective: 2016 Spring Quarter.

UWP 028—Persuasive Writing for Multilingual Students (4)
Lecture/Discussion—4 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better Instruction in analyzing style of persuasive texts, using appropriate vocabulary, and applying English grammatical structures in argumentation. Suitable for multilingual students desiring additional instruction in persuasive English writing. GE credit: AH, WE. Effective: 2017 Fall Quarter.

UWP 029—Research Writing for Multilingual Students (4)
Lecture/Discussion—4 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better Reading and writing effectively in various research genres across the disciplines. Suitable for multilingual students desiring additional instruction in the linguistic and rhetorical features of research writing in English for academic purposes. GE credit: AH, WE. Effective: 2017 Fall Quarter.

UWP 048—Style in the Essay (4)
Lecture/Discussion—4 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; or equivalent. Restricted to completion of UWP 001, or equivalent, with C- (P) or better. Principles of style, language, and structure in the essay. Analysis and development of voice and genre, including sentence revision for force and clarity, and development of effective paragraphs and essays. Not open for credit to students who have taken UWP 018. GE credit: AH, WE. Effective: 2018 Spring Quarter.

UWP 049—Writing Research Papers (4)
Lecture/Discussion—4 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; or equivalent. Restricted to completion of UWP 1, or equivalent, with C- (P) or better. Principles of research writing. Analysis and development of research topics and effective arguments, including critical reading, analysis, integration, and documentation of source material. Not open for credit to students who have taken UWP 019. GE credit: AH, WE. Effective: 2018 Fall Quarter.

UWP 092—Internship in Writing (1-12)
Internship—3-36 hours. Prerequisite(s): UWP 001 or UWP 001V or UWP 001Y or ENL 003 Internships in fields where students can practice their skills. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2018 Winter Quarter.

UWP 098—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): UWP 001 or UWP 001V or UWP 001Y or ENL 003; Or equivalent course; consent of instructor. May be repeated up to 2 time(s). (P/NP grading only.) GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 099—Special Study for Undergraduates (1-5)
Variable—1-5 hours. Prerequisite(s): UWP 001 or UWP 001V or UWP 001Y or ENL 003; Or equivalent course; consent of instructor. May be repeated up to 2 time(s). (P/NP grading only.) GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 100—Genre Theory and Professional Writing (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (UWP 001 or UWP 001V or UWP 001Y); UWP 010; Or the equivalent of UWP 001. Introduction to discipline of professional writing. Examination of writing as a social practice, using genre theory as a conceptual framework. Analysis of how genres function rhetorically in specific contexts and how social systems both shape and are shaped by genres. GE credit: AH, WE. Effective: 2018 Spring Quarter.

UWP 101—Advanced Composition (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or ENL 003 C- or better or NAS 005 C- or better; and upper division standing. Instruction in advanced principles of expository writing. Writing tasks within and beyond the University. Different writing modes, including narrative, analysis, explanation, argument, critique. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102A—Writing in the Disciplines: Special Topics (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to majors or to students concurrently enrolled in an upper division course in a specific academic discipline or interdisciplinary field. Advanced instruction in writing in that discipline and practice in effective styles of communication. May be repeated up to 1 time(s) if taken in conjunction with a different subject-matter course. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102B—Writing in the Disciplines: Biology (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to majors in a biological science or to students concurrently enrolled in an upper division biological science course. Advanced instruction in writing in biology. Not open for credit to students who have completed English 102B. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102C—Writing in the Disciplines: History (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to majors in history or to students concurrently enrolled in an upper division course accepted for the history major. Advanced instruction in writing in history. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102D—Writing in the Disciplines: International Relations (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to majors in international relations or to students concurrently enrolled in an upper division course accepted for the major. Advanced instruction in writing in international relations. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102E—Writing in the Disciplines: Engineering (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to upper division students in the College of Engineering and to students enrolled in an upper division engineering or computer science course for the major. Advanced instruction in writing in engineering. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102F—Writing in the Disciplines: Food Science and Technology (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to majors in food science and technology and to students concurrently enrolled in an upper division course in food science and technology. Advanced instruction in writing in food science and technology. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102G—Writing in the Disciplines: Environmental Writing (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to students with upper division coursework with an environmental focus. Advanced instruction in writing and practice in effective styles of communication in the fields of environmental study, policy, or advocacy. Not open for credit to students who have completed course 102A in the same academic field. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102H—Writing in the Disciplines: Human Development and Psychology (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to majors and minors or to students concurrently enrolled in an upper division course in Human Development or Psychology. Advanced instruction in writing and practice in effective styles of communication in Human Development and Psychology. Not open for credit to students who have completed course 102A in the same academic field. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102I—Writing in the Disciplines: Ethnic Studies (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to majors and minors in ethnic studies, or students with upper division coursework focusing on race and ethnicity. Advanced instruction in cross-disciplinary writing about race and ethnicity and practice in effective styles of communication. Not open for credit to students who have completed course 102A in the same academic field. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102J—Writing in the Disciplines: Fine Arts (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to majors and minors or to students concurrently enrolled in an upper division course in Art History, Art Studio, Design, Music, or Theater and Dance. Advanced instruction in writing about the arts and practice in effective styles of communication. Not open for credit to students who have completed course 102A in the same academic field. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102K—Writing in the Disciplines: Sociology (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to majors and minors in Sociology or to students concurrently enrolled in an upper division Sociology course. Advanced instruction in writing and practice in effective styles of communication in Sociology and related academic and professional fields. Not open for credit to students who have completed course 102A in the same academic field. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102L—Writing in the Disciplines: Film Studies (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to majors and minors or to students concurrently enrolled in an upper division course in Film Studies, Technocultural Studies, English, American Studies, or any other upper division course that includes the analysis and understanding of film as a medium. Advanced instruction in writing about film and practice in effective styles of communication. Not open for credit to students who have completed course 102A in the same academic field. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102M—Writing in the Disciplines: Community and Regional Development (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to upper division Community and Regional Development majors and minors or upper division students concurrently enrolled in an upper division Community and Regional Development course. Advanced instruction in writing in the Community and Regional Development discipline and practice in effective styles of communication. GE credit: ACGH, AH, WE. Effective: 2018 Winter Quarter.

UWP 102N—Writing in the Disciplines: Anthropology (4) ***Review all entries***
Lecture—3 hours; Term Paper. Prerequisite(s): UWP 001 C- or better; ENL 003 C- or better; COM 001 C- or better; COM 002 C- or better; COM 003 C- or better; COM 004 C- or better; NAS 005 C- or better; 4 or 5 on AP English Lit and Comp exam; or 6 or better on IB HL English Exam. Restricted to upper division standing; Anthropology Major or Minor. Advanced instruction in writing and practice in effective styles of communication in Anthropology and related academic and professional fields. GE credit: AH, WE. Effective: 2017 Winter Quarter.

UWP 102N—Writing in the Disciplines: Anthropology (4) ***Review all entries***
Lecture—3 hours; Term Paper. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; 4 or 5 on AP English Lit and Comp exam; or 6 or better on IB HL English Exam. Restricted to upper division standing; Anthropology Major or Minor. Advanced instruction in writing and practice in effective styles of communication in Anthropology and related academic and professional fields. GE credit: AH, WE. Effective: 2018 Summer Session 1.

UWP 104A—Writing in the Professions: Business Writing (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Effective communication in and for organizations, including businesses (corporations), government agencies, and non-profit organizations. Suitable for students entering careers that require substantial communications, such as management, public relations, and grant writing. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 104B—Writing in the Professions: Law (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Advanced principles of critical thinking, argumentation, and style, with special emphasis on their application in the legal profession. Suitable for students planning careers in law, business, administration, or management. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 104C—Writing in the Professions: Journalism (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Non-fiction for magazines and newspapers, with attention to style and language. Emphasis on research, interviewing, market analysis, and query letters. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 104D—Writing in the Professions: Elementary and Secondary Education (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Advanced expository writing in the contemporary American classroom. Strongly recommended for teaching credential candidates. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 104E—Writing in the Professions: Science (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing or enrollment in a graduate science curriculum. Writing abstracts, research proposals, scientific papers, other forms of scientific communication. Presenting data graphically. Primarily for students engaged in or planning careers in basic or applied research. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 104F—Writing in the Professions: Health (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Not open to students who have taken course 104FY. Advanced expository writing common in the health professions, emphasizing effective communication between the writer and different audiences. Topics relate to health, disability, and disease. Suitable for students planning careers in professions such as medicine, dentistry, physical therapy, optometry. Not open for credit to students who have taken course 104FY. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 104FY—Writing in the Professions: Health (4)
Extensive Writing; Lecture/Discussion—1.5 hours; Web Electronic Discussion—1.5 hours. Prerequisite(s): UWP 001 C- or better; UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Not open to students who have taken course 104F. Advanced expository writing common in the health professions, emphasizing effective communication between the writer and different audiences. Topics relate to health, disability, and disease. Suitable for students planning careers in professions such as medicine, dentistry, physical therapy, optometry. Not open for credit to students who have taken course 104F. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 104I—Writing in the Professions: Internships (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to students concurrently enrolled in an internship and to Contemporary Leadership minors. Advanced instruction in writing in the workplace, including public and private sectors, government agencies, profit and non-profit organizations. Collaborative work and practice in effective styles of communication. Not open for credit to students who have completed course 102A. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 104J—Writing in the Professions: Writing for Social Justice (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Advanced instruction in writing for Social Justice, using an interdisciplinary approach combining feminist, critical race, ethnic, cultural, and transnational studies; practice in techniques of research and styles of communication for diverse audiences. Suitable for activists in community organizing, non-profits, politics. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 104T—Writing in the Professions: Technical Writing (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Communicating effectively about technology and other technical subjects to varied audiences for varied purposes. Suitable for students entering professions that require communicating technical information to subject matter experts, managers, technicians, and non-specialists. Not open for credit to students who have taken course 104A prior to fall 2012. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 106—English Grammar (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): UWP 001 or UWP 001V or UWP 001Y or ENL 003 or LIN 001 or LIN 001Y; or Consent of Instructor. Survey of present-day English grammar as informed by contemporary linguistic theories. The major syntactic structures of English; their variation across dialects, styles, and registers; their development; and their usefulness in describing the conventions of English. (English 106 and Linguistics 106.) GE credit: AH. Effective: 2018 Winter Quarter.

UWP 110—Specialized Genres in Professional Writing (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Satisfaction of the upper division writing requirement. Restricted to upper-division students who have satisfied the upper-division writing requirement. Counts toward the writing minor. Instruction in the elements and practices of professional writing in specialized genres. May be repeated up to 2 time(s) when topic differs. GE credit: AH, WE. Effective: 2015 Winter Quarter.

UWP 111A—Specialized Topics in Journalism (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Satisfaction of the upper division writing requirement. Restricted to upper-division students with a strong interest in journalism. Counts toward the writing minor. Instruction in the elements and practices of advanced journalism. May be repeated up to 1 time(s) specialized journalism topic for each course differs. GE credit: AH, WE. Effective: 2009 Fall Quarter.

UWP 111B—Specialized Topics in Journalism: Investigative Journalism (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Satisfaction of the upper division writing requirement. Restricted to upper-division students with a strong interest in journalism; counts toward the writing minor. Instruction in the elements and practices of in-depth investigative journalism. GE credit: AH, WE. Effective: 2009 Fall Quarter.

UWP 111C—Specialized Topics in Journalism: Science Journalism (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Satisfaction of the upper division writing requirement. Restricted to upper-division students with a strong interest in journalism. Counts toward the writing minor. Instruction in the elements and practices of science journalism. GE credit: AH, WE. Effective: 2009 Fall Quarter.

UWP 112A—Introduction to Professional Editing (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Satisfaction of the upper-division writing requirement. Restricted to upper-division students who have satisfied the upper-division writing requirement; counts toward the writing minor, Group C: Theory, History, and Design. Introduction to general editing practices and principles, with an emphasis on professional editing in organizational contexts, including academia and the workplace. Extensive practice in copy, comprehensive, and collaborative editing. GE credit: AH, VL, WE. Effective: 2010 Fall Quarter.

UWP 120—Rhetorical Approaches to Scientific and Technological Issues (4)
Extensive Writing; Lecture/Discussion—3 hours. Restricted to upper division standing. Application of rhetorical theories to scientific issues. Topics include: Rhetorical dimensions of scientific knowledge-making; scientific voice; rhetorical figures in science; incommensurability and demarcation; epistemology, definition, and classification; science wars; models of scientific literacy and accommodation, and implications for risk communication. GE credit: AH, SE, SL, WE. Effective: 2015 Winter Quarter.

UWP 121—History of Scientific Writing (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Upper division standing. History of scientific writing from the 17th century to the present; origins and evolution of scientific genres; role of scientific writing in producing scientific knowledge; discursive differences between disciplines; emergence of English as a global language of science. GE credit: AH, SE, SL, WE. Effective: 2013 Fall Quarter.

UWP 190—Capstone Portfolio Seminar (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 100 Open to majors who have completed 135 units. Capstone course for majors. Synthesis and application of rhetorical concepts learned in the major. Development of professional digital and print portfolio for graduate school and career applications. Effective: 2016 Spring Quarter.

UWP 192—Internship in Writing (1-12)
Internship—3-36 hours. Prerequisite(s): UWP 001 or UWP 001V or UWP 001Y or ENL 003; or equivalent course; consent of instructor. Internships in fields where students can practice their skills. May be repeated up to 12 unit(s). (P/NP grading only.) GE credit: AH. Effective: 2018 Winter Quarter.

UWP 197T—Tutoring in Writing (1-5)
Tutorial—1-5 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Tutoring one-on-one or leading small voluntary discussion groups affiliated with a writing course. May be repeated up to 10 unit(s). (P/NP grading only.) GE credit: AH. Effective: 2005 Fall Quarter.

UWP 197TC—Community Tutoring in Writing (1-4)
Tutorial—1-4 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Field experience, with individuals or in K-12 classroom instruction, focusing on reading- and writing-to-learn strategies in any subject area. May be repeated up to 10 unit(s). (P/NP grading only.) GE credit: AH. Effective: 2005 Fall Quarter.

UWP 198—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): UWP 001 or UWP 001V or UWP 001Y or ENL 003; or equivalent course; consent of instructor. May be repeated up to 10 unit(s). (P/NP grading only.) GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 199—Special Study for Advanced Undergraduates (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: AH, WE. Effective: 2005 Fall Quarter.

UWP 220—Rhetorical Approaches to Genre Study (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Using genre theory and methods of analysis to understand and prepare to do research on different types of writing in varying academic and professional contexts. Emphasis on problems in organizational, professional, and/or interdisciplinary communication. Effective: 2015 Fall Quarter.

UWP 250—Writing Assessment (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Examines key testing and measurement concepts; the history of writing assessment; and relationships among writing tests and methods of teaching writing; the impacts of Information and Communication Technology (ICT), and how educational policies both drive and respond to writing assessments. Effective: 2011 Fall Quarter.

UWP 253—Writing Program Administration (4)
Extensive Writing; Lecture/Discussion—3 hours. Theories, models, and procedures of writing programs, primarily in higher education. Developmental, first-year, and advanced writing programs, writing centers, writing-across-the-curriculum programs, writing minors and majors, and graduate programs in rhetoric and composition. Effective: 2014 Fall Quarter.

UWP 255—Theory and Research in Response to Student Writing (4)
Discussion—3 hours; Extensive Writing; Extensive Writing/Discussion; Project (Term Project). Restricted to graduate standing. Intensive focus on the critical topic of response or feedback to student writers. Coverage of philosophy, theory, and empirical research on teacher written feedback, teacher-student writing conferences, peer response, and error correction. Effective: 2013 Fall Quarter.

UWP 270—Literacy and Technology (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Examines how the physical qualities of texts offer different affordances during production and reception; grounds these discussions in the development of literacy practices and writing technologies from ancient to contemporary; creates frameworks for research into literacy, teaching, and textual technologies. Effective: 2011 Fall Quarter.

UWP 271—Second Language Writing (4)
Extensive Writing; Project (Term Project); Seminar—3 hours. Prerequisite(s): Graduate standing. Restricted to graduate standing. Traces the history of second language writing theory and research on second language writers in a variety of academic and professional contexts. Emphasis on writer characteristics, texts, and contexts. Effective: 2013 Fall Quarter.

UWP 280—Journal Editing Workshop: Writing on the Edge (2)
Seminar—2 hours. Reading and critiquing manuscript submissions. Discussing relevant work in the field of writing studies. Applying principles of professional editing. Developmental editing, copy-editing, and typesetting of accepted manuscripts. Soliciting articles and communicating with contributors. Students encouraged to enroll both quarters. May be repeated for credit. (S/U grading only.) Effective: 2013 Fall Quarter.

UWP 298—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 2005 Fall Quarter.

UWP 299—Individual Study (1-12)
Workshop—1-12 hours. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 2005 Fall Quarter.

UWP 390—Theory and Practice of Teaching University-Level Composition (4)
Extensive Writing; Seminar—3 hours. Open to graduate students teaching course 1 in the fall quarter following this course. Examination of current theories and practices in teaching of writing. Practical application to undergraduate writing courses. Emphasis on designing assignments and class sequences, and responding to student writing. Examination of impact of cultural, technological and theoretical changes on composition pedagogy. Effective: 2013 Fall Quarter.

UWP 392—Teaching Expository Writing (2)
Discussion—2 hours. Prerequisite(s): UWP 390; Graduate standing, appointment as Teaching Assistant in the Composition Program; or the equivalent of UWP 390. Discussion of problems related to teaching expository writing at the university level, with special emphasis on teaching reading and writing skills and responding to student papers. (S/U grading only.) Effective: 2005 Fall Quarter.

UWP 395—Teaching Multilingual Writers (4)
Seminar—3 hours. Prerequisite(s): Graduate standing or advanced undergraduate standing. Recommended: UWP 390, LIN 1, ENL/LIN/UWP 106. Preparing teachers of university-level second language writers, whether in composition courses or courses in other disciplines with a substantial writing component. Suitable for graduate students and advanced undergraduates. Effective: 2017 Fall Quarter.

UWP 396—Teaching Assistant Training Practicum (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit for credit. (S/U grading only.) Effective: 2005 Fall Quarter.

Psychology

Psychology | PSC Information

(College of Letters and Science)

Susan Rivera, Ph.D., Chairperson of the Department

Department Office. 135 Young Hall; 530-752-1880; http://psychology.ucdavis.edu

Faculty. http://psychology.ucdavis.edu/directory-of-people/faculty#c4=all&b_start=0

Psychology | PSC A.B.

(College of Letters and Science)

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The Major Programs

The psychology program at UC Davis is broad and includes students and faculty with a variety of interests. The department has developed around five major areas of emphasis:

Perception, Cognition, and Cognitive Neuroscience (PCCN) involves the study of awareness and thought, and includes such topics as perception, learning, memory, language and cognition.

Biological Psychology covers a broad spectrum of topics including evolutionary, neurobiological, and molecular mechanisms of behavior.

Social-Personality Psychology involves the study of the individual in his or her social environment and includes such topics as personality and individual differences, emotions, stereotyping and prejudice, intergroup relations, the psychology of religion and psychological health and dysfunction.

Developmental Psychology involves the study of changes in behavioral, cognitive, emotional, and social abilities that occur throughout the lifespan. Typical and atypical development is examined using a variety of methods including behavioral, neuroimaging, and physiological assessments.

Quantitative Psychology involves the study of linear and nonlinear models, psychometrics, mixed-effects models, and dynamic models, including experimental design, analysis of variance, regression, multivariate analysis, latent growth models, time series models, and factor analytic models.

The department offers the Bachelor of Arts (A.B.) program for students interested in the liberal arts and the Bachelor of Science (B.S.) program geared for students with an interest in either biology or mathematics. The main objective of both programs is a broad introduction to the scope of contemporary psychology. In addition to completing a number of common core courses for their degree, students may take approved elective courses from a wide range of topics including Educational Psychology, Interpersonal Communication, and Psychological Anthropology, to name a few. The department strongly encourages students to become involved in individual research projects under the direction of faculty members and to participate in our internship program to broaden experience and understanding of the field of psychology.

Preparatory Requirements. Before declaring a major in Psychology, students must complete PSC 001 and PSC 041 with a combined grade point average of at least 2.500. Both courses must be taken for a letter grade. If a 2.500 GPA is not attained in these two courses, a 2.000 GPA in a minimum of three upper division Psychology courses is also acceptable for major declaration.

Career Alternatives. A degree in psychology provides broad intellectual foundations which are useful to the graduate for the development of careers in a variety of areas, including social work, teaching, business, management and counseling. An undergraduate education in psychology also provides excellent preparation for graduate study. Individuals with degrees in psychology may enter graduate programs to prepare for teaching, research, or clinical/counseling careers in

psychology, or may go on to professional schools for training in veterinary and human medicine, law, and many other professions.

Honors and Honors Program. In order to be eligible for high or highest honors in Psychology, the student must both meet the college criteria for honors and complete a research project involving a minimum of six units of course work over at least two quarters which represents an original analysis of data on psychological phenomena. Course 194HA-194HB or other approved courses can be used to satisfy the unit requirement. This project is to be written in thesis form and approved by the department. The quality of the thesis work will be the primary determinant for designating high or highest honors at graduation.

Graduate Study. The Department offers programs of study and research leading to the Ph.D. degree in psychology. Detailed information regarding graduate study may be obtained on our website.

Graduate Advisor. See http://psychology.ucdavis.edu/graduate.

Recommended for All Majors. Students who plan to do graduate work in any area of psychology are strongly encouraged to gain experience through research and internship activities.

Major Advisor. See staff advisors in 101 Young Hall; psychadvising@ucdavis.edu; 530-752-5104; http://psychology.ucdavis.edu/undergraduate/advising.

Preparatory Subject Matter **Units:** 17-20

PSC 001	General Psychology	4
OR		
PSC 001Y	General Psychology	4
OR		
The equivalent.		
PSC 041	Research Methods in Psychology	4
STA 013	Elementary Statistics	4
OR		
STA 100	Applied Statistics for Biological Sciences	4

Strongly recommended that PSC 041 and STA 013 or STA 100 be completed in the first year.

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
OR		
A combination of:		
BIS 010	Everyday Biology	4
AND		
Choose one:		
ANT 001	Human Evolutionary Biology	4
MCB 010	Introduction to Human Heredity	4
NPB 010	Elementary Human Physiology	3

Depth Subject Matter **Units:** 40

Choose two from two of the following four groups and one from the remaining two groups:

Group A:		
PSC 100	Introduction to Cognitive Psychology	4
OR		
PSC 100Y	Introduction to Cognitive Psychology	4

PSC 130	Human Learning and Memory	4
PSC 131	Perception	4
PSC 132	Language and Cognition	4
PSC 135	Cognitive Neuroscience: The Biological Foundations of the Mind	4
PSC 136	Psychology of Music	4

Group B:

PSC 101	Introduction to Biological Psychology	4
PSC 113	Developmental Psychobiology	4
PSC 121	Physiological Psychology	4
PSC 122	Advanced Animal Behavior	4
OR		
NPB 150	Advanced Animal Behavior	4
PSC 123	Hormones and Behavior	3
OR		
NPB 152	Hormones and Behavior	3
PSC 124	Comparative Neuroanatomy	3
OR		
NPB 124	Comparative Neuroanatomy	3
PSC 125	Behavioral Epigenetics	4
PSC 126	Health Psychology	4
PSC 137	Neurobiology of Learning & Memory	4
PSC 159	Gender and Human Reproduction	4

Group C:

PSC 151	Social Psychology	4
PSC 152	Social Cognition	4
PSC 154	Psychology of Emotion	4
PSC 158	Sexual Orientation and Prejudice	4
PSC 161	Psychology of the Self	4
PSC 162	Introduction to Personality Psychology	4
PSC 168	Abnormal Psychology	4

Group D:

PSC 140	Developmental Psychology	4
OR		
HDE 100A	Infancy and Early Childhood	4
OR		
HDE 100B	Middle Childhood and Adolescence	4

Students who have completed HDE 100A or HDE 100B prior to PSC 140 will receive two units of credit for PSC 140.

PSC 141	Cognitive Development	4
OR		
HDE 101	Cognitive Development	4
PSC 142	Social and Personality Development	4
OR		
HDE 102	Social and Personality Development	4

PSC 143	Infant Development	4
PSC 146	The Development of Memory	4
PSC 148	Developmental Disorders	4

Approved Electives **Units:** 16-18

Additional units chosen among Psychology courses and/or approved electives to achieve a total of 40 upper division units. See list of approved electives, below:

Any Psychology courses inside or outside Core Groups:

AAS 141	Psychology of the African American Experience	3
ANT 132	Psychological Anthropology	4
CHI 120	Chicana/ o Psychology	4
CHI 121	Chicana/ o Community Mental Health	4
CHI 122	Psychology Perspectives Chicana/o and Latina/o Family	4
CHI 123	Psychological perspectives on Chicana/o and Latina/o Children and Adolescents	4
CMN 120	Interpersonal Communication	4
CMN 122	Nonverbal Communication	4
CNS 100	Consumer Behavior	3
EDU 110	Educational Psychology: General	4
EXB 102	Introduction to Motor Learning and the Psychology of Sport and Exercise	4
HDE 100A	Infancy and Early Childhood	4
HDE 100B	Middle Childhood and Adolescence	4
HDE 100C	Adulthood and Aging	4
HDE 117	Longevity	4
HDE 163	Cognitive Neuropsychology in Adulthood and Aging	4
LIN 171	Introduction to Psycholinguistics	4
NPB 102	Animal Behavior	3
NPB 168	Neurobiology of Addictive Drugs	4
POL 170	Political Psychology	4
SOC 126	Social Interaction	4
SOC 135	Social Relationships	4
SOC 152	Juvenile Delinquency	4
SOC 171	Sociology of Violence and Inequality	4

Total: 57-60

Psychology | PSC B.S.

(College of Letters and Science)

Susan Rivera, Ph.D., Chairperson of the Department

Department Office. 135 Young Hall; 530-752-1880; http://psychology.ucdavis.edu

Faculty. http://psychology.ucdavis.edu/directory-of-people/faculty#c4=all&b_start=0

The Major Programs

The psychology program at UC Davis is broad and includes students and faculty with a variety of interests. The department has developed around five major areas of emphasis:

Perception, Cognition, and Cognitive Neuroscience (PCCN) involves the study of awareness and thought, and includes such topics as perception, learning, memory, language and cognition.

Biological Psychology covers a broad spectrum of topics including evolutionary, neurobiological, and molecular mechanisms of behavior.

Social-Personality Psychology involves the study of the individual in his or her social environment and includes such topics as personality and individual differences, emotions, stereotyping and prejudice, intergroup relations, the psychology of religion and psychological health and dysfunction.

Developmental Psychology involves the study of changes in behavioral, cognitive, emotional, and social abilities that occur throughout the lifespan. Typical and atypical development is examined using a variety of methods including behavioral, neuroimaging, and physiological assessments.

Quantitative Psychology involves the study of linear and nonlinear models, psychometrics, mixed-effects models, and dynamic models, including experimental design, analysis of variance, regression, multivariate analysis, latent growth models, time series models, and factor analytic models.

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Preparatory Requirements. Before declaring a major in Psychology, students must complete PSC 001 and PSC 041 with a combined grade point average of at least 2.500. Both courses must be taken for a letter grade. If a 2.500 GPA is not attained in these two courses, a 2.000 GPA in a minimum of three upper division Psychology courses is also acceptable for major declaration.

Career Alternatives. A degree in psychology provides broad intellectual foundations which are useful to the graduate for the development of careers in a variety of areas, including social work, teaching, business, management and counseling. An undergraduate education in psychology also provides excellent preparation for graduate study. Individuals with degrees in psychology may enter graduate programs to prepare for teaching, research, or clinical/counseling careers in psychology, or may go on to professional schools for training in veterinary and human medicine, law, and many other professions.

Honors and Honors Program. In order to be eligible for high or highest honors in Psychology, the student must both meet the college criteria for honors and complete a research project involving a minimum of six units of course work over at least two quarters which represents an original analysis of data on psychological phenomena. Course 194HA-194HB or other approved courses can be used to satisfy the unit requirement. This project is to be written in thesis form and approved by the department. The quality of the thesis work will be the primary determinant for designating high or highest honors at graduation.

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Recommended for All Majors. Students who plan to do graduate work in any area of psychology are strongly encouraged to gain experience through research and internship activities.

Major Advisor. See staff advisors in 101 Young Hall; psychadvising@ucdavis.edu; 530-752-5104; http://psychology.ucdavis.edu/undergraduate/advising.

Biological Emphasis **Units:** 102-110

Preparatory Subject Matter

PSC 001	General Psychology	4
OR		
PSC 001Y	General Psychology	4
OR		
The equivalent.		
PSC 041	Research Methods in Psychology	4
STA 013	Elementary Statistics	4
OR		
STA 100	Applied Statistics for Biological Sciences	4

Strongly recommended that PSC 041 and STA 013 or STA 100 be completed in the first year.

MAT 016A	Short Calculus	3
MAT 016B	Short Calculus	3
OR		
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
PHY 010	Topics in Physics for Nonscientists	4
OR		
PHY 010C	Physics of California	3
OR		
PHY 010CY	Physics of California	3
OR		
PHY 007A	General Physics	4
PHY 007B	General Physics	4
BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
BIS 002C	Introduction to Biology: Biodiversity and the Tree of Life	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 008A	Organic Chemistry: Brief Course	2
CHE 008B	Organic Chemistry: Brief Course	4
OR		
CHE 118A	Organic Chemistry for Health and Life Sciences	4
CHE 118B	Organic Chemistry for Health and Life Sciences	4
OR		
CHE 128A	Organic Chemistry	3
CHE 128B	Organic Chemistry	3

Depth Subject Matter

Seven Psychology courses distributed as specified:

Group A: choose two:

PSC 100	Introduction to Cognitive Psychology	4
OR		
PSC 100Y	Introduction to Cognitive Psychology	4

PSC 130	Human Learning and Memory	4
PSC 131	Perception	4
PSC 132	Language and Cognition	4
PSC 135	Cognitive Neuroscience: The Biological Foundations of the Mind	4
PSC 136	Psychology of Music	4

Group B: choose three:

PSC 101	Introduction to Biological Psychology	4
PSC 113	Developmental Psychobiology	4
PSC 121	Physiological Psychology	4
PSC 122	Advanced Animal Behavior	4
OR		
NPB 150	Advanced Animal Behavior	4
PSC 123	Hormones and Behavior	3
OR		
NPB 152	Hormones and Behavior	3
PSC 124	Comparative Neuroanatomy	3
OR		
NPB 124	Comparative Neuroanatomy	3
PSC 125	Behavioral Epigenetics	4
PSC 126	Health Psychology	4
PSC 137	Neurobiology of Learning & Memory	4
PSC 159	Gender and Human Reproduction	4

Group C: choose one:

PSC 151	Social Psychology	4
PSC 152	Social Cognition	4
PSC 154	Psychology of Emotion	4
PSC 158	Sexual Orientation and Prejudice	4
PSC 161	Psychology of the Self	4
PSC 162	Introduction to Personality Psychology	4
PSC 168	Abnormal Psychology	4

Group D: choose one:

PSC 140	Developmental Psychology	4
OR		
HDE 100A	Infancy and Early Childhood	4
OR		
HDE 100B	Middle Childhood and Adolescence	4

Students who have completed HDE 100A or HDE 100B prior to PSC 140 will receive two units of credit for PSC 140.

PSC 141	Cognitive Development	4
OR		
HDE 101	Cognitive Development	4
PSC 142	Social and Personality Development	4
OR		
HDE 102	Social and Personality Development	4

PSC 143	Infant Development	4
PSC 146	The Development of Memory	4
PSC 148	Developmental Disorders	4

Approved Electives

Additional units to achieve 40 upper division units chosen from Psychology courses and/or approved electives. See list of approved electives below.

BIS 101	Genes and Gene Expression	4
NPB 101	Systemic Physiology	5

Recommended coursework for those interested in Graduate Programs in Biological Psychology:

PSC 180B	Research in Psychobiology	4
PSC 199	Special Study for Advanced Undergraduates	1-5

On a Biological Psychology topic.

ANT 154A	The Evolution of Primate Behavior	5
ESP 110	Principles of Environmental Science	4
EVE 100	Introduction to Evolution	4
EVE 101	Introduction to Ecology	4

Quantitative Emphasis **Units:** 90-103

Preparatory Subject Matter

PSC 001	General Psychology	4
OR		
PSC 001Y	General Psychology	4

OR

The equivalent.

PSC 041	Research Methods in Psychology	4
STA 013	Elementary Statistics	4
OR		
STA 100	Applied Statistics for Biological Sciences	4

Strongly recommended that PSC 041 and STA 013 or STA 100 be completed in the first year.

MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
ECS 032A	Introduction to Programming	4
OR		
ECS 036A	Programming and Problem Solving	4
CHE 010	Concept of Chemistry	4
OR		
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
OR		
CHE 002AH	Honors General Chemistry	5
CHE 002BH	Honors General Chemistry	5

PHY 010	Topics in Physics for Nonscientists	4
OR		
PHY 010C	Physics of California	3
OR		
PHY 010CY	Physics of California	3
OR		
PHY 007A	General Physics	4
PHY 007B	General Physics	4

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
OR		
A combination of:		
BIS 010	Everyday Biology	4
AND		
Choose one:		
ANT 001	Human Evolutionary Biology	4
MCB 010	Introduction to Human Heredity	4
NPB 010	Elementary Human Physiology	3

Depth Subject Matter

Five Psychology courses, distributed as specified:

Group A: choose two:		
PSC 100	Introduction to Cognitive Psychology	4
OR		
PSC 100Y	Introduction to Cognitive Psychology	4
PSC 130	Human Learning and Memory	4
PSC 131	Perception	4
PSC 132	Language and Cognition	4
PSC 135	Cognitive Neuroscience: The Biological Foundations of the Mind	4
PSC 136	Psychology of Music	4
Group B: choose two:		
PSC 101	Introduction to Biological Psychology	4
PSC 113	Developmental Psychobiology	4
PSC 121	Physiological Psychology	4
PSC 122	Advanced Animal Behavior	4
OR		
NPB 150	Advanced Animal Behavior	4
PSC 123	Hormones and Behavior	3
OR		
NPB 152	Hormones and Behavior	3
PSC 124	Comparative Neuroanatomy	3
OR		
NPB 124	Comparative Neuroanatomy	3
PSC 125	Behavioral Epigenetics	4
PSC 126	Health Psychology	4
PSC 137	Neurobiology of Learning & Memory	4
PSC 159	Gender and Human Reproduction	4

Group C: choose one:

OR

PSC 151	Social Psychology	4
PSC 152	Social Cognition	4
PSC 154	Psychology of Emotion	4
PSC 158	Sexual Orientation and Prejudice	4
PSC 161	Psychology of the Self	4
PSC 162	Introduction to Personality Psychology	4
PSC 168	Abnormal Psychology	4

Group D: choose one:

PSC 140	Developmental Psychology	4
OR		
HDE 100A	Infancy and Early Childhood	4
OR		
HDE 100B	Middle Childhood and Adolescence	4

Students who have completed HDE 100A or HDE 100B prior to PSC 140 will receive two units of credit for PSC 140.

PSC 141	Cognitive Development	4
OR		
HDE 101	Cognitive Development	4
PSC 142	Social and Personality Development	4
OR		
HDE 102	Social and Personality Development	4
PSC 143	Infant Development	4
PSC 146	The Development of Memory	4
PSC 148	Developmental Disorders	4

PSC 103A	Statistical Analysis of Psychological Data	5

Choose one:

PSC 103B	Statistical Analysis of Psychological Data	5
PSC 104	Applied Psychometrics: An Introduction to Measurement Theory	4

Approved Electives

Additional units to achieve 40 upper division units chosen from Psychology courses and/or approve electives. See list of approved electives below.

Choose one sequence:

STA 106	Applied Statistical Methods: Analysis of Variance	4
STA 108	Applied Statistical Methods: Regression Analysis	4
OR		
STA 130A	Mathematical Statistics: Brief Course	4
STA 130B	Mathematical Statistics: Brief Course	4
OR		
STA 131A	Introduction to Probability Theory	4
STA 131B	Introduction to Mathematical Statistics	4

Approved Electives **Units:** 10-14

What is an elective: Any upper division Psychology courses from inside or outside the Core Groups or any of the courses below:

AAS 141	Psychology of the African American Experience	3
ANT 132	Psychological Anthropology	4
CHI 120	Chicana/ o Psychology	4
CHI 121	Chicana/ o Community Mental Health	4
CHI 122	Psychology Perspectives Chicana/o and Latina/o Family	4
CHI 123	Psychological perspectives on Chicana/o and Latina/o Children and Adolescents	4
CMN 120	Interpersonal Communication	4
CMN 122	Nonverbal Communication	4
CNS 100	Consumer Behavior	3
EDU 110	Educational Psychology: General	4
EXB 102	Introduction to Motor Learning and the Psychology of Sport and Exercise	4
HDE 100A	Infancy and Early Childhood	4
HDE 100B	Middle Childhood and Adolescence	4
HDE 100C	Adulthood and Aging	4
HDE 117	Longevity	4
HDE 163	Cognitive Neuropsychology in Adulthood and Aging	4
LIN 171	Introduction to Psycholinguistics	4
NPB 102	Animal Behavior	3
NPB 168	Neurobiology of Addictive Drugs	4
POL 170	Political Psychology	4
SOC 126	Social Interaction	4
SOC 135	Social Relationships	4
SOC 152	Juvenile Delinquency	4
SOC 171	Sociology of Violence and Inequality	4

Total: 90-110

Psychology | PSC M.A.

(College of Letters and Science)

Susan Rivera, Ph.D., Chairperson of the Department

Department Office. 135 Young Hall; 530-752-1880; http://psychology.ucdavis.edu

Faculty. http://psychology.ucdavis.edu/directory-of-people/faculty#c4=all&b_start=0

Graduate Study. The Department offers programs of study and research leading to the Ph.D. degree in psychology. Detailed information regarding graduate study may be obtained on our website.

The Master of Arts degree is offered only in route to the Ph.D.

Graduate Advisor. See http://psychology.ucdavis.edu/graduate.

Psychology | PSC Ph.D.

(College of Letters and Science)

Susan Rivera, Ph.D., Chairperson of the Department

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Graduate Study. The Department offers programs of study and research leading to the Ph.D. degree in psychology. Detailed information regarding graduate study may be obtained on our website.

Graduate Advisor. See http://psychology.ucdavis.edu/graduate.

Psychology | PSC Minor

(College of Letters and Science)

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Faculty. http://psychology.ucdavis.edu/directory-of-people/faculty#c4=all&b_start=0

The Minor Programs

The psychology program at UC Davis is broad and includes students and faculty with a variety of interests. The department has developed around five major areas of emphasis:

Perception, Cognition, and Cognitive Neuroscience (PCCN) involves the study of awareness and thought, and includes such topics as perception, learning, memory, language and cognition.

Biological Psychology covers a broad spectrum of topics including evolutionary, neurobiological, and molecular mechanisms of behavior.

Social-Personality Psychology involves the study of the individual in his or her social environment and includes such topics as personality and individual differences, emotions, stereotyping and prejudice, intergroup relations, the psychology of religion and psychological health and dysfunction.

Developmental Psychology involves the study of changes in behavioral, cognitive, emotional, and social abilities that occur throughout the lifespan. Typical and atypical development is examined using a variety of methods including behavioral, neuroimaging, and physiological assessments.

Quantitative Psychology involves the study of linear and nonlinear models, psychometrics, mixed-effects models, and dynamic models, including experimental design, analysis of variance, regression, multivariate analysis, latent growth models, time series models, and factor analytic models.

Graduate Study. The Department offers programs of study and research leading to the Ph.D. degree in psychology. Detailed information regarding graduate study may be obtained on our website.

Graduate Advisor. See http://psychology.ucdavis.edu/graduate.

Recommended for All Majors & Minors. Students who plan to do graduate work in any area of psychology are strongly encouraged to gain experience through research and internship activities.

Minor Advisor. See staff advisors in 101 Young Hall; psychadvising@ucdavis.edu; 530-752-5104; http://psychology.ucdavis.edu/undergraduate/advising.

Psychology **Units:** 24

PSC 041	Research Methods in Psychology Please note that PSC 001 or PSC 001Y is a prerequisite for PSC 041 and all upper division Psychology courses.	4

One course from each of the following four groups:

Group A:

PSC 100	Introduction to Cognitive Psychology	4
OR		
PSC 100Y	Introduction to Cognitive Psychology	4
PSC 130	Human Learning and Memory	4
PSC 131	Perception	4
PSC 132	Language and Cognition	4

PSC 135	Cognitive Neuroscience: The Biological Foundations of the Mind	4
PSC 136	Psychology of Music	4

Group B:

PSC 101	Introduction to Biological Psychology	4
PSC 113	Developmental Psychobiology	4
PSC 121	Physiological Psychology	4
PSC 122	Advanced Animal Behavior	4
OR		
NPB 150	Advanced Animal Behavior	4
PSC 123	Hormones and Behavior	3
OR		
NPB 152	Hormones and Behavior	3
PSC 124	Comparative Neuroanatomy	3
OR		
NPB 124	Comparative Neuroanatomy	3
PSC 125	Behavioral Epigenetics	4
PSC 126	Health Psychology	4
PSC 137	Neurobiology of Learning & Memory	4
PSC 159	Gender and Human Reproduction	4

Group C:

PSC 151	Social Psychology	4
PSC 152	Social Cognition	4
PSC 154	Psychology of Emotion	4
PSC 158	Sexual Orientation and Prejudice	4
PSC 161	Psychology of the Self	4
PSC 162	Introduction to Personality Psychology	4
PSC 168	Abnormal Psychology	4

Group D:

HDE 100A	Infancy and Early Childhood	4
HDE 100B	Middle Childhood and Adolescence	4
PSC 140	Developmental Psychology	4
PSC 141	Cognitive Development	4
OR		
HDE 101	Cognitive Development	4
PSC 142	Social and Personality Development	4
OR		
HDE 102	Social and Personality Development	4
PSC 143	Infant Development	4
PSC 146	The Development of Memory	4
PSC 148	Developmental Disorders	4

Approved Electives **Units:** 4-5

Additional units to achieve 20 upper division units chosen from Psychology courses and/or approved electives. See list of approved electives below.

What is an elective: Any upper division Psychology course from inside or outside the Core Groups or any of the courses below:

AAS 141	Psychology of the African American Experience	3
ANT 132	Psychological Anthropology	4
CHI 120	Chicana/ o Psychology	4
CHI 121	Chicana/ o Community Mental Health	4
CHI 122	Psychology Perspectives Chicana/o and Latina/o Family	4
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CMN 120	Interpersonal Communication	4
CMN 122	Nonverbal Communication	4
CNS 100	Consumer Behavior	3
EDU 110	Educational Psychology: General	4
EXB 102	Introduction to Motor Learning and the Psychology of Sport and Exercise	4
HDE 100A	Infancy and Early Childhood	4
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HDE 100C	Adulthood and Aging	4
HDE 117	Longevity	4
HDE 163	Cognitive Neuropsychology in Adulthood and Aging	4
LIN 171	Introduction to Psycholinguistics	4
NPB 102	Animal Behavior	3
NPB 168	Neurobiology of Addictive Drugs	4
POL 170	Political Psychology	4
SOC 126	Social Interaction	4
SOC 135	Social Relationships	4
SOC 152	Juvenile Delinquency	4
SOC 171	Sociology of Violence and Inequality	4

Total: 24

Psychology | PSC Courses

Courses in PSC:

PSC 001—General Psychology (4)
Lecture—4 hours. Principles and basic concepts of psychology. The empirical study of individual behavior including perception, cognition, development, personality, social interactions and the biological underpinnings of behavior. Not open for credit to students who have taken course 001Y. GE credit: SS. Effective: 2017 Winter Quarter.

PSC 001Y—General Psychology (4)
Discussion—1 hour; Lecture—1 hour; Web Virtual Lecture—2 hours. Introduction to empirical approaches. Focus on perception, cognition, personality and social psychology, and biological aspects of behavior. Not open for credit to students who have taken course 001. GE credit: SS. Effective: 2016 Fall Quarter.

PSC 012Y—Data Visualization in the Social Sciences (4)
Laboratory—1.5 hours; Lecture—2 hours; Web Virtual Lecture—1.5 hours. Introduction to quantitative data across the social sciences (Communications, Political Science, Psychology, Sociology, and other disciplines). Transforming data, describing data, producing graphs, visual reasoning, and interpretations. (Communications 12Y, Sociology 12Y, Political Science 12Y.) GE credit: QL, VL. Effective: 2016 Spring Quarter.

PSC 020—Freshman Psychology Seminar (4)
Seminar—4 hours. Prerequisite(s): Freshman standing. Instructor will acquaint students with his or her program of research, the development of scientific questions from the literature, and the application of research methods to examine these questions. Critical thinking will be encouraged via expository writing and brief presentations. Effective: 1997 Winter Quarter.

PSC 041—Research Methods in Psychology (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 012Y, STA 013, or STA 100 strongly recommended. Introduction to experimental design, interviews, questionnaires, field and observational methods, reliability, and statistical inference. GE credit: QL. Effective: 2017 Fall Quarter.

PSC 051—Relationship Science: Lust, Love, and Evolution (4)
Lecture—4 hours. Prerequisite(s): PSC 001 or PSC 001Y; or introductory social science course or introductory life science course. Evolutionary perspectives on attraction and close relationships. Integrating social psychological and evolutionary theories with empirical evidence pertaining to human mating. GE credit: SE, SS. Effective: 2018 Spring Quarter.

PSC 090X—Lower Division Seminar (1-2)
Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Limited enrollment. Examination of a special topic in Psychology through shared readings, discussions, written assignments, or special activities such as fieldwork or laboratory work. Effective: 1997 Winter Quarter.

PSC 098—Directed Group Study (1-5)
Variable. Primarily for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

PSC 099—Special Study for Lower Division Students (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

PSC 100—Introduction to Cognitive Psychology (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041 Introduction to human information processing, mental representation and transformation, imagery, attention, memory, language processing, concept formation, problem solving, and computer simulation. Not open for credit to students who have completed former course 136. Effective: 2018 Winter Quarter.

PSC 100Y—Introduction to Cognitive Psychology (4)
Discussion—1 hour; Lecture—1 hour; Web Virtual Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041 Introduction to human information processing, mental representation and transformation, imagery, attention, memory, language processing, concept formation, problem solving, and computer simulation. Not open for credit to students who have completed former course 136 or current course 100. Effective: 2018 Spring Quarter.

PSC 101—Introduction to Biological Psychology (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041 Pass One open to majors. Survey and integration of the relationships between behavior and biological processes, including physiology, genes, development, ecology, and evolution. Two units of credit for those students who have completed Neurobiology, Physiology and Behavior 100. Effective: 2018 Winter Quarter.

PSC 103A—Statistical Analysis of Psychological Data (5)
Laboratory—2 hours; Lecture—4 hours; Term Paper. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; (STA 013 or STA 013Y or STA 102) Pass One open to Psychology Majors. Design and statistical analysis of psychological investigations and the interpretation of quantitative data in psychology. Not open for credit to students who have completed course 103. GE credit: QL. Effective: 2018 Winter Quarter.

PSC 103B—Statistical Analysis of Psychological Data (5)
Laboratory—2 hours; Lecture—4 hours. Prerequisite(s): PSC 103A; (STA 013 or STA 013Y or STA 102) Pass One open to Psychology majors. Probability theory, sampling distributions, statistical inference, and hypothesis testing using standard parametric and correlational approaches. Simple regression analysis, multiple regression analysis, non-parametric statistics, introduction to multivariate statistics, with applications in psychology. Not open for credit to students who have completed course 105. GE credit: QL. Effective: 2018 Winter Quarter.

PSC 104—Applied Psychometrics: An Introduction to Measurement Theory (4)
Lecture—4 hours. Prerequisite(s): PSC 041; PSC 103A; (STA 013 or STA 013Y); Upper division standing in Psychology. Examination of the basic principles and applications of classical and modern test theory. Topics include test construction, reliability theory, validity theory, factor analysis and latent trait theory. GE credit: QL. Effective: 2018 Spring Quarter.

PSC 107—Questionnaire and Survey Research Methods (4)
Discussion/Laboratory—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): PSC 001 or PSC 001Y; and Consent of Instructor. PSC 041 or an equivalent course on social or behavioral research methods or consent of instructor. Limited enrollment. Introduction to survey and questionnaire research methods with emphasis on how to ask questions. Social and psychological factors that influence survey response. Practical aspects of fielding survey and questionnaire research. GE credit: QL. Effective: 2018 Spring Quarter.

PSC 113—Developmental Psychobiology (4)
Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): PSC 101 The biology of behavioral development; survey and integration of the organismic and environmental processes that regulate the development of behavior. Effective: 1997 Fall Quarter.

PSC 120—Agent-Based Modeling (4)
Lecture/Lab—4 hours. Prerequisite(s): PSC 100 and/or PSC 101 recommended Class size limited to 24 students. Introduction to agent-based computer simulation and analysis with emphasis on learning how to model animals, including humans, to achieve insight into social and group behavior. GE credit: QL. Effective: 2018 Spring Quarter.

PSC 121—Physiological Psychology (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; PSC 101 Pass One open to Psychology majors. Relationship of brain structure and function to behavior, motivation, emotion, language, and learning in humans and other animals. An introduction to the methodology of physiological psychology and neuroscience. Not open for credit to students who have completed former course 108. Effective: 2018 Winter Quarter.

PSC 122—Advanced Animal Behavior (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): PSC 101 or NPB 102 Pass One open to Psychology majors. Advanced integrative survey of biological principles of behavioral organization, emphasizing historical roots, current research directions, conceptual issues and controversies. Laboratory exercises on the description and analysis of the behavior of captive and free-living animals Not open for credit to students who have completed former course 150. (Same course as Neurobiology, Physiology, and Behavior 150.) Effective: 2000 Fall Quarter.

PSC 123—Hormones and Behavior (3)
Lecture—3 hours. Prerequisite(s): NPB 101; (PSC 101 or NPB 102) Pass One open to Psychology majors. Endocrine physiology with an emphasis on the principles of behavior. Fundamental relationships between hormones and various behaviors engaged in by the organism during its lifetime. Role of hormones in behavioral homeostasis, social behavior, reproductive behavior, parental behavior, adaptation to stress. Not open for credit to students who have completed former course 152. (Same course as Neurobiology, Physiology, and Behavior 152.) Effective: 2000 Fall Quarter.

PSC 124—Comparative Neuroanatomy (4) ***Review all entries***
Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): PSC 101 or NPB 100 or NPB 101 Overview of the neuroanatomy of the nervous system in a variety of mammalian and non-mammalian vertebrates. Examine changes or modifications to neural structures as a result of morphological or behavioral specializations. (Neurobiology, Physiology, and Behavior 124) GE credit: SL. Effective: 1997 Fall Quarter.

PSC 124—Comparative Neuroanatomy (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): NPB 100 or NPB 101 or NPB 110B or PSC 121 Overview of the neuroanatomy in mammalian vertebrates, focusing on the cerebral cortex and experimental techniques. Examine changes or modifications to neural structures as a result of morphological or behavioral specializations. (NPB 124.) Effective: 2018 Fall Quarter.

PSC 124L—Comparative Neuroanatomy Laboratory (2)
Laboratory—6 hours. Prerequisite(s): PSC 124 (can be concurrent) Pass One restricted to PSC and NPB majors; must be concurrently enrolled in PSC 124. Comparative neuroanatomy laboratory illustrating modern neuroanatomical techniques in determining neural connections within the mammalian brain. Includes experimentation and presentation of results. (Same course as NPB 124L.) Effective: 2018 Fall Quarter.

PSC 125—Behavioral Epigenetics (4)
Lecture—4 hours. Prerequisite(s): PSC 101 Review of basic principles in genetics and epigenetics with emphasis on behavior. Introduction to the use of modern molecular methods in understanding the complex relationships between genes, environment, and behavior. Effective: 2016 Fall Quarter.

PSC 126—Health Psychology (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; PSC 101 recommended. Pass One open to Psychology majors. Psychological factors influencing health and illness. Topics include stress and coping, personality and health, symptom perception and reporting, heart disease, cancer, compliance, and health maintenance and promotion. Not open for credit to students who have completed former course 160. Effective: 2018 Winter Quarter.

PSC 130—Human Learning and Memory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; (PSC 012Y or STA 013 or STA 100); or Consent of Instructor. Consideration of major theories of human learning and memory with critical examination of relevant experimental data. Effective: 2018 Winter Quarter.

PSC 131—Perception (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; (PSC 100 or PSC 135) Cognitive organizations related to measurable physical energy changes mediated through sensory channels. Perception of objects, space, motion, events. Effective: 2018 Winter Quarter.

PSC 132—Language and Cognition (4)
Lecture—3 hours; Term Paper. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; (PSC 100 or PSC 135); or Consent of Instructor. Introduction to the cognitive processes involved in language comprehension and production. Topics include the biological foundations of language, speech perception, word recognition, syntax, reading ability, and pragmatics. GE credit: WE. Effective: 2018 Winter Quarter.

PSC 133—Neuroeconomics/Reinforcement Learning and Decision Making (4)
Lecture—3 hours; Term Paper. Prerequisite(s): (PSC 100 or PSC 100Y or PSC 135 or ARE 100A or ECN 100A or NPB 162 or NPB 163); (STA 013 or STA 013Y or STA 100 or PSC 103A); or Consent of Instructor. Theoretical and empirical approaches to neuroeconomics (neuroscience of decision making) from psychology, neuroscience, economics, and computer science. Neuroscience of judgment and decision making, behavioral economics, and reinforcement learning. (ECN 107 & CGS 107) GE credit: SL, SS. Effective: 2018 Spring Quarter.

PSC 135—Cognitive Neuroscience: The Biological Foundations of the Mind (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; or Consent of Instructor. PSC 101, PSC 121, or PSC 129 recommended. Neuroscientific foundations of higher mental processes including attention, memory, language, higher-level perceptual and motor processes, and consciousness. Emphasis on the neural mechanisms which form the substrates of human cognition and the relationship of mind to brain. Effective: 2018 Winter Quarter.

PSC 136—Psychology of Music (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; (PSC 100 or PSC 135 or MUS 006C); or Consent of Instructor. Introduction to the mental and neural representations of musical structures and processes involved in perceiving, remembering, and performing music. Music and emotion. GE credit: WE. Effective: 2018 Spring Quarter.

PSC 137—Neurobiology of Learning & Memory (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; PSC 101 Overview of the neural basis of learning and memory focusing on modern behavioral neuroscience research with animals. Topics include consolidation, neural plasticity, cellular competition for memory storage, and the role of neurogenesis in learning. Effective: 2018 Spring Quarter.

PSC 138—Consciousness and Cognition (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; (PSC 100 or PSC 135) Current theoretical and empirical evidence in the study of cognition and consciousness. Theories of consciousness, psychological and neural basis of conscious and unconscious processes such as attention, intentionality, and dreams. (CGS 138) Effective: 2018 Spring Quarter.

PSC 139—Advanced Cognitive Neuroscience (4)
Lecture—3 hours; Term Paper. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; PSC 135; or Consent of Instructor. Advanced integrative survey of cognitive neuroscience, including perception, attention, memory, and navigation. Emphasis on reviewing literature in psychology, neuroscience, and statistics; understanding methods in cognition; and presentation skills. GE credit: SL. Effective: 2018 Spring Quarter.

PSC 140—Developmental Psychology (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041 Pass One open to Psychology majors. An ontogenetic account of human behavior through adolescence with emphasis on motor skills, mental abilities, motivation, and social interaction. Two units of credit allowed to students who have completed Human Development 100A or 100B; not open for credit to students who have completed course 112. (Former course 112.). Effective: 2018 Winter Quarter.

PSC 141—Cognitive Development (4)
Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): PSC 140 or HDE 100A or HDE 100B Pass One open to Psychology & Human Development majors. Theories, methods, evidence, and debates in the field of cognitive development, such as nature/nurture, constraints on learning, and the role of plasticity. Topics include attention, memory, concepts about the physical and social world, and language. (Human Development 101.) GE credit: WE. Effective: 2002 Fall Quarter.

PSC 142—Social and Personality Development (4)
Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): PSC 140 or HDE 100A or HDE 100B Pass One open to Psychology and Human Development majors. Social and personality development of children, infancy through adolescence. Topics include the development of personality, achievement motivation, self-understanding, sex-role identity, and antisocial behavior. Emphasis on the interface between biological and social factors. (Human Development 102.) GE credit: SS, WE. Effective: 2002 Fall Quarter.

PSC 143—Infant Development (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; (PSC 140 or HDE 100A) Psychological development in infancy. Topics include physical and motor development, sensory and nervous system development, and memory and cognitive development. Emphasis will be on evaluating theories, empirical research, and experimental methods for understanding infant development. GE credit: WE. Effective: 2018 Winter Quarter.

PSC 145—Social Psychology (4) ***Review all entries Discontinued***
Lecture—4 hours. Behavior of the individual in the group. Examination of basic psychological processes in social situations, surveying various problems of social interaction: group tensions, norm-development, attitudes, values, public opinion, status. Effective: 2000 Fall Quarter.

PSC 145—Developmental Cognitive Neuroscience (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PSC 135 or ((PSC 140 or HDE 100A or HDE 100B); (PSC 101 or PSC 121 or NPB 161 or HDE 163)); PSC 141 recommended. Neuroscientific theories and methods (EEG, ERP, fNIRS, fMRI) that inform an understanding of behavioral and cognitive development over infancy and childhood. Neurodevelopmental correlates of perception, action, language, and social cognition; value of the neuroscientific perspective; limitations and challenges of neuroscientific research in the developmental context. GE credit: SL. Effective: 2018 Fall Quarter.

PSC 146—The Development of Memory (4)
Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; and any Psychology upper division course from Core Group A or D. Pass One open to Psychology majors. Theory and research on memory development with focus on infancy and childhood. Not open for credit to students who have completed former course 133. GE credit: WE. Effective: 2018 Spring Quarter.

PSC 148—Developmental Disorders (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; (PSC 140 or PSC 141 or HDE 100A or HDE 100B) Current scientific knowledge of the influences of biological, cognitive, and environmental factors on the emergence of disorders with onset in childhood. Examples include autism spectrum, ADD/ADHD, dyslexia and dyscalculia. Emphasis placed on understanding these disorders, their causes and their treatments. Effective: 2018 Spring Quarter.

PSC 151—Social Psychology (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041 Pass One open to Psychology majors. Behavior of the individual in the group. Examination of basic psychological processes in social situations, surveying various problems of social interaction: group tensions, norm-development, attitudes, values, public opinion, status. Not open for credit to students who have completed former course 145. GE credit: DD. Effective: 2018 Winter Quarter.

PSC 151—Social Psychology (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): PSC 001 or PSC 001Y, PSC 041 recommended Pass One open to Psychology majors. Behavior of the individual in the group. Examination of basic psychological processes in social situations, surveying various problems of social interaction: group tensions, norm-development, attitudes, values, public opinion, status. Not open for credit to students who have completed former course 145. GE credit: DD. Effective: 2018 Summer Session 1.

PSC 152—Social Cognition (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041 Examines how social factors influence how we attend to, encode, and process information and how these mental processes affect subsequent judgments and behavior. Effective: 2018 Spring Quarter.

PSC 153—Psychology and Law (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041 Pass One open to Psychology majors. Current theoretical and empirical issues in the study of psychology and law. Topics include eyewitness testimony, child abuse, jury decision making, juvenile delinquency and criminology, prediction of violence, insanity defense, and memory for traumatic events. Not open for credit to students who have completed former course 115. Effective: 2018 Spring Quarter.

PSC 154—Psychology of Emotion (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041 Pass One open to Psychology majors. An introduction to current theories and research on emotion and bodily feelings with special reference to self-knowledge. Not open for credit to students who have completed former course 143. Effective: 2018 Winter Quarter.

PSC 154—Psychology of Emotion (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041 Pass One open to Psychology majors. Introduction to current theories and research on emotion and bodily feelings with special reference to self-knowledge. Effective: 2018 Summer Session 1.

PSC 157—Stereotyping, Prejudice, and Stigma (4)
Lecture/Discussion—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041 Social psychological underpinnings of stereotyping, prejudice, and stigma from sociocultural, motivational, and cognitive perspectives. Topics include: origins, maintenance, change, effects on person perception and memory, and the automaticity/controllability of stereotyping and prejudice. GE credit: DD. Effective: 2018 Winter Quarter.

PSC 158—Sexual Orientation and Prejudice (4)
Lecture/Discussion—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041 Pass One open to Psychology majors. Current scientific knowledge about sexual orientation and prejudice based on sexual orientation. Emphasis is placed on learning the skills necessary for a critical understanding of science and public policy issues relevant to sexuality. GE credit: ACGH, DD, SS, WE. Effective: 2018 Spring Quarter.

PSC 159—Gender and Human Reproduction (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041 Pass One open to Psychology majors. Psychology of reproduction. Reproductive events over the course of an individual's life, including sexual development, mate choice, relationships, and reproduction. Biological and social psychological explanations at the levels of mechanism and evolutionary function. Not open for credit to students who have completed former course 149. (Formally course 149.). Effective: 2018 Spring Quarter.

PSC 161—Psychology of the Self (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041 Psychological theory and research on the self. Topics include: self-knowledge, self-esteem, self-regulation, self-presentation, cognitive and emotional aspects of the self, and the role of the self in shaping social interaction. Effective: 2018 Spring Quarter.

PSC 162—Introduction to Personality Psychology (4)
Lecture—3 hours; Term Paper. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041 Pass One open to Psychology majors. Scientific study of personality. Methods of personality research. Overview of current research and theory in the field of personality psychology. Not open for credit to students who have completed former course 147. GE credit: SS. Effective: 2018 Winter Quarter.

PSC 165—Introduction to Clinical Psychology (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; PSC 168; (PSC 140 or PSC 151) Major theoretical formulations in the history of clinical psychology, from classical psychoanalysis to contemporary existentialism and behavior modification. A survey, based on lectures, films, and tapes, of what clinical psychologists do, including methods of appraisal, professional roles,and approaches to treatment. Effective: 2018 Spring Quarter.

PSC 168—Abnormal Psychology (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041 Descriptive and functional account of behavioral disorders, with primary consideration given to neurotic and psychotic behavior. GE credit: SS. Effective: 2018 Winter Quarter.

PSC 170—Psychology of Religion (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041 Major theories, issues, data, and research methodologies of the psychology of religion. Religious experience and expression; religious development in childhood, adolescence, and adulthood; conversion; religious influences on physical and mental health; cross-cultural perspectives. GE credit: WE. Effective: 2018 Winter Quarter.

PSC 175—Genius, Creativity, and Leadership (4)
Lecture—3 hours; Term Paper. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; or Consent of Instructor. Or equivalents. Phenomenon of genius is examined from a diversity of theoretical, methodological, and disciplinary perspectives, with an emphasis on outstanding creativity and leadership in art, music, literature, philosophy, science, war, and politics. GE credit: SS, WE. Effective: 2018 Spring Quarter.

PSC 180A—Research in Cognitive and Perceptual Psychology (4)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): PSC 041; and Consent of Instructor. And four upper division Psychology courses. Empirical research on selected topics in general experimental psychology
(general research design and analysis, perception, cognition, cognitive development, etc.). Specific content will vary from quarter to quarter.
May be repeated once for credit when content differs. May be repeated up to 1 time(s). Effective: 1998 Fall Quarter.

PSC 180B—Research in Psychobiology (4)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): PSC 101; and Consent of Instructor. Three additional upper division courses in Psychology. Empirical research on selected topics in psychobiology (animal learning, animal behavior, physiological and sensory psychology, developmental psychobiology, computer modeling of neural systems). Content varies. May be repeated once for credit when content differs. May be repeated up to 1 time(s). Effective: 1997 Fall Quarter.

PSC 180C—Research in Personality and Social Psychology (4)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): PSC 041; and Consent of Instructor. And four upper division Psychology courses. Empirical research on selected topics in personality and social psychology (personality, social psychology, organizational psychology, etc.). Content will vary from quarter to quarter. May be repeated once for credit when specific content differs. May be repeated up to 1 time(s). Effective: 1997 Winter Quarter.

PSC 180D—Research in Developmental Psychology (4)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): PSC 041; Consent of Instructor. Four upper division Psychology courses. Empirical research on selected topics in developmental psychology (research design and analysis, development, cognitive development, social and personality development etc.). May be repeated up to 1 time(s) when content differs. Effective: 2017 Winter Quarter.

PSC 185—History of Psychology (4)
Lecture—3 hours; Term Paper. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; Upper division standing or consent of instructor. Pass One open to Psychology majors. Development of psychological thought and research in context of history of philosophy and science. Not open for credit to students who have completed course 120. (Former course 120.). GE credit: SS, WE. Effective: 2018 Winter Quarter.

PSC 190—Seminar in Psychology (4)
Seminar—4 hours. Prerequisite(s): Junior or senior standing; major in Psychology or consent of instructor. Intensive treatment of a special topic or problem of psychological interest. May be repeated for credit in different subject area. May be repeated for credit. Effective: 1997 Winter Quarter.

PSC 190X—Upper Division Seminar (1-2)
Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Limited enrollment. In-depth examination at an upper division level of a special topic in Psychology. Emphasis on student participation in learning. May not be repeated for credit. Effective: 1997 Winter Quarter.

PSC 192—Fieldwork in Psychology (1-6)
Fieldwork—1-6 hours. Prerequisite(s): Consent of Instructor. Upper division standing in Psychology. Limited enrollment. Supervised internship off and on campus, in community and institutional settings. Maximum of six units may be used towards satisfaction of upper division major requirement. May be repeated up to 1 time(s) per internship site. (P/NP grading only.) Effective: 2017 Winter Quarter.

PSC 194HA—Special Study for Honors Students (3)
Independent Study—9 hours. Prerequisite(s): Consent of Instructor. Senior standing in Psychology and qualifications for admission into college honors program; at least one course from PSC 180A, PSC 180B, PSC 180C or PSC 199 strongly recommended. Directed research. Supervised reading, research and writing leading to submission of a Senior Honors thesis under the direction of faculty sponsor. GE credit: WE. Effective: 1997 Winter Quarter.

PSC 194HB—Special Study for Honors Students (3)
Independent Study—9 hours. Prerequisite(s): Consent of Instructor. Senior standing in Psychology and qualifications for admission into college honors program; at least one course from PSC 180A, PSC 180B, PSC 180C or PSC 199 strongly recommended. Directed research. Supervised reading, research and writing leading to submission of a Senior Honors thesis under the direction of faculty sponsor. GE credit: WE. Effective: 1997 Winter Quarter.

PSC 197T—Tutoring in Psychology (1-3)
Tutorial—1-3 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Intended for advanced undergraduate students who will lead discussion sections in Psychology courses. May be repeated for credit for a total of 8 units. May be repeated up to 8 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

PSC 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

PSC 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

PSC 200—Proseminar in Psychology (3)
Independent Study—1 hour; Seminar—2 hours. Prerequisite(s): Graduate standing in Psychology or consent of instructor. Introduces matriculating graduate students to research activities of departmental faculty. (S/U grading only.) Effective: 1997 Winter Quarter.

PSC 201—Research Preceptorship (4)
Discussion—5 hours; Laboratory—4 hours. Prerequisite(s): Consent of Instructor. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

PSC 202—Research Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing in Psychology. Presentation of graduate research to program faculty and graduate students. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

PSC 204A—Statistical Analysis of Psychological Experiments (5)
Laboratory—2 hours; Lecture—4 hours. Prerequisite(s): STA 102; Or equivalent; graduate standing in Psychology or consent of instructor. Probability theory, sampling distributions, statistical inference, and hypothesis testing using standard parametric and correlational approaches. Analysis of variance, factorial and repeated measures, and tests of trends. Not open for credit to students who have completed course 206. Effective: 2014 Spring Quarter.

PSC 204B—Causal Modeling of Correlational Data (5)
Laboratory—2 hours; Lecture—4 hours. Prerequisite(s): PSC 204A; Or the equivalent course and graduate standing in Psychology or consent of instructor. Examination of how to make causal inferences from correlational data in the behavioral sciences. Emphasis is on testing rival causal models using correlations among observed variables. Beginning with multiple regression analysis, discussion advances to path analysis and related techniques. Not open for credit to students who have completed course 207A. Effective: 2015 Spring Quarter.

PSC 204D—Advanced Statistical Inference from Psychological Experiments (5)
Laboratory—2 hours; Lecture—4 hours. Prerequisite(s): PSC 204A; Or the equivalent; graduate standing in Psychology or consent of instructor. Advanced topics in statistical inference, which may include probability theory, sampling distributions, statistical inference and hypothesis testing, nonparametric statistics, Bayesian approaches, and advanced issues in analysis of variance. Not open for credit to students who have completed course 205. Effective: 2014 Spring Quarter.

PSC 205A—Applied Multivariate Analysis of Psychological Data (4)
Lecture—4 hours. Prerequisite(s): PSC 204A; PSC 204B; PSC 204D; or Consent of Instructor. Review of the major methods of multivariate data analysis for psychological data. Students will program statistical routines using a linear algebra-based computing language. Topics will include multivariate analysis of variance. discriminant analysis, canonical analysis factor analysis, and component analysis. Not open for credit to students who have completed course 207B. (Former course 207B.). Effective: 2017 Spring Quarter.

PSC 205B—Factor Analysis (4)
Lecture—3 hours; Term Paper. Prerequisite(s): PSC 204A; PSC 204B; or Consent of Instructor. Or equivalent courses; graduate standing. Theory and methods of factor analysis, including exploratory factor analysis, confirmatory factor analysis, and principal component analysis. Effective: 2015 Winter Quarter.

PSC 205C—Structural Equation Modeling (4)
Lecture—3 hours; Term Paper. Prerequisite(s): PSC 204A; PSC 204B; or Consent of Instructor. Or equivalent courses; graduate standing. Theory and methods of structural equation modeling, including path analysis, confirmatory factor analysis, multiple-group modeling and latent growth curve modeling. Effective: 2008 Fall Quarter.

PSC 205D—Multilevel Models (4)
Lecture—4 hours. Prerequisite(s): PSC 204A; Graduate standing or consent of instructor. Introduction to statistical techniques for the analysis of normal, hierarchically structured data, such as cross-sectional clustered data or repeated-measures data. Topics include hierarchical linear models, latent growth curve models, and how these methods handle unbalanced and/or missing data. Effective: 2004 Fall Quarter.

PSC 205E—Applied Psychometrics and Measurement Theory (4)
Lecture—4 hours. Prerequisite(s): PSC 204A; Graduate standing in Psychology or consent of instructor. Examination of the basic principles and applications of classical and modern test theory. Topics include test construction, reliability theory, validity theory, factor analysis, and latent trait theory. Not open for credit to students who have completed course 204 or 204C. Effective: 2013 Fall Quarter.

PSC 205F—Item Response Theory (4)
Lecture—3 hours; Term Paper. Prerequisite(s): PSC 204A; Or the equivalent; graduate standing in Psychology or consent of instructor. Item response theory allows for the creation of precise measurement instruments in psychological testing. Review Classical Test Theory, and then cover basic IRT models through advanced applications. Effective: 2014 Winter Quarter.

PSC 205G—Applied Longitudinal Data Analysis (4)
Lecture—3 hours; Term Paper. Prerequisite(s): PSC 204A; Graduate standing in Psychology or consent of instructor. Modeling and understanding of intraindividual change and interindividual differences in change. Reviews conventional methods and introduces contemporary techniques for modeling intraindividual change. Effective: 2014 Fall Quarter.

PSC 206A—Theoretical Foundations: Research Methods in Psychology (4)
Lecture/Discussion—3 hours; Term Paper. Restricted to graduate student status. Examines the philosophy and research practices underlying experimental psychology. Topics to be covered include philosophy of science/epistemology, research design, inference and bias in research, theory development, validity, the social context of research, and critical thinking about research. Effective: 2010 Spring Quarter.

PSC 206B—Research Methods in Psychology: Applications in Social-Personality Research (4)
Lecture/Discussion—3 hours; Term Paper. Restricted to graduate student status. Overview of the research designs, assessment methods, and statistical procedure used by social-personality psychologists. Focus on the practical issues that arise when using each method in specific research contexts. Effective: 2009 Fall Quarter.

PSC 207—Survey and Questionnaire Research Methods (4)
Lecture/Discussion—4 hours. Prerequisite(s): Completion of a course on social or behavioral research methods, graduate standing. Survey and questionnaire research methods with emphasis on how to ask questions. Cognitive, motivational, and social processes that influence how respondents answer questions; sampling techniques; internet resources; practical aspects of fielding survey and questionnaire research. Effective: 2003 Fall Quarter.

PSC 208—Physiological Psychology (4)
Seminar—4 hours. Prerequisite(s): Graduate standing in Psychology or consent of instructor. A conceptual analysis of the contributions of neuroanatomy, neurophysiology and neurochemistry to an understanding of animal and human behavior. Effective: 1997 Winter Quarter.

PSC 208A—Fundamentals of Human Electrophysiology (4)
Extensive Problem Solving—1.5 hours; Laboratory—3 hours; Lecture/Discussion—1.5 hours; Project (Term Project)—3 hours. Prerequisite(s): Consent of Instructor. Restricted to 15 students. In-depth introduction and hands-on experience with the event-related potential (ERP) method in the study of attention, executive control, memory, language and social cognitive neuroscience. Effective: 2010 Winter Quarter.

PSC 209A—Introduction to Programming: Matlab (4)
Lecture/Lab—3 hours. Prerequisite(s): Graduate standing or consent of instructor. The Matlab programming environment as a means of organizing, analyzing, and visualizing scientific data. Basic programming concepts such as variables, loops, conditional branching, and efficient programming techniques will be emphasized. Effective: 2006 Fall Quarter.

PSC 210—Fundamentals of Cognitive Neuroimaging (3)
Lecture/Discussion—3 hours. Prerequisite(s): Basic knowledge of inferential statistics and experimental Psychology. Introduction to empirical foundations and methodology of neuroimaging, emphasizing pragmatics of functional magnetic resonance imaging (fMRI) to study cognition. Topics include MR physics, the relationship between neural activity and the BOLD response, experimental design, and analysis of fMRI data. Effective: 2007 Fall Quarter.

PSC 211—Advanced Topics in Neuroimaging (3)
Laboratory—1 hour; Seminar—2 hours. Prerequisite(s): PSC 210; or Consent of Instructor. Restricted to 16 students. Critical presentation and discussion of the most influential advanced issues in neuroimaging, emphasizing fMRI design/analysis and the integration of fMRI with EEG/MEG. May be repeated for credit Course may be repeated when topics differ. (Neuroscience 211 and Neurobiology, Physiology, and Behavior 211.) (S/U grading only.) Effective: 2017 Spring Quarter.

PSC 212A—Developmental Psychology: Cognitive and Perceptual Development (4)
Seminar—4 hours. Prerequisite(s): Graduate standing or consent of instructor; completion of an undergraduate or graduate course on developmental psychology or human development. Theories and empirical findings concerning human cognitive and perceptual development. Development of perception, memory, concepts (e.g., theory of mind, concepts about number), problem solving, and language from infancy to adolescence. Effective: 2003 Fall Quarter.

PSC 212B—Developmental Psychology: Social, Emotional, and Personality Development (4)
Seminar—4 hours. Prerequisite(s): Graduate standing or consent of instructor; completion of an undergraduate or graduate course on developmental psychology or human development. Theories and empirical findings concerning human social, emotional, and personality development. Development of emotions, moral reasoning and behavior, personality, self-concept, and social cognition from infancy to adolescence (may include adulthood). Effective: 2003 Fall Quarter.

PSC 217—Behavioral Genetics (4)
Discussion/Laboratory—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): Graduate standing. Restricted to 20 students. Review basic principles in genetics and select topics in molecular genetics with emphasis on behavior. Use of modern molecular methods to outline complex relationships between genes, environment, and behavior. Not open for credit to students who have completed course 251. Effective: 2008 Spring Quarter.

PSC 218A—Fundamentals of Animal Behavior (5)
Discussion—1 hour; Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Upper division undergraduate introduction to the biology of behavior, such as PSC 101, PSC 122, PSC 123, NPB 102, NPB 150, NPB 152, WFC 141, ENT 104, or ANS 105. Survey of the phenomena and theory of animal behavior from the perspectives of multiple biological disciplines, including evolution, ecology, psychology, genetics, neurobiology, endocrinology, and animal science. (Animal Behavior 218A.) Effective: 2007 Fall Quarter.

PSC 218B—Fundamentals of Animal Behavior (5)
Discussion—1 hour; Lecture/Discussion—4 hours. Prerequisite(s): PSC 209A; or Consent of Instructor. Survey of the phenomena and theory of animal behavior from the perspectives of multiple biological disciplines, including evolution, ecology, psychology, genetics, neurobiology, endocrinology, and animal science. (Animal Behavior 218B.) Effective: 2007 Fall Quarter.

PSC 220—History of Psychology (4)
Lecture—2 hours; Seminar—2 hours. Prerequisite(s): Graduate standing in Psychology or consent of instructor. A lecture-seminar on the history of psychology and on the applicability of early psychological theory and research to contemporary investigations. Effective: 1997 Winter Quarter.

PSC 221—Academic Writing in Psychology (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Class size limited to 10 students. Strategies for developing and honing academic writing skills and writing productivity, with a particular focus on how to write a clear and compelling empirical journal article in psychology. May be repeated up to 4 unit(s) with consent of instructor if student chooses to focus on a substantially different writing project. Effective: 2013 Spring Quarter.

PSC 230—Cognitive Psychology (4)
Seminar—4 hours. Prerequisite(s): Graduate standing in Psychology or consent of instructor. Analysis of the mental processes by which knowledge is acquired, manipulated, stored, retrieved and used. Effective: 1997 Winter Quarter.

PSC 231—Sensation and Perception (4)
Seminar—4 hours. Prerequisite(s): Graduate standing in Psychology or consent of instructor. Analysis of the role of sensory processes and perception in experience and their effects on behavior. Effective: 1997 Winter Quarter.

PSC 241—Attitudes and Social Influence (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Survey of theory and research in the field of attitudes and social influence. Topics include attitude definition and measurement, major theories of attitude formation and change, the relationship between attitudes and behavior, and recent directions and controversies. Effective: 2011 Fall Quarter.

PSC 242—Attraction and Close Relationships (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing in Psychology, Sociology, Human Development, a related social science, or consent of instructor. Social psychological theory and research on attraction and close relationships, with a particular emphasis on romantic relationships. Covers attachment theory, interdependence theory, and evolutionary psychological perspectives. Effective: 2018 Winter Quarter.

PSC 243—Social Cognition (4)
Lecture/Discussion—3 hours; Term Paper. Processes underlying the perception, memory, and judgment of social stimuli, the effects of social and affective factors on cognition, and the interpersonal consequences of those processes. Topics include automaticity/control, motivated cognition, person perception, stereotyping, attitudes, and persuasion. Effective: 2007 Fall Quarter.

PSC 244—Stereotyping, Prejudice, and Stigma (4)
Lecture/Discussion—3 hours; Term Paper. This course examines the social psychological underpinnings of stereotyping, prejudice, and stigma, including sociocultural, motivational, and cognitive factors. Effective: 2007 Fall Quarter.

PSC 245—Social Psychology (4)
Seminar—4 hours. Prerequisite(s): Graduate standing in Psychology or consent of instructor. Theory and research in social psychology. Effective: 1997 Winter Quarter.

PSC 247—Personality (4)
Seminar—4 hours. Prerequisite(s): Graduate standing in Psychology or consent of instructor. Theory and research in human personality. Effective: 1997 Winter Quarter.

PSC 251—Topics in Genetic Correlates of Behavior (4)
Seminar—4 hours. Prerequisite(s): Graduate standing in Psychology or consent of instructor. Theory and experiment in the genetic contributions to animal and human behavior. May be repeated for credit when topic differs. May be repeated for credit. Effective: 1997 Winter Quarter.

PSC 252—Topics in Psychobiology (4)
Seminar—4 hours. Prerequisite(s): Graduate standing in Psychology or consent of instructor. Critical study in a selected area of psychobiology. May be repeated for credit when content differs. May be repeated for credit. Effective: 1997 Winter Quarter.

PSC 261—Cognitive Neuroscience (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Graduate student standing in Psychology or Neuroscience or consent of instructor. Graduate core course for neuroscience. Neurobiological bases of higher mental function including attention, memory, language. One of three in three-quarter sequence. (Neuroscience 223.) Effective: 1997 Winter Quarter.

PSC 263—Topics in Cognitive Psychology (4)
Seminar—4 hours. Prerequisite(s): Graduate standing in Psychology or consent of instructor. Selected topics in language processing, memory, perception, problem solving, and thinking, with an emphasis on the common underlying cognitive processes. May be repeated for credit when content differs. May be repeated for credit. Effective: 1997 Winter Quarter.

PSC 264—Topics in Psycholinguistics (4)
Seminar—4 hours. Prerequisite(s): Graduate standing in Psychology or consent of instructor. Discussion of fundamental issues in the psychology of language. May be repeated for credit when content differs. May be repeated for credit. Effective: 1997 Winter Quarter.

PSC 270—Topics in Personality and Social Psychology (4)
Seminar—4 hours. Prerequisite(s): Graduate student standing or consent of instructor. Critical study of a selected area of personality or social psychology. May be repeated for credit for credit when content differs. Effective: 2005 Fall Quarter.

PSC 272—Topics in Developmental Psychology (4)
Seminar—4 hours. Prerequisite(s): Graduate standing in Psychology or consent of instructor. Selected topics in developmental psychology, including developmental neuroscience, memory development, infancy, cognitive development, social development, child maltreatment, children and law, perceptual development, emotional development, children at risk, and adolescence, with emphasis on developmental processes and developmental theory. May be repeated for credit. Effective: 2005 Fall Quarter.

PSC 289A—Current Research in Psychology (2)
Seminar—2 hours. Prerequisite(s): Graduate standing in Psychology or consent of instructor. Contemporary theory and empirical research in specialized topics in psychology. Topics include developmental attachment, social neuroscience, mental health, emotion, sexual orientation and identity. May be repeated for credit if topic differs. Effective: 2007 Winter Quarter.

PSC 289B—Current Research in Psychology (2)
Discussion—2 hours. Prerequisite(s): PSC 289A; Graduate standing in Psychology or consent of instructor. Intensive examination of contemporary theory and empirical research on a specialized topic in psychology. Sample topics include developmental attachment, social neuroscience, culture and mental health, electrophysiology and cognitive neuroscience, emotion, implicit cognitive processes, sexual orientation and identity, and attention. May be repeated for credit content differs. Effective: 2007 Winter Quarter.

PSC 290—Seminar (4)
Seminar—4 hours. Prerequisite(s): Graduate standing in Psychology or consent of instructor. Seminar devoted to a highly specific research topic in any area of basic psychology. Special topic selected for a quarter will vary depending on interests of instructor and students. Effective: 1997 Winter Quarter.

PSC 298—Group Study (1-5)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

PSC 299—Research (2-9)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

PSC 299D—Dissertation Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

PSC 390—The Teaching of Psychology (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Advanced graduate standing in Psychology or a closely related discipline. Methods and techniques of teaching undergraduate psychology. Integration of learning outcomes with effective evaluation. Practical experience in the application of pedagogical principles. (S/U grading only.) Effective: 2017 Winter Quarter.

PSC 390A—The Teaching of Psychology (6)
Discussion—6 hours; Lecture—6 hours; Practice—6 hours. Prerequisite(s): Consent of Instructor. Advanced graduate standing in Psychology or a closely related discipline. Methods and problems of teaching psychology at the undergraduate and graduate levels; curriculum design and evaluation. Practical experience in the preparation and presentation of material. (S/U grading only.) Effective: 1997 Winter Quarter.

PSC 390B—The Teaching of Psychology (4)
Discussion—6 hours; Lecture—4 hours; Practice—2 hours. Prerequisite(s): Consent of Instructor. Advanced graduate standing in Psychology or a closely related discipline. Methods and problems of teaching psychology at the undergraduate and graduate levels; curriculum design and evaluation. Practical experience in the preparation and presentation of material. (S/U grading only.) Effective: 1997 Winter Quarter.

PSC 391—Teaching of Psychology Practicum (4)
Fieldwork; Seminar—1 hour. Prerequisite(s): PSC 390; or Consent of Instructor. Supervised teaching in undergraduate classrooms. Techniques for delivering content through lectures, discussions, or labs; course administration; communications; assessment of student learning; solving ethical problems; instructional technology. (S/U grading only.) Effective: 2017 Fall Quarter.

PSC 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Public Health

Public Health | Public Health M.P.H.

(School of Medicine)

Department. Public Health Sciences; Med-Sci 1C; 530-754-9048; http://www.ucdmc.ucdavis.edu/phs/

Faculty. http://www.ucdmc.ucdavis.edu/phs/about/phs_faculty.html

The Department of Public Health Sciences offers the Master of Public Health (MPH) degree and a Ph.D. degree. The MPH degree is accredited by the Council on Education for Public Health. Students apply for admission through the Office of Graduate Studies. The following listing is all required core course work for the degree. Course descriptions are given under the individual course offerings. For course information, see Master of Public Health (MPH).

Core courses		**Units:** 40
Biostatistics		
SPH 244	Introduction to Medical Statistics	4
SPH 245	Biostatistics for Biomedical Science	4
SPH 210	Public Health Informatics	2
Epidemiology		
EPI 205	Principles of Epidemiology	4
Health Services Administration		
SPH 273	Health Services Administration	3
Social and Behavioral Influences on Health		
SPH 222	Social & Behavioral Aspects of Public Health	3
General Public Health		
SPH 201	Introduction to Public Health	3
SPH 290	Topics in Public Health Must be repeated for a total of four units.	1
SPH 297	Public Health Practicum	1-16
Added-Competence Selectives		**Units:** 6-11
Elective Units		**Units:** 5-10
		Total: 56

Public Health | SPH Courses

Courses in SPH:

SPH 092—Internship in Community Health (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Students apply theory and concepts learned in the classroom through field work in a community health agency. (P/NP grading only.) Effective: 2008 Summer Session 2.

SPH 101—Introduction to Public Health (3)
Lecture—3 hours. Prerequisite(s): Undergraduate standing. Provide basic concepts and controversies in public health, basic science of public health, social and behavioral factors in health and disease, environmental and occupational health issues, the relationship of public health to the medical care system and health care reform. GE credit: SE, SS. Effective: 2016 Winter Quarter.

SPH 102—Introduction to Human Epidemiology (4)
Discussion—2 hours; Lecture—2 hours. Practice of epidemiology as it relates to human populations. Content is fundamental to the Public Health minor and a required core course. GE credit: SE. Effective: 2017 Spring Quarter.

SPH 104—Globalization and Health: Evidence and Policies (3)
Lecture—3 hours. Provides an overview of the evidence on the multiple effects of globalization policies on health. GE credit: SS, WC. Effective: 2017 Winter Quarter.

SPH 113—Health Disparities in the U.S. (3)
Lecture—3 hours. Introduction to the principles and practice of health disparities research. GE credit: DD, SS. Effective: 2018 Spring Quarter.

SPH 132—Health Issues Confronting Asian Americans and Pacific Islanders (4)
Lecture/Discussion—4 hours. Health issues confronting Asian Americans and Pacific Islanders. (Asian American Studies 132.) GE credit: SS. Effective: 2009 Winter Quarter.

SPH 160—General Health Education and Prevention (5)
Discussion—1 hour; Lecture—4 hours. Open to students in the internship program for the Health Education Program only; class size limited to 50 students. Topics include addiction, substance abuse/prevention, nutrition, stress management, physical fitness, body image, reproductive anatomy & physiology, contraceptive options, safer sex, sexual health, healthy relationships, and other general wellness/health promotion topics. Practice in peer counseling and outreach presentations. (P/NP grading only.) Effective: 2008 Summer Session 2.

SPH 161—Campus Alcohol/Other Drug Abuse Prevention Program Peer Educator Training (4)
Lecture/Discussion—3 hours; Practice—1 hour. Prerequisite(s): SPH 160 (can be concurrent); and Consent of Instructor. Preparation for internship in campus and community substance abuse prevention and educational intervention. Addiction and other physiological responses to alcohol and other drugs. Harm-reduction strategies for individuals and target populations. Practice in peer counseling skills and outreach presentations to groups. (P/NP grading only.) Effective: 2008 Summer Session 2.

SPH 162—Health Advocates Peer Educator Training (4)
Lecture/Discussion—3 hours; Practice—1 hour. Prerequisite(s): SPH 160 (can be concurrent); and Consent of Instructor. Preparation for internship in campus and community health promotion and risk reduction. Nutrition, stress management, physical fitness, body image and disordered eating, skin cancer prevention, and other general wellness/health promotion topics. (P/NP grading only.) Effective: 2008 Summer Session 2.

SPH 190—Topics in Public Health (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Seminar on key issues and current topics in public health. May be repeated for credit. (P/NP grading only.) Effective: 2016 Fall Quarter.

SPH 190C—Research Conference in Community and International Health (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Weekly conference on research problems, progress, and techniques in Community and International Health. Critical discussion of recent journal articles. May be repeated for credit. (P/NP grading only.) Effective: 2008 Summer Session 2.

SPH 192—Internship in Community Health Practice (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Upper division and graduate students. The student, through fieldwork in a community health agency, learns to apply theory and concepts learned in the classroom. (P/NP grading only.) Effective: 2008 Summer Session 2.

SPH 198—Study in Community and International Health (1-5)
Variable. Prerequisite(s): Consent of Instructor. Undergraduate standing. Study and experience for undergraduate students in any number of areas in community and international health. (P/NP grading only.) Effective: 2008 Summer Session 2.

SPH 199—Research in Community and International Health (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Undergraduate standing. Student will work with faculty member in areas of research interest, including but not limited to injury control, international health, health policy, occupational and environmental health, health promotion and wellness, women's health, and health demographics. (P/NP grading only.) Effective: 2008 Summer Session 2.

SPH 201—Introduction to Public Health (3)
Discussion/Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Provides an overview of public health. Covers the history of public health in the U.S.; defines its major functions and constituencies; and, introduces fundamental principles of epidemiology, biostatistics, behavioral sciences, environmental health, infectious diseases, and reducing health disparities. May be repeated up to 1 time(s). Effective: 2011 Summer Session 2.

SPH 202—Public Health Issues in California's Central Valley (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Public health issues in California’s Central Valley, including the influences of migration, racial and ethnic diversity, the agricultural industry, environmental exposures, and rurality. Effective: 2018 Spring Quarter.

SPH 203—Learning and Teaching in Public Health Contexts (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Aimed at current and future public health professionals interested in learning more about the educational potential for interactions with community members and other health professionals—all stakeholders in improving the health of communities. Effective: 2012 Spring Quarter.

SPH 204—Globalization and Health: Evidence and Policies (3)
Lecture—3 hours. Open to graduate student standing. Provides an overview of the evidence on the multiple effects of globalization policies on health. Effective: 2015 Fall Quarter.

SPH 205AY—Epidemiology for Health Professionals (4)
Lecture—2 hours; Web Virtual Lecture—2 hours. Prerequisite(s): Consent of Instructor. Basic epidemiologic concepts and approaches to epidemiologic research, with examples from human medicine, including outbreak investigation, infectious disease epidemiology, properties of tests. Effective: 2017 Fall Quarter.

SPH 207—Advanced Epidemiologic Methodology (4)
Lecture/Discussion—4 hours. Prerequisite(s): EPI 206 In-depth integration of advanced epidemiological concepts. Theory, methods, and applications for observational studies including random and systematic error, confounding, counterfactuals, causal inference, effect modification, internal and external validity, estimability, and interpretation of effect measures, and advanced study designs. (Epidemiology 207.) Effective: 2016 Winter Quarter.

SPH 208—Principles & Applications of Cancer Prevention & Control (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Principles and applications of cancer prevention and control from a public health perspective. (S/U grading only.) Effective: 2018 Spring Quarter.

SPH 209—History of Epidemiology in Public Health (2)
Discussion—1.5 hours; Lecture—0.5 hours. Introduction to the history of epidemiology in solving major public health problems. Original historical articles will be read/discussed. Topics may include: infectious disease, accidents/adverse events, nutritional deficiencies, community vaccination trials, occupational exposures, cancer, birth defects, cardiovascular disease, and smoking. (Epidemiology 209.) Effective: 2014 Fall Quarter.

SPH 210—Public Health Informatics (2)
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Collection, verification, and utilization of data related to populations; infrastructure, functions, and tools used to generate public health knowledge supporting public health practices and policy development/dissemination. (S/U grading only.) Effective: 2008 Summer Session 2.

SPH 212—Migration and Health (3)
Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing. Principles of migration and health. Topics will include demographics, public health invention programs, health care delivery, occupational health, and effects of international migration on the health in communities of origin, transit and destination. Guest presentations by outside experts. Effective: 2012 Spring Quarter.

SPH 213—Health Disparities in the U.S. (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Introduction to the principles and practice of health disparities research. Effective: 2018 Spring Quarter.

SPH 222—Social & Behavioral Aspects of Public Health (3)
Lecture/Discussion—3 hours. Prerequisite(s): STA 102; STA 106; and Consent of Instructor. Graduate standing. Theories and strategies of health behavior change at the individual, group, community, and environmental levels. Examples include: transtheoretical model, social networks, and social marketing. Theories are applied to solve common public health problems (cancer, obesity, smoking, and HIV/AIDS). Effective: 2009 Winter Quarter.

SPH 223—Obesity Prevention in Community Settings (3)
Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Look at causes of the obesity epidemic in the U.S.; identify and critically assess the research literature on various prevention strategies; understand, and apply evidence-based public health strategies to combat obesity; and translate the science to a general audience. Effective: 2014 Fall Quarter.

SPH 232—Health Communication (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Health communication theories and research traditions. Topics include consumer health information seeking; physician-patient interaction; information, social marketing, "edutainment," and media advocacy campaigns; social networks and coping; media influences on health; and new communication technologies in health promotion and healthcare delivery. (Communication 232.) Effective: 2011 Fall Quarter.

SPH 233—Persuasive Technologies for Health (4)
Lecture/Discussion—3 hours; Term Paper. Theorizing, designing and evaluating ethical technology-based health communication interventions. Uses of social media, mobile communication apps, wearable devices, computer-generated tailored messages, educational games, and computational approaches in health promotion and healthcare delivery. (CMN 233) Effective: 2017 Fall Quarter.

SPH 235—Health Communication Campaigns (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Restricted to graduate students. Principles of health communication campaign planning, implementation and evaluation. Strategies for changing health behaviors, shaping policy, and improving healthcare organizations' relations with stakeholders. (CMN 235.
) Effective: 2017 Fall Quarter.

SPH 244—Introduction to Medical Statistics (4)
Lecture—4 hours. Introduction to statistical methods and software in clinical, laboratory and population medicine. Graphical and tabular presentation of data, probability, binomial, Poisson, normal, t-, F-, and Chi-square distributions, elementary nonparametric methods, simple linear regression and correlation, life tables. Only one unit of credit for students who have completed Statistics 100 or Preventive Veterinary Medicine 402. (Clinical Research 244.) Effective: 2017 Winter Quarter.

SPH 245—Biostatistics for Biomedical Science (4)
Lecture—4 hours. Prerequisite(s): CLH 244 or SPH 244; and Consent of Instructor. Or an equivalent course. Analysis of data and design of experiments for laboratory data. (Clinical Research 245.) Effective: 2015 Spring Quarter.

SPH 246—Biostatistics for Clinical Research (4)
Lecture—4 hours. Prerequisite(s): SPH 245 or CLH 245 Emphasizes critical biostatistics for clinical research and targets biomedical audience. Students will develop understanding for basic planning and analysis of clinical studies and learn to develop collaborations with biostatisticians. May be repeated for credit. (Clinical Research 246.) Effective: 2015 Winter Quarter.

SPH 247—Statistical Analysis for Laboratory Data (4)
Lecture—4 hours. Prerequisite(s): CLH 245 or SPH 245 Statistical methods for experimental design and analysis of laboratory data including gene expression arrays, RNA-Seq, and mass spec. (Clinical Research 247.) Effective: 2015 Spring Quarter.

SPH 252—Social Epidemiology (2)
Lecture/Discussion—2 hours. Prerequisite(s): EPI 205A; and Consent of Instructor. Social determinants of health; psychosocial and physiological pathways; health and social inequality; gender and racial/ethnic disparities in health; social support, social cohesion and health; social gradient in behavioral risk factors; social ecological approaches to health intervention; interventions addressing social determinants. (Epidemiology 252.) Effective: 2009 Spring Quarter.

SPH 255—Human Reproductive Epidemiology (3)
Lecture—3 hours. Prerequisite(s): MPM 405; MPM 406; PHY 220; PGG 222; or equivalents or Consent of Instructor. Human reproductive effects and risk of reproductive disorders, examined from macro- and micro-environmental exposures in community and occupational settings, epidemiologic study designs and analyses. Effective: 2009 Spring Quarter.

SPH 262—Principles of Environmental Health Science (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Principles, approaches and issues related to environmental health. Recognizing, assessing, understanding and controlling the impact of people on their environment and the impact of the environment on the public. Effective: 2008 Summer Session 2.

SPH 264—Public Health Econometrics (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Principles of demand and supply; elasticity; benefits and costs; least squares regression; stepwise regression; economic and statistical significance; fixed and random effects; longitudinal data; non-linear relations; continuous and binary variables; instrumental variables; attrition bias; tobit regression; Two-part cost model. (S/U grading only.) Effective: 2008 Spring Quarter.

SPH 266—Applied Analytic Epidemiology (3)
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): MPM 404; or Consent of Instructor. Principles and applications in analysis of epidemiologic data. Methods of analyzing stratified and matched data, logistic regression for cohort and case-control studies, Poisson regression, survival-time methods. (Population Health and Reproduction 266) Effective: 2009 Spring Quarter.

SPH 273—Health Services Administration (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Limited enrollment. Structure and function of public and private medical care. Topics include categories and trends in national medical spending, predictors of patient use, causes of death, managed care, HMOs, Medicare, Medicaid, costs of technology, and medical care in other countries. Effective: 2008 Summer Session 2.

SPH 274—Economic Evaluation in Health Care (3)
Lecture/Lab—3 hours. Prerequisite(s): At least one semester of graduate level Statistics or consent of instructor. Cost-effectiveness/cost-benefit analysis (CE/CBA) methods among various economic evaluation methods. CE/CBA is increasingly used to evaluate alternative choices in public health and clinical practice and to enlighten and inform health policy determinations. Effective: 2012 Fall Quarter.

SPH 276—Critical Assessment in Health Policy and Economics (2)
Lecture/Discussion—2 hours. Course aims to develop critical reading skills of the health policy and health economics literature, mainly following the microeconomic paradigm and analytical techniques. Some basic concepts of micro economic theory will be explained in the class. Effective: 2014 Fall Quarter.

SPH 277—Net Benefit Regression (3)
Lecture/Discussion—3 hours. Prerequisite(s): STA 100 or SPH 244 or MPM 202; or Consent of Instructor. Graduate student standing. Open to graduate students only. Uses regression methods for cost-effectiveness analysis. Focus on methods that create and explain economic information in person-level data. Effective: 2017 Fall Quarter.

SPH 280—Introduction to SAS Programming (3)
Discussion/Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): Introductory statistics course (e.g., MPM 402, STA 102). Introduction to SAS, an integrated software system for data retrieval and management, data manipulation and programming. (Epidemiology (Graduate Group) 280.) Effective: 2016 Fall Quarter.

SPH 290—Topics in Public Health (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Open to students in Master of Public Health program. Key issues and current topics in public health. Course begins in August SSII. Students must enroll in August, then Fall and Winter. The course is a series but grades and units are given at end of each quarter. May be repeated up to 10 time(s). (S/U grading only.) Effective: 2017 Winter Quarter.

SPH 291—Public Health Sciences Doctoral Seminar (1-7)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Seminar to explore research on translational science and rural health; includes presentations of student research in progress. May be repeated up to 6 time(s) when topic differs; with consent of instructor, etc. (S/U grading only.) Effective: 2017 Fall Quarter.

SPH 292A—Public Health Translational Science Rotation (1-7)
Variable—1-7 hours. Prerequisite(s): Ph.D. student in Public Health Sciences or consent of instructor. Public Health Translational Science Rotation for Ph.D. students in Public Health Sciences. May be repeated up to 8 unit(s) with consent of instructor. (S/U grading only.) Effective: 2017 Fall Quarter.

SPH 292B—Public Health Translational Science Rotation (1-7)
Variable—1-3 hours. Prerequisite(s): Consent of Instructor. Open to Ph.D. students in Public Health Sciences. Public Health Translational Science Rotation for Ph.D. students in Public Health Sciences. May be repeated up to 8 unit(s) with consent of instructor. (S/U grading only.) Effective: 2018 Winter Quarter.

SPH 295—International Health (2)
Lecture/Discussion—2 hours. Prerequisite(s): Graduate standing or consent of instructor. Forum for learning health issues and health care systems in other countries. Topics include health care for refugees, the impact of political strife on health, the health care professional in international settings. (S/U grading only.) Effective: 2010 Winter Quarter.

SPH 297—Public Health Practicum (1-16)
Variable—3-32 hours. Prerequisite(s): Consent of Instructor. Open to Master of Public Health students. Practical fieldwork experience in public health. Placement site will vary based on the interest and experience of each student. May be repeated up to 4 time(s). (S/U grading only.) Effective: 2008 Summer Session 2.

SPH 298—Study in Community and International Health (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Graduate student in good academic standing. Study and experience for graduate students in any number of areas in community and international health. (S/U grading only.) Effective: 2008 Summer Session 2.

SPH 299—Research in Community and International Health (1-12)
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Student will work with faculty member in areas of research interest, including but not limited to injury control, international health, health policy, occupational and environmental health, health promotion and wellness, women's health, and health demographics. (S/U grading only.) Effective: 2008 Summer Session 2.

SPH 402—Introductory Medical Spanish (2)
Lecture—2 hours. Prerequisite(s): Medical student or consent of instructor. The vocabulary needed to conduct a basic history and physical examination in Spanish. (H/P/F grading only.) Effective: 2008 Summer Session 2.

SPH 461—Clerkship in Community Health Group Practice (3-9)
Clinical Activity. Prerequisite(s): Third-or fourth-year medical student. Overview of local community health in group practice situations. Students participate in treatment at several clinic sites in Yolo County. Topics include primary care, environmental health, maternal and child health, jail health, and preventive health care for the aged. (S/U grading only.) Effective: 2008 Summer Session 2.

SPH 465—Community Health Preceptorship (3-18)
Clinical Activity—5-40 hours. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing. Participate at state or county health department or other public health organization in on-going investigations into current public health problems, e.g., birth defects, cancer control, diabetes, hypertension, injury control, infectious diseases, aging, Alzheimer's disease, and smoking and tobacco use control. (H/P/F grading only.) Effective: 2010 Spring Quarter.

SPH 466—Occupational and Environmental Medicine Elective (6-12)
Clinical Activity; Laboratory; Variable—6-12 hours. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing. Participate in activities of Occupational and Environmental Health Unit. Major activity is involvement in an epidemiologic research project of the University. Participate in Occupational and Environmental Medicine Clinic at UC Davis Medical Center and other sites, as arranged. (H/P/F grading only.) Effective: 2010 Summer Quarter.

SPH 470—Clinical Selective in Occupational and Environmental Medicine (3-6)
Clinical Activity—9-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing. Outpatient clinical experience in Occupational and Environmental Medicine at UCDMC and other sites, as arranged. Gain experience in evaluating occ/env medical conditions, use of medical literature resources, the worker's compensation system, and toxicological principles. Students may take up to four weeks for six units. (H/P/F grading only.) Effective: 2010 Spring Quarter.

SPH 480—Insights in Occupational and Environmental Medicine (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. First- or second-year medical student in good academic standing. Observe and participate in research and clinical activities in occupational and environmental medicine which include conferences, occupational and environmental medicine clinical activities and field visits. Develop and present small individual research projects. (P/F grading only.) Effective: 2010 Summer Quarter.

SPH 495—International Health (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Medical student in good academic standing. Forum for learning health issues and health care systems in other countries. Topics include health care for refugees, the impact of political strife on health, the health care professional in international settings. (H/P/F grading only.) Effective: 2009 Spring Quarter.

SPH 496—Current Issues in Public Health (1)
Lecture/Discussion—1 hour. Topical issues in public health. Speakers from the local public health community address issues such as disease control programs, access to care. May be repeated up to 3 time(s). (P/F grading only.) Effective: 2008 Summer Session 2.

SPH 498—Study in Public Health Sciences (1-6)
Variable—3-18 hours. Prerequisite(s): Consent of Instructor. Medical student in good academic standing. Study and experience for medical students in areas in community and international health. May be repeated for credit. (H/P/F grading only.) Effective: 2009 Spring Quarter.

SPH 499—Research in Public Health Sciences (1-9)
Variable. Prerequisite(s): Medical students with consent of instructor. Work with faculty member in areas of research interest, including but not limited to public health, injury control, international health, health policy, occupational and environmental health, health promotion and wellness, women's health, and health demographics. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

Public Health Sciences

Public Health Sciences | Public Health Sciences Information

(School of Medicine)

Department. Public Health Sciences; Med-Sci 1C; 530-754-4992; http://www.ucdmc.ucdavis.edu/phs/

Faculty. http://www.ucdmc.ucdavis.edu/phs/about/phs_faculty.html

Public Health Sciences | Public Health Sciences Ph.D.

(School of Medicine)

Department. Public Health Sciences; Med-Sci 1C; 530-754-9048; http://www.ucdmc.ucdavis.edu/phs/

Faculty. http://www.ucdmc.ucdavis.edu/phs/about/phs_faculty.html

The Ph.D. in Public Health Sciences requires two years of research courses and rotations to allow students to practice research and translational public health sciences techniques they have learned in the classroom.

Required Core Courses **Units:** 30-48

SPH 202	Public Health Issues in California's Central Valley	3
SPH 212	Migration and Health	3
SPH 213	Health Disparities in the U.S.	3
SPH 246	Biostatistics for Clinical Research	4
SPH 276	Critical Assessment in Health Policy and Economics	2
SPH 291	Public Health Sciences Doctoral Seminar	1-7
SPH 292A	Public Health Translational Science Rotation	1-7
SPH 292B	Public Health Translational Science Rotation	1-7
EPI 206	Epidemiologic Study Design	4
EPI 220	Problems in Epidemiologic Study Design	4
MHI 210	Introduction to Health Informatics	4

Total: 30-48

Public Health Sciences | Public Health Sciences Minor

(School of Medicine)

Department. Public Health Sciences; Med-Sci 1C; 530-754-4992; http://www.ucdmc.ucdavis.edu/phs/

Faculty. http://www.ucdmc.ucdavis.edu/phs/about/phs_faculty.html

The Public Health Sciences minor offers undergraduate students a foundation of knowledge for those who plan to enter the field of public health immediately following graduation and for those planning to earn an advanced degree in Public Health or a related field including medicine, nursing, and dentistry.

For a full list of electives, see Elective Courses at http://www.ucdmc.ucdavis.edu/phs/education/undergraduate.html.

Public Health Sciences **Units:** 20

SPH 101	Introduction to Public Health	3
SPH 102	Introduction to Human Epidemiology	4
SPH 190	Topics in Public Health	1

Choose one:

SPH 104	Globalization and Health: Evidence and Policies	3
SPH 113	Health Disparities in the U.S.	3

Prior to Winter 2018 Public Health Sciences 113 was Public Health Sciences 105 (2 units); prior to Fall 2018 Public Health Sciences 113 was 2 units.

Electives

Total: 20

Public Health Sciences | SPH Courses

Courses in SPH:

SPH 092—Internship in Community Health (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Students apply theory and concepts learned in the classroom through field work in a community health agency. (P/NP grading only.) Effective: 2008 Summer Session 2.

SPH 101—Introduction to Public Health (3)
Lecture—3 hours. Prerequisite(s): Undergraduate standing. Provide basic concepts and controversies in public health, basic science of public health, social and behavioral factors in health and disease, environmental and occupational health issues, the relationship of public health to the medical care system and health care reform. GE credit: SE, SS. Effective: 2016 Winter Quarter.

SPH 102—Introduction to Human Epidemiology (4)
Discussion—2 hours; Lecture—2 hours. Practice of epidemiology as it relates to human populations. Content is fundamental to the Public Health minor and a required core course. GE credit: SE. Effective: 2017 Spring Quarter.

SPH 104—Globalization and Health: Evidence and Policies (3)
Lecture—3 hours. Provides an overview of the evidence on the multiple effects of globalization policies on health. GE credit: SS, WC. Effective: 2017 Winter Quarter.

SPH 113—Health Disparities in the U.S. (3)
Lecture—3 hours. Introduction to the principles and practice of health disparities research. GE credit: DD, SS. Effective: 2018 Spring Quarter.

SPH 132—Health Issues Confronting Asian Americans and Pacific Islanders (4)
Lecture/Discussion—4 hours. Health issues confronting Asian Americans and Pacific Islanders. (Asian American Studies 132.) GE credit: SS. Effective: 2009 Winter Quarter.

SPH 160—General Health Education and Prevention (5)
Discussion—1 hour; Lecture—4 hours. Open to students in the internship program for the Health Education Program only; class size limited to 50 students. Topics include addiction, substance abuse/prevention, nutrition, stress management, physical fitness, body image, reproductive anatomy & physiology, contraceptive options, safer sex, sexual health, healthy relationships, and other general wellness/health promotion topics. Practice in peer counseling and outreach presentations. (P/NP grading only.) Effective: 2008 Summer Session 2.

SPH 161—Campus Alcohol/Other Drug Abuse Prevention Program Peer Educator Training (4)
Lecture/Discussion—3 hours; Practice—1 hour. Prerequisite(s): SPH 160 (can be concurrent); and Consent of Instructor. Preparation for internship in campus and community substance abuse prevention and educational intervention. Addiction and other physiological responses to alcohol and other drugs. Harm-reduction strategies for individuals and target populations. Practice in peer counseling skills and outreach presentations to groups. (P/NP grading only.) Effective: 2008 Summer Session 2.

SPH 162—Health Advocates Peer Educator Training (4)
Lecture/Discussion—3 hours; Practice—1 hour. Prerequisite(s): SPH 160 (can be concurrent); and Consent of Instructor. Preparation for internship in campus and community health promotion and risk reduction. Nutrition, stress management, physical fitness, body image and disordered eating, skin cancer prevention, and other general wellness/health promotion topics. (P/NP grading only.) Effective: 2008 Summer Session 2.

SPH 190—Topics in Public Health (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Seminar on key issues and current topics in public health. May be repeated for credit. (P/NP grading only.) Effective: 2016 Fall Quarter.

SPH 190C—Research Conference in Community and International Health (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Weekly conference on research problems, progress, and techniques in Community and International Health. Critical discussion of recent journal articles. May be repeated for credit. (P/NP grading only.) Effective: 2008 Summer Session 2.

SPH 192—Internship in Community Health Practice (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Upper division and graduate students. The student, through fieldwork in a community health agency, learns to apply theory and concepts learned in the classroom. (P/NP grading only.) Effective: 2008 Summer Session 2.

SPH 198—Study in Community and International Health (1-5)
Variable. Prerequisite(s): Consent of Instructor. Undergraduate standing. Study and experience for undergraduate students in any number of areas in community and international health. (P/NP grading only.) Effective: 2008 Summer Session 2.

SPH 199—Research in Community and International Health (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Undergraduate standing. Student will work with faculty member in areas of research interest, including but not limited to injury control, international health, health policy, occupational and environmental health, health promotion and wellness, women's health, and health demographics. (P/NP grading only.) Effective: 2008 Summer Session 2.

SPH 201—Introduction to Public Health (3)
Discussion/Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Provides an overview of public health. Covers the history of public health in the U.S.; defines its major functions and constituencies; and, introduces fundamental principles of epidemiology, biostatistics, behavioral sciences, environmental health, infectious diseases, and reducing health disparities. May be repeated up to 1 time(s). Effective: 2011 Summer Session 2.

SPH 202—Public Health Issues in California's Central Valley (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Public health issues in California's Central Valley, including the influences of migration, racial and ethnic diversity, the agricultural industry, environmental exposures, and rurality. Effective: 2018 Spring Quarter.

SPH 203—Learning and Teaching in Public Health Contexts (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Aimed at current and future public health professionals interested in learning more about the educational potential for interactions with community members and other health professionals—all stakeholders in improving the health of communities. Effective: 2012 Spring Quarter.

SPH 204—Globalization and Health: Evidence and Policies (3)
Lecture—3 hours. Open to graduate student standing. Provides an overview of the evidence on the multiple effects of globalization policies on health. Effective: 2015 Fall Quarter.

SPH 205AY—Epidemiology for Health Professionals (4)
Lecture—2 hours; Web Virtual Lecture—2 hours. Prerequisite(s): Consent of Instructor. Basic epidemiologic concepts and approaches to epidemiologic research, with examples from human medicine, including outbreak investigation, infectious disease epidemiology, properties of tests. Effective: 2017 Fall Quarter.

SPH 207—Advanced Epidemiologic Methodology (4)
Lecture/Discussion—4 hours. Prerequisite(s): EPI 206 In-depth integration of advanced epidemiological concepts. Theory, methods, and applications for observational studies including random and systematic error, confounding, counterfactuals, causal inference, effect modification, internal and external validity, estimability, and interpretation of effect measures, and advanced study designs. (Epidemiology 207.) Effective: 2016 Winter Quarter.

SPH 208—Principles & Applications of Cancer Prevention & Control (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Principles and applications of cancer prevention and control from a public health perspective. (S/U grading only.) Effective: 2018 Spring Quarter.

SPH 209—History of Epidemiology in Public Health (2)
Discussion—1.5 hours; Lecture—0.5 hours. Introduction to the history of epidemiology in solving major public health problems. Original historical articles will be read/discussed. Topics may include: infectious disease, accidents/adverse events, nutritional deficiencies, community vaccination trials, occupational exposures, cancer, birth defects, cardiovascular disease, and smoking. (Epidemiology 209.) Effective: 2014 Fall Quarter.

SPH 210—Public Health Informatics (2)
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Collection, verification, and utilization of data related to populations; infrastructure, functions, and tools used to generate public health knowledge supporting public health practices and policy development/dissemination. (S/U grading only.) Effective: 2008 Summer Session 2.

SPH 212—Migration and Health (3)
Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing. Principles of migration and health. Topics will include demographics, public health invention programs, health care delivery, occupational health, and effects of international migration on the health in communities of origin, transit and destination. Guest presentations by outside experts. Effective: 2012 Spring Quarter.

SPH 213—Health Disparities in the U.S. (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Introduction to the principles and practice of health disparities research. Effective: 2018 Spring Quarter.

SPH 222—Social & Behavioral Aspects of Public Health (3)
Lecture/Discussion—3 hours. Prerequisite(s): STA 102; STA 106; and Consent of Instructor. Graduate standing. Theories and strategies of health behavior change at the individual, group, community, and environmental levels. Examples include: transtheoretical model, social networks, and social marketing. Theories are applied to solve common public health problems (cancer, obesity, smoking, and HIV/AIDS). Effective: 2009 Winter Quarter.

SPH 223—Obesity Prevention in Community Settings (3)
Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Look at causes of the obesity epidemic in the U.S.; identify and critically assess the research literature on various prevention strategies; understand, and apply evidence-based public health strategies to combat obesity; and translate the science to a general audience. Effective: 2014 Fall Quarter.

SPH 232—Health Communication (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Health communication theories and research traditions. Topics include consumer health information seeking; physician-patient interaction; information, social marketing, "edutainment," and media advocacy campaigns; social networks and coping; media influences on health; and new communication technologies in health promotion and healthcare delivery. (Communication 232.) Effective: 2011 Fall Quarter.

SPH 233—Persuasive Technologies for Health (4)
Lecture/Discussion—3 hours; Term Paper. Theorizing, designing and evaluating ethical technology-based health communication interventions. Uses of social media, mobile communication apps, wearable devices, computer-generated tailored messages, educational games, and computational approaches in health promotion and healthcare delivery. (CMN 233) Effective: 2017 Fall Quarter.

SPH 235—Health Communication Campaigns (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Restricted to graduate students. Principles of health communication campaign planning, implementation and evaluation. Strategies for changing health behaviors, shaping policy, and improving healthcare organizations' relations with stakeholders. (CMN 235.
) Effective: 2017 Fall Quarter.

SPH 244—Introduction to Medical Statistics (4)
Lecture—4 hours. Introduction to statistical methods and software in clinical, laboratory and population medicine. Graphical and tabular presentation of data, probability, binomial, Poisson, normal, t-, F-, and Chi-square distributions, elementary nonparametric methods, simple linear regression and correlation, life tables. Only one unit of credit for students who have completed Statistics 100 or Preventive Veterinary Medicine 402. (Clinical Research 244.) Effective: 2017 Winter Quarter.

SPH 245—Biostatistics for Biomedical Science (4)
Lecture—4 hours. Prerequisite(s): CLH 244 or SPH 244; and Consent of Instructor. Or an equivalent course. Analysis of data and design of experiments for laboratory data. (Clinical Research 245.) Effective: 2015 Spring Quarter.

SPH 246—Biostatistics for Clinical Research (4)
Lecture—4 hours. Prerequisite(s): SPH 245 or CLH 245 Emphasizes critical biostatistics for clinical research and targets biomedical audience. Students will develop understanding for basic planning and analysis of clinical studies and learn to develop collaborations with biostatisticians. May be repeated for credit. (Clinical Research 246.) Effective: 2015 Winter Quarter.

SPH 247—Statistical Analysis for Laboratory Data (4)
Lecture—4 hours. Prerequisite(s): CLH 245 or SPH 245 Statistical methods for experimental design and analysis of laboratory data including gene expression arrays, RNA-Seq, and mass spec. (Clinical Research 247.) Effective: 2015 Spring Quarter.

SPH 252—Social Epidemiology (2)
Lecture/Discussion—2 hours. Prerequisite(s): EPI 205A; and Consent of Instructor. Social determinants of health; psychosocial and physiological pathways; health and social inequality; gender and racial/ethnic disparities in health; social support, social cohesion and health; social gradient in behavioral risk factors; social ecological approaches to health intervention; interventions addressing social determinants. (Epidemiology 252.) Effective: 2009 Spring Quarter.

SPH 255—Human Reproductive Epidemiology (3)
Lecture—3 hours. Prerequisite(s): MPM 405; MPM 406; PHY 220; PGG 222; or equivalents or Consent of Instructor. Human reproductive effects and risk of reproductive disorders, examined from macro- and micro-environmental exposures in community and occupational settings, epidemiologic study designs and analyses. Effective: 2009 Spring Quarter.

SPH 262—Principles of Environmental Health Science (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Principles, approaches and issues related to environmental health. Recognizing, assessing, understanding and controlling the impact of people on their environment and the impact of the environment on the public. Effective: 2008 Summer Session 2.

SPH 264—Public Health Econometrics (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Principles of demand and supply; elasticity; benefits and costs; least squares regression; stepwise regression; economic and statistical significance; fixed and random effects; longitudinal data; non-linear relations; continuous and binary variables; instrumental variables; attrition bias; tobit regression; Two-part cost model. (S/U grading only.) Effective: 2008 Spring Quarter.

SPH 266—Applied Analytic Epidemiology (3)
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): MPM 404; or Consent of Instructor. Principles and applications in analysis of epidemiologic data. Methods of analyzing stratified and matched data, logistic regression for cohort and case-control studies, Poisson regression, survival-time methods. (Population Health and Reproduction 266) Effective: 2009 Spring Quarter.

SPH 273—Health Services Administration (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Limited enrollment. Structure and function of public and private medical care. Topics include categories and trends in national medical spending, predictors of patient use, causes of death, managed care, HMOs, Medicare, Medicaid, costs of technology, and medical care in other countries. Effective: 2008 Summer Session 2.

SPH 274—Economic Evaluation in Health Care (3)
Lecture/Lab—3 hours. Prerequisite(s): At least one semester of graduate level Statistics or consent of instructor. Cost-effectiveness/cost-benefit analysis (CE/CBA) methods among various economic evaluation methods. CE/CBA is increasingly used to evaluate alternative choices in public health and clinical practice and to enlighten and inform health policy determinations. Effective: 2012 Fall Quarter.

SPH 276—Critical Assessment in Health Policy and Economics (2)
Lecture/Discussion—2 hours. Course aims to develop critical reading skills of the health policy and health economics literature, mainly following the microeconomic paradigm and analytical techniques. Some basic concepts of micro economic theory will be explained in the class. Effective: 2014 Fall Quarter.

SPH 277—Net Benefit Regression (3)
Lecture/Discussion—3 hours. Prerequisite(s): STA 100 or SPH 244 or MPM 202; or Consent of Instructor. Graduate student standing. Open to graduate students only. Uses regression methods for cost-effectiveness analysis. Focus on methods that create and explain economic information in person-level data. Effective: 2017 Fall Quarter.

SPH 280—Introduction to SAS Programming (3)
Discussion/Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): Introductory statistics course (e.g., MPM 402, STA 102). Introduction to SAS, an integrated software system for data retrieval and management, data manipulation and programming. (Epidemiology (Graduate Group) 280.) Effective: 2016 Fall Quarter.

SPH 290—Topics in Public Health (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Open to students in Master of Public Health program. Key issues and current topics in public health. Course begins in August SSII. Students must enroll in August, then Fall and Winter. The course is a series but grades and units are given at end of each quarter. May be repeated up to 10 time(s). (S/U grading only.) Effective: 2017 Winter Quarter.

SPH 291—Public Health Sciences Doctoral Seminar (1-7)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Seminar to explore research on translational science and rural health; includes presentations of student research in progress. May be repeated up to 6 time(s) when topic differs; with consent of instructor, etc. (S/U grading only.) Effective: 2017 Fall Quarter.

SPH 292A—Public Health Translational Science Rotation (1-7)
Variable—1-7 hours. Prerequisite(s): Ph.D. student in Public Health Sciences or consent of instructor. Public Health Translational Science Rotation for Ph.D. students in Public Health Sciences. May be repeated up to 8 unit(s) with consent of instructor. (S/U grading only.) Effective: 2017 Fall Quarter.

SPH 292B—Public Health Translational Science Rotation (1-7)
Variable—1-3 hours. Prerequisite(s): Consent of Instructor. Open to Ph.D. students in Public Health Sciences. Public Health Translational Science Rotation for Ph.D. students in Public Health Sciences. May be repeated up to 8 unit(s) with consent of instructor. (S/U grading only.) Effective: 2018 Winter Quarter.

SPH 295—International Health (2)
Lecture/Discussion—2 hours. Prerequisite(s): Graduate standing or consent of instructor. Forum for learning health issues and health care systems in other countries. Topics include health care for refugees, the impact of political strife on health, the health care professional in international settings. (S/U grading only.) Effective: 2010 Winter Quarter.

SPH 297—Public Health Practicum (1-16)
Variable—3-32 hours. Prerequisite(s): Consent of Instructor. Open to Master of Public Health students. Practical fieldwork experience in public health. Placement site will vary based on the interest and experience of each student. May be repeated up to 4 time(s). (S/U grading only.) Effective: 2008 Summer Session 2.

SPH 298—Study in Community and International Health (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Graduate student in good academic standing. Study and experience for graduate students in any number of areas in community and international health. (S/U grading only.) Effective: 2008 Summer Session 2.

SPH 299—Research in Community and International Health (1-12)
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Student will work with faculty member in areas of research interest, including but not limited to injury control, international health, health policy, occupational and environmental health, health promotion and wellness, women's health, and health demographics. (S/U grading only.) Effective: 2008 Summer Session 2.

SPH 402—Introductory Medical Spanish (2)
Lecture—2 hours. Prerequisite(s): Medical student or consent of instructor. The vocabulary needed to conduct a basic history and physical examination in Spanish. (H/P/F grading only.) Effective: 2008 Summer Session 2.

SPH 461—Clerkship in Community Health Group Practice (3-9)
Clinical Activity. Prerequisite(s): Third-or fourth-year medical student. Overview of local community health in group practice situations. Students participate in treatment at several clinic sites in Yolo County. Topics include primary care, environmental health, maternal and child health, jail health, and preventive health care for the aged. (S/U grading only.) Effective: 2008 Summer Session 2.

SPH 465—Community Health Preceptorship (3-18)
Clinical Activity—5-40 hours. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing. Participate at state or county health department or other public health organization in on-going investigations into current public health problems, e.g., birth defects, cancer control, diabetes, hypertension, injury control, infectious diseases, aging, Alzheimer's disease, and smoking and tobacco use control. (H/P/F grading only.) Effective: 2010 Spring Quarter.

SPH 466—Occupational and Environmental Medicine Elective (6-12)
Clinical Activity; Laboratory; Variable—6-12 hours. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing. Participate in activities of Occupational and Environmental Health Unit. Major activity is involvement in an epidemiologic research project of the University. Participate in Occupational and Environmental Medicine Clinic at UC Davis Medical Center and other sites, as arranged. (H/P/F grading only.) Effective: 2010 Summer Quarter.

SPH 470—Clinical Selective in Occupational and Environmental Medicine (3-6)
Clinical Activity—9-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing. Outpatient clinical experience in Occupational and Environmental Medicine at UCDMC and other sites, as arranged. Gain experience in evaluating occ/env medical conditions, use of medical literature resources, the worker's compensation system, and toxicological principles. Students may take up to four weeks for six units. (H/P/F grading only.) Effective: 2010 Spring Quarter.

SPH 480—Insights in Occupational and Environmental Medicine (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. First- or second-year medical student in good academic standing. Observe and participate in research and clinical activities in occupational and environmental medicine which include conferences, occupational and environmental medicine clinical activities and field visits. Develop and present small individual research projects. (P/F grading only.) Effective: 2010 Summer Quarter.

SPH 495—International Health (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Medical student in good academic standing. Forum for learning health issues and health care systems in other countries. Topics include health care for refugees, the impact of political strife on health, the health care professional in international settings. (H/P/F grading only.) Effective: 2009 Spring Quarter.

SPH 496—Current Issues in Public Health (1)
Lecture/Discussion—1 hour. Topical issues in public health. Speakers from the local public health community address issues such as disease control programs, access to care. May be repeated up to 3 time(s). (P/F grading only.) Effective: 2008 Summer Session 2.

SPH 498—Study in Public Health Sciences (1-6)
Variable—3-18 hours. Prerequisite(s): Consent of Instructor. Medical student in good academic standing. Study and experience for medical students in areas in community and international health. May be repeated for credit. (H/P/F grading only.) Effective: 2009 Spring Quarter.

SPH 499—Research in Public Health Sciences (1-9)
Variable. Prerequisite(s): Medical students with consent of instructor. Work with faculty member in areas of research interest, including but not limited to public health, injury control, international health, health policy, occupational and environmental health, health promotion and wellness, women's health, and health demographics. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

Quantitative Biology & Bioinformatics Minor; Biological Sciences

Quantitative Biology & Bioinformatics Minor; Biological Sciences | Quantitative Biology & Bioinformatics Minor

(College of Biological Sciences)

530-752-0410; clhom@ucdavis.edu; http://quantbio.ucdavis.edu/

The interdisciplinary minor in Quantitative Biology and Bioinformatics is an integrative program that introduces students to the quantitative and computational approaches that are redefining all disciplines in the biological sciences, from molecular and cell biology, through genetics and physiology, to ecology and evolutionary biology. Students in this minor will learn research tools that apply mathematical and computational methods, increase their insight into the strengths and limitations of quantitative approaches, and develop the interdisciplinary perspective that is now the foundation of modern biological research and training.

The minor in Quantitative Biology and Bioinformatics is open to all undergraduates regardless of major and is sponsored by the College of Biological Sciences.

Restrictions. No more than two upper division courses from a single department may be offered in satisfaction of the minor requirements. Only one course used to satisfy a requirement for the minor may be applied toward a student's major.

Minor Advisor. Consult the Biology Academic Success Center (BASC). 1023 Sciences Laboratory Building; 530-752-0410; http://basc.ucdavis.edu/

Quantitative Biology and Bioinformatics **Units:** 18-24

Core Courses

Programming:

ECS 032A	Introduction to Programming	4
OR		
ECS 036A	Programming and Problem Solving	4

OR

The equivalent.

The programming requirement may be satisfied by previous experience and therefore may not entail college course credit. Please see your minor advisor for this determination and its possible impact on your unit requirements for the minor.

Quantitative Biology:

BIS 132	Introduction to Dynamic Models in Modern Biology	4
OR		
MAT 124	Mathematical Biology	4

Bioinformatics:

ECS 124	Theory and Practice of Bioinformatics	4
ECS 129	Computational Structural Bioinformatics	4

Quantitative and Computational Preparation:

Choose one:

BIM 105	Probability and Statistics for Biomedical Engineers	4
ECS 130	Scientific Computation	4
MAT 128A	Numerical Analysis	4
MAT 128B	Numerical Analysis in Solution of Equations	4
MAT 128C	Numerical Analysis in Differential Equations	4
MAT 135A	Probability	4
STA 130A	Mathematical Statistics: Brief Course	4

STA 131A	Introduction to Probability Theory	4
STA 141A	Fundamentals of Statistical Data Science	4

Restricted Electives

Complete two or more from the following list to achieve a total of 18-24 units:

BIS 134	Systems Biology: From Biological Circuits to Biological Systems	2
BIS 180L	Genomics Laboratory	5
BIS 181	Comparative Genomics	3
BIS 183	Functional Genomics	3
BIM 102	Cellular Dynamics	4
BIM 117	Modeling Strategies for Biomedical Engineering	4
BIM 140	Protein Engineering	4
BIM 141	Cell and Tissue Mechanics	4
BIM 151	Mechanics of DNA	3
BIT 150	Applied Bioinformatics	4
ECS 165A	Database Systems	4
EVE 102	Population and Quantitative Genetics	4
EVE 103	Phylogeny, Speciation and Macroevolution	4
EVE 104	Community Ecology	4
EVE 175	Computational Genetics	3
MIC 105	Microbial Diversity	3
MCB 123	Behavior and Analysis of Enzyme and Receptor Systems	3
MCB 143	Cell and Molecular Biophysics	3
MCB 182	Principles of Genomics	3
NPB 166	Math Tools for Neuroscience	4
NPB 167	Computational Neuroscience	5

Choose one:

ESP 121	Population Ecology	4
WFC 122	Population Dynamics and Estimation	4

Total: 18-24

Religious Studies

Religious Studies | RST Information

(College of Letters and Science)

Archana Venkatesan, Ph.D., Chair

Program Office. 213 Sproul Hall; 530-752-1219; http://religions.ucdavis.edu

Faculty. http://religions.ucdavis.edu/people

Religious Studies | RST A.B.

(College of Letters and Science)

Archana Venkatesan, Ph.D., Chair

Program Office. 213 Sproul Hall; 530-752-1219; http://religions.ucdavis.edu

Faculty. http://religions.ucdavis.edu/people

The Major Program

Religion is a major force in human experience. It has shaped the world's history, literature, art, culture, politics, ethics, and economics. In addition to offering courses in all the major religious traditions (Judaism, Christianity, Islam, and Hinduism,) the Religious Studies Program has developed cross-cultural courses dealing with religious symbols, myths, and rituals in written texts, art, theater, and film, and the Internet, as well as, thematic courses dealing with such topics as religion and the body, the rise of fundamentalism, religion and science, religion and ethics, and religion and violence.

The Program. The major introduces students to the academic study of religion. Students can choose from a broad range of courses both in the program itself and in other departments and programs-history, philosophy, psychology, sociology, anthropology, American studies, classics, and medieval studies. In addition to studying religious thought per se, students in the major can also study the way religion has shaped human behavior in such matters as family life, gender roles, ethics, artistic life, concepts of individual freedom, the pursuit of science, and economics. For some students, Religious Studies is an appropriate second major and combines well with anything from philosophy to international agricultural development, political science, and the physical sciences.

Career Alternatives. Because of the program's focus on developing critical thinking, writing, and reading skills, students who major in Religious Studies are well prepared to enter a variety of careers, including teaching, the health professions, law, business, and government. In an increasingly global society, knowledge of the world's religious traditions and practices has become an essential part of a student's education.

Recommended. A reading knowledge of a foreign language is highly recommended.

Course Equivalents. The major advisors have a list of lower and upper division courses that can be substituted for courses suggested above.

Honors and Honors Program. A student becomes eligible for graduation with honors by meeting the minimum GPA and course requirements established by the College of Letters and Science. Upon successful completion of the additional requirements of the College of Letters and Science Honors Program, individual students may be recommended by the program for graduation with high honors or highest honors on the basis of an evaluation of their academic achievements in the major.

Education Abroad Program. The Religious Studies program encourages students to study in the Summer Abroad program, the Quarter Abroad program, or the Education Abroad program. With the approval of a major advisor, applicable courses taken abroad may be accepted in the major or minor programs.

Teaching Credential Subject Representative. See the Teaching Credential/M.A. Program.

Hebrew. Students interested in Hebrew courses should see http://classics.ucdavis.edu/hebrew.

Human Rights Minor. Students interested in the Human Rights minor should see http://humanrightsminor.ucdavis.edu.

Jewish Studies. Students interested in Jewish Studies should see http://jewishstudies.ucdavis.edu.

Major Advisors. Consult the Program office.

Preparatory Subject Matter **Units:** 20

(A) Choose one course from the Religious Studies 1 series.

(B) Choose four courses from other Religious Studies lower division offerings.

Depth Subject Matter **Units:** 40

RST 100	Study of Religion: Issues and Methods	4
OR		
RST 190	Seminar	4

Choose nine upper division Religious Studies courses.

Four of these courses may be upper division courses related to religion that are offered by other departments and taken with the approval of a Religious Studies advisor.

Total: 60

Religious Studies | RST Minor

(College of Letters and Science)

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The Program. The major introduces students to the academic study of religion. Students can choose from a broad range of courses both in the program itself and in other departments and programs-history, philosophy, psychology, sociology, anthropology, American studies, classics, and medieval studies. In addition to studying religious thought per se, students in the major can also study the way religion has shaped human behavior in such matters as family life, gender roles, ethics, artistic life, concepts of individual freedom, the pursuit of science, and economics. For some students, Religious Studies is an appropriate second major and combines well with anything from philosophy to international agricultural development, political science, and the physical sciences.

Career Alternatives. Because of the program's focus on developing critical thinking, writing, and reading skills, students who major in Religious Studies are well prepared to enter a variety of careers, including teaching, the health professions, law, business, and government. In an increasingly global society, knowledge of the world's religious traditions and practices has become an essential part of a student's education.

Recommended. A reading knowledge of a foreign language is highly recommended.

Course Equivalents. The major advisors have a list of lower and upper division courses that can be substituted for courses suggested above.

Honors and Honors Program. A student becomes eligible for graduation with honors by meeting the minimum GPA and course requirements established by the College of Letters and Science. Upon successful completion of the additional requirements of the College of Letters and Science Honors Program, individual students may be recommended by the program for graduation with high honors or highest honors on the basis of an evaluation of their academic achievements in the major.

Education Abroad Program. The Religious Studies program encourages students to study in the Summer Abroad program, the Quarter Abroad program, or the Education Abroad program. With the approval of a major advisor, applicable courses taken abroad may be accepted in the major or minor programs.

Teaching Credential Subject Representative. See the Teaching Credential/M.A. Program.

Hebrew. Students interested in Hebrew courses should see http://classics.ucdavis.edu/hebrew.

Human Rights Minor. Students interested in the Human Rights minor should see http://humanrightsminor.ucdavis.edu.

Jewish Studies. Students interested in Jewish Studies should see http://jewishstudies.ucdavis.edu.

Major Advisors. Consult the Program office.

Religious Studies **Units:** 20

Choose one lower division course.

Choose 16 units of upper division courses.

RST 190	Seminar	4
RST 190 recommended.		

Some substitutions from other departments or programs allowed with consent of advisor.

Total: 20

Religious Studies | RST Courses

Courses in RST:

RST 001—Survey of Religion (4)
Discussion—1 hour; Lecture—3 hours. Basic concepts introduced through readings of the primary religious literature. Discussion of central ideas (creation, history, law, prophecy, suffering, mysticism, asceticism, karma, reincarnation, moksha, etc.); readings from the Bible, Bhagavad Gita, the Koran, selections from Plato and early Buddhist writings. GE credit: ACGH, AH, DD, OL, VL, WE. Effective: 1997 Winter Quarter.

RST 001A—Pilgrimage (4)
Discussion—1 hour; Lecture—3 hours. Introduction to comparative religion, focusing on the theme of pilgrimage in different religious traditions. Not open to students who have taken course 3A. GE credit: AH, WC, WE. Effective: 2013 Spring Quarter.

RST 001B—Death and Afterlife (4)
Discussion—1 hour; Lecture—3 hours. Introduction to comparative religion, focusing on the theme of death and the afterlife in different religious traditions. Not open to students who have taken course 3B. GE credit: AH, OL, VL, WC, WE. Effective: 2013 Spring Quarter.

RST 001C—Sacrifice (4)
Discussion—1 hour; Lecture—3 hours. Introduction to comparative religion, focusing on the theme of sacrifice in different religious traditions. Not open to students who have taken course 3C. GE credit: AH, OL, VL, WC, WE. Effective: 2013 Spring Quarter.

RST 001D—Conversion (4)
Discussion—1 hour; Lecture—3 hours. Introduction to comparative religion, focusing on the theme of conversion in different religious traditions. Not open to students who have taken course 3D. GE credit: AH, WC, WE. Effective: 2013 Spring Quarter.

RST 001E—Fundamentalism (4)
Discussion—1 hour; Lecture—3 hours. Introduction to comparative religion, focusing on the idea of fundamentalism in different religious traditions. No credit given to students that have taken course 3E. GE credit: AH, DD, OL, SS, WE. Effective: 2017 Fall Quarter.

RST 001F—Religion Today (4)
Discussion—1 hour; Lecture—3 hours. Introduction to comparative religion, focusing on different religious traditions in the contemporary world. GE credit: AH, DD, WC, WE. Effective: 2013 Spring Quarter.

RST 001G—Myth, Ritual, and Symbolism (4)
Discussion—1 hour; Lecture—3 hours. Not open to students who have taken and received unit credit for course 2. Myths, rituals and religious symbols found in a variety of religious traditions including examples from ancient and contemporary religious life. Variety of religious phenomena; validity of different approaches to the study of religion. Not open to students who have taken and received unit credit for course 2. GE credit: AH, OL, VL, WC, WE. Effective: 2009 Fall Quarter.

RST 001H—Sex, Marriage, and Divorce in Medieval and Modern Society (4)
Discussion—1 hour; Lecture—3 hours. Methods used in the study of religion, focusing on a particular theme in a number of religious traditions. GE credit: AH, OL, WC, WE. Effective: 2015 Winter Quarter.

RST 001J—Music, Voice, and the Word (4)
Discussion—1 hour; Lecture—3 hours. Exploration of relation between religion and musical traditions in various cultures. Investigation of ways music, vocal performance and sound production reflect and shape modern religious sensibilities. Special attention to gender, ethnicity, race, class, nationalism, secularism and mass media. GE credit: AH, WC. Effective: 2015 Spring Quarter.

RST 005—Comparative Religion (2)
Lecture—2 hours. Comparative Religion based on rotating topics such as Dreams and Revelations, Evil, Prophecy, Salvation, and Crime and Punishment. May be repeated for credit when topic differs. GE credit: AH, WE. Effective: 2018 Winter Quarter.

RST 006—Introduction to Health Sciences and the Humanities (4)
Extensive Writing; Lecture/Discussion—3 hours. Humanities in the health sciences focusing on illness, the practice of medicine, and the role of culture in biomedical research. GE credit: ACGH, AH, DD, SS, WE. Effective: 2018 Spring Quarter.

RST 010—Contemporary Ethical Issues (2)
Lecture—2 hours. Presents challenging, contemporary ethical issues from a multi-cultural perspective. Rotating topics will include Ethical Eating, Capital Punishment, Euthanasia, Poverty, and Animal Rights. May be repeated for credit. GE credit: AH, WE. Effective: 2012 Fall Quarter.

RST 010A—Contemporary Ethical Issues (2)
Discussion—1 hour; Extensive Writing. Prerequisite(s): RST 010 (can be concurrent); RST 010 required concurrently; GE topical breadth and diversity credit only with concurrent enrollment in RST 010. Restricted to students enrolled in course 10. Discussion of the readings assigned for course 10 and completion of a major research paper. May be repeated for credit. GE credit: AH, WE. Effective: 2007 Winter Quarter.

RST 011—Ethical Eating (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Introduction to the complex and varied ethical, religious, and cultural meanings that food has had across the centuries and globe. GE credit: AH, OL, VL, WC, WE. Effective: 2014 Winter Quarter.

RST 012—The Emergence of Judaism, Christianity and Islam (4)
Discussion—1 hour; Lecture—3 hours. History of religion in the ancient Near East and Mediterranean, from the Persian period through the rise of Islam. Emphasis on historical and social contexts of the formation of new traditions, in particular Judaism, Christianity, and Islam. GE credit: AH, OL, WC, WE. Effective: 2012 Winter Quarter.

RST 015Y—Reading War/Fighting War (4)
Extensive Writing; Lecture—2 hours; Web Electronic Discussion—1 hour. Introduction to both classic religious texts about war and a set of actual scenarios drawn from the experience and training of soldiers in recent military conflicts. GE credit: ACGH, AH, DD, OL, VL, WC, WE. Effective: 2013 Spring Quarter.

RST 021—Hebrew Scriptures (4) ***Review all entries***
Lecture—3 hours; Term Paper/Discussion. Selected texts from the Hebrew Scriptures (GenesisII Chronicles) and review of modern scholarship on the texts from a variety of perspectives (historical, literary, sociological, psychological). Course work is based on an English translation and no knowledge of Hebrew is required. GE credit: AH, WC, WE. Effective: 2013 Spring Quarter.

RST 021—The Bible and Its Interpreters (4) ***Review all entries***
Lecture—3 hours; Term Paper/Discussion. Introduction to the Hebrew Bible (Old Testament): key narratives and themes (creation, flood, prophecy, justice, sexuality, etc.); origins in Ancient Israel; diverse ways it has been interpreted in Jewish and Christian communities. GE credit: AH, WC, WE. Effective: 2018 Fall Quarter.

RST 023—Introduction to Judaism (4)
Lecture/Discussion—3 hours; Term Paper. Introduction to the study of religion using examples from the rituals, art and holy texts of Judaism. No prior knowledge of either Judaism or the study of religion is necessary. GE credit: ACGH, AH, DD, WC, WE. Effective: 1997 Winter Quarter.

RST 030—Religions of South Asia (4)
Discussion—1 hour; Lecture—3 hours. Introduction to South Asian religions, including Hinduism, Buddhism, Islam, Jainism and Sikhism. Traces historical developments from Vedic texts and their ascetic reformulation by sages such as Yajnavalkya, Siddhartha Gautama, and Mahavira into our global present. GE credit: AH, VL, WC, WE. Effective: 2014 Winter Quarter.

RST 040—New Testament (4)
Discussion—1 hour; Lecture—3 hours. New Testament literature from critical, historical, and theological
perspectives. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

RST 042—Religion and Science Fiction (4)
Lecture—3 hours; Term Paper. Representations of actual and fictional religious movements in science fiction and fantasy writing and film. Examination of: the characteristics of religion and religiosity in fictional religious movements; the relationship between religion, science, and technology in modern speculative fiction. GE credit: AH, VL, WE. Effective: 2014 Winter Quarter.

RST 045—Christianity (4)
Lecture/Discussion—3 hours; Term Paper/Discussion. Major concepts and practices in the Christian tradition. Survey of the history of Christianity and Christian expansion from antiquity to modern times. Course pays particular attention to Christianity in China, India, Africa, the Middle East, and Latin America. GE credit: AH, VL, WC, WE. Effective: 2012 Fall Quarter.

RST 060—Introduction to Islam (4)
Lecture/Discussion—3 hours; Term Paper/Discussion—1 hour. Introduction to topics central to the Islamic tradition. Muhammad, the Qur'an, Islamic law, theology, philosophy, cosmology, worship, and mysticism. Race and gender in Islam, Islamic revival, and varying experiences of Islam in different historical and cultural settings. GE credit: AH, SS, WC, WE. Effective: 2014 Winter Quarter.

RST 065C—The Qur'an and Its Interpretation (4)
Extensive Writing; Lecture/Discussion—3 hours. The Qur'an, its history, its various functions in the lives of Muslims, and its different interpretations. Quranic themes such as God and humankind, nature and revelation, eschatology and Satan. Islam and other religions; women, gender, and sexuality. GE credit: AH, WC, WE. Effective: 2005 Spring Quarter.

RST 067—Modern Hinduism (4)
Lecture/Discussion—3 hours; Term Paper. Historical survey of modern Hinduism from the early nineteenth century to the present. Topics include Rammohun Roy, Sir William Jones, and Mahatma Gandhi, nationalism, post-colonialism and diasporic religion. GE credit: AH, SS, VL, WC, WE. Effective: 2011 Winter Quarter.

RST 068—Hinduism (4)
Extensive Writing; Lecture—3 hours. Hindu tradition from ancient to modern times. Multiplicity of religious forms within Hinduism with mention of Jainism, Buddhism, and Sikhism and their relation to the mainstream of Hindu religion. GE credit: AH, VL, WC, WE. Effective: 2002 Fall Quarter.

RST 069—Introduction to Hindu Mythology (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Survey of the major narrative traditions within Hinduism, including epic literature and local stories in oral, textual, visual and performative forms. GE credit: AH, VL, WC, WE. Effective: 2014 Winter Quarter.

RST 070—Religion and Language (4)
Lecture/Discussion—3 hours; Term Paper. Basic toolkit for studying religious discourse in a variety of traditions. Concentration on the sacred and profane, the wondrous and ordinary, and the mystical and reasonable. GE credit: AH, WC, WE. Effective: 2014 Winter Quarter.

RST 075—Introduction to Chinese Philosophy (4)
Lecture/Discussion—4 hours. Introduction to Chinese philosophy from classical pre-modern times; emphasis on basic concepts and their impact on social conduct; the Age of Philosophers, the Han synthesis, the medieval Buddhist contribution. Effective: 2004 Summer Session 2.

RST 080—Religion, Gender, Sexuality (4)
Lecture/Discussion—3 hours; Term Paper. Constructions of gender and sexuality within one or more religious
traditions, pre-modern and modern. Emphasis on the interaction between religious, medical, and ethical definitions of the human body and sexual behavior. GE credit: AH, WE. Effective: 2009 Winter Quarter.

RST 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Primarily for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

RST 099—Special Study for Lower Division Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

RST 100—Study of Religion: Issues and Methods (4)
Lecture—3 hours; Term Paper. Principal issues and methods of Religious Studies and associated fields. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

RST 102—Christian Origins (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Development of Christianity from the end of the first century through the major controversies of the fifth century. Emphasis on the relationship between the new religious movement and the Roman Empire, and issues of early Christian identity and diversity. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

RST 103—Medieval and Byzantine Christianity (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Christianity in Europe and the Near East from the year 600 to 1450. Focus on the development of Catholic and Orthodox traditions in ritual, art, and thought, with attention to interactions between regional groups, and Christian interaction with Islam. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

RST 104—Christianity 1450-1700 (4)
Lecture/Discussion—3 hours; Term Paper. History of Reformation conflicts over the authority of scripture, the nature of man and the universe, and the basis of morality with the goal of understanding how these conflicts laid the foundation for the modern world. Effective: 2010 Spring Quarter.

RST 105—Christianity and Modernity, 1700-1920 (4)
Lecture—3 hours; Term Paper. Reaction of Christian critics and apologists to the profound cultural and scientific transformations resulting from the Scientific Revolution, the Enlightenment, and the advent of the modern critical study of religion. GE credit: AH, OL, VL, WC, WE. Effective: 2012 Spring Quarter.

RST 106—Christianity in the Contemporary World (4)
Lecture—3 hours; Term Paper. Christianity in the 20th and 21st centuries. Relationship of Christianity to globalization, industrialization, mass media, and the contemporary secular state. Focus on Christianity in America and developing nations, and on the relationship of established Christian institutions to new Christian movements. GE credit: ACGH, AH, WC, WE. Effective: 2012 Spring Quarter.

RST 110—Life, Meaning and Identity (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Upper division standing. Study of religious lives, the quest for meaning and for personal identity; how religions frame the problems of life; how cultural and personal crises affect youthful identity; the nature and structure of dreams, myths, and ideals. GE credit: AH, WE. Effective: 2016 Spring Quarter.

RST 111—Persuasion and Conviction in Religious Tradition (4)
Lecture/Discussion—4 hours; Term Paper. Selected topics in religious argument. Familiarizes students with the discourse structures of religious persuasion and enables them to perform analysis of such texts. Covers argument styles and structures used in ethics, theology, and preaching. GE credit: ACGH, AH, OL, WC, WE. Effective: 2015 Spring Quarter.

RST 115—Mysticism (4)
Lecture—3 hours; Term Paper. Prerequisite(s): One lower division Religious Studies course. Historical and descriptive analysis of selected key figures in mystical traditions and readings of representative mystical texts. Analytic term paper. GE credit: AH, OL, VL, WC, WE. Effective: 2016 Spring Quarter.

RST 120—Religion, Magic and Science (4)
Extensive Writing; Lecture—3 hours. Religion, magic, and science from the middle ages to the present. Contrast between modern scientific methodology and religious and magical thinking. (STS 120) GE credit: AH, OL, VL, WC, WE. Effective: 2005 Fall Quarter.

RST 122—Studies in Biblical Texts (4)
Lecture—3 hours; Term Paper. Prerequisite(s): RST 021 Study of a book from the Prophets or writings from critical, historical, and religious perspectives. May be repeated once for credit in different subject area. May be repeated up to 1 time(s). GE credit: AH, WE. Effective: 1997 Winter Quarter.

RST 123—Sex and Gender in the Bible (4)
Lecture—3 hours; Term Paper. Gender and sexuality in the Bible and its interpretation in Judaism and Christianity. Femininity and masculinity; gender roles; homosexuality; sexual violence. Historical origins in the ancient world; influence on contemporary views. GE credit: AH, WC, WE. Effective: 2017 Fall Quarter.

RST 124—Topics in Judaism (4)
Lecture—3 hours; Term Paper. Prerequisite(s): RST 023; RST 021 Examination of selected aspects of Jewish life, religion, or literature. Potential topics include: Jewish Perspectives on Jesus; The Golem: History and Legend; Sexuality and Gender in Late Antique Judaism and Early Christianity. May be repeated for credit when topic differs. Effective: 2016 Spring Quarter.

RST 125—Dead Sea Scrolls, Apocrypha, and Pseudepigrapha (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): RST 021; or Consent of Instructor. Survey of the Dead Sea Scrolls, apocryphal and pseudepigraphical writings of Judaism and Christianity and their historical, social, and religious importance. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

RST 126—The Formation of the Rabbinic Tradition (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): RST 021; RST 023; (RST 040 or RST 125) Survey of the classical rabbinic Jewish texts such as the Talmud and of the social and historical contexts of their production in Palestine and Babylonia. GE credit: WC. Effective: 2011 Fall Quarter.

RST 130—Topics in Religious Studies (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): RST 001 or RST 002 or RST 003A or RST 003B or RST 003C; or Consent of Instructor. One course. Thematic study of a phenomenon in more than one religious tradition or of the relationship between religion and another cultural phenomenon. Topics may include archeology and the Bible, women and religion, religion and violence. May be repeated for credit when topic differs. GE credit: WC, WE. Effective: 2002 Fall Quarter.

RST 131—Genocide (4) ***Review all entries***
Lecture/Discussion—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Upper division standing. Comparative and critical study of the modern phenomenon of genocide from religious, ethical and historical perspectives. (Human Rights 131.) GE credit: AH, SS, VL, WC, WE. Effective: 2014 Spring Quarter.

RST 131—Genocide (4) ***Review all entries Discontinued***
Lecture/Discussion—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Upper division standing. Comparative and critical study of the modern phenomenon of genocide from religious, ethical and historical perspectives. (Human Rights 131.) GE credit: AH, SS, VL, WC, WE. Effective: 2018 Fall Quarter.

RST 132—Topics in Mediterranean Ancient Religion (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): RST 021; RST 040; or Consent of Instructor. Thematic study of specific sociological, literary or theological theme across the religious traditions of the ancient Mediterranean/Near East: Greek and Roman religions, Judaism, Christianity, Zoroastrianism, Manichaeism, etc. Topics may include creation, sacrifice, priesthoods, prophecies, holy books, the afterlife. May be repeated up to 2 time(s) when topic differs. GE credit: AH, WC, WE. Effective: 2011 Fall Quarter.

RST 134—Human Rights (4)
Lecture/Discussion—3 hours; Term Paper/Discussion—1 hour. Introduction to the interdisciplinary study of the origins, evolution, denial and protection of Human Rights. No credit for students who have completed course 90. (Human Rights 134.) GE credit: AH, SS, WC, WE. Effective: 2014 Spring Quarter.

RST 135—The Bible and Film (4)
Film Viewing—3 hours; Lecture—2 hours; Term Paper. Prerequisite(s): HUM 010 recommended. Examination of the uses of the Judeo-Christian Scriptures in film. Topics include dramatic depictions of biblical stories, the tension between science and religion, allegorical treatments of biblical themes, and the problems of religious conviction. Effective: 2003 Winter Quarter.

RST 138—Human Rights, Gender, and Sexuality (4) ***Review all entries***
Lecture/Discussion—3 hours; Term Paper. Gender and sexuality in the context of human rights. Topics include women's participation in the public sphere, the right to change gender, the right for family privacy, and the right to marriage. (Human Rights 138.) GE credit: AH, WC, WE. Effective: 2015 Fall Quarter.

RST 138—Human Rights, Gender, and Sexuality (4) ***Review all entries Discontinued***
Lecture/Discussion—3 hours; Term Paper. Gender and sexuality in the context of human rights. Topics include women's participation in the public sphere, the right to change gender, the right for family privacy, and the right to marriage. (Human Rights 138.) GE credit: AH, WC, WE. Effective: 2019 Spring Quarter.

RST 140—Christian Theology (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Historical and systematic introduction to Christian doctrine, with attention to divergent traditions and the problem of orthodoxy and heresy. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

RST 141A—New Testament Literature: Synoptic Gospels (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Life and thought of the early Church as reflected by the Synoptic Tradition; Matthew, Mark, Luke and Acts. Offered every third year to alternate with 141B, 141C. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

RST 141B—New Testament Literature: John (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Life and thought of the early Church as reflected by the Johannine Tradition; the Gospel and letters of John. Offered every third year to alternate with courses 141A and 141C. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

RST 141C—New Testament Literature: Paul (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Life and thought of the early Church as reflected by the Pauline tradition. The letters of Paul. Offered every third year to alternate with 141A, 141B. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

RST 143—New Testament Apocrypha (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Extra-canonical Christian writings and their reception, from antiquity to the present. Emphasis on the importance of New Testament figures both as literary characters and as authors within different Christian traditions. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

RST 144—History of the Bible (4)
Lecture—3 hours; Term Paper. Prerequisite(s): RST 021 or RST 040 History of the formation of the Christian biblical canon, with emphasis on differences between Christian traditions; survey of translations and adaptations of biblical narrative in Christianity, Judaism, and Islam, as well as in contemporary culture. GE credit: AH, WC, WE. Effective: 2014 Winter Quarter.

RST 145—Contemporary American Religion (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): RST 040 and HIS 017B recommended. Examination of several major movements and phenomena in twentieth-century American religion. GE credit: ACGH, AH, DD, WE. Effective: 1997 Winter Quarter.

RST 150—Religious Ethics (4)
Lecture/Discussion—3 hours; Term Paper/Discussion. Prerequisite(s): RST 010 recommended. Study of the religious bases of ethics through examination of ethical problems that arise in different religious cultures around the world and in nations where multiple religious cultures face similar issues. GE credit: AH, WC, WE. Effective: 2014 Winter Quarter.

RST 154—The Hindu Temple (4)
Lecture—3 hours; Term Paper. Comparative history of architecture and symbolism of the Hindu Temple in India, Southeast Asia and the United States. Attention to the temple as expression of religious knowledge, political authority, and cultural heritage through the lens of colonialism and postcolonialism. (Art History 154.) GE credit: AH, SS, VL, WC, WE. Effective: 2015 Fall Quarter.

RST 156—Religion and the Performing Arts in India (4)
Lecture—3 hours; Term Paper. Prerequisite(s): RST 030; RST 068; or Consent of Instructor. Survey of religion and performing arts in India. Emphasis on the influence of colonialism, nationalism, and regionalism on the history of Indian performing arts. GE credit: AH, WC, WE. Effective: 2012 Winter Quarter.

RST 157—Hindu Women and Goddesses (4)
Lecture—3 hours; Term Paper. Hindu goddesses and the religious lives of Hindu women in India and the diaspora. GE credit: AH, VL, WC, WE. Effective: 2010 Fall Quarter.

RST 158—The Ramayana (4)
Lecture—3 hours; Term Paper. Exploration of the Indian epic, Ramayana, through the lens of literature, performance, and visual art. Emphasis on the text's diversity and its contemporary global relevance. Topics include Ramayanas in Southeast Asia, and in various South Asian diaspora communities. (Comparative Literature 156.) GE credit: AH, WC, WE. Effective: 2015 Spring Quarter.

RST 160—Introduction to Islamic Thought (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): RST 060 recommended. The development of Islamic thought from the first centuries of Islam to the eighteenth century. Theology, philosophy, ethics, Sufism, historiography, political theory, fundamentalism, al-Farabi, al-Ghazzali, Ibn Rushd, Tusi, Ibn al-Arabi, Rumi, Molla Sadra, Ibn Khaldun, Ibn Abd al-Wahhab. GE credit: AH, WC, WE. Effective: 2004 Fall Quarter.

RST 161—Modern Islam (4)
Lecture/Discussion—3 hours; Term Paper. Response of Islam to modernity: secularism, reformism, fundamentalism. Islam and imperialism, women, media and immigration. Islamic modernism, political Islam, Islam in Europe and America. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

RST 161B—Modern Islam: Authority and Tradition In Process (4)
Lecture/Discussion—3 hours; Term Paper. Survey of Islamic thought, social organization, politics from eighteenth century through present. Focus on changing notations of moral authority and tradition. Concentration on Middle East and South Asia with sustained treatment of North American engagements with the Islamic world. GE credit: AH, OL, SS, WC, WE. Effective: 2014 Spring Quarter.

RST 162—Introduction to Islamic Law (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): RST 060 recommended. The development of Islamic law in the formative centuries of Islam, ca. 600-1000, as well as its adaptation to changing economic, social, and political conditions in subsequent periods. Legal schools, legal theory, the Shari'a, reformist movements, human rights. GE credit: AH, WC, WE. Effective: 2004 Fall Quarter.

RST 163—Social Life of Islam (4)
Lecture—3 hours; Term Paper. Prerequisite(s): RST 060 or HIS 006 recommended. Introduction to culture and social life in Muslim societies. Focus on the plurality of traditions in Muslim faith, reason, and everyday practice. Special attention to Muslim rituals, ethical values, verbal genres, family life, sexuality and veiling, and youth culture. GE credit: AH, OL, SS, WC, WE. Effective: 2015 Spring Quarter.

RST 165—Islam in Asia (4)
Extensive Writing; Lecture/Discussion—3 hours. Islam as a lived religion in the Indian sub-continent, Central Asia, China, and Southeast Asia. Emphasis is on primary sources studied comparatively and historically. Effective: 2004 Winter Quarter.

RST 166—Religion and Media in the Arab World (4)
Lecture—4 hours. Exploration of the role and experience of media technologies in the Arab world. Study of digital and electronic media as well as alternative media practices. Investigation of new trends in political activism and identity formation. (Middle East/South Asian Studies 131C.) GE credit: OL, SS, VL, WC, WE. Effective: 2014 Fall Quarter.

RST 167—Iraq (4)
Seminar—3 hours; Term Paper—1 hour. Origins, causes and ethical challenges of conditions in Iraq; larger historical, cultural and ethical dimensions of mass violence, war, liberation, neocolonialism, terrorism and resistance. Effective: 2007 Spring Quarter.

RST 170—Buddhism (4)
Lecture—3 hours; Term Paper. Buddhism in its pan-Asian manifestations, from its beginning in India to its development in Sri Lanka and Southeast Asia, Central Asia, China and Japan; teachings and practices, socio-political and cultural impact. GE credit: AH, VL, WC. Effective: 2005 Spring Quarter.

RST 172—Ch'an (Zen) Buddhism (4)
Lecture/Discussion—3 hours; Term Paper. Doctrines and methods of the Ch'an Buddhism, both ancient and modern. Review of ritual techniques, including meditation. Effective: 2005 Spring Quarter.

RST 175A—Chinese Intellectual Traditions: Daoist Traditions (4)
Lecture/Discussion—4 hours. Prerequisite(s): A course in Chinese history recommended. English-language survey of key Daoist texts and scholarship. Topics include Daoist concepts of the cosmos, the natural world, scripture, the body, and immortality; Daoist divinities; Daoism and the state. (Chinese 100A.) GE credit: AH, WC. Effective: 2016 Fall Quarter.

RST 189—Senior Colloquium (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Primarily for seniors in Religious Studies. Discussion in depth of a problem in religion which requires the methods of several disciplines and is important in the encounter between religions. Effective: 1997 Winter Quarter.

RST 190—Seminar (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Required of all Religious Studies majors. Allows majors to integrate their disciplined study of the field. Emphasis on current scholarly debate about the methods for analyzing and comparing diverse religious traditions. Effective: 1997 Winter Quarter.

RST 194HA—Special Study for Honors Students (1-5)
Independent Study. Open only to majors of senior standing who qualify for honors program. Guided research, under the direction of a faculty member approved by the Program Director, leading to a senior honors thesis on a religious studies topic. (P/NP grading only.) Effective: 1997 Winter Quarter.

RST 194HB—Special Study for Honors Students (1-5)
Independent Study. Open only to majors of senior standing who qualify for honors program. Guided research, under the direction of a faculty member approved by the Program Director, leading to a senior honors thesis on a religious studies topic. (P/NP grading only.) Effective: 1997 Winter Quarter.

RST 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

RST 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

RST 201—Methods and Issues in Religious Studies (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Focuses on controversies in the study of comparative religion. How is religion best defined? Are there methods unique to the study of religion? What does the study of religion contribute to the study of society in general? May be repeated up to 2 time(s) the content is substantially different. Effective: 2006 Spring Quarter.

RST 205—Religion and Media (4)
Lecture/Discussion—3 hours; Term Paper. Many communities are finding global media technologies useful for religious practice. This course examines how religious revitalization is historically situated. A phenomenological approach will enable students to situate media and religion within the social and material world of practitioners. Effective: 2009 Winter Quarter.

RST 210—Religion and Postcoloniality, or Savages, Civilization, and Spirituality (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. This course examines relations between religion and colonialisms. Using specific historical situations it explores some of our thorniest theoretical problems. Students acquire a solid understanding of postcolonial theory and the historical tools to critically engage religion in the present. Effective: 2007 Fall Quarter.

RST 212—Religion and Violence (4)
Seminar—3 hours; Term Paper. Comparative and critical study of the ideological, cultural, and theological relationship between forms of violence and religion and religious practice. Effective: 2007 Fall Quarter.

RST 215—Topics in the History of Christianity (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Selected topics in the history of Christianity. Intended for graduate students seeking to do advanced work in the study of Christianity. May cover issues in Christian thought from antiquity, the middle ages, the early modern or modern period. May be repeated for credit when topic differs. Effective: 2010 Fall Quarter.

RST 299—Directed Research (1-12)
Variable. May be repeated for credit. (S/U grading only.) Effective: 2007 Fall Quarter.

RST 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit. (S/U grading only.) Effective: 2009 Winter Quarter.

Russian

Russian | RUS Information

(College of Letters and Science)

Sven-Erik Rose, Ph.D., Chairperson of the Department

Program Office. 213 Sproul Hall; 530-752-1219; http://russian.ucdavis.edu

Faculty. http://russian.ucdavis.edu/people/people-faculty

Russian | RUS A.B.

(College of Letters and Science)

Sven-Erik Rose, Ph.D., Chairperson of the Department

Program Office. 213 Sproul Hall; 530-752-1219; http://russian.ucdavis.edu

Faculty. http://russian.ucdavis.edu/people/people-faculty

The Major Program

The Russian major introduces students to a culture rich in art, music, theater, film, language, and literature. The major offers an opportunity to learn skills needed to enter the fields of foreign affairs, world politics, and international trade, or to begin graduate work in literature, history, cultural studies and international relations.

The Program. The major program instructs students in speaking, understanding, reading, and writing the Russian language. The program also acquaints students with the intellectual and cultural contributions of the Russian world through the study of its literature, traditions, and institutions.

Internships and Career Alternatives. Russian majors may participate in internships where they can serve as translators and interpreters for schools and business firms throughout Northern California. Upon graduation, many Russian majors enter the business world or enter graduate programs in Slavic studies and international relations. The program encourages students to supplement their Russian studies with courses in related fields such as international relations, political science, computer science, cultural studies, or economics in order to maximize their career possibilities.

Honors and Honors Program. The honors program comprises at least one quarter of study under course 194H, which will include a research paper. For details consult the major advisor.

Study Abroad. Students who have completed one or two years of Russian language study can participate in the Education Abroad Program (EAP) in Moscow. Many of our students also participate in summer, semester, and year-long programs sponsored by CIEE and ACTR in St. Petersburg and Moscow.

Prerequisite Credit. Credit normally will not be given for a course if that course is the prerequisite for a course already completed.

Preparatory Subject Matter **Units:** 0-27

RUS 001	Elementary Russian	5
RUS 002	Elementary Russian	5
RUS 003	Elementary Russian	5
RUS 004	Intermediate Russian	4
RUS 005	Intermediate Russian	4
RUS 006	Intermediate Russian	4

OR

The equivalent.

Depth Subject Matter **Units:** 36

RUS 101A	Advanced Russian	4
RUS 101B	Advanced Russian	4
RUS 101C	Advanced Russian	4

Choose one:

RUS 102	Russian Composition	4
RUS 103	Literary Translation	4
RUS 105	Advanced Russian Conversation	4

Additional upper division units chosen in consultation with adviser from the following selection of Literature and Culture courses taught in Russian and English.

RUS 122	19th-Century Russian Literature	4
RUS 124	Twentieth-Century Russian Literature	4
RUS 126	The Russian Theater	4
RUS 129	Russian Film	4
RUS 130	Contemporary Russian Culture	4
RUS 133	Post-Soviet Literature	4
RUS 139	Pushkin	4
RUS 140	Dostoevsky (in English)	4
RUS 141	Tolstoy (in English)	4
RUS 142	Women in Russian Culture	4
RUS 143	Chekhov (in English)	4
RUS 150	Russian Culture	4

The elective upper-division courses in English can be satisfied in part by one or more courses in History, Political Science, Comparative Literature and other departments after consultation with, and prior approval of, the major advisor.

The total of 36 upper-division units may include units earned in the Education Abroad Program.

Total: 36-63

Russian | RUS Minor

(College of Letters and Science)

Sven-Erik Rose, Ph.D., Chairperson of the Department

Program Office. 213 Sproul Hall; 530-752-1219; http://russian.ucdavis.edu

Faculty. http://russian.ucdavis.edu/people/people-faculty

Russian **Units:** 20

RUS 101A	Advanced Russian	4
RUS 101B	Advanced Russian	4
RUS 101C	Advanced Russian	4

Choose 8 units of other upper division Russian courses.

Total: 20

Russian | RUS Courses

Course Placement. Students who have learned Russian at home must consult the department for placement instructions. Students with two years of Russian in high school normally continue in RUS 002; those with three years, RUS 003; those with four years, RUS 004.

Courses in RUS:

RUS 001—Elementary Russian (5)
Discussion—5 hours; Laboratory—1 hour. Introduction to Russian grammar and development of all language skills in a cultural context with special emphasis on communication. GE credit: AH, WC. Effective: 1997 Winter Quarter.

RUS 001A—Accelerated Intensive Elementary Russian (15)
Lecture/Discussion—15 hours. Special 12 week accelerated, intensive summer session course that combines the work of courses 1, 2, and 3. Introduction to Russian grammar and development of all language skills in a cultural context with emphasis on communication. Not open to students who have completed Russian 1, 2, or 3. Effective: 2008 Summer Special Session.

RUS 002—Elementary Russian (5)
Discussion—5 hours; Laboratory—1 hour. Prerequisite(s): RUS 001 Continuation of grammar and language skills developed in course 1. GE credit: AH, WC. Effective: 1997 Winter Quarter.

RUS 003—Elementary Russian (5)
Discussion—5 hours; Laboratory—1 hour. Prerequisite(s): RUS 002 Continuation of grammar and language skills developed in course 2. GE credit: AH, OL, WC. Effective: 2015 Spring Quarter.

RUS 004—Intermediate Russian (4)
Discussion/Laboratory—4 hours. Prerequisite(s): RUS 003 Grammar review and conversational practice in Russian. GE credit: AH, OL, WC. Effective: 2016 Fall Quarter.

RUS 005—Intermediate Russian (4)
Discussion—4 hours; Laboratory—1 hour. Prerequisite(s): RUS 004 Grammar review. Introduction to literature in its sociopolitical context. Conversational practice. GE credit: AH, OL, WC. Effective: 2015 Spring Quarter.

RUS 006—Intermediate Russian (4)
Discussion—4 hours; Laboratory—1 hour. Prerequisite(s): RUS 005 Grammar review. Intermediate conversation and continued reading of literature. Social and cultural practices in contemporary Russia; introduction to Russian history. GE credit: AH, OL, WC. Effective: 2015 Spring Quarter.

RUS 098—Directed Group Study (1-5)
Discussion—1-5 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

RUS 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

RUS 101A—Advanced Russian (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): RUS 006; or Consent of Instructor. Topics in Russian. Grammar for the advanced student. Reading and discussion of journalistic texts and classic and contemporary literature. Conversation exercises utilizing literary and colloquial variants of current Russian speech. GE credit: AH, WC. Effective: 2011 Fall Quarter.

RUS 101B—Advanced Russian (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): RUS 101A; or Consent of Instructor. Continuation of course 101A. Topics in Russian grammar for the advanced student. Reading and discussion of journalistic texts and classic and contemporary literature. Conversational exercises utilizing literary and colloquial variants of current Russian speech. GE credit: AH, WC. Effective: 2011 Winter Quarter.

RUS 101C—Advanced Russian (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): RUS 101B Continuation of course 101B. Topics in Russian grammar for the advanced student. Reading and discussion of journalistic texts and classic and contemporary literature. Conversational exercises utilizing literary and colloquial variants of current Russian speech. GE credit: AH, WC. Effective: 2011 Spring Quarter.

RUS 102—Russian Composition (4)
Lecture/Discussion—3 hours; Tutorial—1 hour. Prerequisite(s): RUS 006; or Consent of Instructor. Practice in writing Russian. One composition on a different topic each week. Topics include: history, geography, politics, and literature of Russia; comparison of Russian and American lifestyles; current events. Conducted in Russian. GE credit: AH, WC, WE. Effective: 2002 Winter Quarter.

RUS 103—Literary Translation (4)
Discussion—3 hours. Prerequisite(s): RUS 101C Translation of Russian literary texts into stylistically equivalent idiomatic English. Effective: 1997 Winter Quarter.

RUS 105—Advanced Russian Conversation (4)
Discussion—3 hours; Practice—1 hour. Prerequisite(s): RUS 006 Intensive conversational practice and discussion based on current events and contemporary texts. GE credit: AH, OL, WC. Effective: 2015 Winter Quarter.

RUS 120—Topics in Russian Literature and Culture (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Upper division standing or consent of instructor. Knowledge of Russian not required. Investigation of significant themes and issues of Russian literature and culture within their European context. May be repeated up to 1 time(s). GE credit: AH, OL, WC, WE. Effective: 2017 Spring Quarter.

RUS 122—19th-Century Russian Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): RUS 101C when the course offered in Russian; no prerequisite when offered in English. Not open to students who have taken course 121 and 127. Study of Russian literature (prose fiction, drama, poetry) from the period between 1800 and the end of the 19th century. May include authors like Pushkin, Lermontov, Gogol, Turgenev, Dostoevsky, Tolstoy, Chekhov. Offered alternately in English or Russian. GE credit: AH, OL, VL, WC, WE. Effective: 2015 Spring Quarter.

RUS 124—Twentieth-Century Russian Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): RUS 101C when offered in Russian; no prerequisite when offered in English. Study of Russian literature (prose, drama, poetry) from the period between 1900 and the end of the 20th century. Authors like Y. Olesha, M. Bulgakov, D. Kharms, and L. Petrushevskaia. Taught in Russian. Not open for credit to students who have taken courses 123 or 128. GE credit: AH, OL, VL, WC, WE. Effective: 2015 Fall Quarter.

RUS 126—The Russian Theater (4)
Lecture—3 hours; Term Paper. Prerequisite(s): RUS 101C; or Consent of Instructor. The main works of Russian dramatists from Fonvizin to the present, including Gogol, Turgenev, Tolstoy, Ostrovsky, Chekhov, Blok, Mayakovsky, Kharms. Conducted in Russian. GE credit: AH, WC, WE. Effective: 2008 Fall Quarter.

RUS 129—Russian Film (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): Completion of Subject A requirements. History of Russian film; film and social revolution, the cult of Stalin, dissident visions; film and the collapse of the Soviet empire; gender and the nation in Russian film. Course taught in English; films are in Russian with English subtitles. (Film Studies 129.) GE credit: AH, VL, WC, WE. Effective: 2009 Fall Quarter.

RUS 130—Contemporary Russian Culture (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Trends in Russian culture and the relationship between artists and the government. Topics: recent changes in the cultural scene, postmodernist trends in literature, visual art, film, and theater. GE credit: AH, OL, VL, WC, WE. Effective: 2016 Spring Quarter.

RUS 133—Post-Soviet Literature (4)
Lecture/Discussion—3 hours; Term Paper. Major authors and trends in Russian literature in post-1991 period. Discussion of impact of economic, social, and cultural turmoil of post-Soviet period on literary marketplace. Analysis of development of literary postmodernism in Russia. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

RUS 139—Pushkin (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): RUS 101C; or Consent of Instructor. Three major periods of Pushkin's poetical works: his early Lyceum verse; his poetry of the early 1820s; and the mature period. Further study of Pushkin's prose fiction, drama, and journalism. GE credit: AH, OL, WC, WE. Effective: 2015 Fall Quarter.

RUS 140—Dostoevsky (in English) (4)
Lecture—3 hours. Reading and analysis of Dostoevskys principal works such as Crime and Punishment, The Idiot, The Brothers Karamazov, and The Diary. Study of social and political views as reflected in Dostoevskys works. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

RUS 141—Tolstoy (in English) (4)
Lecture—3 hours; Term Paper. Study of Leo Tolstoy's literary evolution and moral quest. Readings include his Confession, a major novel such as War and Peace or Anna Karenina, and representative shorter fiction. GE credit: AH, OL, WE. Effective: 2015 Fall Quarter.

RUS 142—Women in Russian Culture (4)
Lecture/Discussion—3 hours; Term Paper. Study of the representation of women in contemporary Russian fiction and film. Exploration of issues such as family dynamics/motherhood, sexuality, work, and women's relationship to the state. Offered in English. GE credit: AH, OL, VL, WC, WE. Effective: 2017 Winter Quarter.

RUS 143—Chekhov (in English) (4)
Extensive Writing; Lecture/Discussion—3 hours. Examination of Chekhov's short stories and major plays, such as The Seagull, Uncle Vanya, The Three Sisters, The Cherry Orchard, and Ivanov, in the broader cultural context of European and Russian fin de siecle. GE credit: AH, OL, WC, WE. Effective: 2016 Fall Quarter.

RUS 150—Russian Culture (4)
Discussion—3 hours; Term Paper. Study of Russian culture in nineteenth and twentieth centuries. Brief introduction of the beginnings up to nineteenth century. Russian art, music, philosophy, church, traditions, and daily life. Knowledge of Russian not required. GE credit: AH, OL, VL, WC, WE. Effective: 2016 Spring Quarter.

RUS 192—Research Essay (2)
Variable. Prerequisite(s): A Russian literature course (may be taken concurrently). A research essay, based on primary and secondary sources, dealing in depth with a topic arising from or related to the prerequisite literature course. May be repeated for credit. May be repeated for credit. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

RUS 194H—Special Study for Honors Students (4)
Independent Study—4 hours. Prerequisite(s): Open only to majors of senior standing who qualify for honors program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in Russian studies. Effective: 1997 Winter Quarter.

RUS 195H—Honors Thesis (4)
Independent Study—4 hours. Prerequisite(s): RUS 194H Writing an honors thesis, under the direction of a faculty member, on a topic in Russian studies. Effective: 1997 Winter Quarter.

RUS 197T—Tutoring in Russian (1-4)
Laboratory—1-2 hours; Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Tutoring in undergraduate courses, including leadership in small voluntary discussion groups affiliated with departmental courses. May be repeated up to 6 unit(s). (P/NP grading only.) Effective: 2014 Winter Quarter.

RUS 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

RUS 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

RUS 299—Individual Study (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. Restricted to graduate students. May be repeated for credit. (S/U grading only.) Effective: 2014 Spring Quarter.

RUS 396—Teaching Assistant Training Practicum (1-4)
Variable—3-20 hours. Prerequisite(s): Graduate standing. May be repeated for credit. (S/U grading only.) Effective: 2014 Winter Quarter.

Science & Society Minor; Science & Society

Science & Society Minor; Science & Society | SAS Minor

(College of Agricultural and Environmental Sciences)

David M. Rizzo, Ph.D., Program Director

Science and Society Program. https://sas.ucdavis.edu/

Program Office. 160 Hutchison Hall; 530-754-7277

The Program. Science and Society is an interdepartmental teaching program administered by the College of Agricultural and Environmental Sciences that offers students throughout the campus the opportunity to discover the connections that link the social, biological, and physical sciences with societal issues and cultural discourses. Course work examines discovery processes in relation to societal values, public policy and ethics, including issues associated with cultural diversity. Whenever possible, opportunities outside the classroom are included as part of the learning experience.

The Science and Society teaching program serves students of all majors and interests. It can allow lower division students who have not yet declared a major a meaningful context for exploring diverse subject matters. The minor for the program includes, in addition to Science and Society courses, upper division courses from both the College of Agricultural and Environmental Sciences and the College of Letters and Science in the areas of history and philosophy of science, policy and decision making, communication of science, and culture, ethics and applications.

Related Courses. See Agricultural and Resource Economics 120, 147, Agricultural Management and Rangeland Resources 1, 101, 122, Communication 115, 140, Community and Regional Development 118, 142, 162, 174, Avian Sciences 13, Environmental Science and Policy 126, 160, 164, 165, Fiber and Polymer Science 110, History 185A, 185B, History and Philosophy of Science 150, Nature and Culture 100, Plant Biology 12, Plant Pathology 140, Political Science 175, Wildlife, Fish, and Conservation Biology 10.

Minor Advisor. D. M. Rizzo

Science and Society **Units:** 22-27

SAS 001	Critical Inquiry into Contemporary Issues	4

Choose one:

SAS 002	Feeding the Planet: Influences on the Global Food Supply	3
SAS 005	Pathways to Discovery: Science and Society	3
SAS 020	Genetics and Society	4
SAS 030	Mushrooms, Molds, and Society	3

SAS 120	Science and Contemporary Societal Issues	3

Choose one from each of the four areas:

History and Philosophy of Science:

CRD 118	Technology and Society	4
CRD 162	People, Work and Technology	5
HIS 185A	History of Science in America	4
HIS 185B	History of Technology in America	4
PHI 107	Philosophy of the Physical Sciences	4
PHI 108	Philosophy of the Biological Sciences	4
PHI 109	Philosophy of the Social Sciences	4

Policy and Decision Making:

ARE 120	Agricultural Policy	4
ARE 147	Resource and Environment Policy Analysis	3
ARE 150	Agricultural Labor	4
CNS 100	Consumer Behavior	3
ESP 160	The Policy Process	4
ESP 165	Climate Policy	3
POL 175	Science, Technology, and Policy	4
SOC 155	Sociology of Law	4
SOC 181	Social Change Organization	4

Communication of Science:

AED 172	Multimedia Productions	3
ANT 120	Language and Culture	4
CMN 130	Group Communication	4
CMN 140	Introduction to Mass Communication	4
LIN 163	Language, Gender, and Society	4
POL 165	Mass Media and Politics	4

Culture, Ethics and Applications:

CRD 142	Rural Change in the Industrialized World	4
ESP 164	Ethical Issues in Environmental Policy	3
FPS 110	Plastics in Society and the Environment	4
PLP 140	Agricultural Biotechnology and Public Policy	4
SOC 144	Agriculture and Society	4

Total: 22-27

Science & Society Minor; Science & Society | SAS Courses

Courses in SAS:

SAS 001—Critical Inquiry into Contemporary Issues (4)
Discussion—1 hour; Lecture/Discussion—3 hours. Open to first year and new transfer students only. Contemporary issues, including global population trends, economic and environmental changes, cultural diversity and biodiversity, nutrition and food safety, fiber and textiles, changing consumer cultures. Inquiry processes emphasize ethics, multiple disciplines, and multiple perspectives. GE credit: SE, SS, WE. Effective: 2003 Fall Quarter.

SAS 002—Feeding the Planet: Influences on the Global Food Supply (3)
Lecture/Discussion—3 hours. Scientific principles and dynamic interactions involved in food production, food processing, nutrition, shelf life and marketing from differing viewpoints. Physical, biological and social science issues influencing the availability and safety of the food supply worldwide. GE credit: SE, SL, SS. Effective: 1997 Winter Quarter.

SAS 003—Science, Technology and Society (4)
Lecture—4 hours. Impact of developments in science and technology on the individual in society and how economics, politics, culture and values affect technological development. Not open for credit to students who have completed former course Applied Behavioral Sciences 18. GE credit: SE, SS. Effective: 1997 Winter Quarter.

SAS 004—Water in Popular Culture (3)
Discussion—1 hour; Film Viewing—2 hours; Lecture—1 hour. Importance of water in many aspects of society as revealed through a survey of its depictions in film. GE credit: SE, SL, SS. Effective: 2008 Fall Quarter.

SAS 005—Pathways to Discovery: Science and Society (3)
Lecture/Discussion—3 hours. Highlights a current issue and/or controversy found in contemporary society and looks at how this problem impacts and is affected by the physical, social and biological sciences. Course varies with topic offered. May be repeated up to 2 time(s). GE credit: SE, SS. Effective: 1997 Winter Quarter.

SAS 007—Terrorism and War (4)
Discussion—1 hour; Lecture—3 hours; Term Paper. Exploration of terrorism and war from science and social sciences perspectives. Terrorist cells and groups; biological, chemical, nuclear, and environmental terrorism; intelligence gathering and espionage; military strategy; genocide; epochal wars; clash of civilizations; nation building; and future global scenarios. GE credit: SE, SS, WE. Effective: 2004 Winter Quarter.

SAS 007V—Terrorism and War (4)
Auto Tutorial—5 hours; Extensive Writing; Web Electronic Discussion—1 hour; Web Virtual Lecture—3 hours. Terrorism and war from science and social sciences perspectives: terrorism (terrorist cells, WMD's, religious extremism), warfare (military strategy, genocide), and statecraft (diplomacy, clash of civilizations, epochal wars). Students my not take both SAS 007V and SAS 007 for credit. GE credit: SS, WC, WE. Effective: 2017 Spring Quarter.

SAS 008—Water Quality at Risk (3)
Discussion—1 hour; Lecture—2 hours. Not open to students who have successfully completed ERS 008. (Formerly Environmental and Resource Sciences 8.) Natural and human threats to water quality. Balance of science and policy in all aspects of attaining, maintaining, and managing water quality, water contamination. Decoding popular media coverage of water quality and water contamination. (Environmental Science and Management 008.) GE credit: SE, SL, SS, WE. Effective: 2011 Fall Quarter.

SAS 009—Crisis in the Environment (3)
Lecture—3 hours. Explores contemporary environmental issues by examining the causes, effects and solutions to a wide range of environmental problems facing the global ecosystem. Integrated discussion of political, societal and economic impact linkages with environmental problems. GE credit: SE, SS, WE. Effective: 2006 Fall Quarter.

SAS 010—Water, Power, Society (3)
Discussion—1 hour; Lecture—2 hours. Water resources issues. How water has been used to gain and wield socio-political power. Water resources development in California related to current and future sustainability of water quantity and quality. Roles of science and policy in solving water problems. (Hydrologic Science 10.) GE credit: SE, SL, SS. Effective: 2005 Spring Quarter.

SAS 011—California Geography (3)
Discussion—1 hour; Lecture—2 hours; Term Paper. Introduction to cultural/societal patterns of California and their relationship to natural resources, biomes,geomorphology, and physiography. Focus on diversity of California's environments and their impacts on and alterations by human activities. Environmental issues in the State. GE credit: SE, SS, WE. Effective: 2006 Fall Quarter.

SAS 012—Plants and Society (4)
Extensive Writing—3 hours; Lecture—3 hours. Prerequisite(s): High school biology. Dependence of human societies on plant and plant products. Plants as resources for food, fiber, health, enjoyment and environmental services. Sustainable uses of plants for food production, raw materials, bioenergy, and environmental conservation. Global population growth and future food supplies. Not open for credit to students who have completed Plant Biology 12.
(Former course Plant Biology 12.). (Plant Science 012.) GE credit: SE, SS, WE. Effective: 2007 Fall Quarter.

SAS 013—Disease and Society (3)
Lecture—3 hours. Limited enrollment. Introduction to the concept of disease, the societal and personal impacts of past, present and future diseases, and the science behind disease discoveries, causes, evolution, diagnosis, treatment, and prevention. GE credit: SE, SL, SS. Effective: 2012 Fall Quarter.

SAS 014—Forests and Society (3)
Discussion—1 hour; Lecture—2 hours. Class size limited to 120 students. Sociology, natural history and current issues of the world's forests. Application of scientific principles in outdoor laboratories and on-campus field trips. GE credit: ACGH, OL, SE, SL, SS, WE. Effective: 2016 Fall Quarter.

SAS 018—GIS and Society (3)
Laboratory—3 hours; Lecture—2 hours; Term Paper/Discussion—0.3 hours. Geographic Information Systems (GIS) as a spatial technology and a tool for change in society. Evaluate physical, biological and social impact of GIS in the context of case studies such as land, water and community planning. GE credit: QL, SE, SL, SS, VL. Effective: 2007 Spring Quarter.

SAS 020—Genetics and Society (4)
Discussion—1 hour; Lecture—3 hours. Basic concepts of genetics, modern methods of biotechnology, the process of scientific discovery and the public perception of the process; present and future impact of genetics on society. Not open for credit to students who have completed course 140. GE credit: OL, SE, SL, SS, WE. Effective: 2005 Winter Quarter.

SAS 025—Global Climate Change: Convergence of Biological, Geophysical, & Social Sciences (3)
Discussion—1 hour; Lecture—2 hours. Causes of global climate change and the biological, geophysical, and social consequences of such change. Methods used by different scientists for predicting future events. Complexity of global affairs. Decision making under uncertainty. GE credit: OL, QL, SE, SL, SS, VL, WC, WE. Effective: 2006 Winter Quarter.

SAS 025V—Global Climate Change: Convergence of Biological, Geophysical, & Social Sciences (3)
Auto Tutorial—5 hours; Extensive Writing—2 hours; Web Electronic Discussion—2 hours; Web Virtual Lecture. Causes of global climate change and the biological, geophysical, and social consequences of such change. Methods used by different scientists for predicting future events. Complexity of global affairs. Decision making under uncertainty. Students cannot take both course 025 and 025V for credit. GE credit: DD, OL, QL, SE, SL, SS, VL, WC, WE. Effective: 2013 Winter Quarter.

SAS 030—Mushrooms, Molds, and Society (3)
Lecture/Discussion—3 hours. Fungi as organisms with which humans interact daily, societal issues arising from these interactions. Fungi in medicine, religion, agriculture, and industry, as well as cultural perceptions of fungi. GE credit: SE, SS. Effective: 1998 Spring Quarter.

SAS 035—Germs: The Good, the Bad, and the Ugly (3)
Discussion—1 hour; Lecture—2 hours. Class size restricted to 60 students. Impact of microorganisms on Earth, Humans and Society. Historical, scientific, and contemporary issues dealing with microbes on natural and built environments. GE credit: SE, SS, WE. Effective: 2017 Spring Quarter.

SAS 040—Photography: Bridging Art and Science (3)
Lecture—2 hours; Studio—3 hours. Photography is used to explore the common ground between art and science. Photographic processes, creativity and aesthetics, chaos and order, principles of space, time and light. Photographic interpretation and documentation of the natural world. Camera required. GE credit: AH, SE, SL, VL, WE. Effective: 2008 Spring Quarter.

SAS 041—Understanding Performance: Appreciation of Modern Theatre, Dance, Film and Performance Art for the Humanities and Sciences (4)
Discussion/Laboratory—1 hour; Lecture/Discussion—3 hours. Relevance of theatre and performance to modern culture, science and society. Approaches to theatre/dance/media/performance art, integrated into Mondavi Centre for the Arts and Theatre and Dance Department programs. (Dramatic Art 5.) GE credit: AH, DD, OL, VL, WC, WE. Effective: 2015 Winter Quarter.

SAS 042—Earth, Water, Science, Song (3)
Lecture—2 hours; Studio—3 hours. Fusion of water and soil science with performing arts. Creative communication of scientific concepts and facts through exercises in song writing and poetry. Design, discuss and conduct public performances related to the functioning of the natural world. GE credit: AH, OL, SE. Effective: 2009 Summer Session 2.

SAS 043—Energy, Materials, and Design Over Time (4)
Discussion—1 hour; Lecture—3 hours. Global history of design across time, viewed through the lens of the effects of the creation and discovery of new energy sources, processes, and materials on design. (DES 040A) GE credit: AH, WC. Effective: 2018 Spring Quarter.

SAS 070A—Genetic Engineering in Medicine, Agriculture, and Law (5)
Lecture—5 hours. Not open to students who have completed BIS 002A and BIS 002B and BIS 002C. Historical and scientific study of the impact of genetic engineering in medicine, agriculture, and law, including examination of social, ethical, and legal issues raised. Offered in a distance-learning format. GE credit: SE, SL, SS. Effective: 2018 Winter Quarter.

SAS 090A—Issues in Environmental and Resource Sciences (2)
Seminar—2 hours. Prerequisite(s): Limited to lower division students. Discussion of historical and current issues in environmental and resource sciences. Lectures, reading and field trips will provide background for selected topics. Effective: 1997 Winter Quarter.

SAS 090B—Observing and Writing in Biology (2)
Laboratory—1 hour; Seminar—1 hour; Term Paper. Students will observe the interactions between microscopic organisms, conduct simple laboratory experiments, describe and analyze observations and discuss scientific observations and writing. Effective: 1997 Winter Quarter.

SAS 090E—Biotechnology-a New Era, a New Struggle (2)
Seminar—2 hours. Animal biotechnology and its applications. Discussion topics include potential societal impacts of various technologies, factors shaping public opinion, and ethical and moral questions arising from new biotechnology applications. Effective: 2001 Fall Quarter.

SAS 090F—Food Distribution in a Hungry World (2)
Seminar—2 hours. Class size limited to 15 students. The biological, technological, environmental, and socioeconomic factors related to food distribution systems at local, regional, national, and international levels. The potential for increasing world food supply by reducing losses between harvest and consumption. Effective: 2001 Fall Quarter.

SAS 090G—Science, Society and the Environment (2)
Seminar—2 hours. Contemporary environmental issues, scientific approaches to addressing these issues, and accompanying societal and ethical considerations. Effective: 2001 Fall Quarter.

SAS 090X—Lower Division Seminar (1-4)
Seminar—1-4 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Limited enrollment. Examination of a special topic in Science and Society through shared readings, discussions, written assignments, or special activities such as fieldwork, laboratory work, etc. May be repeated for credit. Effective: 1997 Winter Quarter.

SAS 092—Internship in Science and Society (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Supervised internship on and off campus, in the community, or in institutional settings. (P/NP grading only.) Effective: 1997 Winter Quarter.

SAS 097T—Tutoring in Science and Society (2-3)
Discussion/Laboratory—6-9 hours. Prerequisite(s): Consent of Instructor. Lower division standing; completion of course being tutored. Tutoring in undergraduate Science and Society courses. Assisting with leading discussion groups under supervision of instructor(s) and teaching assistants. Acting as liaison between the students and course instructor(s) to foster effective communication and interaction. May not be repeated. (P/NP grading only.) Effective: 1998 Fall Quarter.

SAS 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

SAS 099—Special Study for Undergraduates (1-5)
Discussion—3-15 hours. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

SAS 109—Environmental Change, Disease and Public Health (4)
Lecture/Discussion—3 hours; Project (Term Project). Analysis of environmental changes from pre-history to the present and their influence on disease distribution, virulence and public health. Focus on critical study of many human-driven environmental changes and the accelerated transformation/spread of pathogens under globalization. Not open for credit to students who have taken course HIS 109B. (History 109) GE credit: SE, SL, SS, WC. Effective: 2016 Fall Quarter.

SAS 110—Applications of Evolution in Medicine, Human Behavior, and Agriculture (4)
Discussion—1 hour; Lecture—2 hours; Term Paper. Prerequisite(s): BIS 002A; BIS 002B; BIS 002C Class size limited to 60 students. Applications of evolutionary biology in medicine, human behavior, and agriculture. Examination of the imprint of evolution on the human life cycle from conception to death. GE credit: SE, SL, WE. Effective: 2013 Fall Quarter.

SAS 120—Science and Contemporary Societal Issues (3)
Lecture/Discussion—3 hours. Prerequisite(s): Upper division standing. Study of a contemporary societal issue/problem emphasizing critical thinking with information drawn from several disciplines. Multiple instructors illustrate the necessity of an interdisciplinary and cooperative approach in solving important issues. Topic will vary. May be repeated up to 1 time(s). GE credit: SE, SS. Effective: 1997 Winter Quarter.

SAS 121—Global Poverty: Critical Thinking and Taking Action (4)
Discussion—1 hour; Lecture—3 hours. Social science and engineering analysis of causes and effects of world poverty and of policies to reduce it via economic growth, foreign aid, and community-level interventions, e.g., in potable water, sanitation, lighting, small scale energy, irrigation, health and microfinance. GE credit: SS, WC. Effective: 2013 Fall Quarter.

SAS 130—Contemporary Leadership (4)
Lecture—3 hours; Seminar—1 hour. Prerequisite(s): Consent of Instructor. Class size limited to 40 students. Leadership, including issues, skills, and practices as they relate to individuals, organizations, diverse social settings and communities. Written and verbal communications, personality styles for collaborative work, and ethics. GE credit: OL. Effective: 2006 Fall Quarter.

SAS 190X—Science & Society Seminar (1-4)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing. Class size limited to 20 students. In-depth examination at an upper division level of a special topic in Science and Society. Emphasis upon student participation in learning. May be repeated for credit. (P/NP grading only.) Effective: 2005 Fall Quarter.

SAS 192—Internship in Science and Society (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Supervised internship on or off campus, in the community, or in institutional settings. (P/NP grading only.) Effective: 1997 Winter Quarter.

SAS 197T—Tutoring in Science and Society (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing; completion of course being tutored or the equivalent. Tutoring of students in Science and Society courses. Assistance with discussion groups and laboratory sections under supervision of instructor. May be repeated for credit if tutoring another Science and Society course. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

SAS 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

SAS 199—Special Study in Science and Society (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

SAS 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. May be repeated for credit when topic differs. May be repeated for credit. (S/U grading only.) Effective: 1998 Fall Quarter.

SAS 299—Graduate Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate student. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1998 Fall Quarter.

SAS 390—Teaching Methods in Science and Society (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate level. Practical experience in methods and problems related to teaching Science and Society courses. Discussion of critical pedagogies specific to teaching of science-societal issues, preparing for and conducting discussion sessions, analyses of texts and supporting material, formulation of assignments, exams. May be repeated for credit. (S/U grading only.) Effective: 1998 Fall Quarter.

Science & Technology Studies

Science & Technology Studies | STS A.B.

(College of Letters and Science)

Colin Milburn, Ph.D., Program Director

Program Office. 101 Young Hall; stsadvising@ucdavis.edu; http://sts.ucdavis.edu

Faculty. http://sts.ucdavis.edu/directory-of-people/sts-faculty

The Major Program

The Science and Technology Studies (STS) major brings the perspectives of the humanities and social sciences to bear on the analysis and synthesis of science, technology, and medicine. It considers science, technology, and medicine, in tandem with their social, political, and economic contexts. The major combines history, philosophy, anthropology, sociology, cultural studies, environmental studies, literature and media studies, as well as law and business studies to address the impacts and implications of science, technology, and medicine. The major allows students to pursue a broader understanding of science than is available within a traditional science major, and it provides important skills for interpreting science, technology, and medicine in relation to society and culture.

The Program. Graduation with a degree in Science and Technology Studies requires completion of courses in the social sciences, the humanities, and the natural sciences - courses in STS. Upper-division work includes twelve units from each of two different STS concentration ("modules") and twelve units (plus prerequisites) providing depth, concentration, and field work in the sciences. The STS modules are: (1) Cultural Studies of Science and Technology; (2) Ethics, Values, and Science Policy; (3) History and Philosophy of Science; and (4) Medicine, Society, and Culture. Courses in the modules require careful selection to make the best use of the STS major. Prerequisites for courses in the sciences can be extensive and may require substantial advance planning. Students are encouraged to take advantage of faculty and staff advising to develop their plans of their study.

Career Alternatives. The STS major enables students to analyze science and allied practices from historical, philosophical, sociological, political, anthropological, and cultural perspectives. STS prepares students for careers that address the broader ramifications of science, technology and medicine. STS majors often pursue careers in health care and medicine, law, journalism, public policy, economics, government, media and technology industries, science education, non-profit health organizations, libraries and museums, public health administration, management consultant, and teaching. STS majors are also well prepared for advanced research careers in the sciences, the humanities, and the social sciences.

Major Advisor. See staff advisors in 101 Young Hall; stsadvising@ucdavis.edu; 530-752-5104; http://sts.ucdavis.edu/undergraduate/advising-1

Faculty Advisor. The current Director of STS is also available for advising by appointment.

Preparatory Subject Matter **Units:** 16

STS 001	Introduction to Science, Technology and Medicine Studies	4
STS 020	Methods in Science, Technology and Medicine Studies	4

Choose eight units:

AMS 001A	Science and American Culture	4
AMS 001E	Nature and Culture in America	4
AMS 005	Technology in American Lives	4
HUM 003	Medicine and Humanities	4
PHI 030	Introduction to Philosophy of Science	4
PHI 031	Appraising Scientific Reasoning	4
PHI 032	Understanding Scientific Change	4
SAS 001	Critical Inquiry into Contemporary Issues	4
SAS 002	Feeding the Planet: Influences on the Global Food Supply	3
SAS 003	Science, Technology and Society	4
SAS 005	Pathways to Discovery: Science and Society	3
STS 032	Drugs, Science and Culture	4

Lower-division science courses from the Approved Science Electives list below.

Depth Subject Matter **Units:** 44

STS 175	Laboratory Studies Lab	4
STS 180	Topics in Science and Technology Studies	4
OR		
STS 190	Seminar in Science, Technology and Medicine Studies	4

Choose twelve units each from two of the following four modules:

(1) Cultural Studies of Science and Technology:

AMS 101G	Special Topics: New Directions in American Culture Studies	4
AMS 158	Technology and the Modern American Body	4
CRD 118	Technology and Society	4
CRD 162	People, Work and Technology	5
HIS 139A	Medieval and Renaissance Medicine	4
HIS 139B	Medicine, Society, and Culture in Modern Europe	4
STS 108	Intellectual Property in Science	4
STS 109	Visualization in Science: A Critical Introduction	4
STS 120	Religion, Magic and Science	4
STS 130A	From Natural History to the History of Nature	4
STS 131	Darwin	4
STS 150	Gender and Science	4
STS 160	Ghosts of the Machine: How Technology Rewires our Senses	4
STS 162	Surveillance Technologies and Social Media	4
STS 165	Built Environments	4
STS 173	Science Fiction	4
STS 176	Sociology of Knowledge, Science, and Scientific Knowledge	4
SOC 150	Criminology	4
SOC 175	Mass Communication	4

(2) Ethics, Values, and Science Policy:

ARE 120	Agricultural Policy	4
ARE 147	Resource and Environment Policy Analysis	3
AMS 125	Corporate Cultures	4
CMN 170	Digital Technology and Social Change	4
ECS 188	Ethics in an Age of Technology	4
ESP 165	Climate Policy	3
HIS 185B	History of Technology in America	4
PHI 116	Ethical Theories	4
PHI 120	Environmental Ethics	4
PHY 160	Environmental Physics and Society	3
PLP 140	Agricultural Biotechnology and Public Policy	4
POL 171	The Politics of Energy	4
POL 175	Science, Technology, and Policy	4
STS 108	Intellectual Property in Science	4
STS 120	Religion, Magic and Science	4
STS 162	Surveillance Technologies and Social Media	4
STS 164	Writing Science	4

(3) History and Philosophy of Science:

HIS 135A	History of Science to the 18th Century	4
HIS 135B	History of Science, 18th to 20th Centuries	4
HIS 136	Scientific Revolution	4
HIS 185A	History of Science in America	4
HIS 185B	History of Technology in America	4
PHI 104	The Evolution of Mind	4
PHI 108	Philosophy of the Biological Sciences	4
PHI 109	Philosophy of the Social Sciences	4
STS 120	Religion, Magic and Science	4
STS 130A	From Natural History to the History of Nature	4
STS 130B	History of Modern Biology	4
STS 131	Darwin	4
STS 160	Ghosts of the Machine: How Technology Rewires our Senses	4
STS 161	Time: Mechanism and Measurement	4
STS 163	History of Communication Technologies	4
STS 164	Writing Science	4

(4) Medicine, Society, and Culture:

AMS 101G	Special Topics: New Directions in American Culture Studies	4
CMN 165	Media and Health	4
SPH 101	Introduction to Public Health	3
SPH 160	General Health Education and Prevention	5
HIS 139A	Medieval and Renaissance Medicine	4
HIS 139B	Medicine, Society, and Culture in Modern Europe	4
STS 109	Visualization in Science: A Critical Introduction	4
STS 120	Religion, Magic and Science	4
STS 121	Special Topics in Medical Anthropology	4
SOC 154	Health and Illness	4

Note: Although a course may be listed in more than one module, that course may satisfy only one requirement.

Science Electives

Choose twelve units, at least eight of which must be from upper division courses, from the Approved Science Electives list at http://sts.ucdavis.edu/undergraduate/sts-major-requirements. Unit totals will vary with required prerequisites.

Note: Students are strongly advised to choose science elective courses in consultation with faculty or staff advisor. Some courses in some areas may require prerequisites too extensive to be used for the STS major.

Total: 60-80

Science & Technology Studies | STS Courses

Courses in STS:

STS 001—Introduction to Science, Technology and Medicine Studies (4)
Discussion—1 hour; Lecture—3 hours. History, philosophy, sociology, politics, and cultural studies of science, technology, and medicine. Emphasis on a broad range of perspectives. GE credit: SS, WE. Effective: 1998 Fall Quarter.

STS 002—Introduction to the History of Science and Technology (4)
Discussion—1 hour; Lecture—3 hours. Introduction to topics and methods of the history of science and technology. Emphasis on understanding the role of science and technology in the modern world through a long-term historical perspective. (History 002.) GE credit: AH, SL, SS, WC, WE. Effective: 2017 Fall Quarter.

STS 011—Science on Trial: Law, Science, and Technology in the United States (4)
Lecture/Discussion—3 hours; Term Paper. Relationships among law, technology, and science. Scientific evidence and testimony, biology education, patenting, and sterilization. GE credit: ACGH, SS. Effective: 2018 Spring Quarter.

STS 020—Methods in Science, Technology and Medicine Studies (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): STS 001 recommended. Methodological issues concerning the historical, philosophical, sociological, ethical, and political analysis of science, technology, and medicine. Detailed case studies to illustrate different methods of analysis. GE credit: SS, WE. Effective: 1998 Fall Quarter.

STS 032—Drugs, Science and Culture (4)
Discussion—1 hour; Lecture—3 hours. Drugs, politics, science, society in a cultural perspective: emphasis on roles of science, government and the media in shifting attitudes toward alcohol, marijuana, Prozac and other pharmaceuticals; drug laws, war on drugs and global trade in sugar, opium, cocaine. (Anthropology 32.) GE credit: SS, VL, WE. Effective: 2008 Fall Quarter.

STS 040A—Media History 1, Gutenberg to Oppenheimer (4)
Discussion—1 hour; Extensive Writing; Film Viewing—2 hours; Lecture—3 hours. History of Media to 1945, with particular focus on mechanically reproduced mass media technologies including the printing press, the newspaper, photography, cinema, radio and early computing technology. Analysis of inter-related cultural and political topics. (Cinema and Technocultural Studies 40A.) GE credit: AH, OL, SS, VL, WE. Effective: 2014 Fall Quarter.

STS 040B—Media History 2 1945-Present (4)
Discussion—1 hour; Extensive Writing; Film Viewing—2 hours; Lecture—3 hours. Prerequisite(s): STS 040A History of media from 1945 to present, with particular focus on the development of the computer, digital network and internet technologies in the context of other media infrastructures like radio, television and satellite networks. Analysis of inter-related cultural/political topics. (Cinema & Technocultural Studies 040B.) GE credit: AH, OL, SS, VL, WE. Effective: 2015 Winter Quarter.

STS 050—Ancient Science (4)
Discussion—1 hour; Lecture—3 hours. Study of science in ancient Greece and Rome; consideration of its social context; concentration on the basic concepts of physics the world of medicine and biology the history of mathematics and the practices of astronomy astrology and meteorology. (Classics 50.) GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

STS 051—Ancient Medicine (4)
Discussion—1 hour; Lecture—3 hours. Medicine in ancient Greece and Rome; physiological conceptions of the body within scientific and social frameworks; exploration of sanitation technology and health in antiquity; medical treatment of the female body; medicine and the economy. (Classics 051.) GE credit: AH, WC, WE. Effective: 2016 Winter Quarter.

STS 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Work experience off and on campus in all subject areas offered in the program in Science & Technology Studies under the supervision of a member of the faculty. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2006 Fall Quarter.

STS 098—Directed Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) GE credit: SS. Effective: 2006 Fall Quarter.

STS 099—Special Study for Undergraduates (1-5)
Variable—3-15 hours. (P/NP grading only.) Effective: 2006 Fall Quarter.

STS 101—Introduction to Data Studies (4)
Lecture/Discussion—4 hours. Introduction to basic data science concepts, defining problems, clarifying questions, identifying stakeholders, caring for and cleaning data, interviewing techniques, structuring presentations, use of Excel for data problems. GE credit: SS. Effective: 2017 Spring Quarter.

STS 108—Intellectual Property in Science (4)
Lecture/Discussion—4 hours. Prerequisite(s): STS 001; Or other Social Science or Humanities writing course. Historical and conceptual framework for contemporary debates about intellectual property and science. Topics include US patent system and copyright law, interaction between patents and industrial policy, credit in academic and industrial science, role of IP in global knowledge politics. GE credit: ACGH, SS, WE. Effective: 2011 Spring Quarter.

STS 109—Visualization in Science: A Critical Introduction (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STS 001 or STS 020 or ANT 002 recommended. Anthropological approaches to scientific visualization techniques, informatics, simulations. Examination of different visualization techniques toward understanding the work involved in producing them, critical assessment of their power and limits, especially when visualizations are used socially to make claims. (Anthropology 109.) GE credit: SS, VL, WE. Effective: 2016 Fall Quarter.

STS 110—Computing, Data, & Law in the United States (4)
Lecture/Discussion—3 hours; Term Paper. Introduction to the problems in American law and policy borne out of the creation and use of information technologies. Topics include intellectual property, corporate law, privacy, and emerging problems surrounding big data. GE credit: ACGH, SS, WE. Effective: 2018 Winter Quarter.

STS 112—Visualizing Society with Data (4)
Lecture/Lab—3 hours; Term Paper. Analysis and visualization of historical and contemporary data about populations and societies using R. Critical exploration of visual communication of information about people over time and critical assessment of role of data collection and analysis in societies . GE credit: DD, QL, SS. Effective: 2018 Winter Quarter.

STS 113—Business and Technology in the United States: From Electricity to E-Commerce (4)
Lecture/Discussion—3 hours; Term Paper. Historical introduction to the joint development of business and technology in the United States from the late nineteenth century to the present day. GE credit: ACGH, SS, WE. Effective: 2018 Spring Quarter.

STS 120—Religion, Magic and Science (4)
Extensive Writing; Lecture—3 hours. Religion, magic, and science from the middle ages to the present. Contrast between modern scientific methodology and religious and magical thinking. (RST 120) GE credit: AH, OL, VL, WC. Effective: 2005 Fall Quarter.

STS 121—Special Topics in Medical Anthropology (4)
Lecture/Discussion—4 hours. Prerequisite(s): ANT 002 recommended. Introduction to critical medical anthropology. Topics include anthropological analysis of bio-medicine, psychiatry, systems of knowledge and healing, the body, emotions, and clinical encounters in a cross-cultural perspective. (Anthropology 121.) GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

STS 122—Health and Medical Technologies (4)
Lecture/Discussion—3 hours; Term Paper. Critical/historical examination of medical technologies: imaging, pharmaceuticals, genetics, implants/devices. Exploration of mutually constitutive relationship between health, medical technologies, social difference (race/gender/class/sexuality). GE credit: DD, SS. Effective: 2018 Winter Quarter.

STS 129—Health and Medicine in a Global Context (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ANT 002 recommended. Recent works in medical anthropology and the science studies of medicine dealing with social and cultural aspects of global health issues such as AIDS, pandemics, clinical trials, cultural differences in illnesses, diabetes, organ trafficking, medical technologies, illness narratives, and others. (Anthropology 129.) GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

STS 130A—From Natural History to the History of Nature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): HIS 135A recommended. Evolution and demise of natural history as a discipline from Aristotle
to Linnaeus. Considers ancient views of nature and its Renaissance rediscovery; the emergence of biology, botany, geology, and zoology; the history of taxonomy and classification. GE credit: AH, SE, WE. Effective: 1997 Winter Quarter.

STS 130B—History of Modern Biology (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): STS 130A recommended. Development of modern biology from pre-Darwinian roots to the present. Considers emergence of modern biological specialities and consolidation of biological theory around evolutionary ideas. History of allied fields
such as genetics, paleontology, embryology, ecology, systematics and molecular biology. GE credit: AH, SE, WE. Effective: 1997 Winter Quarter.

STS 131—Darwin (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Upper division standing or consent of instructor. Students will explore the life and times of Charles Darwin and will trace the development of evolutionary thinking before and after the Origin of Species to appreciate its place in Victorian society and in the corpus of Darwins thought. GE credit: AH, SE, WE. Effective: 1997 Winter Quarter.

STS 150—Gender and Science (4)
Lecture/Discussion—3 hours; Term Paper. An interdisciplinary approach to the relations between gender and science. Topics include the biological and cultural construction of sexual difference, the role of women as practitioners of science, and feminist approaches to science. GE credit: ACGH, DD, SS, WE. Effective: 1997 Winter Quarter.

STS 151—Media Theory (5)
Discussion—1 hour; Extensive Writing; Film Viewing—3 hours; Lecture—2 hours. Critical and theoretical approaches to the emergence of new technologies since the invention of photography. Examine various approaches to media (formalist, semiotic, structuralist, Frankfurt School, cybernetics, visual and gamer theory). (Cinema and Technocultural Studies 150.) GE credit: AH, OL, SS, VL, WE. Effective: 2014 Fall Quarter.

STS 152—Sounding Data: Critical Approaches to Sonification (4)
Lecture/Discussion—3 hours; Term Paper/Discussion. Critical and creative approaches to auditory data and display in art, science, and technology. Practical introduction to sonification techniques through sound studies and sensory ethnography. Heuristic listening and collaborative sound design. GE credit: SS, WE. Effective: 2017 Spring Quarter.

STS 160—Ghosts of the Machine: How Technology Rewires our Senses (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Historical, aesthetic and critical approaches to how information technologies produced ghost effects or a sense of terror in response to new media like the photograph, gramophone, film, typewriter, computer, Turing Machine. Focus on technological media transforms sense perception. (Technocultural Studies 160.) GE credit: ACGH, AH, SS, VL, WE. Effective: 2013 Fall Quarter.

STS 161—Time: Mechanism and Measurement (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): STS 001 Cultural concepts of time; units and instruments of time measurement; historical differences in the social organization of time; and time measurement in twentieth-century science. GE credit: SS, WE. Effective: 2005 Fall Quarter.

STS 162—Surveillance Technologies and Social Media (4)
Film Viewing—3 hours; Lecture—3 hours; Term Paper. Prerequisite(s): STS 020 or TCS 001 Study of the ubiquitous presence of CCTV, face recognition software, global tracking systems, biosensors, and data mining practices that have made surveillance part of our daily life. Exploration of the boundary between security and control, information and spying. (Cinema & Technocultural Studies 162.) GE credit: ACGH, AH, OL, SS, VL, WE. Effective: 2015 Winter Quarter.

STS 163—History of Communication Technologies (4)
Lecture/Discussion—3 hours; Term Paper. History of communication technologies from the late Middle Ages to the 20th century. Questions of technology, knowledge, power and culture. Particular attention to questions about information and truth. GE credit: SS, WE. Effective: 2005 Fall Quarter.

STS 164—Writing Science (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): STS 001 or ENL 003; Or equivalent. Texts and writing practices in the production of scientific knowledge. Surveys the literary structure of scientific arguments; history of scientific genres; rhetoric and semiotics in scientific culture; graphical systems in the experimental laboratory; narratives of science, including science fiction. (English 164.) GE credit: AH, SL, WE. Effective: 2011 Fall Quarter.

STS 165—Built Environments (4)
Extensive Writing; Lecture—3 hours. Built environments, which are designed to support forms of life. Their role as carriers of cultural memory and in turning knowledge of nature into social assets. Historical constellations of knowledge, social order, and power. GE credit: SS. Effective: 2005 Spring Quarter.

STS 172—Video Games and Culture (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STS 001 or TCS 001 or ENL 003; Or equivalent of any. Critical approaches to the study of video games, focusing on formal, historical, and cultural modes of analysis. History of software and hardware in North American and global contexts. Relations of games to society, politics, economics, literature, media, and the arts. (Cinema and Technocultural Studies 172 and English 172.) GE credit: ACGH, AH, SS, VL. Effective: 2014 Fall Quarter.

STS 173—Science Fiction (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): STS 001 or ENL 003; Or equivalent. The literary modes and methods of science fiction. Representative texts, authors, and themes of the genre - e.g., time travel, alternative universes, and utopias. Relations of science fiction to science, philosophy, and culture. (English 173.) GE credit: AH, WE. Effective: 2008 Winter Quarter.

STS 175—Laboratory Studies Lab (4)
Discussion/Laboratory—4 hours. Prerequisite(s): Upper division standing or consent of instructor. Hands-on training in Science and Technology Studies fieldwork, interviewing, archival research and data analysis. Review of laboratory studies literature, informed consent procedures, ethics, and care of the data. Individual and group projects possible. GE credit: SS, WE. Effective: 2011 Fall Quarter.

STS 176—Sociology of Knowledge, Science, and Scientific Knowledge (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Social, cultural, and historical dimensions of knowledge, especially scientific knowledge. Problems, methods, and theory in sociology of scientific knowledge. Laboratory and historical case studies. Scientific and technical knowledge in institutional and organizational contexts. (Sociology 176.) GE credit: SS. Effective: 2016 Fall Quarter.

STS 180—Topics in History and Philosophy of Science (4) ***Review all entries***
Seminar—3 hours; Term Paper. Prerequisite(s): Course in History and Philosophy of Science or other course-work relevant to topic. In depth treatment of selected topis in the history and philosophy of science. Possible topics include history of modern physics, history of molecular biology, science and society, science and power, scientific explanation, technology and culture, theory testing. May be repeated for credit consent of instructor. GE credit: SS. Effective: 2004 Fall Quarter.

STS 180—Topics in Science and Technology Studies (4) ***Review all entries***
Seminar—3 hours; Term Paper. Prerequisite(s): Course in Science and Technology Studies or other course-work relevant to topic. In-depth treatment of selected topics in anthropology, history, philosophy, and sociology of science and related fields. Possible topics include science and society, science and power, scientific explanation, technology and culture, theory testing. May be repeated for credit when content varies. GE credit: SS. Effective: 2018 Fall Quarter.

STS 190—Seminar in Science, Technology and Medicine Studies (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Open to junior and senior Science and Technology Studies majors only. Intensive reading, discussion, research and writing by small groups in
selected topics of science, technology, and medicine studies scholarship. Emphasis on individual research projects. Effective: 1998 Fall Quarter.

STS 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Work experience off and on campus in all subject areas offered in the program in Science & Technology Studies under the supervision of a member of the faculty. May be repeated up to 3 time(s) for up to 12 units of credit. (P/NP grading only.) Effective: 2006 Fall Quarter.

STS 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

STS 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

STS 200—Theories and Methods in Science & Technology Studies (4)
Seminar—3 hours; Term Paper. Theories and methods of Science & Technology Studies as a field of critical and empirical scholarship, and examination of various contexts in which STS has emerged worldwide. May be repeated up to 1 time(s) with consent of instructor. Effective: 2014 Fall Quarter.

STS 210—Digital Technologies: History and Theory (4)
Discussion—3 hours; Term Paper. Introduction to the history and theory of digital technologies. Human-machine interaction, cybernetics, software studies, and global networking. Effective: 2018 Spring Quarter.

STS 250—History and Philosophy of Science (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Interdisciplinary seminar in the history and philosophy of science. Focuses on issues such as historiography, methodology, and the conceptual foundations of science. May be repeated for credit with consent of instructor. May be repeated for credit. Effective: 1997 Winter Quarter.

STS 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

STS 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

STS 396—Teaching Assitant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Science Teaching Credential

Science Teaching Credential | Science Teaching Credential Information

(College of Letters and Science)

Michael E. Oskin, Ph.D., Chairperson of the Department

David A. Osleger, Ph.D., Vice-Chairperson, Undergraduate Program

Sujoy Mukhopadhyay, Ph.D., Vice-Chairperson, Graduate Program

Department Office. 2119 Earth and Physical Sciences Building: 530-752-0350; http://www.geology.ucdavis.edu

Science Teaching Credential. Students who might wish to become a teacher should consult an advisor in the Cal Teach/Mathematics and Science Teaching Program (CalTeach/MAST) at http://mast.ucdavis.edu/ at their first opportunity in order to combine the prerequisites for a credential program with general education requirements.

The following was incorrectly included in the 2018-2019 catalog.
Science Teaching Credential. Students who might wish to become a teacher should consult an advisor in the Mathematics and Science Teaching Program (MAST; http://mast.ucdavis.edu) at their first opportunity in order to combine the prerequisites for a credential program with General Education requirements. MAST also offers seminars that give participants required experience in elementary, middle school, and high school classrooms. Students hoping to teach Earth and Planetary Science may prepare by satisfying the requirements for the B.S. degree in Natural Science (http://naturalsciences.ucdavis.edu) or the A.B. degree in Geology (77-79 units) and 36 additional units of science as outlined below. Students may also prepare for the science credential by completing the B.S. degree in Geology (107-111 units) and an additional 24 units as indicated by the asterisks (*) shown in the requirements.

Teaching Credential Subject Representative. H.W. Day. See also the Teaching Credential/M.A. Program.

Sexuality Studies Minor; Gender, Sexuality & Women's Studies

Sexuality Studies Minor; Gender, Sexuality & Women's Studies | Sexuality Minor

(College of Letters and Science)

http://gsws.ucdavis.edu/sexualitystudies

The interdisciplinary minor in Sexuality Studies offers students a unique opportunity to study the concept of sexuality—including sexual identities, desires, and practices—by examining its changing meanings and effects across different political, historical, and cultural landscapes. At UC Davis, Sexuality Studies pays particular attention to how gender, race, class, nation, empire, colonialism, and globalization shape popular understandings of sexuality, and how these understandings of sexuality in turn affect social, political, and economic relations of power.

The minor is sponsored by the Gender, Sexuality & Women's Studies Department.

Advising. Gender, Sexuality & Women's Studies Department, 1200 Hart Hall; 530-752-6429

Sexuality Studies **Units:** 18-20

WMS 170	Queer Studies	4

Choose two electives:

ANT 139BN	Gender and Sexuality	4
ENL 186	Literature, Sexuality, and Gender	4
HIS 184	History of Sexuality in America	4
HDE 012	Human Sexuality	3
PSC 158	Sexual Orientation and Prejudice	4

WMS 070	Theory and History of Sexualities	4

Choose two Field B courses (below) or seminars/individual study by petition to achieve a total of 18-20 units:

ASA 112	Asian American Women	4
CHI 160	Mexican Film and Greater Mexican Identity	4
ENL 166	Love and Desire in Contemporary American Poetry	4
HIS 132	Crime and Punishment in Early Modern Europe	4
POL 152	The Constitutional Politics of the Equality	4
SOC 120	Deviance	4
WMS 140	Gender and Law	4
WMS 179	Gender and Literature	4

Restrictions

(A) Students may take no more than one lower division course to satisfy requirements for the minor.
(B) To satisfy the interdisciplinary component of the minor, students must either split their coursework roughly equally between two programs/departments or take coursework in at least three programs/departments.
(C) Students may petition the minor advisor to accept Special Topics courses and Capstone/Senior Seminars as additional courses, as long as their course of study follows the minor's lower-division restriction and interdisciplinary requirements.
(D) Students may petition the minor advisor to accept up to four units of registered individual study, group study or internship towards the minor program, as long as their course of study follows the minor's lower-division restriction and interdisciplinary requirements.

Total: 18-20

Social & Ethnic Relations Minor

Social & Ethnic Relations Minor | Social & Ethnic Relations Minor

(College of Letters and Science)

The interdisciplinary minor in Social and Ethnic Relations explores the racial, ethnic, class and gender aspects of human relations in the modern world. Students study human societies and cultures from a multi-ethnic perspective and across established academic departmental lines. The minor is jointly sponsored by African American and African Studies, Asian American Studies, Native American Studies, and Women and Gender Studies.

Advising. Contact the Program in Asian American Studies, 3131 Hart Hall, ethnicstudiessao@ucdavis.edu.

Social and Ethnic Relations **Units:** 24

Choose one from each of the following six groups to total 24 units:

(A)

AAS 100	Survey of Ethnicity in the US	4
ANT 134	Buddhism in Global Culture	4
NAS 134	Race, Culture, and Nation	4
WMS 102	Gender and Post Colonialism	4

(B)

AAS 123	Black Female Experience in Contemporary Society	4
AAS 133	The Black Family In America	4
AAS 145A	Black Social and Political Thought	4

(C)

ASA 001	Historical Experience of Asian Americans	4
ASA 002	Contemporary Issues of Asian Americans	4
ASA 100	Asian American Communities	4
ASA 110	Theoretical Perspective in Asian American Studies (Discontinued)	4
ASA 130	Asian American Literature	4

(D)

CHI 130	United States-Mexican Border Relations	4
CHI 132	Political Economy of Chicana/o Communities	4

(E)

NAS 001	Introduction to Native American Studies	4
NAS 010	Native American Experience	4
NAS 115	Native Americans in the Contemporary World	4
NAS 119	Introduction to Federal Indian Law	4
NAS 130A	Native American Ethno-Historical Development	4
NAS 130B	Native American Ethno-Historical Development	4
NAS 130C	Native American Ethno-Historical Development	4
NAS 157	Native American Religion and Philosophy	4
NAS 180	Native American Women	4

(F)

WMS 103	Introduction to Feminist Theory	4
WMS 104	Feminist Research	4
WMS 180	Women of Color Writing in the United States	4

Restrictions.

(A) Courses applied toward the satisfaction of a major may not also be offered in satisfaction of the minor.

(B) No more than four units (one course) may be lower division.

Total: 24

Social Sciences

Social Sciences | Social Sciences Information

(College of Letters and Science)

Program Office. 469 Kerr Hall; https://ls.ucdavis.edu/our-college/soc-sci/

The Program of Study

The Program in Social Sciences promotes the development of innovative curricular initiatives across the social sciences, including offering broadly conceived, integrative undergraduate-level and graduate-level courses. Faculty affiliated with the program are often engaged in interdepartmental teaching and research.

Social Theory & Comparative History

Social Theory & Comparative History | Social Theory & Comparative History Information

(College of Letters and Science)

This designated emphasis was disestablished effective September 19, 2011.

Social Theory & Comparative History | STH Courses

Courses in STH:

STH 250—Research in Social Theory and Comparative History (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Admission to Social Theory and Comparative History Designated Emphasis. Theoretically informed research in comparative history. Students read exemplary works and learn to frame their own research projects. Presentations include Center for History, Society, and Culture faculty and visitors discussing current research. Effective: 1997 Winter Quarter.

STH 290—Advanced Topics in Social Theory and Comparative History (4)
Seminar—3 hours; Term Paper. Prerequisite(s): HIS 204 or SOC 242A; and Consent of Instructor. Interdisciplinary study of particular substantive problems in social theory and comparative history. Topics vary. Effective: 1997 Winter Quarter.

STH 295—Advanced Group Research in Social Theory and Comparative History (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Participation in research workshops sponsored by the Center for Comparative Research for History, Society, and Culture. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

STH 296—Theory and Society Journal Editorial Workshop (1-4)
Independent Study—3 hours; Workshop—1 hour. Reading and offering workshop critiques of papers submitted for publication. Reading and discussion of other relevant work in history and the social science. May be repeated up to 36 unit(s) with consent of instructor. (S/U grading only.) Effective: 2000 Fall Quarter.

Sociology

Sociology | SOC Information

(College of Letters and Science)

Ryken Grattet, Ph.D., Chairperson of the Department

Department Office. 1283 Social Sciences and Humanities Building; 530-752-0782; http://sociology.ucdavis.edu

Faculty. http://sociology.ucdavis.edu/people

Sociology | SOC A.B.

(College of Letters and Science)

Ryken Grattet, Ph.D., Chairperson of the Department

Department Office. 1283 Social Sciences and Humanities Building; 530-752-0782; http://sociology.ucdavis.edu

Faculty. http://sociology.ucdavis.edu/people

The Major Programs

Sociology is the study of human society in all its manifestations. Its aim is to discover the process and structure of human interaction, to identify the main forces that sustain or weaken social groups, and to determine the conditions that transform social life. Sociology, like any science, is a disciplined, intellectual quest for knowledge about the fundamental nature of things.

Students selecting the Sociology major may choose from four options in the major. The General Sociology emphasis allows students to obtain a broad understanding of the concepts, methods, and theories of sociology. Students with a special interest in the areas of Law and Society or Social Services may choose a more specialized program of courses and practical experience within the sociology major. The Comparative Studies and World Development emphasis provides a sociological perspective on social and economic changes throughout the world, with a stress on relationships between "developed" and "developing" societies. In their junior year, students are encouraged to consider the Education Abroad Program—especially one in a developing country.

Career Opportunities. In the Sociology major, the General option is for students desiring a solid liberal arts education as well as those interested in graduate work in the social sciences. Options in Law and Society or Social Services prepare students for careers in such areas as law, corrections, social work or counseling. The Comparative Studies and World Development emphasis prepares students for graduate training leading to careers in international fields.

Major Advisor. Consult the Departmental Advising office in 1282 Social Sciences and Humanities Building or see http://sociology.ucdavis.edu/undergraduate/advising/advising-office.

Honors Program. An Honors Program is available to Sociology and Sociology-Organizational Studies majors who have demonstrated excellence in their field of study. To be eligible for the program, students must have a grade-point average of 3.500 in the major and the recommendation of a faculty sponsor familiar with their work. In addition to meeting the standard major requirements, students are encouraged to take a 199 course with their sponsor in the spring of their third year, prior to the seminar courses. Honors students write an honors thesis and take two quarters (eight units) of Honors coursework (SOC 194H). Successful completion of the Honors Program, when combined with College GPA requirements, enables the student to graduate with High or Highest Honors. Students should apply for the program before they begin their fourth year.

General Emphasis **Units:** 73-74

Preparatory Subject Matter

SOC 001	Introduction to Sociology	5
SOC 046A	Introduction to Social Research	4
SOC 046B	Introduction to Social Research	5

Choose one:

SOC 002	Self and Society	4
SOC 003	Social Problems	4
SOC 004	Immigration and Opportunity	4
SOC 005	Global Social Change: An Introduction to Macrosociology	4
SOC 011	Sociology of Labor and Employment	4
SOC 025	Sociology of Popular Culture	4
SOC 030A	Intercultural Relations in Multicultural Societies	3
SOC 030B	Intercultural Relations in Multicultural Societies	3

ANT 002	Cultural Anthropology	5
OR		
ANT 020	Comparative Cultures	4

Choose one:

HIS 004A	History of Western Civilization	4
HIS 004B	History of Western Civilization	4
HIS 004C	History of Western Civilization	4
HIS 006	Introduction to the Middle East	4

HIS 007A	History of Latin America to 1700	4
HIS 007B	History of Latin America, 1700-1900	4
HIS 007C	History of Latin America 1900-present	4
HIS 008	History of Indian Civilization	4
HIS 009A	History of East Asian Civilization	4
HIS 009B	History of East Asian Civilization	4
HIS 010C	World History III	4
HIS 015A	Africa to 1900	4
HIS 015B	Africa Today	4
HIS 017A	History of the United States	4
HIS 017B	History of the United States	4

Choose one:

PHI 005	Critical Reasoning	4
PHI 014	Ethical and Social Problems in Contemporary Society	4
PHI 024	Introduction to Ethics	4

Depth Subject Matter

(A)

SOC 100	Origins of Modern Sociological Theory	4

(B) Choose one from each of the following four categories:

Individual, Culture and Society:

SOC 125	Sociology of Culture	4
SOC 126	Social Interaction	4
SOC 135	Social Relationships	4

Stratification and Social Differentiation:

SOC 130	Race Relations	4
SOC 132	The Sociology of Gender	4
SOC 140	Social Stratification	4

Organizations and Institutions:

SOC 118	Political Sociology	4
SOC 131	The Family	4
SOC 146	Sociology of Religion	4
SOC 180A	Complex Organizations	4

Social Dynamics:

SOC 104	The Political Economy of International Migration	4
SOC 141	Industrialization and Social Change	4
SOC 143A	Urban Society	4
SOC 170	Population	4

(C) Choose three upper division courses from one of the following clusters, not counting courses taken to fulfill requirement B.

Individual, Culture and Society:

SOC 102	Society and Culture of California	4
SOC 120	Deviance	4
SOC 122	Sociology of Adolescence	4
SOC 125	Sociology of Culture	4
SOC 126	Social Interaction	4
SOC 128	Interracial Interpersonal Dynamics	4
SOC 129	Sociology of Black Experience in America	4

SOC 131	The Family	4
SOC 132	The Sociology of Gender	4
SOC 134	Sociology of Racial Ethnic Families	4
SOC 135	Social Relationships	4
SOC 137	African American Society and Culture 1790 to 1990	4
SOC 143B	Sociology of City Life	4
SOC 148	Collective Behavior	4
SOC 150	Criminology	4
SOC 152	Juvenile Delinquency	4
SOC 153	The Sociology of Childhood	4
SOC 172	Ideology of Class, Race and Gender	4
SOC 173	Sociology Through Literature	4
SOC 174	American Jewish Identities and Communities	4
SOC 175	Mass Communication	4
SOC 176	Sociology of Knowledge, Science, and Scientific Knowledge	4

Stratification and Social Differentiation:

SOC 118	Political Sociology	4
SOC 128	Interracial Interpersonal Dynamics	4
SOC 129	Sociology of Black Experience in America	4
SOC 130	Race Relations	4
SOC 132	The Sociology of Gender	4
SOC 133	Sexual Stratification and Politics	4
SOC 134	Sociology of Racial Ethnic Families	4
SOC 140	Social Stratification	4
SOC 145A	Sociology of Third World Development	4
SOC 145B	Gender and Rural Development in the Third World	4
SOC 171	Sociology of Violence and Inequality	4
SOC 172	Ideology of Class, Race and Gender	4
SOC 185	Social Policy	4
SOC 185Y	Social Policy (Hybrid Version)	4
SOC 188	Markets, Culture and Inequality in China	4
Not more than one of the following:		
AAS 123	Black Female Experience in Contemporary Society	4
ASA 100	Asian American Communities	4
CHI 110	Sociology of the Chicana/o Experience	4
NAS 115	Native Americans in the Contemporary World	4

Organizations and Institutions:

SOC 118	Political Sociology	4
SOC 124	Education and Inequality in the U.S.	4
SOC 131	The Family	4
SOC 133	Sexual Stratification and Politics	4
SOC 139	Corporations and Society	4
SOC 146	Sociology of Religion	4
SOC 149	Religion and American Society	4
SOC 150	Criminology	4
SOC 151	The Criminal Justice System	4
SOC 154	Health and Illness	4
SOC 155	Sociology of Law	4

SOC 159	Work, Employment, and Careers in the 21st Century	4
SOC 160	Sociology of the Environment	4
SOC 180A	Complex Organizations	4
SOC 180B	Complex Organizations	4
SOC 181	Social Change Organization	4
SOC 182	Utopian Communal Groups and Movements	4
SOC 183	Comparative Organizations	4
SOC 185	Social Policy	4
SOC 185Y	Social Policy (Hybrid Version)	4

Social Dynamics:

SOC 104	The Political Economy of International Migration	4
SOC 123	American Society	4
SOC 125	Sociology of Culture	4
SOC 138	Economic Sociology	4
SOC 141	Industrialization and Social Change	4
SOC 143A	Urban Society	4
SOC 145A	Sociology of Third World Development	4
SOC 145B	Gender and Rural Development in the Third World	4
SOC 147	Sociological Perspectives on East Asia	4
SOC 148	Collective Behavior	4
SOC 156	Social Movements	4
SOC 157	Social Conflict	4
SOC 158	Women's Social Movements in Latin America	4
SOC 170	Population	4

Student-Initiated Thematic Cluster:
Developed with a faculty advisor and approved by the Sociology Undergraduate Curriculum Committee.

(D) Eight units of Sociology beyond courses taken to fulfill above requirements, and outside of the course cluster used to fulfill requirement C.

(E) One additional elective upper division Sociology course not already used to fulfill other major requirements; may use four units of 192, 194H, 195 or 199.

Law and Society Emphasis **Units:** 73-74

Preparatory Subject Matter

SOC 001	Introduction to Sociology	5

Choose one:

SOC 003	Social Problems	4
SOC 004	Immigration and Opportunity	4
SOC 011	Sociology of Labor and Employment	4

SOC 046A	Introduction to Social Research	4
SOC 046B	Introduction to Social Research	5

Choose one:

ANT 002	Cultural Anthropology	5
ANT 020	Comparative Cultures	4
POL 001	American National Government	4
POL 003	International Relations	4
POL 004	Basic Concepts in Political Theory	4
POL 007	Contemporary Issues in Law and Politics	4

Choose one:

HIS 004A	History of Western Civilization	4
HIS 004B	History of Western Civilization	4
HIS 004C	History of Western Civilization	4
HIS 006	Introduction to the Middle East	4
HIS 007A	History of Latin America to 1700	4
HIS 007B	History of Latin America, 1700-1900	4
HIS 007C	History of Latin America 1900-present	4
HIS 008	History of Indian Civilization	4
HIS 009A	History of East Asian Civilization	4
HIS 009B	History of East Asian Civilization	4
HIS 010C	World History III	4
HIS 015A	Africa to 1900	4
HIS 015B	Africa Today	4
HIS 017A	History of the United States	4
HIS 017B	History of the United States	4

Choose one:

PHI 005	Critical Reasoning	4
PHI 014	Ethical and Social Problems in Contemporary Society	4
PHI 024	Introduction to Ethics	4

Depth Subject Matter

SOC 100	Origins of Modern Sociological Theory	4
SOC 155	Sociology of Law	4

Choose from the following categories:

Individual Culture and Society:

SOC 125	Sociology of Culture	4
SOC 126	Social Interaction	4
SOC 135	Social Relationships	4

Stratification and Social Differentiation:

SOC 130	Race Relations	4
SOC 132	The Sociology of Gender	4
SOC 140	Social Stratification	4

Organizations and Institutions:

SOC 118	Political Sociology	4
SOC 131	The Family	4
SOC 146	Sociology of Religion	4
SOC 160	Sociology of the Environment	4
SOC 180A	Complex Organizations	4

Crime and Social Dynamics:

SOC 120	Deviance	4

SOC 150	Criminology	4
SOC 151	The Criminal Justice System	4
SOC 152	Juvenile Delinquency	4
SOC 171	Sociology of Violence and Inequality	4

Stratifications and Social Dynamics:

SOC 118	Political Sociology	4
SOC 137	African American Society and Culture 1790 to 1990	4
SOC 148	Collective Behavior	4
SOC 156	Social Movements	4
SOC 157	Social Conflict	4
SOC 158	Women's Social Movements in Latin America	4
AAS 123	Black Female Experience in Contemporary Society	4
AAS 145A	Black Social and Political Thought	4
AAS 145B	Black Intellectuals	4
CHI 130	United States-Mexican Border Relations	4
CHI 132	Political Economy of Chicana/o Communities	4
NAS 117	Native American Governmental Decision Making	4
NAS 118	Native American Politics	4

Legal Studies:

ASA 155	Asian American Legal History	4
CHI 182	Race and Juvenile Justice	4
ENL 107	Freedom of Expression	4
ESP 161	Environmental Law	4
ETX 138	Legal Aspects of Environmental Toxicology	3
HYD 150	Water Law	3
PHI 119	Philosophy of Law	4
POL 122	International Law	4
POL 150	Judicial Politics and Constitutional Interpretation	4
POL 151	The Constitutional Politics of the First Amendment and the Right to Privacy.	4
POL 152	The Constitutional Politics of the Equality	4
POL 154	Legal Philosophy	4
PSC 153	Psychology and Law	4
UWP 104B	Writing in the Professions: Law	4
WMS 140	Gender and Law	4

Choose one additional elective upper division Sociology course not already used to fulfill other major requirements; may use four units of 192, 194H, 195 or 199.

Social Services Emphasis **Units:** 72-74

Preparatory Subject Matter

SOC 001	Introduction to Sociology	5
SOC 002	Self and Society	4
OR		
SOC 003	Social Problems	4

SOC 046A	Introduction to Social Research	4
SOC 046B	Introduction to Social Research	5
PSC 001	General Psychology	4

Choose two:

ASA 001	Historical Experience of Asian Americans	4
ASA 002	Contemporary Issues of Asian Americans	4
AAS 010	African-American Culture and Society	4
AAS 015	Introduction to African American Humanities	4
CHI 010	Introduction to Chicana/o Studies	4
CHI 050	Chicana and Chicano Culture	4
NAS 001	Introduction to Native American Studies	4
NAS 010	Native American Experience	4
SOC 004	Immigration and Opportunity	4
SOC 011	Sociology of Labor and Employment	4
SOC 030A	Intercultural Relations in Multicultural Societies	3
SOC 030B	Intercultural Relations in Multicultural Societies	3

Depth Subject Matter

SOC 100	Origins of Modern Sociological Theory	4
SOC 131	The Family	4
SOC 140	Social Stratification	4
SOC 185	Social Policy	4
OR		
SOC 185Y	Social Policy (Hybrid Version)	4

Choose one:

PSC 140	Developmental Psychology	4
PSC 142	Social and Personality Development	4
PSC 151	Social Psychology	4
PSC 168	Abnormal Psychology	4

Choose from the following categories:

Social Issues; choose two:

SOC 104	The Political Economy of International Migration	4
SOC 120	Deviance	4
SOC 122	Sociology of Adolescence	4
SOC 124	Education and Inequality in the U.S.	4
SOC 139	Corporations and Society	4
SOC 143A	Urban Society	4
SOC 146	Sociology of Religion	4
SOC 149	Religion and American Society	4
SOC 150	Criminology	4
SOC 153	The Sociology of Childhood	4
SOC 154	Health and Illness	4
SOC 155	Sociology of Law	4
SOC 156	Social Movements	4
SOC 160	Sociology of the Environment	4
SOC 170	Population	4
SOC 171	Sociology of Violence and Inequality	4

Social Interaction; choose one:

SOC 126	Social Interaction	4
SOC 128	Interracial Interpersonal Dynamics	4
SOC 143B	Sociology of City Life	4
SOC 148	Collective Behavior	4
SOC 157	Social Conflict	4

Race and Ethnicity; choose one:

AAS 100	Survey of Ethnicity in the US	4
ASA 102	Theoretical Perspective in Asian American Studies	4
ASA 131	Ethnicity, Culture, and the Self	4
ASA 150	Filipino American Experience	4
ASA 150B	Japanese American Experience	4
ASA 150C	Chinese American Experience	4
ASA 150D	Korean American Experience	4
ASA 150E	Southeast Asian American Experience	4
CHI 110	Sociology of the Chicana/o Experience	4
CRD 176	Comparative Ethnicity	4
NAS 115	Native Americans in the Contemporary World	4
SOC 129	Sociology of Black Experience in America	4
SOC 130	Race Relations	4
SOC 134	Sociology of Racial Ethnic Families	4
SOC 137	African American Society and Culture 1790 to 1990	4
SOC 172	Ideology of Class, Race and Gender	4

Gender; choose one:

SOC 132	The Sociology of Gender	4
SOC 133	Sexual Stratification and Politics	4
SOC 145B	Gender and Rural Development in the Third World	4
SOC 172	Ideology of Class, Race and Gender	4

Organizational Behavior; choose one:

SOC 139	Corporations and Society	4
SOC 146	Sociology of Religion	4
SOC 151	The Criminal Justice System	4
SOC 154	Health and Illness	4
SOC 159	Work, Employment, and Careers in the 21st Century	4
SOC 180A	Complex Organizations	4
SOC 180B	Complex Organizations	4
SOC 181	Social Change Organization	4
SOC 182	Utopian Communal Groups and Movements	4
SOC 183	Comparative Organizations	4

Comparative Studies and World Development Emphasis **Units:** 78-108

Preparatory Subject Matter

SOC 001	Introduction to Sociology	5
SOC 005	Global Social Change: An Introduction to Macrosociology	4
SOC 046A	Introduction to Social Research	4
SOC 046B	Introduction to Social Research	5
ECN 001B	Principles of Macroeconomics	4

ANT 002	Cultural Anthropology	5
OR		
ANT 020	Comparative Cultures	4
HIS 010C	World History III	4
OR		
POL 002	Introduction to Comparative Politics	4

Course work in one modern foreign language at the two-year level or provide proof of proficiency.

Depth Subject Matter

SOC 100	Origins of Modern Sociological Theory	4
SOC 104	The Political Economy of International Migration	4
SOC 141	Industrialization and Social Change	4
SOC 145A	Sociology of Third World Development	4
SOC 170	Population	4

Choose one:

ANT 126A	Anthropology of Development	4
ANT 126B	Women and Development	4
ECN 115A	Economic Development	4

Choose three:

ANT 127	Urban Anthropology	4
SOC 118	Political Sociology	4
SOC 130	Race Relations	4
SOC 131	The Family	4
SOC 143A	Urban Society	4
SOC 144	Agriculture and Society	4
SOC 145B	Gender and Rural Development in the Third World	4
SOC 156	Social Movements	4
SOC 158	Women's Social Movements in Latin America	4

Regional focus; choose three from one of the following groups:

Africa:

AAS 110	West African Social Organization	4
AAS 111	Cultural Politics in Contemporary Africa	4
AAS 162	Islam in Africa and the Americas	4
ANT 140A	Cultures and Societies of West and Central Africa	4
ANT 140B	Cultures and Societies of East and South Africa	4
HIS 115A	History of West Africa	4
HIS 115B	History of East Africa and the Indian Ocean	4
HIS 115C	History of Southern Africa from Exploration to the Rainbow Nation	4
HIS 116	African History: Special Themes	4
POL 134	Africa and U.S. Foreign Policy	4

Latin America:

AAS 107A	African Descent Communities and Culture in the Caribbean and Latin America	4

AAS 180	Race and Ethnicity in Latin America	4
ANT 144	Contemporary Societies and Cultures of Latin America	4
HIS 159	Women and Gender in Latin American History	4
HIS 162	History of the Andean Region	4
HIS 163A	History of Brazil	4
HIS 163B	History of Brazil	4
HIS 164	History of Chile	4
HIS 165	Latin American Social Revolutions	4
HIS 166A	History of Mexico to 1848	4
HIS 166B	History of Mexico since 1848	4
HIS 167	Modern Latin American Cultural and Intellectual History	4
HIS 168	History of Inter-American Relations	4
NAS 120	Ethnopolitics of South American Indians	4
NAS 133	Ethnohistory of Native People of Mexico and Central America	4
SOC 158	Women's Social Movements in Latin America	4
SPA 170	Introduction to Latin American Culture	4
SPA 172	Mexican Culture	4
SPA 173	Cinema and Latin American Culture	4

Middle East:

ANT 142	Peoples of the Middle East	4
HIS 112A	Topics in Pre-Modern Jewish History	4
HIS 112B	Topics in Modern Jewish History	4
HIS 113	History of Modern Israel	4
HIS 190A	Middle Eastern History I: The Rise of Islam, 600-1000	4
HIS 190B	Middle Eastern History II: The Age of the Crusades, 1001-1400	4
HIS 190C	Middle Eastern History III: The Ottomans, 1401-1730	4
HIS 193A	History of the Modern Middle East, 1750-1914	4
HIS 193B	History of the Modern Middle East, From 1914	4
Jewish Studies; see an advisor		
Middle Eastern Studies; see an advisor		
RST 162	Introduction to Islamic Law	4
WMS 184	Gender in the Arab World	4

Asia-China & Japan:

AAS 107C	African Descent Communities and Culture in Asia	4
ANT 148A	Culture and Political Economy in Contemporary China	4
ANT 149A	Traditional Japanese Society	4
ANT 149B	Contemporary Japanese Society	4
EAS 113	Cinema and Society in China	4
ECN 171	Economy of East Asia	4
HIS 191A	Classical China	4
HIS 191B	High Imperial China	4
HIS 191C	Late Imperial China	4

HIS 191D	Nineteenth Century China: The Empire Confronts the West	4
HIS 191E	The Chinese Revolution	4
HIS 191F	History of the People's Republic of China	4
HIS 191G	Special Topics in Chinese History to 1800	4
HIS 191H	Special Topics in Chinese History after 1800	4
HIS 191J	Sex and Society in Modern Chinese History	4
HIS 194A	Aristocratic and Feudal Japan	4
HIS 194B	Early Modern Japan	4
HIS 194C	Modern Japan	4
POL 148A	Government and Politics of East Asia: China	4
POL 148B	Government and Politics in East Asia: Japan	4
RST 165	Islam in Asia	4
RST 170	Buddhism	4
RST 172	Ch'an (Zen) Buddhism	4
SOC 147	Sociological Perspectives on East Asia	4
SOC 188	Markets, Culture and Inequality in China	4

Southeast Asia/Pacific:

ANT 143A	Ethnology of Southeast Asia	4
ANT 145	Performance, Embodiment, and Space in South Asia	4
ANT 147	Modern South Asia Cinema	4
ECN 171	Economy of East Asia	4
HIS 191A	Classical China	4
HIS 191B	High Imperial China	4
HIS 191C	Late Imperial China	4
HIS 191D	Nineteenth Century China: The Empire Confronts the West	4
HIS 191E	The Chinese Revolution	4
HIS 191F	History of the People's Republic of China	4
HIS 191G	Special Topics in Chinese History to 1800	4
HIS 191H	Special Topics in Chinese History after 1800	4
HIS 191J	Sex and Society in Modern Chinese History	4
HIS 195B	History of Modern Korea	4
HIS 196A	Medieval India	4
HIS 196B	Modern India	4
POL 148B	Government and Politics in East Asia: Japan	4
POL 148C	Government and Politics in East Asia: Southeast Asia	4
RST 165	Islam in Asia	4
RST 170	Buddhism	4
RST 172	Ch'an (Zen) Buddhism	4

Total: 72-108

Sociology | SOC; Organizational Studies A.B.

(College of Letters and Science)

Ryken Grattet, Ph.D., Chairperson of the Department

Department Office. 1283 Social Sciences and Humanities Building; 530-752-0782; http://sociology.ucdavis.edu

Faculty. http://sociology.ucdavis.edu/people

The Major Programs

The Organizational Studies (OS) major is designed to provide a broad understanding of the political, social, and economic organizations that make up modern society. Whether thinking about the structure of government bureaucracies, legal systems, economic markets, educational systems, or workplaces, OS offers an interdisciplinary view from which to understand the contemporary world in which complex and formal organizations are ubiquitous. Formal organizations influence how we feel, what we think, and what we can accomplish. As such, the OS major provides both a basic understanding of the field as well as enhancing your ability to pursue their more specialized career interests.

At the upper-division level, you can chose one of four specialized tracks, any one of which will help to better identify and inform your career goals—whether that be in postgraduate education or a specific type of job— and pursue them after graduation. Whether you select the "Business and Society," "Public Policy and Social Welfare," "Nonprofit and Social Change Organizations" or the "Student-Initiated Theme" track, once completed you will have a unique and valuable area of expertise.

Students who plan to enroll in graduate programs in business, public policy, public administration, and education are advised to develop proficiencies in statistics and calculus (such as the MAT 016 series).

Track 1: The Business and Society track is for students who hold an interest in or wish to pursue careers in management or corporate professions and who are interested in economic institutions and commerce, management and administration, work and workplaces, and labor markets. Courses in this cluster analyze businesses, firms, corporations, and markets—nationally and globally—and their place in society, historically and in the present, from a critical perspective. The BAS examines the origins of business corporations and economic markets (and relations); the power relations, inequalities, and stratification associated with contemporary business organizations (firms and corporations); why business organizations rely on particular organizational structures to increase their efficiencies and effectiveness; and overviews of the role business and regulatory organizations play in the economy.

Postgraduate training and careers that follow from this cluster:

- Professional training: MBA programs; mediation programs; law; public policy
- Graduate training: sociology; economics; Ph.D. business school programs (with concentrations in organizational behavior, entrepreneurship, industrial relations, economic analysis, policy analysis, labor relations)
- Career paths: managers, human resources professionals, project managers, diversity personnel, corporate social responsibility personnel, lobbyists, business entrepreneur, labor relations specialists, creative professionals, research staff at policy institutes such as Economic Policy Institute, Urban InstituteE2. Track 2: Public Policy and Social Welfare (PPSW)

Track 2: Public Policy and Social Welfare (PPSW)

The PPSW track is for students who hold an interest in or plan to pursue careers in government and/or social welfare organizations. Courses in this track emphasize how formal organizations and institutions emerge to address key social problems and the policies they generate and utilize to solve them; the unique challenges that government and other policy oriented organizations confront in addressing and managing public problems and promoting the common good; and the dynamics and special circumstances that specific organizational/institutional policy fields such as education, health care, and social welfare confront in seeking to fulfill their charge.

Postgraduate training and careers that follow from this track:

- Professional training: programs in public policy, public administration, government, social welfare, counseling, public affairs, law, leadership institutes, community psychology
- Graduate training: Ph.D. programs in sociology, political science, public administration, education, educational leadership
- Career paths: consultants, social service workers and administrators, staff at policy institutes and think tanks, program evaluation and development, nonprofit administrators, lawyers, teachers, research staff at policy institutes and think tanks, leadership positions in education, including higher education, counselors

Track 3: Nonprofit and social movement organizations (NSMO):

The NSMO track is for students who wish to contribute to local, national, and global transformation(s), to social justice, and/or who plan to pursue a career in the non-profit sector focusing on addressing specific causes and fulfilling social agendas. Students in this cluster may have particular interest in understanding the role that informal and formal organizations—from well-organized and mature non-profits to emergent social movement organizations—play in responding to and affecting social change. This cluster familiarizes students with the unique capacity of organizations to change the world but simultaneously, the barriers, limitations, and challenges to doing so.

Postgraduate training and careers that follow from this track:

- Professional training: programs in community development, regional development, urban development, public policy, public administration, Master's programs in social change, law and social change, business programs with a concentration in corporate responsibility
- Graduate training: programs sociology, history, labor studies, development, international relations, political science
- Career paths: working in nongovernmental organizations around the world (NGO's), joining the Peace Corps or Teach America; teaching in other countries; jobs in any number of areas that are the focus of social change and social justice efforts (energy, housing, labor, community and regional development, health, corporate social responsibility); working in for-profit companies in the areas of energy, corporate social responsibility, work/family support programs, research staff at policy institutes and think tanks

Track 4: Student-Initiated Track:

Select a combination of five courses from any of the above 3 themes (at least three courses should be from SOC). Students choosing this track must meet with a SOC undergraduate advisor to obtain approval of selected courses.

Major Advisor. Consult the Departmental Advising office in 1282 Social Sciences and Humanities Building or see http://sociology.ucdavis.edu/undergraduate/advising/advising-office.

Honors Program. An Honors Program is available to Sociology and Sociology-Organizational Studies majors who have demonstrated excellence in their field of study. To be eligible for the program, students must have a grade-point average of 3.500 in the major and the recommendation of a faculty sponsor familiar with their work. In addition to meeting the standard major requirements, students are encouraged to take a 199 course with their sponsor in the spring of their third year, prior to the seminar courses. Honors students write an honors thesis and take two quarters (eight units) of Honors coursework (SOC 194H). Successful completion of the Honors Program, when combined with College GPA requirements, enables the student to graduate with High or Highest Honors. Students should apply for the program before they begin their fourth year.

Preparatory Subject Matter **Units:** 30

SOC 001	Introduction to Sociology	5
SOC 002	Self and Society	4

Choose one:

SOC 004	Immigration and Opportunity	4

SOC 005	Global Social Change: An Introduction to Macrosociology	4
SOC 011	Sociology of Labor and Employment	4

SOC 046A	Introduction to Social Research	4
SOC 046B	Introduction to Social Research	5
ECN 001A	Principles of Microeconomics	4
ECN 001B	Principles of Macroeconomics	4

Depth Subject Matter **Units:** 45

SOC 100	Origins of Modern Sociological Theory	4
SOC 180A	Complex Organizations	4
SOC 106	Intermediate Social Statistics	5
OR		
STA 103	Applied Statistics for Business and Economics	4

Choose one:

CMN 120	Interpersonal Communication	4
CMN 130	Group Communication	4
CMN 136	Organizational Communication	4
CMN 170	Digital Technology and Social Change	4
OR		
CMN 170V	Digital Technology and Social Change	4
CMN 172	Interpersonal Technologies	4
SOC 126	Social Interaction	4
SOC 135	Social Relationships	4

Choose five from one of the following tracks; at least three of the five must be from Sociology:

Track 1: Business and Society

ARE 112	Fundamentals of Organization Management	4
ARE 130	Agricultural Markets	4
ARE 132	Cooperative Business Enterprises	4
AMS 125	Corporate Cultures	4
CRD 118	Technology and Society	4
CRD 141	Organization of Economic Space	4
CRD 156	Community Economic Development	5
CRD 162	People, Work and Technology	5
ECN 110B	World Economic History Since the Industrial Revolution	4
ECN 111B	Economics History	4
ECN 115A	Economic Development	4
ECN 116	Comparative Economic Systems	4
ECN 121A	Industrial Organization	4
ECN 151A	Economics of the Labor Market	4
ECN 151B	Economics of Human Resources	4
HIS 185B	History of Technology in America	4
HIS 194D	Business and Labor in Modern Japan	4
MGT 150	Technology Management	4
POL 180	Bureaucracy in Modern Society	4
POL 187	Administrative Theory	4
SOC 103	Evaluation Research Methods	4

SOC 138	Economic Sociology	4
SOC 139	Corporations and Society	4
SOC 141	Industrialization and Social Change	4
SOC 159	Work, Employment, and Careers in the 21st Century	4
SOC 160	Sociology of the Environment	4
SOC 188	Markets, Culture and Inequality in China	4

Track 2: Public Policy and Social Welfare

ARE 147	Resource and Environment Policy Analysis	3
OR		
ARE 147M	Resource and Environmental Policy Analysis	2
CRD 142	Rural Change in the Industrialized World	4
CRD 151	Community Field Research: Theory and Analysis	4
CRD 152	Community Development	4
CRD 154	Social Theory and Community Change	4
CRD 158	Small Community Governance	4
CRD 164	Theories of Organizations and their Role in Community Change	5
CRD 171	Housing and Social Policy	4
CRD 172	Social Inequality: Issues and Innovations	4
ECN 115A	Economic Development	4
ECN 116	Comparative Economic Systems	4
POL 107	Environmental Politics and Administration	4
POL 118A	History of Political Theory: Ancient	4
POL 118B	History of Political Theory: Early Modern	4
POL 118C	History of Political Theory: Late Modern	4
POL 180	Bureaucracy in Modern Society	4
POL 187	Administrative Theory	4
SOC 103	Evaluation Research Methods	4
SOC 104	The Political Economy of International Migration	4
SOC 124	Education and Inequality in the U.S.	4
SOC 154	Health and Illness	4
SOC 162	Society, Culture, and Health	4
SOC 163	Population Health: Social Determinants and Disparities in Health	4
SOC 164	Health Policy and Politics	4
CRD 149	Community Development Perspectives on Environmental Justice	4
SOC 185	Social Policy	4

Track 3: Nonprofit and Social Movement Organizations

CHI 132	Political Economy of Chicana/o Communities	4
CRD 140	Dynamics of Regional Development	4
CRD 147	Community Youth Development	4
CRD 149	Community Development Perspectives on Environmental Justice	4
CRD 152	Community Development	4
CRD 154	Social Theory and Community Change	4
CRD 156	Community Economic Development	5
CRD 158	Small Community Governance	4
CRD 164	Theories of Organizations and their Role in Community Change	5
ECN 111B	Economics History	4
ECN 115A	Economic Development	4

ECN 116	Comparative Economic Systems	4
HIS 185B	History of Technology in America	4
HIS 194D	Business and Labor in Modern Japan	4
POL 180	Bureaucracy in Modern Society	4
POL 187	Administrative Theory	4
SOC 103	Evaluation Research Methods	4
SOC 140	Social Stratification	4
SOC 156	Social Movements	4
SOC 160	Sociology of the Environment	4
SOC 163	Population Health: Social Determinants and Disparities in Health	4
SOC 164	Health Policy and Politics	4
SOC 181	Social Change Organization	4
SOC 182	Utopian Communal Groups and Movements	4
SOC 183	Comparative Organizations	4
WMS 187	Gender and Public Policy	4

Track 4: Student-Initiated Track:

Choose a combination of five courses from any of the above three themes; at least three courses should be from SOC. Students choosing this track must meet with a SOC undergraduate adviser to obtain approval of selected courses.

Choose one:

SOC 128	Interracial Interpersonal Dynamics	4
SOC 130	Race Relations	4
SOC 132	The Sociology of Gender	4
SOC 134	Sociology of Racial Ethnic Families	4
SOC 140	Social Stratification	4
SOC 145A	Sociology of Third World Development	4
SOC 145B	Gender and Rural Development in the Third World	4
SOC 172	Ideology of Class, Race and Gender	4

Choose one additional elective upper division Sociology course not already used to fulfill other major requirements; may use four units of 192, 194H, 195, or 199.

Total: 75

Sociology | SOC M.A.

(College of Letters and Science)

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Faculty. http://sociology.ucdavis.edu/people

Graduate Study. The Department offers programs of study and research leading to the M.A. and Ph.D. degrees in sociology. Further information regarding graduate study may be obtained at the Department office or on our website.

The Master of Science degree is offered only in route to the Ph.D.

Graduate students in Sociology have the opportunity to pursue designated emphases in Critical Theory, Social Theory and Comparative History, Native American Studies, Economy, Justice and Society, or Feminist Theory and Research. See these headings for further details on these interdisciplinary programs.

Graduate Advisors. Consult the Graduate Program Coordinator in 327 Young Hall.

Sociology | SOC Ph.D.

(College of Letters and Science)

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Graduate students in Sociology have the opportunity to pursue designated emphases in Critical Theory, Social Theory and Comparative History, Native American Studies, Economy, Justice and Society, or Feminist Theory and Research. See these headings for further details on these interdisciplinary programs.

Graduate Advisors. Consult the Graduate Program Coordinator in 327 Young Hall.

Sociology | SOC Minor

(College of Letters and Science)

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Sociology **Units:** 20

Choose any five upper division Sociology courses, except:

SOC 190X	Seminar in Sociological Analysis	4
SOC 191	Workshop in Contemporary Sociological Theory	4
SOC 192	Internship and Research Practicum	2-6
SOC 193	Workshop in Field Research	2
SOC 194H	Special Study for Honors Students	1-5
SOC 197T	Tutoring in Sociology	1-4
SOC 198	Directed Group Study	1-5
SOC 199	Special Study for Advanced Undergraduates	1-5

Total: 20

Sociology | SOC Courses

Courses in SOC:

SOC 001—Introduction to Sociology (5)
Discussion—1 hour; Lecture—4 hours. Principles and basic concepts of sociology. The study of groups, culture, collective behavior, classes and caste, community and ecology, role, status, and personality. GE credit: ACGH, DD, SS. Effective: 1997 Winter Quarter.

SOC 002—Self and Society (4)
Discussion—1 hour; Lecture—3 hours. Exploration of how self and identity are formed and transformed by socialization and social interaction in relation to roles, groups, institutions, power, and social change. Consideration of how people make decisions, fall in love, and come to blows. GE credit: ACGH, DD, SS. Effective: 2015 Winter Quarter.

SOC 003—Social Problems (4)
Discussion—1 hour; Lecture—3 hours. General sociological consideration of contemporary social problems in relation to sociocultural change and programs for improvement. GE credit: ACGH, DD, SS. Effective: 1997 Winter Quarter.

SOC 004—Immigration and Opportunity (4)
Discussion—1 hour; Lecture—3 hours; Term Paper. Social and demographic analysis of immigration: motives and experiences of immigrants; immigration and social mobility; immigration, assimilation, and social change; multicultural societies. Detailed study of immigration into the U.S., with comparative studies of Europe, Australia, and other host countries. GE credit: ACGH, DD, SS, WC. Effective: 1997 Winter Quarter.

SOC 005—Global Social Change: An Introduction to Macrosociology (4)
Discussion—1 hour; Lecture—3 hours. Introduction to change and diversity in world history, including the United States. Examines population and family, technological change and economic development, power and status, culture and identity. GE credit: ACGH, SS, WC. Effective: 1997 Winter Quarter.

SOC 006—Health and Illness (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the sociology of health and illness, including social determinants of health, social inequalities in health/health disparities, social construction of health, the organization of health care, and the politics of health care reform. GE credit: DD, SS. Effective: 2016 Fall Quarter.

SOC 011—Sociology of Labor and Employment (4)
Discussion—1 hour; Lecture—3 hours. Labor and employment issues in the contemporary United States with some use of historical and comparative materials. Topics will include strategies pursued by employers and employees, labor market discrimination and the role of social policies in shaping labor markets. GE credit: SS. Effective: 2006 Summer Session 1.

SOC 012Y—Data Visualization in the Social Sciences (4)
Laboratory—1.5 hours; Lecture—2 hours; Web Virtual Lecture—1.5 hours. Introduction to quantitative data across the social sciences (Communications, Political Science, Psychology, Sociology, and other disciplines). Transforming data, describing data, producing graphs, visual reasoning, and interpretations. (Communication 12Y, Psychology 12Y, Political Science 12Y.) GE credit: QL, VL. Effective: 2016 Spring Quarter.

SOC 025—Sociology of Popular Culture (4)
Discussion—1 hour; Lecture—3 hours. Social mechanisms that shape modern popular culture. High, folk, and mass culture: historical emergence of popular culture. Mass media, commercialization, ideology and cultural styles. Theories and methods for analyzing cultural expressions in pop music, street art, film, television, and advertising. GE credit: SS, VL. Effective: 1997 Winter Quarter.

SOC 030A—Intercultural Relations in Multicultural Societies (3)
Discussion—1.5 hours; Lecture—1.5 hours. Macro-structural analysis of contemporary multicultural societies; immigration and assimilation in comparative perspective; social construction of racial and ethnic group identities; ethnicity and gender; group conflict and cooperation; controversies surrounding multiculturalism. First course in a two-course Multicultural Immersion Program. GE credit: ACGH, DD, SS. Effective: 2005 Fall Quarter.

SOC 030B—Intercultural Relations in Multicultural Societies (3)
Discussion—1.5 hours; Lecture—1.5 hours. Prerequisite(s): SOC 030A; or Consent of Instructor. Social-psychological analysis of personal experiences living in a multicultural society; conforming to or rejecting group identity or stereotypes; managing and reducing conflict; cross-cultural communication; promises and problems of diversity at UCD. Second course in a two-course Multicultural Immersion Program. GE credit: ACGH, DD, SS. Effective: 2005 Winter Quarter.

SOC 046A—Introduction to Social Research (4)
Discussion—1 hour; Lecture—3 hours; Project (Term Project); Term Paper. Examination of the methodological problems of social research. Selection
and definition of problems of investigation, data-gathering techniques, and sampling. GE credit: SS. Effective: 1997 Winter Quarter.

SOC 046B—Introduction to Social Research (5)
Discussion—1 hour; Lecture—4 hours. Data-analysis techniques, measurement, scaling, multivariate analysis, and quantitative measures of association. GE credit: QL, SS. Effective: 2012 Fall Quarter.

SOC 090X—Lower Division Seminar (1-2)
Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Limited enrollment. Examination of a special topic in sociology through shared readings, discussions, written assignments, or special activities such as fieldwork, laboratory work, etc. May not be repeated for credit. GE credit: SS. Effective: 1997 Winter Quarter.

SOC 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Primarily intended for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

SOC 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

SOC 100—Origins of Modern Sociological Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Origins of modern sociological thought. Special emphasis on three major theorists from the classical tradition of nineteenth century European social thought: Karl Marx, Max Weber, and Emile Durkheim. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 102—Society and Culture of California (4)
Discussion—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. California's distinctive society and culture; sociological analyses of topical issues concerning diversity, environment, cities. GE credit: ACGH, DD, SS. Effective: 2016 Fall Quarter.

SOC 103—Evaluation Research Methods (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SOC 001 or SOC 002 or SOC 003 recommended; SOC 046A and SOC 046B recommended. Surveys applications of research methods to the evaluation of social programs, primarily emphasizing methodological issues, e.g., research design and data collection; uses of evaluation research are also discussed and placed in theoretical context. Participation in an evaluation project. GE credit: SL, SS. Effective: 2016 Fall Quarter.

SOC 104—The Political Economy of International Migration (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, SOC 003, or SOC 004 recommended. Analysis of worldwide migration patterns, and social scientific theories of international and transnational migration. Focus in economical, political, and social impact of immigration and potential for international and regional cooperation. (International Relations 104.) GE credit: SS, WC. Effective: 2016 Fall Quarter.

SOC 106—Intermediate Social Statistics (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): SOC 046B; or Consent of Instructor. Intermediate level course in statistical analysis of social data, emphasizing the logic and use of statistical measures, procedures, and mathematical models especially relevant to sociological analysis. GE credit: QL, SL, SS. Effective: 2016 Fall Quarter.

SOC 118—Political Sociology (4)
Lecture—3 hours; Project (Term Project); Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Relation of social cleavages and social cohesion to the functioning of political institutions; the social bases of local and national power structures; social sources of political movement, analysis of concepts of alienation, revolution, ideology, ruling class, and elite. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 120—Deviance (4)
Lecture—3 hours; Term Paper/Discussion. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Social structural sources, institutional practices and microprocesses associated with illegality, evil, disease, immorality, disability, racial and class differences, citizenship, and the body. Special emphasis on expert knowledge and the production and management of social difference. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 122—Sociology of Adolescence (4)
Lecture—3 hours; Project (Term Project); Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Chronological age and social status; analysis of social processes bearing upon the socialization of children and adolescents. The emergence of youth cultures. Generational succession as a cultural problem. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 123—American Society (4)
Discussion—1 hour; Lecture—3 hours; Project (Term Project); Term Paper. The demographic and social structure of American society and population, with emphasis on ethnic and class groups as bases for political and economic interest. Attention to selected current social controversies. GE credit: ACGH, DD, SS. Effective: 1997 Winter Quarter.

SOC 124—Education and Inequality in the U.S. (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Functions of schooling in contemporary U.S. society. Racial, ethnic, social class, and gender inequalities in student outcomes. Consideration of classic and current controversies in the sociology of education and education policy. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 125—Sociology of Culture (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Sociological approaches to study of historical and contemporary culture and mass media, and their structuring in relation to social actors, institutions, stratification, power, the production of culture, audiences, and the significance of culture in processes of change. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 126—Social Interaction (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Everyday interaction in natural settings; ethnographic approaches to the understanding of social meanings, situations, personal identity and human relationships. Particular attention to the work of Erving Goffman and to principles of field observation and qualitative analysis. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 128—Interracial Interpersonal Dynamics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Analysis of the influences of cultural differences and racial stratification on interpersonal interaction in instrumental settings (e.g., work, education, political action) and intimate settings (e.g., friendship, love, marriage, family). Minority/majority relationships. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 129—Sociology of Black Experience in America (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Survey of historical and contemporary theoretical sociological perspectives on the Black experience in United States. Emphasis on comparisons of Black sociological perspectives and mainstream perspectives of specific sociologists. GE credit: ACGH, DD, SS. Effective: 2016 Fall Quarter.

SOC 130—Race Relations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Functions of the social definitions of race and racial groups. Analysis of racial conflict, oppression, and other forms of ethnic stratification. Models of ethnic interaction and social change. Emphasis on racial relationships within the U.S. GE credit: ACGH, DD, SS. Effective: 2016 Fall Quarter.

SOC 131—The Family (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Contemporary family life in historical and cross-cultural perspective. How different family forms arose, their significance today and prospects for further family change. Attention to power relations within and beyond the family and to the social implications of family transformation. GE credit: ACGH, DD, SS. Effective: 2016 Fall Quarter.

SOC 132—The Sociology of Gender (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Analysis of biological, psychological, cultural and structural conditions underlying the status and roles of men and women in contemporary society, drawing on a historical and comparative perspective. GE credit: ACGH, DD, SS. Effective: 2016 Fall Quarter.

SOC 133—Sexual Stratification and Politics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. SOC 001, SOC 002, or SOC 003 recommended. Analysis of origins, dynamics, and social implications of sexual stratification. Examination of classical and contemporary theorists such as Engels, Freud, J.S. Mill, de Beauvoir, Juliet Mitchell, D. Dinnerstein. Attention to selected issues in social movements for and against sexual equality. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 134—Sociology of Racial Ethnic Families (4)
Discussion—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Asian American, Black, Chicano, and Native American family life in comparative historical perspective. Family structure and gender roles are considered in relation to socio-historical dynamics. GE credit: ACGH, DD, SS. Effective: 2016 Fall Quarter.

SOC 135—Social Relationships (4)
Discussion—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Social and cultural factors influencing friendships and intimate relationships. Topics include relationship development, relationship maintenance, and relationship loss. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 137—African American Society and Culture 1790 to 1990 (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Political and social transformations of African American communities between 1790 and 1990, as seen through film, literature, and music. Topics include: Black consciousness, Afro-Slave culture, The Harlem Renaissance, and contemporary Hip Hop. GE credit: ACGH, DD, SS. Effective: 2016 Fall Quarter.

SOC 138—Economic Sociology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Overview of the rapidly growing field of economic sociology. Focus on variations in the ways that markets are organized. The relationship between individual and collective rationality will also be emphasized. GE credit: ACGH, SS, WC. Effective: 2016 Fall Quarter.

SOC 139—Corporations and Society (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Study of the history and power of the modern corporation; corporate organization; politics, the state, and the corporation; labor unions and the labor process; competition, regulation and international markets; the multinational and conglomerate corporation; and mass markets and consumerism. GE credit: ACGH, SS. Effective: 2016 Fall Quarter.

SOC 140—Social Stratification (4)
Lecture—3 hours; Project (Term Project); Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Systems of social ranking, theories of stratification; power, prestige, culture, and styles of life of various social classes; social mobility and its consequences for social structure. GE credit: ACGH, DD, SS. Effective: 2016 Fall Quarter.

SOC 141—Industrialization and Social Change (4)
Lecture—3 hours; Project (Term Project); Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Selected technological and social factors. Preconditions of economic development and industrialization. Social, political, and cultural issues at various levels of economic development. Major historical differences and major current trends. Emphasis either on highly industrialized countries or on less developed countries. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 143A—Urban Society (4)
Discussion—1 hour; Lecture—3 hours; Project (Term Project); Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Theories of city origins. Analysis of the historic process of urbanization and of varying city types. Comparison of American and European experience of metropolitanization,counterurbanization,and neighborhood change. Consideration of competing theories of urban growth and change and competing visions of the urban future. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 143B—Sociology of City Life (4)
Discussion—1 hour; Lecture—3 hours; Project (Term Project); Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Critical dissection of the loss of community issue. Analysis of the organization of primary ties in the city, of the culture of urban public life and of the learning of city skills. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 144—Agriculture and Society (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Development of agriculture as a major enterprise in modern society with the concomitant reduction in the labor force and family farms. Analysis of issues including mechanization, migrant labor, corporate farming, and public resource policy. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 145A—Sociology of Third World Development (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SOC 001; Upper division standing. Introduction to theories and contemporary issues in the sociology of development. Topics such as urbanization, rural/agrarian change, class, status groups, international division of labor, sectoral shifts, international capital, informal economy, gender, and political processes are analyzed within a comparative-historical framework. GE credit: SS, WC. Effective: 1997 Winter Quarter.

SOC 145B—Gender and Rural Development in the Third World (4)
Seminar—4 hours. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Political-economic analysis of women and work during the process of socioeconomic change in the world with particular attention to the family/household context. GE credit: SS, WC. Effective: 2016 Fall Quarter.

SOC 146—Sociology of Religion (4)
Discussion—1 hour; Lecture—3 hours; Project (Term Project); Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Relationship between social structures and religions. The social setting of the major world religions. Religious innovators and institutionalization (churches, sects, cults). Secularization in the modern world and the rise of secular ideologies. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 147—Sociological Perspectives on East Asia (4)
Discussion—1 hour; Lecture—3 hours; Project (Term Project); Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Sociological theories and concepts applied toward understanding East Asian society. Emphasis on the political structure, stratification, and economy in China and Japan. Analysis of historical and contemporary similarities and differences. GE credit: SS, WC. Effective: 2016 Fall Quarter.

SOC 148—Collective Behavior (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Study of behavior of human crowds and masses in extraordinary circumstances, including crowd panics, mass scares, collective protests, riots, revolutionary situations, ecstatic and revivalist gatherings, crazes, fads, and fashions. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 149—Religion and American Society (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Historical, contemporary survey of religious traditions and organizations and their relation to U.S. social and cultural patterns. Civil religion, religious pluralism, minority and deviant communities, religious migration, U.S. religion as a social institution, and religion, politics, and social stratification. GE credit: ACGH, DD, SS. Effective: 2016 Fall Quarter.

SOC 150—Criminology (4)
Lecture—3 hours; Project (Term Project); Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Sociological analysis of criminal behavior in relation to social structure and the criminalization process. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 151—The Criminal Justice System (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Sociological analysis of the different components of the criminal justice system including the emergence and interpretation of criminal laws, the contemporary roles and functions of the police, criminal courts and correctional institutions. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 152—Juvenile Delinquency (4)
Lecture—3 hours; Project (Term Project); Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Study of juvenile delinquency in relation to the family, peer groups, community, and institutional structures. Consideration of processing of the delinquent by formal agencies of control. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 153—The Sociology of Childhood (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Contemporary childhood in historical, cross-cultural, and global perspectives. Examine changes in understanding of the nature of childhood and "best interests of the child" by class, race, gender, geographic region, and historical period. GE credit: ACGH, DD, SS, WC. Effective: 2016 Fall Quarter.

SOC 154—Health and Illness (4)
Lecture—3 hours; Project (Term Project); Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Theoretical tools for understanding the social determinants of health and health care, including such topics as health policy, social sources of illness, social construction of illness, medicalization, social disparities in health, and the illness experience. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 155—Sociology of Law (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Law considered as social control; relation of legal institutions to society as affecting judicial decision making and administration of justice. Lawyers as an occupational group. Legal reform. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 156—Social Movements (4)
Discussion—1 hour; Lecture—3 hours; Project (Term Project); Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Analysis of several aspects of social movements: mobilization, forms of organization, ideology, recruitment, leadership, strategies and tactics, development, effects. Frequent use of sound and film materials. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 157—Social Conflict (4)
Discussion—1 hour; Lecture—3 hours; Project (Term Project); Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Analysis of the causes, dynamics, and regulation of social conflict within and between various kinds of social groupings with particular reference to nonviolent methods of waging and regulating conflict. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 158—Women's Social Movements in Latin America (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Contemporary women's social movements in Latin America, focusing on Honduras, El Salvador, Brazil, and Nicaragua. Examination of exploitation and oppression in Latin America. GE credit: DD, SS, WC. Effective: 2016 Fall Quarter.

SOC 159—Work, Employment, and Careers in the 21st Century (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Historical and contemporary overview of employment, work, and occupations in American society. Study of authority and power relations, labor markets, control systems, stratification, and corporate structures, and how these factors shape work in diverse or organizational and employment setting. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 160—Sociology of the Environment (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Production, consumption, and urban expansion. Basic social logics surrounding current problems of resource scarcity (environmental extractions) and excess wastes (environmental additions). Ways that society can change and re-organize itself to become more environmentally conscious and hence ecologically sustainable. GE credit: ACGH, DD, SS, WC. Effective: 2016 Fall Quarter.

SOC 161—The Civil Justice System (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Empirical studies of the different aspects of the civil justice system in the United States and Global Society including the litigation, juries, civil rights, and international laws relating to trade, the environment, and human rights. Effective: 2016 Fall Quarter.

SOC 162—Society, Culture, and Health (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SOC 001, SOC 002, SOC 003, or SOC 006 recommended. Analysis of how socio-cultural factors shape illness experience. Evaluation of how certain conditions come to be understood as health conditions; illness identities and biographies; doctor-patient interactions; biomedical cultures; and how race, ethnicity, and gender shape health practices. GE credit: DD, SS. Effective: 2016 Fall Quarter.

SOC 163—Population Health: Social Determinants and Disparities in Health (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SOC 001, SOC 002, SOC 003, or SOC 006 recommended. Survey of the social determinants and disparities in health: measurement of population health; health transitions and global disparities; domestic disparities in health by class, race/ethnicity, nativity, gender, and sexual orientation; social determinants including social support, social stress, neighborhoods, and policy. GE credit: DD, SS. Effective: 2016 Fall Quarter.

SOC 164—Health Policy and Politics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SOC 001, SOC 002, SOC 003, or SOC 006 recommended. Introduction to health policy and politics, including health care access and delivery, and policies related to health inequalities, the social determinants of illness and health behaviors. GE credit: DD, SS. Effective: 2016 Fall Quarter.

SOC 170—Population (4)
Discussion—1 hour; Lecture—3 hours; Project (Term Project); Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Introduction to the study of human population, including theories and statistical measures; social causes and consequences of population trends; changes in population structure; geographical distribution, migration, sociopsychological factors affecting fertility. GE credit: QL, SS. Effective: 2016 Fall Quarter.

SOC 171—Sociology of Violence and Inequality (4)
Lecture/Discussion—4 hours. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. How systems of social inequality organize the practice of violence. Definitions of violence and issues affecting the social capacity for violence. Analysis and comparison of different forms of violence associated with race, class, gender relations and social organization. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 172—Ideology of Class, Race and Gender (4)
Lecture—4 hours. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Examination of popular belief systems that accompany relations between social classes, whites and blacks, and men and women in the United States. How do dominant groups attempt to justify each relationship, and is there ideological conflict or consensus between groups. GE credit: ACGH, DD, SS. Effective: 2016 Fall Quarter.

SOC 173—Sociology Through Literature (4)
Discussion—1 hour; Lecture—3 hours; Project (Term Project); Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Introduction to analysis of literature as sociological data. Reading of numerous works on American and other societies by authors such as Steinbeck, Lewis, Dreiser, Schulberg, Orwell, etc. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 174—American Jewish Identities and Communities (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Sociology of Jewish life, analyzing challenges to Jewish identity and community in the diaspora. Diversity within the Jewish community, Americanization, women, new immigrants, post-Holocaust Jewish identity, and LGBT Jews. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 175—Mass Communication (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Examines the relationship between the media and social structures. History of mediastate relations. Media as reflector and shaper of values. Emphasis on current European and Marxist and pluralist theories rather than on content analysis. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 176—Sociology of Knowledge, Science, and Scientific Knowledge (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Social, cultural, and historical dimensions of knowledge, especially scientific knowledge. Problems, methods, and theory in sociology of scientific knowledge. Laboratory and historical case studies. Scientific and technical knowledge in institutional and organizational contexts. (Science and Technology Studies 176.) GE credit: SS. Effective: 2016 Fall Quarter.

SOC 178—Punishment and Corrections (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SOC 001, 002, or 003 recommended. Origins, characteristics, and consequences of various sanctions and punishment regimes including fines, banishment, incarceration, deportation, and execution. GE credit: SS. Effective: 2017 Spring Quarter.

SOC 180A—Complex Organizations (4)
Discussion—1 hour; Lecture—3 hours; Project (Term Project); Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Develops a sociological approach to organizations theory. Designed to
introduce sociological concepts, address the alternative psychological and economic models, and involve students in the practice of organizational analysis. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 180B—Complex Organizations (4)
Discussion—1 hour; Lecture—3 hours; Project (Term Project); Term Paper. Prerequisite(s): Consent of Instructor. SOC 001, SOC 002, or SOC 003 recommended. Builds on concepts and skills developed in course 180A. Deals with the issues of organizational decision making, design, and survival. Emphasis on relations between organizations and the effects of those relations in both the public and private sectors. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 181—Social Change Organization (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Analysis of organizations with social change and improvement goals and programs, emphasizing voluntary associations and grassroots citizen groups. Topics treated include formation, decision making and leadership, strategies and tactics, factionalism and coalitions, effectiveness. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 182—Utopian Communal Groups and Movements (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Formations, structures, and social life of historical and contemporary countercultural, utopian, dystopian, intentional, and religious communal settlements and movements, including comparison with other small settlement forms such as monasteries, villages, neighborhoods, encampments, and communities. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 183—Comparative Organizations (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): SOC 001, SOC 002 or SOC 003 recommended; SOC 180A recommended. Examination of the economic, cultural, and political organization of major industrial and developing nations. Discussion of patterns and practices, alternative theoretical models of explanation, and case studies of organizations. Societies may include Japan, Germany, Egypt, China, and the U.S. GE credit: ACGH, SS, WC. Effective: 2016 Fall Quarter.

SOC 185—Social Policy (4)
Lecture—3 hours; Project (Term Project); Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Examination of social policies that affect the well-being of individuals, families and groups, including such policies as old-age pensions, health insurance, and aid to the poor. Students may not take both course 185 and 185Y for credit. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 185Y—Social Policy (Hybrid Version) (4)
Lecture—1.5 hours; Term Paper/Discussion—1 hour; Web Virtual Lecture—1.5 hours. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Examination of social policies that affect the well-being of individuals, families and groups, including such policies as old-age pensions, health insurance, and aid to the poor. Students may not take both courses 185 and 185Y for credit. GE credit: SS, WE. Effective: 2016 Fall Quarter.

SOC 188—Markets, Culture and Inequality in China (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Economic and political systems and patterns of social interaction and inequality in China. State and corporate structures and practices, market and consumer behaviors, social mobility and stratification, protest and resistance. GE credit: SS, WC. Effective: 2016 Fall Quarter.

SOC 189—Social Science Writing (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Improved analytic writing and methods for reporting social science research to a wider public. Sociological analysis of the conditions of good and bad writing. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 190X—Seminar in Sociological Analysis (4)
Seminar—3 hours; Term Paper. Prerequisite(s): SOC 100; Upper division standing; SOC 100 (former SOC 165A). Limited enrollment. In-depth examination at an upper division level of a special topic in Sociology. Emphasis on student participation in learning. May not be repeated for credit. GE credit: SS. Effective: 1997 Winter Quarter.

SOC 191—Workshop in Contemporary Sociological Theory (4)
Lecture—2 hours; Term Paper; Workshop—1 hour. Prerequisite(s): SOC 100; SOC 100 (former SOC 165A); senior standing. Workshop in contemporary sociological theory that allows students to explore the uses of theory in empirical inquiry on problems of interest to students. Contemporary theory considered in relation to classical and modern influences, concept formation, theory construction, and explanation. Not open for credit to students who have received credit for course 165B. GE credit: SS. Effective: 1997 Winter Quarter.

SOC 192—Internship and Research Practicum (2-6)
Internship—6-18 hours. Prerequisite(s): Consent of Instructor. Must have 84 units complete; faculty approval of proposed internship. Supervised internship and study in an agency, organization, or institution; application of sociological concepts to the work experience. May be repeated for credit with consent of instructor. Maximum of four units may be counted toward the major. (P/NP grading only.) Effective: 2018 Winter Quarter.

SOC 193—Workshop in Field Research (2)
Lecture/Discussion—2 hours. Prerequisite(s): SOC 046A; (SOC 192 (can be concurrent) or SOC 199 (can be concurrent)); SOC 192 or SOC 199 required concurrently for 2.0-4.0 units, senior standing. Overview of the process of collecting, recording, analyzing, and reporting qualitative social data. Emphasis on application of principles; each participant completes an original research project. Not open for credit to students who have completed course 194HA. GE credit: SS, WE. Effective: 2001 Fall Quarter.

SOC 194H—Special Study for Honors Students (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Open to Sociology majors of senior standing who qualify for the Honors program. Independent study of a sociological problem involving the writing of an Honors thesis. May be repeated up to 8 unit(s). (P/NP grading only.) GE credit: WE. Effective: 2014 Fall Quarter.

SOC 194HA—Special Study for Honors Students (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Senior standing and admission to the Honors Program. Directed reading, research and writing culminating in the preparation of a Senior Honors Thesis under direction of faculty advisor. GE credit: SS. Effective: 1997 Fall Quarter.

SOC 194HB—Special Study for Honors Students (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Senior standing and admissions to the Honors Program. Directed reading, research and writing culminating in the preparation of a Senior Honors Thesis under direction of faculty advisor. GE credit: SS. Effective: 1997 Spring Quarter.

SOC 195—Special Topics in Sociological Analysis (4)
Seminar—3 hours; Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. In-depth examination of topics in sociology. Emphasis on student research and writing. May be repeated for credit when topic differs. May be repeated for credit. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 197T—Tutoring in Sociology (1-4)
Tutorial—3-12 hours. Prerequisite(s): Upper division standing; completion of appropriate course with distinction. Activities vary depending on the nature of the course assignment. May include (but not limited to) tutoring on course material, advising on projects and papers, and leading discussion groups. (P/NP grading only.) Effective: 1997 Winter Quarter.

SOC 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

SOC 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Must have 84 units complete and faculty approval. Special study. (P/NP grading only.) Effective: 2018 Winter Quarter.

SOC 201—Social Research (4)
Lecture/Discussion—3 hours; Term Paper—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Comparative survey of sociological inquiry, taught as a practicum. Philosophy of social science; values and research; research agendas and research problem formulations; research process; explanations; interpretation; study design; concept formation, measure, sampling, data acquisition, inference; rhetoric and presentation of findings. Effective: 2007 Fall Quarter.

SOC 206—Quantitative Analysis in Sociology (4)
Lecture—4 hours. Prerequisite(s): SOC 106 Survey of the statistical models and methods that serve as a foundation for quantitative research in sociology, with an emphasis on multivariate regression analysis, as well as measurement theory and time series analysis. (S/U grading only.) Effective: 1997 Winter Quarter.

SOC 207A—Methods of Quantitative Research (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SOC 106; Or the equivalent. Principles of study design, examination of measurement, survey research methods and multivariate analysis. Course will stress actual practice of techniques. Students will carry out quantitative data analysis using packaged computer programs. May be repeated up to 8 unit(s) with instructor approval. Effective: 2015 Fall Quarter.

SOC 208—Topics in Advanced Quanitative Methods in Social Science (4)
Seminar—3 hours; Term Paper. Prerequisite(s): SOC 206; Or the equivalent and graduate standing; major graduate students. Analysis of the logic and application of an advanced statistical model; the particular model chosen may vary. Emphasis on the model's assumptions, its strengths and weaknesses, its application for social science inquiry, and the relationship between methods and social theory. May be repeated up to 12 unit(s). Effective: 2007 Spring Quarter.

SOC 215—Economy, Polity, and Society (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Open to graduate students in sociology and related disciplines. Course introduces students to topics and selected issues in the related fields of economic and political sociology and political economy. Effective: 1997 Winter Quarter.

SOC 220—Deviance, Law, and Social Control (4)
Project (Term Project); Seminar—3 hours. Prerequisite(s): SOC 120; or Consent of Instructor. Report and discussions of literature on selected forms of deviance in relation to law and formal social control. Agency contacts and exploratory research projects. Effective: 1997 Winter Quarter.

SOC 224—Sociology of Education (4)
Seminar—3 hours; Term Paper. Prerequisite(s): SOC 206 or equivalent recommended. Restricted to graduate students or consent of instructor. Overview of sociological theories accounting for the form, role, and evolution of educational systems. Emphasis on empirical research on education and social stratification and application to educational policy. Effective: 2018 Winter Quarter.

SOC 225—Cultural Sociology (4)
Seminar—3 hours; Term Paper. Explores the varied ways in which culture is understood in the social sciences and the research questions that follow from contrasting viewpoints. The approach is historically informed and focused on changing cultural forms in relation to industrialization and post-modernism. Effective: 1997 Winter Quarter.

SOC 226—Sociological Social Psychology (4)
Seminar—3 hours; Term Paper—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Advanced study of the varying approaches, methods, issues and topical concerns of sociological social psychology. Analysis of central and representative historical and contemporary works. Effective: 1997 Winter Quarter.

SOC 227—Sociology of Reproduction (4)
Discussion—1 hour; Lecture—3 hours. Recent social science scholarship in such areas as teenage pregnancy,
family planning, abortion, adoption, AIDS, and new reproductive technologies; focus on the current situation in the United States. Effective: 1997 Winter Quarter.

SOC 230—Ethnic (Race) Relations (4)
Lecture—3 hours; Term Paper. Advanced study of the determinants of ethnic groupings and their interrelationships. Major theme will be the patterns of ethnic stratification and causes of ethnic conflict. Specific focus upon dominance and resistance to dominance. Influence of social science research. Effective: 1997 Winter Quarter.

SOC 233—Gender, Culture, and Local/Global Transformation (4)
Seminar—3 hours; Term Paper. Focus on critical approach to women and development; analyze local transformations with global connections within specific cultural contexts. Course covers theory, methodological issues, and relationship between theory and practice. Effective: 1998 Fall Quarter.

SOC 234—Gender, Family, and Society (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. The major theoretical traditions and concerns in family sociology and sociology of gender. Analysis of selected classical and contemporary works representative of functionalist, Marxist, psychoanalytic, feminist and critical theoretical approaches to these subjects (e.g.,Engels,Parsons,Freud,Horkheimer,Goode,Lasch,Mitchell). Emphasis on macro and historical questions. Effective: 1997 Winter Quarter.

SOC 242A—Methodologies of Sociohistorical Inquires (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of instructor not required for graduate students in the Social Sciences Division or the Humanities, Arts, and Cultural Studies Division; required for undergraduates and students from other divisions or colleges. Introduction to comparative and case methodological approaches to sociohistorical inquiry, theoretical and practical issues, and substantive research agendas ranging from study of large-scale social transformations to close microhistories, including research agendas being developed by students in the course. Effective: 2015 Fall Quarter.

SOC 243—Urban Society (4)
Seminar—3 hours; Term Paper. Broad overview of the issues and concerns of the field of urban sociology. Special emphasis on the human experience of urban living in contemporary, cross-cultural or historical settings. Effective: 1997 Winter Quarter.

SOC 245—Developing Societies (4)
Project (Term Project); Seminar—3 hours; Term Paper. Prerequisite(s): Graduate student status or familiarity with problems of developing societies. Analysis of social and economic problems of developing societies from the standpoint of theory and research on modernization and underdevelopment. Nature of third world dependency and interdependence in the global political economy. Effective: 1997 Winter Quarter.

SOC 248—Social Movements (4)
Seminar—3 hours; Term Paper. Analysis of current issues in and contributions to the study of collective behavior and social movements; particular focus upon the strategies and tactics of social movements. Effective: 1997 Winter Quarter.

SOC 254—Sociology of Health and Illness (4)
Seminar—3 hours; Term Paper. Open to graduate or professional students. Sociological perspectives and methods on the study of health and illness. Students select topics for supervised research. Research paper required. Effective: 2018 Winter Quarter.

SOC 255—Sociology of Law (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Analysis of the nature of the legal process and its impact on social behavior. Will consider (1) nature and functions of law, (2) the organization and administration of law, and (3) the capacity of law to affect social behavior. Effective: 1997 Winter Quarter.

SOC 265A—Classical Sociological Theory (4)
Discussion—1 hour; Lecture—3 hours. Introduces graduate students to the work of the main classical thinkers in the tradition of social theory, such as Marx, Durkheim, Weber, Simmel, Freud, G.H. Mead, and Parsons, locating them within the historical,cultural,and philosophical milieu in which their ideas originated. Effective: 1997 Winter Quarter.

SOC 265B—Theory in Contemporary Sociology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SOC 265A Explores the uses of theories in contemporary sociology by tracing their connections with classical sociological writings and their relations to broader theoretical concerns of contemporary social thought, with particular emphasis on relevance to the current historical, cultural and social milieu. Effective: 1997 Winter Quarter.

SOC 270—Social Demography (4)
Seminar—4 hours. Prerequisite(s): SOC 170; or Consent of Instructor. How social institutions affect and are affected by the level and variation of mortality, migration, and fertility. Special emphases on the determinants of fertility-related attitudes and behavior, on less-developed countries, and on contemporary empirical studies. Effective: 1997 Winter Quarter.

SOC 280—Organizations and Institutions (4)
Seminar—4 hours. Theory of formal organizations and bureaucracy. Methods of research in organizational and institutional studies. Historical and comparative
analysis of political, religious, educational, military, and economic structure. Effective: 1997 Winter Quarter.

SOC 288—Integrative Research Practicum (4)
Extensive Writing; Seminar—6 hours; Term Paper. Prerequisite(s): SOC 207A; SOC 242A; SOC 292A; Consent of Instructor. Continuing training in field, quantitative, and/or comparative-historical methods. Emphasis on students' research projects and applications of principles related to research design, concept and theory construction causality and interpretation, and data and measurement. Completion of research paper is required. Effective: 2015 Fall Quarter.

SOC 290—Seminar (4)
Seminar—3 hours; Term Paper. (S/U grading only.) Effective: 1997 Winter Quarter.

SOC 292A—Field Research (4)
Fieldwork; Seminar—3 hours. Prerequisite(s): Graduate standing in Sociology or consent of instructor. Introduction to the logic, methods, and practices of field research, with particular emphasis on the ethnographic tradition of participant observation. Interviewing and other qualitative techniques will also be covered. Students will develop original research projects based on their own fieldwork. Effective: 2015 Fall Quarter.

SOC 293—Proseminar in Sociology (2)
Seminar—2 hours. Prerequisite(s): First-year Sociology graduate students only. Introduction to graduate training in sociology. A seminar designed to introduce students entering graduate work in the department to its ongoing research activities. (S/U grading only.) Effective: 1997 Winter Quarter.

SOC 295—Special Topics Seminar (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Research topics in Sociology. Specific topic will vary according to faculty interest and student demand. May be repeated for credit when topic differs. May be repeated for credit. Effective: 1999 Fall Quarter.

SOC 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

SOC 299—Individual Study (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

SOC 390A—The Teaching of Sociology (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): Graduate standing; required for first-time teaching assistants. Practical instruction in teaching methods for qualitative and quantitative courses. Pedagogical issues involved in critical sociological analysis. (S/U grading only.) Effective: 1997 Winter Quarter.

SOC 390B—The Teaching of Sociology (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): Graduate standing. Practical instruction in devising course syllabi, lectures and assignments for Associate-Instructors and others interested in college teaching. Discussion of pedagogical methods of teaching qualitative and quantitative courses. (S/U grading only.) Effective: 1997 Winter Quarter.

SOC 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

SOC 466—Research Paper Workshop (2)
Discussion—0.5 hours; Workshop—1.5 hours. Prerequisite(s): Master of Arts standing. A workshop to assist advanced graduate students in the preparation of an original research paper. Students present their research papers and discuss issues in theory, research design, data, empirical inference, and verbal and written presentation of a professional research paper. (S/U grading only.) Effective: 1997 Winter Quarter.

Soils & Biogeochemistry (Graduate Group)

Soils & Biogeochemistry (Graduate Group) | Soils & Biogeochemistry Information

Sanjai J. Parikh, Ph.D., Chairperson of the Group

Group Office. 1152 Plant & Environmental Sciences Building; 530-752-1669; http://soils.ucdavis.edu/; http://lawr.ucdavis.edu/graduate_sbg.htm

Faculty. http://soils.ucdavis.edu/people/faculty/

Soils & Biogeochemistry (Graduate Group) | Soils & Biogeochemistry M.S.

Sanjai J. Parikh, Ph.D., Chairperson of the Group

Group Office. 1152 Plant & Environmental Sciences Building; 530-752-1669; http://soils.ucdavis.edu/; http://lawr.ucdavis.edu/graduate_sbg.htm

Faculty. http://soils.ucdavis.edu/people/faculty/

Graduate Study. The Soils and Biogeochemistry Graduate Group offers programs of study and research leading to the M.S. and Ph.D. degrees. The focus of Soils and Biogeochemistry is on the physical, chemical and biological processes occurring in soils of different landforms and ecosystems. The goal is to understand the complex processes of mass and energy flow that control agricultural and natural ecosystem functions, productivity, and sustainability. Investigations assess impacts and implications of natural processes and anthropogenic effects, such as climate change, on soil and ecosystem behavior and development. Examples include: fate and emission of greenhouse gases; soil carbon sequestration; fate and transport of native and applied chemicals; soil microbial ecology; nutrient uptake and management; nutrient cycling in managed and wildland ecosystems; pesticide and trace element adsorption on surfaces; mineral weathering; organic agriculture; bioavailability of toxics; soil erosion; conservation; ecosystem productivity and sustainability; and the study of soil evolution on the landscape. These studies are carried out within a framework of integrating applied chemical, physical, mathematical, and biological sciences.

Graduate Advisors. Randy Dahlgren, Ph.D.; Jorge Rodrigues, Ph.D.; Sanjai Parikh, Ph.D.

Graduate Admissions Officer. Jorge Rodrigues, Ph.D.

Soils & Biogeochemistry (Graduate Group) | Soils & Biogeochemistry Ph.D.

Sanjai J. Parikh, Ph.D., Chairperson of the Group

Group Office. 1152 Plant & Environmental Sciences Building; 530-752-1669; http://soils.ucdavis.edu/; http://lawr.ucdavis.edu/graduate_sbg.htm

Faculty. http://soils.ucdavis.edu/people/faculty/

Graduate Study. The Soils and Biogeochemistry Graduate Group offers programs of study and research leading to the M.S. and Ph.D. degrees. The focus of Soils and Biogeochemistry is on the physical, chemical and biological processes occurring in soils of different landforms and ecosystems. The goal is to understand the complex processes of mass and energy flow that control agricultural and natural ecosystem functions, productivity, and sustainability. Investigations assess impacts and implications of natural processes and anthropogenic effects, such as climate change, on soil and ecosystem behavior and development. Examples include: fate and emission of greenhouse gases; soil carbon sequestration; fate and transport of native and applied chemicals; soil microbial ecology; nutrient uptake and management; nutrient cycling in managed and wildland ecosystems; pesticide and trace element adsorption on surfaces; mineral weathering; organic agriculture; bioavailability of toxics; soil erosion; conservation; ecosystem productivity and sustainability; and the study of soil evolution on the landscape. These studies are carried out within a framework of integrating applied chemical, physical, mathematical, and biological sciences.

Graduate Advisors. Randy Dahlgren, Ph.D.; Jorge Rodrigues, Ph.D.; Sanjai Parikh, Ph.D.

Graduate Admissions Officer. Jorge Rodrigues, Ph.D.

Soil Science Minor; Land, Air & Water Resources

Soil Science Minor; Land, Air & Water Resources | SSC Minor

(College of Agricultural and Environmental Sciences)

Faculty. http://lawr.ucdavis.edu/people/faculty

Major Programs. See the Soils and Biogeochemistry track in Environmental Science and Management.

The Department of Land, Air and Water Resources, Soils and Biogeochemistry Program, offers a minor program in soil science. The minor is especially geared toward students in the environmental sciences including Hydrologic Science, Environmental Science and Management, Environmental Toxicology, Ecological Management and Restoration, International Agricultural Development, Crop Science and Management, Environmental Horticulture and Urban Forestry, Geology, and Plant Biology.

Graduate Study. Programs of study leading to the M.S. and Ph.D. degrees in Soils & Biogeochemistry are available. Information regarding these programs can be obtained from the graduate advisor, at http://soils.ucdavis.edu/ and in the Graduate Announcement. See also Graduate Studies.

Minor Advisor. R.J. Southard (Land, Air and Water Resources)

Soil Science		**Units:** 21
SSC 100	Principles of Soil Science	5

Choose 16 units:

SSC 102	Environmental Soil Chemistry	3
SSC 105	Field Studies of Soils in California Ecosystems	5
SSC 107	Soil Physics	5
SSC 109	Sustainable Nutrient Management	4
SSC 111	Soil Microbiology	4
SSC 118	Soils in Land Use and the Environment	4
SSC 120	Soil Genesis, Morphology, and Classification	5
PLS 158	Mineral Nutrition of Plants	4
HYD 124	Plant-Water-Soil Relationships	4
HYD 134	Aqueous Geochemistry	6

Total: 21

Soil Science Minor; Land, Air & Water Resources | SSC Courses

Questions pertaining to the following courses should be directed to the instructor, to the Resource Sciences Teaching Center in 1150 Plant and Environmental Sciences Building 530-752-1603.

Courses in SSC:

SSC 010—Soils in Our Environment (3)
Independent Study; Lecture—3 hours. Class size limited to 90 students. Soils in our global ecosystem; soils as natural bodies formed by interactive environmental processes; soil response to use and management; sustainable use of soil resources; role of soils in agricultural and environmental issues; role of soils in our daily lives. GE credit: QL, SE, SL. Effective: 2006 Fall Quarter.

SSC 092—Soil Science Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Work experience off and on campus in soil science. Internship supervised
by a member of the faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

SSC 100—Principles of Soil Science (5)
Laboratory—3 hours; Lecture—3 hours; Term Paper. Prerequisite(s): College-level courses in each of chemistry, physics, biology, and geology recommended. Soil as part of natural and managed ecosystems and landscapes. Solid, liquid, and gas phases and their interactions in the soil. Water, gas and heat movement in soil. Soil biology. Plant nutrient acquisition and use.Soil development, management and use. GE credit: QL, SE, SL, VL. Effective: 2018 Winter Quarter.

SSC 102—Environmental Soil Chemistry (3)
Lecture—3 hours. Prerequisite(s): General chemistry; SSC 100 or equivalent recommended. Soil chemistry processes related to the fate and transport of contaminants in soil. Soil minerals, natural organic matter, surface charge, soil solution chemistry, redox reactions in soil, and sorption of inorganic and organic contaminants. GE credit: QL, SE, SL. Effective: 2018 Winter Quarter.

SSC 105—Field Studies of Soils in California Ecosystems (5)
Prerequisite(s): SSC 100 and SSC 120 or equivalent recommended. Class size limited to a minimum of 10 and a maximum of 24 students. Field-based studies of soils in California ecosystems, away from campus, throughout California. Emphasis on description and classification of soils; relationships among soils, vegetation, geology, and climate; physical, chemical, and biological processes in soils on the landscape; and the role of soils in land use. May be repeated up to 1 time(s). GE credit: QL, SE, SL, VL, WE. Effective: 2005 Summer Special Session.

SSC 107—Soil Physics (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): SSC 100; ERS 100; MAT 016A; Or the equivalent of MAT 016A. Physical properties of soil. Principles of water, gas, heat, and solute movement in soil with selected examples related to soil and water management. Influence of soil properties on transfer processes. GE credit: SE. Effective: 1999 Fall Quarter.

SSC 109—Sustainable Nutrient Management (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): SSC 100; Or the equivalent. Availability of nutrients in organic and conventional agricultural, vineyard, orchard and plantation forest soils; management of fertilizers, cover crops, compost, sewage sludge and manures for crop production and to prevent loss to the environment is emphasized. GE credit: OL, QL, SE, SL, VL, WE. Effective: 2008 Spring Quarter.

SSC 111—Soil Microbiology (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): BIS 002C recommended. Major groups of microorganisms in soil, their interrelationships, and their responses to environmental variables. Role of microorganisms in cycling of nutrients. Plant-microbe relationships. Transformations of organic and inorganic pollutants. GE credit: QL, SE, SL, WE. Effective: 2018 Winter Quarter.

SSC 112—Soil Ecology (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): SSC 100 or equivalent recommended. Overview of living constituents of soils, their interactions, importance to, and impact on biogeochemical cycles, decomposition, and soil properties. Practical applications of soil biological diversity are emphasized. GE credit: SE. Effective: 2018 Winter Quarter.

SSC 118—Soils in Land Use and the Environment (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. SSC 100 or equivalent recommended. Soils are considered as elements in land use planning and environmental quality. Topics include: soil survey reports, remote sensing, land capability classification, soil erosion/conservation, waste disposal on soils and soil reclamation. One one-day field trip. GE credit: SE, SL. Effective: 2018 Winter Quarter.

SSC 120—Soil Genesis, Morphology, and Classification (5)
Laboratory—3 hours; Lecture—4 hours. Prerequisite(s): SSC 100; GEL 050 recommended. Recognition and description of soils; chemical, biological and physical processes of soil formation. Factors of soil formation. Interactions of soils with diverse ecosystems. Introduction to soil classification. Practice using soil taxonomy. Practical experience describing soil properties in the field. GE credit: QL, SE, SL, VL. Effective: 1997 Winter Quarter.

SSC 192—Soil Science Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Work experience off and on campus in soil science. Internship supervised by a member of the faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

SSC 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

SSC 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

SSC 202—Topics in Advanced Soil Chemistry (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. General chemistry; SSC 100 or equivalent recommended. Restricted to 18 students. Reviews of current research in soil chemistry. Topics include double layer theory; clay mineral and oxide surface chemistry; adsorption on soil surfaces; speciation and modeling of solution ions; solubility and mineral stability diagrams. May be repeated up to 1 time(s) if topic differs. Effective: 2018 Winter Quarter.

SSC 205—Field Studies of Soils in California Ecosystems (5)
Discussion—15 hours; Fieldwork—50 hours; Lecture—5 hours. Prerequisite(s): SSC 100 and SSC 120 or equivalent recommended. Class size limited to 24 students. Field-based soil studies in California ecosystems. Description and classification of soils; relationships among soils, vegetation, geology, and climate; physical, chemical, and biological processes; their role in land use. Similar to course 105; requires additional work for graduate credit. May be repeated up to 1 time(s) if geographic locale changes. Effective: 2006 Spring Quarter.

SSC 208—Soil-Plant Interrelationships (3)
Lecture—3 hours. Prerequisite(s): (SSC 100); PLB 111; or Consent of Instructor. Plant needs, occurrence and reactions of water and mineral nutrients in soils; root systems and their growth in soils; mass flow and diffusion mechanisms in nutrient acquisition; models relating nutrient uptake to soil and plant characteristics;nutrient assimilation and crop quality. Effective: 1997 Winter Quarter.

SSC 211—Advanced Soil Microbiology (3)
Lecture—3 hours. Prerequisite(s): CHE 008A; CHE 008B; SSC 111; BIS 102, BIS 103 or an equivalent course recommended. Microbial metabolism of organic chemicals in soil, both natural and
xenobiotic. Decomposition of organic matter. Kinetics of microbial processes in soil. Effective: 1997 Winter Quarter.

SSC 219—Ecosystem Biogeochemistry (4)
Discussion/Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): Introductory courses in ecology/biology and soils recommended; undergraduates accepted with consent of instructor. Multidisciplinary analysis of energy and nutrient transfers within terrestrial ecosystems. Examination of processes and inter- and intra-system interactions between the atmosphere, biosphere, lithosphere and hydrosphere. Laboratory section uses biogeochemical simulation models to examine case studies. (Ecology 219) Effective: 1997 Winter Quarter.

SSC 220—Pedology (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. SSC 120 recommended. Topics selected from studies of soil-forming processes, soil-geomorphic
relations, mineral weathering, new developments in soil classification, and development of pedologic theory. Topics vary from year to year. May be repeated once for credit. May be repeated up to 1 time(s). Effective: 1997 Winter Quarter.

SSC 222—Global Carbon Cycle (3)
Lecture—3 hours. Prerequisite(s): CHE 008A; CHE 008B; MAT 016A; MAT 016B; SSC 100; Or the equivalent of SSC 100. Global carbon cycle from Phanerozoic epoch to modern times. Examination of long and short-term carbon cycles. Transfer of carbon among ocean, land and life with emphasis on humic substance formation, methods of characterization, reactions with organics and soil carbon stabilization. Effective: 2008 Summer Session 1.

SSC 290—Special Topics in Soil Science (1-4)
Seminar—1-4 hours; Variable. Prerequisite(s): Graduate standing. Seminars and critical review of problems, issues, and research in soil science. May be repeated for credit. (S/U grading only.) Effective: 2010 Fall Quarter.

SSC 298—Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Group Study May be repeated for credit when topic differs. (S/U grading only.) Effective: 2014 Spring Quarter.

SSC 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

SSC 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Spanish

Spanish | SPA Information

(College of Letters and Science)

Department Office. 215 Sproul Hall; 530-752-0835; http://spanish.ucdavis.edu

Faculty. http://spanish.ucdavis.edu/en/people

Spanish | SPA A.B.

(College of Letters and Science)

Department Office. 215 Sproul Hall; 530-752-0835; http://spanish.ucdavis.edu

Faculty. http://spanish.ucdavis.edu/en/people

The Major Program

The Spanish major program assures proficiency in all four language skills-speaking, understanding, reading, and writing-and acquaints students with the intellectual and cultural contributions of the Spanish-speaking world through a study of its language, literature, and cultural productions.

The Program. The department's lower division program gives students a solid foundation in the Spanish language, either through the traditional elementary and intermediate language series or through an accelerated three-course sequence of Spanish for native speakers. At the upper division level, students receive a broad introduction to basic concepts and the practice of literary and cultural criticism and to the four areas of study represented in the department's curriculum: Spanish linguistics, Spanish literature and culture, Latin-American literature and culture, and Latina/o literatures and cultures in the United States. Students are encouraged to work closely with the department's academic advisors in designing a program of studies tailored to their individual needs and interests. Many students combine the Spanish major with another major in the humanities or social sciences.

Advising. Given the great flexibility in the Spanish major, it is important that students design their programs in close consultation with their major advisor. This is especially important for students who intend to use their major as preparation for graduate study, for those who are planning a teaching career, and for those who wish to take advantage of our Education Abroad Program options.

Major Advisors. Student Affairs Officer/Undergraduate Academic Coordinator; Laura Barrera, ljbarrera@ucdavis.edu.

Student Learning Outcomes. Educational Objectives:

- *Linguistics.* Demonstrate knowledge of the Spanish speaking world's linguistic diversity through the comprehension of Spanish in a variety of situations, discursive modes and historical, regional or social variations. Demonstrates analytic, interpretative, and critical thinking skills; SPA 111N, 113, 115/S, 116, 117, 118, 180.
- *Literature.* Demonstrate analytic, interpretative and critical thinking skills with respect to literary texts from Latin America, Spain, the United States and other countries in which there is a literary production in Spanish; SPA 100/S, 130, 131N, 134A/B, 142 (Spain); 150N, 151, 157, 159/S (Latin America); 117, 174, 176, 177 (United States).
- *Culture.* Demonstrate cultural awareness with respect to the diversity of cultural products and manifestations produced in the Spanish speaking world (Latin America, Spain, the United States and other countries in which there is a cultural production in Spanish; SPA 100/S, 141/S, 170/S, 174.
- *Film and Art.* Demonstrate analytic interpretative and critical thinking skills with respect to linguistics, literature and cultural studies.

Career Alternatives. The program, alone or in combination with other major programs, may lead to advanced study of the language or literature and culture of Spain and Spanish America, and to careers not only in teaching, but also in other professions such as library science, law, medicine, and in government, social service, business, or international relations.

Honors Program. Candidates for high or highest honors in Spanish must write a senior thesis under the direction of a faculty member. For this purpose, honors candidates must enroll in at least six units of SPA 194H distributed over two quarters. Normally, a student will undertake the honors project during the first two quarters of the senior year; other arrangements must be authorized by

the department chair. Only students who, at the end of their junior year (135 units), have attained a cumulative GPA of 3.500 in courses required for the major will be eligible for the honors program. The requirements for earning high and highest honors in Spanish are in addition to the regular requirements for the major in Spanish.

UC Education Abroad Program Options. The department encourages its majors to consider study in a Spanish-speaking country with our UC Education Abroad Program (UCEAP). It is now possible for our students to complete significant portions of the Spanish major in the UCEAP centers at both the lower (Preparatory Subject Matter) and upper division levels through newly introduced options. See UC Davis Study Abroad at http://studyabroad.ucdavis.edu/.

UC Davis Quarter Abroad. The Quarter Abroad Program offers programs in Mendoza, Argentina (fall quarter) and in Madrid, Spain (spring quarter). These programs aim at providing students with opportunities to increase their knowledge of the Spanish language and cultures by experiencing the life-learning challenges of living and studying abroad.

Students may earn 15-22 UC Davis units toward the Spanish major, minor, or foreign language requirement. Each program may offer an upper division course taught by the UC Davis Program Director focusing on history, culture and society.

For more information, contact C. Colombi or C. Martínez-Carazo or see http://studyabroad.ucdavis.edu/programs/quarterabroad/.

Prerequisite Credit. Credit normally will not be given for a course if that course is the prerequisite of a course already successfully completed. Exceptions can be made by the Department Chairperson only.

Preparatory Subject Matter **Units:** 0-33

SPA 001	Elementary Spanish	5
SPA 001S	Elementary Spanish	5
SPA 002	Elementary Spanish	5
OR		
SPA 002S	Elementary Spanish	5
OR		
SPA 002V	Elementary Spanish	5
OR		
SPA 002Y	Elementary Spanish	5
SPA 003	Elementary Spanish	5
OR		
SPA 003S	Elementary Spanish	5
OR		
SPA 003V	Elementary Spanish	5
OR		
SPA 003Y	Elementary Spanish	5
SPA 021	Intermediate Spanish	5
OR		
SPA 021S	Intermediate Spanish	5
OR		
SPA 021V	Intermediate Spanish I	5
OR		
SPA 021Y	Intermediate Spanish	5
SPA 022	Intermediate Spanish	5
OR		
SPA 022S	Intermediate Spanish	5

OR		
SPA 022V	Intermediate Spanish II	5
OR		
SPA 022Y	Intermediate Spanish	5
SPA 023	Spanish Composition I	4
OR		
SPA 023S	Spanish Composition I	4
SPA 024	Spanish Composition II	4
OR		
SPA 024S	Spanish Composition II	4

OR

SPA 031	Intermediate Spanish for Native Speakers I	5
SPA 032	Intermediate Spanish for Native Speakers II	5
SPA 033	Intermediate Spanish for Native Speakers III	5

Depth Subject Matter **Units:** 41-44

Choose one in each of the following five areas:

SPA 100	Principles of Hispanic Literature and Criticism	4
SPA 100S	Principles of Hispanic Literature and Criticism	4
SPA 141	Introduction to Spanish Culture	4
SPA 141S	Introduction to Spanish Culture	4
SPA 170	Introduction to Latin American Culture	4
SPA 170S	Introduction to Latin American Culture	4
SPA 111N	The Structure of Spanish: Sounds and Words	3
SPA 115	History of the Spanish Language	4
SPA 116	Applied Spanish Linguistics	4
OR		
SPA 116S	Applied Spanish Linguistics	4
SPA 130	Survey of Spanish Literature to 1700	4
SPA 131N	Survey of Spanish Literature: 1700 to Present	4
SPA 134A	Don Quijote I	4
SPA 142	Special Topics in Spanish Cultural and Literary Studies	4
SPA 150N	Survey of Latin American Literature to 1900	4
SPA 151	Survey of Latin American Literature 1900 to Present	4
SPA 157	Great Works of Latin American Literature/Culture	4
SPA 159	Special Topics in Latin American Literature and Culture	4
SPA 159S	Special Topics in Latin American Literature and Culture	4
SPA 117	Teaching Spanish as a Native Tongue in the U.S.: Praxis and Theory	4
SPA 174	Chicano Culture	4
SPA 176	Literature in Spanish Written in the United States	4
SPA 177	California and Latin America	4

Students planning to take SPA 110 should do so at the beginning of the upper division sequence or concurrently with one from:

SPA 100	Principles of Hispanic Literature and Criticism	4
SPA 100S	Principles of Hispanic Literature and Criticism	4

SPA 141	Introduction to Spanish Culture	4
SPA 141S	Introduction to Spanish Culture	4
SPA 170	Introduction to Latin American Culture	4
SPA 170S	Introduction to Latin American Culture	4

Choose six electives in consultation with the student's major advisor: Students may, with the approval of their advisor, choose up to two electives outside the Spanish department in such programs as:

African American and African Studies:

AAS 107A	African Descent Communities and Culture in the Caribbean and Latin America	4
AAS 180	Race and Ethnicity in Latin America	4

Anthropology:

ANT 144	Contemporary Societies and Cultures of Latin America	4

Art History:

AHI 151	Arts of the Indians of the Americas	4

Chicana/o Studies:

CHI 154	The Chicana/o Novel	4
CHI 155	Chicana/o Theater	4
CHI 156	Chicana/o Poetry	4
CHI 160	Mexican Film and Greater Mexican Identity	4
CHI 170	Contemporary Issues in Chicano Art	4
CHI 171	Mexican and Chicano Mural Workshop	4

Comparative Literature:

COM 152	Literature of the Americas	4
COM 165	Caribbean Literatures	4
COM 165S	Caribbean Literatures	4

Education:

EDU 151	Language Development in the Chicano Child	3
EDU 152	Academic Spanish for Bilingual Teachers	3

History:

HIS 159	Women and Gender in Latin American History	4
HIS 160	Spain and America in the 16th century	4
HIS 164	History of Chile	4
HIS 165	Latin American Social Revolutions	4
HIS 166A	History of Mexico to 1848	4
HIS 166B	History of Mexico since 1848	4
HIS 167	Modern Latin American Cultural and Intellectual History	4
HIS 168	History of Inter-American Relations	4
HIS 169A	Mexican-American History	4
HIS 169B	Mexican-American History	4

Linguistics:

LIN 166	The Spanish Language in the United States	4

Native American Studies:

NAS 120	Ethnopolitics of South American Indians	4

NAS 133A	Ethnohistory of Native Peoples of Mexico and Central America to 1500	4
NAS 133B	Ethnohistory of Native Peoples of Mexico and Central America 1500 to 2000	4
NAS 184	Contemporary Indigenous Literature of Mexico	4

A maximum of six units of SPA 199 may be counted toward the major. SPA 199 cannot be used to replace regular departmental courses.

Total: 41-77

Spanish | SPA M.A.

(College of Letters and Science)

Department Office. 210 Sproul Hall; 530-752-2239; http://spanish.ucdavis.edu/en/graduate-program

Faculty. http://spanish.ucdavis.edu/en/people

Graduate Study. The Department offers courses leading to the M.A. degree in Spanish to students who have completed with distinction the A.B. degree in Spanish, or the equivalent. Candidates will be recommended for admission to graduate studies in Spanish provided they meet the requirements of the Graduate Studies office and the Department of Spanish. The Department also offers programs of study and research leading to the Ph.D. degree. Detailed information may be obtained by writing to the Chairperson or the Graduate Director of the Spanish Department.

Graduate Advisor. Maria Ruby, mruby@ucdavis.edu

Spanish | SPA Ph.D.

(College of Letters and Science

Department Office. 210 Sproul Hall; 530-752-2239; http://spanish.ucdavis.edu/en/graduate-program

Faculty. http://spanish.ucdavis.edu/en/people

Graduate Study. The Department offers courses leading to the M.A. degree in Spanish to students who have completed with distinction the A.B. degree in Spanish, or the equivalent. Candidates will be recommended for admission to graduate studies in Spanish provided they meet the requirements of the Graduate Studies office and the Department of Spanish. The Department also offers programs of study and research leading to the Ph.D. degree. Detailed information may be obtained by writing to the Chairperson or the Graduate Director of the Spanish Department.

Graduate Advisor. Maria Ruby, mruby@ucdavis.edu

Spanish | SPA Minor

(College of Letters and Science)

Cecilia Colombi, Ph.D., Chairperson of the Department

Department Office. 215 Sproul Hall; 530-752-0835; http://spanish.ucdavis.edu

Faculty. http://spanish.ucdavis.edu/en/people

Spanish **Units:** 23-24

Choose one in each of the following five areas:

SPA 100	Principles of Hispanic Literature and Criticism	4
SPA 100S	Principles of Hispanic Literature and Criticism	4
SPA 141	Introduction to Spanish Culture	4
SPA 141S	Introduction to Spanish Culture	4

SPA 170	Introduction to Latin American Culture	4
SPA 170S	Introduction to Latin American Culture	4
SPA 111N	The Structure of Spanish: Sounds and Words	3
SPA 115	History of the Spanish Language	4
SPA 116	Applied Spanish Linguistics	4
SPA 130	Survey of Spanish Literature to 1700	4
SPA 131N	Survey of Spanish Literature: 1700 to Present	4
SPA 134A	Don Quijote I	4
SPA 142	Special Topics in Spanish Cultural and Literary Studies	4
SPA 150N	Survey of Latin American Literature to 1900	4
SPA 151	Survey of Latin American Literature 1900 to Present	4
SPA 157	Great Works of Latin American Literature/Culture	4
SPA 159	Special Topics in Latin American Literature and Culture	4
SPA 159S	Special Topics in Latin American Literature and Culture	4
SPA 117	Teaching Spanish as a Native Tongue in the U.S.: Praxis and Theory	4
SPA 174	Chicano Culture	4
SPA 176	Literature in Spanish Written in the United States	4
SPA 177	California and Latin America	4

One upper division Spanish elective.

Consult a departmental advisor if any of these courses are to be taken abroad.

Total: 23-24

Spanish | SPA Courses

Courses in SPA:

SPA 001—Elementary Spanish (5)
Lecture/Discussion—5 hours. Introduction to Spanish grammar and development of all language skills in a cultural context with special emphasis on communication. Not open for credit for students who have completed equivalent course 001S. Students who have successfully completed Spanish 2 or 3 in the 10th or higher grade of high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed. GE credit: AH, WC. Effective: 2016 Winter Quarter.

SPA 001A—Accelerated Intensive Elementary Spanish (15)
Lecture/Discussion—15 hours. Introduction to Spanish grammar and development of all language skills in a cultural context with emphasis on communication. Special 12-week accelerated, intensive summer session course combining the work of courses 1, 2 and 3. Not open to students who have completed equivalent courses 1, 1S, 2, 2S, 2V, 2Y, 3, 3S, 3V or 3Y. GE credit: AH, WC. Effective: 2016 Summer Special Session.

SPA 001S—Elementary Spanish (5)
Lecture/Discussion—5 hours. Introduction to Spanish grammar and development of all language skills in a cultural context with special emphasis on communication. Offered in a Spanish speaking country under the supervision of a UC Davis faculty/lecturer. Not open for credit to students who have taken equivalent course 1. GE credit: AH, WC. Effective: 2016 Spring Quarter.

SPA 002—Elementary Spanish (5)
Lecture/Discussion—5 hours. Prerequisite(s): SPA 001 or SPA 001S; Or the equivalent. Continuation of courses 1 and 1S in the areas of grammar and basic language skills. Not open for credit for students who have completed equivalent course 2S, 2V or 2Y. GE credit: AH, WC. Effective: 2016 Winter Quarter.

SPA 002S—Elementary Spanish (5)
Lecture/Discussion—5 hours. Prerequisite(s): SPA 001 or SPA 001S Continuation of Spanish 001 and 001S in the areas of grammar and basic language skills. Offered in a Spanish speaking country under the supervision of UC Davis faculty/lecturer. Not open for credit to students who have taken course 002, 002V or 002Y. GE credit: AH, WC. Effective: 2016 Spring Quarter.

SPA 002V—Elementary Spanish (5)
Web Electronic Discussion—2 hours; Web Virtual Lecture—3 hours. Prerequisite(s): SPA 001 or SPA 001S; Or the equivalent. Continuation of course 1, 1S, or previous high school experience in the areas of grammar and basic language skills. Online format combining synchronous chatting with technologically based materials. Not open for credit to students who have taken equivalent course 2, 2S, 2Y, or higher. GE credit: AH, WC. Effective: 2017 Spring Quarter.

SPA 002Y—Elementary Spanish (5)
Lecture/Discussion—3 hours; Web Electronic Discussion—2 hours. Prerequisite(s): SPA 001 or SPA 001S Continuation of course 1 or 1S in the areas of grammar and basic language skills. Hybrid format combining classroom instruction with technologically based materials. Not open for credit to students who have taken equivalent course 2, 2S, or 2V. GE credit: AH, WC. Effective: 2016 Winter Quarter.

SPA 003—Elementary Spanish (5)
Lecture/Discussion—5 hours. Prerequisite(s): SPA 002 or SPA 002S or SPA 002V or SPA 002Y Completion of grammar sequence and continuing practice of all language skills using cultural texts. Not open for credit for students who have completed equivalent course 003S, 003V or 003Y. GE credit: AH, WC. Effective: 2016 Spring Quarter.

SPA 003S—Elementary Spanish (5)
Lecture/Discussion—5 hours. Prerequisite(s): SPA 002 or SPA 002S or SPA 002V or SPA 002Y Completion of grammar sequence and continuing practice of all language skills using cultural texts. Offered in a Spanish speaking country under the supervision of UC Davis faculty. Not open for credit for students who have completed equivalent course 003, 003V or 003Y. GE credit: AH, WC. Effective: 2016 Spring Quarter.

SPA 003V—Elementary Spanish (5)
Web Electronic Discussion—2 hours; Web Virtual Lecture—3 hours. Prerequisite(s): SPA 002 or SPA 002S or SPA 002V or SPA 002Y Continuation of course 2, 2S, 2V or 2Y. Online format combining synchronous chatting with technologically based materials. Not open to students who have taken equivalent course 3, 3S, 3Y, or higher. GE credit: AH, WC. Effective: 2016 Winter Quarter.

SPA 003Y—Elementary Spanish (5)
Lecture/Discussion—3 hours; Web Electronic Discussion—2 hours. Prerequisite(s): SPA 002 or SPA 002S or SPA 002V or SPA 002Y Completion of grammar sequence and continuing practice of all language skills using cultural texts. Hybrid format combining classroom instruction with technologically based materials. Not open to students who have taken equivalent course 3, 3S, or 3V. GE credit: AH, WC. Effective: 2016 Winter Quarter.

SPA 008—Elementary Spanish Conversation (2)
Discussion—3 hours. Prerequisite(s): (SPA 003 or SPA 003V or SPA 003Y); SPA 021 (concurrently) recommended. Not open to native speakers or upper division students. Designed to develop oral communication skills. Emphasis on increasing vocabulary, improving listening comprehension, pronunciation, accuracy and grammar control. Practice of everyday situations. GE credit: OL, WC. Effective: 2018 Spring Quarter.

SPA 021—Intermediate Spanish (5)
Lecture/Discussion—5 hours. Prerequisite(s): SPA 003 or SPA 003S or SPA 003V or SPA 003Y Review and development of grammar, vocabulary and composition acquired in the first year through exercises and reading of modern texts. Not open for credit for students who have completed equivalent course 021S, 021V or 021Y. GE credit: AH, WC. Effective: 2016 Spring Quarter.

SPA 021S—Intermediate Spanish (5)
Lecture/Discussion—5 hours. Prerequisite(s): SPA 003 or SPA 003S or SPA 003V or SPA 003Y Review and development of the grammar, vocabulary and composition acquired in the first year through exercises and reading of modern texts. Not open for credit for students who have completed equivalent course 021, 021V or 021Y. GE credit: AH, WC. Effective: 2016 Spring Quarter.

SPA 021V—Intermediate Spanish I (5)
Web Electronic Discussion—2 hours; Web Virtual Lecture—3 hours. Prerequisite(s): SPA 003 or SPA 003Y or SPA 003V; Or the equivalent from previous high school language experience. Continuation of course 3, 3V, 3Y, 3S, or previous high school experience in the areas of grammar and intermediate language skills. Online format combining synchronous chatting with technologically based materials. Not open for credit to students who have taken equivalent course 21, 21Y or 21S. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

SPA 021Y—Intermediate Spanish (5)
Lecture/Discussion—3 hours; Web Electronic Discussion—2 hours. Prerequisite(s): SPA 003 or SPA 003S or SPA 003V or SPA 003Y Continuation of courses 3, 3S, 3V and 3Y in the areas of grammar and basic language skills. Hybrid format combining classroom instruction with technologically based materials where learning takes place both face-to-face and online. Not open for credit to students who have taken equivalent course 21, 21S or 21V. GE credit: AH, WC. Effective: 2016 Spring Quarter.

SPA 022—Intermediate Spanish (5)
Lecture/Discussion—5 hours. Prerequisite(s): SPA 021 or SPA 021S or SPA 021V or SPA 021Y Development of all language skills through exercises and reading of modern texts. Development on more difficult grammar concepts and further practice on composition. Not open for credit for students who have completed equivalent course 022S, 022V or 022Y. GE credit: AH, WC. Effective: 2016 Spring Quarter.

SPA 022S—Intermediate Spanish (5)
Lecture/Discussion—5 hours. Prerequisite(s): SPA 021 or SPA 021S or SPA 021V or SPA 021Y Development of all language skills through exercises and reading of modern texts. Development of more difficult grammar concepts and further practice on composition. Not open for credit for students who have completed equivalent course 022, 022V or 022Y. GE credit: AH, WC. Effective: 2016 Spring Quarter.

SPA 022V—Intermediate Spanish II (5)
Web Electronic Discussion—2 hours; Web Virtual Lecture—3 hours. Prerequisite(s): SPA 021 or SPA 021S or SPA 021V or SPA 021Y; Or equivalent from previous high school language experience. Continuation of course 21, 21V, 21Y, 22S, or previous high school experience in the areas of grammar and intermediate language skills. Online format combining synchronous chatting with technologically based materials. Not open for credit to students who have taken course 22, 22Y, or 22S. GE credit: AH, OL, SS, WC, WE. Effective: 2016 Spring Quarter.

SPA 022Y—Intermediate Spanish (5)
Lecture/Discussion—3 hours; Web Electronic Discussion—2 hours. Prerequisite(s): SPA 021 or SPA 021S or SPA 021V or SPA 021Y Continuation of course 21, 21S, or 21V in the areas of grammar and basic language skills. Online format combining synchronous chatting with technologically based materials. Not open to students who have taken equivalent course 22, 22S or 22V. GE credit: AH, WC. Effective: 2016 Winter Quarter.

SPA 023—Spanish Composition I (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): SPA 022 or SPA 022S or SPA 022V or SPA 022Y Development of writing skills by way of reading, discussion, and analysis of authentic materials, literary texts, and videos. Selective review of grammar. Composition, journals, individual and group projects. Not open for students who have completed equivalent course 023S. GE credit: AH, WC, WE. Effective: 2016 Winter Quarter.

SPA 023S—Spanish Composition I (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): SPA 022 or SPA 022S or SPA 022V or SPA 022Y Development of writing skills by way of reading, discussion, and analysis of authentic materials, literary texts, and videos. Selective review of grammar. Composition, journals, individual and group projects. Course is taught in a Spanish speaking country. Not open for credit to students who have completed equivalent course 23. GE credit: AH, WC, WE. Effective: 2016 Winter Quarter.

SPA 024—Spanish Composition II (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): SPA 023 or SPA 023S Development of advanced level writing skills, with emphasis on how to write argumentative prose, essays, and research papers. Introduction to the analysis of literary genres. Compositions, journals, individual and group projects. Not open for credit for students who have completed equivalent course 024S. GE credit: AH, WC, WE. Effective: 2016 Winter Quarter.

SPA 024S—Spanish Composition II (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): SPA 023 or SPA 023S Development of advanced level writing skills, with emphasis on how to write argumentative prose, essays, and research papers. Introduction to the analysis of literary genres. Compositions, journals, individual and group projects. Not open for credit to students who have completed equivalent course 24. GE credit: AH, WC, WE. Effective: 2016 Winter Quarter.

SPA 028—Intermediate Spanish Conversation (2)
Discussion—3 hours. Prerequisite(s): SPA 008 or SPA 022 or SPA 022V or SPA 022Y Continuation of course 8. Designed to develop oral communication skills at a more advanced level. Practice in more complex situations. (Former course 9) GE credit: OL, WC. Effective: 2018 Spring Quarter.

SPA 031—Intermediate Spanish for Native Speakers I (5)
Extensive Writing; Lecture/Discussion—3 hours; Tutorial—1 hour. Prerequisite(s): SPA 003 or SPA 003V or SPA 003Y; Or equivalent course or consent of instructor. First course of a three-quarter series designed to provide bilingual students whose native language is Spanish with the linguistic and learning skills required for successfully completing upper division courses in Spanish. Intensive review of grammar and composition. GE credit: AH, OL, WC, WE. Effective: 2018 Winter Quarter.

SPA 032—Intermediate Spanish for Native Speakers II (5)
Extensive Writing; Lecture/Discussion—3 hours; Tutorial—1 hour. Prerequisite(s): SPA 031; Consent of Instructor. Continuation of Spanish 31, intensive review of grammar and composition. Development of all language skills through reading of modern texts, presentation/discussion of major ideas, vocabulary expansion, and writing essays on topics discussed. Designed for students whose native language is Spanish. GE credit: AH, OL, WC, WE. Effective: 2016 Winter Quarter.

SPA 033—Intermediate Spanish for Native Speakers III (5)
Extensive Writing; Lecture/Discussion—3 hours; Tutorial—1 hour. Prerequisite(s): SPA 032; Consent of Instructor. Development of writing skills, with emphasis on experimenting with various writing styles: analytical, argumentative, and creative. Analytical review of literary genres. Written essays will be assigned. Students will develop a research paper. Designed for students whose native language is Spanish. GE credit: AH, OL, WC, WE. Effective: 2016 Winter Quarter.

SPA 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of instructor and department chairperson. Primarily for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

SPA 098F—Student Facilitated Course (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Student facilitated course intended primarily for lower division students. (P/NP grading only.) Effective: 2017 Winter Quarter.

SPA 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

SPA 100—Principles of Hispanic Literature and Criticism (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SPA 024 or SPA 024S or SPA 033 Principles of literary criticism applied to the study of fiction, drama, poetry, and essay of major literary writers of the Hispanic world. Not open for credit to students who have taken course 100S. GE credit: AH, OL, WC, WE. Effective: 2004 Spring Quarter.

SPA 100S—Principles of Hispanic Literature and Criticism (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SPA 024 or SPA 033 Principles of literary criticism applied to the study of fiction, drama, poetry and essay of major literary writers of the Hispanic world. Offered in a Spanish speaking country under the supervision of a UC Davis faculty/lecturer. Not open to students who have taken equivalent course 100. GE credit: AH, OL, WC, WE. Effective: 2002 Spring Quarter.

SPA 110—Advanced Spanish Composition (4)
Lecture—3 hours. Prerequisite(s): SPA 024 or SPA 033 Practice in expository writing with emphasis on clarity and idiomatic
expression. Practical application and review of selected grammar topics. (Part of former courses 110A and 110B.) GE credit: WE. Effective: 1997 Winter Quarter.

SPA 111N—The Structure of Spanish: Sounds and Words (3)
Lecture—3 hours. Prerequisite(s): (SPA 024 or SPA 033); or Consent of Instructor. LIN 001 recommended. Linguistic description of the sound patterns of Spanish and how those sounds can be used to form larger units, such as morphemes and words. Theoretical and practical comparisons with English and with other Romance languages. (Former course 132.) GE credit: SS. Effective: 2016 Fall Quarter.

SPA 112N—The Structure of Spanish: Words and Phrases (3)
Lecture—3 hours. Prerequisite(s): SPA 111N; or Consent of Instructor. A study of Spanish word and phrase structure, with special emphasis on the constituent structure of noun and verb phrases. Theoretical and practical comparisons with English and with other Romance languages. (Former course 131.) GE credit: SS. Effective: 2016 Fall Quarter.

SPA 113—Spanish Pronunciation (4)
Lecture—3 hours; Term Paper. Prerequisite(s): (SPA 024 or SPA 033); LIN 001 recommended. Sound structure of modern Spanish; theoretical analysis of selected problems in pronunciation. Strongly recommended for prospective teachers of Spanish. GE credit: SS. Effective: 2016 Fall Quarter.

SPA 114N—Contrastive Analysis of English and Spanish (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): SPA 024 or SPA 033; or Consent of Instructor. SPA 111N and SPA 112N recommended. Contrastive analysis of English and Spanish, error analysis, introduction to structuralist and transformational linguistics. Individual and group conferences. (Former course 137.) GE credit: SS. Effective: 2016 Fall Quarter.

SPA 115—History of the Spanish Language (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SPA 024 or SPA 033; or Consent of Instructor. LIN 001 recommended. Spanish language from its roots in spoken Latin to modernity. Emphasis on the close relationship between historical events and language change, and the role that literature plays in language standardization. Not open to students who have completed equivalent course 115S. GE credit: AH, SS. Effective: 2016 Fall Quarter.

SPA 115S—History of the Spanish Language (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SPA 024 or SPA 033; or Consent of Instructor. LIN 001 recommended. Spanish language from its roots in spoken Latin to modernity. Emphasis on the close relationship between historical events and language change, and the role that literature plays in language standardization. Offered in a Spanish speaking country under the supervision of a UC Davis faculty/lecturer. Not open to students who have completed equivalent course 115. GE credit: AH, SS. Effective: 2016 Fall Quarter.

SPA 116—Applied Spanish Linguistics (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SPA 024 or SPA 033; or Consent of Instructor. LIN 001 recommended. Exploration of the major theoretical and practical issues concerning learning Spanish as a second language. For students interested in teaching Spanish as a career. Not open to students who have taken equivalent course 116S. GE credit: SS. Effective: 2016 Fall Quarter.

SPA 116S—Applied Spanish Linguistics (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SPA 024 or SPA 033; or Consent of Instructor. LIN 001 recommended. Exploration of the major theoretical and practical issues concerning learning Spanish as a second language. For students interested in teaching Spanish as a career. Offered in a Spanish speaking country, in Spanish, under the supervision of UC Davis faculty. Not open to students who have taken course 116. GE credit: SS. Effective: 2016 Fall Quarter.

SPA 117—Teaching Spanish as a Native Tongue in the U.S.: Praxis and Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SPA 024 or SPA 033; or Consent of Instructor. LIN 001 recommended. Designed for students interested in teaching Spanish to native speakers. Focus on cultural diversity of the Spanish speaking population in the United States; applied language teaching methodologies in the context of teaching Spanish to native speakers at different levels. GE credit: OL. Effective: 2016 Fall Quarter.

SPA 118—Topics in Spanish Linguistics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 111N; or Consent of Instructor. Study of specialized topics in Spanish linguistics, for example: language and use; text and context; language and society; bilingualism; Spanish dialectology; syntax and semantics. May be repeated once for credit when topic differs. May be repeated up to 1 time(s). GE credit: SS. Effective: 2016 Fall Quarter.

SPA 123—Creative Writing in Spanish (4)
Discussion—4 hours. Prerequisite(s): SPA 024 or SPA 033; or Consent of Instructor. Intensive writing of poetry or fiction in Spanish or in a bilingual (Spanish/English) format. Students will write both in prescribed forms and in experimental forms of their own choosing. GE credit: WE. Effective: 1997 Winter Quarter.

SPA 130—Survey of Spanish Literature to 1700 (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Survey of Spanish literature (narrative, poetry and drama) to 1700, Emphasis on the multicultural birth of the Spanish culture, the formation and growth of the Spanish language and letters through its written records and the literature of the early period. GE credit: AH, WC. Effective: 2008 Summer Session 1.

SPA 131N—Survey of Spanish Literature: 1700 to Present (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Survey of modern Spanish literature, providing an overview of main literary movements (romanticism, realism, naturalism, modernism, avantgarde). Emphasis on the philosophical and historical background and on the European context for modern Spanish literature. (Part of former courses 104A and 104B.) GE credit: AH, WC. Effective: 2008 Summer Session 1.

SPA 132—Golden Age Drama and Performance (4)
Lecture—1.5 hours; Performance Instruction—1.5 hours. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Limited enrollment. Golden Age drama: text and performance. Study of Spanish Baroque drama as performance art. Close reading of plays and related aspects of seventeenth-century theater: theatrical spaces, staging, performance, actors, public, language, costumes. Final project is performance of a play. May be repeated up to 2 time(s). GE credit: AH, OL, VL, WC. Effective: 2007 Winter Quarter.

SPA 133N—Golden Age Literature of Spain (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Introduction to the study of the principal authors and literary movements of 16th- and 17th-century Spain and Spanish American colonial literature. May be repeated up to 3 time(s) with consent of instructor. GE credit: AH, OL, WC, WE. Effective: 2008 Summer Session 1.

SPA 134A—Don Quijote I (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Critical interpretation of Don Quijote Part One by Cervantes. Focused study of key elements within the socio-cultural context of Golden Age Spain. Don Quijote as prototype for the modern novel. GE credit: AH, WC, WE. Effective: 2007 Fall Quarter.

SPA 134B—Don Quijote II (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 134A Critical interpretation of Don Quijote Part Two by Cervantes. Focused study of key elements within the socio-cultural context of Golden Age Spain. Don Quijote as prototype for the modern novel. GE credit: AH, WC, WE. Effective: 2006 Winter Quarter.

SPA 135N—Spanish Romanticism (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Romanticism as a philosophical concept, and as a literary movement in Spain, with emphasis on its distinctive, specific "romantic" qualities and its literary expression in five leading authors of the early nineteenth century. (Former course 114.) GE credit: AH, WC. Effective: 2008 Summer Session 1.

SPA 136N—The Spanish Novel of the 19th Century (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Literary realism in Spain, focusing on Leopoldo Alas (Clarín), Emilia Pardo Bazán and Benito Pérez Galdós unique characteristics of Spanish realism and its historical roots in Cervantes and the picaresque. GE credit: AH, WC, WE. Effective: 2008 Summer Session 1.

SPA 137N—Twentieth-Century Spanish Fiction (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Study of the main literary trends and authors of the modern Spanish novel and short story. Selected works by Unamuno, Valle-Inclán, Sender,
Cela, Matute, Ayala and others. GE credit: AH, WC, WE. Effective: 2008 Summer Session 1.

SPA 138N—Modern and Contemporary Spanish Poetry (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Study of the main literary trends and authors of modern and contemporary Spanish poetry. Selected works by Machado, Juan Ramón Jiménez, García Lorca, Guillén, Aleixandre, Hernández Hierro and others. Offered in alternate years. (Former course 120C.) GE credit: AH, OL, WC. Effective: 2008 Summer Session 1.

SPA 139—Modern Spanish Theater (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Study of the main dramatic trends and playwrights of modern Spanish theater. Selected works by Valle Inclán, García-Lorca, Mihura, Buero-Vallejo, Arrabal and others. Offered in alternate years. GE credit: AH, WC. Effective: 2008 Summer Session 1.

SPA 140N—Modern Spanish Essay (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Ortega, Unamuno and the modern Spanish essay. Their concept of Spain and their relations with other movements and thinkers. GE credit: AH, WC, WE. Effective: 2008 Summer Session 1.

SPA 141—Introduction to Spanish Culture (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SPA 024 or SPA 024S or SPA 033 Introduction to history, geography and culture of Spain. Art, history of ideas, and everyday cultural manifestations. Introduction to critical reading and textual analysis. Not open for students who have completed equivalent course 141S. GE credit: AH, VL, WC. Effective: 2007 Fall Quarter.

SPA 141S—Introduction to Spanish Culture (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SPA 024 or SPA 024S or SPA 033 Introduction to history, geography and culture of Spain. Art, history of ideas, and everyday cultural manifestations. Introduction to critical reading and textual analysis. Offered in a Spanish speaking country under the supervision of UC Davis faculty. Not open to students who have taken equivalent course 141. GE credit: AH, VL, WC. Effective: 2007 Spring Quarter.

SPA 142—Special Topics in Spanish Cultural and Literary Studies (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Special topics in the study of Spanish literature and culture. May be repeated up to 2 time(s). GE credit: AH, OL, WC, WE. Effective: 2008 Summer Session 1.

SPA 143—Spanish Art (4)
Discussion—1 hour; Lecture—3 hours; Term Paper. Spanish art and the different historical, sociological and political manifestations that frame it. History of art, including Paleolithic, Roman, Visigothic, Romanesque, Goth, Renaissance, Baroque, Neoclassic
and Contemporary art. GE credit: AH, VL, WC. Effective: 2000 Summer Quarter.

SPA 144—Topics in Spanish Cultural Studies (4)
Lecture—3 hours; Project (Term Project)—1 hour. Prerequisite(s): SPA 024 or SPA 024S or SPA 033 Study of specific historical tendencies in Spanish culture(s) from the Romans to the present. Sources studied may include literature, film, art, journalism, and performance. Approaches to material may address issues of aesthetics, politics, identity, and globalization. May be repeated up to 1 time(s). GE credit: AH, WC. Effective: 2005 Fall Quarter.

SPA 147—Anglos, Latinos and the Spanish Black Legend: The Origins and Educational Implications of Anti-Hispanic Prejudice (4)
Fieldwork; Lecture/Discussion—3 hours; Term Paper. Examination of Anti-Hispanic prejudice in the United States focusing on the "Black Legend," a 16th Century anti-Spanish myth underpinning the doctrine of "Manifest Destiny." Exploration of the Legend's presence in contemporary American society through interviews and analysis of school textbooks. (Education 147.) GE credit: ACGH, AH, DD, WE. Effective: 2016 Fall Quarter.

SPA 148—Cinema in the Spanish-Speaking World in Translation (4)
Film Viewing—3 hours; Lecture—3 hours. Prerequisite(s): SPA 024 or SPA 024S or SPA 033 Analysis of the culture of the Spanish-speaking world through film in translation. Emphasis on the cultural information illustrated by the films; no prior knowledge of cinematography required. Films with subtitles. Not open for students who have completed equivalent course 148S. GE credit: AH, VL, WC. Effective: 2004 Fall Quarter.

SPA 148S—Cinema in the Spanish-Speaking World in Translation (4)
Film Viewing—3 hours; Lecture—3 hours. Prerequisite(s): SPA 024 or SPA 033 Analysis of the culture of the Spanish-speaking world through film in translation. Emphasis on the cultural information illustrated by the films; no prior knowledge of cinematography required. Films with subtitles. Offered in a Spanish speaking country, in Spanish, under the supervision of UC Davis faculty. Not open to students who have taken equivalent course 148. GE credit: AH, VL, WC. Effective: 2002 Spring Quarter.

SPA 149—Latin-American Literature in Translation (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003; Or the equivalent of ENL 003. Reading, lectures and discussions in English of works by Borges, Cortázar, Fuentes, García Márquez, Paz and others. May not be counted toward the major in Spanish. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

SPA 150N—Survey of Latin American Literature to 1900 (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Latin American literature from preconquest texts and the chronicles of the Conquest to romanticism and modernism. Reading selections include fiction, poetry, drama and essays. GE credit: AH, WC. Effective: 2008 Summer Session 1.

SPA 151—Survey of Latin American Literature 1900 to Present (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Latin American literature from 1900 to the present. Reading selections include fiction, poetry, drama, essays, testimonio, etc. GE credit: AH, WC. Effective: 2008 Fall Quarter.

SPA 153—Latin American Short Story (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Evolution of the Latin American short story from the 19th century to the present. Emphasis on the contemporary period. GE credit: AH, WC. Effective: 2008 Summer Session 1.

SPA 154—Latin American Novel (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Evolution of the Latin American novel from the 19th century to the present. Emphasis on significant contemporary works. GE credit: AH, WC. Effective: 2008 Summer Session 1.

SPA 155—Mexican Novel (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Evolution of the Mexican novel from the 19th century to the present. Emphasis on the narrative of the Revolution and significant contemporary works. GE credit: AH, WC. Effective: 2008 Summer Session 1.

SPA 156—Latin American Literature of the Turn of the 20th Century (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Modernism as an authentic expression of Latin American literature and its influence on 20th-century poetry and prose. In depth analysis of the works of Darío and other major writers of the era. Offered in alternate years. GE credit: AH, WC. Effective: 2008 Summer Session 1.

SPA 157—Great Works of Latin American Literature/Culture (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Study of major works of Latin American literature/culture and their cultural and literary milieus. May include novels, poetry, film, etc. Works may be analyzed in terms of style, influence, cultural significance, political importance, and/or commercial success. GE credit: AH, WC. Effective: 2008 Fall Quarter.

SPA 158—Latin American Poetry: From Vanguardism to Surrealism and Beyond (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Study of vanguardism, surrealism, and more recent movements of Latin American poetry. An in-depth analysis of the works of such major poets as Neruda, Vallejo, and Paz. GE credit: AH, WC. Effective: 2008 Summer Session 1.

SPA 159—Special Topics in Latin American Literature and Culture (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S; One course. Special topics in the study of Latin American literature and culture. May be repeated up to 1 time(s) when topic or subject differs; students may take any SPA 159 course two times total in combination. GE credit: AH, WC. Effective: 2015 Winter Quarter.

SPA 159S—Special Topics in Latin American Literature and Culture (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S; One course. Special topics in the study of Latin American literature and culture. Offered in a Spanish speaking country under the supervision of UC Davis faculty. May be repeated up to 1 time(s) when topic or subject differs; students may take any SPA 159 course two times total in combination. GE credit: AH, WC. Effective: 2015 Winter Quarter.

SPA 159Y—Special Topics in Latin American Literature and Culture (4)
Lecture/Discussion—1 hour; Web Virtual Lecture—3 hours. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S; One course. Special topics in the study of Latin American literature and culture. Hybrid format combining classroom instruction with technologically based materials. May be repeated up to 1 time(s) when topic or subject differs; students may take any Spanish 159 course two times total in combination. GE credit: AH, WC. Effective: 2016 Spring Quarter.

SPA 160—Latin American Women Writers in Translation (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Upper division standing or consent of instructor. Latin American women writers from the 19th and 20th centuries. Recent theoretical approaches to literature by women in Latin America. Discussions in English of works by Matto de Turner, Avellaneda, Storni, Ocampo, Agustini, Mistral, Castellanos, and others. GE credit: AH, WC. Effective: 2005 Spring Quarter.

SPA 170—Introduction to Latin American Culture (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 024 or SPA 024S or SPA 033 Introduction to history, geography and culture of Latin America. Multiple genres of cultural production and representation, with a focus on cultural diversity and regional difference. Introduction to critical reading and textual analysis. Not open for students who have completed equivalent course SPA 170S. GE credit: AH, VL, WC, WE. Effective: 2008 Summer Session 1.

SPA 170S—Introduction to Latin American Culture (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): SPA 024 or SPA 024S or SPA 033 Introduction to history, geography and culture of Latin America. Multiple genres of cultural production and representation, with a focus on cultural diversity and regional difference. Introduction to critical reading and textual analysis. Offered in a Spanish-speaking country. Not open for students who have completed equivalent course 170. GE credit: AH, VL, WC, WE. Effective: 2008 Summer Session 1.

SPA 171—Music from Latin America (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Examination of music from Latin America. Characteristic music (i.e. tango, bossa nova, salsa, musica motena, musica andina) as well as its implications in other musical genres. Taught in English or Spanish depending on instructor. May be repeated up to 1 time(s) when the topic differs. Not open to students who taken Spanish 171S or Music 127S. (Music 127) GE credit: AH, VL, WC, WE. Effective: 2018 Winter Quarter.

SPA 171S—Music from Latin America (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Examination of music from Latin America. Characteristic music (i.e. tango, bossa nova, salsa, musica motena, musica andina) as well as its implications in other musical genres. Taught in English or Spanish depending on instructor. May be repeated up to 1 time(s) when content differs. Not open to students who have taken SPA 171 or MUS 127. (Music 127S.) GE credit: AH, VL, WC, WE. Effective: 2018 Winter Quarter.

SPA 172—Mexican Culture (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SPA 024 or SPA 024S or SPA 033 Study of Mexican culture through a diversity of cultural expression, including elite, popular and mass media culture. Focus on national icons and archetypes, multiculturalism, transnationalism. May be repeated up to 1 time(s). GE credit: AH, VL, WC. Effective: 2008 Fall Quarter.

SPA 173—Cinema and Latin American Culture (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): SPA 024 or SPA 024S or SPA 033 Understanding Latin American cultures through cinema. History and critical analysis of Latin American film. Focus on a national cinematic tradition. Comparative experiences in different parts of Latin America and/or a particular era. Conducted entirely in Spanish. May be repeated up to 1 time(s) when topic differs. GE credit: AH, VL, WC. Effective: 2005 Spring Quarter.

SPA 174—Chicano Culture (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SPA 024 or SPA 033 An interdisciplinary survey of Chicano culture. Topics include literature, art, folklore, oral tradition, music, politics, as well as
everyday cultural manifestations. Conducted in Spanish. (Former course 124.) GE credit: ACGH, AH, DD. Effective: 1997 Winter Quarter.

SPA 175—Topics in Latin American Cultural Studies (4)
Lecture—3 hours; Project (Term Project)—1 hour. Prerequisite(s): SPA 024 or SPA 024S or SPA 033 Specific historical tendencies and issues in Latin American culture(s) from precolombian times to present. Studies of literature, film, art, journalism and performance. Focus on issues of aesthetics, politics, identity, and globalization. May be repeated up to 1 time(s) content differs. GE credit: AH, VL, WC, WE. Effective: 2008 Fall Quarter.

SPA 176—Literature in Spanish Written in the United States (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 024 or SPA 033 Survey of the literary and cultural contributions of the main Spanish-speaking populations present in the U.S.: Chicanos, Puerto Ricans, Cuban-Americans, Central Americans, and other Latinos. GE credit: ACGH, AH, DD. Effective: 1997 Winter Quarter.

SPA 177—California and Latin America (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SPA 024 or SPA 024S or SPA 033 Interdisciplinary survey on the relationship between California and Latin America (1500s-present). Latin American representations of California and Californian representations of Latin America, as well as borderlands texts, with a special focus on Mexican-American perspectives. Conducted in Spanish. GE credit: ACGH, DD. Effective: 2008 Fall Quarter.

SPA 178A—Spanish for the Professions (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SPA 024 or SPA 024S or SPA 033 For students with an advanced level of Spanish interested in the use of Spanish in the health care, legal and law enforcement and marketing and business professions. Field trips documenting the use of Spanish in the public context. GE credit: AH, DD, OL, SS, WE. Effective: 2014 Fall Quarter.

SPA 179—Science and Politics of the Human Body in the Spanish-Speaking World (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Interaction between the interpretations of scientific ideas, philosophical issues, and politics concerning the human body in the Spanish-speaking world through different historical periods. Not open to students who have taken equivalent course 179Y. GE credit: AH, SE, SS. Effective: 2015 Fall Quarter.

SPA 179Y—Science and Politics of the Human Body in the Spanish-Speaking World (4)
Discussion—2 hours; Web Virtual Lecture—2 hours. Interaction between the interpretations of scientific ideas, philosophical issues, and politics concerning the human body in the Spanish-speaking world through different historical periods. Not open for credit to students who have taken equivalent course 179. GE credit: AH, SE, SS. Effective: 2015 Fall Quarter.

SPA 180—Senior Seminar in Spanish Linguistics (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Senior standing; a major in Spanish or consent of instructor. Limited enrollment. Group study of a special topic drawn from Spanish linguistics. Independent research project. May be repeated up to 1 time(s). GE credit: AH, OL, SS, WE. Effective: 2007 Fall Quarter.

SPA 181—Senior Seminar in Spanish Literature/Culture (4)
Seminar—3 hours; Term Paper—1 hour. Prerequisite(s): Senior standing; a major in Spanish or consent of instructor. Limited enrollment. Group study of a special topic drawn from Spanish literary or cultural studies. Independent research project. May be repeated up to 1 time(s) if content differs. GE credit: AH, OL, WE. Effective: 2006 Fall Quarter.

SPA 182—Senior Seminar in Latin American Literature/Culture (4)
Seminar—3 hours; Term Paper—1 hour. Prerequisite(s): Senior standing; a major in Spanish or consent of instructor. Limited enrollment. Group study of a special topic drawn from Latin American literary or cultural studies. Independent research project. May be repeated up to 1 time(s) if content differs. GE credit: AH, OL, WC, WE. Effective: 2006 Fall Quarter.

SPA 192I—Internship in Spanish (1-12)
Independent Study—3-36 hours. Prerequisite(s): SPA 023; and Consent of Instructor. Junior standing; major in Spanish, Chicano Studies, or a related field. Internships in fields where Spanish language skills can be used and perfected (teaching, counseling, translating-interpreting). May be repeated up to 8 unit(s) Units will not count toward the Spanish major. (P/NP grading only.) Effective: 1997 Winter Quarter.

SPA 194H—Special Study for Honors Students (1-5)
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. Senior standing and qualificaiton for the Spanish honors program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in Spanish literature, civilization, or language studies. May be repeated up to 8 unit(s). (P/NP grading only.) GE credit: AH, WC, WE. Effective: 2000 Winter Quarter.

SPA 197T—Tutoring in Spanish (1-4)
Tutorial—1-4 hours. Prerequisite(s): Upper division standing and permission of the chair. Tutoring in undergraduate courses including leadership in small voluntary discussion groups affiliated with departmental courses. May be repeated for credit for a total of 6 units. May be repeated up to 6 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

SPA 197TC—Tutoring in the Community (2-4)
Tutorial—2-4 hours. Prerequisite(s): Upper division standing and permission of the chair. Tutoring in public schools under the guidance of a regular teacher and supervision by a departmental faculty member. May be repeated for credit for a total of 6 units. May be repeated up to 6 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

SPA 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of instructor and department chairperson. (P/NP grading only.) GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

SPA 198F—Student Faciliated Course (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Student facilitated course intended primarily for upper division students. (P/NP grading only.) Effective: 2017 Winter Quarter.

SPA 199—Special Study for Advanced Undergraduates (1-5)
Variable. Special study of a topic or an author to be determined in consultation with an individual faculty member. May be repeated up to 6 unit(s). (P/NP grading only.) GE credit: AH, WC, WE. Effective: 2000 Winter Quarter.

SPA 199FA—Student Facilitated Course Development (1-2)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Open to upper division Spanish majors only. Under the supervision of a faculty member, an undergraduate student plans and develops the course they will offer under 98F/198F. (P/NP grading only.) Effective: 2017 Spring Quarter.

SPA 199FB—Student Facilitated Teaching (1-4)
Variable—1-4 hours. Prerequisite(s): SPA 199FA; Consent of Instructor. Must have completed course 199FA, and be teaching a course 98F or 198F; open to upper division Spanish majors only. Student-facilitated course under the supervision of a faculty member, an undergraduate student teaches a course under 98F/198F. (P/NP grading only.) Effective: 2017 Fall Quarter.

SPA 201—Literary Theory I (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Basic theories and practical approaches to modern and contemporary Hispanic literature. Emphasis on formalism, poststructuralism, socio-cultural discourses, and ideologies. Effective: 1997 Winter Quarter.

SPA 202—Literary Theory II (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Major contemporary critical theories including recent, innovative approaches to Hispanic literature and culture. Readings from Semiotics and Deconstructionism to Psychological and Socio-ideological approaches.
Emphasis on Postmodern and Neo-colonial discourse. Effective: 1997 Winter Quarter.

SPA 203—Research Methodologies (1)
Seminar—2 hours. Introduction to the range of scholarly research methodologies currently being realized in Spanish linguistics, literary and cultural studies: archival research, textual analysis, discourse analysis, statistics for linguistics, etc.; introduction to scholarly writing (MLA style) and scholarly publishing. (S/U grading only.) Effective: 2013 Fall Quarter.

SPA 205—Spanish Phonology (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Some knowledge of phonetics is required and consent of instructor; LIN 109 and LIN 139 highly recommended. Analyzes the sound patterns of Spanish from both linear and non-linear perspectives. Students will develop a clear understanding of what phonology is and the nature of Spanish phonology, as defined by modern linguistic analysis. Effective: 1997 Winter Quarter.

SPA 206—Spanish Syntax (4)
Seminar—3 hours; Term Paper. Prerequisite(s): LIN 165; LIN 140. An examination of Spanish word order within the framework of general linguistic theory. The student will investigate how to write a grammar
of Spanish with particular attention to the structure of noun and verb clauses. Effective: 1997 Winter Quarter.

SPA 207—History of the Spanish Language (4)
Seminar—3 hours; Term Paper. Prerequisite(s): LAT 001 (Former course 220A.) Effective: 1997 Winter Quarter.

SPA 208—Old Spanish Texts (4)
Seminar—3 hours; Term Paper. Prerequisite(s): SPA 207 An in-depth linguistic examination of Old Spanish texts from the 12th to the 15th centuries, with particular attention to the significance of orthographic changes. Effective: 1997 Winter Quarter.

SPA 211—Hispanic Dialectology (4)
Seminar—3 hours; Term Paper. Prerequisite(s): SPA 220; or Consent of Instructor. Descriptive and historical study of the distinctive features of Peninsular and American Spanish dialects. (Former course 221.) Effective: 1997 Winter Quarter.

SPA 212—Applied Linguistics (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing and SPA 215 and SPA 216 recommended. Focuses on the relevant linguistic aspects of teaching Spanish. Designed for graduate students who have an interest in second-language learning
and teaching. Effective: 1997 Winter Quarter.

SPA 215—Special Topics in Hispanic Linguistics (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. SPA 205 and SPA 206 recommended. Specialized topics in Hispanic linguistics (e.g., pragmatics, sociolinguistics, topics in syntax, semantics, or diachronic studies). May be repeated for credit when topic differs. May be repeated for credit. Effective: 1997 Winter Quarter.

SPA 220—Catalan Language and Culture (4)
Laboratory—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Good command of Spanish, Portuguese, French or Italian and graduate level of studies in any of these languages. Open to advanced undergraduate students, with notions of Catalan, can be admitted with consent of instructor; designed for graduate students. Foundation for the acquisition of Catalan oral, reading and elementary writing level skills for students of Spanish (Iberianists or Hispanists), with the capacity to interpret educated written language. Emphasis on weekly review of grammar and all language skills. Effective: 2014 Winter Quarter.

SPA 222—Critical Approaches to Spanish Literature I: Prose & Essay (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Critical approaches to Spanish narrative and essay. May be repeated up to 2 time(s) topic differs. Effective: 2002 Fall Quarter.

SPA 223—Critical Approaches to Spanish Literature II: Poetry & Drama (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Critical approaches to Spanish poetry and drama. May be repeated up to 2 time(s) when topic differs. Effective: 2002 Fall Quarter.

SPA 224—Studies of a Major Writer, Period, or Genre in Spanish Literature (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Artistic development of a major Spanish writer and his/her intellectual and literary milieu or study of a special topic, period, or genre. May be repeated for credit with consent of instructor. May be repeated for credit. Effective: 1997 Winter Quarter.

SPA 230—Topics in Latin American Cultural Studies (4)
Seminar—3 hours; Term Paper. Discussion of select contemporary theoretical debates in Latin American Cultural Studies. Application of critical questions to the analysis of cultural texts. May be repeated up to 2 time(s) when content differs. Effective: 2007 Fall Quarter.

SPA 231—Interamerican Studies (4)
Seminar—3 hours; Term Paper. Survey of methodologies of investigation for crosscultural or comparative projects in the geographical context of the Americas. Focus on particular problems of language, discipline, national definitions, and global hierarchies of knowledge that complicate such projects. Readings of interamerican cultural texts. Effective: 2007 Fall Quarter.

SPA 252—Medieval Spanish Literature: Prose (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. An exploration of the major genres of Medieval Spanish prose from its origins to 1450. Effective: 1997 Winter Quarter.

SPA 253—Medieval Spanish Literature: Epic (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Medieval Spanish epic narratives. Major theoretical perspectives on the genesis, diffusion, and character of the Medieval epic. Relationship of epic to ballad literature. Effective: 1997 Winter Quarter.

SPA 254—Medieval Hispanic Lyric (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Analysis of the most representative lyric poetry in the various Peninsular languages and in provencal, troubadour poetry, kharjas, villancicos, cantigas de amigo, and courtly lyric. Effective: 1997 Winter Quarter.

SPA 255—Spanish Literature of the Early Renaissance (4)
Seminar—3 hours; Term Paper. Spanish Literature, 1450-1550, with emphasis on La Celestina. (Former
course 229.) Effective: 1997 Winter Quarter.

SPA 256—Spanish Literature of the Renaissance and Golden Age: Poetry (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Extensive critical study of the main currents of Renaissance and Baroque Spanish poetry through its language structures, styles (Culteranismo-Conceptismo), rhetorical devices, myths, and themes (love, death, time). Effective: 1997 Winter Quarter.

SPA 257—Spanish Literature of the Renaissance and Golden Age: Drama (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. An exploration of major 16th and17th century literary and cultural developments through the study of selected dramas. Effective: 1997 Winter Quarter.

SPA 258—Spanish Literature of the Renaissance and Golden Age: Prose (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. The origins and development of the Spanish novel during the Renaissance
and the Spanish Golden Age. Effective: 1997 Winter Quarter.

SPA 259—Cervantes and the Novel (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. The narrative works of Miguel de Cervantes with special emphasis on Don Quijote. Effective: 1997 Winter Quarter.

SPA 260—Modern Spanish Literature (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Topics of Spanish literature, from 1700-1920. Effective: 1997 Winter Quarter.

SPA 261—Contemporary Spanish Literature: Poetry (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Critical analysis of modern Spanish poetry from a wide spectrum of poetic currents. Effective: 1997 Winter Quarter.

SPA 262—Contemporary Spanish Literature: Narrative (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Study of the 20th-century novel and short story with emphasis on the avant-garde, existentialism, social realism, and postmodern trends. May be repeated up to 2 time(s) when topic differs and with consent of instructor. Effective: 2003 Spring Quarter.

SPA 263—Contemporary Spanish Literature: Drama (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. The Spanish theatrical production of the last 70 years. Effective: 1997 Winter Quarter.

SPA 264—Contemporary Spanish Literature: Essay (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Major thinkers from Ganivet to Unamuno and Ortega y Gassett. Emphasis will be placed on the relationships between Spanish thought and European philosophical currents. Effective: 1997 Winter Quarter.

SPA 265—Women Writers of Spain (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Introduction to the development of a feminine consciousness in the Spanish contemporary literary scene. Selected texts represent particularly innovative typologies of feminine discourse in the realm of the historical, psychoanalytical, and metafictional, erotic, and allegorical fiction. Effective: 1997 Winter Quarter.

SPA 272—Critical Approaches to Latin American Literature: Narrative (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Development of Latin American literary periods and currents in narrative (novel, short story, and essay), from early colonial times to the present. May be repeated up to 2 time(s) material changes. Effective: 2008 Summer Session 1.

SPA 273—Critical Approaches to Latin American Literature: Poetry and Drama (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Development of Latin American literary periods and currents in poetry and drama, from early Colonial times to the present. May be repeated up to 2 time(s) when topic differs. Effective: 2008 Summer Session 1.

SPA 274—Studies of a Major Writer, Period, or Genre in Latin American Literature (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Artistic development of a major Latin American writer and his/her intellectual and literary milieu or study of a special topic, period, or genre. May be repeated for credit with consent of instructor. May be repeated for credit. Effective: 2008 Summer Session 1.

SPA 275—Colonial Literature (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Graduate standing. An examination of pre-Hispanic and Colonial narrative, poetry and theatre. Emphasis on historical, anthropological, and ethnographic approaches to Colonial discourse. Effective: 1997 Winter Quarter.

SPA 276—Twentieth-Century Latin American Drama (4)
Seminar—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Major Latin American dramatists from Florencio Sánchez to the present. (Former course 240.). Effective: 2008 Summer Session 1.

SPA 277—Latin American Novel, 1900-1950 (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Study of main trends and key authors in Latin America in the first half of the 20th century. (Former course 241A.). Effective: 2008 Summer Session 1.

SPA 278—New Trends in Latin American Fiction (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Recent developments in Latin American narrative. Emphasis on innovative language and structure. (Former course 241B.). Effective: 2008 Summer Session 1.

SPA 279—Mexican Narrative (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Study of the evolution of Mexican narrative. Emphasis on the narrative
of the Revolution and significant contemporary works. Effective: 1997 Winter Quarter.

SPA 280—Latin American Short Story (4)
Seminar—3 hours; Term Paper. Works by major writers with emphasis on 20th-century authors such as
Quiroga, Borges, García Márquez, Cortázar, and Rulfo. (Former course 243). Effective: 2008 Summer Session 1.

SPA 281—Latin American Women Writers (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Study of feminist critical theories, gender construction, and self-representation within the history of socio-cultural changes in Latin America. Effective: 2008 Summer Session 1.

SPA 282—Darío and Modernism (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Study of poetry and prose of Spanish-American Modernism (1880-1916). Offered in alternate years. (Former course 245.) Effective: 1997 Winter Quarter.

SPA 283—New Directions in Latin American Poetry (4)
Seminar—3 hours; Term Paper. New trends in Latin American poetry. Effective: 2008 Summer Session 1.

SPA 284—The Latin American Essay (4)
Seminar—3 hours; Term Paper. Major Latin American essayists from Sarmiento to contemporary essayists. Effective: 2008 Summer Session 1.

SPA 285—Multicultural Approaches to Cuban Literature and Culture (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Study of main trends in Cuban literature. Emphasis on historical, geographic, social and cultural context (including music and film). Course taught in English with some readings in Spanish. Effective: 1999 Spring Quarter.

SPA 291—Foreign Language Learning in the Classroom (4)
Project (Term Project); Seminar—3 hours. Overview of approaches to university-level foreign language instruction and the theoretical notions underlying current trends in classroom practices across commonly taught foreign languages. (German (GER) course 291; French (FRE) course 291) Effective: 2006 Fall Quarter.

SPA 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

SPA 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

SPA 300—The Teaching of Spanish (3)
Lecture—3 hours. Prerequisite(s): Senior or graduate standing; a major or minor in Spanish. Effective: 1997 Fall Quarter.

SPA 390—The Teaching of Spanish in College (4)
Discussion—2 hours; Lecture—2 hours. Prerequisite(s): Graduate standing. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required of graduate teaching assistants. Effective: 1997 Winter Quarter.

SPA 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Statistics

Statistics | STA Information

(College of Letters and Science)

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The Major Program

Statistics enables us to make inferences about entire populations, based on samples extracted from those populations. Statistical methods can be applied to problems from almost every discipline and they are vitally important to researchers in agricultural, biological, environmental, social, engineering, and medical sciences.

The Program. Statistics majors may receive either a Bachelor of Arts or a Bachelor of Science degree. Both the A.B. and the B.S. programs require theoretical and applied course work and

underscore the strong interdependence of statistical theory and the applications and computational aspects of statistics. The B.S. degree program has four tracks: General Track, Applied Statistics Track, Computational Statistics Track, and the Statistical Data Science Track. The A.B. degree program has one track.

A.B. in Statistics-Applied Statistics Option Track emphasizes statistical applications. This track is recommended for students who are interested in applications of statistical techniques to various disciplines, especially the social sciences.

Major Advisor. D. Paul

Students are encouraged to meet with an advisor to plan a program as early as possible. Sometime before or during the first quarter of the junior year, students planning to major in Statistics should consult with a faculty advisor to plan the remainder of their undergraduate programs.

Career Alternatives. Probability models, statistical methods, and computational techniques are used in a great many fields, including the biological, physical, social, and health sciences, business, and engineering. The wide applicability of statistics is reflected in the strong demand for graduates with statistical training in both the public and private sectors. Employment opportunities include careers in data and policy analysis in government and industry, financial management, quality control, insurance and healthcare industry, actuarial science, engineering, public health, biological and pharmaceutical research, law, and education. Students with an undergraduate degree in statistics have entered advanced studies in statistics, economics, finance, psychology, medicine, business management and analytics, and other professional school programs.

Preparatory Subject Matter **Units:** 20-23

MAT 016A	Short Calculus	3
MAT 016B	Short Calculus	3
MAT 016C	Short Calculus	3
OR		
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
MAT 017C	Calculus for Biology and Medicine	4
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 022A	Linear Algebra	3

Choose one:

ECS 010	Introduction to Programming (Discontinued)	4
ECS 030	Programming and Problem Solving (Discontinued)	4
ECS 032A	Introduction to Programming	4
ECS 036A	Programming and Problem Solving	4
ECS 040	Software Development and Object-Oriented Programming (Discontinued)	4

OR

The equivalent of one of the above.

STA 032	Gateway to Statistical Data Science	4

Depth Subject Matter **Units:** 45-48

STA 106	Applied Statistical Methods: Analysis of Variance	4
STA 108	Applied Statistical Methods: Regression Analysis	4
STA 138	Analysis of Categorical Data	4

STA 130A	Mathematical Statistics: Brief Course	4
STA 130B	Mathematical Statistics: Brief Course	4

Choose one:

STA 137	Applied Time Series Analysis	4
STA 141A	Fundamentals of Statistical Data Science	4

Choose three:

STA 104	Applied Statistical Methods: Nonparametric Statistics	4
STA 135	Multivariate Data Analysis	4
STA 137	Applied Time Series Analysis	4
STA 141A	Fundamentals of Statistical Data Science	4
STA 141B	Data & Web Technologies for Data Analysis	4
OR		
STA 141C	Big Data & High Performance Statistical Computing	4
STA 144	Sampling Theory of Surveys	4
STA 145	Bayesian Statistical Inference	4
STA 160	Practice in Statistical Data Science	4
MAT 168	Optimization	4

One approved four unit course:

STA 194HA	Special Studies for Honors Students	4
STA 194HB	Special Studies for Honors Students	4
STA 199	Special Study for Advanced Undergraduates	1-5

Three upper division elective courses outside of Statistics

Electives are chosen with and must be approved by the major advisor. Electives should follow a coherent sequence in one single disciple where statistical methods and models are applied and should cover the quantitative aspects of the discipline. A list of pre-approved electives can be found on the Statistics Department website.

Total: 65-71

Statistics | STA B.S.

(College of Letters and Science)

Thomas Lee, Ph.D., Chairperson of the Department

Department Office. 4118 Mathematical Sciences Building; 530-752-2361; http://www.stat.ucdavis.edu

Faculty. http://www.stat.ucdavis.edu/people/faculty.html

The Major Program

Statistics enables us to make inferences about entire populations, based on samples extracted from those populations. Statistical methods can be applied to problems from almost every discipline and they are vitally important to researchers in agricultural, biological, environmental, social, engineering, and medical sciences.

The Program. Statistics majors may receive either a Bachelor of Arts or a Bachelor of Science degree. Both the A.B. and the B.S. programs require theoretical and applied course work and

underscore the strong interdependence of statistical theory and the applications and computational aspects of statistics. The B.S. degree program has four tracks: General Track, Applied Statistics Track, Computational Statistics Track, and the Statistical Data Science Track.

B.S. in Statistics-General Track emphasizes statistical theory and is especially recommended as preparation for graduate study in statistics.

B.S. in Statistics-Applied Statistics Track emphasizes statistical applications. This track is recommended for students who are interested in applications of statistical techniques to various disciplines including the biological, physical and social sciences.

B.S. in Statistic-Computational Statistics Track emphasizes computing. This track is recommended for students interested in the computational and data management aspects of statistical analysis.

B.S. in Statistic-Statistical Data Science Track emphasizes data handling skills and statistical computation. This track is recommended for students interested in statistical learning methodology, advanced data handling techniques and computational aspects of statistical analysis.

Major Advisor. D. Paul

Students are encouraged to meet with an advisor to plan a program as early as possible. Sometime before or during the first quarter of the junior year, students planning to major in Statistics should consult with a faculty advisor to plan the remainder of their undergraduate programs.

Career Alternatives. Probability models, statistical methods, and computational techniques are used in a great many fields, including the biological, physical, social, and health sciences, business, and engineering. The wide applicability of statistics is reflected in the strong demand for graduates with statistical training in both the public and private sectors. Employment opportunities include careers in data and policy analysis in government and industry, financial management, quality control, insurance and healthcare industry, actuarial science, engineering, public health, biological and pharmaceutical research, law, and education. Students with an undergraduate degree in statistics have entered advanced studies in statistics, economics, finance, psychology, medicine, business management and analytics, and other professional school programs.

General Statistics Track **Units:** 82-84

Preparatory Subject Matter

MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3
OR		
MAT 067	Modern Linear Algebra	4
MAT 025	Advanced Calculus	4
ECS 030	Programming and Problem Solving (Discontinued)	4
OR		
ECS 040	Software Development and Object-Oriented Programming (Discontinued)	4
OR		
The equivalent.		

Any one introductory statistics course; except STA 010.

Depth Subject Matter

STA 106	Applied Statistical Methods: Analysis of Variance	4
STA 108	Applied Statistical Methods: Regression Analysis	4
STA 138	Analysis of Categorical Data	4
STA 131A	Introduction to Probability Theory	4
STA 131B	Introduction to Mathematical Statistics	4
STA 131C	Introduction to Mathematical Statistics	4

Choose three:

STA 104	Applied Statistical Methods: Nonparametric Statistics	4
STA 135	Multivariate Data Analysis	4
STA 137	Applied Time Series Analysis	4
STA 141A	Fundamentals of Statistical Data Science	4
STA 141B	Data & Web Technologies for Data Analysis	4
STA 141C	Big Data & High Performance Statistical Computing	4
STA 144	Sampling Theory of Surveys	4
STA 145	Bayesian Statistical Inference	4
STA 160	Practice in Statistical Data Science	4
MAT 168	Optimization	4

One approved four unit course:

STA 194HA	Special Studies for Honors Students	4
STA 194HB	Special Studies for Honors Students	4
STA 199	Special Study for Advanced Undergraduates	1-5

MAT 125A	Real Analysis	4
MAT 108	Introduction to Abstract Mathematics	4
OR		
MAT 125B	Real Analysis	4
MAT 167	Applied Linear Algebra	4

Related elective courses

One upper division course approved by major advisor; it should be in mathematics, computer science or in quantitative aspects of a substantive discipline.

Applied Statistics Track **Units:** 75-83

Preparatory Subject Matter

MAT 016A	Short Calculus	3
MAT 016B	Short Calculus	3
MAT 016C	Short Calculus	3
OR		
MAT 017A	Calculus for Biology and Medicine	4
MAT 017B	Calculus for Biology and Medicine	4
MAT 017C	Calculus for Biology and Medicine	4
OR		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4

MAT 021 series recommended.

MAT 022A	Linear Algebra	3
ECS 010	Introduction to Programming (Discontinued)	4
OR		
ECS 030	Programming and Problem Solving (Discontinued)	4
OR		
ECS 040	Software Development and Object-Oriented Programming (Discontinued)	4

OR
The equivalent.

Two introductory courses serving as the prerequisites to upper division courses in a chosen discipline to which statistics is applied.

Any one introductory statistics course; except STA 010.

Depth Subject Matter

STA 106	Applied Statistical Methods: Analysis of Variance	4
STA 108	Applied Statistical Methods: Regression Analysis	4
STA 138	Analysis of Categorical Data	4
STA 141A	Fundamentals of Statistical Data Science	4
STA 130A	Mathematical Statistics: Brief Course	4
STA 130B	Mathematical Statistics: Brief Course	4

Choose three:

STA 104	Applied Statistical Methods: Nonparametric Statistics	4
STA 135	Multivariate Data Analysis	4
STA 137	Applied Time Series Analysis	4
STA 141B	Data & Web Technologies for Data Analysis	4
OR		
STA 141C	Big Data & High Performance Statistical Computing	4
STA 144	Sampling Theory of Surveys	4
STA 145	Bayesian Statistical Inference	4
STA 160	Practice in Statistical Data Science	4
MAT 168	Optimization	4

One approved four unit course:

STA 194HA	Special Studies for Honors Students	4
STA 194HB	Special Studies for Honors Students	4
STA 199	Special Study for Advanced Undergraduates	1-5

Four upper division elective courses outside of Statistics.

Electives are chosen with and must be approved by the major advisor. Electives should follow a coherent sequence in one single disciple where statistical methods and models are applied: at least three of them should cover the quantitative aspects of the discipline. A list of pre-approved electives can be found on the Statistics Department website.

Computational Statistics Track **Units:** 79

Preparatory Subject Matter

MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3
ECS 060	Data Structures and Programming (Discontinued)	4

Any one introductory statistics course; except STA 010.

Depth Subject Matter

STA 106	Applied Statistical Methods: Analysis of Variance	4
STA 108	Applied Statistical Methods: Regression Analysis	4
STA 141A	Fundamentals of Statistical Data Science	4
STA 131A	Introduction to Probability Theory	4
STA 131B	Introduction to Mathematical Statistics	4

Choose two:

STA 104	Applied Statistical Methods: Nonparametric Statistics	4
STA 135	Multivariate Data Analysis	4
STA 137	Applied Time Series Analysis	4
STA 138	Analysis of Categorical Data	4
STA 144	Sampling Theory of Surveys	4
STA 145	Bayesian Statistical Inference	4
STA 160	Practice in Statistical Data Science	4

One approved four unit course:

STA 194HA	Special Studies for Honors Students	4
STA 194HB	Special Studies for Honors Students	4
STA 199	Special Study for Advanced Undergraduates	1-5

Programming, Data Management & Data Technologies:

ECS 130	Scientific Computation	4
OR		
ECS 145	Scripting Languages and Their Applications	4
ECS 165A	Database Systems	4

Scientific Computational Algorithm and Visualization; choose two:

ECS 122A	Algorithm Design and Analysis	4
ECS 129	Computational Structural Bioinformatics	4
ECS 140A	Programming Languages	4
ECS 158	Programming on Parallel Architectures	4
ECS 163	Information Interfaces	4
STA 141B	Data & Web Technologies for Data Analysis	4
STA 141C	Big Data & High Performance Statistical Computing	4

Choose two:

MAT 124	Mathematical Biology	4
MAT 128A	Numerical Analysis	4
MAT 128B	Numerical Analysis in Solution of Equations	4
MAT 129	Fourier Analysis	4
MAT 145	Combinatorics	4
MAT 148	Discrete Mathematics	4

MAT 160	Mathematics for Data Analytics and Decision Making	4
MAT 165	Mathematics and Computers	4
MAT 167	Applied Linear Algebra	4
MAT 168	Optimization	4

Statistical Data Science Track **Units:** 79

Preparatory Subject Matter

MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3

Choose one:

ECS 010	Introduction to Programming (Discontinued)	4
ECS 030	Programming and Problem Solving (Discontinued)	4
ECS 040	Software Development and Object-Oriented Programming (Discontinued)	4

One introductory statistics course; except SAT 010.
STA 032 or SAT 100 preferred.

Depth Subject Matter

STA 106	Applied Statistical Methods: Analysis of Variance	4
STA 108	Applied Statistical Methods: Regression Analysis	4
STA 131A	Introduction to Probability Theory	4
STA 131B	Introduction to Mathematical Statistics	4
STA 131C	Introduction to Mathematical Statistics	4
STA 135	Multivariate Data Analysis	4
STA 141A	Fundamentals of Statistical Data Science	4
STA 141B	Data & Web Technologies for Data Analysis	4
STA 141C	Big Data & High Performance Statistical Computing	4
STA 160	Practice in Statistical Data Science	4
ECS 171	Machine Learning	4
MAT 167	Applied Linear Algebra	4
OR		
MAT 168	Optimization	4

Choose one:

STA 104	Applied Statistical Methods: Nonparametric Statistics	4
STA 137	Applied Time Series Analysis	4
STA 138	Analysis of Categorical Data	4
STA 144	Sampling Theory of Surveys	4
STA 145	Bayesian Statistical Inference	4
MAT 128A	Numerical Analysis	4
ECS 122A	Algorithm Design and Analysis	4
ECS 158	Programming on Parallel Architectures	4
ECS 163	Information Interfaces	4
ECS 165A	Database Systems	4

One approved four unit course:

STA 194HA	Special Studies for Honors Students	4
STA 194HB	Special Studies for Honors Students	4

STA 199	Special Study for Advanced Undergraduates	1-5

Total: 79-84

Statistics | STA B.S./M.S.

Thomas (C.M.) Lee, Ph.D., Chairperson of the Program

Ethan Anderes, Ph.D., Vice Chairperson for Graduate Affairs

Program Office. 4118 Mathematical Sciences Building; 530-554-1367; http://www.stat.ucdavis.edu

Faculty. http://www.stat.ucdavis.edu/people/faculty.htm

The Department offers undergraduate majors a path into the Statistics M.S. program through the Integrated Degree Program (I.D.P.). This program is intended for students who seek to be employed as statisticians in government or industry. The minimum major GPA requirement is 3.200 at the end of the junior year, although students with demonstrated excellence in academic work (with a major GPA of 3.500 or above) are most likely to be admitted. Before moving into the graduate phase, I.D.P. students must satisfy all requirements of the B.S. degree.

To apply for the I.D.P., undergraduate students must submit the Statistics I.D.P. form along with supporting documents during the last quarter of their junior year, to enter the I.D.P. in the first quarter of their senior year. In addition, applicants must submit an application to the M.S. program during the senior year, prior to the deadline of the MS application. Students with a major GPA of 3.500 or above may waive the GRE requirement in the M.S. application. Before applying to the I.D.P., students are strongly advised to consult with both the undergraduate and graduate advisors.

Once a student enters the graduate phase of the I.D.P., they follow the course requirements for the Master's degree (44 units, 18 of which are graduate level). A maximum of 6 units taken in the undergraduate phase can be transferred to the M.S. provided they have not been used to satisfy any requirements of the B.S. degree.

Major Advisor. Debashis Paul

Graduate Advisor. Ethan Anderes (Statistics)

Statistics | STA Minor

(College of Letters and Science)

Thomas Lee, Ph.D., Chairperson of the Department

Department Office. 4118 Mathematical Sciences Building; 530-752-2361; http://www.stat.ucdavis.edu

Faculty. http://www.stat.ucdavis.edu/people/faculty.html

The Department offers a minor program in Statistics that consists of five upper division level courses focusing on the fundamentals of mathematical statistics and of the most widely used applied statistical methods.

Statistics **Units:** 20

STA 106	Applied Statistical Methods: Analysis of Variance	4
STA 108	Applied Statistical Methods: Regression Analysis	4
STA 130A	Mathematical Statistics: Brief Course	4
STA 130B	Mathematical Statistics: Brief Course	4
OR		
STA 131A	Introduction to Probability Theory	4

STA 131B	Introduction to Mathematical Statistics	4

Choose one:

STA 101	Advanced Applied Statistics for the Biological Sciences	4
STA 104	Applied Statistical Methods: Nonparametric Statistics	4
STA 135	Multivariate Data Analysis	4
STA 137	Applied Time Series Analysis	4
STA 138	Analysis of Categorical Data	4
STA 141A	Fundamentals of Statistical Data Science	4
STA 141B	Data & Web Technologies for Data Analysis	4
STA 141C	Big Data & High Performance Statistical Computing	4
STA 144	Sampling Theory of Surveys	4
STA 145	Bayesian Statistical Inference	4
STA 160	Practice in Statistical Data Science	4

Preparation.

STA 013	Elementary Statistics	4
OR		
STA 032	Gateway to Statistical Data Science	4
OR		
STA 100	Applied Statistics for Biological Sciences	4

Additional preparatory courses will be needed based on the course prerequisites listed in the catalog.

Total: 20

Statistics | STA Courses

Courses in STA:

STA 010—Statistical Thinking (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): Two years of high school algebra. Statistics and probability in daily life. Examines principles of collecting, presenting and interpreting data in order to critically assess results reported in the media; emphasis is on understanding polls, unemployment rates, health studies; understanding probability, risk and odds. GE credit: QL, SE. Effective: 2000 Spring Quarter.

STA 012—Introduction to Discrete Probability (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): Two years of high school algebra. Random experiments; countable sample spaces; elementary probability axioms; counting formulas; conditional probability; independence; Bayes theorem; expectation; gambling problems; binomial, hypergeometric, Poisson, geometric, negative binomial and multinomial models; limiting distributions; Markov chains. Applications in the social, biological, and engineering sciences. GE credit: QL, SE. Effective: 1999 Fall Quarter.

STA 013—Elementary Statistics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Two years of high school algebra or Mathematics D. Descriptive statistics; basic probability concepts; binomial, normal, Student's t, and chi-square distributions. Hypothesis testing and confidence intervals for one and two means and proportions. Regression. Not open for credit for students who have completed course 13V, or higher. GE credit: QL, SE. Effective: 2016 Fall Quarter.

STA 013Y—Elementary Statistics (4)
Lecture—1.5 hours; Web Virtual Lecture—5 hours. Prerequisite(s): Two years of high school algebra or Mathematics D. Descriptive statistics; basic probability concepts; binomial, normal, Student's t, and chi-square distributions. Hypothesis testing and confidence intervals for one and two means and proportions. Regression. Not open for credit for students who have completed course 13, or higher. GE credit: QL, SE. Effective: 2016 Fall Quarter.

STA 032—Gateway to Statistical Data Science (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016B or MAT 021B or MAT 017B Probability concepts; programming in R; exploratory data analysis; sampling distribution; estimation and inference; linear regression; simulations; resampling methods. Alternative to Statistics 13 for students with a background in calculus and programming. Only two units of credit allowed to students who have taken course 13; not open for credit to students who have taken course 100. GE credit: QL, SE. Effective: 2018 Winter Quarter.

STA 090X—Seminar (1-2)
Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. High school algebra. Examination of a special topic in a small group setting. Effective: 1997 Winter Quarter.

STA 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

STA 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2000 Spring Quarter.

STA 100—Applied Statistics for Biological Sciences (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016B or MAT 017B or MAT 021B Descriptive statistics, probability, sampling distributions, estimation, hypothesis testing, contingency tables, ANOVA, regression; implementation of statistical methods using computer package. Only two units credit allowed to students who have taken course courses 13, 32 or 103; not open for credit to students who have taken course 102. GE credit: QL, SE. Effective: 2017 Spring Quarter.

STA 101—Advanced Applied Statistics for the Biological Sciences (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 100 Basic experimental designs, two-factor ANOVA without interactions, repeated measures ANOVA, ANCOVA, random effects vs. fixed effects, multiple regression, basic model building, resampling methods, multiple comparisons, multivariate methods, generalized linear models, Monte Carlo simulations. GE credit: QL, SE. Effective: 2014 Fall Quarter.

STA 103—Applied Statistics for Business and Economics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (STA 013 or STA 013Y or STA 032 or STA 100); (MAT 016B or MAT 017B or MAT 021B) Descriptive statistics; probability; random variables; expectation; binomial, normal, Poisson, other univariate distributions; joint distributions; sampling distributions, central limit theorem; properties of estimators; linear combinations of random variables; testing and estimation; Minitab computing package. Two units credit given to students who have completed course 100. GE credit: QL, SE. Effective: 2018 Winter Quarter.

STA 104—Applied Statistical Methods: Nonparametric Statistics (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 013 or STA 013Y or STA 032 or STA 100 Sign and Wilcoxon tests, Walsh averages. Two-sample procedures. Inferences concerning scale. Kruskal-Wallis test. Measures of association. Chi square and Kolmogorov-Smirnov tests. GE credit: QL, SE. Effective: 2018 Winter Quarter.

STA 106—Applied Statistical Methods: Analysis of Variance (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 013 or STA 013Y or STA 032 or STA 100 Basics of experimental design. One-way and two-way fixed effects analysis of variance models. Randomized complete and incomplete block design. Multiple comparisons procedures. One-way random effects model. GE credit: SE. Effective: 2018 Winter Quarter.

STA 108—Applied Statistical Methods: Regression Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 013 or STA 013Y or STA 032 or STA 100 Simple linear regression, variable selection techniques, stepwise regression, analysis of covariance, influence measures, computing packages. GE credit: QL, SE, SL. Effective: 2018 Winter Quarter.

STA 130A—Mathematical Statistics: Brief Course (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016C or MAT 017C or MAT 021C Basic probability, densities and distributions, mean, variance, covariance, Chebyshev's inequality, some special distributions, sampling distributions, central limit theorem and law of large numbers, point estimation, some methods of estimation, interval estimation, confidence intervals for certain quantities, computing sample sizes. Only 2 units of credit allowed to students who have taken course 131A. GE credit: QL, SE. Effective: 2018 Winter Quarter.

STA 130B—Mathematical Statistics: Brief Course (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 130A or STA 131A or MAT 135A Transformed random variables, large sample properties of estimates. Basic ideas of hypotheses testing, likelihood ratio tests, goodness-of-
fit tests. General linear model, least squares estimates, Gauss-Markov theorem. Analysis of variance, F-test. Regression and correlation, multiple regression. Selected topics. GE credit: QL, SE. Effective: 2016 Fall Quarter.

STA 131A—Introduction to Probability Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021B; MAT 021C; MAT 022A or MAT 067 Fundamental concepts of probability theory, discrete and continuous random variables, standard distributions, moments and moment-generating functions, laws of large numbers and the central limit theorem. Not open for credit to students who have completed Mathematics 135A. GE credit: QL, SE. Effective: 2018 Winter Quarter.

STA 131B—Introduction to Mathematical Statistics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 131A or MAT 135A; or Consent of Instructor. Sampling, methods of estimation, bias-variance decomposition, sampling distributions, Fisher information, confidence intervals, and some elements of hypothesis testing. GE credit: SE. Effective: 2017 Winter Quarter.

STA 131C—Introduction to Mathematical Statistics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 131B; or Consent of Instructor. Testing theory, tools and applications from probability theory, Linear model theory, ANOVA, goodness-of-fit. GE credit: SE. Effective: 2016 Fall Quarter.

STA 135—Multivariate Data Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (STA 130B or STA 131B); (MAT 022A or MAT 067) Multivariate normal distribution; Mahalanobis distance; sampling distributions of the mean vector and covariance matrix; Hotellings T2; simultaneous inference; one-way MANOVA; discriminant analysis; principal components; canonical correlation; factor analysis. Intensive use of computer analyses and real data sets. GE credit: QL, SE. Effective: 2016 Fall Quarter.

STA 137—Applied Time Series Analysis (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 108 Time series relationships; univariate time series models: trend, seasonality, correlated errors; regression with correlated errors; autoregressive models; autoregressive moving average models; spectral analysis: cyclical behavior and periodicity, measures of periodicity, periodogram; linear filtering; prediction of time series; transfer function models. GE credit: QL, SE. Effective: 2016 Fall Quarter.

STA 138—Analysis of Categorical Data (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (STA 130B or STA 131B) or (STA 106, STA 108) Varieties of categorical data, cross-classifications, contingency tables, tests for independence. Multidimensional tables and log-linear models, maximum likelihood estimation; tests of goodness-of-fit. Logit
models, linear logistic models. Analysis of incomplete tables. Packaged computer programs, analysis of real data. GE credit: QL, SE. Effective: 1997 Winter Quarter.

STA 141A—Fundamentals of Statistical Data Science (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (STA 108 or STA 106); (STA 032 or STA 100 or STA 013 or STA 013Y) Introduction to computing for data analysis and visualization, and simulation, using a high-level language (e.g., R). Computational reasoning, computationally intensive statistical methods, reading tabular and non-standard data. Not open for credit to students who have taken course 141 or course 242. Effective: 2018 Spring Quarter.

STA 141B—Data & Web Technologies for Data Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 141A Essentials of using relational databases and SQL. Processing data in blocks. Scraping Web pages and using Web services/APIs. Basics of text mining. Interactive data visualization with Web technologies. Computational data workflow and best practices. Statistical methods. Effective: 2018 Winter Quarter.

STA 141C—Big Data & High Performance Statistical Computing (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 141B or (STA 141A, ECS 010) High-performance computing in high-level data analysis languages; different computational approaches and paradigms for efficient analysis of big data; interfaces to compiled languages; R and Python programming languages; high-level parallel computing; MapReduce; parallel algorithms and reasoning. Effective: 2018 Winter Quarter.

STA 144—Sampling Theory of Surveys (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): (STA 130B or STA 131B) or (STA 106, STA 108) Simple random, stratified random, cluster, and systematic sampling plans; mean, proportion, total, ratio, and regression estimators for these plans; sample survey design, absolute and relative error, sample size selection, strata construction; sampling and nonsampling sources of error. GE credit: QL, SE. Effective: 2016 Fall Quarter.

STA 145—Bayesian Statistical Inference (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 130B or STA 131B Subjective probability, Bayes Theorem, conjugate priors, non-informative priors, estimation, testing, prediction, empirical Bayes methods, properties of Bayesian procedures, comparisons with classical procedures, approximation techniques, Gibbs sampling, hierarchical Bayesian analysis, applications, computer implemented data analysis. GE credit: QL, SE. Effective: 2016 Fall Quarter.

STA 160—Practice in Statistical Data Science (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 106; STA 108; (STA 130B or STA 131B); (STA 141 or STA 141A) Principles and practice of interdisciplinary, collaborative data analysis; complete case study review and team data analysis project. Effective: 2016 Spring Quarter.

STA 190X—Seminar (1-2)
Seminar—1-2 hours. Prerequisite(s): STA 013 or STA 013Y or STA 032 or STA 100 or STA 103 In-depth examination of a special topic in a small group setting. Effective: 2018 Spring Quarter.

STA 192—Internship in Statistics (1-12)
Internship—3-36 hours; Term Paper. Prerequisite(s): Consent of Instructor. Upper division standing. Work experience in statistics. (P/NP grading only.) Effective: 1997 Winter Quarter.

STA 194HA—Special Studies for Honors Students (4)
Independent Study—12 hours. Prerequisite(s): Senior qualifying for honors. Directed reading, research and writing, culminating in the completion of a senior honors thesis or project under direction of a faculty advisor. GE credit: SE. Effective: 1997 Winter Quarter.

STA 194HB—Special Studies for Honors Students (4)
Independent Study—12 hours. Prerequisite(s): Senior qualifying for honors. Directed reading, research and writing, culminating in the completion of a senior honors thesis or project under direction of a faculty advisor. GE credit: SE. Effective: 1997 Winter Quarter.

STA 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

STA 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

STA 200A—Introduction to Probability Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021A; MAT 021B; MAT 021C; MAT 022A; Consent of Instructor. Fundamental concepts of probability theory, discrete and continuous random variables, standard distributions, moments and moment-generating functions, laws of large numbers and the central limit theorem. Effective: 2018 Winter Quarter.

STA 200B—Introduction to Mathematical Statistics I (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 200A; or Consent of Instructor. Sampling, methods of estimation, bias-variance decomposition, sampling distributions, Fisher information, confidence intervals, and some elements of hypothesis testing. Effective: 2018 Winter Quarter.

STA 200C—Introduction to Mathematical Statistics II (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 200B; or Consent of Instructor. Testing theory, tools and applications from probability theory, Linear model theory, ANOVA, goodness-of-fit. No credit to students who have taken course 131C. Effective: 2018 Spring Quarter.

STA 201—SAS Programming for Statistical Analysis (3)
Discussion/Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): Introductory, upper division statistics course; some knowledge of vectors and matrices; STA 106 or STA 108 or the equivalent suggested. Introductory SAS language, data management, statistical applications, methods. Includes basics, graphics, summary statistics, data sets, variables and functions, linear models, repetitive code, simple macros, GLIM and GAM, formatting output, correspondence analysis, bootstrap. Prepare SAS base programmer certification exam. Effective: 2013 Fall Quarter.

STA 205—Statistical Methods for Research with SAS (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): An introductory upper division statistics course and some knowledge of vectors and matrices; STA 100, or STA 102, or STA 103 suggested or the equivalent. Focus on linear statistical models widely used in scientific research. Emphasis on concepts, methods and data analysis using SAS. Topics include simple and multiple linear regression, polynomial regression, diagnostics, model selection, variable transformation, factorial designs and ANCOVA. Effective: 2008 Fall Quarter.

STA 206—Statistical Methods for Research - I (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): Introductory statistics course; some knowledge of vectors and matrices. Focus on linear statistical models. Emphasis on concepts, method and data analysis; formal mathematics kept to minimum. Topics include simple and multiple linear regression, polynomial regression, diagnostics, model selection, factorial designs and analysis of covariance. Use of professional level software. Effective: 2013 Fall Quarter.

STA 207—Statistical Methods for Research II (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 206; Knowledge of vectors and matrices. Linear and nonlinear statistical models emphasis on concepts, methods/data analysis using professional level software; formal mathematics kept to minimum. Topics include linear mixed models, repeated measures, generalized linear models, model selection, analysis of missing data, and multiple testing procedures. Effective: 2013 Fall Quarter.

STA 208—Statistical Methods in Machine Learning (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 206; STA 207; STA 135; Or their equivalents. Focus on linear and nonlinear statistical models. Emphasis on concepts, methods, and data analysis; formal mathematics kept to minimum. Topics include resampling methods, regularization techniques in regression and modern classification, cluster analysis and dimension reduction techniques. Use professional level software. Effective: 2013 Fall Quarter.

STA 209—Optimization for Big Data Analytics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 200A; STA 208 Optimization algorithms for solving problems in statistics, machine learning, data analytics. Review computational tools for implementing optimization algorithms (gradient descent, stochastic gradient descent, coordinate descent, Newton's method.) Effective: 2018 Spring Quarter.

STA 222—Biostatistics: Survival Analysis (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 131C Incomplete data; life tables; nonparametric methods; parametric methods; accelerated failure time models; proportional hazards models; partial likelihood; advanced topics. (Biostatistics 222.) Effective: 2002 Fall Quarter.

STA 223—Biostatistics: Generalized Linear Models (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 131C Likelihood and linear regression; generalized linear model; Binomial regression; case-control studies; dose-response and bioassay; Poisson regression; Gamma regression; quasi-likelihood models; estimating equations; multivariate GLMs. (Biostatistics 223.) Effective: 2002 Fall Quarter.

STA 224—Analysis of Longitudinal Data (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): ((STA 222, STA 223) or (BST 222, BST 223)); STA 232B; or Consent of Instructor. Standard and advanced methodology, theory, algorithms, and applications relevant for analysis of repeated measurements and longitudinal data in biostatistical and statistical settings. (Biostatistics 224.) Effective: 2005 Spring Quarter.

STA 225—Clinical Trials (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 223 or BST 223; or Consent of Instructor. Basic statistical principles of clinical designs, including bias, randomization, blocking, and masking. Practical applications of widely-used designs, including dose-finding, comparative and cluster randomization designs. Advanced statistical procedures for analysis of data collected in clinical trials. (Biostatistics 225.) Effective: 2005 Spring Quarter.

STA 226—Statistical Methods for Bioinformatics (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 131C; or Consent of Instructor. Data analysis experience recommended. Standard and advanced statistical methodology, theory, algorithms, and applications relevant to the analysis of -omics data. (Biostatistics 226.) Effective: 2007 Fall Quarter.

STA 231A—Mathematical Statistics I (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 131A; STA 131B; STA 131C; MAT 025; MAT 125A; Or equivalent of MAT 025 and MAT 125A. First part of three-quarter sequence on mathematical statistics. Emphasizes foundations. Topics include basic concepts in asymptotic theory, decision theory, and an overview of methods of point estimation. Effective: 2008 Summer Session 1.

STA 231B—Mathematical Statistics II (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 231A Second part of a three-quarter sequence on mathematical statistics. Emphasizes: hyposthesis testing (including multiple testing) as well as theory for linear models. Effective: 2008 Summer Session 1.

STA 231C—Mathematical Statistics III (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 231A; STA 231B Third part of three-quarter sequence on mathematical statistics. Emphasizes large sample theory and their applications. Topics include statistical functionals, smoothing methods and optimization techniques relevant for statistics. Effective: 2008 Summer Session 1.

STA 232A—Applied Statistics I (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 106; STA 108; STA 131A; STA 131B; STA 131C; MAT 167 Estimation and testing for the general linear model, regression, analysis of designed experiments, and missing data techniques. Effective: 2011 Fall Quarter.

STA 232B—Applied Statistics II (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 106; STA 108; STA 131A; STA 131B; STA 131C; STA 232A; MAT 167 Alternative approaches to regression, model selection, nonparametric methods amenable to linear model framework and their applications. Effective: 2011 Fall Quarter.

STA 232C—Applied Statistics III (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 106; STA 108; STA 131C; STA 232B; MAT 167 Multivariate analysis: multivariate distributions, multivariate linear models, data analytic methods including principal component, factor, discriminant, canonical correlation and cluster analysis. Effective: 2011 Fall Quarter.

STA 233—Design Experiments (3)
Lecture—3 hours. Prerequisite(s): STA 131C Topics from balanced and partially balanced incomplete block designs, fractional factorials, and response surfaces. Effective: 1997 Winter Quarter.

STA 235A—Probability Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): (MAT 125B, MAT 135A) or STA 131A; or Consent of Instructor. Measure-theoretic foundations, abstract integration, independence, laws of large numbers, characteristic functions, central limit theorems. Weak convergence in metric spaces, Brownian motion, invariance principle. Conditional expectation. Topics selected from: martingales, Markov chains, ergodic theory. (Mathematics 235A.) Effective: 2007 Spring Quarter.

STA 235B—Probability Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): STA 235A or MAT 235A; or Consent of Instructor. Measure-theoretic foundations, abstract integration, independence, laws of large numbers, characteristic functions, central limit theorems. Weak convergence in metric spaces, Brownian motion, invariance principle. Conditional expectation. Topics selected from: martingales, Markov chains, ergodic theory. (Mathematics 235B.) Effective: 2008 Spring Quarter.

STA 235C—Probability Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): STA 235B or MAT 235B; or Consent of Instructor. Measure-theoretic foundations, abstract integration, independence, laws of large numbers, characteristic functions, central limit theorems. Weak convergence in metric spaces, Brownian motion, invariance principle. Conditional expectation. Topics selected from: martingales, Markov chains, ergodic theory. (Mathematics 235C.) Effective: 2008 Spring Quarter.

STA 237A—Time Series Analysis (4)
Lecture—3 hours; Term Paper. Prerequisite(s): STA 131B; Or the equivalent of STA 131B. Advanced topics in time series analysis and applications. Models for experimental data, measures of dependence, large-sample theory, statistical estimation and inference. Univariate and multivariate spectral analysis, regression, ARIMA models, state-space models, Kalman filtering. Effective: 1999 Fall Quarter.

STA 237B—Time Series Analysis (4)
Lecture—3 hours; Term Paper. Prerequisite(s): STA 131B; STA 237A; Or the equivalent of STA 131B. Advanced topics in time series analysis and applications. Models for experimental data, measures of dependence, large-sample theory, statistical estimation and inference. Univariate and multivariate spectral analysis, regression, ARIMA models, state-space models, Kalman filtering. Effective: 1999 Fall Quarter.

STA 238—Theory of Multivariate Analysis (4)
Lecture—3 hours; Term Paper. Prerequisite(s): STA 131B; STA 135 Multivariate normal and Wishart distributions, Hotellings T-Squared, simultaneous inference, likelihood ratio and union intersection tests, Bayesian methods, discriminant analysis, principal component and factor analysis, multivariate clustering, multivariate regression and analysis of variance, application to data. Effective: 1999 Fall Quarter.

STA 240A—Nonparametric Inference (4)
Lecture—3 hours; Term Paper. Prerequisite(s): STA 231C; STA 235A, STA 235B, STA 235C recommended. Comprehensive treatment of nonparametric statistical inference, including the most basic materials from classical nonparametrics, robustness, nonparametric estimation of a distribution function from
incomplete data, curve estimation, and theory of resampling methodology. Effective: 2000 Winter Quarter.

STA 240B—Nonparametric Inference (4)
Lecture—3 hours; Term Paper. Prerequisite(s): STA 231C; STA 235A, STA 235B, STA 235C recommended. Comprehensive treatment of nonparametric statistical inference, including the most basic materials from classical nonparametrics, robustness, nonparametric estimation of a distribution function from
incomplete data, curve estimation, and theory of re-sampling methodology. Effective: 2000 Winter Quarter.

STA 241—Asymptotic Theory of Statistics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): STA 231C; STA 235A, STA 235B, STA 235C desirable. Topics in asymptotic theory of statistics chosen from weak convergence, contiguity, empirical processes, Edgeworth expansion, and semiparametric inference. Effective: 2000 Spring Quarter.

STA 242—Introduction to Statistical Programming (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 130A; STA 130B; or equivalent of STA 130A and STA 130B. Essentials of statistical computing using a general-purpose statistical language. Topics include algorithms; design; debugging and efficiency; object-oriented concepts; model specification and fitting; statistical visualization; data and text processing; databases; computer systems and platforms; comparison of scientific programming languages. Effective: 2009 Winter Quarter.

STA 243—Computational Statistics (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): (STA 130A, STA 130B); (MAT 067 or MAT 167); Or equivalent of STA 130A and 130B, or equivalent of MAT 167 or MAT 067. Numerical analysis; random number generation; computer experiments and resampling techniques (bootstrap, cross validation); numerical optimization; matrix decompositions and linear algebra computations; algorithms (markov chain monte carlo, expectation-maximization); algorithm design and efficiency; parallel and distributed computing. Effective: 2009 Winter Quarter.

STA 250—Topics in Applied and Computational Statistics (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 131A; STA 232A recommended, not required. Resampling, nonparametric and semiparametric methods, incomplete data analysis, diagnostics, multivariate and time series analysis, applied Bayesian methods, sequential analysis and quality control, categorical data analysis, spatial and image analysis, computational biology, functional data analysis, models for correlated data, learning theory. May be repeated for credit with consent of graduate advisor. Effective: 2006 Spring Quarter.

STA 251—Topics in Statistical Methods and Models (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 231B; Or the equivalent of STA 231B. Topics may include Bayesian analysis, nonparametric and semiparametric regression, sequential analysis, bootstrap, statistical methods in high dimensions, reliability, spatial processes, inference for stochastic process, stochastic methods in finance, empirical processes, change-point problems, asymptotics for parametric, nonparametric and semiparametric models, nonlinear time series, robustness. May be repeated for credit if topics differ; only with consent of the graduate advisor. Effective: 2002 Fall Quarter.

STA 252—Advanced Topics in Biostatistics (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): (STA 222 or BST 222); (STA 223 or BST 223) Biostatistical methods and models selected from the following: genetics, bioinformatics and genomics; longitudinal or functional data; clinical trials and experimental design; analysis of environmental data; dose-response, nutrition and toxicology; survival analysis; observational studies and epidemiology; computer-intensive or Bayesian methods in biostatistics. May be repeated for credit with consent of advisor when topic differs. (Biostatistics 252.) Effective: 2002 Fall Quarter.

STA 260—Statistical Practice and Data Analysis (3)
Lecture/Discussion—3 hours. Prerequisite(s): STA 207 or STA 232B; Working knowledge of advanced statistical software and the equivalent of STA 207 or STA 232B. Open to students enrolled in the graduate program in Statistics or Biostatistics, as the class also serves to provide professional service to clients and collaborators who work with the students. Principles and practice of interdisciplinary collaboration in statistics, statistical consulting, ethical aspects, and basics of data analysis and study design. Emphasis on practical consulting and collaboration of statisticians with clients and scientists under instructor supervision. May be repeated up to 1 time(s). Effective: 2014 Fall Quarter.

STA 280—Orientation to Statistical Research (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. Guided orientation to original statistical research papers, and oral presentations in class of such papers by students under the supervision of a faculty member. May be repeated once for credit. May be repeated up to 1 time(s). (S/U grading only.) Effective: 1999 Spring Quarter.

STA 290—Seminar in Statistics (1-6)
Variable. Prerequisite(s): Consent of Instructor. Seminar on advanced topics in probability and statistics. (S/U grading only.) Effective: 1997 Winter Quarter.

STA 292—Graduate Group in Statistics Seminar (1-2)
Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Advanced study in various fields of statistics with emphasis in applied topics, presented by members of the Graduate Group in Statistics and other guest speakers. (S/U grading only.) Effective: 1997 Fall Quarter.

STA 298—Directed Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Special topics in Statistics appropriate for study at the graduate level. May be repeated for credit. Effective: 2004 Spring Quarter.

STA 299—Individual Study (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

STA 299D—Dissertation Research (1-12)
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. Advancement to candidacy for Ph.D. Research in Statistics under the supervision of major professor. May be repeated for credit. (S/U grading only.) Effective: 2004 Spring Quarter.

STA 390—Methods of Teaching Statistics (2)
Laboratory—1 hour; Lecture/Discussion—1 hour. Prerequisite(s): Graduate standing. Practical experience in methods/problems of teaching statistics at university undergraduate level. Lecturing techniques, analysis of tests and supporting material, preparation and grading of examinations, and use of statistical software. Emphasis on practical training. May be repeated for credit. (S/U grading only.) Effective: 2004 Spring Quarter.

STA 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

STA 401—Methods in Statistical Consulting (3)
Discussion—1 hour; Lecture—3 hours. Students must be enrolled in the graduate program in Statistics or Biostatistics. Introduction to consulting, in-class consulting as a group, statistical consulting with clients, and in-class discussion of consulting problems. Clients are drawn from a pool of University clients. May be repeated for credit with consent of graduate advisor. (S/U grading only.) Effective: 2006 Spring Quarter.

Statistics (Graduate Group)

Statistics (Graduate Group) | Statistics (Graduate Group) Information

Thomas (C.M.) Lee, Ph.D., Chairperson of the Program

Ethan Anderes, Ph.D., Vice Chairperson for Graduate Affairs

Program Office. 4118 Mathematical Sciences Building; 530-554-1367; http://www.stat.ucdavis.edu

Faculty. http://www.stat.ucdavis.edu/people/faculty.htm

Statistics (Graduate Group) | Statistics (Graduate Group) M.S.

Thomas (C.M.) Lee, Ph.D., Chairperson of the Program

Ethan Anderes, Ph.D., Vice Chairperson for Graduate Affairs

Program Office. 4118 Mathematical Sciences Building; 530-554-1367; http://www.stat.ucdavis.edu

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Graduate Study. The Graduate Program in Statistics offers programs of study and research leading to the M.S. and Ph.D. degrees. The M.S. gives students a strong foundation in the theory of statistics as well as substantial familiarity with the most widely used statistical methods. Facility in computer programming is essential for some of the course work. The supervised statistical consulting required of all M.S. students has proven to be a valuable educational experience. The Ph.D. program combines advanced course work in statistics and probability with the opportunity for in-depth concurrent study in an applied field. For detailed information contact the Chairperson of the Program or the Graduate Advisor.

Preparation. Preparation for the graduate program requires a year of calculus, a course in linear algebra, facility with a programming language and upper division coursework in mathematics and/or statistics. For admission to the Ph.D. program, course work requirements for the master's degree, and at least one semester/two quarters of advanced calculus must be completed.

Graduate Advisor. Ethan Anderes (Statistics)

Statistics (Graduate Group) | Statistics (Graduate Group) Ph.D.

Thomas (C.M.) Lee, Ph.D., Chairperson of the Program

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Preparation. Preparation for the graduate program requires a year of calculus, a course in linear algebra, facility with a programming language and upper division coursework in mathematics and/or statistics. For admission to the Ph.D. program, course work requirements for the master's degree, and at least one semester/two quarters of advanced calculus must be completed.

Graduate Advisor. Ethan Anderes (Statistics)

Statistics (Graduate Group) | STA Courses

Courses in STA:

STA 010—Statistical Thinking (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): Two years of high school algebra. Statistics and probability in daily life. Examines principles of collecting, presenting and interpreting data in order to critically assess results reported in the media; emphasis is on understanding polls, unemployment rates, health studies; understanding probability, risk and odds. GE credit: QL, SE. Effective: 2000 Spring Quarter.

STA 012—Introduction to Discrete Probability (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): Two years of high school algebra. Random experiments; countable sample spaces; elementary probability axioms; counting formulas; conditional probability; independence; Bayes theorem; expectation; gambling problems; binomial, hypergeometric, Poisson, geometric, negative binomial and multinomial models; limiting distributions; Markov chains. Applications in the social, biological, and engineering sciences. GE credit: QL, SE. Effective: 1999 Fall Quarter.

STA 013—Elementary Statistics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Two years of high school algebra or Mathematics D. Descriptive statistics; basic probability concepts; binomial, normal, Student's t, and chi-square distributions. Hypothesis testing and confidence intervals for one and two means and proportions. Regression. Not open for credit for students who have completed course 13V, or higher. GE credit: QL, SE. Effective: 2016 Fall Quarter.

STA 013Y—Elementary Statistics (4)
Lecture—1.5 hours; Web Virtual Lecture—5 hours. Prerequisite(s): Two years of high school algebra or Mathematics D. Descriptive statistics; basic probability concepts; binomial, normal, Student's t, and chi-square distributions. Hypothesis testing and confidence intervals for one and two means and proportions. Regression. Not open for credit for students who have completed course 13, or higher. GE credit: QL, SE. Effective: 2016 Fall Quarter.

STA 032—Gateway to Statistical Data Science (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016B or MAT 021B or MAT 017B Probability concepts; programming in R; exploratory data analysis; sampling distribution; estimation and inference; linear regression; simulations; resampling methods. Alternative to Statistics 13 for students with a background in calculus and programming. Only two units of credit allowed to students who have taken course 13; not open for credit to students who have taken course 100. GE credit: QL, SE. Effective: 2018 Winter Quarter.

STA 090X—Seminar (1-2)
Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. High school algebra. Examination of a special topic in a small group setting. Effective: 1997 Winter Quarter.

STA 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

STA 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2000 Spring Quarter.

STA 100—Applied Statistics for Biological Sciences (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016B or MAT 017B or MAT 021B Descriptive statistics, probability, sampling distributions, estimation, hypothesis testing, contingency tables, ANOVA, regression; implementation of statistical methods using computer package. Only two units credit allowed to students who have taken course courses 13, 32 or 103; not open for credit to students who have taken course 102. GE credit: QL, SE. Effective: 2017 Spring Quarter.

STA 101—Advanced Applied Statistics for the Biological Sciences (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 100 Basic experimental designs, two-factor ANOVA without interactions, repeated measures ANOVA, ANCOVA, random effects vs. fixed effects, multiple regression, basic model building, resampling methods, multiple comparisons, multivariate methods, generalized linear models, Monte Carlo simulations. GE credit: QL, SE. Effective: 2014 Fall Quarter.

STA 103—Applied Statistics for Business and Economics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (STA 013 or STA 013Y or STA 032 or STA 100); (MAT 016B or MAT 017B or MAT 021B) Descriptive statistics; probability; random variables; expectation; binomial, normal, Poisson, other univariate distributions; joint distributions; sampling distributions, central limit theorem; properties of estimators; linear combinations of random variables; testing and estimation; Minitab computing package. Two units credit given to students who have completed course 100. GE credit: QL, SE. Effective: 2018 Winter Quarter.

STA 104—Applied Statistical Methods: Nonparametric Statistics (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 013 or STA 013Y or STA 032 or STA 100 Sign and Wilcoxon tests, Walsh averages. Two-sample procedures. Inferences concerning scale. Kruskal-Wallis test. Measures of association. Chi square and Kolmogorov-Smirnov tests. GE credit: QL, SE. Effective: 2018 Winter Quarter.

STA 106—Applied Statistical Methods: Analysis of Variance (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 013 or STA 013Y or STA 032 or STA 100 Basics of experimental design. One-way and two-way fixed effects analysis of variance models. Randomized complete and incomplete block design. Multiple comparisons procedures. One-way random effects model. GE credit: SE. Effective: 2018 Winter Quarter.

STA 108—Applied Statistical Methods: Regression Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 013 or STA 013Y or STA 032 or STA 100 Simple linear regression, variable selection techniques, stepwise regression, analysis of covariance, influence measures, computing packages. GE credit: QL, SE, SL. Effective: 2018 Winter Quarter.

STA 130A—Mathematical Statistics: Brief Course (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016C or MAT 017C or MAT 021C Basic probability, densities and distributions, mean, variance, covariance, Chebyshev's inequality, some special distributions, sampling distributions, central limit theorem and law of large numbers, point estimation, some methods of estimation, interval estimation, confidence intervals for certain quantities, computing sample sizes. Only 2 units of credit allowed to students who have taken course 131A. GE credit: QL, SE. Effective: 2018 Winter Quarter.

STA 130B—Mathematical Statistics: Brief Course (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 130A or STA 131A or MAT 135A Transformed random variables, large sample properties of estimates. Basic ideas of hypotheses testing, likelihood ratio tests, goodness-of-
fit tests. General linear model, least squares estimates, Gauss-Markov theorem. Analysis of variance, F-test. Regression and correlation, multiple regression. Selected topics. GE credit: QL, SE. Effective: 2016 Fall Quarter.

STA 131A—Introduction to Probability Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021B; MAT 021C; MAT 022A or MAT 067 Fundamental concepts of probability theory, discrete and continuous random variables, standard distributions, moments and moment-generating functions, laws of large numbers and the central limit theorem. Not open for credit to students who have completed Mathematics 135A. GE credit: QL, SE. Effective: 2018 Winter Quarter.

STA 131B—Introduction to Mathematical Statistics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 131A or MAT 135A; or Consent of Instructor. Sampling, methods of estimation, bias-variance decomposition, sampling distributions, Fisher information, confidence intervals, and some elements of hypothesis testing. GE credit: SE. Effective: 2017 Winter Quarter.

STA 131C—Introduction to Mathematical Statistics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 131B; or Consent of Instructor. Testing theory, tools and applications from probability theory, Linear model theory, ANOVA, goodness-of-fit. GE credit: SE. Effective: 2016 Fall Quarter.

STA 135—Multivariate Data Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (STA 130B or STA 131B); (MAT 022A or MAT 067) Multivariate normal distribution; Mahalanobis distance; sampling distributions of the mean vector and covariance matrix; Hotellings T2; simultaneous inference; one-way MANOVA; discriminant analysis; principal components; canonical correlation; factor analysis. Intensive use of computer analyses and real data sets. GE credit: QL, SE. Effective: 2016 Fall Quarter.

STA 137—Applied Time Series Analysis (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 108 Time series relationships; univariate time series models: trend, seasonality, correlated errors; regression with correlated errors; autoregressive models; autoregressive moving average models; spectral analysis: cyclical behavior and periodicity, measures of periodicity, periodogram; linear filtering; prediction of time series; transfer function models. GE credit: QL, SE. Effective: 2016 Fall Quarter.

STA 138—Analysis of Categorical Data (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (STA 130B or STA 131B) or (STA 106, STA 108) Varieties of categorical data, cross-classifications, contingency tables, tests for independence. Multidimensional tables and log-linear models, maximum likelihood estimation; tests of goodness-of-fit. Logit
models, linear logistic models. Analysis of incomplete tables. Packaged computer programs, analysis of real data. GE credit: QL, SE. Effective: 1997 Winter Quarter.

STA 141A—Fundamentals of Statistical Data Science (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (STA 108 or STA 106); (STA 032 or STA 100 or STA 013 or STA 013Y) Introduction to computing for data analysis and visualization, and simulation, using a high-level language (e.g., R). Computational reasoning, computationally intensive statistical methods, reading tabular and non-standard data. Not open for credit to students who have taken course 141 or course 242. Effective: 2018 Spring Quarter.

STA 141B—Data & Web Technologies for Data Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 141A Essentials of using relational databases and SQL. Processing data in blocks. Scraping Web pages and using Web services/APIs. Basics of text mining. Interactive data visualization with Web technologies. Computational data workflow and best practices. Statistical methods. Effective: 2018 Winter Quarter.

STA 141C—Big Data & High Performance Statistical Computing (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 141B or (STA 141A, ECS 010) High-performance computing in high-level data analysis languages; different computational approaches and paradigms for efficient analysis of big data; interfaces to compiled languages; R and Python programming languages; high-level parallel computing; MapReduce; parallel algorithms and reasoning. Effective: 2018 Winter Quarter.

STA 144—Sampling Theory of Surveys (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): (STA 130B or STA 131B) or (STA 106, STA 108) Simple random, stratified random, cluster, and systematic sampling plans; mean, proportion, total, ratio, and regression estimators for these plans; sample survey design, absolute and relative error, sample size selection, strata construction; sampling and nonsampling sources of error. GE credit: QL, SE. Effective: 2016 Fall Quarter.

STA 145—Bayesian Statistical Inference (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 130B or STA 131B Subjective probability, Bayes Theorem, conjugate priors, non-informative priors, estimation, testing, prediction, empirical Bayes methods, properties of Bayesian procedures, comparisons with classical procedures, approximation techniques, Gibbs sampling, hierarchical Bayesian analysis, applications, computer implemented data analysis. GE credit: QL, SE. Effective: 2016 Fall Quarter.

STA 160—Practice in Statistical Data Science (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 106; STA 108; (STA 130B or STA 131B); (STA 141 or STA 141A) Principles and practice of interdisciplinary, collaborative data analysis; complete case study review and team data analysis project. Effective: 2016 Spring Quarter.

STA 190X—Seminar (1-2)
Seminar—1-2 hours. Prerequisite(s): STA 013 or STA 013Y or STA 032 or STA 100 or STA 103 In-depth examination of a special topic in a small group setting. Effective: 2018 Spring Quarter.

STA 192—Internship in Statistics (1-12)
Internship—3-36 hours; Term Paper. Prerequisite(s): Consent of Instructor. Upper division standing. Work experience in statistics. (P/NP grading only.) Effective: 1997 Winter Quarter.

STA 194HA—Special Studies for Honors Students (4)
Independent Study—12 hours. Prerequisite(s): Senior qualifying for honors. Directed reading, research and writing, culminating in the completion of a senior honors thesis or project under direction of a faculty advisor. GE credit: SE. Effective: 1997 Winter Quarter.

STA 194HB—Special Studies for Honors Students (4)
Independent Study—12 hours. Prerequisite(s): Senior qualifying for honors. Directed reading, research and writing, culminating in the completion of a senior honors thesis or project under direction of a faculty advisor. GE credit: SE. Effective: 1997 Winter Quarter.

STA 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

STA 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

STA 200A—Introduction to Probability Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021A; MAT 021B; MAT 021C; MAT 022A; Consent of Instructor. Fundamental concepts of probability theory, discrete and continuous random variables, standard distributions, moments and moment-generating functions, laws of large numbers and the central limit theorem. Effective: 2018 Winter Quarter.

STA 200B—Introduction to Mathematical Statistics I (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 200A; or Consent of Instructor. Sampling, methods of estimation, bias-variance decomposition, sampling distributions, Fisher information, confidence intervals, and some elements of hypothesis testing. Effective: 2018 Winter Quarter.

STA 200C—Introduction to Mathematical Statistics II (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 200B; or Consent of Instructor. Testing theory, tools and applications from probability theory, Linear model theory, ANOVA, goodness-of-fit. No credit to students who have taken course 131C. Effective: 2018 Spring Quarter.

STA 201—SAS Programming for Statistical Analysis (3)
Discussion/Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): Introductory, upper division statistics course; some knowledge of vectors and matrices; STA 106 or STA 108 or the equivalent suggested. Introductory SAS language, data management, statistical applications, methods. Includes basics, graphics, summary statistics, data sets, variables and functions, linear models, repetitive code, simple macros, GLIM and GAM, formatting output, correspondence analysis, bootstrap. Prepare SAS base programmer certification exam. Effective: 2013 Fall Quarter.

STA 205—Statistical Methods for Research with SAS (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): An introductory upper division statistics course and some knowledge of vectors and matrices; STA 100, or STA 102, or STA 103 suggested or the equivalent. Focus on linear statistical models widely used in scientific research. Emphasis on concepts, methods and data analysis using SAS. Topics include simple and multiple linear regression, polynomial regression, diagnostics, model selection, variable transformation, factorial designs and ANCOVA. Effective: 2008 Fall Quarter.

STA 206—Statistical Methods for Research - I (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): Introductory statistics course; some knowledge of vectors and matrices. Focus on linear statistical models. Emphasis on concepts, method and data analysis; formal mathematics kept to minimum. Topics include simple and multiple linear regression, polynomial regression, diagnostics, model selection, factorial designs and analysis of covariance. Use of professional level software. Effective: 2013 Fall Quarter.

STA 207—Statistical Methods for Research II (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 206; Knowledge of vectors and matrices. Linear and nonlinear statistical models emphasis on concepts, methods/data analysis using professional level software; formal mathematics kept to minimum. Topics include linear mixed models, repeated measures, generalized linear models, model selection, analysis of missing data, and multiple testing procedures. Effective: 2013 Fall Quarter.

STA 208—Statistical Methods in Machine Learning (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 206; STA 207; STA 135; Or their equivalents. Focus on linear and nonlinear statistical models. Emphasis on concepts, methods, and data analysis; formal mathematics kept to minimum. Topics include resampling methods, regularization techniques in regression and modern classification, cluster analysis and dimension reduction techniques. Use professional level software. Effective: 2013 Fall Quarter.

STA 209—Optimization for Big Data Analytics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 200A; STA 208 Optimization algorithms for solving problems in statistics, machine learning, data analytics. Review computational tools for implementing optimization algorithms (gradient descent, stochastic gradient descent, coordinate descent, Newton’s method.) Effective: 2018 Spring Quarter.

STA 222—Biostatistics: Survival Analysis (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 131C Incomplete data; life tables; nonparametric methods; parametric methods; accelerated failure time models; proportional hazards models; partial likelihood; advanced topics. (Biostatistics 222.) Effective: 2002 Fall Quarter.

STA 223—Biostatistics: Generalized Linear Models (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 131C Likelihood and linear regression; generalized linear model; Binomial regression; case-control studies; dose-response and bioassay; Poisson regression; Gamma regression; quasi-likelihood models; estimating equations; multivariate GLMs. (Biostatistics 223.) Effective: 2002 Fall Quarter.

STA 224—Analysis of Longitudinal Data (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): ((STA 222, STA 223) or (BST 222, BST 223)); STA 232B; or Consent of Instructor. Standard and advanced methodology, theory, algorithms, and applications relevant for analysis of repeated measurements and longitudinal data in biostatistical and statistical settings. (Biostatistics 224.) Effective: 2005 Spring Quarter.

STA 225—Clinical Trials (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 223 or BST 223; or Consent of Instructor. Basic statistical principles of clinical designs, including bias, randomization, blocking, and masking. Practical applications of widely-used designs, including dose-finding, comparative and cluster randomization designs. Advanced statistical procedures for analysis of data collected in clinical trials. (Biostatistics 225.) Effective: 2005 Spring Quarter.

STA 226—Statistical Methods for Bioinformatics (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 131C; or Consent of Instructor. Data analysis experience recommended. Standard and advanced statistical methodology, theory, algorithms, and applications relevant to the analysis of -omics data. (Biostatistics 226.) Effective: 2007 Fall Quarter.

STA 231A—Mathematical Statistics I (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 131A; STA 131B; STA 131C; MAT 025; MAT 125A; Or equivalent of MAT 025 and MAT 125A. First part of three-quarter sequence on mathematical statistics. Emphasizes foundations. Topics include basic concepts in asymptotic theory, decision theory, and an overview of methods of point estimation. Effective: 2008 Summer Session 1.

STA 231B—Mathematical Statistics II (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 231A Second part of a three-quarter sequence on mathematical statistics. Emphasizes: hyposthesis testing (including multiple testing) as well as theory for linear models. Effective: 2008 Summer Session 1.

STA 231C—Mathematical Statistics III (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 231A; STA 231B Third part of three-quarter sequence on mathematical statistics. Emphasizes large sample theory and their applications. Topics include statistical functionals, smoothing methods and optimization techniques relevant for statistics. Effective: 2008 Summer Session 1.

STA 232A—Applied Statistics I (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 106; STA 108; STA 131A; STA 131B; STA 131C; MAT 167 Estimation and testing for the general linear model, regression, analysis of designed experiments, and missing data techniques. Effective: 2011 Fall Quarter.

STA 232B—Applied Statistics II (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 106; STA 108; STA 131A; STA 131B; STA 131C; STA 232A; MAT 167 Alternative approaches to regression, model selection, nonparametric methods amenable to linear model framework and their applications. Effective: 2011 Fall Quarter.

STA 232C—Applied Statistics III (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 106; STA 108; STA 131C; STA 232B; MAT 167 Multivariate analysis: multivariate distributions, multivariate linear models, data analytic methods including principal component, factor, discriminant, canonical correlation and cluster analysis. Effective: 2011 Fall Quarter.

STA 233—Design Experiments (3)
Lecture—3 hours. Prerequisite(s): STA 131C Topics from balanced and partially balanced incomplete block designs, fractional factorials, and response surfaces. Effective: 1997 Winter Quarter.

STA 235A—Probability Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): (MAT 125B, MAT 135A) or STA 131A; or Consent of Instructor. Measure-theoretic foundations, abstract integration, independence, laws of large numbers, characteristic functions, central limit theorems. Weak convergence in metric spaces, Brownian motion, invariance principle. Conditional expectation. Topics selected from: martingales, Markov chains, ergodic theory. (Mathematics 235A.) Effective: 2007 Spring Quarter.

STA 235B—Probability Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): STA 235A or MAT 235A; or Consent of Instructor. Measure-theoretic foundations, abstract integration, independence, laws of large numbers, characteristic functions, central limit theorems. Weak convergence in metric spaces, Brownian motion, invariance principle. Conditional expectation. Topics selected from: martingales, Markov chains, ergodic theory. (Mathematics 235B.) Effective: 2008 Spring Quarter.

STA 235C—Probability Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): STA 235B or MAT 235B; or Consent of Instructor. Measure-theoretic foundations, abstract integration, independence, laws of large numbers, characteristic functions, central limit theorems. Weak convergence in metric spaces, Brownian motion, invariance principle. Conditional expectation. Topics selected from: martingales, Markov chains, ergodic theory. (Mathematics 235C.) Effective: 2008 Spring Quarter.

STA 237A—Time Series Analysis (4)
Lecture—3 hours; Term Paper. Prerequisite(s): STA 131B; Or the equivalent of STA 131B. Advanced topics in time series analysis and applications. Models for experimental data, measures of dependence, large-sample theory, statistical estimation and inference. Univariate and multivariate spectral analysis, regression, ARIMA models, state-space models, Kalman filtering. Effective: 1999 Fall Quarter.

STA 237B—Time Series Analysis (4)
Lecture—3 hours; Term Paper. Prerequisite(s): STA 131B; STA 237A; Or the equivalent of STA 131B. Advanced topics in time series analysis and applications. Models for experimental data, measures of dependence, large-sample theory, statistical estimation and inference. Univariate and multivariate spectral analysis, regression, ARIMA models, state-space models, Kalman filtering. Effective: 1999 Fall Quarter.

STA 238—Theory of Multivariate Analysis (4)
Lecture—3 hours; Term Paper. Prerequisite(s): STA 131B; STA 135 Multivariate normal and Wishart distributions, Hotellings T-Squared, simultaneous inference, likelihood ratio and union intersection tests, Bayesian methods, discriminant analysis, principal component and factor analysis, multivariate clustering, multivariate regression and analysis of variance, application to data. Effective: 1999 Fall Quarter.

STA 240A—Nonparametric Inference (4)
Lecture—3 hours; Term Paper. Prerequisite(s): STA 231C; STA 235A, STA 235B, STA 235C recommended. Comprehensive treatment of nonparametric statistical inference, including the most basic materials from classical nonparametrics, robustness, nonparametric estimation of a distribution function from
incomplete data, curve estimation, and theory of resampling methodology. Effective: 2000 Winter Quarter.

STA 240B—Nonparametric Inference (4)
Lecture—3 hours; Term Paper. Prerequisite(s): STA 231C; STA 235A, STA 235B, STA 235C recommended. Comprehensive treatment of nonparametric statistical inference, including the most basic materials from classical nonparametrics, robustness, nonparametric estimation of a distribution function from
incomplete data, curve estimation, and theory of re-sampling methodology. Effective: 2000 Winter Quarter.

STA 241—Asymptotic Theory of Statistics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): STA 231C; STA 235A, STA 235B, STA 235C desirable. Topics in asymptotic theory of statistics chosen from weak convergence, contiguity, empirical processes, Edgeworth expansion, and semiparametric inference. Effective: 2000 Spring Quarter.

STA 242—Introduction to Statistical Programming (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 130A; STA 130B; or equivalent of STA 130A and STA 130B. Essentials of statistical computing using a general-purpose statistical language. Topics include algorithms; design; debugging and efficiency; object-oriented concepts; model specification and fitting; statistical visualization; data and text processing; databases; computer systems and platforms; comparison of scientific programming languages. Effective: 2009 Winter Quarter.

STA 243—Computational Statistics (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): (STA 130A, STA 130B); (MAT 067 or MAT 167); Or equivalent of STA 130A and 130B, or equivalent of MAT 167 or MAT 067. Numerical analysis; random number generation; computer experiments and resampling techniques (bootstrap, cross validation); numerical optimization; matrix decompositions and linear algebra computations; algorithms (markov chain monte carlo, expectation-maximization); algorithm design and efficiency; parallel and distributed computing. Effective: 2009 Winter Quarter.

STA 250—Topics in Applied and Computational Statistics (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 131A; STA 232A recommended, not required. Resampling, nonparametric and semiparametric methods, incomplete data analysis, diagnostics, multivariate and time series analysis, applied Bayesian methods, sequential analysis and quality control, categorical data analysis, spatial and image analysis, computational biology, functional data analysis, models for correlated data, learning theory. May be repeated for credit with consent of graduate advisor. Effective: 2006 Spring Quarter.

STA 251—Topics in Statistical Methods and Models (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 231B; Or the equivalent of STA 231B. Topics may include Bayesian analysis, nonparametric and semiparametric regression, sequential analysis, bootstrap, statistical methods in high dimensions, reliability, spatial processes, inference for stochastic process, stochastic methods in finance, empirical processes, change-point problems, asymptotics for parametric, nonparametric and semiparametric models, nonlinear time series, robustness. May be repeated for credit if topics differ; only with consent of the graduate advisor. Effective: 2002 Fall Quarter.

STA 252—Advanced Topics in Biostatistics (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): (STA 222 or BST 222); (STA 223 or BST 223) Biostatistical methods and models selected from the following: genetics, bioinformatics and genomics; longitudinal or functional data; clinical trials and experimental design; analysis of environmental data; dose-response, nutrition and toxicology; survival analysis; observational studies and epidemiology; computer-intensive or Bayesian methods in biostatistics. May be repeated for credit with consent of advisor when topic differs. (Biostatistics 252.) Effective: 2002 Fall Quarter.

STA 260—Statistical Practice and Data Analysis (3)
Lecture/Discussion—3 hours. Prerequisite(s): STA 207 or STA 232B; Working knowledge of advanced statistical software and the equivalent of STA 207 or STA 232B. Open to students enrolled in the graduate program in Statistics or Biostatistics, as the class also serves to provide professional service to clients and collaborators who work with the students. Principles and practice of interdisciplinary collaboration in statistics, statistical consulting, ethical aspects, and basics of data analysis and study design. Emphasis on practical consulting and collaboration of statisticians with clients and scientists under instructor supervision. May be repeated up to 1 time(s). Effective: 2014 Fall Quarter.

STA 280—Orientation to Statistical Research (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. Guided orientation to original statistical research papers, and oral presentations in class of such papers by students under the supervision of a faculty member. May be repeated once for credit. May be repeated up to 1 time(s). (S/U grading only.) Effective: 1999 Spring Quarter.

STA 290—Seminar in Statistics (1-6)
Variable. Prerequisite(s): Consent of Instructor. Seminar on advanced topics in probability and statistics. (S/U grading only.) Effective: 1997 Winter Quarter.

STA 292—Graduate Group in Statistics Seminar (1-2)
Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Advanced study in various fields of statistics with emphasis in applied topics, presented by members of the Graduate Group in Statistics and other guest speakers. (S/U grading only.) Effective: 1997 Fall Quarter.

STA 298—Directed Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Special topics in Statistics appropriate for study at the graduate level. May be repeated for credit. Effective: 2004 Spring Quarter.

STA 299—Individual Study (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

STA 299D—Dissertation Research (1-12)
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. Advancement to candidacy for Ph.D. Research in Statistics under the supervision of major professor. May be repeated for credit. (S/U grading only.) Effective: 2004 Spring Quarter.

STA 390—Methods of Teaching Statistics (2)
Laboratory—1 hour; Lecture/Discussion—1 hour. Prerequisite(s): Graduate standing. Practical experience in methods/problems of teaching statistics at university undergraduate level. Lecturing techniques, analysis of tests and supporting material, preparation and grading of examinations, and use of statistical software. Emphasis on practical training. May be repeated for credit. (S/U grading only.) Effective: 2004 Spring Quarter.

STA 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

STA 401—Methods in Statistical Consulting (3)
Discussion—1 hour; Lecture—3 hours. Students must be enrolled in the graduate program in Statistics or Biostatistics. Introduction to consulting, in-class consulting as a group, statistical consulting with clients, and in-class discussion of consulting problems. Clients are drawn from a pool of University clients. May be repeated for credit with consent of graduate advisor. (S/U grading only.) Effective: 2006 Spring Quarter.

Study of Religion (Graduate Group)

Study of Religion (Graduate Group) | SOR Information

Seth Sanders, Ph.D., Chairperson of the Group

Program Office. 210 Sproul Hall; 530-752-2239; Fax 530-752-8630; http://religiongradgroup.ucdavis.edu/

Faculty. http://religiongradgroup.ucdavis.edu/people/faculty

Study of Religion (Graduate Group) | SOR M.A.

Seth Sanders, Ph.D., Chairperson of the Group

Program Office. 210 Sproul Hall; 530-752-2239; Fax 530-752-8630; http://religiongradgroup.ucdavis.edu/

Faculty. http://religiongradgroup.ucdavis.edu/people/faculty

Graduate Study. The Graduate Group in the Study of Religion offers students classical training in the literatures of particular religious traditions, and they are encouraged to understand these traditions at the intersection of contemporary thematic and regional phenomena.

Students have the opportunity to concentrate primarily on one of three regional specializations: American religious cultures, Mediterranean religions, and Asian religions. An additional regional specialization typically serves as a secondary area of competence. Students further shape their scholarship through intensive engagement in one of the following thematic specializations: Values, Ethics, and Human Rights; Modernity, Science, and Secularism; Visual Culture, Media, and Technology; Language, Rhetoric, and Performance; Body and Praxis; Theory and Method.

This curriculum guides students through a rigorous course of study, providing the breadth and depth necessary to produce exciting, rigorous scholarship at forefront of the field of Religious Studies. Graduate Group training prepares students for careers in academia as well as in the government and the private sector.

Preparation. Admission to the Graduate Group requires a Bachelor's or Master's degree in a discipline relevant to the study of religion, as well as preparation in at least one language relevant to the intended area of primary research. The group requires three letters of recommendation and a sample of recent written work. The general GRE is also required.

Graduate Advisor. Contact the Group office.

While an M.A. degree may be obtained while pursuing a Ph.D. degree, only Ph.D. applications will be accepted.

Study of Religion (Graduate Group) | SOR Ph.D.

Seth Sanders, Ph.D., Chairperson of the Group

Program Office. 210 Sproul Hall; 530-752-2239; Fax 530-752-8630; http://religiongradgroup.ucdavis.edu/

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Graduate Advisor. Contact the Group office.

Study of Religion (Graduate Group) | REL Courses

Courses in REL:

REL 200A—Historical Roots of the Study of Religion (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Consideration of the historical and philosophical formation of religion as a concept. Treats the emergence of religion as a category of analysis and understanding from the Reformation through the Enlightenment. Effective: 2013 Fall Quarter.

REL 200B—Foundational Theories of Religion (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Survey of classical 19th and 20th century approaches to the study of religion. Effective: 2013 Fall Quarter.

REL 200C—Contemporary Approaches to the Study of Religion (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Consideration of major themes, issues and methods in the contemporary study of religion. Perspectives from diverse cultural settings employed to consider modern historical, philosophical, and social contexts that inform understandings of religion. Effective: 2013 Fall Quarter.

REL 200D—Field Profile Seminar I and II (1-2)
Project (Term Project). Individually guided research to survey the field of study, under the supervision of a faculty member. Four units total over two or more quarters are required by the end of the second year. May be repeated for credit. Effective: 2013 Fall Quarter.

REL 210A—Special Topics in American Religious Cultures (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Comparative, interpretive study of the treatment of specific topics in American religious cultures. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

REL 210B—Special Topics in Asian Religious Cultures (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Comparative, interpretive study of the treatment of specific topics in Asian religious cultures. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

REL 210C—Special Topics in Mediterranean Religious Cultures (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Comparative, interpretive study of the treatment of specific topics in Mediterranean religious cultures. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

REL 230A—Thematic Topics - Body and Praxis (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Comparative, interpretive study of the treatment of religion through specific topics and themes relating to the body and praxis. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

REL 230B—Thematic Topics - Language, Rhetoric, and Performance (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Comparative, interpretive study of the treatment of religion through specific topics and themes relating to language, rhetoric, and performance. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

REL 230C—Thematic Topics - Modernity, Science, and Secularism (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Comparative, interpretive study of the treatment of religion through specific topics and themes relating to modernity, science, and secularism. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

REL 230D—Thematic Topics - Theory and Method (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Comparative, interpretive study of the treatment of religion through specific topics and themes relating to theory and method. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

REL 230E—Thematic Topics - Values, Ethics, and Human Rights (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Comparative, interpretive study of the treatment of religion through specific topics and themes relating to values, ethics, and human rights. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

REL 230F—Thematic Topics - Visual Culture, Media, and Technology (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Comparative, interpretive study of the treatment of religion through specific topics and themes relating to visual culture, media, and technology. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

REL 231B—Theories of Language (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Restricted to graduate students. Focuses on historical theories of language that precede and accompany post-structuralist theory. Intended to introduce graduate students to the context of modern theory formation. May cover structuralism, integrationalism, and grammaticalization. Effective: 2015 Spring Quarter.

REL 231E—History, Theory and Criticism of Human Rights (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Restricted to graduate students. Introduces the advanced study of Human Rights and the theoretical and practical elaboration of the international Human Rights system. Seminar will engage with criticism of Human Rights and develop research and teaching within disciplinary and interdisciplinary frameworks. (Human Rights 200A.) Effective: 2013 Fall Quarter.

REL 298—Group Study (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Group Study May be repeated for credit. (S/U grading only.) Effective: 2013 Fall Quarter.

REL 299—Research (1-12)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Research May be repeated for credit. (S/U grading only.) Effective: 2012 Fall Quarter.

REL 299D—Dissertation Writing (1-12)
Variable. Prerequisite(s): Consent of Instructor. Advanced to candidacy for the Ph.D. program. Dissertation Writing May be repeated for credit. (S/U grading only.) Effective: 2013 Fall Quarter.

Sustainability in the Built Environment Minor; Civil & Environmental Engineering

Sustainability in the Built Environment Minor; Civil & Environmental Engineering | Sustainability in the Built Environment Minor

(College of Engineering)

Amit M. Kanvinde, Ph.D., Chairperson of the Department; 530-754-9471

Department Office. 2001 Ghausi Hall; 530-752-0586; http://cee.engr.ucdavis.edu

Faculty. http://cee.engr.ucdavis.edu/people/faculty-directory/

The built environmental plays an integral role in meeting society's most basic needs of shelter, security, mobility, community, and water and waste treatment, but it also contributes significantly to the sustainability challenges of climate change, pollution, resource consumption, and land use. As society and government policy increase pressure to reduce the environmental impacts of our everyday activities, individuals must increasingly understand how the built environment they design and maintain fits into the complex environmental and human system in which we live.

This minor provides a guiding framework for educating individuals who will design and maintain our future built environment in the challenges and potential solutions for improved sustainability.

The minor is designed to attract students from a range of departments and programs across campus, including, but not limited to, Environmental Science and Policy, Urban Planning, Plant Sciences, Landscape Architecture, Design, Engineering, Community and Regional Development, Anthropology, Agriculture and Resource Economics, Atmospheric Science, Environmental Remote Sensing, Environmental Toxicology, Applied Biological Systems Technology, Geology, Hydrology, and Nature and Culture. Students enrolled in the minor will acquire fundamental skills and knowledge of the elements and integrated processes necessary for a sustainable built environment.

Successful completion of the minor requires both a minimum overall UC GPA of 2.000 and a minimum 2.000 GPA for the coursework completed for the minor, with no grade lower than a C- for any course used for the minor. All courses must be taken for a letter grade.

The online Minor Declaration form is available via the Online Advising Student Information System (OASIS) at https://students.ucdavis.edu/.

Transcript notation must be requested no later than the quarter preceding graduation, and will appear as a minor in Sustainability in the Built Environment.

Minor advisors. H.N. Bischel, C.E. Bronner, A.L. Forrest, F.J. Loge, A. Kendall, S.A. Miller

Sustainability in the Built Environment **Units:** 20

ECI 123	Urban Systems and Sustainability	4
ECI 143	Green Engineering Design and Sustainability	4

Choose 12 units (If ECI 143 was not completed, choose 16 units):

ECI 125	Building Energy Performance	4
ECI 148A	Water Quality Management	4
ECI 149	Air Pollution	4
ECI 155	Water Resources Engineering Planning	4
ECI 165	Transportation Policy	3
ENG 188	Science and Technology of Sustainable Power Generation	4
ANT 101	Ecology, Nature, and Society	4
	Same as ESP 101.	
ANT 104N	Cultural Politics of the Environment	4
ARE 175	Natural Resource Economics	4
ARE 176	Environmental Economics	4
ATM 116	Modern Climate Change	3
CRD 142	Rural Change in the Industrialized World	4
CRD 154	Social Theory and Community Change	4
CRD 172	Social Inequality: Issues and Innovations	4
ESP 161	Environmental Law	4
ESP 162	Environmental Policy	4
ESP 171	Urban and Regional Planning	4
ETX 101	Principles of Environmental Toxicology	4
ETX 102A	Environmental Fate of Toxicants	4
GEL 130	Non-Renewable Natural Resources	3
GEL 134	Environmental Geology and Land Use Planning	3
LDA 003	Sustainable Development: Theory and Practice	4
LDA 180	Advanced Design and Planning Studio	6
	Due to variability in series course offering, consent of minor advisor is required.	
PLS 101	Agriculture and the Environment	3
PLS 141	Ethnobotany	4
PLS 150	Sustainability and Agroecosystem Management	4
PLS 162	Urban Ecology	3

Total: 20

Sustainability in the Built Environment Minor; Civil & Environmental Engineering | ECI Courses

Courses in ECI:

ECI 003—Civil Infrastructure and Society (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): MAT 021A (can be concurrent) Pass One restricted to lower division students; Civil Engineering majors. Introduction to civil infrastructure and its relationship with society and the natural environment. Exposure to innovative research on civil engineering and environmental systems. Participation in laboratory experiments illustrative of the solution of representative but simplified engineering problems. Not open for credit to upper division students. GE credit: OL, SE, SS. Effective: 2016 Winter Quarter.

ECI 016—Spatial Data Analysis (2)
Laboratory—3 hours; Lecture—1 hour. Restricted to Civil Engineering and Biological Systems Engineering majors; non-majors accommodated on a space-available basis. Computer-aided design and geographic information systems in civil engineering practice. GE credit: QL, SE. Effective: 2010 Spring Quarter.

ECI 019—C Programming for Civil and Environmental Engineers (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): MAT 021A (can be concurrent) Pass One open to Civil Engineering majors and Optical Science and Engineering majors. Computational problem solving techniques for Civil and Environmental Engineering applications using structured C programming. Algorithm design applied to realistic problems. GE credit: SE. Effective: 2011 Winter Quarter.

ECI 040—Introduction to Environmental Engineering (4)
Lecture—4 hours. Prerequisite(s): CHE 002B Pass One open to students in the College of Engineering. Introduction to topics in environmental engineering; discussion on influence of literary work, art, and media on the evolution of environmental engineering practice, relevant laws, and regulations; presentations of historical case studies. GE credit: AH. Effective: 2017 Winter Quarter.

ECI 090X—Lower Division Seminar (1-4)
Seminar—1-4 hours. Prerequisite(s): Consent of Instructor. Examination of a special topic in a small group setting. May be repeated for credit. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 092—Internship for Engineering (1-5)
Internship. Prerequisite(s): Lower division standing; approval of project prior to period of internship. Supervised work experience in civil engineering. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 100—Introduction to Fluid Mechanics for Civil and Environmental Engineers (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 035 C- or better; MAT 022B C- or better; PHY 009B C- or better Pass One restricted to Civil Engineering, Environmental Engineering and Hydrology majors. Fluid flow in civil & environmental engineering, basis for design, buoyancy, hydrostatics, gravity dams, hydraulic modeling: similarity & scaling, conservation laws, flow in bends, nozzles, pipes, pumps, turbines, complimentary lab experiments. Not open for credit to students who have taken ENG 103. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 114—Probabilistic Systems Analysis for Civil Engineers (4)
Lecture—4 hours. Prerequisite(s): MAT 021C C- or better Probabilistic concepts and models in engineering. Statistical analysis of engineering experimental and field data. Introduction to stochastic processes and models of engineering systems. Not open for credit to students who have completed STA 120. GE credit: QL, SE. Effective: 2013 Fall Quarter.

ECI 115—Computer Methods in Civil & Environmental Engineering (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (ENG 006 or ECS 030); MAT 022B Open to Civil Engineering majors only. Presentation, implementation and application of numerical algorithms and computer models for the solution of practical problems in Civil and Environmental Engineering. GE credit: SE. Effective: 2013 Fall Quarter.

ECI 119—Parallel Processing for Engineering Applications. (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): C programming or consent of instructor. Fundamental skills in parallel computing for engineering applications; emphasis on structured parallel programming for distributed memory parallel clusters. No credit allowed for students who have taken ECI 119B. GE credit: SE. Effective: 2005 Spring Quarter.

ECI 123—Urban Systems and Sustainability (4)
Lecture—4 hours. Prerequisite(s): Upper division standing. Systems-level approach of how to evaluate and then modify sustainability of urban systems based on interaction with natural environments. Topics include: definition/metrics of urban sustainability; system analyses of urban systems; enabling technology, policies, legislation; measures and modification of ecological footprints. GE credit: ACGH, DD, SE, SL, SS, WE. Effective: 2006 Fall Quarter.

ECI 125—Building Energy Performance (4)
Lecture—4 hours. Prerequisite(s): Upper division standing in Engineering. Open to students in the College of Engineering. Mechanisms of energy consumption in buildings including end uses, thermal loads, ventilation, air infiltration, thermal energy distribution, and HVAC systems; energy performance simulation; methods and strategies of energy efficiency. GE credit: SE. Effective: 2011 Winter Quarter.

ECI 130—Structural Analysis (4)
Lecture—4 hours. Prerequisite(s): ENG 104 C- or better; MAT 022A Open to Civil Engineering majors. Elastic structural analysis of determinate and indeterminate trusses, beams and frames. Plastic bending and limit analysis. GE credit: QL, SE. Effective: 2014 Winter Quarter.

ECI 131—Matrix Structural Analysis (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 104 C- or better; ENG 006 Open to Engineering majors only. Matrix formulation and computer analysis of statically indeterminate structures. Stiffness and flexibility formulations for elastic structures. Finite element methods for elasticity and bending problems. GE credit: SE. Effective: 2013 Fall Quarter.

ECI 132—Structural Design: Metallic Elements (4)
Lecture—4 hours. Prerequisite(s): ECI 130 Design of metallic beams, columns, and other members for various types of loading and boundary conditions; design of connections between members; member performance within structural systems. GE credit: SE, VL. Effective: 2013 Fall Quarter.

ECI 135—Structural Design: Concrete Elements (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECI 130 Restricted to Civil Engineering, Civil Engineering/Materials Science and Engineering, and Materials Science and Engineering majors only. Strength design procedures for columns, rectangular beams, T-beams and beams of general cross-section. Building code requirements for bending, shear, axial load, combined stresses and bond. Introduction to prestressed concrete. GE credit: QL, SE. Effective: 2013 Fall Quarter.

ECI 136—Building Design (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (ECI 130 or ECI 131); (ECI 135 or ECI 132) Design of a building structure for a specific need under the multiple constraints of safety, serviceability, cost and aesthetics. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 137—Construction Principles and Project Management (4)
Laboratory—3 hours; Lecture—3 hours. Restricted to upper division standing in Engineering. Project management, with civil engineering construction and design applications, including project scope, schedule, resources, cost, quality, risk, and control. Construction industry overview. Interactions between planning, design, construction, operations. Construction operations analysis. Contract issues. Project management software, field trips, guest lectures. GE credit: ACGH, OL, QL, SE, SS, VL, WE. Effective: 2013 Fall Quarter.

ECI 138—Earthquake Loads on Structures (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECI 130 or ECI 131 Determination of loads on structures due to earthquakes. Methods of estimating equivalent static lateral forces; response spectrum and time history analysis. Concepts of mass, damping and stiffness for typical structures. Design for inelastic behavior. Numerical solutions and Code requirements. GE credit: SE. Effective: 2013 Fall Quarter.

ECI 139—Advanced Structural Mechanics (4)
Lecture—4 hours. Prerequisite(s): ENG 104 C- or better Review of stress, strain, equilibrium, compatibility, and elastic material behavior. Plane stress and plane strain problems in elasticity; energy methods. Theories for unsymmetric bending, straight and curved beams. Beams on elastic foundations; stresses in plates and shells; elastic stability. GE credit: QL, SE. Effective: 2013 Fall Quarter.

ECI 140A—Environmental Analysis of Aqueous Systems (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 002B C- or better Pass One restricted to Environmental Engineering majors. Introduction to "wet chemical" and instrumental techniques commonly used in the examination of water and wastewater and associated data analysis. Not open for credit to students who have taken ECH 140 or CHE 100. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 140B—Chemical Principles for Environmental Engineers (4)
Lecture—4 hours. Prerequisite(s): CHE 002B C- or better Aqueous chemistry; equilibrium relationships; carbonate system; thermodynamics; kinetics & rate laws; precipitation, adsorption, & volatilization phenomenon; oxidation & reduction reactions; pH, pE and predominance diagrams; organic chemicals. Not open for credit to students who have taken ECI 140. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 140C—Biological Principles for Environmental Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 140A C- or better or ECI 140B C- or better Fundamental microbiology concepts for environmental engineers; provides background needed for the application of water and wastewater treatment, bioremediation, air pollution control and biotransformations in environmental engineered systems. Only two units of credit for students who have taken MIC 101 or MIC 102. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 140D—Water and Wastewater Treatment System Design (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (ENG 103 C- or better or ECI 100 C- or better); (ECI 140 C- or better or ECI 140A C- or better or ECI 140B C- or better or ECI 140C C- or better or ECI 148A C- or better) Evaluation and design of water and wastewater treatment systems. Not open for credit to students who have taken ECI 148B. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 141—Engineering Hydraulics (3)
Lecture—3 hours. Prerequisite(s): ENG 103 C- or better or ECI 100 C- or better Nature of flow of a real fluid; flow in pipes; open channel flow; turbomachinery; fluid forces on objects: boundary layers, lift and drag. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 141L—Engineering Hydraulics Laboratory (1)
Laboratory—3 hours. Prerequisite(s): ECI 141 (can be concurrent) Open to Engineering students only. Laboratory experiments and demonstrations on flow measurements, sluice gates, hydraulic jump, flow characteristics, and centrifugal pumps. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 142—Engineering Hydrology (4)
Lecture—4 hours. Prerequisite(s): ECI 141 (can be concurrent) Restricted to students in the College of Engineering. The hydrologic cycle. Evapotranspiration, interception, depression storage and infiltration. Streamflow analysis and modeling. Flood routing through channels and reservoirs. Frequency analysis of hydrologic variables. Precipitation analysis for hydrologic design. Hydrologic design. GE credit: QL, SE. Effective: 2013 Fall Quarter.

ECI 143—Green Engineering Design and Sustainability (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Upper division standing. Restricted to upper division standing; Pass One restricted to Civil Engineering majors. Application of concepts, goals and metrics of sustainability, green engineering and industrial ecology to engineering design. Other course topics include life-cycle assessments, analysis of environmental management systems, and economics of pollution prevention and sustainability. GE credit: QL, SE, SL, SS. Effective: 2017 Winter Quarter.

ECI 144—Groundwater Systems Design (4)
Lecture—4 hours. Prerequisite(s): ECI 141 Groundwater occurrence, distribution, and movement; groundwater flow systems; radial flow to wells and aquifer testing; aquifer management; groundwater contamination; solute transport by groundwater; fate and transport of subsurface contaminants. Groundwater supply and transport modeling. GE credit: SE. Effective: 2005 Spring Quarter.

ECI 144L—Groundwater Systems Design Laboratory (1)
Laboratory—3 hours. Prerequisite(s): ECI 144 (can be concurrent); ECI 144 required concurrently. Computer modeling of groundwater flow under regional gradient, well injection/withdrawal, and natural and engineered boundary conditions. Use of Groundwater Vistas computer program. Effective: 2010 Fall Quarter.

ECI 145—Hydraulic Structure Design (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): ECI 141 C- or better Project-based course on the design of an integrated urban drainage system with focus on consideration of design alternatives, multiple realistic constraints, quantification of uncertainty, codes and standards, technical drawing and cost analysis. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 146—Water Resources Simulation (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 103 C- or better or ECI 100 C- or better Computer simulation techniques in the analysis, design and operation of surface water systems; modeling concepts and practices with application to surface runoff; water quality in rivers and streams and dispersion of contaminants in water bodies. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 148A—Water Quality Management (4)
Lecture—4 hours. Prerequisite(s): CHE 002B C- or better Basic concepts of water quality measurements and regulations. Introduction to physical, biological and chemical processes in natural waters. Fundamentals of mass balances in water and wastewater treatment. GE credit: SE. Effective: 2013 Fall Quarter.

ECI 149—Air Pollution (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021D; MAT 022B; CHE 002B C- or better; (ATM 121A or ENG 103 C- or better or ECI 100 C- or better) Physical and technical aspects of air pollution. Emphasis on geophysical processes and air pollution meteorology as well as physical and chemical properties of pollutants. (ATM 149.) GE credit: QL, SE, SL. Effective: 2018 Winter Quarter.

ECI 150—Air Pollution Control System Design (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECI 149 C- or better or ATM 149 C- or better Design and evaluation of air pollution control devices and systems. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 153—Deterministic Optimization and Design (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): MAT 021C; MAT 022A; Computer programming course. Operations research. Optimization techniques such as linear programming, dynamic programming, and non-linear programming. Applications in civil engineering disciplines, including multiple realistic constraints, through computer-based course projects. GE credit: QL, SE, SL. Effective: 2013 Fall Quarter.

ECI 155—Water Resources Engineering Planning (4)
Lecture—4 hours. Prerequisite(s): (ENG 106 or ECN 001A or ECN 001AV); ECI 114 Basic engineering planning concepts; role of engineering, economic, environmental and social information and analysis; institutional, political and legal aspects. Case studies and computer models illustrate the planning of water resource systems. GE credit: QL, SE, SL, SS, WE. Effective: 2018 Winter Quarter.

ECI 161—Transportation System Operations (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021C C- or better; PHY 009A C- or better Principles of transportation system operations; traffic characteristics and methods of measurement; models of transportation operations and congestion applied to urban streets and freeways. GE credit: QL, SE. Effective: 2016 Fall Quarter.

ECI 163—Energy and Environmental Aspects of Transportation (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): ECN 001A or ECN 001AV or ENG 106 Engineering, economic, and systems planning concepts. Analysis and evaluation of energy, air quality and selected environmental attributes of transportation technologies. Strategies for reducing pollution and petroleum consumption in light of institutional and political constraints. Evaluation of vehicle emission models. (ESP 163.) GE credit: SE, SL, SS, WE. Effective: 2018 Spring Quarter.

ECI 165—Transportation Policy (3)
Lecture—3 hours. Transportation and associated environmental problems confronting urban areas, and prospective technological and institutional solutions. Draws upon concepts and methods from economics, engineering, political science and environmental studies. GE credit: QL, SE, SS. Effective: 2013 Fall Quarter.

ECI 171—Soil Mechanics (4)
Lecture—4 hours. Prerequisite(s): (ENG 103 (can be concurrent) or ECI 100 (can be concurrent)); ENG 104 C- or better; ECI 171L (can be concurrent); ECI 171L required concurrently. Restricted to Civil Engineering and Environmental Engineering majors only. Soil formations, mass-volume relationships, soil classification, effective stress, soil-water-void relationships, compaction, seepage, capillarity, compressibility, consolidation, strength, states of stress and failure, lateral earth pressures, and slope stability. GE credit: SE. Effective: 2018 Spring Quarter.

ECI 171L—Soil Mechanics Laboratory (1)
Laboratory—3 hours. Prerequisite(s): ECI 171 (can be concurrent); ECI 171 required concurrently. Laboratory studies utilizing standard testing methods to determine physical, mechanical and hydraulic properties of soil and demonstration of basic principles of soil behavior. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 173—Foundation Design (4)
Lecture—4 hours. Prerequisite(s): ECI 171 Foundation analysis and design, including site characterization, evaluation of shallow and deep foundation alternatives, evaluation of bearing capacity and settlements, design of retaining structures, and case-based design experiences. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 175—Geotechnical Earthquake Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 171 C- or better Tectonics, faults, site response, and probabilistic ground motion prediction equations. Cyclic loading and liquefaction of soil elements and layers. Empirical procedures and field tests for evaluation of triggering and consequences, of liquefaction. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 179—Pavement Engineering (4)
Discussion/Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 104 C- or better Pavement types (rigid, flexible, unsurfaced, rail), their applications (roads, airfields, ports, rail) and distress mechanisms. Materials, traffic and environment characterization. Empirical and mechanistic-empirical design procedures. Maintenance, rehabilitation and reconstruction; construction quality; asphalt concrete mix design. GE credit: QL, SE, SL, VL. Effective: 2013 Fall Quarter.

ECI 189A—Selected Topics in Civil Engineering; Environmental Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Environmental Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189B—Selected Topics in Civil Engineering; Hydraulics and Hydrologic Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Hydraulics and Hydrologic Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189C—Selected Topics in Civil Engineering; Engineering Planning (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Engineering Planning. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189D—Selected Topics in Civil Engineering; Geotechnical Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Geotechnical Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189E—Selected Topics in Civil Engineering; Structural Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Structural Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189F—Selected Topics in Civil Engineering; Structural Mechanics (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Structural Mechanics. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189G—Selected Topics in Civil Engineering; Transportation Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Transportation Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189H—Selected Topics in Civil Engineering; Transportation Planning (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Transportation Planning. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189I—Selected Topics in Civil Engineering; Water Resources Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Water Resources Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189J—Selected Topics in Civil Engineering; Water Resources Planning (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Water Resources Planning. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 190C—Research Group Conferences in Civil and Environmental Engineering (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing in Civil and Environmental Engineering. Research group conferences. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 192—Internship in Engineering (1-5)
Internship. Prerequisite(s): Upper division standing; approval of project prior to the period of the internship. Supervised work experience in civil engineering. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 193A—Civil and Environmental Engineering Senior Design (4) ***Review all entries***
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): (ECI 140D C- or better) or (ECI 171 C- or better, ECI 171L C- or better) or (ECI 132 C- or better or ECI 135 C- or better) or (ECI 161 C- or better or ECI 163 C- or better) or (ECI 141 C- or better, ECI 141L C- or better); and Consent of Instructor. And one ECI major depth course with a C- or better. Students must be in final year of study. Open to seniors in Civil Engineering and Environmental Engineering only; students must be in their final year of study. Culminating design experience for civil engineering and environmental engineering majors. Student teams work closely with faculty, city officials or consulting clients to propose, implement and validate a unique solution to a real-world problem. GE credit: OL, SE, WE. Effective: 2018 Winter Quarter.

ECI 193A—Civil and Environmental Engineering Senior Design (4) ***Review all entries***
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): (ECI 140D C- or better) or (ECI 171 C- or better, ECI 171L C- or better) or (ECI 132 C- or better or ECI 135 C- or better) or (ECI 161 C- or better or ECI 163 C- or better) or (ECI 141 C- or better, ECI 141L C- or better); and Consent of Instructor. And one other ECI major depth course with a C- or better; students must be in their final year of study. Open to seniors in Civil Engineering and Environmental Engineering only. Culminating design experience for civil engineering and environmental engineering majors. Student teams work closely with faculty, city officials or consulting clients to propose, implement and validate a unique solution to a real-world problem. GE credit: OL, SE, WE. Effective: 2018 Fall Quarter.

ECI 193B—Civil and Environmental Engineering Senior Design (4)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): ECI 193A Open to seniors in Civil Engineering and Environmental Engineering only. Culminating design experience for civil engineering and environmental engineering majors. Student teams work closely with faculty, city officials or consulting clients to propose, implement and validate a unique solution to a real-world problem. GE credit: OL, SE, VL, WE. Effective: 2017 Fall Quarter.

ECI 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 199—Special Study for Advanced Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Special study. (P/NP grading only.) GE credit: SE. Effective: 2016 Fall Quarter.

ECI 201—Introduction to Theory of Elasticity (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 104 Fundamental equations of elasticity in three dimensions; plane stress and plane strain; flexture and torsion of bars of various shapes. Introduction to variational and approximate methods. Effective: 1997 Winter Quarter.

ECI 203—Inelastic Behavior of Solids (3)
Lecture—3 hours. Prerequisite(s): ECI 201 Fundamentals of theories of plasticity, viscoelasticity and viscoplasticity for solids. Macroscopic constitutive modelling for engineering materials, e.g., metals, polymers, soils, etc., and microscopic motivation. Effective: 1997 Winter Quarter.

ECI 205—Continuum Mechanics (3)
Lecture—3 hours. Prerequisite(s): ECI 201 Tensor formulation of the field equations for continuum mechanics, including large deformation effects. Invariance and symmetry requirements. Introduction to nonlinear thermoelasticity and thermodynamics. Solution of three-dimensional problems. Selected topics. Effective: 1998 Winter Quarter.

ECI 206—Fracture Mechanics (4)
Lecture—4 hours. Prerequisite(s): ECI 201; ENG 104 Linear and nonlinear fracture mechanics, stress analysis, energy concepts, brittle fracture criteria, path independent integrals, Dugdale-Barenblatt model, general cohesive zone models, ductile fracture criteria, crack tip fields for stationary and propagating cracks, fatigue. Application of numerical methods for fracture mechanics. Effective: 2006 Winter Quarter.

ECI 211—Advanced Matrix Structural Analysis (4)
Lecture—4 hours. Prerequisite(s): ECI 131 Analysis of complex frameworks by the displacement method; treatment of tapered beams, curved beams, and beams on elastic foundations; partially rigid connections; geometric and material nonlinearities; buckling; flexibility-based formulations; FEM-software for nonlinear analysis of structures. Effective: 2003 Winter Quarter.

ECI 212A—Finite Element Procedures in Applied Mechanics (4)
Lecture—4 hours. Prerequisite(s): EAD 115 or (MAT 128A, MAT 128B (can be concurrent)) Weighted-residual and Rayleigh-Ritz methods. Weak/variational formulation and development of discrete equations using finite element approximations. Application to one- and two-dimensional problems (heat conduction). Effective: 2003 Winter Quarter.

ECI 212B—Finite Elements: Application to Linear and Non-Linear Structural Mechanics Problems (4)
Lecture—4 hours. Prerequisite(s): ECI 212A Application to linear and nonlinear structural mechanics problems. Linear elasticity, weak form, and finite element approximation. Incompressible media problems. Non-linear problems with material nonlinearity. Effective: 2003 Winter Quarter.

ECI 213—Analysis of Structures Subjected to Dynamic Loads (4)
Lecture—4 hours. Prerequisite(s): ECI 211 (can be concurrent) Analysis of structures subjected to earthquake, wind and blast loading; distributed, consistent and lumped mass techniques; computer implementation; nonlinear response spectrum; frequency and time domain analysis; seismic protection of structures; numerical methods in linear and nonlinear structural dynamics. Effective: 2012 Fall Quarter.

ECI 214—Probabilistic Seismic Hazard Analysis and Design Ground Motions (4)
Lecture—4 hours. Probabilistic seismic hazard analysis for use in developing design spectra and for seismic risk analyses, including the development of earthquake ground motion time series for use in dynamic analyses of structures. Effective: 2016 Winter Quarter.

ECI 216—Meshfree Methods and Partition of Unity Finite Elements (4)
Lecture—4 hours. Prerequisite(s): ECI 201; ECI 212A Advanced discretization techniques such as meshfree methods and partition of unity finite elements for the Galerkin solution of boundary-value problems in solid and structural mechanics. Application of meshfree and extended finite element methods in computational fracture. Effective: 2016 Winter Quarter.

ECI 221—Theory of Plates and Introduction to Shells (3)
Lecture—3 hours. Prerequisite(s): ECI 201 (can be concurrent) Development of classical and refined plate theories. Application to isotropic, orthotropic and composite plates. Solutions for rectangular
and circular plates. Membrane theory for axisymmetric shells and bending of circular shells. Effective: 1997 Winter Quarter.

ECI 223—Advanced Dynamics, Signal Processing, and Smart Structures Technology (4)
Lecture—4 hours. Prerequisite(s): ECI 213; Or equivalent. Signal processing and system identification of structures under dynamic excitations; Fourier and Laplace transforms; data acquisition and sensor design fundamentals; sensor technologies/techniques for nondestructive evaluation; structural control; actuators and dampers for smart structures; piezoelectrics and acoustic emissions; micro- and nano-fabrication. Effective: 2011 Winter Quarter.

ECI 232—Advanced Topics in Concrete Structures (4)
Lecture—4 hours. Prerequisite(s): ECI 130; ECI 135; ECI 138; Graduate standing. Ductility of reinforced concrete; strength of two-way slabs; modified compression field theory. Effective: 2001 Fall Quarter.

ECI 233—Advanced Design of Steel Structures (4)
Lecture—4 hours. Prerequisite(s): (ECI 130 or ECI 131); ECI 132 Review of Load and Resistance Factor Design (LRFD); steel-plate girder design; plastic design of indeterminate systems; moment frames and bracing systems; connection design; seismic design of steel structures; vibration of flooring systems; steel-concrete composite design. Effective: 2004 Winter Quarter.

ECI 234—Prestressed Concrete (4)
Lecture—4 hours. Prerequisite(s): ECI 135; (ECI 130 or ECI 131) Survey of methods and applications; prestressing materials and systems; prestress losses; flexural design; design for shear and torsion; deflection computation and control; continuous beams and indeterminate structures; floor systems; partial prestressing; design of compression members; strut-and-tie models. Effective: 2003 Fall Quarter.

ECI 235—Cement Composites (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 104 Applications of cement composites; materials selection and proportioning; component and composite properties; hydration reactions and microstructure development; mechanisms of failure; nondestructive test methods; fiber reinforcement; concrete durability; novel reinforcing materials; ferrocement; repair and retrofit technologies; applications to structural design. Effective: 2002 Fall Quarter.

ECI 236—Design of Fiber Reinforced Polymer Composite Structures (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECI 135 Basics of mechanics and design of polymer matrix composites: composite classification, manufacturing process, micromechanical property determination, classical lamination theory, strength theories, first-ply-failure, test methods, design practice, strengthening and retrofitting of existing reinforced concrete structures. Effective: 2008 Winter Quarter.

ECI 237—Bridge Design (4)
Lecture—4 hours. Prerequisite(s): ECI 130; ECI 135; ECI 234 recommended. Open to Graduate Students only. Bridge types, behavior and construction characteristics; design philosophy, details according to Caltrans and American Association of State Highway and Transportation Officials codes, principles; seismic design and retrofit of concrete bridges; modern bridges using advanced fiber reinforced polymer composites; fieldtrip required. Effective: 2007 Fall Quarter.

ECI 238—Performance-Based Seismic Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 138; ECI 213 Modern seismic design; performance-based seismic design; seismic hazard; seismic demands: linear and nonlinear procedures; performance assessment: deterministic and probabilistic procedure; review of FEMA-350, FEMA-356, ATC-40 and other performance-based guidelines. Effective: 2005 Spring Quarter.

ECI 240—Water Quality (4)
Lecture—4 hours. Prerequisite(s): ECI 141; ECI 142 Quality requirements for beneficial uses of water. Hydrologic cycle of quality. Hydromechanics in relation to quality of surface and groundwaters; transport and fate of waterborne pollutants. Heat
budget for surface waters; predictive methods; introduction to water quality modeling. Effective: 2000 Fall Quarter.

ECI 241—Environmental Reactive Chemical Transport Modeling (4)
Lecture—4 hours. Prerequisite(s): CHE 002A or CHE 002B or ECI 149; Or equivalent. Modeling of reactive chemical transport in air and water including kinetic reactions, equilibrium reactions, and phase partitioning. Emphasis on numerical solution schemes and programming techniques to provide deeper insight into model performance and limitations. Effective: 2014 Fall Quarter.

ECI 242—Air Quality (4)
Lecture—4 hours. Prerequisite(s): ENG 105; ECI 141; ECI 149; Or equivalents. Factors determining air quality. Effects of air pollutants. Physical and chemical fundamentals of atmospheric transport and reaction. Introduction to dispersion modeling. Effective: 2002 Fall Quarter.

ECI 243A—Water and Waste Treatment (4)
Lecture—4 hours. Prerequisite(s): ECI 148A; Or the equivalent. Characteristics of water and airborne wastes; treatment processes and process kinetics; treatment system design. Effective: 1999 Fall Quarter.

ECI 243B—Water and Waste Treatment (4)
Lecture—4 hours. Prerequisite(s): ECI 243A Continuation of course 243A. Aeration, thickening, biological processes, design of biological treatment systems. Effective: 2000 Winter Quarter.

ECI 243L—Pilot Plant Laboratory (4)
Discussion—1 hour; Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): ECI 243A; ECI 243B (can be concurrent); or Consent of Instructor. Graduate standing. Laboratory investigation of physical, chemical, and biological processes for water and wastewater treatment. Effective: 2016 Winter Quarter.

ECI 244—Life Cycle Assessment for Sustainable Engineering (4)
Lecture—4 hours. Prerequisite(s): Graduate standing. Life cycle assessment methodology is taught emphasizing applications to infrastructure and energy systems. Life cycle design, life cycle cost methods, other tools from industrial ecology, and links to policy are covered as well. Effective: 2011 Fall Quarter.

ECI 245A—Applied Environmental Chemistry: Inorganic (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 105; ECI 140; CHE 002B; Or the equivalent of CHE 002B; CHE 002C or CHE 107A recommended. Chemistry of natural and polluted waters. Topics include chemical, kinetic and equilibrium principles, redox reactions, gas solution and solid-solution equilibria, thermodynamics, carbonate systems, coordination chemistry, interfacial phenomena. Effective: 2000 Spring Quarter.

ECI 245B—Applied Environmental Chemistry: Organic (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 128A; CHE 128B; CHE 128C; Or the equivalent; CHE 002C or CHE 107A recommended. Transport and transformation of organic chemicals in the environment.
Topics include application of thermodynamics to predict solubility and activity coefficients; distribution of organic chemicals between the aqueous phase and air, solvent, or solid phases; chemical, photochemical and biological transformation reactions. Effective: 2001 Spring Quarter.

ECI 246N—Understanding Climate Change: Causes and Consequences (4)
Lecture—4 hours. Open to graduate students. Diverse physical processes that govern climate and drive climate change. Observational, experimental and modeling techniques and methods used in the development of our scientific understanding of the Earth system. Effective: 2016 Spring Quarter.

ECI 247—Aerosols (4)
Lecture—4 hours. Prerequisite(s): ENG 103; ENG 105; ECI 141; ECI 149 Behavior of airborne particles including particle formation, modification, and removal processes. Effective: 2002 Fall Quarter.

ECI 247L—Aerosols Laboratory (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): ECI 247 Methods of generation and characterization of aerosols. Detailed topics may include flow rate measurement, aerosol generation, aerosol collection, ions measurement, metals measurement, and carbon measurement. May be repeated up to 1 time(s). Effective: 2002 Fall Quarter.

ECI 248—Biofilm Processes (4)
Lecture—4 hours. Prerequisite(s): SSC 111 or SSC 211 or ECI 243B; or Consent of Instructor. Calculus and basic cell molecular biology are recommended. Natural and engineered biofilms, including biofilm occurrence and development, spatial structure, microbial processes, fundamental and applied research tools, biofilm reactors, beneficial uses, and detrimental effects. Effective: 2004 Spring Quarter.

ECI 249—Probabilistic Design and Optimization (4)
Lecture—4 hours. Prerequisite(s): ECI 114; ECI 153; ENG 106; Or equivalents. Design by optimization for probabilistic systems, decision theory, the value of information, probabilistic linear programming, probabilistic dynamic programming, nonlinear probabilistic optimization. Applications in civil engineering design, project evaluation, and risk management. Effective: 2006 Winter Quarter.

ECI 250—Civil Infrastructure System Optimization and Identification (4)
Lecture—4 hours. Prerequisite(s): MAT 021C; MAT 022A; Programming course; EAD 115 and mathematical modeling course recommended. Restricted to graduate standing. Applied mathematics with a focus on modeling, identifying, and controlling dynamic, stochastic, and underdetermined systems. Applications in transportation networks, water resource planning, and other civil infrastructure systems. Effective: 2005 Spring Quarter.

ECI 251—Transportation Demand Analysis (4)
Lecture—4 hours. Prerequisite(s): ECI 114; Or the equivalent. Procedures used in urban travel demand forecasting. Principles and assumptions of model components (trip generation, trip distribution, model split). New methods of estimating travel demand. Computer exercises using empirical data to calibrate models and forecast travel demand. Effective: 1999 Fall Quarter.

ECI 252—Sustainable Transportation Technology and Policy (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): ECI 165 Role of technical fixes and demand management in creating a sustainable transportation system. Emphasis on technology options, including alternative fuels, electric propulsion, and IVHS. Analysis of market demand and travel behavior, environmental impacts, economics and politics. (ESP 252.) Effective: 2000 Fall Quarter.

ECI 253—Dynamic Programming and Multistage Decision Processes (4)
Lecture—4 hours. Prerequisite(s): MAT 021C; MAT 022A; Programming course; EAD 115 recommended. Operations research. Optimization techniques with a focus on dynamic programming in treating deterministic, stochastic, and adaptive multistage decision processes. Brief review of linear programming and non-linear programming. Applications in transportation networks and other civil infrastructure systems. Effective: 2005 Spring Quarter.

ECI 254—Exploring Data from Built Environment Using R (4)
Laboratory—3 hours; Lecture—3 hours. Introduction to modern data science, specifically data acquisition, exploratory data analysis, visualization, and beginning data analysis using R. Emphasizes computational reasoning and working with tabular and non-standard data. Focus will be on data generated in the built environment. (Geography 279.) Effective: 2017 Fall Quarter.

ECI 256—Urban Traffic Management and Control (4)
Lecture—4 hours. Prerequisite(s): ECI 114 Basic concepts, models, and methods related to the branch of traffic science that deals with the movement of vehicles on a road network, including travel speed, travel time, congestion concepts, car-following and hydrodynamic traffic models. Effective: 2000 Fall Quarter.

ECI 257—Flow in Transportation Networks (4)
Lecture—4 hours. Prerequisite(s): ECI 153; ECI 161 or ECI 256 recommended. Elements of graph theory, a survey of pertinent optimization techniques, extremal principles in network flow problems, deterministic equilibrium assignment, stochastic equilibrium assignment, extensions of equilibrium assignments and dynamic transportation network assignment. Effective: 2000 Winter Quarter.

ECI 259—Asphalt and Asphalt Mixes (4)
Lecture—4 hours. Prerequisite(s): ECI 179; or Consent of Instructor. Asphalts and asphalt mix types and their use in civil engineering structures, with primary emphasis on pavements. Asphalt, aggregate properties and effects on mix properties. Design, construction, recycling. Recent developments and research. Effective: 2006 Winter Quarter.

ECI 260—Sediment Transport (4)
Lecture—4 hours. Prerequisite(s): ECI 141; Or equivalent. Sediment transport in hydrologic systems. Process-oriented course which will emphasize how sediment moves and the physical processes that affect sediment transport. Field trip. Effective: 2006 Winter Quarter.

ECI 264A—Transport, Mixing and Water Quality in River and Lakes (4)
Lecture—4 hours. Prerequisite(s): ECI 141; ECI 240 Principal causes of mixing and transport in rivers, lakes and reservoirs, and their impacts on water quality. Case studies of specific lakes and rivers. Effective: 2000 Fall Quarter.

ECI 264B—Transport, Mixing and Water Quality in Estuaries and Wetlands (4)
Lecture—4 hours. Prerequisite(s): ECI 141; ECI 240 Principal causes of mixing and transport in estuaries and wetlands, and their impacts on water quality. Topics include advection/diffusion; tides; transverse mixing; longitudinal dispersion; sediment transport; nutrient cycling; computer modeling of estuaries. Case studies of specific systems. Effective: 2000 Spring Quarter.

ECI 265—Stochastic Hydrology and Hydraulics (4)
Lecture—4 hours. Prerequisite(s): ECI 266; or Consent of Instructor. Physics-based stochastic methods in modeling hydrologic and hydraulic processes; theory for modeling hydrologic-hydraulic governing equations as stochastic partial differential equations applied to various hydrologic-hydraulic processes under uncertainty, including transport, open channel flow, overland flow, soil water flow, and groundwater. Effective: 2015 Winter Quarter.

ECI 266—Applied Stochastic Methods in Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 114 or MAT 131 or STA 130A or STA 131A or MAT 118A (can be concurrent) Stochastic processes classification; Gaussian random fields; stochastic calculus in mean square; Ito and Stratonovich stochastic differential equations; Fokker-Planck equation; stochastic differential equations
with random coefficients. Effective: 1999 Fall Quarter.

ECI 267—Water Resource Management (3)
Lecture—3 hours. Prerequisite(s): ECI 114; ECI 141; ECI 142; ECI 153 recommended. Engineering, institutional, economic, and social basis for managing local and regional water resources. Examples in the context of California's water development and management. Uses of computer modeling to improve water management. (GEO 212.) Effective: 2013 Fall Quarter.

ECI 268—Infrastructure Economics (3)
Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ENG 106; Or the equivalent. Economics applied to infrastructure engineering planning, operations, maintenance, and management problems; microeconomic and macroeconomic theories; benefit-cost analysis; effect of uncertainty; optimization economics; non-classical economics; public finance. Effective: 2018 Spring Quarter.

ECI 269—Transportation-Air Quality: Theory and Practice (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECI 149; Or the equivalent. Health and regulatory
aspects of airborne pollutants. Principles of modeling
vehicle emissions. Conformity issues and the regulatory
framework. Regional and micro-scale modeling. Effective: 1999 Fall Quarter.

ECI 270—Advanced Water Resources Management (3)
Lecture—3 hours. Prerequisite(s): ECI 153; ECI 267; Or the equivalent. Discussion of technical papers related to planning theory, system maintenance, regionalization, multi-objective methods, risk analysis, institutional issues, pricing model application, economic development, forecasting, operations, and other topics. Effective: 1997 Winter Quarter.

ECI 271—Inverse Problems (4)
Lecture—4 hours. Prerequisite(s): ECI 114; ECI 144; Or equivalents. Inverse calibration of distributed parameter models, using data representing model outputs. Forward and inverse mappings, stability, uniqueness, identifiability. Optimization formulation of inverse problems, maximum likelihood and other objective functions, indirect and direct approaches, solution by UCODE in hands-on project format. Effective: 2010 Fall Quarter.

ECI 272A—Advanced Hydrogeology (4)
Lecture—4 hours. Prerequisite(s): ECI 144; MAT 118A recommended. Flow in confined, unconfined, and leaky aquifers. Geological aspects of aquifers. Regional groundwater flow and hydraulics of pumping and recharging wells. Identification of aquifer parameters. Isotope hydrogeology and recharge estimation. Effective: 2000 Fall Quarter.

ECI 272B—Advanced Hydrogeology (4)
Lecture—4 hours. Prerequisite(s): ECI 212A; ECI 272A Processes of subsurface flows and transport. Numerical methods of subsurface fluid flow and transport systems. Flow in the unsaturated zone. Fresh water-salt water interface in coastal aquifers. Macrodispersion. Identification of regional aquifer parameters. Modeling of aquifer systems. Effective: 2000 Fall Quarter.

ECI 272C—Multiphase Reactive Transport (4)
Lecture—4 hours. Prerequisite(s): ECI 142; ECI 144; ECI 148A Multicomponent reactive transport including multiple phases. Advective/dispersive transport, chemical equilibria, and mass transformation kinetics. Natural chemical/microbiological processes including sorption, complexation, biodegradation, and diffusive mass transfer. Eulerian and Lagrangean averaging methods. Applications to contaminant remediation problems in river and subsurface hydrology. Effective: 2004 Fall Quarter.

ECI 273—Water Resources Systems Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 114; ECI 153; Or the equivalent. Planning and management of water resource systems. Deterministic and stochastic simulation and optimization techniques. Capacity design and operation of reservoir systems for water supply, hydropower, flood control, and environmental objectives. Effective: 2018 Winter Quarter.

ECI 275—Hydrologic Time-Series Analysis (4)
Lecture—4 hours. Prerequisite(s): ECI 114; ECI 142 Application of statistical methods for analysis and modeling of hydrologic series. Statistical simulation and prediction of hydrologic sequences using time series methodology. Effective: 2003 Fall Quarter.

ECI 276—Watershed Hydrology (4)
Lecture—4 hours. Prerequisite(s): ECI 142; Or the equivalent. Analysis and mathematical modeling of hydrologic processes taking place in a watershed. Precipitation analysis and modeling. Theory of overland flow and its kinematic wave approximation.Analysis and modeling of saturated and unsaturated subsurface flow processes taking place on a hill slope. Effective: 1997 Winter Quarter.

ECI 277A—Computational River Mechanics I (4)
Lecture—4 hours. Prerequisite(s): EAD 115 (can be concurrent); ECI 141 (can be concurrent) Unsteady open channel flows, computation of water surface profiles, shallow water equations, St. Venant equations, method of characteristics, finite difference methods, stability and accuracy of explicit and implicit schemes, flood routing in simple and compound channels, advection of plumes. Not open for credit to students who have taken ECI 277. Effective: 2004 Fall Quarter.

ECI 277B—Computational River Mechanics II (4)
Lecture—4 hours. Prerequisite(s): ECI 277A Open channel flows, physical aspects of river mechanics, formulation of depth-averaged equations, boundary conditions, coordinates transformation and grid generation, finite-difference solution techniques, applications to two-dimensional momentum and pollutant transport in rivers. Effective: 2004 Fall Quarter.

ECI 277C—Turbulence and Mixing Processes (4)
Lecture—4 hours. Prerequisite(s): Graduate standing. Nature of turbulent flows, conservation equations, momentum, heat and mass transport in free and wall-bounded flows, body forces and mixing, roughness effects, turbulence modeling and simulation. Effective: 2004 Fall Quarter.

ECI 278—Hydrodynamics (3)
Lecture—3 hours. Prerequisite(s): ECI 141 Perturbation methods. Basic water waves. Governing equations for fluid motion on a rotating earth. Rotation effects, vorticity dynamics, Ekman layer. Stratification effects, internal waves and turbulent mixing. Combined effects. Effective: 1997 Winter Quarter.

ECI 279—Advanced Mechanics of Fluids (4)
Lecture—4 hours. Prerequisite(s): ECI 141 Rotational flows. Navier-Stokes equations and solutions for laminar flow; boundary layer equations and solution techniques. Nature of turbulence. Reynolds equations. Introduction to turbulence modeling. Effective: 1997 Winter Quarter.

ECI 280A—Nonlinear Finite Elements for Elastic-Plastic Problems (4)
Lecture—4 hours. Prerequisite(s): Consent of Instructor. State of the art finite element methods and tools for elasticplastic problems, including computational techniques based on the finite element method and the theory of elastoplasticity. Effective: 2008 Spring Quarter.

ECI 280B—Nonlinear Dynamic Finite Elements (4)
Lecture—4 hours. Prerequisite(s): Consent of Instructor. State of the art computational methods and tools for analyzing linear and nonlinear dynamics problems. Effective: 2009 Spring Quarter.

ECI 281A—Advanced Soil Mechanics (4)
Lecture—4 hours. Prerequisite(s): ECI 171 Consolidation and secondary compression. Preloading and wick drains. Seepage and seepage pressures. Filtration, drainage, and dewatering. Shear strength: friction, cohesion, dilatancy and critical states. Effective: 2004 Fall Quarter.

ECI 281B—Advanced Soil Mechanics (5)
Laboratory—3 hours; Lecture—4 hours. Prerequisite(s): ECI 281A Site investigation and soil characterization within the context of slope stability analysis. Effective: 2014 Spring Quarter.

ECI 282—Pavement Design and Rehabilitation (4)
Lecture—4 hours. Prerequisite(s): ECI 179; or Consent of Instructor. Advanced pavement design and structural/functional condition evaluation for concrete and asphalt pavements. Highways, airfields, port facilities; new facilities, rehabilitation, reconstruction. Mechanistic-empirical procedures, materials, climate and traffic characterization. Use of current design methods; recent developments and research. Effective: 2004 Winter Quarter.

ECI 283—Physico-Chemical Aspects of Soil Behavior (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECI 171 Study of the geotechnical behavior of soils considering formation, transport, mineralogy, soil-fluid-electrolyte systems, surface tension, particle mechanics, shape, fabric, and structure. Laboratories demonstrate effects of fundamental interparticle forces (contact, Van Der Waals, capillarity and chemical). Effective: 2012 Fall Quarter.

ECI 284—Theoretical Geomechanics (4)
Lecture—4 hours. Prerequisite(s): ECI 171 Elasticity, plasticity, micromechanics, coupled behavior and large deformations for geomaterials. Prediction of stress-strain-volume change behavior of geomaterials. Monotonic and cyclic loading, anisotropy, bifurcation of deformation. Effective: 2004 Winter Quarter.

ECI 286—Advanced Foundation Design (4)
Lecture—4 hours. Prerequisite(s): ECI 173 Design and analysis of pile and pier foundations, including seismic effects; deep excavation systems; tie-back, nailing, and anchor systems; coffer dams; loads on buried conduits; ground modification techniques; and other related topics. Effective: 2004 Spring Quarter.

ECI 287—Geotechnical Earthquake Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 138; ECI 281A Characteristics and estimation of earthquake ground motions; wave propagation and local site response; liquefaction potential and remediation; residual strength and stability considerations; ground deformations; dynamic soil-structure interaction. Effective: 2004 Spring Quarter.

ECI 288—Earth and Rockfill Dams (4)
Lecture—4 hours. Prerequisite(s): ECI 281A; ECI 281B (can be concurrent) Site selection; design considerations; layout; seismic effects including considerations of fault movements; construction; environmental considerations, instrumentation; maintenance remediation and retrofit of existing dams. Effective: 2004 Winter Quarter.

ECI 289A—Selected Topics in Civil Engineering; Environmental Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Environmental Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289B—Selected Topics in Civil Engineering; Hydraulics and Hydrologic Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Hydraulics and Hydrologic Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289C—Selected Topics in Civil Engineering; Engineering Planning (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Engineering Planning. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289D—Selected Topics in Civil Engineering; Geotechnical Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Geotechnical Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289E—Selected Topics in Civil Engineering; Structural Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Structural Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289F—Selected Topics in Civil Engineering; Structural Mechanics (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Structural Mechanics. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289G—Selected Topics in Civil Engineering; Transportation Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Transportation Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289H—Selected Topics in Civil Engineering; Transportation Planning (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Transportation Planning. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289I—Selected Topics in Civil Engineering; Water Resources Engineering (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Directed group study in Water Resources Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 290—Seminar (1)
Seminar—1 hour. Discussion of current graduate research, and guest lectures on recent advances. Oral presentation of individual study. Course required of graduate degree candidates. (S/U grading only.) Effective: 1997 Winter Quarter.

ECI 290C—Graduate Research Group Conference (1)
Discussion—1 hour. Research problems, progress, and techniques in civil engineering. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

ECI 296—Topics in Water and Environmental Engineering (1)
Seminar—2 hours. Seminars presented by visiting lecturers, UC Davis faculty and, graduate students. May be repeated for credit. (S/U grading only.) Effective: 2000 Winter Quarter.

ECI 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

ECI 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

ECI 390—The Teaching of Civil Engineering (1)
Discussion—1 hour. Prerequisite(s): Meet qualifications for teaching assistant and/or associate-in in Civil Engineering. Participation as teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated up to 9 unit(s). (S/U grading only.) Effective: 1997 Winter Quarter.

Sustainable Agriculture & Food Systems

Sustainable Agriculture & Food Systems | Sustainable Agriculture & Food Systems B.S.

(College of Agriculture and Environmental Sciences)

Sustainable Agriculture and Food Systems is an interdisciplinary major hosted by Department of Land, Air and Water Resources.

William Horwath, Ph. D., Major Advisor

Program Office. 1303 Hart Hall; 530-752-2244; http:///asi.ucdavis.edu/safs

The Major Program

The Sustainable Agriculture and Food Systems (SA&FS) major serves students interested in improving the sustainability of agriculture and food systems. This major prepares graduates to understand the interdisciplinary and systems-based aspects of sustainability and provides them with the knowledge, leadership skills and experiences required to excel in agricultural and food systems professions.

The Program

This program is designed to develop students' competencies for addressing the environmental, social, and economic challenges and opportunities associated with agricultural and food systems sustainability. The program emphasizes an experiential learning approach to sustainability education, allowing students to choose between three tracks within the major. Students in the Agriculture and Ecology track focus on crop and animal production systems, ecology, and practices that mitigate negative impacts while producing environmental and social benefits. Students in the Food and Society track focus on issues related to the social, cultural, political and community development aspects of agriculture and food systems. Students in the Economics and Policy track focus on issues related to agricultural and resource economics, policy and management. The program provides students with practical experiences through courses with on- and off-campus fieldwork and through internship placements at sites related to students' interests and focus of study.

Major Advisor. R. Galt (Human Ecology); Track I Advisor. W. Horwath (Land, Air& Water Resources); Track II Advisor. R. Galt (Human Ecology); Track III Advisor. T. Tomich (Human Ecology, Environmental Science & Policy)

Advising Center for the major is located in 1303 Hart Hall, Department of Human Ecology 530-752-2244.

Internships and Career Alternatives

Sustainable Agriculture and Food Systems students are required to complete an internship in the field before graduation. Internships have been arranged with local, county, and state agricultural agencies, production farms and commercial processors and retailers, domestic and international non-governmental organizations, and rural and urban community development programs. Graduates are prepared to pursue a broad range of careers related to agricultural production and food system management, rural and urban community services, education and development, and agricultural and environmental sciences, as well as careers in agricultural, environmental, and economic policy and analysis. Positions may be in private industry, government and public service agencies and in the non-profit sector, nationally and internationally. The major also prepares students for graduate studies in a wide range of fields related to agriculture and food systems.

English Composition Requirement — **Units:** 4-8

See College requirement; must include CMN 001.

Core Courses — **Units:** 23-26

PLS 015	Introduction to Sustainable Agriculture	4
CRD 020	Food Systems	4
ANS 112	Sustainable Animal Agriculture	3
OR		
PLS 150	Sustainability and Agroecosystem Management	4

ARE 121	Economics of Agricultural Sustainability	4
PLS 190	Seminar on Alternatives in Agriculture	2-4
ESP 191A	Workshop on Food System Sustainability	3
ESP 191B	Workshop on Food System Sustainability	3

Internship Requirement **Units:** 12

Students must complete at least 12 units of internship, six of which must be completed off campus or must involve advanced responsibilities if on campus.

Applied Production **Units:** 6-9

Choose one:

PLS 049	Organic Crop Production Practices	3
PLP 040	Edible Mushroom Cultivation	2
VEN 101A	Viticultural Practices	3
VEN 101B	Viticultural Practices	3
VEN 101C	Viticultural Practices	3
ENH 120	Management of Container Media	3
PLS 131	Identification and Ecology of Grasses	2

Choose one:

ANS 049A	Animal Management Practices: Aquaculture	2
ANS 049B	Animal Management Practices: Beef	2
ANS 049C	Animal Management Practices: Dairy	2
ANS 049D	Animal Management Practices: Goats	2
ANS 049E	Animal Management Practices: Horses	2
ANS 049F	Animal Management Practices: Laboratory Animals	2
ANS 049G	Animal Management Practices: Meats	2
ANS 049H	Animal Management Practices: Poultry	2
ANS 049I	Animal Management Practices: Sheep	2
ANS 049J	Animal Management Practices: Swine	2
ANS 041L	Domestic Animal Production Laboratory	2

Choose one:

ABT 049	Field Equipment Operation	2
ABT 052	Field Equipment Welding	2
ABT 101	Engine Technology	3
ABT 142	Equipment and Technology for Small Farms	2
FST 050	Introduction to Food Preservation	3

Track I: Agriculture and Ecology **Units:** 99

Focuses on crop and animal production systems, ecology, and practices that mitigate negative impacts while producing environmental and social benefits.

Preparatory Subject Matter

MAT 016A	Short Calculus	3
MAT 016B	Short Calculus	3
PLS 120	Applied Statistics in Agricultural Sciences	4
OR		
STA 100	Applied Statistics for Biological Sciences	4
CHE 002A	General Chemistry	5

CHE 002B	General Chemistry	5
PHY 001A	Principles of Physics	3
BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
PLS 002	Botany and Physiology of Cultivated Plants	4
ANS 001	Domestic Animals and People	4
OR		
ANS 002	Introductory Animal Science	4
FST 001	Principles of Food Science	3
ECN 001A	Principles of Microeconomics	4
CRD 001	The Community	4

Choose one:

PHI 014	Ethical and Social Problems in Contemporary Society	4
PHI 015	Introduction to Bioethics	4
PHI 024	Introduction to Ethics	4

Choose one:

ANT 002	Cultural Anthropology	5
POL 004	Basic Concepts in Political Theory	4
SOC 001	Introduction to Sociology	5
SOC 003	Social Problems	4

Depth Subject Matter

ARE 120	Agricultural Policy	4
OR		
ARE 147	Resource and Environment Policy Analysis	3
ESP 161	Environmental Law	4
OR		
ESP 169	Water Policy and Politics	3
SSC 100	Principles of Soil Science	5
OR		
SSC 109	Sustainable Nutrient Management	4

Choose one:

ANS 129	Environmental Stewardship in Animal Production Systems	3
ENH 160	Restoration Ecology	3
ESP 100	General Ecology	4
EVE 101	Introduction to Ecology	4
PLS 105	Concepts in Pest Management	3
PLS 142	Ecology of Crop Systems (Discontinued)	4
WFC 154	Conservation Biology	4

Additional upper-division restricted electives chosen in consultation with the track faculty advisor.

Track II: Food and Society **Units:** 108

Focuses on issues related to the social, cultural, political and community development aspects of agriculture and food systems.

Preparatory Subject Matter

PHI 005	Critical Reasoning	4
OR		
PHI 031	Appraising Scientific Reasoning	4

Choose one:

PHI 014	Ethical and Social Problems in Contemporary Society	4
PHI 015	Introduction to Bioethics	4
PHI 024	Introduction to Ethics	4

SOC 046B	Introduction to Social Research	5
OR		
STA 013	Elementary Statistics	4

Choose at least one:

CRD 151	Community Field Research: Theory and Analysis	4
LDA 150	Introduction to Geographic Information Systems	4
STA 103	Applied Statistics for Business and Economics	4
SOC 106	Intermediate Social Statistics	5

CHE 002A	General Chemistry	5

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
OR		
BIS 010	Everyday Biology	4

PLS 002	Botany and Physiology of Cultivated Plants	4

Choose one:

BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
ESP 001	Environmental Analysis	4
ESP 030	World Ecosystems & Geography	3
WFC 010	Wildlife Ecology and Conservation	4
WFC 011	Introduction to Conservation Biology	3

FST 001	Principles of Food Science	3
SSC 010	Soils in Our Environment	3
ECN 001A	Principles of Microeconomics	4
POL 004	Basic Concepts in Political Theory	4

Choose one:

ANT 002	Cultural Anthropology	5
SOC 001	Introduction to Sociology	5
SOC 003	Social Problems	4

CRD 001	The Community	4
CRD 002	Ethnicity and American Communities	4

Depth Subject Matter

ARE 112	Fundamentals of Organization Management	4
OR		

ARE 150	Agricultural Labor	4

Choose one:

ARE 147	Resource and Environment Policy Analysis	3
ARE 176	Environmental Economics	4
ESP 160	The Policy Process	4
ESP 161	Environmental Law	4
ESP 169	Water Policy and Politics	3
ESP 172	Public Lands Management	4
ESP 179	Environmental Impact Assessment	4

Choose 12 units:

ANT 101	Ecology, Nature, and Society	4
CRD 118	Technology and Society	4
CRD 142	Rural Change in the Industrialized World	4
CRD 149	Community Development Perspectives on Environmental Justice	4
CRD 152	Community Development	4
SOC 130	Race Relations	4
SOC 160	Sociology of the Environment	4

Choose one:

AMS 101G	Special Topics: New Directions in American Culture Studies	4
AMS 156	Race, Culture and Society in the United States	4
HIS 108	Global Environmental History	4
HIS 172	American Environmental History	4
NAS 123	Native Foods and Farming of the Americas	4
NAS 162	California Indian Environmental Policy II	4
PHI 109	Philosophy of the Social Sciences	4
WMS 104	Feminist Research	4
WMS 136	Critical Food Studies	4

Additional upper-division restricted electives chosen in consultation with the track faculty advisor.

Track III: Economics and Policy **Units:** 108

Focuses on issues related to agricultural and resource economics, policy and management.

Preparatory Subject Matter

MAT 016A	Short Calculus	3
MAT 016B	Short Calculus	3
SOC 046B	Introduction to Social Research	5
OR		
STA 013	Elementary Statistics	4

Choose one:

ARE 106	Econometric Theory and Applications	4
STA 103	Applied Statistics for Business and Economics	4
SOC 106	Intermediate Social Statistics	5

CHE 002A	General Chemistry	5

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
OR		
BIS 010	Everyday Biology	4
PLS 002	Botany and Physiology of Cultivated Plants	4

Choose one:

BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
ESP 001	Environmental Analysis	4
ESP 030	World Ecosystems & Geography	3
WFC 010	Wildlife Ecology and Conservation	4
WFC 011	Introduction to Conservation Biology	3

FST 001	Principles of Food Science	3
SSC 010	Soils in Our Environment	3
ECN 001A	Principles of Microeconomics	4
ECN 001B	Principles of Macroeconomics	4
POL 004	Basic Concepts in Political Theory	4

Choose one:

ANT 002	Cultural Anthropology	5
SOC 001	Introduction to Sociology	5
SOC 003	Social Problems	4-5

CRD 001	The Community	4

Choose one:

PHI 014	Ethical and Social Problems in Contemporary Society	4
PHI 015	Introduction to Bioethics	4
PHI 024	Introduction to Ethics	4

Depth Subject Matter

Choose one:

ARE 112	Fundamentals of Organization Management	4
ARE 150	Agricultural Labor	4
ARE 157	Analysis for Operations and Production Management	4

Choose 11-12 units:

ARE 120	Agricultural Policy	4
ARE 130	Agricultural Markets	4
ARE 147	Resource and Environment Policy Analysis	3
ARE 176	Environmental Economics	4
ESP 160	The Policy Process	4
ESP 161	Environmental Law	4
ESP 169	Water Policy and Politics	3
ESP 172	Public Lands Management	4
ESP 179	Environmental Impact Assessment	4

Choose eight units:

ANT 101	Ecology, Nature, and Society	4
CRD 118	Technology and Society	4
CRD 142	Rural Change in the Industrialized World	4

CRD 149	Community Development Perspectives on Environmental Justice	4
CRD 152	Community Development	4
SOC 130	Race Relations	4
SOC 160	Sociology of the Environment	4

Additional restricted electives chosen in consultation with an advisor.

Total: 140-163

Sustainable Agriculture & Food Systems | SAF Courses

Courses in SAF:

SAF 090—SA & FS Seminar (1-2)
Seminar—1-3 hours. Introductory or survey topics within Sustainable Agriculture and Food Systems. May be repeated for credit When topic differs. (P/NP grading only.) Effective: 2018 Spring Quarter.

SAF 090X—SA & FS Portfolio (1-4)
Workshop—3-12 hours. Prerequisite(s): Consent of Instructor. Restricted to Sustainable Agriculture and Food Systems majors with lower-division standing or consent of instructor. SA&FS Portfolios are designed to complement interdisciplinary, academic coursework by supporting student development of each of the SA&FS Student Learning Outcomes: Systems Thinking, Experimentation & Inquiry, Understanding Values, Interpersonal Communication, Strategic Management, Civic Engagement and Personal Development. May be repeated for credit. (P/NP grading only.) Effective: 2015 Spring Quarter.

SAF 092—Internship (1-12)
Internship—3-36 hours; Variable—1 hour. Prerequisite(s): Consent of Instructor. Restricted to Sustainable Agriculture and Food Systems majors or with consent of instructor. Lower-division internship for students enrolled in the Sustainable Agriculture and Food Systems program of study. Enrollment for non-majors by consent of instructor. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2013 Fall Quarter.

SAF 098—Directed Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Restricted to Sustainable Agriculture and Food Systems major or with consent of instructor. Group study on focused topics in Sustainable Agriculture and Food Systems. Varies according to instructor. Course plan is adapted to student need and interest in conjunction with the expertise of the instructor. May be repeated for credit. (P/NP grading only.) Effective: 2013 Fall Quarter.

SAF 099—Special Study for Undergraduates (1-5)
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. Under faculty supervision, students pursue a special or individualized course of study related to Sustainable Agriculture and Food Systems. May be repeated for credit. (P/NP grading only.) Effective: 2013 Fall Quarter.

SAF 192—Internship (1-12)
Internship—3-36 hours; Variable—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing. Restricted to Sustainable Agriculture and Food Systems majors or non-majors by consent of instructor. Upper-division internship for students enrolled in the Sustainable Agriculture and Food Systems program of study. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2013 Fall Quarter.

SAF 197T—Tutoring in Sustainable Agriculture and Food Systems (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Undergraduates assist the instructor by tutoring students in regularly scheduled courses that fulfill SA&FS major requirements. May be repeated for credit. (P/NP grading only.) Effective: 2013 Fall Quarter.

SAF 197TC—SA&FS Tutoring in the Community (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Undergraduates assist the instructor by tutoring in the community in settings related to Sustainable Agriculture and Food Systems. May be repeated for credit. (P/NP grading only.) Effective: 2013 Fall Quarter.

SAF 198—Directed Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Restricted to Sustainable Agriculture and Food Systems major or with consent of instructor. Group study on focused topics in Sustainable Agriculture and Food Systems. Varies according to instructor. Course plan is adapted to student need and interest in conjunction with the expertise of the instructor. May be repeated for credit. (P/NP grading only.) Effective: 2013 Fall Quarter.

SAF 199—Special Study for Advanced Undergraduates (1-5)
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Under faculty supervision, advanced students pursue a special or individualized course of study related to Sustainable Agriculture and Food Systems. May be repeated for credit. (P/NP grading only.) Effective: 2013 Fall Quarter.

Sustainable Environmental Design

Sustainable Environmental Design | Sustainable Environmental Design B.S.

(College of Agriculture and Environmental Sciences)

(Department of Human Ecology)

Pasty Eubanks Owens, M.L.A., Vice Chair, Landscape Architecture and Environmental Design

Program Office. 131 Hunt Hall; 530-752-3907;
http://humanecology.ucdavis.edu/lda/academic_programs/sed

Faculty. http://humanecology.ucdavis.edu/lda/people/faculty/

The Major Program

The Sustainable Environmental Design major is intended to build student understanding and skills related to creation of sustainable communities and landscapes. Coursework emphasizes urban and environmental design, sustainable development theory and practice, green building, local government planning and decision-making, community dynamics and organizations, and written, graphic, and oral presentation of sustainability strategies.

The Program

The Sustainable Environmental Design major is particularly suited for students who are interested in the physical form and design of communities and related public and private processes. It is focused on the physical environment of communities and the process of designing, planning for, and regulating the built landscape and the place-making considerations involved in creating sustainable communities.

Major Advisor. Stephen Wheeler

Advising Center. See Sharla Cheney, 135 Hunt Hall, 530-754-8628, scheney@ucdavis.edu.

Career Alternatives. Graduates will choose to pursue work in government, community organizations, education, or the private sector. They will also be well-positioned to pursue graduate education in city and regional planning, landscape architecture, architecture, public policy, public administration, law, real estate, and related fields.

Courses in Sustainable Environmental Design. See course listing under Landscape Architecture.

Preparatory Subject Matter **Units:** 61

English Writing/Oral Communication

BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5

Choose one course each in Statistics, Economics, Political Science, Physical Sciences, and Sociology.

LDA 001	Introduction to Environmental Design	4
LDA 002	Place, Culture and Community	4
LDA 003	Sustainable Development: Theory and Practice	4
LDA 021	Landscape Representation I	4
LDA 030	History of Environmental Design	4
LDA 050	Site Ecology	4
LDA 070	Introduction to Spacemaking	4

Depth Subject Matter **Units:** 20

LDA 140	Green Building, Design, and Materials	4
LDA 141	Community Participation and Design	4
LDA 142	Applying Sustainable Strategies	6
ESP 171	Urban and Regional Planning	4
LDA 190	Proseminar in Landscape Architecture Two quarters.	2

Restricted Electives **Units:** 20-25

Choose 20 units of upper division courses chosen from courses related to community sustainability.

Internship: Recommended

Total: 101-106

Teaching Credential/M.A. Program; Education, School of

Teaching Credential/M.A. Program; Education, School of | Teaching Credential/M.A. Program

School of Education Building; 530-752-5887; Fax 530-754-6672; eduadvising@ucdavis.edu; https://education.ucdavis.edu/teaching-credentialma

Faculty. https://education.ucdavis.edu/faculty-directory

The **Teaching Credential with Master's Degree** program offers an opportunity for qualified students to complete the requirements for both a Masters of Arts in Education degree and a Multiple Subject OR Single Subject Credential in English, mathematics, science, social science or

agriculture in a six-quarter program completed in less than two years. The BCLAD (bi-lingual) authorization is available to credential candidates in both the elementary and secondary programs.

The Credential Program prepares students for the teaching profession by immersing them in the total environment of a public school classroom while enrolled in required coursework. The coursework incorporates a theoretical-practical approach to the teaching-learning process, encouraging close interactions among teacher candidates and teacher education faculty. Students complete requirements for the M.A. degree during two part-time quarters following the credential year. This coursework introduces the integration of research into teaching practice, making teachers more informed and pro-active practitioners.

Graduate Advisor. Lisa Sullivan

Graduate Coordinator. Jana Royal

Courses. See Education, School of.

Teaching Credential/M.A. Degree Program

Academic preparation for the Teaching Credential Program includes a completed bachelor's degree and a GPA of at least 3.00. For the Multiple Subject credential, many undergraduate majors are appropriate preparation for the program. For Single Subject credential candidates, we recommend an undergraduate major in the intended area of secondary teaching. Use undergraduate internship opportunities to gain classroom experience in the grade levels at which you wish to teach. In addition to these general requirements, learn about current state and UC Davis credential prerequisites at the School of Education website or call our Student Services Office.

- Classroom experience in the appropriate grade levels
- U.S. Constitution course
- Specific preparatory coursework; see advisor for details
- California Basic Skills Requirement
- For the elementary credential program, the California Subject Examination for Teachers (CSET)
- For secondary credential programs, approved subject matter coursework or the California Subject Examination for Teachers (CSET) for the appropriate subject

Applicants are encouraged to have program prerequisites and testing requirements completed prior to submitting an application. Credential requirements are regularly revised by the State of California. To obtain the most current information, students considering a career in teaching are encouraged to consult with the School of Education advisors throughout their undergraduate career.

M.A. in Education Degree Programs. Applicants to the General Track M.A. must have completed an undergraduate degree with a major in a field that supports their intended area of emphasis. A minimum undergraduate GPA of 3.000 is necessary for graduate admission at the University of California, Davis. Please consult with advisors in the School of Education regarding additional testing or supplemental information that may be required for application to a specific program.

Ed.D. Degree (CANDEL). Applicants to the CANDEL program must meet general admission requirements for graduate study at the University of California. Requirements include a bachelor's and master's degree (or equivalent) from an accredited institution, and a GPA of at least 3.000. In addition, applicants will have demonstrated prior experience in administrative or leadership roles in an educational institution or related areas.

Ph.D. Degree. Applicants to the Ph.D. program in Education must have a bachelor's degree, and normally will have completed a master's degree (or equivalent) in a field that supports their intended area of emphasis. A minimum GPA of 3.000 in previous undergraduate coursework is required for graduate admission at the University of California, Davis. Applicants must demonstrate a high potential for scholarly achievement and research. Individuals possessing graduate degrees in fields other than education are encouraged to apply. Experience in teaching, research, or related areas of education are desirable.

Technocultural Studies

Technocultural Studies | Technocultural Studies A.B.

(College of Letters and Science)

Michael Neff, Ph.D., Chairperson of the Department

Program Office. 101 Art Building; 530-752-0105; http://arts.ucdavis.edu/cinema-and-digital-media

Faculty.http://arts.ucdavis.edu/cinema-digital-media-program-faculty

The Technocultural Studies major is an interdisciplinary integration of current research in cultural history and theory with innovative hands-on production in digital media and "low-tech." It focuses on the fine and performing arts, media arts, community media, literature and cultural studies as they relate to technology and science. Backed by critical perspectives and the latest forms of research and production skills, students enjoy the mobility to explore individual research and expression, project-based collaboration and community engagement.

The Program. Preparatory course work involves a solid introduction to the history, ideas and current activities of technocultural studies. For depth subject matter, students in the major select to concentrate on either critical studies or creative production emphases, and work toward a final project. All majors are required to take at least one course from another department or program relevant to their area of study, upon approval from Technocultural Studies, and may take more courses with approval. The final project for the critical studies emphasis consists of a substantial research paper. The final project for the creative production emphasis will be a major individual or collaborative work. Plans for final projects must be approved in advance.

Major Advisor. Information on the current Academic Advisors can be obtained by contacting the Arts Group Advising Center at 530-752-0616 or http://arts.ucdavis.edu/arts-group-undergraduate-advising.

Career Paths. Technocultural Studies is designed to prepare graduates to be highly adaptable, collaborative, multi-skilled and current with the latest developments. Perhaps most importantly is self-motivation: students do best when fueled by their own passions and plot their own directions, while held to very high standards. We feel this is the best education for living and working in a complex, rapidly changing world. Final research papers and creative production portfolios will provide graduate school admissions committees, employers or clients with tangible evidence of Technocultural Studies graduates' track records and talents.

Preparatory Subject Matter **Units:** 28

TCS 001	Introduction to Technocultural Studies	4
TCS 005	Media Archaeology	4
TCS 007A	Technocultural Workshop; Digital Imaging	1
TCS 007B	Technocultural Workshop; Digital Video	1
TCS 007C	Technocultural Workshop; Digital Sound	1
TCS 007D	Technocultural Workshop; Web Design	1
TCS 007E	Technocultural Workshop; Topics in Digital Production	1
AMS 001A	Science and American Culture	4
OR		
AMS 005	Technology in American Lives	4

Depth Subject Matter **Units:** 44

TCS 190	Research Methods in Technocultural Studies	4
TCS 191	Writing Across Media	4

Production Emphasis

Choose five from production based Technocultural Studies:

TCS 100	Experimental Digital Cinema I	4
TCS 101	Experimental Digital Cinema II	4
TCS 103	Interactivity and Animation	4
TCS 104	Documentary Production	4
TCS 110	Object-Oriented Programming for Artists	4
TCS 111	Community Media Production	4
TCS 112	New Radio Features and Documentary	4
TCS 113	Community Networks	4
TCS 121	Introduction to Electronic Sound	4
TCS 122	Intermediate Sonic Arts	4
TCS 123	Sight and Soundtrack	4
TCS 192	Internship (Discontinued)	1-4

Choose two from Technocultural Studies:

TCS 120	History of Sound in the Arts	4
TCS 150	Introduction to Theories of the Technoculture	4
TCS 151	Topics in Virtuality	4
TCS 152	New Trends in Technocultural Arts	4
TCS 153	Concepts of Innovative Soundtracks	4
TCS 154	Outsider Machines	4
TCS 155	Introduction to Documentary Studies	4
TCS 158	Technology and the Modern American Body	4
TCS 159	Media Subcultures	4

Choose a four-unit class from another department or program relevant to the student's area of concentration, as approved by Technocultural Studies.

Studies Emphasis

Choose two from production based Technocultural Studies:

TCS 100	Experimental Digital Cinema I	4
TCS 101	Experimental Digital Cinema II	4
TCS 103	Interactivity and Animation	4
TCS 104	Documentary Production	4
TCS 110	Object-Oriented Programming for Artists	4
TCS 111	Community Media Production	4
TCS 112	New Radio Features and Documentary	4
TCS 113	Community Networks	4
TCS 121	Introduction to Electronic Sound	4
TCS 122	Intermediate Sonic Arts	4
TCS 123	Sight and Soundtrack	4
TCS 192	Internship (Discontinued)	1-4

Choose five from Technocultural Studies:

TCS 120	History of Sound in the Arts	4
TCS 150	Introduction to Theories of the Technoculture	4
TCS 151	Topics in Virtuality	4
TCS 152	New Trends in Technocultural Arts	4
TCS 153	Concepts of Innovative Soundtracks	4
TCS 154	Outsider Machines	4
TCS 155	Introduction to Documentary Studies	4

TCS 158	Technology and the Modern American Body	4
TCS 159	Media Subcultures	4

Choose a four-unit class from another department or program relevant to the student's area of concentration, as approved by Technocultural Studies.

TCS 198	Directed Group Study (Discontinued)	1-5

Total: 72

Technocultural Studies | TCS Courses

Courses in TCS:

TCS 001—Introduction to Technocultural Studies (4)
Extensive Writing; Lecture—3 hours. Contemporary developments in the fine and performing arts, media arts, digital arts, and literature as they relate to technological and scientific practices. GE credit: AH, VL, WE. Effective: 2012 Fall Quarter.

TCS 005—Media Archaeology (4)
Lecture/Discussion—3 hours; Term Paper. Evolution of media technologies and practices beginning in the 19th Century as they relate to contemporary digital arts practices. Special focus on the reconstruction of the social and artistic possibilities of lost and obsolete media technologies. GE credit: AH, SE, VL, WE. Effective: 2012 Fall Quarter.

TCS 007A—Technocultural Workshop; Digital Imaging (1)
Seminar—1 hour. Workshops in technocultural digital skills; Digital Imaging. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 007B—Technocultural Workshop; Digital Video (1)
Seminar—1 hour. Workshops in technocultural digital skills; Digital Video. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 007C—Technocultural Workshop; Digital Sound (1)
Seminar—1 hour. Workshops in technocultural digital skills; Digital Sound. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 007D—Technocultural Workshop; Web Design (1)
Seminar—1 hour. Workshops in technocultural digital skills; Web Design. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 007E—Technocultural Workshop; Topics in Digital Production (1)
Seminar—1 hour. Workshops in technocultural digital skills; Topics in Digital Production. May be repeated for credit. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 100—Experimental Digital Cinema I (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): CTS 020 or ART 012 or TCS 007B; TCS 170B; or equivalent with consent of instructor. Class size limited to 20 students. Experimental approaches to the making of film and video in the age of digital technologies. Builds upon foundation provided by course 20. Instruction in technical, conceptual, creative, and critical skills for taking a project from idea to fruition. GE credit: AH, OL, VL. Effective: 2017 Spring Quarter.

TCS 101—Experimental Digital Cinema II (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): TCS 100 Continuation of course 100 with further exploration of digital cinema
creation. Additional topics include new modes of distribution, streaming, installation and exhibition. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 103—Interactivity and Animation (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Fundamentals of creating interactive screen-based work. Theories of interactivity, linear versus non-linear structures and audience involvement and participation. Use of digital production tools to produce class projects. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 104—Documentary Production (4)
Lecture/Discussion—3 hours; Project (Term Project). Prerequisite(s): TCS 007B; TCS 155; Or equivalent proficiency to TCS 007B. Traditional and new forms of documentary, with focus on technocultural issues. Skills and strategies for producing work in various media. Progression through all stages of production, from conception through post-production to critique. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 110—Object-Oriented Programming for Artists (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): TCS 001 Introduction to object-oriented programming for artists. Focus on understanding the metaphors and potential of object-oriented programming for sound, video, performance, and interactive installations. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 111—Community Media Production (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Use of video and new media tools to address social issues among neighborhood and community groups. Students will use basic video, sound, and lighting techniques as they work with local groups in a group video project. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 112—New Radio Features and Documentary (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. New feature and documentary production for radio and other audiophonic media, including audio streaming websites and installation. Emphasis on new and experimental approaches to audio production for broadcast on community radio and in international arts programming. Effective: 2012 Fall Quarter.

TCS 113—Community Networks (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Impact and implications of computer-based networks in community, civic, and social life. Subjects may include community-access computer sites, neighborhood wireless networks, the digital divide, open-source software, and citizen action. Effective: 2012 Fall Quarter.

TCS 115—Electronics for Artists (4)
Laboratory—3 hours; Lecture—3 hours. Creative application of electronic technology relevant to media and fine arts involving both electronic principles and hands-on application. Effective: 2012 Fall Quarter.

TCS 120—History of Sound in the Arts (4)
Lecture—3 hours; Term Paper. Prerequisite(s): TCS 001 A survey of the use of sound, voice, noise, and modes of listening in the modernist, avante-garde, and experimental arts, from the late 19th Century to the present. Focus on audiophonic and audiovisual technologies. Effective: 2012 Fall Quarter.

TCS 121—Introduction to Electronic Sound (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Introduction to the use of electronic sound within the arts. Techniques and aesthetics of experimental contemporary practices. Creation of original sound works. Effective: 2018 Winter Quarter.

TCS 122—Intermediate Sonic Arts (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): TCS 121; TCS 170C Techniques of recording, editing, mixing, and synthesis to combine voice, field recordings, and electronic signals. Incorporating live, recorded, and found sounds to create multidimensional stories. Presentation of live performances, audio recordings, and sound installations. Effective: 2012 Fall Quarter.

TCS 123—Sight and Soundtrack (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): TCS 007C; TCS 170C The use of sound to articulate, lend mood or subconciously underscore visual, environmental or performative situations, combining music, voice, sound effects and other noises to create sound designs that enhance, alter or support action and movement. Effective: 2012 Fall Quarter.

TCS 125—Advanced Sound: Performance and Improvisation (4)
Practice—3 hours; Workshop—3 hours. Prerequisite(s): TCS 121; TCS 122; or Consent of Instructor. Culmination of TCS sound courses. Class will focus on performance and improvisation, culminating in a final public performance. Students will be expected to do extensive reading and rehearsal outside of class time. Effective: 2012 Fall Quarter.

TCS 130—Fundamentals of 3D Computer Graphics (4)
Laboratory—3 hours; Lecture—3 hours. A foundation course that teaches students the theory of three dimensional computer graphics, including modeling, rendering and animation. Development of practical skills through the use of professional software to create computer graphics Effective: 2012 Fall Quarter.

TCS 131—Character Animation (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): TCS 130; or Consent of Instructor. The art of character animation in three dimensional computer animation. Movement theory, principles of animation, animation timing. Development of technical and practical skills. Effective: 2012 Fall Quarter.

TCS 150—Introduction to Theories of the Technoculture (4)
Extensive Writing; Lecture/Discussion—3 hours. Major cultural theories of technology with emphasis on media, communications, and the arts. Changing relationships between technologies, humans, and culture. Focus on the evolution of modern technologies and their reception within popular and applied contexts. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 151—Topics in Virtuality (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): TCS 001 Social, political, economic, and aesthetic factors in virtual reality. Artificial environments, telepresence, and simulated experience. Focus on contemporary artists' work and writing. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 152—New Trends in Technocultural Arts (4)
Lecture/Discussion—3 hours; Term Paper. Current work at the intersection of the arts, culture, science, and technology including biological and medical sciences, computer science and communications, and artificial intelligence and digital media. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 153—Concepts of Innovative Soundtracks (4)
Lecture/Discussion—3 hours; Term Paper. Innovative and unconventional soundtracks in cinema, media arts, and fine arts. Introduction to basic analytical skills for understanding sound-image relationships. Effective: 2012 Fall Quarter.

TCS 154—Outsider Machines (4)
Lecture/Discussion—3 hours; Term Paper. Invention, adaptation and use of technologies outside the mainstream, commonsense, and the possible. Topics include machines as metaphor and embodied thought, eccentric customizing and and fictional technologies. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 155—Introduction to Documentary Studies (4)
Lecture/Discussion—3 hours; Term Paper. Recent evolution of the documentary. The personal essay film; found-footage/appropriation work; non-linear, multi-media forms; spoken word; storytelling; oral history recordings; and other examples of documentary expression. GE credit: ACGH, AH, DD, VL. Effective: 2012 Fall Quarter.

TCS 158—Technology and the Modern American Body (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): TCS 001; (AMS 001A or AMS 005) The history and analysis of the relationships between human bodies and technologies in modern society. Dominant and eccentric examples of how human bodies and technologies influence one another and reveal underlying cultural assumptions. (American Studies 158.) GE credit: ACGH, AH, WE. Effective: 2012 Fall Quarter.

TCS 159—Media Subcultures (4)
Lecture/Discussion—3 hours; Term Paper. Relationships between subcultural groups and media technologies. Media as the cohesive and persuasive force of subcultural activities. List-servs, websites, free radio, fan 'zines, and hip-hop culture. GE credit: ACGH, VL. Effective: 2012 Fall Quarter.

TCS 160—Ghosts of the Machine: How Technology Rewires our Senses (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Historical, aesthetic and critical approaches to how information technologies produced ghost effects or a sense of terror in response to new media like the photograph, gramophone, film, typewriter, computer, Turing Machine. Focus on technological media transforms sense perception. (Science and Technology Studies 160.) GE credit: ACGH, AH, SS, VL, WE. Effective: 2013 Fall Quarter.

TCS 170A—Advanced Technocultural Workshop (1)
Seminar—1 hour. Prerequisite(s): TCS 007A; Or equivalent. Workshop in advanced technocultural digital skills: Digital Imaging. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 170B—Advanced Technocultural Workshop (1)
Seminar—1 hour. Prerequisite(s): TCS 007B; Or equivalent. Workshop in advanced technocultural digital skills: Digital Video. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 170C—Advanced Technocultural Workshop (1)
Seminar—1 hour. Prerequisite(s): TCS 007C Workshop in advanced technocultural digital skills: Digital Sound. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 170D—Advanced Technocultural Workshop (1)
Seminar—1 hour. Prerequisite(s): TCS 007D Workshop in advanced technocultural digital skills: Web Design. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 170E—Advanced Technocultural Workshop (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Workshop in advanced technocultural digital skills: Topics in Digital Production. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 175—Small Scale Film Production (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Lecture and intensive workshop teaching small-scale film production. Appointments as a(n) director, director of photography, actor, writer, lighting designer, sound designer and other critical positions are used to produce and submit a short film to a film festival. May be repeated up to 2 time(s). (Dramatic Art 175.) Effective: 2012 Fall Quarter.

TCS 190—Research Methods in Technocultural Studies (4)
Lecture/Discussion—3 hours; Project (Term Project). Introduction to basic research methods for Technocultural Studies: electronic and archived images, sounds and data, satellite downlinking, radiowave scanning, and oral histories. GE credit: VL, WE. Effective: 2012 Fall Quarter.

TCS 191—Writing Across Media (4)
Extensive Writing; Lecture/Discussion—3 hours. Introduction to experimental approaches to writing for different media and artistic practices. How written texts relate to the images, sounds, and performances in digital and media production. GE credit: WE. Effective: 2012 Fall Quarter.

TCS 192—Internship (1-4) ***Review all entries***
Internship—3-12 hours. Supervised internship on or off campus in area relevant to Technocultural Studies. May be repeated up to 2 time(s). (P/NP grading only.) Effective: 2012 Fall Quarter.

TCS 192—Internship (1-4) ***Review all entries Discontinued***
Internship—3-12 hours. Supervised internship on or off campus in area relevant to Technocultural Studies. May be repeated up to 2 time(s). (P/NP grading only.) Effective: 2018 Fall Quarter.

TCS 197T—Tutoring in Technocultural Studies (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of Instructor. Undergraduates assist the instructor by tutoring students in one of the department's regularly scheduled courses. May be repeated up to 8 unit(s). (P/NP grading only.) Effective: 2012 Fall Quarter.

TCS 198—Directed Group Study (1-5) ***Review all entries***
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2012 Fall Quarter.

TCS 198—Directed Group Study (1-5) ***Review all entries Discontinued***
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2018 Fall Quarter.

TCS 199—Special study for advanced undergraduates (1-5) ***Review all entries***
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Guided study with faculty member in independent scholarly activity. May be repeated up to 8 unit(s). (P/NP grading only.) Effective: 2012 Fall Quarter.

TCS 199—Special study for advanced undergraduates (1-5) ***Review all entries Discontinued***
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Guided study with faculty member in independent scholarly activity. May be repeated up to 8 unit(s). (P/NP grading only.) Effective: 2018 Fall Quarter.

Technology Management Minor; Graduate School of Management

Technology Management Minor; Graduate School of Management | Technology Management Minor

School Office. Gallagher Hall; 530-752-7658

The Graduate School of Management offers a minor in Technology Management to undergraduate students. This minor complements students' undergraduate studies with courses in the ways in which engineering and science-based industrial enterprises manage and use knowledge from science, engineering and technology. The minor also provides students with business and management skills that should enable them to use their engineering and science education more effectively in a technology environment.

To complete the minor, students must complete a minimum of 20 units of coursework in the minor with a GPA of 2.000 or better. Students may petition to have the minor noted on their transcript by following the process designated by their college, which allows the Graduate School of Management to approve the minor electronically. Contact your college's academic advisor for more information.

Minor Requirements **Units:** 20

Choose five:

MGT 120	Managing and Using Information Technology	4
MGT 140	Marketing for the Technology-Based Enterprise	4
MGT 150	Technology Management	4
MGT 160	Financing New Business Ventures	4
MGT 170	Managing Costs and Quality	4
MGT 180	Supply Chain Planning and Management	4

Most prerequisites could be used to partially satisfy the University's General Education requirements for science and engineering majors. No grade lower than a C- will be accepted in any prerequisite course.

Total: 20

Textiles (Graduate Group)

Textiles (Graduate Group) | Textiles (Graduate Group) M.S.

Ning Pan, Ph.D., Chairperson of the Group

Group Office. 129 Everson Hall; 530-752-8035; nerabaud@ucdavis.edu; http://textiles.ucdavis.edu

Faculty. http://textiles.ucdavis.edu/faculty.html

Graduate Study. The Graduate Group in Textiles offers a program of study and research leading to the M.S. degree. Students in the program are trained in an interdisciplinary approach emphasizing the physical and behavioral science aspects of textiles. Research areas include chemical, physical, biochemical, and mechanical properties of fibers and polymers as well as fibrous assemblies, including fabrics, composites, paper, and nonwovens; and psychological and sociological factors relating to perception and consumption of textiles and apparel. Extensive specialized fiber, polymer, and textiles research facilities and a behavioral research laboratory are available. For detailed information regarding the program, address the Chairperson of the Group.

Graduate Advisors. Y.L. Hsieh, G. Sun

Textiles & Clothing

Textiles & Clothing | TXC Information

(College of Agricultural and Environmental Sciences)

You-Lo Hsieh, Ph.D., Chairperson of the Division

Division Office. 129 Everson Hall; 530-752-6650; http://textiles.ucdavis.edu

Faculty. http://textiles.ucdavis.edu/faculty.html

Textiles & Clothing | TXC B.S.

(College of Agricultural and Environmental Sciences)

You-Lo Hsieh, Ph.D., Chairperson of the Division

Division Office. 129 Everson Hall; 530-752-6650; http://textiles.ucdavis.edu

Faculty. http://textiles.ucdavis.edu/faculty.html

The Major Program

The textiles and clothing major emphasizes the connections among (a) the physical characteristics of textile products, (b) human perceptions of and behavior toward these products, and (c) global economic trends affecting the textile/apparel marketplace. An integrative knowledge base links textile products with people and processes, to focus on the production, distribution, and consumer use of textiles and apparel; see also Fiber and Polymer Science.

The Program. The textiles and clothing major offers two options: textile science and marketing/economics. The Textile Science option provides students with a broad knowledge base in both the social and physical sciences. This base includes production, end-use applications and care of textiles and apparel, physical and chemical properties of textiles, and social-psychological and economic aspects of textiles and clothing. The Marketing/Economics option emphasizes social science and business course work, while also providing students with an awareness of the physical nature of textile products.

Major Advisor. You-Lo Hsieh

Advising Center for the major is located in 1204 RMI south 530-752-3250 or 129B Everson Hall 530-754-8368.

Internships and Career Alternatives. Textiles and clothing majors can pursue internships and careers in apparel production and merchandising, retail management, international marketing, textile testing and conservation, and textiles journalism. The majority of textiles and clothing graduates accept entry-level management and technical positions within the textile and apparel industry or in related fields; e.g., merchandising and marketing, production, research and development, technical service and design. Students may also pursue graduate studies in textiles, business, and other areas depending on their specific selections of restricted elective course work.

Preparatory Subject Matter **Units:** 42-44

Choose one:

PLS 021	Application of Computers in Technology	3
ECS 015	Introduction to Computers	4
ECS 030	Programming and Problem Solving (Discontinued)	4

ECN 001A	Principles of Microeconomics	4
ECN 001B	Principles of Macroeconomics	4

Choose one:

ANT 002	Cultural Anthropology	5
SAS 001	Critical Inquiry into Contemporary Issues	4
AHI 001A	Ancient Mediterranean Art	4
AHI 001B	Medieval and Renaissance Art	4
AHI 001C	Baroque to Modern Art	4
AHI 001D	Arts of Asia	4

PHY 001A	Principles of Physics	3
OR		
PHY 010	Topics in Physics for Nonscientists	4

PSC 001	General Psychology	4
SOC 002	Self and Society	4
STA 013	Elementary Statistics	4
TXC 006	Introduction to Textiles	4
TXC 007	Style and Cultural Studies	4
TXC 008	The Textiles and Apparel Industries	4

Choose one of the following two options:

Marketing/Economics Option **Units:** 86-88

Additional Preparatory Subject Matter for the option.

MGT 011A	Elementary Accounting	4
MGT 011B	Elementary Accounting	4
CHE 010	Concept of Chemistry	4
OR		
CHE 002A	General Chemistry	5
MAT 016A	Short Calculus	3
MAT 016B	Short Calculus	3

Depth Subject Matter

ARE 100A	Intermediate Microeconomics: Theory of Production and Consumption	4
ARE 100B	Intermediate Microeconomics: Imperfect Competition, Markets and Welfare Economics	4
ARE 106	Econometric Theory and Applications	4
ARE 136	Managerial Marketing	4
STA 103	Applied Statistics for Business and Economics	4
PSC 151	Social Psychology	4
OR		
CNS 100	Consumer Behavior	3
FPS 110	Plastics in Society and the Environment	4
TXC 107	Social and Psychological Aspects of Clothing	4
TXC 162	Textile Fabrics	3
TXC 162L	Textile Fabrics Laboratory	1
TXC 163	Textile Coloration and Finishing	3
TXC 163L	Textile Coloration and Finishing Laboratory	1
TXC 164	Principles of Apparel Production	3
TXC 165	Textile Processes	3
TXC 171	Clothing Materials Science	4
TXC 173	Principles of Fashion Marketing	3
TXC 174	Introduction to World Trade in Textiles and Clothing	4

Restricted Electives

Choose 12 units:

ARE 018	Business Law	4
ARE 112	Fundamentals of Organization Management	4
ARE 142	Personal Finance	3
ARE 155	Operations Research and Management Science	4
ARE 157	Analysis for Operations and Production Management	4
ARE 171A	Financial Management of the Firm (Discontinued)	4
ARE 171B	Financial Management of the Firm (Discontinued)	4
ANT 122A	Economic Anthropology	4
ANT 126A	Anthropology of Development	4
CNS 100	Consumer Behavior	3
DES 077	Introduction to Structural Design for Fashion	4
DES 107	Advanced Structural Design for Fashion	4
DES 143	History of Fashion	4
ECN 101	Intermediate Macro Theory	4
ECN 121A	Industrial Organization	4
ECN 121B	Industrial Organization	4
ECN 134	Financial Economics	4
ECN 162	International Economic Relations	4

AND

Other relevant course work.

Foreign language units may be used to satisfy any or all of the required 12 units.

MAT 016C	Short Calculus	3
PSC 151	Social Psychology	4
SOC 123	American Society	4
SOC 126	Social Interaction	4
SOC 140	Social Stratification	4
SOC 141	Industrialization and Social Change	4

SOC 145 (Discontinued 1990)

TXC 180A	Introduction to Research in Textiles	2
TXC 180B	Introduction to Research in Textiles	2
TXC 230	Behavorial Science Concepts in Textiles	3
TXC 293	Recent Advances in Textiles	3

With consent of instructor.

AND

Maximum of five units:

TXC 192	Internship in Textiles and Clothing	1-12
OR		
TXC 199	Special Study for Advanced Undergraduates	1-5

Textile Science Option **Units:** 86-87

Additional Preparatory Subject Matter for the option.

CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 008A	Organic Chemistry: Brief Course	2
CHE 008B	Organic Chemistry: Brief Course	4
MAT 016A	Short Calculus	3

Depth Subject Matter

ARE 112	Fundamentals of Organization Management	4
ARE 113	Fundamentals of Marketing Management	4
DES 143	History of Fashion	4
PSC 151	Social Psychology	4
OR		
CNS 100	Consumer Behavior	3
FPS 100	Principles of Polymer Materials Science	3
FPS 161	Structure and Properties of Fibers	3
FPS 161L	Textile Chemical Analysis Laboratory	1
TXC 107	Social and Psychological Aspects of Clothing	4
TXC 162	Textile Fabrics	3
TXC 162L	Textile Fabrics Laboratory	1
TXC 163	Textile Coloration and Finishing	3
TXC 163L	Textile Coloration and Finishing Laboratory	1
TXC 164	Principles of Apparel Production	3
TXC 165	Textile Processes	3
TXC 171	Clothing Materials Science	4
TXC 173	Principles of Fashion Marketing	3
TXC 174	Introduction to World Trade in Textiles and Clothing	4

Restricted Electives

Choose 16 units:

ARE 018	Business Law	4
ARE 141 (Discontinued 1998)		
ARE 142	Personal Finance	3
ARE 155	Operations Research and Management Science	4
ARE 171A	Financial Management of the Firm (Discontinued)	4
ARE 171B	Financial Management of the Firm (Discontinued)	4
PLS 120	Applied Statistics in Agricultural Sciences	4
CHE 002C	General Chemistry	5
CHE 128A	Organic Chemistry	3
CHE 128B	Organic Chemistry	3

CHE 128C	Organic Chemistry	3
CMN 042 (Nonexistent)		
CMN 130	Group Communication	4
CMN 136	Organizational Communication	4
CMN 140	Introduction to Mass Communication	4
CRD 162	People, Work and Technology	5
CNS 100	Consumer Behavior	3
DES 077	Introduction to Structural Design for Fashion	4
DES 107	Advanced Structural Design for Fashion	4
DES 142A	World Textiles: Eastern Hemisphere	4
DES 142B	World Textiles: Western Hemisphere	4
ECN 100	Intermediate Micro Theory	4
ECN 101	Intermediate Macro Theory	4
ECN 121A	Industrial Organization	4
ECN 121B	Industrial Organization	4
ECN 134	Financial Economics	4
FPS 110	Plastics in Society and the Environment	4
Foreign Language units may be used to satisfy any or all of the required 16 units.		
MGT 011A	Elementary Accounting	4
MGT 011B	Elementary Accounting	4
MAT 016B	Short Calculus	3
MAT 016C	Short Calculus	3
PSC 151	Social Psychology	4
SOC 025	Sociology of Popular Culture	4
SOC 123	American Society	4
SOC 126	Social Interaction	4
SOC 140	Social Stratification	4
SOC 148	Collective Behavior	4
SOC 159	Work, Employment, and Careers in the 21st Century	4
SOC 175	Mass Communication	4
STA 106	Applied Statistical Methods: Analysis of Variance	4
STA 108	Applied Statistical Methods: Regression Analysis	4
TXC 180A	Introduction to Research in Textiles	2
TXC 180B	Introduction to Research in Textiles	2
TXC 230	Behavorial Science Concepts in Textiles	3
TXC 293	Recent Advances in Textiles	3
With consent of instructor.		
AND		
Maximum of five units:		
TXC 192	Internship in Textiles and Clothing	1-12
OR		
TXC 199	Special Study for Advanced Undergraduates	1-5

Total: 128-132

Textiles & Clothing | TXC Minor

(College of Agricultural and Environmental Sciences)

You-Lo Hsieh, Ph.D., Chairperson of the Division

Division Office. 129 Everson Hall; 530-752-6650; http://textiles.ucdavis.edu

Faculty. http://textiles.ucdavis.edu/faculty.html

The Division of Textiles and Clothing offers a minor program for non-majors interested in satisfying secondary career objectives. For acceptance into the program see the staff advisor in 129B Everson Hall.

Minor Advisor. G. Sun

Textiles and Clothing **Units:** 18

Choose one:		
TXC 006	Introduction to Textiles	4
TXC 007	Style and Cultural Studies	4
TXC 008	The Textiles and Apparel Industries	4
Choose 14 units:		
FPS 100	Principles of Polymer Materials Science	3
FPS 110	Plastics in Society and the Environment	4
FPS 161	Structure and Properties of Fibers	3
FPS 161L	Textile Chemical Analysis Laboratory	1
TXC 107	Social and Psychological Aspects of Clothing	4
TXC 162	Textile Fabrics	3
AND		
TXC 162L	Textile Fabrics Laboratory	1
TXC 163	Textile Coloration and Finishing	3
AND		
TXC 163L	Textile Coloration and Finishing Laboratory	1
TXC 164	Principles of Apparel Production	3
TXC 165	Textile Processes	3
TXC 171	Clothing Materials Science	4
TXC 173	Principles of Fashion Marketing	3
TXC 174	Introduction to World Trade in Textiles and Clothing	4
		Total: 18

Textiles & Clothing | TXC Courses

Questions pertaining to the following courses should be directed to the instructor or to the Division of Textiles and Clothing. See also courses in Fiber and Polymer Science.

Courses in TXC:

TXC 006—Introduction to Textiles (4)
Laboratory—3 hours; Lecture—3 hours. Introduction to the structure and properties of textiles. Consumer
use and fabric characteristics are emphasized. GE credit: SE, SL, VL. Effective: 1997 Winter Quarter.

TXC 007—Style and Cultural Studies (4)
Discussion/Laboratory—1 hour; Lecture/Discussion—3 hours. The multiple and overlapping influences of gender, sexuality, ethnicity, and class on constructions of identity and community are explored through the study of style in popular culture and everyday life. Continuity and change in clothing and appearance styles are interpreted. GE credit: AH, SS, VL, WC, WE. Effective: 2010 Fall Quarter.

TXC 008—The Textiles and Apparel Industries (4)
Lecture—4 hours. Textile and apparel industries including fashion theory, production, distribution, and consumption of textile goods. GE credit: SS. Effective: 1997 Winter Quarter.

TXC 092—Internship in Textiles and Clothing (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Work experience off campus in a textiles or clothing-related area. Supervision by a member of the Textiles and Clothing faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

TXC 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

TXC 099—Special Study for Lower Division Students (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

TXC 107—Social and Psychological Aspects of Clothing (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SOC 002 Social and cognitive factors influencing management and perception of personal appearance in everyday life. Concepts and methods appropriate to the study of meaning of clothes in social and cultural contexts. GE credit: SS, VL, WE. Effective: 1997 Winter Quarter.

TXC 162—Textile Fabrics (3)
Lecture—3 hours. Prerequisite(s): TXC 006 Properties of fabrics as related to serviceability, comfort, and appearance. GE credit: SE, VL. Effective: 1997 Winter Quarter.

TXC 162L—Textile Fabrics Laboratory (1)
Laboratory—3 hours. Prerequisite(s): TXC 162 (can be concurrent) Laboratory methods and procedures employed in studying properties of textile fabrics as related to serviceability, comfort, and appearance. GE credit: QL, SE, VL, WE. Effective: 1997 Winter Quarter.

TXC 163—Textile Coloration and Finishing (3)
Lecture—3 hours. Prerequisite(s): TXC 006; (FPS 110 or CHE 008B) Basic principles of textile dyeing, printing, and finishing; color theory; structure, properties, and application of dyes and finishes; factors affecting application and fastness; maintenance of dyed and finished textiles. GE credit: SE, VL. Effective: 1997 Winter Quarter.

TXC 163L—Textile Coloration and Finishing Laboratory (1)
Laboratory—3 hours. Prerequisite(s): TXC 163 (can be concurrent) Demonstrates various aspects of dyeing, printing, and finishing of textile substrates including the effect of fiber and finish type, and
physical and chemical variables on dyeing and finishing processes and on the properties of the resultant textile. GE credit: QL, SE, SL, WE. Effective: 1997 Winter Quarter.

TXC 164—Principles of Apparel Production (3)
Lecture—3 hours. Prerequisite(s): TXC 006 or TXC 008 Overview of characteristics, technology, processes, and research in apparel manufacturing industries including study of government statistics, material utilization and fabrication, mechanization, management, and production engineering. GE credit: OL, SS, VL. Effective: 1997 Winter Quarter.

TXC 165—Textile Processes (3)
Lecture/Discussion—3 hours. Prerequisite(s): TXC 006 Physical processes involved in the production of textiles from the individual fiber to the finished fabric. Includes spinning, texturing, yarn formation, weaving preparation, weaving and knitting, tufting and
fabric finishing. GE credit: SE. Effective: 1997 Winter Quarter.

TXC 171—Clothing Materials Science (4)
Discussion/Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): TXC 006; TXC 008; And senior standing. The properties, characterization, and performance evaluation of clothing materials and structures for specific functional applications. Principles and methods related to wetting and transport properties, fabric hand and aesthetic properties, clothing comfort, and material and assembly technology. GE credit: SE, VL. Effective: 1997 Winter Quarter.

TXC 173—Principles of Fashion Marketing (3)
Lecture—3 hours. Prerequisite(s): TXC 008; (ECN 001A or ECN 001AV); (ARE 113 or ARE 136) Study of basic elements of fashion marketing including philosophy and objectives, organization, merchandising, pricing, promotion and personnel. GE credit: SS, VL. Effective: 2018 Spring Quarter.

TXC 174—Introduction to World Trade in Textiles and Clothing (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): TXC 008 Structure of the global fiber/textile/apparel complex and its distribution patterns with an overview of political, economic and technological factors that are changing these industries and their markets. GE credit: SS, WC. Effective: 2005 Winter Quarter.

TXC 180A—Introduction to Research in Textiles (2)
Laboratory—6 hours. Prerequisite(s): Consent of Instructor. Senior standing with textile-related major. Senior thesis on independent problems. Research begun in course 180A will be continued and completed in course 180B. GE credit: SS, WE. Effective: 1997 Winter Quarter.

TXC 180B—Introduction to Research in Textiles (2)
Laboratory—6 hours. Prerequisite(s): Consent of Instructor. Senior standing with textile-related major. Senior thesis on independent problems. Research begun in course 180A will be continued and completed in course 180B. GE credit: SS, WE. Effective: 1997 Winter Quarter.

TXC 192—Internship in Textiles and Clothing (1-12)
Laboratory—3-36 hours. Prerequisite(s): Consent of Instructor. Work-learn experience off campus in a textiles or clothing-related area. Supervision by a member of the Textiles and Clothing faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

TXC 197T—Tutoring in Textiles and Clothing (1-5)
Discussion/Laboratory—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division textiles-related major. Tutoring of students in Textiles and Clothing courses. Assistance with discussion groups and laboratory sections under supervision of instructor. May be repeated for credit if tutoring another textiles course. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

TXC 198—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

TXC 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

TXC 230—Behavorial Science Concepts in Textiles (3)
Lecture—3 hours. Prerequisite(s): TXC 107; Upper division or graduate course in statistics (e.g., AMR 120) and one in a behavioral science (e.g., PSC 145). Examination of theories and research concerning relationships between clothing and human behavior with emphasis on research techniques, including methods of measuring clothing variables. Effective: 1997 Winter Quarter.

TXC 290—Seminar (1)
Seminar—1 hour. Critical review of selected topics of current interest in textiles. (S/U grading only.) Effective: 1997 Winter Quarter.

TXC 290C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Individual faculty members meet with their graduate students. Critical presentations of original research are made by graduate students. Research activities are planned. Discussions are led by major professors for their research groups. (S/U grading only.) Effective: 1997 Winter Quarter.

TXC 293—Recent Advances in Textiles (3)
Lecture—3 hours. Prerequisite(s): Two upper division courses in Textiles and Clothing or consent of instructor. Critical reading and evaluation on selected topics of current interest in textiles. Multidisciplinary aspects of the topics selected will be stressed. May be repeated for credit. May be repeated for credit. Effective: 1997 Winter Quarter.

TXC 298—Group Study (1-5)
Variable. Effective: 1997 Winter Quarter.

TXC 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

TXC 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Theatre & Dance

Theatre & Dance | DRA Information

(College of Letters and Science)

David Grenke, Chairperson of the Department

Department Office. 101 Art Building; 530-752-0888; Fax 530-752-8818; http://arts.ucdavis.edu/theatre-dance

Faculty. http://arts.ucdavis.edu/theatre-dance-faculty

Theatre & Dance | DRA A.B.

(College of Letters and Science)

David Grenke, Chairperson of the Department

Department Office. 101 Art Building; 530-752-0888; Fax 530-752-8818; http://arts.ucdavis.edu/theatre-dance

Faculty. http://arts.ucdavis.edu/theatre-dance-faculty

The Theatre and Dance Major Program

The A.B. degree in Theatre and Dance provides students with an appreciation for an understanding of performance and its role in culture and society. The program offers a strong foundation in all aspects of drama, theatre, dance performance, and production. Students build significant skills in specific areas (including acting, directing, choreography, design, playwriting and devising, production skills and management) as well as achieving a broad knowledge of theatre and dance.

Productions and Facilities. Each year's schedule includes opportunities to work with professional directors and choreographers in three Granada Artists-in-Residence productions; the Main Stage Dance/Theatre Productions; Film Festival at UC Davis; projects generated through the Institute for Exploration in Theatre, Dance and Performance; and workshops and performance projects developed by M.F.A and Ph.D. students. These productions are staged in our proscenium (Main), thrust (Wyatt), black box (Arena), performance studio (Della Davidson Performance Studio) and intimate laboratory theatre (Lab A), as well as in the Mondavi Center's Vanderhoef Studio Theatre and Jackson Hall. These productions are part of the academic program of the department and serve an important purpose in the study of theatre and dance. Participation is open to all students.

Production Requirements. All students completing a major in Theatre and Dance must participate in productions, including work in at least two of the following three areas: acting/dance; design (scenic, costume, lighting, painting, props, sound); directing/playwriting/stage management, as well as crew assignments for a minimum of two productions and work in production labs.

Graduate Study. The Department of Theatre and Dance offers programs of study and research leading to the M.F.A. in Theatre and Dance (the interdisciplinary weaving of acting, directing, design, choreography and practice and research) and contributing to the Graduate Group Ph.D. in Performance Studies. Detailed information may be obtained by contacting the Graduate Program Administrators: for the M.F.A. in Theatre and Dance, 530-752-8710, and for the Graduate Group in Performance Studies, 530-754-6973.

Preparatory Subject Matter **Units:** 24

Choose one:

DRA 021A	Fundamentals of Acting	4
DRA 040A	Beginning Modern Dance	2
DRA 040B	Intermediate Modern Dance	2
DRA 042A	Beginning Ballet	2
DRA 042B	Intermediate Ballet	2

DRA 028	Entertainment Engineering and Management: Stagecraft to Stage Management	4
DRA 055	Contemporary Local, National and Global Theatre, Dance and Performance	4
DRA 056A	History of Theatre and Dance I: Myth, Magic and Madness	4
DRA 056B	History of Theatre and Dance II: Romance, Revenge and Rebellion	4
DRA 056C	History of Theatre and Dance III: Sex, Society and the State	4

Depth Subject Matter **Units:** 42

Choose two:

DRA 142	History of Modern Dance	4
DRA 150	American Theatre and Drama	4
DRA 155	Representing Race in Performance	4
DRA 155A	African American Dance and Culture in the United States, Brazil and the Caribbean	4
DRA 156A	History of Theatre and Dance: Ancient to 1650 (Discontinued)	4
DRA 156B	Theatre in History and Place: Local, National and Global Conditions for Production	4
DRA 156C	Modern Aesthetic Movements in Performance	4
DRA 156D	Theatre History Through Shakespeare	4
DRA 158	Performance Studies Undergraduate Seminar	4
DRA 159	Contemporary Experimental Performance, Theatre and Drama	4

Choose one:

DRA 124A	Principles of Theatrical Design: Scenery	4
DRA 124B	Principles of Theatrical Design: Scenery	4
DRA 124C	Principles of Theatrical Design: Lighting	4
DRA 124D	Principles of Theatrical Design: Costume	4
DRA 124E	Costume Design for Film	4
DRA 126	Principles of Performing Arts Stage Management	4

Choose one:

DRA 120	Intermediate Acting/Gateway: The Actor's Toolkit	4
DRA 141	Introduction to the Fundamentals of Movement	4
DRA 144A	Introduction to Traditional Chinese Embodied Culture	4
DRA 146A	Professional Track Modern Dance I	4

Choose one:

DRA 127A	Principles of Directing	4
DRA 140A	Dance Composition	4
DRA 160A	Principles of Playwriting	4

Choose eight units:

DRA 114	Theatre on Film	4
DRA 115	Advanced Study of Major Film Makers	4
DRA 116	Design on Screen	4
DRA 120	Intermediate Acting/Gateway: The Actor's Toolkit	4
DRA 121A	Advanced Acting: Scene Study and Script Analysis	4
DRA 121B	Advanced Acting: Rehearsal Processes and Practices	4
DRA 121C	Advanced Acting: Character and Style	4
DRA 122A	Advanced Acting: Devising and Collaboration	4
DRA 122B	Advanced Acting: Shakespeare and His Contemporaries	4
DRA 122C	Advanced Acting: Special Topics in Acting	4
DRA 124A	Principles of Theatrical Design: Scenery	4
DRA 124B	Principles of Theatrical Design: Scenery	4
DRA 124C	Principles of Theatrical Design: Lighting	4
DRA 124D	Principles of Theatrical Design: Costume	4
DRA 124E	Costume Design for Film	4
DRA 125	Scenic Painting: Studio	4
DRA 126	Principles of Performing Arts Stage Management	4
DRA 127A	Principles of Directing	4
DRA 127B	Principles of Directing	4
DRA 130	Approaches to Theatrical Design: Practice and Theory	4
DRA 135	Voice in Performance	2
DRA 140A	Dance Composition	4
DRA 140B	Dance Composition	4
DRA 140C	Dance Composition	4
DRA 141	Introduction to the Fundamentals of Movement	4
DRA 142	History of Modern Dance	4
DRA 143	Dance and Movement Studio	1-4
DRA 144A	Introduction to Traditional Chinese Embodied Culture	4
DRA 144B	Traditional Chinese Physical Culture	4
DRA 144C	Daoist Philosophy in Traditional Chinese Movement Culture	4
DRA 146A	Professional Track Modern Dance I	4
DRA 146B	Professional Track Modern Dance II	4
DRA 146C	Professional Track Modern Dance III	4
DRA 150	American Theatre and Drama	4
DRA 154	Asian Theatre and Drama: Contexts and Forms	4
DRA 155A	African American Dance and Culture in the United States, Brazil and the Caribbean	4
DRA 156A	History of Theatre and Dance: Ancient to 1650 (Discontinued)	4
DRA 156B	Theatre in History and Place: Local, National and Global Conditions for Production	4
DRA 156C	Modern Aesthetic Movements in Performance	4
DRA 156D	Theatre History Through Shakespeare	4
DRA 158	Performance Studies Undergraduate Seminar	4
DRA 159	Contemporary Experimental Performance, Theatre and Drama	4
DRA 160A	Principles of Playwriting	4
DRA 160B	Principles of Playwriting	4
DRA 170	Media Theatre	4
DRA 174	Acting for Camera	4
DRA 175	Small Scale Film Production	4

Choose six units from at least two of:

DRA 145	Directed Choreography Projects	4
DRA 180A	Theatre Laboratory: Performance	1-5

DRA 180B	Theatre Laboratory: Design	1-4
DRA 180C	Theatre Laboratory: Management, Directing, other Production Team	1-5
DRA 180D	Theatre Laboratory: Crew	2-4

Choose one:

DRA 180E	Theatre Laboratory: Scenic	1-4
DRA 180F	Theatre Laboratory: Costume	1-4
DRA 180G	Theatre Laboratory: Lighting/Sound/Projection	1-4
DRA 195	Senior Capstone Experience	2

Honors Major Requirements

Preparatory Subject Matter **Units:** 24

DRA 028	Entertainment Engineering and Management: Stagecraft to Stage Management	4
DRA 055	Contemporary Local, National and Global Theatre, Dance and Performance	4
DRA 056A	History of Theatre and Dance I: Myth, Magic and Madness	4
DRA 056B	History of Theatre and Dance II: Romance, Revenge and Rebellion	4
DRA 056C	History of Theatre and Dance III: Sex, Society and the State	4

Choose one:

DRA 021A	Fundamentals of Acting	4
DRA 040A	Beginning Modern Dance	2
DRA 040B	Intermediate Modern Dance	2
DRA 042A	Beginning Ballet	2
DRA 042B	Intermediate Ballet	2

Depth Subject Matter **Units:** 56

Choose two:

DRA 142	History of Modern Dance	4
DRA 150	American Theatre and Drama	4
DRA 155	Representing Race in Performance	4
DRA 155A	African American Dance and Culture in the United States, Brazil and the Caribbean	4
DRA 156A	History of Theatre and Dance: Ancient to 1650 (Discontinued)	4
DRA 156B	Theatre in History and Place: Local, National and Global Conditions for Production	4
DRA 156C	Modern Aesthetic Movements in Performance	4
DRA 156D	Theatre History Through Shakespeare	4
DRA 158	Performance Studies Undergraduate Seminar	4
DRA 159	Contemporary Experimental Performance, Theatre and Drama	4

Choose one:

DRA 124A	Principles of Theatrical Design: Scenery	4
DRA 124B	Principles of Theatrical Design: Scenery	4
DRA 124C	Principles of Theatrical Design: Lighting	4
DRA 124D	Principles of Theatrical Design: Costume	4

DRA 124E	Costume Design for Film	4
DRA 126	Principles of Performing Arts Stage Management	4

Choose one:

DRA 120	Intermediate Acting/Gateway: The Actor's Toolkit	4
DRA 141	Introduction to the Fundamentals of Movement	4
DRA 144A	Introduction to Traditional Chinese Embodied Culture	4
DRA 146A	Professional Track Modern Dance I	4

Choose one:

DRA 127A	Principles of Directing	4
DRA 140A	Dance Composition	4
DRA 160A	Principles of Playwriting	4

Choose six units from at least two of:

DRA 145	Directed Choreography Projects	4
DRA 180A	Theatre Laboratory: Performance	1-5
DRA 180B	Theatre Laboratory: Design	1-4
DRA 180C	Theatre Laboratory: Management, Directing, other Production Team	1-5

DRA 180D	Theatre Laboratory: Crew	4

Choose one:

DRA 180E	Theatre Laboratory: Scenic	1-4
DRA 180F	Theatre Laboratory: Costume	1-4
DRA 180G	Theatre Laboratory: Lighting/Sound/Projection	1-4

Choose 16 units:

DRA 114	Theatre on Film	4
DRA 115	Advanced Study of Major Film Makers	4
DRA 116	Design on Screen	4
DRA 120	Intermediate Acting/Gateway: The Actor's Toolkit	4
DRA 121A	Advanced Acting: Scene Study and Script Analysis	4
DRA 121B	Advanced Acting: Rehearsal Processes and Practices	4
DRA 121C	Advanced Acting: Character and Style	4
DRA 122A	Advanced Acting: Devising and Collaboration	4
DRA 122B	Advanced Acting: Shakespeare and His Contemporaries	4
DRA 122C	Advanced Acting: Special Topics in Acting	4
DRA 124A	Principles of Theatrical Design: Scenery	4
DRA 124B	Principles of Theatrical Design: Scenery	4
DRA 124C	Principles of Theatrical Design: Lighting	4
DRA 124D	Principles of Theatrical Design: Costume	4
DRA 124E	Costume Design for Film	4
DRA 125	Scenic Painting: Studio	4
DRA 126	Principles of Performing Arts Stage Management	4
DRA 127A	Principles of Directing	4
DRA 127B	Principles of Directing	4
DRA 130	Approaches to Theatrical Design: Practice and Theory	4
DRA 135	Voice in Performance	2
DRA 140A	Dance Composition	4
DRA 140B	Dance Composition	4
DRA 140C	Dance Composition	4
DRA 141	Introduction to the Fundamentals of Movement	4
DRA 142	History of Modern Dance	4
DRA 143	Dance and Movement Studio	1-4

DRA 144A	Introduction to Traditional Chinese Embodied Culture	4
DRA 144B	Traditional Chinese Physical Culture	4
DRA 144C	Daoist Philosophy in Traditional Chinese Movement Culture	4
DRA 146A	Professional Track Modern Dance I	4
DRA 146B	Professional Track Modern Dance II	4
DRA 146C	Professional Track Modern Dance III	4
DRA 150	American Theatre and Drama	4
DRA 154	Asian Theatre and Drama: Contexts and Forms	4
DRA 155A	African American Dance and Culture in the United States, Brazil and the Caribbean	4
DRA 156A	History of Theatre and Dance: Ancient to 1650 (Discontinued)	4
DRA 156B	Theatre in History and Place: Local, National and Global Conditions for Production	4
DRA 156C	Modern Aesthetic Movements in Performance	4
DRA 156D	Theatre History Through Shakespeare	4
DRA 158	Performance Studies Undergraduate Seminar	4
DRA 159	Contemporary Experimental Performance, Theatre and Drama	4
DRA 160A	Principles of Playwriting	4
DRA 160B	Principles of Playwriting	4
DRA 170	Media Theatre	4

At least eight of these units must be in a specific area determined in consultation with a faculty advisor and reflecting preparation for the honors project.

DRA 194HA	Special Study for Honors Students	3
DRA 194HB	Special Study for Honors Students	3
DRA 195	Senior Capstone Experience	2

Total: 66-80

Theatre & Dance | DRA Minor

(College of Letters and Science)

David Grenke, Chairperson of the Department

Department Office. 101 Art Building; 530-752-0888; Fax 530-752-8818; http://arts.ucdavis.edu/theatre-dance

Faculty. http://arts.ucdavis.edu/theatre-dance-faculty

The Theatre and Dance Major Program

The Department of Theatre and dance facilities are complemented by an excellent faculty and production staff…three times a year, as well as the Granada-Artist-in-Residence program, which brings a major director, choreographer or playwright to the department three times a year. The faculty includes a group of distinguished scholars in history, theory and criticism whose research and teaching focuses on social engagement and activism. Students, both majors and non-majors, can audition for department productions or apply to the Institute for Exploration in Theatre, Dance and Performance to do related work.

The A.B. degree in Theatre and Dance provides students with an appreciation for an understanding of performance and its role in culture and society. The program offers a strong foundation in all aspects of drama, theatre, dance performance, and production. Students build significant skills in specific areas (including acting, directing, choreography, design, playwriting and devising, production skills and management) as well as achieving a broad knowledge of theatre and dance.

Productions and Facilities. Each year's schedule includes opportunities to work with professional directors and choreographers in three Granada Artists-in-Residence productions; the Main Stage Dance/Theatre Productions; Film Festival at UC Davis; projects generated through the Institute for Exploration in Theatre, Dance and Performance; and workshops and performance projects developed by M.F.A and Ph.D. students. These productions are staged in our proscenium (Main), thrust (Wyatt), black box (Arena), performance studio (Della Davidson Performance Studio) and intimate laboratory theatre (Lab A), as well as in the Mondavi Center's Vanderhoef Studio Theatre and Jackson Hall. These productions are part of the academic program of the department and serve an important purpose in the study of theatre and dance. Participation is open to all students.

Transfer Students. As described above, all students completing a major in Theatre and Dance must participate in dramatic productions, including work in at least two of the following three areas: acting/dance; design (scenic, costume, lighting, painting, props, sound); directing/playwriting/stage management as well as crew assignments for a minimum of two productions while in residence at UC Davis. Transfer students should see the major advisor for an evaluation of your previous experience.

Guest Artists. The Granada Visiting Artists Program brings distinguished professional artists to the campus each year, to be in residence for a quarter. These working professional artists interact closely with students in the classroom and rehearsal halls and provide them excellent pre-professional experiences of theater practice.

Graduate Study. The Department of Theatre and Dance offers programs of study and research leading to the M.F.A. in Theatre and Dance (the interdisciplinary weaving of acting, directing, design, choreography and practice and research) and contributing to the Graduate Group Ph.D. in Performance Studies. Detailed information may be obtained by contacting the Graduate Program Administrators: for the M.F.A. in Theatre and Dance, 530-752-8710, and for the Graduate Group in Performance Studies, 530-754-6973.

Theatre and Dance **Units:** 22

Choose two:

DRA 142	History of Modern Dance	4
DRA 150	American Theatre and Drama	4
DRA 155	Representing Race in Performance	4
DRA 155A	African American Dance and Culture in the United States, Brazil and the Caribbean	4
DRA 156A	Performance Analysis	4
DRA 156B	Theatre in History and Place: Local, National and Global Conditions for Production	4
DRA 156C	Modern Aesthetic Movements in Performance	4
DRA 156D	Theatre History Through Shakespeare	4
DRA 158	Performance Studies Undergraduate Seminar	4
DRA 159	Contemporary Experimental Performance, Theatre and Drama	4

Choose eight units:

DRA 114	Theatre on Film	4
DRA 115	Advanced Study of Major Film Makers	4
DRA 116	Design on Screen	4
DRA 120	Intermediate Acting/Gateway: The Actor's Toolkit	4
DRA 121A	Advanced Acting: Scene Study and Script Analysis	4
DRA 121B	Advanced Acting: Rehearsal Processes and Practices	4
DRA 121C	Advanced Acting: Character and Style	4
DRA 122A	Advanced Acting: Devising and Collaboration	4
DRA 122B	Advanced Acting: Shakespeare and His Contemporaries	4

DRA 122C	Advanced Acting: Special Topics in Acting	4
DRA 124A	Principles of Theatrical Design: Scenery	4
DRA 124B	Principles of Theatrical Design: Scenery	4
DRA 124C	Principles of Theatrical Design: Lighting	4
DRA 124D	Principles of Theatrical Design: Costume	4
DRA 124E	Costume Design for Film	4
DRA 125	Scenic Painting: Studio	4
DRA 126	Principles of Performing Arts Stage Management	4
DRA 127A	Principles of Directing	4
DRA 127B	Principles of Directing	4
DRA 130	Approaches to Theatrical Design: Practice and Theory	4
DRA 140A	Dance Composition	4
DRA 140B	Dance Composition	4
DRA 140C	Dance Composition	4
DRA 141	Introduction to the Fundamentals of Movement	4
DRA 142	History of Modern Dance	4
DRA 143	Dance and Movement Studio	1-4
DRA 144A	Introduction to Traditional Chinese Embodied Culture	4
DRA 144B	Traditional Chinese Physical Culture	4
DRA 144C	Daoist Philosophy in Traditional Chinese Movement Culture	4
DRA 150	American Theatre and Drama	4
DRA 154	Asian Theatre and Drama: Contexts and Forms	4
DRA 155	Representing Race in Performance	4
DRA 155A	African American Dance and Culture in the United States, Brazil and the Caribbean	4
DRA 156A	Performance Analysis	4
DRA 156B	Theatre in History and Place: Local, National and Global Conditions for Production	4
DRA 156C	Modern Aesthetic Movements in Performance	4
DRA 156D	Theatre History Through Shakespeare	4
DRA 158	Performance Studies Undergraduate Seminar	4
DRA 159	Contemporary Experimental Performance, Theatre and Drama	4
DRA 160A	Principles of Playwriting	4
DRA 160B	Principles of Playwriting	4
DRA 170	Media Theatre	4
DRA 180D	Theatre Laboratory: Crew	2-4

Choose one:

DRA 145	Directed Choreography Projects	4
DRA 180A	Theatre Laboratory: Performance	1-5
DRA 180B	Theatre Laboratory: Design	1-4
DRA 180C	Theatre Laboratory: Management, Directing, other Production Team	1-5
DRA 180E	Theatre Laboratory: Scenic	1-4
DRA 180F	Theatre Laboratory: Costume	1-4
DRA 180G	Theatre Laboratory: Lighting/Sound/Projection	1-4

Total: 22

Theatre & Dance | DRA Courses

Courses in DRA:

DRA 001—Theatre, Performance and Culture (4)
Discussion—1 hour; Lecture—3 hours. Not open to students who have completed DRA 001S. Introductory investigation of the nature of performance, moving from performance theory to consideration of various manifestations of performance including theatre, film and media, performance art, dance, sports, rituals, political and religious events, and other "occasions." GE credit: AH, DD, VL, WE. Effective: 2013 Fall Quarter.

DRA 001S—Theatre, Performance and Culture (4)
Discussion—1 hour; Lecture—3 hours. Not open to students who have completed DRA 001. Introductory investigation of the nature of performance, moving from performance theory to consideration of various manifestations of performance including theatre, film and media, performance art, dance, sports, rituals, political and religious events, and other "occasions." For Short Term Programs Abroad. Effective: 2005 Spring Quarter.

DRA 002—Acting: The Basics: History and Practice (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the historical evolution of the actor – from ancient Greece & Asia to the Hollywood icon & postdramatic performer – and the practical foundations of acting for stage and screen. Onstage opportunities within lecture course structure. GE credit: AH, OL, VL. Effective: 2015 Winter Quarter.

DRA 005—Understanding Performance: Appreciation of Modern Theatre, Dance, Film and Performance Art for the Humanities and Sciences (4)
Discussion/Laboratory—1 hour; Lecture/Discussion—3 hours. Relevance of theatre and performance to modern culture, science and society. Approaches to theatre/dance/media/performance art, integrated into Mondavi Centre for the Arts and Theatre and Dance Department programs. (SAS 041.) GE credit: AH, DD, OL, VL, WC, WE. Effective: 2015 Winter Quarter.

DRA 010—Introduction to Acting (4)
Discussion/Laboratory—4 hours. Fundamentals of movement, speech, theatre games, and improvisation. Selected reading and viewing of theatre productions. Intended for students not specializing in Dramatic Art. GE credit: OL, VL. Effective: 2015 Spring Quarter.

DRA 011—Introduction to Presentation Skills (2)
Lecture/Lab—4 hours. Class size limited to 20 students. Development of clear oral and physical communication skills that build confidence, presentational style and clarity for students whose command of English is at a basic level. Effective: 2013 Spring Quarter.

DRA 014—Introduction to Contemporary Dance (4)
Laboratory—3 hours; Lecture—3 hours. Introduction to basic issues and methods in contemporary dance. Focus on preparing the student for dancing and dance-making through basic techniques of improvisation and composition. Consideration of dance as
a cultural practice. GE credit: VL. Effective: 2012 Fall Quarter.

DRA 020—Introduction to Dramatic Art (4)
Discussion—1 hour; Lecture—3 hours. Understanding and appreciation of both the distinctive and collaborative contributions of playwright, actor, director, and designer to the total work of dramatic art. Study of plays from the major periods of dramatic art in their cultural contexts. GE credit: AH, VL, WC, WE. Effective: 2013 Fall Quarter.

DRA 021A—Fundamentals of Acting (4)
Laboratory—4 hours; Lecture—2 hours. Open to students planning to major in Theatre and Dance. Physical and psychological resources of the actor. Experience in individual and group contact and communication, theatre games, advanced improvisation, sound and movement dynamics. Viewing of theatre productions. GE credit: OL, VL. Effective: 2016 Fall Quarter.

DRA 024—Visual Aspects of Dramatic Art (4)
Lecture/Discussion—4 hours. Understanding and appreciation of the visual aspects of dramatic art: theatre architecture, scenery, lighting, costume, and makeup. GE credit: AH, VL. Effective: 2013 Fall Quarter.

DRA 025—Technical Aspects of Dramatic Production (3)
Lecture—3 hours. Technical principles of dramatic production emphasizing the three areas of scenic, costume and lighting studios. Subjects covered include basic tools, materials and equipment, production practices; and the interdisciplinary and collaborative nature of dramatic production. Effective: 1997 Winter Quarter.

DRA 026—Performing Arts Production Management (3)
Lecture—3 hours. Theoretical study of performing arts administration and backstage operations from audition through performance. Techniques of scheduling,
production management, stage management, technical direction, audience control, box office, promotion, safety, accommodations for persons with
disabilities and emergency procedures. Effective: 1997 Winter Quarter.

DRA 028—Entertainment Engineering and Management: Stagecraft to Stage Management (4)
Lecture/Discussion—4 hours. Introduction to technical production and management in theatre and dance. Topics include stage management, theatrical mechanics, backstage protocols, scenic construction, properties, lighting, basic shop tools, costume shop use and construction, basic make-up, sound equipment, graphics and robotics for theatre. GE credit: AH. Effective: 2015 Spring Quarter.

DRA 030—Theatre Laboratory (1-5)
Project (Term Project)—2 hours. Prerequisite(s): Consent of Instructor. Projects in acting, production, scene design, costuming, lighting, directing, and playwriting. Participation in departmental productions. May be repeated up to 11 unit(s). Effective: 2016 Spring Quarter.

DRA 040A—Beginning Modern Dance (2)
Discussion/Laboratory—4 hours. Fundamentals of modern dance focusing primarily on the development of techniques and creative problem solving. Basic anatomy, dance terminology, and a general overview of modern dance history. May be repeated up to 2 time(s) Non-dance majors can only repeat the course once; dance majors may apply to the dance faculty advisor for permission to repeat more times; dance is a repetitive practice that involves constant reiteration and demands this for improvement and better understanding of the somatic and proprioceptive skills. GE credit: AH, VL. Effective: 2017 Spring Quarter.

DRA 040B—Intermediate Modern Dance (2)
Discussion/Laboratory—4 hours. Prerequisite(s): DRA 040A; or Consent of Instructor. Modern dance techniques. Basic anatomy, dance terminology and a general overview of modern dance history. May be repeated up to 1 time(s) For Dance majors, further repeats negotiated with faculty advisor in dance. GE credit: AH, VL. Effective: 2016 Spring Quarter.

DRA 041A—Beginning Jazz Dance (2)
Discussion/Laboratory—4 hours. Fundamentals of jazz dance; includes warm-ups, dance techniques and combinations. Basic anatomy, dance terminology and general overview of jazz dance history. May be repeated up to 1 time(s). Effective: 2017 Spring Quarter.

DRA 041B—Intermediate Jazz Dance (2)
Discussion/Laboratory—4 hours. Prerequisite(s): DRA 041A; or Consent of Instructor. Warm-ups, dance techniques and combinations at the intermediate level. Basic anatomy, dance terminology and a general overview of jazz styles of historically significant jazz choreographers and leading contemporary jazz choreographers. May be repeated up to 1 time(s) with consent of instructor. Effective: 2016 Spring Quarter.

DRA 042A—Beginning Ballet (2)
Discussion/Laboratory—4 hours. Fundamentals of ballet, focusing on the development of technique through proper alignment, quality, and rhythm. Basic anatomy, ballet terminology, and dance history. May be repeated for credit with consent of instructor. GE credit: AH, VL. Effective: 2016 Spring Quarter.

DRA 042B—Intermediate Ballet (2)
Discussion/Laboratory—4 hours. Prerequisite(s): DRA 042A; or Consent of Instructor. Barre and center work at the intermediate level. Development and
refinement of technique through proper alignment, rhythmic, and qualitative understanding. Anatomy, ballet terminology, and dance history. May be repeated for credit with consent of instructor. GE credit: AH, VL. Effective: 2016 Spring Quarter.

DRA 043A—Contact Improvisation Dance (2)
Lecture/Lab—4 hours. Fundamentals of contact improvisation and its applications to all forms of dance, performance, sports, physical safety and health. Solo improvisation, safety, communication, alignment, basic lifting and weight-sharing, intuition, developing relaxed readiness and personal expression. May be repeated up to 2 time(s). GE credit: AH, VL. Effective: 2014 Fall Quarter.

DRA 043B—Intermediate Contact Improvisation (2)
Lecture/Lab—4 hours. Prerequisite(s): DRA 043A; or Consent of Instructor. Building on the fundamentals. Reviewing basics, extended improvising, skillfully working with partners of different sizes and abilities, advanced lifting, advanced safety practices, embracing risk and disorientation, subtle nuances of communication. May be repeated up to 2 time(s). GE credit: AH, VL. Effective: 2016 Spring Quarter.

DRA 044A—Beginning Hip Hop Dance (2)
Discussion/Laboratory—4 hours. Fundamentals of Hip Hop dance focusing on developing a fluid movement vocabulary, facility in body isolations, intricate rhythmic patterning, quick shifts of weight and mastering dance combinations. Discussions on Hip Hop dance history, styles and terminology. May be repeated up to 1 time(s). Effective: 2002 Fall Quarter.

DRA 044B—Intermediate Hip Hop Dance (2)
Discussion/Laboratory—4 hours. Prerequisite(s): DRA 044A; or Consent of Instructor. Expansion of Hip Hop dance vocabulary by focusing on mastering body isolations and intricate rhythmic techniques, complex dance combinations, advanced across the floor sequences. May be repeated up to 1 time(s). Effective: 2002 Fall Quarter.

DRA 055—Contemporary Local, National and Global Theatre, Dance and Performance (4)
Lecture/Discussion—4 hours. Introduction a range of contemporary theatre, dance and performance in local, national and international settings. Training in critical approaches to and aesthetic appreciation of these forms. Emphasis varies based on instructor. GE credit: AH, DD, VL, WC. Effective: 2015 Fall Quarter.

DRA 056A—History of Theatre and Dance I: Myth, Magic and Madness (4)
Lecture/Discussion—4 hours. Exploration of aesthetic movements in various disciplines of theatre and dance from the origins to 1550. Examination of Greek, Roman, Sanskrit, Kathakali, Chinese, Japanese, Mesoamerican, Medieval European, and Indigenous theatre and dance including oral, ritual and shamanic performance. Offered once a year. GE credit: AH, VL, WC. Effective: 2014 Fall Quarter.

DRA 056B—History of Theatre and Dance II: Romance, Revenge and Rebellion (4)
Lecture/Discussion—4 hours. Exploration of aesthetic movements in various disciplines of theatre and dance from 1550 to 1850. Examination of genres related to romance, revenge and rebellion using European, North and South American, and Asian examples. Offered once a year. GE credit: AH, VL, WC. Effective: 2015 Winter Quarter.

DRA 056C—History of Theatre and Dance III: Sex, Society and the State (4)
Lecture/Discussion—4 hours. Exploration of aesthetic movements in various disciplines of theatre and dance from 1850-1968. Examination of melodrama, popular theatre, naturalism, psychological realism, and the avant-garde using European, North and South American, Asian, and African examples. Offered once a year. GE credit: AH, VL, WC. Effective: 2015 Spring Quarter.

DRA 092—Internship in Dramatic Art (1-12)
Variable—1-12 hours. Prerequisite(s): Consent of instructor and department chairperson. Restricted to lower division students with less than 84 units completed. Internship outside the Department of Theatre and Dance enabling students to practice their skills. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2006 Fall Quarter.

DRA 098—Directed Group Study (1-5)
Primarily for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

DRA 099—Special Study for Undergraduates (1-5)
(P/NP grading only.) Effective: 1997 Winter Quarter.

DRA 111—Advanced Presentation Skills (2)
Lecture/Lab—4 hours. Class size limited 20 students. Development of clear oral and physical communication skills that build confidence, presentational style and clarity for students whose command of English is at a competent to fluent level. GE credit: OL. Effective: 2013 Spring Quarter.

DRA 111S—Representation and Identity in Culture and Cinema (4)
Film Viewing—4 hours; Lecture/Discussion—2 hours. Issues of personal and collective identity via study of film narratives from different cultures. Reflection of dominant cultural identities in film. Taught in Australia. Effective: 2006 Spring Quarter.

DRA 114—Theatre on Film (4)
Film Viewing—2 hours; Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Study of six/eight plays on film, using mixed casts and raising issues of diversity. Focus: sociohistorical context for production and reception, interpretation and analysis of topics (gender, ethnicity, age, politics, philosophy), and filming, screenwriting, design, and acting/directing for film. GE credit: AH, SS, VL. Effective: 2016 Fall Quarter.

DRA 115—Advanced Study of Major Film Makers (4)
Film Viewing—2 hours; Lecture/Discussion—3 hours. Analysis of the contribution of some outstanding film creators. Study of diverse aesthetic theories of the cinema and their application to selected films. May be repeated for credit when different film creator studied, or studied with a different methodological approach. GE credit: VL. Effective: 2016 Spring Quarter.

DRA 116—Design on Screen (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Analysis of the contribution of outstanding designers for cinema, television and filmed entertainment. Study of diverse aesthetic theories of production design and art direction, costume design, or cinematography. Introductory principles and practice, history. May be repeated up to 2 time(s) when topic differs. (CTS 116.) GE credit: AH, VL. Effective: 2013 Fall Quarter.

DRA 120—Intermediate Acting/Gateway: The Actor's Toolkit (4)
Lecture/Lab—6 hours. Prerequisite(s): DRA 021A; or Consent of Instructor. Limited enrollment. Implementation of acting tools drawn predominantly from Stanislavsky’s ‘system’. Gateway into the Advanced Acting courses. GE credit: OL, VL. Effective: 2013 Spring Quarter.

DRA 121A—Advanced Acting: Scene Study and Script Analysis (4)
Lecture/Lab—6 hours. Prerequisite(s): DRA 120; and Consent of Instructor. Limited enrollment. In-depth study, analysis and performance of texts from different eras, genres and styles. Implementation of tools to undertake independent preparation of character creation. May be repeated up to 8 unit(s) Since acting requires repetition to habituate the body and imagination to new practices, this course may be taken twice. New scripts and scenes must be undertaken in the repetition. GE credit: OL, VL. Effective: 2013 Spring Quarter.

DRA 121B—Advanced Acting: Rehearsal Processes and Practices (4)
Lecture/Lab—6 hours. Prerequisite(s): DRA 120; and Consent of Instructor. Limited enrollment. Development of rehearsal practice and etiquette, using a variety of scenes from different eras and genres. May be repeated up to 8 unit(s) The course has been established to enable visiting artists in residence to undertake the instruction, as well as faculty. Therefore, this course may be taken twice, as students will be exposed to different professional practitioners' working processes. New etudes, scripts and scenes must be undertaken in the repetition. GE credit: OL, VL. Effective: 2013 Spring Quarter.

DRA 121C—Advanced Acting: Character and Style (4)
Lecture/Lab—6 hours. Prerequisite(s): DRA 120; and Consent of Instructor. Limited enrollment. Study of psycho-physical techniques to create characters with an emphasis on non-realistic styles. May be repeated up to 8 unit(s) Since acting requires repetition to habituate the body and imagination to new practices, this course may be taken twice. New scripts and scenes must be undertaken in the repetition. GE credit: OL, VL. Effective: 2012 Fall Quarter.

DRA 122A—Advanced Acting: Devising and Collaboration (4)
Lecture/Lab—6 hours. Prerequisite(s): DRA 120; and Consent of Instructor. Limited enrollment. Study and practice of various devising techniques, to collaborate on and produce a series of short etudes and dramatic scenes/short plays. May be repeated up to 8 unit(s) Since acting requires repetition to habituate the body and imagination to new practices, this course may be taken twice. New scripts and scenes must be undertaken in the repetition. GE credit: OL, VL. Effective: 2016 Spring Quarter.

DRA 122B—Advanced Acting: Shakespeare and His Contemporaries (4)
Lecture/Lab—6 hours. Prerequisite(s): DRA 120; and Consent of Instructor. Limited enrollment. Study and performance of classical texts (monologues and dialogues), with a focus on Shakespeare and the Elizabethan world view. May be repeated up to 8 unit(s) Since acting requires repetition to habituate the body and imagination to new practices, this course may be taken twice. New monologues and scenes must be undertaken in the repetition. GE credit: OL, VL. Effective: 2013 Spring Quarter.

DRA 122C—Advanced Acting: Special Topics in Acting (4)
Lecture/Lab—6 hours. Prerequisite(s): DRA 120; and Consent of Instructor. Restricted to Theatre and Dance majors; limited enrollment. Intensive study and practical exploration of a specialized area; for example, World Theatre, Social Theatre, Physical Theatre, Musical Theatre, the Ancient Greeks, etc. May be repeated up to 8 unit(s). GE credit: AH, OL, VL. Effective: 2016 Fall Quarter.

DRA 124A—Principles of Theatrical Design: Scenery (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Pass One restricted to Theatre and Dance majors. Scene design processes, working drawings, sketching techniques, scale models, methods and materials of scenery construction. GE credit: AH, VL. Effective: 2018 Winter Quarter.

DRA 124B—Principles of Theatrical Design: Scenery (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Pass One restricted to Theatre and Dance majors. Analysis of plays in terms of scene design, elements of design, execution of designs for modern and period plays. GE credit: AH, VL. Effective: 2018 Winter Quarter.

DRA 124C—Principles of Theatrical Design: Lighting (4)
Lecture/Lab—4 hours. Prerequisite(s): Consent of Instructor. Pass One restricted to Theatre and Dance majors. Theories of lighting the stage, equipment and control systems, execution of lighting plots. GE credit: AH, VL. Effective: 2018 Winter Quarter.

DRA 124D—Principles of Theatrical Design: Costume (4)
Lecture/Discussion—4 hours. Prerequisite(s): DRA 024; Consent of Instructor. Pass one restricted to Theatre and Dance majors. Source materials for theatrical costuming, selecting fabrics, elements of design, analysis of plays in terms of costume design, execution of designs for modern and period plays. GE credit: AH, OL, VL. Effective: 2018 Winter Quarter.

DRA 124E—Costume Design for Film (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Pass One restricted to Theatre and Dance majors. Theory and practice of the art and business of film costume design. Script analysis, costume research, developing design concepts, budgeting, and current production practices and methods. Execution of designs for period and contemporary films. Viewing of current films. (CTS 124E.) GE credit: AH, OL, VL. Effective: 2018 Winter Quarter.

DRA 125—Scenic Painting: Studio (4)
Laboratory—3 hours; Lecture—2 hours; Studio—1 hour. Prerequisite(s): DRA 024 or DRA 028; or Consent of Instructor. upper division standing in Theatre and Dance, Art Studio, or Design. Scene painting techniques, practices and materials including color mixing and matching, wood graining, faux painting techniques, glazing, creating foliage, stone and brick. May be repeated up to 1 time(s) with consent of instructor. GE credit: AH, VL. Effective: 2016 Spring Quarter.

DRA 126—Principles of Performing Arts Stage Management (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Stage management principles for theatre, dance, musical theatre, music, and concerts. The dynamical role of the stage manager in the performing arts, upper-management team. Effective: 2014 Fall Quarter.

DRA 127A—Principles of Directing (4)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Director's creative approach to the play and to its staging. GE credit: VL. Effective: 2016 Spring Quarter.

DRA 127B—Principles of Directing (4)
Laboratory—4 hours; Lecture—2 hours; Rehearsal. Prerequisite(s): DRA 127A; or Consent of Instructor. Director's creative approach to the actor. GE credit: VL. Effective: 2016 Spring Quarter.

DRA 128—Principles of Theatre Sound (3)
Laboratory—3 hours; Lecture/Discussion—2 hours. Fundamentals of sound, sound equipment, and sound design as used in modern theatre and other performance venues. Assembly, set-up, and operation of basic theatre sound reinforcement system, recording system, and theatrical playback system. Effective: 2004 Winter Quarter.

DRA 130—Approaches to Theatrical Design: Practice and Theory (4)
Seminar—2 hours; Studio—4 hours. Prerequisite(s): DRA 124A or DRA 124B or DRA 124C or DRA 124D or DRA 124E; Upper division standing in Theatre and Dance, Art Studio or Design; or consent of instructor. Advanced design study in specific areas including but not limited to: research, design styles and concepts, new materials and techniques, scenery, lighting, costume, makeup, photography, projections, computer technology, spectacle and special effects, and alternative theatre forms and genres. May be repeated up to 3 time(s) when topic differs; when instructor differs. GE credit: AH, VL. Effective: 2016 Spring Quarter.

DRA 135—Voice in Performance (2)
Performance Instruction—4 hours. Prerequisite(s): DRA 021B; or Consent of Instructor. Progression of exercises to free, develop and strengthen the voice, as a human and then as an actor's instrument with emphasis on how the voice works, to freeing the channel for sound, to interpersonal communication. May be repeated up to 2 time(s). Effective: 2009 Fall Quarter.

DRA 140A—Dance Composition (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): DRA 040A or DRA 041A or DRA 042A; or Consent of Instructor. Introduction to the craft of choreography. Compose phrases and present movement studies based on the elements of choreography: motivation, space, time, force/energy. GE credit: VL. Effective: 2016 Spring Quarter.

DRA 140B—Dance Composition (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): DRA 140A Continuation of the study of choreography, focusing on the development of group choreography: duets, trios, quartets and group work, form, and accompaniment. Effective: 1999 Spring Quarter.

DRA 140C—Dance Composition (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): DRA 140A; DRA 140B Continuation of study of choreography focusing on sequencing movements for groups. The relation between dance and allied mediums of music, sets, costumes and lighting. Students conceptualize a choreographic issue and explore it through creation of short dance studies. Effective: 1999 Spring Quarter.

DRA 141—Introduction to the Fundamentals of Movement (4)
Lecture/Discussion—4 hours. Introduction to fundamentals of movement that combines intellectual and kinesthetic understanding of the body's skeletal and muscular systems. Explorations based on theories of various body mind specialists including Laban, Feldenkrais, Bartenieff and Sweigard as well as the eastern discipline of Yoga. GE credit: VL. Effective: 2014 Fall Quarter.

DRA 142—History of Modern Dance (4)
Lecture/Discussion—4 hours. Modern Dance tradition, focusing on its theorizations of individual and social identity. Students will write and choreograph analyses of principle dances in this tradition. GE credit: AH, VL, WE. Effective: 2015 Winter Quarter.

DRA 143—Dance and Movement Studio (1-4)
Discussion/Laboratory—2-8 hours. Prerequisite(s): Consent of Instructor. Special studies in dance and movement such as African, Balinese,
Baroque, Chinese, European, and stage combat. Offered as needed for stage productions. May be repeated up to 8 unit(s). GE credit: AH, VL. Effective: 2016 Spring Quarter.

DRA 144—Introduction to Traditional Chinese Physical Culture (4)
Lecture/Discussion—4 hours. Traditional Chinese Wushu practices, explored through practical work in dance laboratory conditions. Integration of practice with conceptual analysis; contemporary social, educational and artistic applications. GE credit: AH, SS. Effective: 2011 Fall Quarter.

DRA 144A—Introduction to Traditional Chinese Embodied Culture (4)
Lecture/Discussion—4 hours. Traditional Chinese Wushu practices, explored through practical work in dance laboratory conditions. Integration of practice with conceptual analysis; contemporary social, educational and artistic applications. GE credit: AH, DD, SS, VL, WC. Effective: 2014 Winter Quarter.

DRA 144B—Traditional Chinese Physical Culture (4)
Lecture/Discussion—4 hours. Prerequisite(s): DRA 144A Traditional Chinese Wushu practices, explored through practical work in dance laboratory conditions. Integration of practice with conceptual analysis; contemporary social, educational and artistic applications. May be repeated up to 2 time(s) when content and instructor varies and if student progression is required. GE credit: AH, DD, SS, VL, WC. Effective: 2014 Winter Quarter.

DRA 144C—Daoist Philosophy in Traditional Chinese Movement Culture (4)
Lecture/Discussion—4 hours. Prerequisite(s): DRA 144B Daoist practices of movement and their relation to daoist philosophy, explored through work in dance laboratory conditions. Integration of practice with conceptual analysis, and critical philosophy around values and ethical action. May be repeated up to 2 time(s) when content or instructor varies and if student progression is required. GE credit: AH, DD, VL, WC. Effective: 2014 Winter Quarter.

DRA 145—Directed Choreography Projects (4)
Lecture/Lab—6 hours. Prerequisite(s): DRA 140A; DRA 140B; DRA 140C; or Consent of Instructor. Conceptualization, creation, casting, rehearsing, and concert presentation of complete dances, with students integrating elements of stagecraft and directing the on-stage rehearsals. Effective: 1999 Winter Quarter.

DRA 146A—Professional Track Modern Dance I (4)
Lecture/Lab—6 hours. Prerequisite(s): Consent of Instructor. Professionally oriented performance training. Rigorous, consistent training regimen based on traditional modern dance technique. Breath and voice, skeletal and muscular placement, moving from the spine, contraction technique, movement intention. May be repeated up to 2 time(s). GE credit: VL. Effective: 2016 Spring Quarter.

DRA 146B—Professional Track Modern Dance II (4)
Lecture/Lab—6 hours. Prerequisite(s): DRA 146A; and Consent of Instructor. Body and space relationships in solos, duets and group work; stylistic variations of Graham technique; works of Paul Taylor. May be repeated up to 1 time(s). GE credit: VL. Effective: 2016 Spring Quarter.

DRA 146C—Professional Track Modern Dance III (4)
Lecture/Lab—6 hours. Prerequisite(s): DRA 146A; DRA 146B; and Consent of Instructor. Continuation of course 146B. Time as a theatrical device, sustaining movement and non-movement, phrasing, musicality. May be repeated up to 1 time(s). GE credit: VL. Effective: 2017 Winter Quarter.

DRA 150—American Theatre and Drama (4)
Lecture—4 hours. The history of the theatre from Colonial times to the present. Readings of selected plays. GE credit: ACGH, AH, DD, VL, WE. Effective: 2014 Winter Quarter.

DRA 151S—Australian Performance and Culture (4)
Lecture/Discussion—2 hours; Seminar—2 hours. Australian performance and theatre practices as a product of its culture of origin. Relationships between art and society. Taught in Australia. Effective: 2006 Spring Quarter.

DRA 154—Asian Theatre and Drama: Contexts and Forms (4)
Lecture/Discussion—4 hours. Selected Asian plays and performance forms in their cultural and artistic contexts; myth, ritual and the theatre; performance training, visual presentation of the text; political theatre; intercultural performance-the fusion of Asian and Western traditions. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

DRA 155—Representing Race in Performance (4)
Lecture—4 hours. Representation and performance of "race" in American culture featuring different sub-headings such as "African American Theatre" or "Asian-Americans on Stage." May be repeated up to 1 time(s) when topic differs. GE credit: AH, DD, WE. Effective: 2012 Spring Quarter.

DRA 155A—African American Dance and Culture in the United States, Brazil and the Caribbean (4)
Lecture/Discussion—4 hours. Comparative study of the African American dance forms in the U.S.A.,

Brazil, Haiti, Cuba, Jamaica, Barbados, and Trinidad. Examination of ritual, folk, and popular dance forms and the socio/historical factors that have influenced these forms. (AAS 155A.) GE credit: AH, VL, WC. Effective: 2012 Fall Quarter.

DRA 155B—Ancient and Contemporary Greek Theatre and Dance (6)
Discussion/Laboratory—10 hours; Performance Instruction—10 hours; Seminar—13 hours. Origins of early theatres and the first actors, playwrights and dancers and their powerful influence on western performance and thought up to present day. Offered in Greece. GE credit: AH. Effective: 2011 Fall Quarter.

DRA 156AN—Performance Analysis (4)
Discussion—1 hour; Lecture—3 hours. Performance on the stage, in the street, in everyday life, ritual, and in politics. Satire, irony, creative protest and performance. Social movements, the state, and performance as tactical intervention. GE credit: AH, DD, WE. Effective: 2016 Spring Quarter.

DRA 156B—Theatre in History and Place: Local, National and Global Conditions for Production (4)
Discussion—1 hour; Lecture—3 hours. Exploration of local, national and global issues in theatre production, with special attention to historical changes in social and political contexts for performance. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

DRA 156C—Modern Aesthetic Movements in Performance (4)
Discussion—1 hour; Discussion/Laboratory—3 hours. Important movements in performance, especially theatre and dance, from realism to the present. Primary emphasis on Western traditions though others may be studied. GE credit: AH, WE. Effective: 2017 Spring Quarter.

DRA 156D—Theatre History Through Shakespeare (4)
Extensive Writing; Lecture—4 hours. Shakespeare's plays, theatre history, and theatre today. European contexts from 1590-2004 and international theatre from 20th century. Stagecraft, different media (print, stage, film), social/political environments, design, and cultural change (gender, sexuality and ethnicity). May be repeated up to 1 time(s). GE credit: AH, OL, WC, WE. Effective: 2014 Spring Quarter.

DRA 158—Performance Studies Undergraduate Seminar (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. DRA 156AN recommended. Focused inquiry into a particular genre, period, movement, artist, or theme in performance. Philosophical and aesthetic issues as well as historical and cultural performance contexts. In-depth research projects in relationship to the subject of inquiry. May be repeated for credit. GE credit: WE. Effective: 2016 Spring Quarter.

DRA 159—Contemporary Experimental Performance, Theatre and Drama (4)
Extensive Writing; Lecture/Discussion—3 hours. Evaluation and examination of the "New Theatre;" its experimental and innovative nature since the 1960s. Dance, film, stage, performance art and public acts of a performative nature. May be repeated up to 3 time(s) if content differs. GE credit: AH, DD, VL, WC, WE. Effective: 2014 Spring Quarter.

DRA 159S—Contemporary Experimental Performance, Theatre and Drama (4)
Lecture/Discussion—4 hours. Evaluation and examination of the "New Theatre;" its experimental and innovative nature since the 1960s. Dance, film, stage, performance art and public acts of a performative nature. May be repeated up to 12 unit(s) if instructor or content varies. GE credit: AH, WE. Effective: 2015 Winter Quarter.

DRA 160A—Principles of Playwriting (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Analysis of dramatic structure; preparation of scenarios; the composition of plays. GE credit: WE. Effective: 2018 Winter Quarter.

DRA 160B—Principles of Playwriting (4)
Lecture—4 hours. Prerequisite(s): DRA 160A; and Consent of Instructor. Analysis of dramatic structure; preparation of scenarios; the composition of plays. GE credit: WE. Effective: 2016 Spring Quarter.

DRA 170—Media Theatre (4)
Lecture—1 hour; Performance Instruction—1 hour; Rehearsal—2 hours. New media and application of in theatre devising and performance. Emphasis on collaborative process in relationship to integration of emerging technologies and formation of new theatrical works. Development of collaborative performance through lecture, demonstration, improvisation and experimentation. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2017 Spring Quarter.

DRA 174—Acting for Camera (4)
Lecture/Lab—6 hours. Prerequisite(s): Consent of Instructor. Analysis and practice of acting skills required for camera work and digital media. May be repeated up to 8 unit(s) when instructor differs. (CTS 174.) Effective: 2013 Spring Quarter.

DRA 175—Small Scale Film Production (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Lecture and intensive workshop teaching small-scale film production. Appointments as a(n) director, director of photography, actor, writer, lighting designer, sound designer and other critical positions are used to produce and submit a short film to a film festival. May be repeated up to 2 time(s). (TCS 175.) Effective: 2011 Fall Quarter.

DRA 180—Theatre Laboratory (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Projects in acting, production, scene design, costuming, lighting, directing, and playwriting. Participation in departmental productions. May be repeated for credit. Effective: 2016 Spring Quarter.

DRA 180A—Theatre Laboratory: Performance (1-5)
Rehearsal—12 hours. Prerequisite(s): Consent of Instructor. Limited enrollment. Rehearsal and performance of a production directed or choreographed by visiting Granada Artists-in-Residence and/or faculty, and/or the UG Edge Festival. May be repeated for credit Since each production involves different scripts, directions, challenges of rehearsal practices and performance processes, it is possible for students to appear in a variety of productions in the course of their education. Admission by audition. Effective: 2013 Spring Quarter.

DRA 180B—Theatre Laboratory: Design (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Design-related participation in theatre and dance productions involves research, creation and implementation of design concept in collaboration with the director and other members of the production team. May be repeated for credit Because each theatrical piece is conceived and produced afresh with new source material, scripts, and production style the challenges and assignments for the designers will be new each and every time they design a show. GE credit: AH, VL. Effective: 2016 Spring Quarter.

DRA 180C—Theatre Laboratory: Management, Directing, other Production Team (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Participation in theatre and dance production in management, direction, choreography, dramaturgy, writing or other production related role; research, creation and implementation of production concept in collaboration with members of the production team and cast. May be repeated up to 5 unit(s) May repeat multiple times but only for a total of five units. Permission to repeat is required from the Dramatic Art department. Effective: 2014 Fall Quarter.

DRA 180D—Theatre Laboratory: Crew (2-4)
Laboratory—6-12 hours. Prerequisite(s): Consent of Instructor. Participation in theatre and dance productions as backstage running crew which will involve skill development, rehearsal and execution of performance. May be repeated for credit. Effective: 2013 Spring Quarter.

DRA 180E—Theatre Laboratory: Scenic (1-4)
Laboratory—3-12 hours. Prerequisite(s): Consent of Instructor. Practical experience working on scenery and properties for theatre and dance department productions. Study and execution of basic scenery and prop engineering, construction, painting, rigging. Study of techniques, materials, tools, and equipment use. Skill development, professional etiquette. Safety training requirement. May be repeated for credit. Effective: 2013 Spring Quarter.

DRA 180F—Theatre Laboratory: Costume (1-4)
Laboratory—3-12 hours. Prerequisite(s): Consent of Instructor. Practical experience working on costumes for theatre and dance department productions. Study and execution of basic costume construction techniques and materials, tools, and equipment use. Skills development, professional etiquette. Safety training requirement. May be repeated for credit. Effective: 2013 Spring Quarter.

DRA 180G—Theatre Laboratory: Lighting/Sound/Projection (1-4)
Laboratory—3-12 hours. Prerequisite(s): Consent of Instructor. Practical experience working on lighting, sound or projections for theatre and dance department productions. Study and execution of basic techniques, materials, tools, and equipment use. Skill development, professional etiquette. Safety training requirement. May be repeated for credit. Effective: 2013 Spring Quarter.

DRA 192—Internships in Theatre and Dance (1-12)
Internship—3-36 hours. Theatre production experience in creative, technical or management areas. Experience in galleries, performance sites, or theatre/dance/physical theatre companies. May be repeated up to 12 unit(s). Not open to students who have completed DRA 192S. (P/NP grading only.) Effective: 2004 Fall Quarter.

DRA 192S—Internships in Theatre and Dance (1-12)
Internship—3-36 hours. Theatre production experience in creative, technical or management areas. Experience in galleries, performance sites, or theatre/dance/physical theatre companies. This course is offered in Sydney, Australia. May be repeated up to 12 unit(s). Not open to students who have completed DRA 192. (P/NP grading only.) Effective: 2005 Spring Quarter.

DRA 194HA—Special Study for Honors Students (3)
Independent Study—9 hours. Prerequisite(s): Qualification for Letters and Science Honors Program and admission to Theatre and Dance Senior Honors Program. Preparation and presentation of a culminating project, under the supervision of an instructor, in one of the creative or scholarly areas of Theatre and Dance. (P/NP grading only.) Effective: 2016 Spring Quarter.

DRA 194HB—Special Study for Honors Students (3)
Independent Study—9 hours. Prerequisite(s): Qualification for Letters and Science Honors Program and admission to Theatre and Dance Senior Honors Program. Preparation and presentation of a culminating project, under the supervision of an instructor, in one of the creative or scholarly areas of Theatre and Dance. Effective: 2016 Spring Quarter.

DRA 195—Senior Capstone Experience (2)
Lecture/Discussion—1 hour; Project (Term Project). Open to Theatre and Dance Majors who have completed 135 or more units. Capstone experience for majors. Examination, reflection and synthesis on development. Discussion of professional development and translatable skills. Individual project and development of portfolio. (P/NP grading only.) GE credit: AH, WE. Effective: 2016 Fall Quarter.

DRA 197T—Tutoring in Dramatic Art (1-5)
Tutorial—1-5 hours. Prerequisite(s): Consent of Instructor. Upper division or graduate standing with major in Theatre and Dance; consent of department chairperson. Leading of small voluntary groups affiliated with one of the department's regular courses. May be repeated for credit. (P/NP grading only.) Effective: 2016 Spring Quarter.

DRA 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

DRA 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

DRA 200—Methods and Materials in Theatre Research (4)
Seminar—3 hours; Term Paper. Essential research tools in theatre and related fields; bibliographies,
primary sources; methods of evaluating and presenting evidence; delineating research areas in the field. Effective: 1997 Winter Quarter.

DRA 211—Advanced Voice and Speech (3)
Laboratory—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open only to Dramatic Arts Students and Ph.D. students with an emphasis in Performance and Theatre. Review a progression of exercises to free, develop and strengthen the voice, first as a human instrument, and then as an actor's instrument using various texts such as Shakespeare, Ibsen and contemporary plays. Required for the M.F.A. degree in Acting. May be repeated up to 2 time(s). Effective: 2016 Spring Quarter.

DRA 212—Advanced Stage Movement (3)
Laboratory—6 hours. Prerequisite(s): Consent of Instructor. Graduate standing in the MFA Program. Open to advanced undergraduates by consent of instructor. Application of modes of exploration, breath placement, and the use of imagery as well as Laban's effort/shape system as a method of analysis in classic and modern plays. May be repeated for credit. Effective: 2016 Spring Quarter.

DRA 221—Special Problems in Advanced Acting (4)
Laboratory—4 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Advanced acting problems arising from differences in the type and style of plays selected from Greece to the present. May be repeated for credit. Effective: 1997 Winter Quarter.

DRA 224A—Seminar in Theatrical Design: Ancient Worlds--Early 17th Century (4)
Project (Term Project)—2 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Group study while focusing primarily on one discipline: scenic, costume or lighting design. Periods covered: Greek, Medieval, Renaissance, Shakespearean, Jacobean, early 17th century. Design projects include script analysis, research of period style, fashion, character development, developing design concepts, presentation skills. Effective: 2016 Spring Quarter.

DRA 224B—Seminar in Theatrical Design: Mid 17th Century to 1900 (4)
Project (Term Project)—2 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Group study focusing primarily on one discipline: scenic, costume or lighting design. Periods covered: Cavalier, Restoration 18th century opera and ballet, 19th century drama. Design projects include script analysis, research of period style, fashion, character development, developing design concepts,presentation skills. Effective: 2016 Spring Quarter.

DRA 224C—Seminar in Theatrical Design: the 20th Century (4)
Project (Term Project)—2 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Group study focusing primarily on one discipline-scenic, costume or lighting design. 20th century genres covered: Realism, Brecht, Musicals, Contemporary Dance, short narrative film. Design projects include script analysis, research of period style, fashion, character development, developing design concepts, presentation skills. Effective: 2016 Spring Quarter.

DRA 224D—Seminar in Theatrical Design: Contemporary Concepts (4)
Project (Term Project)—2 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Group study focusing primarily on one discipline: scenic, costume or lighting design. Emphasis on contemporary design concepts for new works and classics: Shakespeare, modern dance, concept plays and musicals. Script and character analysis for design in performance, research, design projects. Effective: 2016 Spring Quarter.

DRA 224E—Seminar in Theatrical Design: Advanced Concepts (4)
Project (Term Project)—2 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Group study focusing primarily on one discipline: scenic, costume or lighting design. Emphasis on special issues in contemporary design concepts for new works and classics. Script and character analysis for design in performance, research, design projects. Effective: 2016 Spring Quarter.

DRA 225—Performance Design Studio: Techniques and Media (2)
Studio—2 hours. Prerequisite(s): DRA 224A (can be concurrent) or DRA 224B (can be concurrent) or DRA 224C (can be concurrent) or DRA 224D (can be concurrent) or DRA 224E (can be concurrent); Consent of Instructor. Exploration and development of techniques and skills in the performance design process. Drafting, model building, drawing, painting and rendering, costume drawing, color theory, lighting techniques, design portfolio preparation and presentation. May be repeated up to 5 time(s). Effective: 2016 Spring Quarter.

DRA 228—Seminar in Directing Theory: Non-Realism (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Modern directing theory as it applies to non-realistic theatre; development of directorial concepts for production of selected non-realistic plays-Greek to the present; emphasis on textual analysis. Effective: 2016 Spring Quarter.

DRA 229—Special Problems in Directing (4)
Laboratory—2 hours; Rehearsal—4 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Projects in directing scenes selected from plays from ancient Greece to the present. May be repeated up to 2 time(s). Effective: 2014 Spring Quarter.

DRA 230—Advanced Problems in Choreography and Performance (2)
Discussion/Laboratory—2 hours. Prerequisite(s): Consent of Instructor. Explores contemporary issues of choreography and performance in depth and how those issues pertain to performance work. Focus will include contemporary thought on representation, legibility, new forms, and cultural attitudes. May be repeated up to 6 time(s). Effective: 2012 Winter Quarter.

DRA 244—Critical Approaches to Traditional Systems of Body Movement (4)
Discussion/Laboratory—6 hours; Project (Term Project); Term Paper. Prerequisite(s): Consent of Instructor. Introduction to traditional systems for body movement, development of critical approaches to them, and experiments in how they inform training and practice in theatre, dance, and performance. May be repeated up to 5 time(s). Effective: 2016 Fall Quarter.

DRA 250—Modern Theatre (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Theatre of Europe and America, 1860-1940, with emphasis on the relationship of the dramas of the period to the physical circumstances under which they were produced. Effective: 2016 Spring Quarter.

DRA 251—Scoring and Scripting in Performance (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Process of weaving together various performance elements brought into play by the artists in their respective disciplines. The "script" is the thread from which the artists' "scores" will layer and transform the "script" into performance for specific time, place, spectators. Effective: 2016 Spring Quarter.

DRA 252—Performance: Concepts of Space, Place, and Time (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Innovative theories of creating performance spaces, establishing a sense of place, and communicating the concept of time explored through collaborative interaction. Research includes traditional principles, site-specific spaces and consideration of various tempi from music and movement. Effective: 2016 Spring Quarter.

DRA 253—Approaches to Collaboration (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Exploration of different approaches to collaboration among artists in different media and their influence on the creative process. Effective: 2016 Spring Quarter.

DRA 254—Performing Identities/Personae (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Historical and contemporary theories of constructing stage identities. Discussion and project collaborations based on theories. Questions of identity related to ethnicity, gender or sexual orientation. Effective: 2016 Spring Quarter.

DRA 255—Composition in the Arts (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Examine manner in which specific elements utilized by actors, dancers, directors, choreographers, and designers are combined or related to form a whole in space and time, as well as methods of sequencing used by each discipline to produce artistic products. May be repeated up to 1 time(s). Effective: 2016 Spring Quarter.

DRA 256—Visual Language for Performance (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Restricted to graduate students. Exploration of different approaches and methods to the visual elements of performance. Focus on design and style for different media and genres, storytelling through visual elements of performance. Effective: 2017 Winter Quarter.

DRA 257—Interdisciplinary Seminar in Theatre, Dance and Performance (1)
Project (Term Project)—1.5 hours; Seminar—1.5 hours. Prerequisite(s): Consent of Instructor. Restricted to students enrolled in the MFA in Dramatic Art; students taking the PhD in Performance Studies or the DE in Studies in Performance and Practice may apply to enroll. Interdisciplinary seminar for first and second year MFA students in Theatre and Dance. Topics range from current practice in dance, theatre, film and performance, to leading edge developments by outstanding practitioners in the field. May be repeated up to 2 time(s). Effective: 2017 Spring Quarter.

DRA 259—Topics in Contemporary Theatre and Performance (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Special topics designed to study in depth aspects of contemporary
performance including performance analysis, cultural and historical context, modes of production, theoretical and political entailments, and issues of spectatorship (e.g., "Brecht and After," "British Theater," "Race and Gender in Performance." May be repeated up to 5 time(s). Effective: 2016 Spring Quarter.

DRA 260—Approaches and Methodologies to Studies in Performance and Practice (4)
Project (Term Project); Seminar—3 hours; Term Paper. Prerequisite(s): Admission to any graduate program in the University and consent of instructor. Preference to students enrolled in the Designated Emphasis in Studies in Performance and Practice. Instruction is offered a variety of disciplinary approaches and methodologies in Performance and Practice, with a focus is on cross-disciplinary learning and research. Usually offered each quarter. May be repeated for credit when content differs. Effective: 2016 Fall Quarter.

DRA 265A—Performance Studies: Modes of Production (4)
Project (Term Project); Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Introduces students to the literature of performance production in a
variety of media: theatre, dance, film, video, computer-based, looking at cultural, aesthetic, rhetorical and political theory. Usually offered in alternate years. Maybe repeated for credit with different topical matter/instructor. May be repeated up to 3 time(s) topic differs. Effective: 2016 Fall Quarter.

DRA 265B—Peformance Studies: Signification and the Body (4)
Project (Term Project); Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Introduces students to analysis of the body in performance, drawing on theoretical models from several fields. May be repeated up to 3 time(s) when topic differs. Effective: 2016 Fall Quarter.

DRA 265C—Performance Studies: Performance and Society (4)
Project (Term Project); Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Introduces students to the role of performance (broadly defined), in everyday life, sociopolitical negotiation, identity, social movements, the media, and the state. May be repeated up to 3 time(s) when topic differs. Effective: 2016 Fall Quarter.

DRA 265D— Performance studies: Theory, History, Criticism (4)
Project (Term Project); Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Introduction to the theory, history and criticism, informing performance studies. May be repeated up to 3 time(s) when topic differs. Effective: 2016 Fall Quarter.

DRA 280—Theatre Laboratory (1-12)
Variable. Prerequisite(s): Consent of Instructor. Advanced practice in acting, designing, directing, playwriting, and technical theatre. May be repeated for credit. Effective: 2016 Fall Quarter.

DRA 298—Group Study (1-5)
Prerequisite(s): Consent of Instructor. Effective: 1997 Winter Quarter.

DRA 299—Individual Study (1-12)
Variable. Prerequisite(s): Consent of Instructor. Individual study. (S/U grading only.) Effective: 2016 Fall Quarter.

DRA 299D—Dissertation Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Dissertation research. (S/U grading only.) Effective: 2016 Fall Quarter.

DRA 396—Teaching Assitant Training Practicum (1-4)
Variable. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2016 Spring Quarter.

DRA 413—Stage Make-up (1)
Lecture/Lab—2 hours. Prerequisite(s): Consent of Instructor. Approved for graduate degree credit. Lectures, demonstrations, and practical work in aspects of theatrical make-up. Effective: 1997 Winter Quarter.

Transportation Technology & Policy (Graduate Group)

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Susan Handy, Ph.D., Chairperson of the Group

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Group Office. West Village, 1605 Tilia, Suite 100; 530-752-0247; https://its.ucdavis.edu/students/graduate-group-in-transportation-technology-and-policy/

Faculty. https://itspeople.ucdavis.edu/

Graduate Study. The Graduate Group in Transportation Technology and Policy offers the M.S. (Plan I—thesis; and Plan II—exam), and Ph.D. degrees in two areas of specialization: Transportation Technology; and Transportation Planning and Policy. The technology track is for students trained in engineering and the physical sciences and interested in systems-level planning, analysis, management and design of advanced technologies (emphasizing vehicle propulsion and "intelligent transportation system" technologies) focusing on energy and environmental issues. The planning and policy track is aimed at students from a wider range of disciplines interested in the broader public policy issues concerning transportation systems. The curriculum for both tracks includes courses in civil, mechanical, and environmental engineering, economics, policy sciences, statistics, travel behavior, management, technology assessment and environmental studies.

Preparation. Applicants will normally be expected to have completed two courses in calculus, one course in linear algebra, and one course each in calculus level statistics and microeconomics. Additionally, students entering the technology track will need either to have an appropriate technical background or make up a relatively large number of prerequisite courses in order to be able to take the approved courses in that track.

Program of Study. Students will have the option of following either a technology or policy/management track. M.S. students complete six core courses plus electives. Ph.D. students take seven courses from the same core, three additional courses from their chosen track, one more in the alternate track, plus electives. Master's degrees require a minimum of 36 quarter units and doctoral degrees require a minimum of 54 units. M.S. Plan I students may replace up to six units of regular course work with research (course 299) units. At least two thirds of all credits must be at the graduate level.

Graduate Advisors. Susan Handy; Gil Tal (Admissions)

Transportation Technology & Policy (Graduate Group) | TTP Ph.D.

Susan Handy, Ph.D., Chairperson of the Group

Group Office. West Village, 1605 Tilia, Suite 100; 530-752-0247; https://its.ucdavis.edu/students/graduate-group-in-transportation-technology-and-policy/

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Graduate Advisors. Susan Handy; Gil Tal (Admissions)

Transportation Technology & Policy (Graduate Group) | TTP Courses

Courses in TTP:

TTP 200—Transportation Survey Methods (4)
Lecture—4 hours. Prerequisite(s): STA 013 or STA 013Y; ECI 251 recommended. Description of types of surveys commonly used in transportation demand modeling, including travel and activity diaries, attitudinal, panel, computer, and stated-response surveys. Discussion of sampling, experimental design, and survey design issues. Analysis methods, including factor, discriminant and cluster analysis. Not open for credit to students who have taken Civil and Environmental Engineering 255. (Geography 281.) Effective: 2018 Spring Quarter.

TTP 210—Fundamentals of Transportation Technology (4)
Discussion—2 hours; Lecture—2 hours. Prerequisite(s): MAT 021A; MAT 021B; MAT 022A; and Consent of Instructor. Graduate or junior/senior undergraduate as a technical elective. Limited enrollment. Fundamentals of Transportation Technology is a course designed to prepare students in the basics of thermodynamics, fluid mechanics and heat transfer as they relate to transportation. Not open for credit to students who have completed course 289. (Former course 289.). Effective: 2007 Spring Quarter.

TTP 220—Transportation Planning and Policy (4)
Lecture/Discussion—4 hours. Limited enrollment. Transportation planning process at the regional level, including the role of federal policy in shaping regional transportation planning, tools and techniques used in regional transportation planning, issues facing regional transportation planning agencies, pros and cons of potential solutions and strategies. Students having taken this course previously as course 289 cannot repeat it for credit; having taken other course 289 offerings does not preclude taking this course for credit. (Geography 236.) Effective: 2013 Winter Quarter.

TTP 281—ITS Transportation Seminar Series (1)
Seminar—1.5 hours. Transportation seminars by guest speakers, on varied topics. May be repeated for credit. (S/U grading only.) Effective: 2006 Spring Quarter.

TTP 282—Transportation Orientation Seminar (1)
Seminar—1 hour. Ten weeks of seminars, introducing various topics in transportation research and education, focusing on topics of particular interest at UC Davis. May be repeated for credit. (S/U grading only.) Effective: 2006 Spring Quarter.

TTP 283—Professionalism, Leadership, and Ethics (1)
Seminar—2 hours. Speakers from industry, government, academia, and NGOs will lead discussions about succeeding and performing in the professional world. They will address leadership, ethics, and other workplace issues. May be repeated for credit. (S/U grading only.) Effective: 2006 Spring Quarter.

TTP 289A—Selected Topics in Transportation Technology and Policy (1-5)
Laboratory; Lecture. Prerequisite(s): Consent of Instructor. Directed group study of special topics with instruction carried out through lecture or laboratory, or a combination of both. May be repeated for credit. May be repeated for credit. Effective: 1997 Fall Quarter.

TTP 289B—Selected Topics in Transportation Technology and Policy (1-5)
Laboratory; Lecture. Prerequisite(s): Consent of Instructor. Directed group study of special topics with instruction carried out lecture or laboratory, or a combination of both. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1999 Fall Quarter.

TTP 290C—Graduate Research Group Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Research problems, progress, and techniques in transportation. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Fall Quarter.

TTP 292—Internship in TTP (1-5)
Internship. Prerequisite(s): Consent of Instructor. Second year standing; approval of project prior to period of internship. Supervised work experience in transportation studies. May be repeated for credit when topic differs. (S/U grading only.) Effective: 2000 Spring Quarter.

TTP 298—Group Study (1-5)
Discussion—1-5 hours. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Fall Quarter.

TTP 299—Research (1-12)
Discussion—1-12 hours. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Fall Quarter.

TTP 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

UC Davis Study Abroad

UC Davis Study Abroad | UC Davis Study Abroad Information

Aliki Dragona, Ph.D., Fadi Fathallah, Ph.D., Faculty Directors

UC Davis Study Abroad
International Center, Suite 1120
530-297-4633; Fax 530-297-4695; studyabroad@ucdavis.edu; http://studyabroad.ucdavis.edu/

The opportunity to study abroad is one of the richest educational experiences a student can have. When students return from study abroad in places like Italy or Hong Kong, they describe their time abroad as an experience that changed their lives. Students study abroad to pursue their academic interests in a global context, to learn a language, to gain practical field work, internship or lab experience, to prepare for a job in the global economy and to add distinction to an application for graduate or professional school.

UC Davis Study Abroad can help students decide which program is best for them, whether to study abroad or away within the United States for a summer, quarter, semester or full year and when to go abroad (freshman through senior years). UC Davis Study Abroad Coordinators also participate in freshman seminars, offer financial aid workshops and can advise on programs that have internship opportunities. UC Davis Study Abroad also administers the Global and International Studies (GIS) minor, which is overseen by a Program Committee.

UC Davis Study Abroad is home to UC Davis Quarter Abroad, UC Davis Summer Abroad, UC Davis Internships Abroad, UC Davis Seminars Abroad, UC Davis Exchanges and the University of California Education Abroad Program (UCEAP). UC Davis Study Abroad also provides advising for students interested in non-UC "independent" programs and administers the Non-UC Study Abroad leave program. Finally, UC Davis Study Abroad advises and provides student services for international UCEAP Reciprocity students.

UC Education Abroad Program (UCEAP)

Fadi Fathallah, Ph.D., Faculty Director

UC Davis Study Abroad
International Center, Suite 1120; 530-752-5763; Fax 530-752-4154;
http://studyabroad.ucdavis.edu/programs/uceap/

The UC Education Abroad Program (UCEAP) is one of the premiere study abroad programs in the nation. UCEAP offers international study programs in association with nearly 140 host universities and institutions in some 32 countries around the world. Participating students remain registered at UC while studying abroad and receive full academic credit for their work. UCEAP students maintain their financial aid and scholarship eligibility while abroad. UCEAP has study abroad opportunities for undergraduates at all class levels as well as for qualified graduate students who have completed at least one full year of graduate work and have the support of their graduate program and graduate dean.

UCEAP offers year, semester, quarter, and summer programs for all majors. Over 50% of the programs are offered in English, while several programs allow students to learn a language while experiencing the culture first hand. Some programs include the possibility of internships or field research. In most cases, students attend courses taught by the faculty of the host institution.

UC faculty members serve as directors at most Study Centers abroad, providing in-country academic advising to students during their program. Full UC credit is granted for courses satisfactorily completed, and courses and grades are recorded on official UC transcripts. With careful planning, most UCEAP students make normal progress toward their UC degrees, even those students who study abroad for a full year. With approval of their major or college advisors, students may earn credit towards their major, minor and general education requirements.

Graduation Requirements. UCEAP prospective applicants, particularly students who intend to study abroad during their senior year, should carefully plan their course programs for Davis and abroad in order to satisfy university, college, and major/minor requirements for their degree.

Although units and grade points earned while studying abroad through UCEAP are incorporated into the University transcript and GPA, departments and majors retain the right to determine which UCEAP courses will be accepted in satisfaction of major and minor requirements.

All degree candidates must meet the University residence requirement. Recognizing the special value of study abroad, the faculty have approved two exceptions to the usual residence requirement for students participating in the Education Abroad Program:

- Students planning to graduate immediately upon completion of their UCEAP program may satisfy the University residence requirement by completing at least 35 of their final 45 units on the Davis campus preceding entry into the EAP,

or

- Students should consult with their college Dean's office early during the UCEAP planning process for information on the university residence requirement.

Students may satisfy GE requirements while on UCEAP, but should consult with the UC Davis Study Abroad and their college Dean's office prior to departure for information on the certification process. Students may participate in UCEAP provided that (1) they will not exceed 225 units prior to their departure and (2) that all their degree requirements have been fulfilled either before they leave campus or during their time on UCEAP study abroad program.

Participants may only return to campus from UCEAP to complete any outstanding degree requirements provided that they can do so within 225 units. Participants in programs that conclude in May or June who satisfy all degree requirements while abroad and expect to graduate upon completion of the year abroad should file for candidacy to receive their degree in September; candidacy filing dates are established by the Office of the University Registrar. In most cases, transcripts from abroad may will not be received in time to be posted on the student's Davis transcript for UCEAP returnees to be included on the June degree list. Such returning students may register to participate in the June commencement ceremony; however, their graduation date will be in September. Participants in programs that conclude in November or December should file for candidacy to receive their degree in March. Such returning students may be able register to participate in either the December or subsequent June commencement ceremony. Their graduation date will be in March.

UC Davis Faculty-Led Programs Abroad

Aliki Dragona, Ph.D., Faculty Director

UC Davis Study Abroad
International Center, Suite 1120; 530-752-5763; Fax 530-752-4154;
http://studyabroad.ucdavis.edu/

UC Davis Study Abroad offers a number of faculty-led programs abroad and within the United States, including UC Davis Quarter Abroad, UC Davis Summer Abroad, UC Davis Internships Abroad, UC Davis Seminars Abroad, and UC Davis Exchanges These programs enable students to study abroad in small program cohorts taught by UC Davis faculty in over 30 countries around the world. Programs are specifically tailored to UC Davis disciplines and provide unique opportunities for study, internships, field or lab work, research, service learning and volunteering, and language learning in intimate and engaging environments.

Participants remain registered UC Davis students while abroad or away and receive UC Davis units for their academic work. Open to students from any major, these programs allow students to choose courses from a wide range of specializations.

Programs range from two-week seminars to four-week summer offerings to quarter-long options. All programs allow students to experience the country' unique culture through co-curricular activities, such as day-trips to surrounding areas, museum tours, and theatre visits. Many also include field work, internship, or service learning opportunities.

Financial aid and scholarships apply. Students may participate in UC Davis faculty-led programs as early as their freshman year, or as late as their senior year. Applicants must have a 2.000 GPA (internship applicants must have a 2.500 GPA), be in good academic and disciplinary standing, and must fulfill any prerequisites specific to the program courses.

In preparation for UC Davis Study Abroad programs, students are urged to take Education Abroad Program (EAP) 090X or 190X.

UC Davis Quarter Abroad

Academic Focus. Students can earn 12-28 UC Davis quarter units through 3-6 courses taught abroad. Academic focus varies by program and may include subject area courses, language learning, lab work, internship/field work, and/or practical training experience. Programs range in length from 10 to 16 weeks. UC Davis faculty leaders teach one or more of the courses of the program, while other courses may be taught or co-taught by adjunct faculty of the host country, under supervision by UC Davis faculty. Students may be able to apply earned units towards their major, minor, language, or general education requirements.

UC Davis Summer Abroad

Academic Focus. Students earn 8 UC Davis quarter units through two courses taught abroad or away. All courses are taught by UC Davis faculty, sometimes with select supplemental lectures provided by local experts. Planned group activities and field trips enhance classroom instruction.

Students may be able to apply earned units towards their major, minor, or general education requirements. Programs allow students to complete coursework in English in a wide variety of non-English-speaking locations.

UC Davis Internships Abroad

Academic Focus. Students earn 6 or more UC Davis units for internship hours and supplemental instruction. Internship programs are structured around thematic areas of study such as Global Health, Engineering, Business and Communication. Placements are a collaboration between international organizations, UC Davis Study Abroad and the UC Davis Internship and Career Center to ensure the internships meet requirements for credit and relevance to the subject area. In addition to internship hours worked, students will take an online course taught by UC Davis faculty that places their internship in a broader social and cultural context. Planned group activities and field trips enhance the formal internship work. Students may be able to apply earned units towards their major, minor, or general education requirements. Most placements are in English-speaking environments; some programs require language proficiency.

UC Davis Seminars Abroad

Academic Focus. Students earn 2-6 UC Davis quarter units through one or more courses taught abroad or away. These short courses are taught by UC Davis faculty and may be offered as stand-alone programs or as an international component to a course taught during a regular term on campus. A heavy focus on field trips, onsite projects and group activities enhance classroom instruction. Students many be able to apply earned units toward their major, minor, or general education requirements. Programs are typically offered in September, June, or during the winter break.

UC Davis Exchanges

Academic Focus. UC Davis Exchanges are department-based undergraduate exchanges that leverage new or pre-existing working/research relationships among faculty to promote student mobility between institutions. UC Davis faculty and departments identify courses at the partner institution that are taught in English and can be converted into course equivalents at UC Davis. Students enroll in at least 12-15 units of advisor-approved course equivalents for each quarter they are on UC Davis Exchanges. Exchanges may be for 1, 2, or 3 academic quarters and are built around a specific thematic academic program.

UC Davis Study Abroad | EAP Courses

Courses in EAP:

EAP 090X—International Education Seminar (1)
Seminar—1 hour. Prerequisite(s): Open to lower division applicants for EAP or UC Davis study abroad and international internship programs. Seminar examines the academic, cultural, and personal issues of study abroad, including academic programs abroad, country-specific history and culture, cross-cultural experiences, culture shock, racial and gender issues. May be repeated for credit. (P/NP grading only.) Effective: 1998 Winter Quarter.

EAP 180—Education Abroad: Special Topics (1-12)
Discussion/Laboratory—3 hours; Lecture/Discussion—3-12 hours. Prerequisite(s): Minimum GPA requirement for each study abroad program as specified in the written agreement between UC Davis and the host institution; prerequisites for language courses may also apply. Students who participate in approved international programs take this course up to 12 units while studying abroad. May be repeated for credit May be repeated for credit; credits will be reviewed by departments and Dean's Office to determine how they fulfill UC Davis requirements. Effective: 2014 Winter Quarter.

EAP 190X—International Education Seminar (1)
Seminar—1 hour. Prerequisite(s): Open to upper division applicants for EAP or UC Davis study abroad and international internship programs. Seminar examines the academic, cultural, and personal issues of study abroad, including academic programs abroad, country-specific history and culture, cross-cultural experiences, culture shock, racial and gender issues. May be repeated for credit. (P/NP grading only.) Effective: 1998 Winter Quarter.

EAP 192—Internship in Education Abroad (1-12)
Internship—3-36 hours. Prerequisite(s): Participation in a study abroad program. Internship with Education Abroad program, potentially either at university or abroad. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2017 Winter Quarter.

UC Washington Center

UC Washington Center | UC Washington Center Information

Campus Program Office. The Grove (Surge III), Room 1350, 530-752-6652; http://washingtonprogram.ucdavis.edu

Residential Program Location. 1608 Rhode Island Avenue, NW, Washington, D.C. 20036

The University of California hosts a system-wide academic and residential program for undergraduate students attending from each of the UC campuses. Housed within the UC Washington Center (UCDC), an 11-story, state of the art facility, convenient to public transportation and located in downtown D.C., the programs provide undergraduates opportunity to enrich their education while in residence for one quarter in the nation's capital. The program's principal activities include enrollment in credit-bearing courses, participation in academic internships, and opportunity to explore the many educational, cultural and historical activities in the Washington area.

Program of Study

UCDC is open to undergraduates from all majors who will have upper-division standing by the start of the quarter in which they plan to participate although not required. A GPA of at least 3.000 is recommended for admission although not required. Applicants are also evaluated based on overall relevant employment, internship, and volunteer experiences, written statement, and letter(s) of recommendation (only one is required).

Academic Year Component (11 weeks). Students earn academic credit and continue to be registered as full-time UC Davis students during the quarter in which they participate.

- **Internship.** (Mandatory) Students work from 3-4 days per week as interns in think-tanks, museums, Congress, federal agencies, interest groups, trade associations, research institutions, media corporations, or in other organizations related to the interests and objectives of individual students.

- **Research Seminar.** (Mandatory) Each student writes a research paper in consultation with Washington Program faculty and graduate fellows. To complete the assignment, students take advantage of the many unique research resources in Washington, DC.

- **Elective Seminar Course (Optional).** Each student may optionally enroll in one elective upper division seminar course taught at UCDC. These courses vary each quarter from among offerings that typically include international relations, history, political science, public policy and other social sciences; the arts and humanities; and science policy. In addition to regular instruction, seminars often include guest speakers, observations of congressional committees and federal agencies, and other relevant Washington experiences.

Courses are taught by UCDC faculty appointed by the various UC campuses, or visiting faculty from the Washington area.

Financial aid eligibility and awards as determined by the home campus is maintained while enrolled in the program, and the aid package can be adjusted to reflect the additional costs of the program.

Summer Component (10 weeks). UCDC also offers a 10-week Summer Program with a credit or non-credit option. The credit option allows students to enroll in an internship, working 4-5 days a week and from 32-40 hours per week. Students pay the summer sessions rate per credit hour plus an application fee. The non-credit option (internship only) has no enrollment fee. Both options allow students to participate in many educational, cultural, historical and social activities.

University Graduation Requirements

- All prospective applicants should carefully plan their course programs in order to satisfy university, college, and major/minor requirements for their degree.
- Although units and grade points earned at UCDC are incorporated into the University transcript and GPA calculation, departments and programs retain the right to determine which UCDC courses will be accepted in satisfaction of major and minor requirements.
- All degree candidates must meet the University residence requirement. Students should consult with their college Dean's office early during the UCDC planning process for information on the university residence requirement, particularly students who intend to study abroad or participate in UCDC during their senior year.

Recognizing the special value of UCDC, the faculty has approved two exceptions to the usual residence requirement for students participating in the Washington Program:

- Students planning to graduate immediately upon completion of participation in UCDC may satisfy the University residence requirement by completing at least 35 of their final 45 units on the Davis campus immediately preceding entry into UCDC.
- Students who have not finished all of their degree requirements following completion of their participation in the UCDC program may satisfy the University residence requirement by completing at least 35 units, including at least 12 units after returning from UCDC, on the Davis campus within the final 90 units earned toward the degree.

Students who will not meet the residency requirements outlined may petition their Dean's office requesting an exception to policy.

- Students may satisfy GE requirements while at UCDC but should consult with their college Dean's office prior to departure for information on the certification process.
- Students with a large number of units may participate in the UCDC program provided that (1) they will not exceed 225 units prior to their departure and (2) that all their degree requirements have been fulfilled either before they leave campus or during their time at UCDC. Participants may only return to campus from UCDC to complete any outstanding degree requirements provided that they can do so within the 225 unit restriction.

UC Washington Center | WAS Courses

Optional elective courses listed at http://www.ucdc.edu/academic/courses.

Courses in WAS:

WAS 187—Gun Violence (4)
Lecture/Discussion—4 hours. Restricted to students attending UC Washington Center program. Gun violence, viewed from the perspectives of criminology and public health. Topics include personal and societal contributing factors and critical assessment of potential solutions. Effective: 2002 Spring Quarter.

WAS 192—Internship in the UC Davis Washington Program (8)
Internship—32 hours. Prerequisite(s): WAS 193 (can be concurrent); Junior or senior standing, admission in the UC Davis Washington Program. WAS 193 required concurrently. Internship in Washington, DC with associated, supervised research project. (P/NP grading only.) Effective: 2014 Fall Quarter.

WAS 193—Washington Center Research Seminar (4)
Independent Study—3 hours; Lecture/Discussion—1 hour; Tutorial—0.5 hours. Prerequisite(s): WAS 192 (can be concurrent) Core academic component of Washington Program. Topics coordinated with internships. Research draws on resources uniquely available in Washington, DC. Supervised preparation of extensive paper. (Political Science 193W.) GE credit: OL, SS, WE. Effective: 2002 Spring Quarter.

University Honors Program

University Honors Program | University Honors Program Information

David Furlow, Ph.D., Director

Eddy Ruiz, Ph.D., Associate Director

Program Office. 1350 The Grove (formerly Surge 3) 530-752-3225; http://honors.ucdavis.edu/

Faculty. Includes members from various departments across colleges.

The Program of Study

The honors course of study is designed to enhance the undergraduate experience of highly motivated students in all academic pathways. The University Honors Program (UHP) is an interdisciplinary, campus-wide honors program for top students interested in enhancing their education through special courses, close contact with faculty, and dynamic interaction with academic peers.

General Education Honors courses, seminars, and special study opportunities constitute the course offerings of the University Honors Program. First-year and second-year students in the UHP take six General Education honors courses during their first and second year. Upper division and transfer students complete a variety of research projects and service learning opportunities. All students who successfully complete the program receive transcript notation.

UHP courses and seminars are designed to foster critical thinking and analytic interpretation, improve oral, written and technical communication skills, enhance research skills, and provide experience with group dynamics and collaborative exploration of problems. Course enrollment is generally limited to 25 students.

Updated program information is available at the UHP website. A complete list of these courses, with course registration numbers, is made available to admitted students through the UHP office.

Only University Honors Program students may register for the courses in University Honors Program (HNR).

Includes members from various departments across colleges.

University Honors Program | HNR Courses

Courses in HNR:

HNR 090X—Honors Discussion Section (1)
Discussion—1 hour. Prerequisite(s): Open only to students in the Davis Honors Challenge. Examination of special topics in selected lower division courses
through additional readings, discussions, term papers, collaborative work, or special activities, including projects, field and laboratory experiences, computer simulations, creative works. May be repeated for credit. May be repeated for credit. Effective: 1997 Spring Quarter.

HNR 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Open only to students in the Davis Honors Challenge. Supervised work experience under the auspices of the Davis Honors Challenge. May be repeated for credit for a total of 12 units. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Fall Quarter.

HNR 094—Honors Seminar (4)
Seminar—4 hours. Open to students in the Davis Honors Challenge. Collaborative, multidisciplinary exploration of complex contemporary problem. Focus on critical thinking and analytical interpretation, on oral and written communication, and on the use of electronic media in gathering information. May be repeated for credit. GE credit: WE. Effective: 2013 Winter Quarter.

HNR 098—Directed Group Study (1-5)
Discussion—1-5 hours. Prerequisite(s): Consent of Instructor. Open to students in the Davis Honors Challenge. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 1997 Summer Quarter.

HNR 099—Special Study for Undergraduates (1-5)
Independent Study—1-5 hours. Prerequisite(s): Consent of Instructor. Student in the Davis Honors Challenge. (P/NP grading only.) Effective: 1997 Winter Quarter.

HNR 190X—Honors Contract (1)
Discussion; Independent Study. Prerequisite(s): Open only to students in the Davis Honors Challenge. In-depth examination of material in an upper division course as defined in an Honors Contract Proposal submitted by the student. Contract must be approved by the instructor and the Honors Council of the Academic Senate. May be repeated for credit. May be repeated for credit. Effective: 1997 Fall Quarter.

HNR 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Open only to students in the Davis Honors Challenge. Supervised work experience under the auspices of the Davis Honors Challenge. May be repeated for credit for a total of 12 units. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Fall Quarter.

HNR 194—Honors Seminar (3)
Seminar—3 hours. Prerequisite(s): Consent of Instructor. Open only to students in the Davis Honors Challenge. Team-based work on actual problems drawn from the public or private sector. Focus on critical thinking and analytic interpretation, oral and written communication skills, and developement of practical solutions to real-world problems. Effective: 2000 Fall Quarter.

HNR 195—Honors Thesis/Honors Project (1-3)
Independent Study—3-9 hours. Prerequisite(s): Open only to students in the Davis Honors Challenge. Guided independent study of a selected topic leading to the presentation of an honors thesis/honors project. May be repeated for credit up to 9 units. May be repeated up to 9 unit(s). Effective: 1999 Fall Quarter.

HNR 198—Directed Group Study (1-5)
Discussion—1-5 hours. Prerequisite(s): Consent of Instructor. Open only to students in the Davis Honors Challenge. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 1997 Fall Quarter.

HNR 199—Special Study for Advanced Undergraduates (1-5)
Independent Study—1-5 hours. Prerequisite(s): Open only to students in the Davis Honors Challenge. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 1997 Fall Quarter.

University Honors Program | IST Courses

Courses in IST:

IST 008—Colloquium (1)
Discussion—1 hour. Lectures, films, and readings on the interrelation between the arts and sciences. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

IST 008A—Special Topics in Natural Science and Mathematics (4)
Discussion—1 hour; Lecture—3 hours. Limited enrollment. Group study of a special topic in natural sciences and mathematics. Course varies with topic offered. Limited enrollment. May be repeated for credit. May be repeated for credit. GE credit: SE, SL. Effective: 1997 Winter Quarter.

IST 008B—Special Topics in Humanities (4)
Discussion—1 hour; Lecture—3 hours. Limited enrollment. Group study of a special topic in humanities. Course varies with
topic offered. Limited enrollment. May be repeated for credit. May be repeated for credit. GE credit: AH. Effective: 1997 Winter Quarter.

IST 008C—Special Topics in the Social Sciences (4)
Discussion—1 hour; Lecture—3 hours. Limited enrollment. Group study of a special topic in social sciences. Course varies
with topic offered. Limited enrollment. May be repeated for credit. May be repeated for credit. GE credit: SS. Effective: 1997 Winter Quarter.

IST 009—Seminar (1)
Seminar—1 hour. Preparation of a research report. Normally taken with course 8. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 2017 Fall Quarter.

IST 090—Seminar (1)
Seminar—1 hour. Prerequisite(s): IST 009; and Consent of Instructor. And completion of 45 units with a minimum GPA of 3.250. Enrollment limited to sophomores who participated in the Integrated Studies Honors Program during their freshman year and transfer students by consent of instructor. Interrelation between the arts and sciences, focusing on a special topic. (P/NP grading only.) Effective: 2007 Fall Quarter.

IST 094—Introduction to Undergraduate Research (1)
Seminar—1 hour. Prerequisite(s): IST 009; and Consent of Instructor. And completion of 45 units with a minimum GPA of 3.500. Restricted to sophomores who participated in the Integrated Studies Honors Program during their freshman year and other students by consent of instructor. The nature of research at the undergraduate level. (P/NP grading only.) Effective: 2008 Winter Quarter.

IST 190—Topics in Integrated Studies (1)
Seminar—1 hour. Prerequisite(s): IST 009; and Consent of Instructor. Discussion of the integration of the arts and sciences, focusing on a special topic. May be repeated up to 3 time(s) when topic differs. (P/NP grading only.) Effective: 2003 Spring Quarter.

IST 194HA—Special Study for Honors Students (4)
Independent Study—3 hours; Seminar—1 hour. Prerequisite(s): IST 009; and Consent of Instructor. And completion of 90 units with a minimum GPA of 3.500. A program of research culminating in the writing of a junior honors thesis under the direction of a faculty advisor. May be repeated up to 1 time(s). Effective: 2004 Fall Quarter.

IST 194HB—Special Study for Honors Students (4)
Independent Study—3 hours; Seminar—1 hour. Prerequisite(s): IST 009; and Consent of Instructor. And completion of 90 units with a minimum GPA of 3.500. A program of research culminating in the writing of a junior honors thesis under the direction of a faculty advisor. May be repeated up to 1 time(s). Effective: 2005 Winter Quarter.

IST 197T—Tutoring in Integrated Studies (1-4)
Tutorial—1 hour. Prerequisite(s): Consent of Director of Integrated Studies. Open to students in the Integrated Studies Program only. Tutoring in Integrated Studies courses, usually in small discussion groups. Weekly discussions with the instructor on the subject matter of the course being tutored and on the art and craft of teaching. May be repeated up to 8 time(s). (P/NP grading only.) Effective: 2004 Spring Quarter.

University Writing Program

University Writing Program | University Writing Program Information

(College of Letters & Science)

Carl Whithaus, Ph.D., Program Director

Program Office. 109 Voorhies Hall; 530-752-6283; http://writing.ucdavis.edu

The Program

The University Writing Program (UWP) offers writing courses and seeks to improve writing instruction across campus through a variety of programs. The UWP coordinates first year, intermediate, and advanced writing courses that satisfy college composition requirements and offers courses in writing across the curriculum, writing in specific disciplines, and writing in the professions. The Professional Writing Minor serves students from all majors who are planning careers as professional writers or editors, as well as those whose academic and professional careers demand advanced writing skills. The Program offers graduate courses in the teaching of writing and in composition theory, history, and research. The Designated Emphasis in Writing, Rhetoric, and Composition Studies offers Ph.D. students in affiliated programs the opportunity to prepare for leadership roles in writing research, teaching, and program administration. The UWP also administers the English Composition Examination, an alternative way to satisfy the advanced writing requirement. The UWP publishes an annual anthology of exemplary student writing, Prized Writing, and a journal for writing instructors, Writing on the Edge. The Writing in the Disciplines Workshop Program presents workshops on teaching writing for faculty and TAs and workshops on writing for students. The Writing Ambassadors Program trains advanced undergraduates and places them as interns in K-12 classrooms to improve writing instruction.

University Writing Program | UWP Courses

Courses in UWP:

UWP 001—Expository Writing (4)
Lecture/Discussion—4 hours. Prerequisite(s): Completion of Entry-Level Writing Requirement. Composition, the essay, paragraph structure, diction, and related topics. Frequent writing assignments. Not open for credit to students who have taken courses 1 or 1Y or 1V. GE credit: AH, WE. Effective: 2010 Fall Quarter.

UWP 001V—Expository Writing (4)
Web Electronic Discussion—2 hours; Web Virtual Lecture—2 hours. Prerequisite(s): Completion of Entry-Level Writing Requirement. Composition, the essay, paragraph structure, diction, and related topics. Frequent writing assignments. Not open to students who have taken course 1 or 1Y. GE credit: AH, WE. Effective: 2013 Spring Quarter.

UWP 001Y—Expository Writing (4)
Lecture/Discussion—2 hours; Web Electronic Discussion—2 hours. Prerequisite(s): Completion of Entry-Level Writing Requirement. Composition, the essay, paragraph structure, diction, and related topics. Frequent writing assignments. Not open to students who have taken course 1 or 1V. GE credit: AH, WE. Effective: 2013 Fall Quarter.

UWP 010—Introduction to Professional Writing Studies (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Introduction to writing as an object of study and to theories and research in the field. Survey of how writing is created, disseminated, and used in private, public, and academic contexts. GE credit: AH, WE. Effective: 2018 Spring Quarter.

UWP 011—Popular Science and Technology Writing (4)
Discussion—1 hour; Lecture/Discussion—3 hours. Positioning of science and technology in society as reflected and constructed in popular texts. Topics include genre theory, demarcation, rhetorical figures, forms of qualitative and quantitative reasoning, and the epistemic role of popularization in science. GE credit: AH, WE. Effective: 2014 Winter Quarter.

UWP 012—Writing and Visual Rhetoric (4)
Discussion—1 hour; Lecture/Discussion—3 hours. Introduction to writing needs, conventions, and genres in design contexts. Emphasis on applying critical reading, analysis, and writing skills to designed products, such as graphics, visual communications, and clothes, and designed spaces, such as exhibitions and interior architecture. GE credit: AH, VL, WE. Effective: 2014 Fall Quarter.

UWP 013—Video Game Rhetorics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better Examination of video games as rhetorical texts whose meaning is produced through complex interplay of procedures, narratives, rules, and context. Writing about video games using critical perspectives and analytic methods. GE credit: AH, VL, WE. Effective: 2018 Spring Quarter.

UWP 018—Style in the Essay (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better Style, language, and structure in the essay. Analyzing style, developing a voice in writing, revising sentences, developing effective paragraphs and arguments, and writing with force and clarity. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 018—Style in the Essay (4) ***Review all entries Discontinued***
Lecture/Discussion—4 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better Style, language, and structure in the essay. Analyzing style, developing a voice in writing, revising sentences, developing effective paragraphs and arguments, and writing with force and clarity. GE credit: AH, WE. Effective: 2018 Fall Quarter.

UWP 019—Writing Research Papers (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better Critical reading, analysis, documentation, and writing research-based assignments. Formulation of research topics and development of effective arguments. Reading and writing assignments may focus on a single theme. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 019—Writing Research Papers (4) ***Review all entries Discontinued***
Lecture/Discussion—4 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better Critical reading, analysis, documentation, and writing research-based assignments. Formulation of research topics and development of effective arguments. Reading and writing assignments may focus on a single theme. GE credit: AH, WE. Effective: 2018 Fall Quarter.

UWP 020—Oral English for International Students (3)
Lecture/Discussion—3 hours. Open to non-native speakers of English with priority enrollment to international teaching assistants with qualifying placement exam scores. Intensive work in oral English for international students, to increase fluency, accuracy, and use of appropriate discourse strategies in academic settings (e.g., seminar, discussion, laboratory). Training in segmental features of English sounds, intonation, stress, non-verbal cues, and register. May be repeated for credit. (P/NP grading only.) Effective: 2018 Fall Quarter.

UWP 021—Introduction to Academic Reading and Writing for Multilingual Students (4)
Lecture/Discussion—4 hours. Pass One placed in the course via the English Language Placement Examination (ELPE) offered by the UWP; students receiving scores below 70 are placed in course 21, the first course in the sequence. Reading and writing paragraphs and short multi-paragraph texts for academic purposes. Suitable for students whose primary home language was not English. Effective: 2016 Fall Quarter.

UWP 022—Intermediate Academic Reading and Writing for Multilingual Students (4)
Lecture/Discussion—4 hours. Prerequisite(s): UWP 021 Pass One passed course 21 with C- or better OR a score of 70-79 on the English Language Placement Examination (ELPE) offered by the UWP. Reading and writing short multi-paragraph texts for academic purposes. Suitable for students whose primary home language was not English. Effective: 2016 Fall Quarter.

UWP 023—Advanced Academic Reading and Writing for Multilingual Students (4)
Lecture/Discussion—4 hours. Prerequisite(s): UWP 022 Pass One passed course 22 with a C- or better OR a score of 80-89 on the English Language Placement Examination (ELPE) offered by the UWP. Reading and writing source/research-based texts for academic purposes. Suitable for students whose primary home language was not English. Effective: 2016 Fall Quarter.

UWP 025—Academic Writing for ESL Students (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Writing skills necessary for upper division courses, including skills crucial to writing lab and project reports, summaries, critiques, abstracts, and responses to exam questions. Includes practice with the syntax, grammar, and vocabulary characteristics of academic writing. Not open for credit to students who have taken LIN 027. Effective: 2018 Spring Quarter.

UWP 026—Reading in Scientific and Technical Subjects for ESL Students (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Instruction and practice in reading scientific and technical texts. Techniques for comprehending and analyzing grammatical and organizational patterns. Notetaking skills, summarizing, vocabulary enrichment. Not open for credit to students who have taken LIN 028. (P/NP grading only.) Effective: 2018 Spring Quarter.

UWP 027—Persuasive Writing for Multilingual Students (4)
Lecture/Discussion—4 hours. Prerequisite(s): UWP 001; Or equivalent. Not open to students with C- (P) or better in courses 101, 102, and 104; class size limited to 18 students. Instruction in analyzing style of persuasive texts, using appropriate vocabulary, and applying English grammatical structures for argumentative purposes. Suitable for multilingual students desiring additional instruction in the linguistic and rhetorical features of persuasive English writing for academic purposes. GE credit: WE. Effective: 2016 Spring Quarter.

UWP 028—Persuasive Writing for Multilingual Students (4)
Lecture/Discussion—4 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better Instruction in analyzing style of persuasive texts, using appropriate vocabulary, and applying English grammatical structures in argumentation. Suitable for multilingual students desiring additional instruction in persuasive English writing. GE credit: AH, WE. Effective: 2017 Fall Quarter.

UWP 029—Research Writing for Multilingual Students (4)
Lecture/Discussion—4 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better Reading and writing effectively in various research genres across the disciplines. Suitable for multilingual students desiring additional instruction in the linguistic and rhetorical features of research writing in English for academic purposes. GE credit: AH, WE. Effective: 2017 Fall Quarter.

UWP 048—Style in the Essay (4)
Lecture/Discussion—4 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; or equivalent. Restricted to completion of UWP 001, or equivalent, with C- (P) or better. Principles of style, language, and structure in the essay. Analysis and development of voice and genre, including sentence revision for force and clarity, and development of effective paragraphs and essays. Not open for credit to students who have taken UWP 018. GE credit: AH, WE. Effective: 2018 Spring Quarter.

UWP 049—Writing Research Papers (4)
Lecture/Discussion—4 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; or equivalent. Restricted to completion of UWP 1, or equivalent, with C- (P) or better. Principles of research writing. Analysis and development of research topics and effective arguments, including critical reading, analysis, integration, and documentation of source material. Not open for credit to students who have taken UWP 019. GE credit: AH, WE. Effective: 2018 Fall Quarter.

UWP 092—Internship in Writing (1-12)
Internship—3-36 hours. Prerequisite(s): UWP 001 or UWP 001V or UWP 001Y or ENL 003 Internships in fields where students can practice their skills. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2018 Winter Quarter.

UWP 098—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): UWP 001 or UWP 001V or UWP 001Y or ENL 003; Or equivalent course; consent of instructor. May be repeated up to 2 time(s). (P/NP grading only.) GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 099—Special Study for Undergraduates (1-5)
Variable—1-5 hours. Prerequisite(s): UWP 001 or UWP 001V or UWP 001Y or ENL 003; Or equivalent course; consent of instructor. May be repeated up to 2 time(s). (P/NP grading only.) GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 100—Genre Theory and Professional Writing (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (UWP 001 or UWP 001V or UWP 001Y); UWP 010; Or the equivalent of UWP 001. Introduction to discipline of professional writing. Examination of writing as a social practice, using genre theory as a conceptual framework. Analysis of how genres function rhetorically in specific contexts and how social systems both shape and are shaped by genres. GE credit: AH, WE. Effective: 2018 Spring Quarter.

UWP 101—Advanced Composition (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or ENL 003 C- or better or NAS 005 C- or better; and upper division standing. Instruction in advanced principles of expository writing. Writing tasks within and beyond the University. Different writing modes, including narrative, analysis, explanation, argument, critique. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102A—Writing in the Disciplines: Special Topics (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to majors or to students concurrently enrolled in an upper division course in a specific academic discipline or interdisciplinary field. Advanced instruction in writing in that discipline and practice in effective styles of communication. May be repeated up to 1 time(s) if taken in conjunction with a different subject-matter course. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102B—Writing in the Disciplines: Biology (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to majors in a biological science or to students concurrently enrolled in an upper division biological science course. Advanced instruction in writing in biology. Not open for credit to students who have completed English 102B. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102C—Writing in the Disciplines: History (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to majors in history or to students concurrently enrolled in an upper division course accepted for the history major. Advanced instruction in writing in history. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102D—Writing in the Disciplines: International Relations (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to majors in international relations or to students concurrently enrolled in an upper division course accepted for the major. Advanced instruction in writing in international relations. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102E—Writing in the Disciplines: Engineering (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to upper division students in the College of Engineering and to students enrolled in an upper division engineering or computer science course for the major. Advanced instruction in writing in engineering. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102F—Writing in the Disciplines: Food Science and Technology (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to majors in food science and technology and to students concurrently enrolled in an upper division course in food science and technology. Advanced instruction in writing in food science and technology. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102G—Writing in the Disciplines: Environmental Writing (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to students with upper division coursework with an environmental focus. Advanced instruction in writing and practice in effective styles of communication in the fields of environmental study, policy, or advocacy. Not open for credit to students who have completed course 102A in the same academic field. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102H—Writing in the Disciplines: Human Development and Psychology (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to majors and minors or to students concurrently enrolled in an upper division course in Human Development or Psychology. Advanced instruction in writing and practice in effective styles of communication in Human Development and Psychology. Not open for credit to students who have completed course 102A in the same academic field. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102I—Writing in the Disciplines: Ethnic Studies (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to majors and minors in ethnic studies, or students with upper division coursework focusing on race and ethnicity. Advanced instruction in cross-disciplinary writing about race and ethnicity and practice in effective styles of communication. Not open for credit to students who have completed course 102A in the same academic field. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102J—Writing in the Disciplines: Fine Arts (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to majors and minors or to students concurrently enrolled in an upper division course in Art History, Art Studio, Design, Music, or Theater and Dance. Advanced instruction in writing about the arts and practice in effective styles of communication. Not open for credit to students who have completed course 102A in the same academic field. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102K—Writing in the Disciplines: Sociology (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to majors and minors in Sociology or to students concurrently enrolled in an upper division Sociology course. Advanced instruction in writing and practice in effective styles of communication in Sociology and related academic and professional fields. Not open for credit to students who have completed course 102A in the same academic field. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102L—Writing in the Disciplines: Film Studies (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to majors and minors or to students concurrently enrolled in an upper division course in Film Studies, Technocultural Studies, English, American Studies, or any other upper division course that includes the analysis and understanding of film as a medium. Advanced instruction in writing about film and practice in effective styles of communication. Not open for credit to students who have completed course 102A in the same academic field. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102M—Writing in the Disciplines: Community and Regional Development (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to upper division Community and Regional Development majors and minors or upper division students concurrently enrolled in an upper division Community and Regional Development course. Advanced instruction in writing in the Community and Regional Development discipline and practice in effective styles of communication. GE credit: ACGH, AH, WE. Effective: 2018 Winter Quarter.

UWP 102N—Writing in the Disciplines: Anthropology (4) ***Review all entries***
Lecture—3 hours; Term Paper. Prerequisite(s): UWP 001 C- or better; ENL 003 C- or better; COM 001 C- or better; COM 002 C- or better; COM 003 C- or better; COM 004 C- or better; NAS 005 C- or better; 4 or 5 on AP English Lit and Comp exam; or 6 or better on IB HL English Exam. Restricted to upper division standing; Anthropology Major or Minor. Advanced instruction in writing and practice in effective styles of communication in Anthropology and related academic and professional fields. GE credit: AH, WE. Effective: 2017 Winter Quarter.

UWP 102N—Writing in the Disciplines: Anthropology (4) ***Review all entries***
Lecture—3 hours; Term Paper. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; 4 or 5 on AP English Lit and Comp exam; or 6 or better on IB HL English Exam. Restricted to upper division standing; Anthropology Major or Minor. Advanced instruction in writing and practice in effective styles of communication in Anthropology and related academic and professional fields. GE credit: AH, WE. Effective: 2018 Summer Session 1.

UWP 104A—Writing in the Professions: Business Writing (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Effective communication in and for organizations, including businesses (corporations), government agencies, and non-profit organizations. Suitable for students entering careers that require substantial communications, such as management, public relations, and grant writing. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 104B—Writing in the Professions: Law (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Advanced principles of critical thinking, argumentation, and style, with special emphasis on their application in the legal profession. Suitable for students planning careers in law, business, administration, or management. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 104C—Writing in the Professions: Journalism (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Non-fiction for magazines and newspapers, with attention to style and language. Emphasis on research, interviewing, market analysis, and query letters. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 104D—Writing in the Professions: Elementary and Secondary Education (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Advanced expository writing in the contemporary American classroom. Strongly recommended for teaching credential candidates. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 104E—Writing in the Professions: Science (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing or enrollment in a graduate science curriculum. Writing abstracts, research proposals, scientific papers, other forms of scientific communication. Presenting data graphically. Primarily for students engaged in or planning careers in basic or applied research. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 104F—Writing in the Professions: Health (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Not open to students who have taken course 104FY. Advanced expository writing common in the health professions, emphasizing effective communication between the writer and different audiences. Topics relate to health, disability, and disease. Suitable for students planning careers in professions such as medicine, dentistry, physical therapy, optometry. Not open for credit to students who have taken course 104FY. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 104FY—Writing in the Professions: Health (4)
Extensive Writing; Lecture/Discussion—1.5 hours; Web Electronic Discussion—1.5 hours. Prerequisite(s): UWP 001 C- or better; UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Not open to students who have taken course 104F. Advanced expository writing common in the health professions, emphasizing effective communication between the writer and different audiences. Topics relate to health, disability, and disease. Suitable for students planning careers in professions such as medicine, dentistry, physical therapy, optometry. Not open for credit to students who have taken course 104F. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 104I—Writing in the Professions: Internships (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to students concurrently enrolled in an internship and to Contemporary Leadership minors. Advanced instruction in writing in the workplace, including public and private sectors, government agencies, profit and non-profit organizations. Collaborative work and practice in effective styles of communication. Not open for credit to students who have completed course 102A. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 104J—Writing in the Professions: Writing for Social Justice (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Advanced instruction in writing for Social Justice, using an interdisciplinary approach combining feminist, critical race, ethnic, cultural, and transnational studies; practice in techniques of research and styles of communication for diverse audiences. Suitable for activists in community organizing, non-profits, politics. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 104T—Writing in the Professions: Technical Writing (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Communicating effectively about technology and other technical subjects to varied audiences for varied purposes. Suitable for students entering professions that require communicating technical information to subject matter experts, managers, technicians, and non-specialists. Not open for credit to students who have taken course 104A prior to fall 2012. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 106—English Grammar (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): UWP 001 or UWP 001V or UWP 001Y or ENL 003 or LIN 001 or LIN 001Y; or Consent of Instructor. Survey of present-day English grammar as informed by contemporary linguistic theories. The major syntactic structures of English; their variation across dialects, styles, and registers; their development; and their usefulness in describing the conventions of English. (English 106 and Linguistics 106.) GE credit: AH. Effective: 2018 Winter Quarter.

UWP 110—Specialized Genres in Professional Writing (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Satisfaction of the upper division writing requirement. Restricted to upper-division students who have satisfied the upper-division writing requirement. Counts toward the writing minor. Instruction in the elements and practices of professional writing in specialized genres. May be repeated up to 2 time(s) when topic differs. GE credit: AH, WE. Effective: 2015 Winter Quarter.

UWP 111A—Specialized Topics in Journalism (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Satisfaction of the upper division writing requirement. Restricted to upper-division students with a strong interest in journalism. Counts toward the writing minor. Instruction in the elements and practices of advanced journalism. May be repeated up to 1 time(s) specialized journalism topic for each course differs. GE credit: AH, WE. Effective: 2009 Fall Quarter.

UWP 111B—Specialized Topics in Journalism: Investigative Journalism (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Satisfaction of the upper division writing requirement. Restricted to upper-division students with a strong interest in journalism; counts toward the writing minor. Instruction in the elements and practices of in-depth investigative journalism. GE credit: AH, WE. Effective: 2009 Fall Quarter.

UWP 111C—Specialized Topics in Journalism: Science Journalism (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Satisfaction of the upper division writing requirement. Restricted to upper-division students with a strong interest in journalism. Counts toward the writing minor. Instruction in the elements and practices of science journalism. GE credit: AH, WE. Effective: 2009 Fall Quarter.

UWP 112A—Introduction to Professional Editing (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Satisfaction of the upper-division writing requirement. Restricted to upper-division students who have satisfied the upper-division writing requirement; counts toward the writing minor, Group C: Theory, History, and Design. Introduction to general editing practices and principles, with an emphasis on professional editing in organizational contexts, including academia and the workplace. Extensive practice in copy, comprehensive, and collaborative editing. GE credit: AH, VL, WE. Effective: 2010 Fall Quarter.

UWP 120—Rhetorical Approaches to Scientific and Technological Issues (4)
Extensive Writing; Lecture/Discussion—3 hours. Restricted to upper division standing. Application of rhetorical theories to scientific issues. Topics include: Rhetorical dimensions of scientific knowledge-making; scientific voice; rhetorical figures in science; incommensurability and demarcation; epistemology, definition, and classification; science wars; models of scientific literacy and accommodation, and implications for risk communication. GE credit: AH, SE, SL, WE. Effective: 2015 Winter Quarter.

UWP 121—History of Scientific Writing (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Upper division standing. History of scientific writing from the 17th century to the present; origins and evolution of scientific genres; role of scientific writing in producing scientific knowledge; discursive differences between disciplines; emergence of English as a global language of science. GE credit: AH, SE, SL, WE. Effective: 2013 Fall Quarter.

UWP 190—Capstone Portfolio Seminar (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 100 Open to majors who have completed 135 units. Capstone course for majors. Synthesis and application of rhetorical concepts learned in the major. Development of professional digital and print portfolio for graduate school and career applications. Effective: 2016 Spring Quarter.

UWP 192—Internship in Writing (1-12)
Internship—3-36 hours. Prerequisite(s): UWP 001 or UWP 001V or UWP 001Y or ENL 003; or equivalent course; consent of instructor. Internships in fields where students can practice their skills. May be repeated up to 12 unit(s). (P/NP grading only.) GE credit: AH. Effective: 2018 Winter Quarter.

UWP 197T—Tutoring in Writing (1-5)
Tutorial—1-5 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Tutoring one-on-one or leading small voluntary discussion groups affiliated with a writing course. May be repeated up to 10 unit(s). (P/NP grading only.) GE credit: AH. Effective: 2005 Fall Quarter.

UWP 197TC—Community Tutoring in Writing (1-4)
Tutorial—1-4 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Field experience, with individuals or in K-12 classroom instruction, focusing on reading- and writing-to-learn strategies in any subject area. May be repeated up to 10 unit(s). (P/NP grading only.) GE credit: AH. Effective: 2005 Fall Quarter.

UWP 198—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): UWP 001 or UWP 001V or UWP 001Y or ENL 003; or equivalent course; consent of instructor. May be repeated up to 10 unit(s). (P/NP grading only.) GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 199—Special Study for Advanced Undergraduates (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: AH, WE. Effective: 2005 Fall Quarter.

UWP 220—Rhetorical Approaches to Genre Study (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Using genre theory and methods of analysis to understand and prepare to do research on different types of writing in varying academic and professional contexts. Emphasis on problems in organizational, professional, and/or interdisciplinary communication. Effective: 2015 Fall Quarter.

UWP 250—Writing Assessment (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Examines key testing and measurement concepts; the history of writing assessment; and relationships among writing tests and methods of teaching writing; the impacts of Information and Communication Technology (ICT), and how educational policies both drive and respond to writing assessments. Effective: 2011 Fall Quarter.

UWP 253—Writing Program Administration (4)
Extensive Writing; Lecture/Discussion—3 hours. Theories, models, and procedures of writing programs, primarily in higher education. Developmental, first-year, and advanced writing programs, writing centers, writing-across-the-curriculum programs, writing minors and majors, and graduate programs in rhetoric and composition. Effective: 2014 Fall Quarter.

UWP 255—Theory and Research in Response to Student Writing (4)
Discussion—3 hours; Extensive Writing; Extensive Writing/Discussion; Project (Term Project). Restricted to graduate standing. Intensive focus on the critical topic of response or feedback to student writers. Coverage of philosophy, theory, and empirical research on teacher written feedback, teacher-student writing conferences, peer response, and error correction. Effective: 2013 Fall Quarter.

UWP 270—Literacy and Technology (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Examines how the physical qualities of texts offer different affordances during production and reception; grounds these discussions in the development of literacy practices and writing technologies from ancient to contemporary; creates frameworks for research into literacy, teaching, and textual technologies. Effective: 2011 Fall Quarter.

UWP 271—Second Language Writing (4)
Extensive Writing; Project (Term Project); Seminar—3 hours. Prerequisite(s): Graduate standing. Restricted to graduate standing. Traces the history of second language writing theory and research on second language writers in a variety of academic and professional contexts. Emphasis on writer characteristics, texts, and contexts. Effective: 2013 Fall Quarter.

UWP 280—Journal Editing Workshop: Writing on the Edge (2)
Seminar—2 hours. Reading and critiquing manuscript submissions. Discussing relevant work in the field of writing studies. Applying principles of professional editing. Developmental editing, copy-editing, and typesetting of accepted manuscripts. Soliciting articles and communicating with contributors. Students encouraged to enroll both quarters. May be repeated for credit. (S/U grading only.) Effective: 2013 Fall Quarter.

UWP 298—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 2005 Fall Quarter.

UWP 299—Individual Study (1-12)
Workshop—1-12 hours. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 2005 Fall Quarter.

UWP 390—Theory and Practice of Teaching University-Level Composition (4)
Extensive Writing; Seminar—3 hours. Open to graduate students teaching course 1 in the fall quarter following this course. Examination of current theories and practices in teaching of writing. Practical application to undergraduate writing courses. Emphasis on designing assignments and class sequences, and responding to student writing. Examination of impact of cultural, technological and theoretical changes on composition pedagogy. Effective: 2013 Fall Quarter.

UWP 392—Teaching Expository Writing (2)
Discussion—2 hours. Prerequisite(s): UWP 390; Graduate standing, appointment as Teaching Assistant in the Composition Program; or the equivalent of UWP 390. Discussion of problems related to teaching expository writing at the university level, with special emphasis on teaching reading and writing skills and responding to student papers. (S/U grading only.) Effective: 2005 Fall Quarter.

UWP 395—Teaching Multilingual Writers (4)
Seminar—3 hours. Prerequisite(s): Graduate standing or advanced undergraduate standing. Recommended: UWP 390, LIN 1, ENL/LIN/UWP 106. Preparing teachers of university-level second language writers, whether in composition courses or courses in other disciplines with a substantial writing component. Suitable for graduate students and advanced undergraduates. Effective: 2017 Fall Quarter.

UWP 396—Teaching Assistant Training Practicum (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit for credit. (S/U grading only.) Effective: 2005 Fall Quarter.

Veterinary Medicine, School of

Veterinary Medicine, School of | Veterinary Medicine, School of; Information

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Isaac N. Pessah, Ph.D., Associate Dean—Research and Graduate Education Programs

Jane Sykes, B.V.Sc, Ph.D., Chief Medical Officer—Veterinary Medical Teaching Hospital

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Veterinary Medicine, School of | APC Courses

Courses in APC:

APC 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Internship experience off and on campus in all subject areas offered in the Department of Anatomy, Physiology & Cell Biology. Internships are supervised by a member of the faculty. May be repeated for credit. (P/NP grading only.) Effective: 2007 Winter Quarter.

APC 099—Special Study for Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2007 Winter Quarter.

APC 100—Comparative Vertebrate Organology (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (BIS 001A, BIS 001B) or (BIS 002A, BIS 002B) Functional anatomy of major organ systems in vertebrates. Each system examined from cellular to gross level in fish, birds, and mammals. Emphasis on how differentiated cell types are integrated into tissues and organs to perform diverse physiological functions. (NPB 123.) Effective: 2015 Fall Quarter.

APC 192—Internship (1-15)
Internship—3-45 hours. Prerequisite(s): Upper-division standing; approval of internship. Internship experience off and on campus in all subject areas offered in the Department of Anatomy, Physiology & Cell Biology. Internships are supervised by a member of the faculty. May be repeated for credit when topic differs. (P/NP grading only.) Effective: 2004 Spring Quarter.

APC 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

APC 199—Special Study for Advanced Undergraduates (1-5)
Laboratory—3-15 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

APC 286—Basics of Microscopy and Cellular Imaging (2)
Laboratory—2 hours; Lecture—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Class size limited to 20 students. Practical applications of basic microscope techniques used to image cells and tissues with the goal of using these techniques to generate publication quality images. Principles of light, epifluorescent, confocal and electron microscopy, their applications and limitations. Effective: 2005 Spring Quarter.

APC 290—Seminar (1)
Seminar—1 hour. Discussion and critical evaluation of advanced topics and current trends in research. (P/NP grading only.) Effective: 1997 Winter Quarter.

APC 291—Topics in Biology of Respiratory System (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Topics concerning structure and function of respiratory system. Possible topics include: lung growth, pulmonary reaction to toxicants, pulmonary inflammation, lung metabolism, biology of lung cells, tracheobronchial epithelium, nasal cavity structure and function. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

APC 298—Group Study (1-5)
Laboratory—6-15 hours. Prerequisite(s): Consent of Instructor. Effective: 1997 Winter Quarter.

APC 299—Research (1-12)
Laboratory—6-36 hours. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

Veterinary Medicine, School of | PHR Courses

Courses in PHR:

PHR 092—Internship in Veterinary Science (1-4)
Clinical Activity—3-36 hours; Discussion/Laboratory—1-4 hours. Prerequisite(s): Approval of project prior to period of internship by faculty sponsor. Supervised work experience in reproduction. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHR 106—Human-Animal Interactions: Benefits and Issues (2)
Fieldwork—1 hour; Lecture—18 hours. Prerequisite(s): Upper division standing or consent of instructor. The contributions of animals to human society, including historic, anthropologic, developmental, human health and therapeutic perspectives, as well as effects of humans on animals. One field trip required. Effective: 2009 Winter Quarter.

PHR 192—Internship in Veterinary Science (1-12)
Clinical Activity—3-36 hours; Discussion/Laboratory—1-12 hours. Prerequisite(s): Upper division standing; approval of project prior to period of internship. Supervised work experience in Reproduction. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHR 198—Directed Group Study (1-5)
Variable—3-15 hours. May be repeated for credit. (P/NP grading only.) Effective: 2010 Spring Quarter.

PHR 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHR 202—Sampling in Health-Related Research (3)
Lecture—3 hours. Prerequisite(s): MPM 403; and Consent of Instructor. Or the equivalent. A very thorough coverage of simple random sampling, stratified sampling, cluster sampling, systematic sampling and other sampling methods applied extensively in epidemiology and other health-related disciplines. Emphasis on application of the sampling methods. Effective: 1997 Winter Quarter.

PHR 203—Multivariate Biostatistics (3)
Lecture—3 hours. Prerequisite(s): MPM 403; MPM 404; and Consent of Instructor. Or the equivalent. Multivariate procedures covered are principal component analysis, factor analysis, Two-group and k-group multivariate ANOVA, multivariate
regression, Two-group and k-group discriminant analysis and repeated measures analysis, cluster analysis, and canonical analysis. Emphasis is on application of procedures. Effective: 1997 Winter Quarter.

PHR 210—Epidemiological Approaches to Waterborne Zoonotic Pathogens (1)
Lecture—1 hour. Waterborne zoonotic diseases remain a significant cause of human illness. Review key waterborne pathogens; their biology, fate and transport in aquatic systems; on-farm management practices for reducing microbial contamination of California's fresh and marine aquatic resources from livestock production systems. (S/U grading only.) Effective: 2012 Winter Quarter.

PHR 212—Epidemiology of the Zoonoses (4)
Discussion—5 hours; Lecture—35 hours. Prerequisite(s): Graduate standing or third-year standing in the School of Veterinary Medicine or consent of instructor. Epidemiological, biological and ecological features of some major infections shared by humans and other animals. Wildlife and domestic animals zoonoses of major health and economic significance are presented to illustrate how knowledge of zoonoses epidemiology is essential for implementing control measures. Effective: 2005 Winter Quarter.

PHR 241—Advanced Topics in Canine Genetics and Genomics (2)
Discussion—2 hours. Prerequisite(s): GGG 201A; GGG 201C; Or equivalents, with consent of instructor. Limited enrollment. In-depth study of topics in canine genomics and genetics. Topics will vary annually, but can include positional cloning, whole genome association, complex traits and linkage disequilibrium. Students will lead discussions on assigned readings. May be repeated for credit when topic differs. Effective: 2007 Fall Quarter.

PHR 243—Advanced Topics in Conservation Genetics (2)
Discussion—18 hours; Lecture—2 hours. Prerequisite(s): Undergraduate genetics and ecology or consent of instructor. Restricted to 16 students. In-depth study of topics related to the application of genetic tools to wildlife conservation. Topics will vary annually, but may include use of non-invasive methods of genetic assessment and monitoring of wildlife populations. Students will lead discussions on assigned readings. May be repeated up to 1 time(s) when topics differ. (S/U grading only.) Effective: 2010 Spring Quarter.

PHR 266—Applied Analytic Epidemiology (3)
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): MPM 404; or Consent of Instructor. Principles and applications in analysis of epidemiologic data. Methods of analyzing stratified and matched data, logistic regression for cohort and case-control studies, Poisson regression, survival-time methods. (Public Health Sciences 266) Effective: 2009 Spring Quarter.

PHR 277—Mathematical Models in Epidemiology (3)
Laboratory—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): MPM 403; (EPI 205A or MPM 405); Consent of instructor; although not required, students are encouraged to refresh their knowledge of high school calculus and differential equations. Class size limited to 30 students. Theory of epidemics and mathematical modeling concepts for infectious diseases to include discrete and continuous time models, their use to explore disease dynamics and investigate prevention and control strategies for human and veterinary infectious diseases. (Epidemiology 277.) Effective: 2013 Fall Quarter.

PHR 290—Seminar (1)
Seminar—1 hour. Presentation and discussion of advanced and current topics in population health and reproduction. (S/U grading only.) Effective: 2016 Winter Quarter.

PHR 298—Group Study (1-5)
Variable. Effective: 1997 Winter Quarter.

PHR 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

Veterinary Medicine, School of | PMI Courses

Courses in PMI:

PMI 099—Special Study for Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2003 Fall Quarter.

PMI 126—Fundamentals of Immunology (3)
Lecture—3 hours. Prerequisite(s): BIS 102; or Consent of Instructor. Or equivalent. Overview of immunology including components of the immune system, initiation and regulation of the immune response, infection and immunity, hypersensitivity and immune dysfunction. Clinical immunologic techniques, immunodeficiency, and vaccinology. Effective: 2004 Fall Quarter.

PMI 126L—Immunology Laboratory (2)
Laboratory—6 hours. Prerequisite(s): PMI 126 (can be concurrent); Or equivalent. Laboratory procedures in clinical immunology. Cells of the innate and adaptive systems. Quantitative and qualitative characterization of the immune response. Effective: 2014 Winter Quarter.

PMI 127—Medical Bacteria and Fungi (5) ***Review all entries***
Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): Any Microbiology course with lab; Immunology strongly recommended. Introduction to the bacterial and mycotic pathogens of man and animals, with emphasis on pathogenic mechanisms and ecologic aspects of infectious disease. Effective: 2015 Spring Quarter.

PMI 127—Medical Bacteria and Fungi (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): PMI 127L (can be concurrent); Any Microbiology course with lab; Immunology strongly recommended; PMI 127L to be taken concurrently. Pass One restricted to Microbiology majors. Introduction to the bacterial and mycotic pathogens of man and animals, with emphasis on pathogenic mechanisms and ecologic aspects of infectious disease. Effective: 2018 Fall Quarter.

PMI 127L—Medical Bacteria and Fungi Lab (2)
Laboratory—6 hours. Prerequisite(s): PMI 127 (can be concurrent); Any Microbiology course with lab; Immunology strongly recommended. Pass One restricted to Microbiology majors. Introduction to the bacterial and mycotic pathogens of man and animals, with emphasis on pathogenic mechanisms and ecologic aspects of infectious disease. Effective: 2018 Fall Quarter.

PMI 128—Biology of Animal Viruses (3)
Lecture—3 hours. Prerequisite(s): BIS 102 Fundamental physical and chemical properties of animal viruses; methods of propagation, purification and assay. Mechanisms of viral replication and pathogenesis of viral infections in man and animals. Immunity to virus diseases and oncogenic properties of animal viruses. Two units of credit given if completed MIC 162. Effective: 2004 Fall Quarter.

PMI 129Y—One Health: Human, Animal & Environment Interfaces (3)
Lecture/Discussion—3 hours; Web Electronic Discussion. Class size limited to upper division undergraduate students in good standing with the school and who fulfill the course prerequisites below; enrollment limited to 100 students/term. Introduction to fundamentals, challenges, and opportunities in One Health using local and global health case studies. Animal, human, and environmental health problems, along with tools and transdisciplinary approaches, will be introduced to foster innovative thinking that addresses complex issues. GE credit: OL, SE, SL, SS. Effective: 2013 Spring Quarter.

PMI 198—Directed Group Study (1-5)
Independent Study—3-5 hours. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2004 Fall Quarter.

PMI 199—Special Study for Advanced Undergraduates (1-5)
Variable—3-15 hours. May be repeated for credit. (P/NP grading only.) Effective: 2003 Fall Quarter.

PMI 200—Research Foundations (1)
Seminar—1 hour. Introduction to key components of graduate school success including mentor/mentee relationship issues, avoiding plagiarism, hypothesis development and experimental design, demystifying the grant writing process, understanding the NIH administrative structure, preparing for a non-academic career, and strategies to maintain a work-life balance. (S/U grading only.) Effective: 2018 Fall Quarter.

PMI 201—Integrative Pathobiology Core I (5)
Discussion—2 hours; Lecture—3 hours. Overview of molecular biology techniques, tissue structure and function, cell membrane pathology and cellular mechanisms of disease including cellular responses and adaptations to stress, cell cycle, cell death, cell biomechanics, vascular disturbances, and mechanisms of neoplasia and tumorigenesis. Effective: 2014 Winter Quarter.

PMI 202—Integrative Pathobiology Core II (4)
Discussion—2 hours; Lecture—2 hours. The second required core course in the graduate group with topics in inflammation, host-pathogen interaction, regenerative medicine, integrative pathology and population and ecosystem health. Effective: 2014 Spring Quarter.

PMI 203—Experimental Design and Data Analysis in Pathobiology (2)
Lecture—1 hour; Lecture/Lab—2 hours. Follows two required core courses in, courses 201 and 202, for Ph.D. and M.S. students. Goal is to bridge gap between statistics and real-world pathobiology to increase students' skills and independence in experiment design and data analysis. Effective: 2013 Fall Quarter.

PMI 206—Mentored Scientific Writing (1)
Discussion—1.5 hours. Prerequisite(s): Consent of Instructor. Enrollment limited to 12 students. Drafting a scientific manuscript for publication based on research results. Students engage in collaborative peer review and learn effective writing, including how to convey a persuasive message and write clearly and succinctly. May be repeated up to 1 time(s). (S/U grading only.) Effective: 2017 Winter Quarter.

PMI 214—Vector-borne Infectious Diseases: Changing Patterns (2)
Lecture/Discussion—2 hours. Prerequisite(s): Open to graduate students, MPVM and MPH students, DVM and medical students with second- or third-year standing. Open to upper division undergraduate students with consent of instructor(s) Vector-borne infectious diseases especially as they relate to changing patterns associated with climatic changes, trade and population movement. (ENT 214) Effective: 2010 Fall Quarter.

PMI 221—Topics in Virus Research (1)
Discussion—1 hour. Prerequisite(s): Graduate student standing (Ph.D. or M.S.). Restricted to 10 students. Discussion-based seminar covering graduate student virology research. Informal presentations and discussion of technical problems in research design and experimentation are encouraged. Current stage of the research project is not important. May be repeated up to 4 time(s). (S/U grading only.) Effective: 2010 Fall Quarter.

PMI 270—Advanced Immunology (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): Introductory course in Immunology. Restricted to graduate student status in the Comparative Pathology Graduate Group; all other students require consent of instructor. Current concepts of immunology with an emphasis on interactions between the host, the environment and the pathogen. These interactions will include those that are protective and successful for the host as well as those that are deleterious. Effective: 2008 Summer Session 1.

PMI 290—Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate level standing. Topics in pathology, microbiology or immunology. May be repeated for credit. (S/U grading only.) Effective: 2005 Winter Quarter.

PMI 291A—Seminar in Immunology (1)
Seminar—1 hour. Prerequisite(s): PMI 126; Or the equivalent course. Students choose topic for each quarter. Individual or pairs of students choose a paper for all to read and present a seminar based on the subject of the paper. All students participate in discussion. May be repeated for credit. (S/U grading only.) Effective: 1997 Fall Quarter.

PMI 293A—Seminar in Infectious Diseases (1)
Seminar—1 hour. Prerequisite(s): Current enrollment in health science professional school or graduate standing in biological sciences. Discussion of current topics and cases of infectious diseases. May be repeated up to 1 time(s) topic differs. (S/U grading only.) Effective: 2004 Fall Quarter.

PMI 298—Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Group study. May be repeated for credit. (S/U grading only.) Effective: 2005 Winter Quarter.

PMI 299—Research (1-12)
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit. (S/U grading only.) Effective: 2004 Winter Quarter.

Veterinary Medicine, School of | VMB Courses

Courses in VMB:

VMB 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Work experience off and on campus in all subject areas offered in the Department of Molecular Biosciences. Internships supervised by a member of the faculty. May be repeated for credit. (P/NP grading only.) Effective: 2003 Fall Quarter.

VMB 101V—Principles of Pharmacology and Toxicology (3)
Auto Tutorial—2 hours; Project (Term Project)—1.5 hours; Web Electronic Discussion—1.5 hours; Web Virtual Lecture—0.25 hours. Prerequisite(s): Consent of Instructor. Upper division standing in a science major; chemistry through organic chemistry, general biology, or consent of instructor; good standing with the university; computing capability (use MS Word®, Excel®, PowerPoint, menu driven software programs, Course LMS); own a computer or have ready access to a computer with broadband internet access; Neurobiology, Physiology, and Behavior 101 and Biological Sciences 104 recommended. The course is designed for advanced undergraduate students with interests in pursuing graduate degrees in pharmacology, toxicology, physiological sciences, and for students with an interest in pursuing DVM, MD, Pharmacy, Dentistry and Nursing professional degrees. Students who pursue careers in environmental sciences, public health management, and epidemiology may also benefit from the subject matter presented in this course. Online course will provide training in core concepts of pharmacological and toxicological sciences and prepare students to develop higher-order problem solving and critical thinking skills. GE credit: OL, SE, SL. Effective: 2016 Fall Quarter.

VMB 101Y—Principles of Pharmacology and Toxicology (3)
Auto Tutorial—5 hours; Discussion/Laboratory—1.5 hours; Web Electronic Discussion—0.5 hours; Web Virtual Lecture—1 hour. Prerequisite(s): Upper division standing in a science major; Chemistry through organic chemistry and general biology, or consent from instructor; good standing with university; computing capability using MS Word, Excel, and PowerPoint, menu driven software programs, SmartSite; computer, or ready access to a computer, with broadband Internet access. Restricted to upper division undergraduate students in good standing with school and fulfill course prerequisites. Hybrid course provides training in core concepts of pharmacological and toxicological sciences. Develop higher-order problem solving and critical thinking skills. GE credit: OL, SE, SL. Effective: 2013 Fall Quarter.

VMB 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Work experience off and on campus in all subject areas offered by the Department of Molecular Biosciences. Internships supervised by a member of the faculty. May be repeated for credit. (P/NP grading only.) Effective: 2003 Fall Quarter.

VMB 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

VMB 234—Current Topics in Neurotoxicology (3)
Lecture—3 hours. Prerequisite(s): Core courses in one of the following graduate programs: Pharmacology and Toxicology, Agricultural and Environmental Chemistry, Biochemistry and Molecular Biology, Cell and Developmental Biology, Immunology, Molecular Cellular and Integrative Physiology or Neuroscience. Restricted to upper level undergraduate students must obtain permission from the course coordinator. General principles of neurotoxicology, the cell and molecular mechanisms and health impacts of specific neurotoxicants and the contribution of neurotoxic compounds to complex neurodevelopmental disorders and neurodegenerative diseases. (Environmental Toxicology 234 and Molecular, Cellular, and Integrative Physiology 234.) Effective: 2010 Fall Quarter.

VMB 253—Metabolism of Toxicants and Drugs (2)
Lecture—2 hours. Prerequisite(s): PTX 201; PTX 202; PTX 203; General biochemistry or consent of instructor. Significance/chemical pathways of toxicants and drug metabolism, enzymology and molecular aspects of P450 and flavin monooxygenases,
hydrolases and phase 2 transferases and experimental approaches for metabolism studies. Effective: 1997 Winter Quarter.

VMB 254—Toxicology of the Respiratory System (3)
Discussion; Lecture—3 hours. Prerequisite(s): PTX 201; PTX 202; PTX 203; or Consent of Instructor. Survey of structure and function of the respiratory system, the pathophysiology of major lung diseases, the interactions of toxicants with the lung and response of this organ to injury. Effective: 2006 Winter Quarter.

VMB 255—Pharmacokinetics and Biopharmaceuticals (2)
Discussion—4 hours; Lecture—16 hours. In-depth study of pharmacokinetics, including the fundamentals of pharmacokinetics, how to design a pharmacokinetic study and how to use both compartmental and non-compartmental analysis to interpret the data. Effective: 2011 Spring Quarter.

VMB 290—Seminar (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Topics in nutrition, pharmacology/toxicology, and biochemistry. May be repeated for credit. (S/U grading only.) Effective: 2003 Fall Quarter.

VMB 297T—Tutoring in Graduate Molecular Biosciences (1-5)
Practice—1-5 hours. Prerequisite(s): Consent of Instructor. Graduate or professional student standing. Assist in preparation and teaching of courses in Nutrition, Pharmacology and Toxicology, or other courses offered by the department under direct supervision of the instructor. Designed for graduate or professional students who desire teaching experience in graduate courses. May be repeated up to 5 unit(s). (S/U grading only.) Effective: 2003 Winter Quarter.

VMB 298—Group Study (1-5)
Variable—3-15 hours. May be repeated for credit. (S/U grading only.) Effective: 2005 Winter Quarter.

VMB 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

VMB 397T—Tutoring in Molecular Biosciences (1-5)
Discussion—1-5 hours. Prerequisite(s): Consent of Instructor. Graduate or professional student standing. Experience in professional curriculum for graduate or professional students, not teaching assistants, under direct supervision of instructor. May be repeated up to 5 unit(s). (S/U grading only.) Effective: 2003 Fall Quarter.

Veterinary Medicine, School of | VME Courses

Courses in VME:

VME 057V—Global Population, Health, and Environment (4)
Web Electronic Discussion—2 hours; Web Virtual Lecture—2 hours. Students critically examine multi-scale processes involving human, animal, and ecosystem health. Online team and independent work engage local and global topics around population pressures on environments and environmental pressures on populations. Effective: 2017 Spring Quarter.

VME 158—Infectious Disease in Ecology and Conservation (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B; BIS 002C; or equivalent. EVE 100 is recommended. Introduction to the dynamics and control of infectious disease in wildlife, including zoonotic diseases and those threatening endangered species. Basic epidemiological models and application to field data. Scientists' role in developing disease control policies. Effective: 2017 Winter Quarter.

VME 198—Directed Group Study (1-5)
Variable—3-15 hours. May be repeated for credit. (P/NP grading only.) Effective: 2007 Fall Quarter.

VME 199—Special Studies for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

VME 217—Evaluation and Use of Diagnostic Tests (2)
Discussion—3 hours; Laboratory—6 hours; Lecture—14 hours. Prerequisite(s): MPM 205 or EPI 205; Consent of Instructor. Class size limited to 30 students. Clinical and epidemiologic properties and application of diagnostic tests for disease, with emphasis on selecting tests; validating, evaluating, and interpreting new tests individually and in aggregate; determining cutoff values; and developing testing strategies. Effective: 2017 Winter Quarter.

VME 225—Viral Pathogenesis Seminar/Journal Club (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate student status in the Comparative Pathology, Microbiology or Immunology graduate groups. Participatory seminar addressing the mechanisms of retroviral pathogenesis in a journal club format. Focus on the review of current scientific journal papers concerning viral pathogenesis, immunology and virology with a special focus on retroviruses. May be repeated up to 12 time(s). (S/U grading only.) Effective: 2017 Winter Quarter.

VME 258—Infectious Disease in Ecology and Conservation (1)
Discussion—2 hours. Prerequisite(s): VME 158 must be taken concurrently. Presentation, analysis and discussion of primary literature on the dynamics and control of infectious disease in wildlife, including zoonotic diseases and those threatening endangered species. Multidisciplinary approach combines perspectives of ecology and veterinary medicine. Effective: 2008 Winter Quarter.

VME 298—Group Study (1-5)
Variable. Prerequisite(s): Student in School of Veterinary Medicine or consent of instructor. Group study in selected areas of the clinical sciences. (S/U grading only.) Effective: 1997 Winter Quarter.

VME 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

Veterinary Medicine, School of | VSR Courses

Courses in VSR:

VSR 099—Special Study for Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2005 Fall Quarter.

VSR 199—Special Study for Advanced Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2005 Fall Quarter.

VSR 298—Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Group study. May be repeated for credit. (S/U grading only.) Effective: 2005 Fall Quarter.

VSR 299—Research (1-12)
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. May be repeated for credit. (S/U grading only.) Effective: 2005 Fall Quarter.

Viticulture & Enology

Viticulture & Enology | VEN B.S.

(College of Agricultural and Environmental Sciences)

David E. Block, Ph.D., Chairperson of the Department

Department Office. 1162 RMI North Building; 530-752-0380; http://wineserver.ucdavis.edu

Faculty. http://wineserver.ucdavis.edu/people/faculty/index.html

The Major Program

The Viticulture and Enology major provides an interdisciplinary education in the biological and physical principles underlying grape and wine production as well as practical knowledge of grape growing (viticulture) and wine making (enology). This program provides the knowledge base for problem-solving and decision-making in commercial grape and wine production.

Preparatory Requirements. Before transferring into the Viticulture and Enology major, students must complete the following courses with a grade of C- or better and with a combined grade point average of at least 2.500 at the University of California (at least 3.000 for similar courses taken at community college) for these and all other preparatory courses. In addition, students' overall UC GPA must be 2.250 or higher. All courses must be taken for a letter grade.

	UNITS
Biological Sciences 002A	5
Chemistry 002A, 002B, 002C, 008A	17
Mathematics 016A	3
Physics 001A, 001B or 007A	4-6

Recommendations. Completion of UC Davis equivalents of the following preparatory courses for the major are not required for entry but are highly recommended. Failure to complete these will delay entry into required upper division courses and may thus delay graduation. Some courses may be available at UC Davis during Summer Session:

	UNITS
Chemistry 008B	4
Mathematics 016B	3
Plant Sciences 002	4
Biological Sciences 102	3

The Program. The curriculum builds upon a foundation of biology, chemistry, biochemistry and mathematics with specialized courses related to grape and wine production. To complete the program, students may choose to place particular emphasis on viticulture, enology or economics. Credit may also be earned for foreign language study and internships.

Major Advisors. H. Heymann, A. Walker

Related Major Programs. Food Science and Technology, and Plant Sciences.

Career Alternatives. Graduates are qualified for a variety of vineyard and winery positions, including production management, quality control and research. Additionally they may work in related fields such as pest management, nursery production and analytical services.

Graduate Study. Several graduate groups offer programs of study leading to advanced degrees in the fields of viticulture and enology. For the M.S. or Ph.D. degree, see Agricultural and Environmental Chemistry (A Graduate Group), Engineering: Chemical Engineering, Ecology (A Graduate Group), Food Science (A Graduate Group), Integrative Genetics and Genomics (A Graduate Group), Horticulture and Agronomy (A Graduate Group), Microbiology (A Graduate Group), Plant Biology (A Graduate Group), Plant Pathology, Soils and Biogeochemistry (A Graduate Group), and Viticulture and Enology (A Graduate Group).

Preparatory Subject Matter **Units:** 48-50

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
OR		
PLS 002	Botany and Physiology of Cultivated Plants	4
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 002C	General Chemistry	5
CHE 008A	Organic Chemistry: Brief Course	2
CHE 008B	Organic Chemistry: Brief Course	4
PLS 021	Application of Computers in Technology	3
OR		
Equivalent and advisor approval.		
MAT 016A	Short Calculus	3
MAT 016B	Short Calculus	3
PHY 001A	Principles of Physics	3
PHY 001B	Principles of Physics	3

OR		
PHY 007A	General Physics	4
VEN 002	Introduction to Viticulture	2
VEN 003	Introduction to Winemaking	3

Depth Subject Matter **Units:** 48-53

BIS 102	Structure and Function of Biomolecules	3
BIS 103	Bioenergetics and Metabolism	3
OR		
BIS 105	Biomolecules and Metabolism	3
MIC 102	Introductory Microbiology	3
MIC 103L	Introductory Microbiology Laboratory	2
PLS 120	Applied Statistics in Agricultural Sciences	4
OR		
STA 106	Applied Statistical Methods: Analysis of Variance	4
VEN 101A	Viticultural Practices	3
VEN 101B	Viticultural Practices	3
VEN 101C	Viticultural Practices	3
VEN 110	Grapevine Growth and Physiology	3
VEN 118	Grapevine Pests, Diseases and Disorders	3
VEN 123	Analysis of Musts and Wines	2
VEN 124	Wine Production	2
VEN 125	Wine Types and Sensory Evaluation	2
VEN 126	Wine Stability	3
VEN 128	Wine Microbiology	2
VEN 135	Wine Technology and Winery Systems	4

AND

In consultation with the advisor, choose three:

VEN 123L	Analysis of Musts & Wines Laboratory	2
VEN 124L	Wine Production Laboratory	3
VEN 125L	Sensory Evaluation of Wine Laboratory	2
VEN 126L	Wine Stability Laboratory	2
VEN 127L	Post-Fermentation Wine Processing Lab	3
VEN 128L	Wine Microbiology Laboratory	2

If more than three are taken, the extra courses will count as restricted electives in Area B.

Restricted Electives **Units:** 28

In consultation with advisor, choose 28 units from the following five areas. At least 12 units must be from one of the following areas: (A) Plant Science, (B) Food Science and Microbiology, or (C) Economics and Business.

(A) Plant Science Area:

ABT 150	Introduction to Geographic Information Systems	4
ATM 133	Biometeorology	4
BIS 101	Genes and Gene Expression	4
BIT 160	Principles of Plant Biotechnology	3
ENT 110	Arthropod Pest Management	5
HYD 110	Irrigation Principles and Practices	3
HYD 124	Plant-Water-Soil Relationships	4

MCB 126	Plant Biochemistry	3
NEM 100	General Plant Nematology	4
PLB 111	Plant Physiology	3
PLB 112	Plant Growth and Development	3
PLB 123	Plant-Virus-Vector Interaction	3
PLB 143	Evolution of Crop Plants	4
PLP 120	Introduction to Plant Pathology	4
PLS 154	Introduction to Plant Breeding	4
PLS 157	Physiology of Environmental Stresses in Plants	4
PLS 158	Mineral Nutrition of Plants	4
PLS 171	Principles and Practices of Plant Propagation	4
PLS 176	Introduction to Weed Science	4
SSC 100	Principles of Soil Science	5
SSC 102	Environmental Soil Chemistry	3
SSC 109	Sustainable Nutrient Management	4
SSC 118	Soils in Land Use and the Environment	4
VEN 111	World Viticulture	3

(B) Food Science and Microbiology Area:

BIS 101	Genes and Gene Expression	4
FST 102A	Malting and Brewing Science	4
FST 102B	Practical Malting and Brewing	4
FST 104	Food Microbiology	3
FST 104L	Food Microbiology Laboratory	4
FST 109	Principles of Quality Assurance in Food Processing	3
FST 110	Food Processing	4
FST 110L	Food Processing Laboratory	2
FST 127	Sensory Evaluation of Foods	4
MIC 140	Bacterial Physiology	3
MIC 150	Genomes of Pathogenic Bacteria	3
MIC 155L	Bacterial Physiology Lab	4
VEN 140	Distilled Beverage Technology	3

(C) Economics and Business Area:

ARE 100A	Intermediate Microeconomics: Theory of Production and Consumption	4
ARE 112	Fundamentals of Organization Management	4
ARE 113	Fundamentals of Marketing Management	4
ARE 118	Tax Accounting	4
ARE 130	Agricultural Markets	4
ARE 140	Farm Management	4
ARE 150	Agricultural Labor	4
ECN 001A	Principles of Microeconomics	4
ECN 001B	Principles of Macroeconomics	4
MGT 011A	Elementary Accounting	4
MGT 011B	Elementary Accounting	4
VEN 111	World Viticulture	3

(D) Language Area:

Maximum 12 units, not counting course 1, of one of the following languages: French, German, Italian, Portuguese or Spanish. Courses taught in English will not count as restricted electives in this major.

At least one course must be Intermediate or Conversational; qualifying Intermediate or Conversational courses are listed below:

FRE 021	Intermediate French	5

FRE 022	Intermediate French	5
FRE 023	Intermediate French	5
GER 011	Travel and the Modern World	4
GER 020	Intermediate German	4
GER 021	Intermediate German	4
GER 022	Intermediate German	4
ITA 004	Intermediate Italian	4
ITA 005	Intermediate Italian	4
SPA 008	Elementary Spanish Conversation	2
SPA 021	Intermediate Spanish	5
SPA 022	Intermediate Spanish	5
SPA 028	Intermediate Spanish Conversation	2
SPA 031	Intermediate Spanish for Native Speakers I	5
SPA 032	Intermediate Spanish for Native Speakers II	5
SPA 033	Intermediate Spanish for Native Speakers III	5

(E) Internship Area:

Choose a maximum of eight units:

VEN 190X	Winemaking Seminar	1
VEN 192	Internship	1-12
VEN 198	Directed Group Study	1-5
VEN 199	Special Study for Advanced Undergraduates	1-5
VEN 290	Seminar	1
VEN 298	Group Study	1-5

May be counted as restricted electives by prior arrangement with advisor.

May be increased to 12 units in exceptional circumstances.

Total: 120-133

Viticulture & Enology | VEN Courses

Courses in VEN:

VEN 002—Introduction to Viticulture (2)
Lecture—2 hours. Fundamental principles of biology and culture of the grapevine including taxonomy, morphology, physiology, distribution, domestication, utilization, propagation, production systems, harvesting, and storage and processing of grapes. Successful completion of the course should prepare students for upper division courses in viticulture. GE credit: SE. Effective: 1997 Winter Quarter.

VEN 003—Introduction to Winemaking (3)
Lecture—3 hours. Overview of the history of wine, viticulture, fermentation, winery operations, the physiology of wine consumption, wines produced in California and other major wine-producing regions and the sensory evaluation of wine. GE credit: SE, SS. Effective: 1997 Winter Quarter.

VEN 090X—Lower Division Seminar (2)
Extensive Writing; Seminar—1 hour; Term Paper. Prerequisite(s): Consent of Instructor. Lower division standing. Introduction to current issues surrounding wine and health as they relate to diet, nutrition, and toxicology. Effective: 1998 Winter Quarter.

VEN 099—Special Study for Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

VEN 101A—Viticultural Practices (3)
Discussion/Laboratory—3.5 hours; Lecture—1.5 hours. Prerequisite(s): VEN 002 Identification, cultivation, and use of the major wine, table, raisin, and rootstock cultivars. Includes practices specific to the fall such as fruit contracts, maturity sampling, harvesting, cover crops, and soil-pests. One field trip required. GE credit: SE. Effective: 2004 Fall Quarter.

VEN 101B—Viticultural Practices (3)
Discussion/Laboratory—3.5 hours; Lecture—1.5 hours. Prerequisite(s): VEN 002 Theory, principles, and practices of pruning and grapevine propagation. Plant materials and the certification process, weed control and weed identification, wood diseases, and frost protection. One field trip required. GE credit: SE. Effective: 2004 Winter Quarter.

VEN 101C—Viticultural Practices (3)
Discussion/Laboratory—3.5 hours; Lecture—1.5 hours. Prerequisite(s): VEN 002 Field oriented experience in the principles and practices of grapevine production, including vineyard establishment, vine training, trellising, canopy management practices, irrigation and water management, and methods of crop adjustment for improvement of fruit quality. One field trip required. GE credit: SE. Effective: 2004 Spring Quarter.

VEN 110—Grapevine Growth and Physiology (3)
Lecture—3 hours. Prerequisite(s): VEN 002 Botanical aspects including morphology and domestication will precede lectures covering flower development and energy budget concepts. Impact of physiological variables such as photosynthesis translocation, mineral nutrition, and water relations on fruit ripening and composition will be covered. GE credit: SE. Effective: 1997 Winter Quarter.

VEN 111—World Viticulture (3)
Lecture—3 hours. Prerequisite(s): Upper division standing. Study of the diversity of viticulture, both geographical and historical. History of grape growing and its spread throughout the world will be covered, along with discussions of current viticultural practices in different parts of the world, including California. GE credit: OL, SE, WE. Effective: 1997 Winter Quarter.

VEN 111L—Critical Evaluation of Wines of the World (1)
Discussion/Laboratory—3 hours. Prerequisite(s): VEN 111 (can be concurrent); VEN 125 C or better; VEN 111 required concurrently. Critical analysis of wines produced in different parts of the world with emphasis on the relationship between sensory properties of the wines and factors associated with their place of origin. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

VEN 115—Raisin and Table Grape Production (2)
Lecture—2 hours. Prerequisite(s): VEN 002 Overview of the raisin and table grape industries in California and other production areas of the world. Cultural practices associated with raisin and table grape production will also be discussed. GE credit: SE. Effective: 1997 Winter Quarter.

VEN 118—Grapevine Pests, Diseases and Disorders (3)
Lecture—3 hours. Prerequisite(s): VEN 002 Various pests and diseases of vineyards throughout California. Pest/disease identification and control methods (to include sampling techniques) also will be discussed. Integrated management approach to pest control methods will be emphasized. GE credit: SE. Effective: 1997 Winter Quarter.

VEN 123—Analysis of Musts and Wines (2) ***Review all entries***
Lecture—2 hours. Prerequisite(s): CHE 002C; CHE 008B; PLS 021 Fundamental principles of analytical chemistry as they relate to specific methods used in winemaking. GE credit: SE. Effective: 2018 Winter Quarter.

VEN 123—Analysis of Musts and Wines (2) ***Review all entries***
Lecture—2 hours. Prerequisite(s): CHE 002C; PLS 021; (CHE 008B or CHE 118B or CHE 128B) Fundamental principles of analytical chemistry as they relate to specific methods used in winemaking. GE credit: SE. Effective: 2018 Fall Quarter.

VEN 123L—Analysis of Musts & Wines Laboratory (2) ***Review all entries***
Independent Study—3 hours; Laboratory—3 hours. Prerequisite(s): VEN 123 (can be concurrent); CHE 002C; CHE 008B; PLS 021; Or equivalent of CHE 008B. Restricted to upper division and graduate students in Viticulture & Enology; others by approval of instructor. Fundamental principles of analytical chemistry as they relate to specific methods used in winemaking. Laboratory exercises demonstrating various chemical, physical and biochemical methods. Data will be analyzed and results interpreted in weekly lab reports; includes student-designed independent project and written report. GE credit: QL, SE, VL, WE. Effective: 2018 Winter Quarter.

VEN 123L—Analysis of Musts & Wines Laboratory (2) ***Review all entries***
Independent Study—3 hours; Laboratory—3 hours. Prerequisite(s): VEN 123 (can be concurrent); CHE 002C; PLS 021; (CHE 008B or CHE 118B or CHE 128B); Restricted to upper division and graduate students in Viticulture & Enology; others by approval of instructor. Fundamental principles of analytical chemistry as they relate to specific methods used in winemaking. Laboratory exercises demonstrating various chemical, physical and biochemical methods. Data will be analyzed and results interpreted in weekly lab reports; includes student-designed independent project and written report. GE credit: QL, SE, VL, WE. Effective: 2018 Fall Quarter.

VEN 124—Wine Production (2) ***Review all entries***
Lecture—2 hours. Prerequisite(s): VEN 003; VEN 123 (can be concurrent); BIS 102 Principles and practices of making standard types of wines, with special reference to grape varieties used and methods of vinification. GE credit: SE, WE. Effective: 2000 Fall Quarter.

VEN 124—Wine Production (2) ***Review all entries***
Lecture—2 hours. Prerequisite(s): VEN 003; VEN 123 (can be concurrent); (BIS 102 or BIS 105) Principles and practices of making standard types of wines, with special reference to grape varieties used and methods of vinification. GE credit: SE, WE. Effective: 2018 Fall Quarter.

VEN 124L—Wine Production Laboratory (3)
Independent Study—3 hours; Laboratory—3 hours; Term Paper—3 hours. Prerequisite(s): VEN 124 (can be concurrent) Restricted to undergraduates in fermentation science, viticulture & enology, biotechnology, microbiology, food science and applied plant biology majors; to graduate students in food science, agricultural and environmental chemistry and horticulture. Current technologies used in production of California table wines; analysis and monitoring of impact of fermentation variables on microbial performance and product quality; student-designed independent research project. GE credit: OL, SE, WE. Effective: 2000 Fall Quarter.

VEN 125—Wine Types and Sensory Evaluation (2)
Lecture—2 hours. Prerequisite(s): (PLS 120 or STA 106) Open to upper division and graduate students in Viticulture & Enology; others by approval of instructor. Principles of sensory evaluation and application to wines. Factors influencing wine flavor, data from sensory analysis of model solutions. GE credit: QL, SE. Effective: 2018 Spring Quarter.

VEN 125L—Sensory Evaluation of Wine Laboratory (2)
Laboratory—3 hours; Term Paper—3 hours. Prerequisite(s): VEN 125 (can be concurrent) Restricted to upper division major students in fermentation science or viticulture & enology; graduate students in the food science program. Sensory evaluation of wines and model systems using discrimination tests, ranking, descriptive analysis and time-intensity analysis. Data will be analyzed by appropriate statistical tests and the results interpreted in extensive weekly lab reports. GE credit: QL, SE, VL, WE. Effective: 2001 Winter Quarter.

VEN 126—Wine Stability (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): VEN 124 Restricted to viticulture & enology; fermentation science, applied plant biology majors; graduate students in food science, microbiology, horticulture and horticulture and agronomy groups. Principles of equilibria and rates of physical and chemical reactions in wines; treatment of unstable components in wines by adsorption, ion exchange, refrigeration, filtration, and membrane processes; and protein, polysaccharide, tartrate, oxidative and color stabilities. GE credit: SE. Effective: 2001 Winter Quarter.

VEN 126L—Wine Stability Laboratory (2) ***Review all entries***
Independent Study—3 hours; Laboratory—3 hours. Prerequisite(s): VEN 126 (can be concurrent); and Consent of Instructor. Restricted to upper division Fermentation Science, Viticulture & Enology majors, graduate students in the Food Science, Agricultural and Environmental Chemistry, Microbiology, or by consent of instructor. Practical application of principles of equilibria and rates of physical and chemical reactions to wine stability. GE credit: SE, WE. Effective: 2001 Winter Quarter.

VEN 126L—Wine Stability Laboratory (2) ***Review all entries***
Independent Study—3 hours; Laboratory—3 hours. Prerequisite(s): VEN 126 (can be concurrent); VEN 123L; and Consent of Instructor. Restricted to upper division Fermentation Science, Viticulture & Enology majors, graduate students in the Food Science, Agricultural and Environmental Chemistry, Microbiology, or by consent of instructor. Practical application of principles of equilibria and rates of physical and chemical reactions to wine stability. GE credit: SE, WE. Effective: 2019 Winter Quarter.

VEN 127L—Post-Fermentation Wine Processing Lab (3)
Laboratory—3 hours. Prerequisite(s): VEN 123; VEN 123L; VEN 126; VEN 126L; VEN 135 (can be concurrent); or Consent of Instructor. Restricted to upper division or graduate standing. Sensory and chemical impact of processing on wines; bench-scale analytical results to make and implement processing decisions; principles and theories of equipment operation and scale-up. Effective: 2018 Spring Quarter.

VEN 128—Wine Microbiology (2)
Lecture—2 hours. Prerequisite(s): (VEN 123, VEN 124); (MIC 102, FST 104, FST 104L); MIC 103L; VEN 125, VEN 126 recommended Nature, development, physiology, biochemistry and control of yeasts and bacteria involved in the making, aging and spoilage of wine. GE credit: SE. Effective: 2018 Winter Quarter.

VEN 128L—Wine Microbiology Laboratory (2)
Laboratory—6 hours. Prerequisite(s): VEN 123; VEN 124; VEN 128 (can be concurrent); FST 104; FST 104L; MIC 103L Restricted to upper division major students in fermentation science or viticulture & enology; graduate students in the food science program. Nature, development, physiology, biochemistry and control of yeasts and bacteria involved in the making, aging and spoilage of wine. GE credit: SE, VL, WE. Effective: 2018 Winter Quarter.

VEN 135—Wine Technology and Winery Systems (4)
Discussion/Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): PLS 021; MAT 016A; MAT 016B; ((PHY 001A, PHY 001B) or PHY 007A) Process technologies and process systems that are used in modern commercial wineries. Lectures, demonstrations, problem solving sessions, and possible field trips. Includes grape preparation and fermentation equipment; post-fermentation processing equipment; winery utilities, cleaning systems, and waste treatment. GE credit: SE. Effective: 2018 Spring Quarter.

VEN 140—Distilled Beverage Technology (3)
Lecture—3 hours. Prerequisite(s): CHE 008B; FST 110A Distillation principles and practices; production technology of brandy,
whiskey, rum, vodka, gin, and other distilled beverages; characteristics of raw materials, fermentation, distillation, and aging. GE credit: QL, SE. Effective: 1997 Winter Quarter.

VEN 181—Readings in Enology (1)
Discussion—1 hour. Prerequisite(s): VEN 003 Critical evaluation of selected monographs in enology. Discussion leadership rotates among the students. May be repeated up to 3 time(s). (P/NP grading only.) GE credit: SE. Effective: 2002 Spring Quarter.

VEN 190X—Winemaking Seminar (1)
Discussion—1 hour; Seminar—1 hour. Prerequisite(s): VEN 003 Open to Viticulture & Enology majors and graduate students. Outside speakers on a specific winemaking topic chosen for the quarter. Discussion with the speaker hosted by the faculty member(s) in charge. May be repeated up to 3 time(s). (P/NP grading only.) GE credit: SE. Effective: 2002 Spring Quarter.

VEN 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Work experience related to Fermentation Science (Enology) or Plant Science (Viticulture) majors. Internships must be approved and supervised by a member of the department or major faculty, but are arranged by the student. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

VEN 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

VEN 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

VEN 200—Introduction to Scientific Methods (2)
Lecture/Discussion—1 hour; Term Paper—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Processes involved in conducting scientific research. Topics covered will include conducting literature review, formulating hypotheses, and analyzing and reporting results. Students will complete an annotated bibliography and complete a written and oral research proposal. Effective: 2000 Spring Quarter.

VEN 210—Grape Development and Composition (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): (BIS 102, BIS 103) or BIS 105 Anatomy, physiology and biochemistry of grape berry development, with emphasis on the development of grape composition relevant to winemaking. Effective: 2018 Winter Quarter.

VEN 215—Sensometrics (3)
Lecture—3 hours. Prerequisite(s): FST 117; ((VEN 125, VEN 125L) or (FST 107A or FST 107B)); Or equivalent to course FTS 117. Experimental design and statistical analysis, including multivariate analysis, for both sensory and instrumental data in enology and food-related studies. Effective: 2004 Fall Quarter.

VEN 216—Sustainable Vineyard Development (5)
Fieldwork—3 hours; Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): (VEN 101A, VEN 101B, VEN 101C); (VEN 115 or VEN 118); or Consent of Instructor. Application of plant, meteorological, soil, water, GIS, and economic sciences to sustainable vineyard development. Preparation of a comprehensive study to determine the viticultural and economic feasibility of a given site for raisin, table, or wine grape production. Effective: 2017 Fall Quarter.

VEN 217—Field and GIS Evaluation of Soils (3)
Fieldwork—3 hours; Lecture/Lab—4 hours. Prerequisite(s): PLS 120; (PLS 205 or PLS 206); (SSC 100 or SSC 105 or SSC 107); VEN 101C; Consent of Instructor. ABT 180 is recommended. Principles and practices used to evaluate agricultural soils in the field, including soil pits, soil cores, electrical conductivity meters, ground penetrating radar, geomorphology and surface terrain analysis. Use of geographic information sciences, soil databases, digital elevation models and geostatistics. Effective: 2011 Fall Quarter.

VEN 219—Natural Products of Wine (3)
Lecture—3 hours. Prerequisite(s): VEN 123; VEN 124; and Consent of Instructor. Or natural products background. Structure, occurrence, and changes due to wine production to the natural products found in wine. Chemicals with a sensory impact will be emphasized, including flavonoids and other phenolics, terpenes and norisoprenoids, pyrazines, oak volatiles and other wine constituents. Effective: 1997 Winter Quarter.

VEN 223—Instrumental Analysis of Must and Wine (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): VEN 123 or FST 103; BIS 102 and BIS 103 or BIS 105, CHE 107B or CHE 115 recommended. Open to upper division students in Viticulture & Enology, Food Science and Technology; students in Food Science, Ag & Environmental Chemistry and Viticulture & Enology graduate groups. Theory and practice of instrumental analysis of wines and musts. mphasis on the principles of analytical techniques (e.g., CE, GC, HPLC, Mass Spectrometry) and factors determining correct choice of instrumental method. Effective: 2011 Fall Quarter.

VEN 224—Advances in the Science of Winemaking (3)
Lecture—3 hours. Prerequisite(s): VEN 125; VEN 126; or Consent of Instructor. Graduate standing. Selected topics in the science and technology of winemaking. Topics will be drawn from current research of participating enology and viticulture faculty. Critical analysis of the technical content of published material will be emphasized. Effective: 2001 Spring Quarter.

VEN 225—Advanced Sensory Analysis of Wines (3)
Laboratory—4 hours; Lecture/Discussion—2 hours. Prerequisite(s): ((VEN 124, VEN 125) or FST 107); AMR 120; Or the equivalent. Sensory descriptive analysis experiments will be designed and conducted using standard sensory science methods.Data will be analyzed by analyses of variance, principal component analyses and generalized Procrustes analysis to evaluate the judges performance and interpret the significance of the results. Effective: 1997 Winter Quarter.

VEN 235—Winery Design (4)
Discussion—1 hour; Independent Study; Lecture—2 hours. Prerequisite(s): VEN 124; VEN 135; or Consent of Instructor. Design of wineries. Includes process calculations, equipment selection, process layout and building choice and siting. Project scheduling, capital costs, and ten-year cash flow analysis for the winery. One field trip required. Effective: 2005 Winter Quarter.

VEN 270—Critical Evaluation of Scientific Literature (2)
Discussion—2 hours. Prerequisite(s): Consent of Instructor. Contemporary research topics in biological sciences. Discussion of recent research articles in a special topic area chosen by instructor. Intended to develop skills in critical evaluation of scientific publications. May be repeated for credit. (S/U grading only.) Effective: 2000 Winter Quarter.

VEN 290—Seminar (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

VEN 290C—Advanced Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Planning and results of research programs, proposals, and experiments. Discussion and critical evaluation of original research being conducted by the group. Discussion led by individual research instructors for research group. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

VEN 291—Advanced Viticulture (2)
Lecture/Discussion—2 hours. Prerequisite(s): VEN 110; VEN 116; VEN 124; VEN 125; VEN 210 recommended. Critical evaluation of scientific and popular literature on selected topics of current interest that relate viticulture to fruit or wine sensory attributes or quality. May be repeated up to 1 time(s). Effective: 2000 Winter Quarter.

VEN 292—Advanced Internship (1-15)
Internship—3-45 hours; Variable. Prerequisite(s): VEN 123; VEN 123L; VEN 124; VEN 124L; VEN 125; VEN 125L; VEN 126; VEN 126L; VEN 128; VEN 128L; and Consent of Instructor. Restricted to Viticulture & Enology Graduate Group graduate students. Work experience related to Fermentation Science (Enology) or Plant Science (Viticulture) majors. Internships must be approved and supervised by a graduate group faculty member or students major professor, but are arranged by the student. May be repeated up to 15 unit(s). (S/U grading only.) Effective: 2010 Winter Quarter.

VEN 297T—Tutoring in Viticulture and Enology (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. Designed for graduate students who desire teaching experience, but are not teaching assistants. Student contact primarily in laboratory or
discussion sections, and under direction of a faculty member. (S/U grading only.) Effective: 1997 Winter Quarter.

VEN 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

VEN 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

VEN 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

Viticulture & Enology (Graduate Group)

Viticulture & Enology (Graduate Group) | VEN M.S.

Dario Cantu, Ph.D., Chairperson of the Group

Group Office. 1204 RMI South; 530-752-3250; Fax 530-7582-032; http://vengg.ucdavis.edu

Faculty. https://vengg.ucdavis.edu/person-type/faculty

Graduate Study. The M.S. program offers advanced studies in viticulture and enology, ranging from the genetics, physiology and biochemistry of grapevines to the chemistry, microbiology and sensory science of wines and the chemical engineering of winemaking. Priority application deadline January 15, applications accepted until May 15.

Ph.D. studies are not offered by the Graduate Program in Viticulture and Enology.

Preparation. Applicants to the program are required to have a level of competence equivalent to that of a strong science undergraduate program. This includes coursework in biology, general chemistry, organic chemistry, calculus, statistics (analysis of variance), biochemistry, microbiology, and economics.

Specific requirements are outlined in detail and may be obtained by visiting http://vengg.ucdavis.edu.

Graduate Advisor. D. Cantú, R. Runnebaum, A. Waterhouse

Viticulture & Enology (Graduate Group) | VEN Courses

Courses in VEN:

VEN 002—Introduction to Viticulture (2)
Lecture—2 hours. Fundamental principles of biology and culture of the grapevine including taxonomy, morphology, physiology, distribution, domestication, utilization, propagation, production systems, harvesting, and storage and processing of grapes. Successful completion of the course should prepare students for upper division courses in viticulture. GE credit: SE. Effective: 1997 Winter Quarter.

VEN 003—Introduction to Winemaking (3)
Lecture—3 hours. Overview of the history of wine, viticulture, fermentation, winery operations, the physiology of wine consumption, wines produced in California and other major wine-producing regions and the sensory evaluation of wine. GE credit: SE, SS. Effective: 1997 Winter Quarter.

VEN 090X—Lower Division Seminar (2)
Extensive Writing; Seminar—1 hour; Term Paper. Prerequisite(s): Consent of Instructor. Lower division standing. Introduction to current issues surrounding wine and health as they relate to diet, nutrition, and toxicology. Effective: 1998 Winter Quarter.

VEN 099—Special Study for Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

VEN 101A—Viticultural Practices (3)
Discussion/Laboratory—3.5 hours; Lecture—1.5 hours. Prerequisite(s): VEN 002 Identification, cultivation, and use of the major wine, table, raisin, and rootstock cultivars. Includes practices specific to the fall such as fruit contracts, maturity sampling, harvesting, cover crops, and soil-pests. One field trip required. GE credit: SE. Effective: 2004 Fall Quarter.

VEN 101B—Viticultural Practices (3)
Discussion/Laboratory—3.5 hours; Lecture—1.5 hours. Prerequisite(s): VEN 002 Theory, principles, and practices of pruning and grapevine propagation. Plant materials and the certification process, weed control and weed identification, wood diseases, and frost protection. One field trip required. GE credit: SE. Effective: 2004 Winter Quarter.

VEN 101C—Viticultural Practices (3)
Discussion/Laboratory—3.5 hours; Lecture—1.5 hours. Prerequisite(s): VEN 002 Field oriented experience in the principles and practices of grapevine production, including vineyard establishment, vine training, trellising, canopy management practices, irrigation and water management, and methods of crop adjustment for improvement of fruit quality. One field trip required. GE credit: SE. Effective: 2004 Spring Quarter.

VEN 110—Grapevine Growth and Physiology (3)
Lecture—3 hours. Prerequisite(s): VEN 002 Botanical aspects including morphology and domestication will precede lectures covering flower development and energy budget concepts. Impact of physiological variables such as photosynthesis translocation, mineral nutrition, and water relations on fruit ripening and composition will be covered. GE credit: SE. Effective: 1997 Winter Quarter.

VEN 111—World Viticulture (3)
Lecture—3 hours. Prerequisite(s): Upper division standing. Study of the diversity of viticulture, both geographical and historical. History of grape growing and its spread throughout the world will be covered, along with discussions of current viticultural practices in different parts of the world, including California. GE credit: OL, SE, WE. Effective: 1997 Winter Quarter.

VEN 111L—Critical Evaluation of Wines of the World (1)
Discussion/Laboratory—3 hours. Prerequisite(s): VEN 111 (can be concurrent); VEN 125 C or better; VEN 111 required concurrently. Critical analysis of wines produced in different parts of the world with emphasis on the relationship between sensory properties of the wines and factors associated with their place of origin. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

VEN 115—Raisin and Table Grape Production (2)
Lecture—2 hours. Prerequisite(s): VEN 002 Overview of the raisin and table grape industries in California and other production areas of the world. Cultural practices associated with raisin and table grape production will also be discussed. GE credit: SE. Effective: 1997 Winter Quarter.

VEN 118—Grapevine Pests, Diseases and Disorders (3)
Lecture—3 hours. Prerequisite(s): VEN 002 Various pests and diseases of vineyards throughout California. Pest/disease identification and control methods (to include sampling techniques) also will be discussed. Integrated management approach to pest control methods will be emphasized. GE credit: SE. Effective: 1997 Winter Quarter.

VEN 123—Analysis of Musts and Wines (2) ***Review all entries***
Lecture—2 hours. Prerequisite(s): CHE 002C; CHE 008B; PLS 021 Fundamental principles of analytical chemistry as they relate to specific methods used in winemaking. GE credit: SE. Effective: 2018 Winter Quarter.

VEN 123—Analysis of Musts and Wines (2) ***Review all entries***
Lecture—2 hours. Prerequisite(s): CHE 002C; PLS 021; (CHE 008B or CHE 118B or CHE 128B) Fundamental principles of analytical chemistry as they relate to specific methods used in winemaking. GE credit: SE. Effective: 2018 Fall Quarter.

VEN 123L—Analysis of Musts & Wines Laboratory (2) ***Review all entries***
Independent Study—3 hours; Laboratory—3 hours. Prerequisite(s): VEN 123 (can be concurrent); CHE 002C; CHE 008B; PLS 021; Or equivalent of CHE 008B. Restricted to upper division and graduate students in Viticulture & Enology; others by approval of instructor. Fundamental principles of analytical chemistry as they relate to specific methods used in winemaking. Laboratory exercises demonstrating various chemical, physical and biochemical methods. Data will be analyzed and results interpreted in weekly lab reports; includes student-designed independent project and written report. GE credit: QL, SE, VL, WE. Effective: 2018 Winter Quarter.

VEN 123L—Analysis of Musts & Wines Laboratory (2) ***Review all entries***
Independent Study—3 hours; Laboratory—3 hours. Prerequisite(s): VEN 123 (can be concurrent); CHE 002C; PLS 021; (CHE 008B or CHE 118B or CHE 128B); Restricted to upper division and graduate students in Viticulture & Enology; others by approval of instructor. Fundamental principles of analytical chemistry as they relate to specific methods used in winemaking. Laboratory exercises demonstrating various chemical, physical and biochemical methods. Data will be analyzed and results interpreted in weekly lab reports; includes student-designed independent project and written report. GE credit: QL, SE, VL, WE. Effective: 2018 Fall Quarter.

VEN 124—Wine Production (2) ***Review all entries***
Lecture—2 hours. Prerequisite(s): VEN 003; VEN 123 (can be concurrent); BIS 102 Principles and practices of making standard types of wines, with special reference to grape varieties used and methods of vinification. GE credit: SE, WE. Effective: 2000 Fall Quarter.

VEN 124—Wine Production (2) ***Review all entries***
Lecture—2 hours. Prerequisite(s): VEN 003; VEN 123 (can be concurrent); (BIS 102 or BIS 105) Principles and practices of making standard types of wines, with special reference to grape varieties used and methods of vinification. GE credit: SE, WE. Effective: 2018 Fall Quarter.

VEN 124L—Wine Production Laboratory (3)
Independent Study—3 hours; Laboratory—3 hours; Term Paper—3 hours. Prerequisite(s): VEN 124 (can be concurrent) Restricted to undergraduates in fermentation science, viticulture & enology, biotechnology, microbiology, food science and applied plant biology majors; to graduate students in food science, agricultural and environmental chemistry and horticulture. Current technologies used in production of California table wines; analysis and monitoring of impact of fermentation variables on microbial performance and product quality; student-designed independent research project. GE credit: OL, SE, WE. Effective: 2000 Fall Quarter.

VEN 125—Wine Types and Sensory Evaluation (2)
Lecture—2 hours. Prerequisite(s): (PLS 120 or STA 106) Open to upper division and graduate students in Viticulture & Enology; others by approval of instructor. Principles of sensory evaluation and application to wines. Factors influencing wine flavor, data from sensory analysis of model solutions. GE credit: QL, SE. Effective: 2018 Spring Quarter.

VEN 125L—Sensory Evaluation of Wine Laboratory (2)
Laboratory—3 hours; Term Paper—3 hours. Prerequisite(s): VEN 125 (can be concurrent) Restricted to upper division major students in fermentation science or viticulture & enology; graduate students in the food science program. Sensory evaluation of wines and model systems using discrimination tests, ranking, descriptive analysis and time-intensity analysis. Data will be analyzed by appropriate statistical tests and the results interpreted in extensive weekly lab reports. GE credit: QL, SE, VL, WE. Effective: 2001 Winter Quarter.

VEN 126—Wine Stability (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): VEN 124 Restricted to viticulture & enology; fermentation science, applied plant biology majors; graduate students in food science, microbiology, horticulture and horticulture and agronomy groups. Principles of equilibria and rates of physical and chemical reactions in wines; treatment of unstable components in wines by adsorption, ion exchange, refrigeration, filtration, and membrane processes; and protein, polysaccharide, tartrate, oxidative and color stabilities. GE credit: SE. Effective: 2001 Winter Quarter.

VEN 126L—Wine Stability Laboratory (2) ***Review all entries***
Independent Study—3 hours; Laboratory—3 hours. Prerequisite(s): VEN 126 (can be concurrent); and Consent of Instructor. Restricted to upper division Fermentation Science, Viticulture & Enology majors, graduate students in the Food Science, Agricultural and Environmental Chemistry, Microbiology, or by consent of instructor. Practical application of principles of equilibria and rates of physical and chemical reactions to wine stability. GE credit: SE, WE. Effective: 2001 Winter Quarter.

VEN 126L—Wine Stability Laboratory (2) ***Review all entries***
Independent Study—3 hours; Laboratory—3 hours. Prerequisite(s): VEN 126 (can be concurrent); VEN 123L; and Consent of Instructor. Restricted to upper division Fermentation Science, Viticulture & Enology majors, graduate students in the Food Science, Agricultural and Environmental Chemistry, Microbiology, or by consent of instructor. Practical application of principles of equilibria and rates of physical and chemical reactions to wine stability. GE credit: SE, WE. Effective: 2019 Winter Quarter.

VEN 127L—Post-Fermentation Wine Processing Lab (3)
Laboratory—3 hours. Prerequisite(s): VEN 123; VEN 123L; VEN 126; VEN 126L; VEN 135 (can be concurrent); or Consent of Instructor. Restricted to upper division or graduate standing. Sensory and chemical impact of processing on wines; bench-scale analytical results to make and implement processing decisions; principles and theories of equipment operation and scale-up. Effective: 2018 Spring Quarter.

VEN 128—Wine Microbiology (2)
Lecture—2 hours. Prerequisite(s): (VEN 123, VEN 124); (MIC 102, FST 104, FST 104L); MIC 103L; VEN 125, VEN 126 recommended Nature, development, physiology, biochemistry and control of yeasts and bacteria involved in the making, aging and spoilage of wine. GE credit: SE. Effective: 2018 Winter Quarter.

VEN 128L—Wine Microbiology Laboratory (2)
Laboratory—6 hours. Prerequisite(s): VEN 123; VEN 124; VEN 128 (can be concurrent); FST 104; FST 104L; MIC 103L Restricted to upper division major students in fermentation science or viticulture & enology; graduate students in the food science program. Nature, development, physiology, biochemistry and control of yeasts and bacteria involved in the making, aging and spoilage of wine. GE credit: SE, VL, WE. Effective: 2018 Winter Quarter.

VEN 135—Wine Technology and Winery Systems (4)
Discussion/Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): PLS 021; MAT 016A; MAT 016B; ((PHY 001A, PHY 001B) or PHY 007A) Process technologies and process systems that are used in modern commercial wineries. Lectures, demonstrations, problem solving sessions, and possible field trips. Includes grape preparation and fermentation equipment; post-fermentation processing equipment; winery utilities, cleaning systems, and waste treatment. GE credit: SE. Effective: 2018 Spring Quarter.

VEN 140—Distilled Beverage Technology (3)
Lecture—3 hours. Prerequisite(s): CHE 008B; FST 110A Distillation principles and practices; production technology of brandy,
whiskey, rum, vodka, gin, and other distilled beverages; characteristics of raw materials, fermentation, distillation, and aging. GE credit: QL, SE. Effective: 1997 Winter Quarter.

VEN 181—Readings in Enology (1)
Discussion—1 hour. Prerequisite(s): VEN 003 Critical evaluation of selected monographs in enology. Discussion leadership rotates among the students. May be repeated up to 3 time(s). (P/NP grading only.) GE credit: SE. Effective: 2002 Spring Quarter.

VEN 190X—Winemaking Seminar (1)
Discussion—1 hour; Seminar—1 hour. Prerequisite(s): VEN 003 Open to Viticulture & Enology majors and graduate students. Outside speakers on a specific winemaking topic chosen for the quarter. Discussion with the speaker hosted by the faculty member(s) in charge. May be repeated up to 3 time(s). (P/NP grading only.) GE credit: SE. Effective: 2002 Spring Quarter.

VEN 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Work experience related to Fermentation Science (Enology) or Plant Science (Viticulture) majors. Internships must be approved and supervised by a member of the department or major faculty, but are arranged by the student. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

VEN 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

VEN 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

VEN 200—Introduction to Scientific Methods (2)
Lecture/Discussion—1 hour; Term Paper—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Processes involved in conducting scientific research. Topics covered will include conducting literature review, formulating hypotheses, and analyzing and reporting results. Students will complete an annotated bibliography and complete a written and oral research proposal. Effective: 2000 Spring Quarter.

VEN 210—Grape Development and Composition (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): (BIS 102, BIS 103) or BIS 105 Anatomy, physiology and biochemistry of grape berry development, with emphasis on the development of grape composition relevant to winemaking. Effective: 2018 Winter Quarter.

VEN 215—Sensometrics (3)
Lecture—3 hours. Prerequisite(s): FST 117; ((VEN 125, VEN 125L) or (FST 107A or FST 107B)); Or equivalent to course FTS 117. Experimental design and statistical analysis, including multivariate analysis, for both sensory and instrumental data in enology and food-related studies. Effective: 2004 Fall Quarter.

VEN 216—Sustainable Vineyard Development (5)
Fieldwork—3 hours; Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): (VEN 101A, VEN 101B, VEN 101C); (VEN 115 or VEN 118); or Consent of Instructor. Application of plant, meteorological, soil, water, GIS, and economic sciences to sustainable vineyard development. Preparation of a comprehensive study to determine the viticultural and economic feasibility of a given site for raisin, table, or wine grape production. Effective: 2017 Fall Quarter.

VEN 217—Field and GIS Evaluation of Soils (3)
Fieldwork—3 hours; Lecture/Lab—4 hours. Prerequisite(s): PLS 120; (PLS 205 or PLS 206); (SSC 100 or SSC 105 or SSC 107); VEN 101C; Consent of Instructor. ABT 180 is recommended. Principles and practices used to evaluate agricultural soils in the field, including soil pits, soil cores, electrical conductivity meters, ground penetrating radar, geomorphology and surface terrain analysis. Use of geographic information sciences, soil databases, digital elevation models and geostatistics. Effective: 2011 Fall Quarter.

VEN 219—Natural Products of Wine (3)
Lecture—3 hours. Prerequisite(s): VEN 123; VEN 124; and Consent of Instructor. Or natural products background. Structure, occurrence, and changes due to wine production to the natural products found in wine. Chemicals with a sensory impact will be emphasized, including flavonoids and other phenolics, terpenes and norisoprenoids, pyrazines, oak volatiles and other wine constituents. Effective: 1997 Winter Quarter.

VEN 223—Instrumental Analysis of Must and Wine (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): VEN 123 or FST 103; BIS 102 and BIS 103 or BIS 105, CHE 107B or CHE 115 recommended. Open to upper division students in Viticulture & Enology, Food Science and Technology; students in Food Science, Ag & Environmental Chemistry and Viticulture & Enology graduate groups. Theory and practice of instrumental analysis of wines and musts. mphasis on the principles of analytical techniques (e.g., CE, GC, HPLC, Mass Spectrometry) and factors determining correct choice of instrumental method. Effective: 2011 Fall Quarter.

VEN 224—Advances in the Science of Winemaking (3)
Lecture—3 hours. Prerequisite(s): VEN 125; VEN 126; or Consent of Instructor. Graduate standing. Selected topics in the science and technology of winemaking. Topics will be drawn from current research of participating enology and viticulture faculty. Critical analysis of the technical content of published material will be emphasized. Effective: 2001 Spring Quarter.

VEN 225—Advanced Sensory Analysis of Wines (3)
Laboratory—4 hours; Lecture/Discussion—2 hours. Prerequisite(s): ((VEN 124, VEN 125) or FST 107); AMR 120; Or the equivalent. Sensory descriptive analysis experiments will be designed and conducted using standard sensory science methods.Data will be analyzed by analyses of variance, principal component analyses and generalized Procrustes analysis to evaluate the judges performance and interpret the significance of the results. Effective: 1997 Winter Quarter.

VEN 235—Winery Design (4)
Discussion—1 hour; Independent Study; Lecture—2 hours. Prerequisite(s): VEN 124; VEN 135; or Consent of Instructor. Design of wineries. Includes process calculations, equipment selection, process layout and building choice and siting. Project scheduling, capital costs, and ten-year cash flow analysis for the winery. One field trip required. Effective: 2005 Winter Quarter.

VEN 270—Critical Evaluation of Scientific Literature (2)
Discussion—2 hours. Prerequisite(s): Consent of Instructor. Contemporary research topics in biological sciences. Discussion of recent research articles in a special topic area chosen by instructor. Intended to develop skills in critical evaluation of scientific publications. May be repeated for credit. (S/U grading only.) Effective: 2000 Winter Quarter.

VEN 290—Seminar (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

VEN 290C—Advanced Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Planning and results of research programs, proposals, and experiments. Discussion and critical evaluation of original research being conducted by the group. Discussion led by individual research instructors for research group. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

VEN 291—Advanced Viticulture (2)
Lecture/Discussion—2 hours. Prerequisite(s): VEN 110; VEN 116; VEN 124; VEN 125; VEN 210 recommended. Critical evaluation of scientific and popular literature on selected topics of current interest that relate viticulture to fruit or wine sensory attributes or quality. May be repeated up to 1 time(s). Effective: 2000 Winter Quarter.

VEN 292—Advanced Internship (1-15)
Internship—3-45 hours; Variable. Prerequisite(s): VEN 123; VEN 123L; VEN 124; VEN 124L; VEN 125; VEN 125L; VEN 126; VEN 126L; VEN 128; VEN 128L; and Consent of Instructor. Restricted to Viticulture & Enology Graduate Group graduate students. Work experience related to Fermentation Science (Enology) or Plant Science (Viticulture) majors. Internships must be approved and supervised by a graduate group faculty member or students major professor, but are arranged by the student. May be repeated up to 15 unit(s). (S/U grading only.) Effective: 2010 Winter Quarter.

VEN 297T—Tutoring in Viticulture and Enology (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. Designed for graduate students who desire teaching experience, but are not teaching assistants. Student contact primarily in laboratory or
discussion sections, and under direction of a faculty member. (S/U grading only.) Effective: 1997 Winter Quarter.

VEN 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

VEN 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

VEN 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

War-Peace Studies Minor; International Relations

War-Peace Studies Minor; International Relations | War-Peace Studies Minor

(College of Letters and Science)

The interdisciplinary minor in War-Peace Studies examines the causes and dynamics of intra- and international wars and efforts to prevent and settle such conflicts.

Students in the minor are encouraged to participate in the educational activities of the Davis Program of the UC Institute on Global Conflict and Cooperation (IGCC).

The minor is sponsored by the International Relations Program.

Advising. International Relations Program; 530-754-8098

War-Peace Studies **Units:** 19-20

Choose one or two from each of the following areas:

Approaches:

ANT 123AN	Resistance, Rebellion, and Popular Movements	4
ANT 126B	Women and Development	4
COM 157	War and Peace in Literature	4
PHI 115	Problems in Normative Ethics	4
PHI 118	Political Philosophy	4
POL 121	Scientific Study of War	4
POL 123	The Politics of Interdependence	4
POL 124	The Politics of Global Inequality	4
POL 132	National Security Policy	4
POL 176	Racial Politics	4
SOC 157	Social Conflict	4
WMS 102	Gender and Post Colonialism	4

Northern and Western Regions:

HIS 134A	The Age of Revolution	4
HIS 138C	Russian History: The Rise and Fall of the Soviet Union, 1917 to the Present	4
HIS 142A	History of the Holocaust	4
HIS 143	History of Eastern Europe and the Balkans	4
HIS 144A	History of Germany, 1450 to 1789	4
HIS 144B	History of Germany since 1789	4
HIS 145	War and Revolution in Europe 1789-1918	4
HIS 170B	The American Revolution	4
HIS 171B	Civil War Era	4
HIS 174B	War, Prosperity, and Depression: United States, 1917-1945	4
NAS 130B	Native American Ethno-Historical Development	4
POL 130	Recent U.S. Foreign Policy	4
POL 131	Analysis of U.S. Foreign Policy	4

Southern and Eastern Regions:

ANT 142	Peoples of the Middle East	4
ANT 143A	Ethnology of Southeast Asia	4
ANT 144	Contemporary Societies and Cultures of Latin America	4
HIS 165	Latin American Social Revolutions	4
HIS 191F	History of the People's Republic of China	4
HIS 194C	Modern Japan	4
NAS 120	Ethnopolitics of South American Indians	4
POL 142A	Comparative Development: Political Development in Modernizing Societies	4

Restriction. No more than two courses from a single department may be offered in satisfaction of the minor requirements.

Total: 19-20

Watershed Science Minor; Land, Air & Water Resources

Watershed Science Minor; Land, Air & Water Resources | Watershed Science Minor

(College of Agricultural and Environmental Sciences)

Randy Southard, Chairperson

Susan Ustin, Vice Chairperson

Department Office. 1110 Plant and Environmental Sciences Building; 530-752-1130; http://lawr.ucdavis.edu

Faculty. http://lawr.ucdavis.edu/people/faculty/hydrology

The Hydrology Program of the Department of Land, Air and Water Resources offers the minor in Watershed Science. This minor is intended for environmental, natural, or social science students who have an interest in the interfaces between hydrology, ecology, policy and management. The interested student should have completed preparatory course work in calculus (MAT 016B), chemistry (CHE 002A; CHE 002B recommended), physics (PHY 007A), and biology (BIS 002A). Course work in the minor provides fundamental skills and knowledge on science and management of watersheds in the context of current water resources and ecological problems.

Minor Advisor. Graham Fogg; 530-752-6810; gefogg@ucdavis.edu.

Watershed Science **Units:** 23-25

HYD 141	Physical Hydrology	4
OR		
ESM 100	Principles of Hydrologic Science	4
SSC 100	Principles of Soil Science	5
OR		
SSC 118	Soils in Land Use and the Environment	4
HYD 144	Groundwater Hydrology	4
OR		
SSC 107	Soil Physics	5
HYD 124	Plant-Water-Soil Relationships	4
OR		
HYD 151	Field Methods in Hydrology	4

Choose one:

HYD 143	Ecohydrology	4
ESM 144	Trees and Forests	4
ESP 151	Limnology	4

Choose one:

HYD 150	Water Law	3
ESM 121	Water Science and Management	3
ESP 161	Environmental Law	4

Total: 23-25

Watershed Science Minor; Land, Air & Water Resources | HYD Courses

Courses in HYD:

HYD 010—Water, Power, Society (3)
Discussion—1 hour; Lecture—2 hours. Water resources issues. How water has been used to gain and wield socio-political power. Water resources development in California as related to current and future sustainability of water quantity and quality. Roles of science and policy in solving water problems. (Science and Society 10.) GE credit: SE, SL, SS. Effective: 2005 Spring Quarter.

HYD 092—Hydrologic Science Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division student. Work experience off and on campus in Hydrologic Science. Internship supervised by a member of the faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

HYD 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2002 Spring Quarter.

HYD 103N—Fluid Mechanics Fundamentals (4)
Lecture—4 hours. Prerequisite(s): PHY 009B Fluid mechanics axioms, fluid statics, kinematics, velocity fields for one-dimensional incompressible flow and boundary layers, turbulent flow time averaging, potential flow, dimensional analysis, and macroscopic balances to solve a range of practical problems. (Biological Systems Engineering 103.) GE credit: QL, SE, VL. Effective: 2005 Spring Quarter.

HYD 110—Irrigation Principles and Practices (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): PHY 007A; SSC 100 recommended. General course for agricultural and engineering students dealing with soil and plant aspects of irrigation and drainage. Soil-water principles including water movement, plant responses to irrigation regimes, water use by crops; also irrigation systems and water quality. Not open for credit to students who have completed WSC 110. GE credit: SE, SL. Effective: 2009 Fall Quarter.

HYD 124—Plant-Water-Soil Relationships (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): One upper division course in soil science, such as SSC 100; and one upper division course in plant science or plant biology, such as PLB 111; or consent of instructor. Principles of plant interactions with soil and atmospheric water environments and practical applications to crop management (e.g., irrigation) and plant eco-physiology (e.g., drought). Not open for credit to students who have completed Water Science 104. GE credit: QL, SE, SL. Effective: 2008 Spring Quarter.

HYD 124—Plant-Water-Soil Relationships (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (SSC 100 (can be concurrent) or SSC 107 (can be concurrent)); (PLS 100A (can be concurrent) or PLB 111 (can be concurrent)); or Consent of Instructor. Principles of plant interactions with soil and atmospheric water environments and practical applications to crop management (e.g., irrigation) and plant eco-physiology (e.g., drought). Not open for credit to students who have completed WSC 104. GE credit: QL, SE, SL. Effective: 2018 Fall Quarter.

HYD 134—Aqueous Geochemistry (6)
Laboratory—3 hours; Lecture—4 hours. Prerequisite(s): CHE 002B Chemistry of natural waters; dielectric properties of water; thermodynamic and mass-action relations; metal hydrolysis; acid-base equilibria; metal-coordination chemistry; solubility calculations; electron-exchange reactions; sorptive partitioning; ion exchange; and dissolved organic matter. GE credit: QL, SE. Effective: 2009 Fall Quarter.

HYD 141—Physical Hydrology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PHY 009B; MAT 021B; HYD 100 recommended. Introduction to the processes that constitute the hydrologic cycle. Special emphasis on a quantitative description of the following processes: precipitation, infiltration, evaporation, transpiration, surface runoff, and groundwater runoff. GE credit: QL, SE, SL, VL. Effective: 1997 Fall Quarter.

HYD 142—Systems Hydrology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): HYD 141 or ECI 142 General course considering hydrologic processes from a systems or statistical model perspective. General probability concepts are applied to frequency, time series and spatial data analysis. Linear systems are also considered in conjunction with Kalman filter techniques. GE credit: OL, QL, SE. Effective: 1998 Winter Quarter.

HYD 143—Ecohydrology (4)
Extensive Problem Solving; Lecture/Discussion—3 hours. Prerequisite(s): HYD 010 or HYD 141 or ESP 001 or ESM 100 or ESM 108 or ESM 120 or GEL 001 or GEL 050 or SSC 100; or Consent of Instructor. Movement and storage of water in individual ecosystems and the integrated functioning of water and biota at the watershed scale. GE credit: OL, QL, SE, SL. Effective: 2017 Winter Quarter.

HYD 144—Groundwater Hydrology (4)
Lecture—4 hours. Prerequisite(s): MAT 016B or MAT 021A; HYD 103 or ENG 103 recommended. Fundamentals of groundwater flow and contaminant hydrology. Occurrence, distribution, and movement of groundwater. Well-flow systems. Aquifer tests. Well construction operation and maintenance. Groundwater exploration and quality assessment. Agricultural threats to groundwater quality: fertilizers, pesticides, and salts. (Biological Systems Engineering 144.) GE credit: QL, SE, SL, VL. Effective: 2006 Fall Quarter.

HYD 145—Water Science and Design (4) ***Review all entries***
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): HYD 141 or MAT 016C or MAT 017C or MAT 021C; or Consent of Instructor. Introduction to watershed engineering, storm water management, design of hydraulic systems. Topics include hydrological risk analysis, flood routing, design storms, open channel flow, pipes, culverts, spillways, and detention basins. Class project and field trips will apply theory to real-life problems. GE credit: QL, SE, SL, WE. Effective: 2016 Fall Quarter.

HYD 145—Water Science and Design (4) ***Review all entries***
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (HYD 141 or ESM 100); (MAT 016B or MAT 021B); or Consent of Instructor. Introduction to watershed engineering, storm water management, design of hydraulic systems. Topics include hydrological risk analysis, flood routing, design storms, open channel flow, pipes, culverts, spillways, and detention basins. Class project and field trips will apply theory to real-life problems. GE credit: QL, SE, SL, WE. Effective: 2018 Fall Quarter.

HYD 146—Hydrogeology and Contaminant Transport (5)
Laboratory—2 hours; Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): HYD 144 or ECI 144; Or the equivalent. Physical and chemical processes affecting groundwater flow and contaminant transport, with emphasis on realistic hydrogeologic examples. Groundwater geology and chemistry. Fundamentals of groundwater flow and transport analysis. Laboratory includes field pumping test and work with physical and computer models. (Geology 156.) GE credit: SE. Effective: 2002 Winter Quarter.

HYD 147—Runoff, Erosion and Water Quality Management (3)
Fieldwork; Lecture/Lab—3 hours. Prerequisite(s): (PHY 007B or PHY 009B); (MAT 016C or MAT 017C or MAT 021C); (ECI 142 or HYD 141 or ESM 100); or equivalent. Practical hydrology and runoff water quality management from disturbed watersheds. Development of hillslope and soils restoration concepts and practice, modeling and application. (Biological Systems Engineering 147.) GE credit: SE. Effective: 2018 Spring Quarter.

HYD 150—Water Law (3)
Lecture—3 hours. Prerequisite(s): Consent of instructor or upper division standing. Principles and issues of California Water Law.Types of water rights, groundwater rights and management, and protection of instream uses.Water projects, role of federal government and federal/state relations. Basic water quality acts, endangered species act, water transfers and current water issues. GE credit: ACGH, SS. Effective: 2016 Fall Quarter.

HYD 151—Field Methods in Hydrology (4)
Fieldwork—3 hours; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): ERS 100 or HYD 141 Measurement methods and data analysis for evaluation of water storage, movement and contamination in the field. Equipment such as data loggers, water and sediment samplers, pressure transducers, weather stations, surveying equipment, and flow meters will be used. GE credit: QL, SE, SL. Effective: 2003 Winter Quarter.

HYD 182—Environmental Analysis using GIS (4)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): ABT 150 or LDA 150; Or equivalent GIS experience and skills; general biology and/or ecology courses are recommended. Ecosystem and landscape modeling with emphasis on hydrology and solute transport. Spatial analysis of environmental risk analysis including ecological risk assessment, natural resource management. Spatial database structures, scripting, data models, and error analysis in GIS. (Applied Biological Systems Technology 182.) GE credit: QL, SE, SL, VL. Effective: 2018 Winter Quarter.

HYD 192—Hydrologic Science Internship (1-12)
Internship—3-40 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Work experience off and on campus in water science. Internship supervised by a member of the faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

HYD 198—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

HYD 199—Special Study for Advanced Undergraduate (1-5)
Variable. Prerequisite(s): Senior standing. (P/NP grading only.) Effective: 1997 Fall Quarter.

HYD 200—Survey of Hydrologic Sciences (1)
Seminar—1 hour; Term Paper. Prerequisite(s): Open to students in the Hydrologic Sciences program. Seminar course exposes students to the diversity of sciences involved in the program. Students prepare a paper and presentation in their area of research interest. May be repeated twice for credit. May be repeated up to 2 time(s). (S/U grading only.) Effective: 1997 Winter Quarter.

HYD 201A—Hydrologic Sciences Core Survey (3)
Lecture/Discussion—2 hours; Project (Term Project). Considers the primary sub-disciplines while reviewing the fundamental scientific concepts/processes of the hydrologic sciences research community, and includes a basic writing component. Effective: 2017 Fall Quarter.

HYD 201B—Hydrologic Sciences Core Seminar (1)
Seminar—2 hours. Exposes students to the research underway in the Hydrologic Sciences Graduate Group as well as provide them the opportunity to present and refine their research through interaction with other students in the Graduate Group. (P/NP grading only.) Effective: 2018 Winter Quarter.

HYD 205—Continuum Mechanics of Natural Systems (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021D; MAT 022B; PHY 009B Continuum mechanics of static and dynamic air, water, earth and biological systems using hydraulic, heat and electrical conductivity; diffusivity; dispersion; strain; stress; deformation gradient; velocity gradient; stretch and spin tensors. (Biological Systems Engineering 205.) Effective: 2002 Fall Quarter.

HYD 210—Vadose Modeling and Characterization (3)
Discussion—0.5 hours; Laboratory—3 hours; Lecture—1.5 hours. Prerequisite(s): SSC 107; or Consent of Instructor. Principles and modeling of water flow and chemical transport in the vadose zone, with specific applications to soils. Topics include hydraulic properties, finite difference application to unsaturated water flow, parameter optimization, diffusive and convective transport in gaseous and liquid phases. Effective: 2015 Spring Quarter.

HYD 243—Water Resource Planning and Management (3)
Lecture—3 hours. Prerequisite(s): HYD 141 or ECI 142 Applications of deterministic and stochastic mathematical programming
techniques to water resource planning, analysis, design and management. Water allocation, capacity expansion, and reservoir operation. Conjunctive use of surface water and groundwater. Water quality management. Irrigation planning and operation models. (Biological Systems Engineering 243.) Effective: 1997 Fall Quarter.

HYD 245—Climate Change, Water and Society (4)
Lecture—4 hours. Class size limited to 25 students. Integration of climate science and hydrology with policy to understand hydroclimatology and its impact upon natural and human systems. Assignments: readings, take-home examination on climate and hydrologic science, paper that integrates course concepts into a research prospectus or review article. (Atmospheric Science 245 and Ecology 245.) Effective: 2015 Spring Quarter.

HYD 252—Hillslope Geomorphology and Sediment Budgets (4)
Fieldwork—3 hours; Lecture—3 hours. Prerequisite(s): HYD 141 or GEL 035 or ECI 142; or Consent of Instructor. Exploration of theoretical and empirical foundations of sediment production on hillslopes using computer models and field experiments to promote an understanding of how watersheds evolve naturally and with human impacts. Effective: 2001 Spring Quarter.

HYD 254Y—Ecohydraulics (3)
Discussion—1 hour; Extensive Problem Solving; Web Virtual Lecture—1 hour. Use of 2D hydrodynamic modeling to perform instream flow assessment by exploring flow-dependent hydraulic patterns at multiple spatial scales and extrapolating results with empirical and analytical functions to evaluate geomorphic resilience and ecological functions. Effective: 2014 Fall Quarter.

HYD 256—Geomorphology of Estuaries and Deltas (4)
Fieldwork—3 hours; Lecture—3 hours. Prerequisite(s): HYD 141 or GEL 035; or ECI 042 or Consent of Instructor. Survey of the processes and landforms associated with sediment deposition in the coastal zone. Application of geomorphic principles to coastal management issues. Effective: 2002 Spring Quarter.

HYD 264—Modeling of Hydrologic Processes (3)
Lecture—3 hours. Prerequisite(s): HYD 141; STA 102; Or the equivalents. Techniques used to model the spatio-temporal structure of rainfall and runoff are introduced. Procedures studied include those based on stochastic point processes, chaos theory, fractal geometry, and fractional noises. Effective: 1997 Winter Quarter.

HYD 269—Numerical Modeling of Groundwater Systems (3)
Lecture—3 hours. Prerequisite(s): MAT 022B; (ECI 144; or HYD 145A); HYD 145B; Finite difference and finite element techniques in modeling groundwater flow and transport. Fundamentals of constructing and calibrating models with hands-on applications. Methods and limitations of numerical solution of transport equations. Model interpretation and ethics. Effective: 1997 Winter Quarter.

HYD 273—Introduction to Geostatistics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 130A; STA 130B; Or the equivalent. Statistical treatment of spatial data with hydrologic emphasis. Topics: theory of random functions, variogram analysis, Kriging/co-Kriging, indicator geostatistics, and stochastic simulation of spatial variability. Geostatistical software use. Effective: 2018 Winter Quarter.

HYD 274—Practice of Groundwater Flow and Transport Modeling (3)
Lecture—2 hours; Lecture/Discussion—0.5 hours; Lecture/Lab—0.5 hours. Prerequisite(s): HYD 269; (ECI 272B or ECI 272C) Selecting and building groundwater flow and transport models. Planning, preparation, execution, presentation, and review of modeling projects. Review of methods, assumptions, and limitations of groundwater models; practicing with MODFLOW, MT3D, associated GUI, and with other groundwater modeling software of choice. Effective: 2012 Fall Quarter.

HYD 275—Analysis of Spatial Processes (3)
Lecture—3 hours. Prerequisite(s): STA 102; Or the equivalent; HYD 273 or STA 273A recommended. Characterization of homogeneous random fields; extremes and spectral parameters; geometry of excursions, local averaging; scale of fluctuation; non-Gaussian and irregular random fields; geostatistical
applications. Effective: 1997 Winter Quarter.

HYD 286—Selected Topics in Environmental Remote Sensing (3)
Discussion—2 hours; Lecture—1 hour; Project (Term Project). Prerequisite(s): ERS 186; Consent of Instructor. Or equivalent; ERS 186L recommended. In depth investigation of advanced topics in remote sensing applications, measurements, and theory. May be repeated for credit. (Geography 286.) Effective: 2014 Fall Quarter.

HYD 290—Seminar in Hydrologic Science (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing and background in Hydrologic Science. Seminars and critical review of problems, issues, and research in hydrologic sciences. Oral presentations of research. Topics will vary. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

HYD 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

HYD 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

HYD 396—Teaching Assistant Training Practicum (1-4)
Variable. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

HYD 410—OSHA HAZWOPER Refresher Course (1)
Lecture—1 hour. Updates hazardous materials handling information for purposes of keeping certification current. Certification lapses until the refresher course is complete. (P/NP grading only.) Effective: 1998 Winter Quarter.

HYD 440—Hazardous Waste Operations Training (3)
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): Upper division standing in College of Agricultural and Environmental Sciences. Forty-hour course designed to meet the requirements of Federal OSHA
regulation CFR 1910.120. Covers the health, regulatory, processing and safe handling issues/problems associated with working with hazardous
materials. (P/NP grading only.) Effective: 1997 Spring Quarter.

Wildlife, Fish, & Conservation Biology

Wildlife, Fish, & Conservation Biology | WFC Information

(College of Agricultural and Environmental Sciences)

Nann A. Fangue, Ph.D., Chairperson of the Department

Department Office. 1086 Academic Surge; 530-754-9796; http://wfcb.ucdavis.edu

Faculty. http://wfcb.ucdavis.edu/people/faculty/

Wildlife, Fish, & Conservation Biology | WFC B.S.

(College of Agricultural and Environmental Sciences)

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The Major Program

The Wildlife, Fish, and Conservation Biology major deals with the relationships between the requirements of wildlife and the needs of people. Understanding these relationships is vital for the maintenance of ecological diversity, recreational resources, and food supplies. Students completing the major possess a broad knowledge of ecology and natural history, but with the quantitative skills to use this knowledge in critical thinking and decision-making.

The Program. The major emphasizes broad training in biological sciences, with specialization in one of four areas. The major is designed primarily for students interested in becoming professionals in the diverse fields of wildlife, fish, and conservation biology, including veterinary and wildlife health sciences. The breadth of course requirements, when combined with electives, also make this an excellent preparatory major for secondary school teaching. Certification by professional societies such as The Wildlife Society, American Fisheries Society, or the Ecological Society of America, or preparation for graduate studies may also be achieved by careful planning of electives with a faculty advisor.

Major Advisor. Eric Post

Students transferring to UC Davis from another institution or new students declaring the major of Wildlife, Fish, and Conservation Biology must consult the Master Advisor so that their program can be evaluated and a faculty advisor assigned. Contact the Department in 1086 Academic Surge Building or telephone 530-754-9796.

Career Alternatives. The major prepares students to excel in the dynamic fields of environmental and conservation biology, emphasizing vertebrate animals—both native and invasive—in their natural environments, as well as resolution of conflicts between humans and wild animals. Positions now held by graduates of this major include wildlife biology, fisheries biology, wildlife damage

management, and resource biologists and managers with local, state, and federal agencies, biologists or consultants with private industries such as environmental consulting firms, commercial fishing businesses, electrical utilities, sporting clubs or businesses, and aquaculture operations, as well as veterinarians, medical physicians, and professors/researchers who teach and/or conduct research in academic institutions.

Written/Oral Expression **Units:** 8

Completing UWP 001 and CMN 001 will simultaneously satisfy the College requirements.

UWP 001	Expository Writing	4

Choose one:

CMN 001	Introduction to Public Speaking	4
CMN 003	Interpersonal Communication Competence	4
DRA 010	Introduction to Acting	4

Preparatory Subject Matter **Units:** 50-51

BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
BIS 002B	Introduction to Biology: Principles of Ecology and Evolution	5
BIS 002C	Introduction to Biology: Biodiversity and the Tree of Life	5
CHE 002A	General Chemistry	5
CHE 002B	General Chemistry	5
CHE 008A	Organic Chemistry: Brief Course	2
CHE 008B	Organic Chemistry: Brief Course	4
MAT 016A	Short Calculus	3
MAT 016B	Short Calculus	3
PHY 001A	Principles of Physics	3
PHY 001B	Principles of Physics	3

Choose one:

STA 100	Applied Statistics for Biological Sciences	4
PLS 120	Applied Statistics in Agricultural Sciences	4

Choose one:

WFC 010	Wildlife Ecology and Conservation	4
WFC 050	Natural History of California's Wild Vertebrates	3
WFC 051	Introduction to Conservation Biology	3

Depth Subject Matter **Units:** 45-50

Students graduating with this major are required to attain at least a C average (2.000) in all courses taken at the university in depth and area of specialization subject matter.

ESP 100	General Ecology	4
OR		
EVE 101	Introduction to Ecology	4
EVE 100	Introduction to Evolution	4
BIS 101	Genes and Gene Expression	4
WFC 121	Physiology of Fishes	4
OR		

WFC 130	Physiological Ecology of Wildlife	4
NPB 102	Animal Behavior	3
OR		
WFC 141	Behavioral Ecology	4
WFC 122	Population Dynamics and Estimation	4
WFC 154	Conservation Biology	4

Choose three lecture courses and two laboratory (L) courses:

WFC 110	Biology and Conservation of Wild Mammals	3
WFC 110L	Laboratory in Biology and Conservation of Wild Mammals	3
WFC 111	Biology and Conservation of Wild Birds	3
WFC 111L	Laboratory in Biology and Conservation of Wild Birds	3
WFC 120	Biology and Conservation of Fishes	3
WFC 120L	Laboratory in Biology and Conservation of Fishes	2
WFC 134	Herpetology	3
WFC 134L	Herpetology Laboratory	3

WFC 100	Field Methods in Wildlife, Fish, & Conservation Biology	4
OR		
WFC 101	Field Research in Wildlife Ecology	2
WFC 101L	Field Research in Wildlife Ecology: Laboratory	4
OR		
WFC 102	Field Studies in Fish Biology	1
WFC 102L	Field Studies in Fish Biology: Laboratory	6

Strongly recommended, but not required:

STA 104	Applied Statistical Methods: Nonparametric Statistics	4
OR		
STA 106	Applied Statistical Methods: Analysis of Variance	4
OR		
STA 108	Applied Statistical Methods: Regression Analysis	4
LDA 150	Introduction to Geographic Information Systems	4
APC 100	Comparative Vertebrate Organology	4

Restricted Electives **Units:** 12-24

Choose one from the four Areas of Specialization, below. No course can be used to simultaneously satisfy the Depth Subject Matter and the Area of Specialization.

Areas of Specialization

(1) Wildlife and Conservation Biology:

WFC 151	Wildlife Ecology	4

Choose one:

PLS 102	California Floristics	5
PLS 131	Identification and Ecology of Grasses	2
PLS 144	Trees and Forests	4
PLS 147	California Plant Communities	3
AND		
PLS 147L	California Plant Communities Field Study	1
PLS 178	Biology and Management of Aquatic Plants	3

PLB 102	California Floristics	5
PLB 108	Systematics and Evolution of Angiosperms	5
PLB 117	Plant Ecology	4
PLB 119	Population Biology of Invasive Plants and Weeds	3
PLB 148	Introductory Mycology	4

Choose two:

WFC 110	Biology and Conservation of Wild Mammals	3
WFC 111	Biology and Conservation of Wild Birds	3
WFC 120	Biology and Conservation of Fishes	3
WFC 134	Herpetology	3
WFC 136	Ecology of Waterfowl and Game Birds	4
WFC 152	Ecology of Human-Wildlife Conflicts	3
WFC 155	Habitat Conservation and Restoration	3
AND		
WFC 155L	Habitat Conservation and Restoration Laboratory	2
WFC 156	Plant Geography	4
WFC 157	Coastal Ecosystems	4
WFC 160	Animal Coloration	3

Note: Students interested in certification as a Wildlife Biologist from The Wildlife Society should consider additional courses in plant sciences.

(2) Fish Biology:

WFC 120	Biology and Conservation of Fishes	3
WFC 120L	Laboratory in Biology and Conservation of Fishes	2

Choose one:

ENT 116	Freshwater Macroinvertebrates	3
EVE 112	Biology of Invertebrates	3
AND		
EVE 112L	Biology of Invertebrates Laboratory	2
OR		
EVE 114	Experimental Invertebrate Biology	3

Choose three courses including at least one course from each of the following two groups:

(a) Aquatic Systems

ANS 118	Fish Production	4
ESP 116N	Oceanography	3
ESP 150C	Biological Oceanography	4
ESP 151	Limnology	4
ESP 151L	Limnology Laboratory	3
ESP 152	Coastal Oceanography	3
ESP 155	Wetland Ecology	4
EVE 115	Marine Ecology	4
ESM 100	Principles of Hydrologic Science	4
HYD 143	Ecohydrology	4
WFC 144	Marine Conservation Science	4

WFC 155	Habitat Conservation and Restoration	3
AND		
WFC 155L	Habitat Conservation and Restoration Laboratory	2
WFC 157	Coastal Ecosystems	4
WFC 160	Animal Coloration	3

(b) Water Policy/Law

HYD 150	Water Law	3
ESP 161	Environmental Law	4
ESP 162	Environmental Policy	4
ESP 166	Ocean and Coastal Policy	3
ESP 169	Water Policy and Politics	3

(3) Wildlife Health:

WFC 151	Wildlife Ecology	4

Choose two:

BIS 102	Structure and Function of Biomolecules	3
BIS 103	Bioenergetics and Metabolism	3
OR		
ABI 102	Animal Biochemistry and Metabolism	5
ABI 103	Animal Biochemistry and Metabolism	5

Choose one:

WFC 110	Biology and Conservation of Wild Mammals	3
WFC 111	Biology and Conservation of Wild Birds	3
WFC 120	Biology and Conservation of Fishes	3
WFC 134	Herpetology	3
WFC 136	Ecology of Waterfowl and Game Birds	4
WFC 141	Behavioral Ecology	4
WFC 144	Marine Conservation Science	4
WFC 152	Ecology of Human-Wildlife Conflicts	3
WFC 155	Habitat Conservation and Restoration	3
AND		
WFC 155L	Habitat Conservation and Restoration Laboratory	2
WFC 160	Animal Coloration	3

Choose one:

ANS 103	Animal Welfare	4
ANS 104	Principles and Applications of Domestic Animal Behavior	4
ANS 170	Ethics of Animal Use	4
APC 100	Comparative Vertebrate Organology	4
MIC 101	Introductory Microbiology	5
MCB 150	Developmental Biology	4
NPB 101	Systemic Physiology	5
NPB 140	Principles of Environmental Physiology	3
VME 158	Infectious Disease in Ecology and Conservation	3
MIC 102	Introductory Microbiology	3

MIC 103L	Introductory Microbiology Laboratory	2

Note that this AOS recommends additional preparatory courses; prerequisites for admission to Veterinary Medicine vary among schools and students should confirm the specific requirements of the school(s) to which they wish to apply.

Additional Preparatory (recommended, not required):

CHE 002C	General Chemistry	5
CHE 118A	Organic Chemistry for Health and Life Sciences	4
CHE 118B	Organic Chemistry for Health and Life Sciences	4
CHE 118C	Organic Chemistry for Health and Life Sciences	4
PHY 007A	General Physics	4
PHY 007B	General Physics	4
PHY 007C	General Physics	4

(4) Individualized:

Students may, with prior approval of their adviser and the curriculum committee, design their own individualized specialization within the major. The specialization will consist of at least four upper division courses with a common theme.

Total: 115-133

Wildlife, Fish, & Conservation Biology | WFC Minor

(College of Agricultural and Environmental Sciences)

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The minor in Wildlife, Fish, and Conservation Biology is designed for students interested in basic training and understanding of the ecology and conservation of wild terrestrial and aquatic vertebrates, emphasizing birds, mammals, amphibians, reptiles, and fish, but with relevance and application to all life forms.

Minor Advisor. Eric Post

Minor Requirements **Units:** 20-31

WFC 100	Field Methods in Wildlife, Fish, & Conservation Biology	4
WFC 151	Wildlife Ecology	4
WFC 154	Conservation Biology	4

Choose one:

WFC 110	Biology and Conservation of Wild Mammals	3
WFC 111	Biology and Conservation of Wild Birds	3
WFC 120	Biology and Conservation of Fishes	3
WFC 134	Herpetology	3

Two-four upper division elective courses chosen from the Wildlife, Fish, and Conservation Biology curriculum; excluding:

WFC 190	Departmental Research Seminar	1
WFC 191	Museum Science	2
WFC 192	Internship	1-12

WFC 195	Field and Laboratory Research	3
WFC 197T	Tutoring in Wildlife and Fisheries	1-5
WFC 198	Directed Group Study	1-5
WFC 199	Special Study for Advanced Undergraduates	1-5

Total: 20-31

Wildlife, Fish, & Conservation Biology | WFC Courses

Courses in WFC:

WFC 010—Wildlife Ecology and Conservation (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the ecology and conservation of vertebrates. Complexity
and severity of world problems in conserving biological diversity. GE credit: SE, SL, WE. Effective: 1997 Winter Quarter.

WFC 011—Introduction to Conservation Biology (3)
Lecture—3 hours. Introduction to conservation biology and background to the biological issues and controversies surrounding loss of species and habitats for students with no background in biological sciences. GE credit: SE, SL. Effective: 2003 Spring Quarter.

WFC 050—Natural History of California's Wild Vertebrates (3)
Discussion—1 hour; Lecture—2 hours. Examination of the natural history of California's wild vertebrates (fish, amphibians, reptiles, birds, and mammals), including their biogeography, systematics, ecology and conservation status. GE credit: SE, SL, WE. Effective: 2009 Winter Quarter.

WFC 051—Introduction to Conservation Biology (3)
Lecture—3 hours. Introduction to conservation biology including both biological and social issues related to the loss of species and habitats. Intended for students with no background in biological sciences. GE credit: SE, SL. Effective: 2017 Spring Quarter.

WFC 092—Internship (1-6)
Internship—3-18 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Work experience off and on campus in all subject areas offered in the
department. Internships supervised by a member of the faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

WFC 099—Special Study for Undergraduates (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special study for undergraduates. (P/NP grading only.) Effective: 2010 Winter Quarter.

WFC 100—Field Methods in Wildlife, Fish, & Conservation Biology (4)
Fieldwork—3 hours; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): EVE 101 (can be concurrent) or ESP 100 (can be concurrent); (BIS 002A, BIS 002B, BIS 002C); and Consent of Instructor. Or equivalent course of EVE 101 or ESP 100 (can be taken concurrently). Introduction to field methods for monitoring and studying wild vertebrates and their habitats, with an emphasis on ecology and conservation. Required weekend field trips. GE credit: SE. Effective: 2017 Spring Quarter.

WFC 101—Field Research in Wildlife Ecology (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. One upper division course in each of ecology, statistics, and either ornithology, mammalogy, or herpetology. Field research in ecology of wild vertebrates in terrestrial environments; formulation of testable hypotheses, study design, introduction to research methodology, oral and written presentation of results. Limited enrollment. GE credit: SE, VL, WE. Effective: 2017 Winter Quarter.

WFC 101L—Field Research in Wildlife Ecology: Laboratory (4)
Fieldwork—15 hours; Lecture/Discussion—2 hours. Prerequisite(s): WFC 101 (can be concurrent); and Consent of Instructor. Limited enrollment. Field research in ecology of wild vertebrates in terrestrial environments; testing ecological hypotheses through field research, application of research methodology, supervised independent research projects. Held between Labor Day and fall quarter. Effective: 2017 Winter Quarter.

WFC 102—Field Studies in Fish Biology (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Upper division course in each of ecology, aquatic biology, fish biology, and statistics. Emphasis on theory of quantitative fish capture methods and design of individual research projects on ecology, behavior, physiology or population biology of fishes. Effective: 1997 Winter Quarter.

WFC 102L—Field Studies in Fish Biology: Laboratory (6)
Discussion/Laboratory—3 hours; Fieldwork—15 hours; Laboratory—12 hours. Prerequisite(s): WFC 102 (can be concurrent); and Consent of Instructor. Field investigations of fish biology are emphasized including quantitative capture methods and individual research projects on ecology, behavior, physiology or population biology of fishes at the field site in relation to their habitats. GE credit: SE, WE. Effective: 2017 Winter Quarter.

WFC 110—Biology and Conservation of Wild Mammals (3)
Lecture—3 hours. Prerequisite(s): (BIS 002A, BIS 002B, BIS 002C); (EVE 101 (can be concurrent) or ESP 100 (can be concurrent)); Or equivalent course to ESP 100 or EVE 101. Origins, evolution, diversification, and geographical and ecological distributions of mammals. Morphological, physiological, reproductive, and behavioral adaptations of mammals to their environment. Effective: 2017 Winter Quarter.

WFC 110L—Laboratory in Biology and Conservation of Wild Mammals (3)
Laboratory—6 hours. Prerequisite(s): WFC 110 (can be concurrent); and Consent of Instructor. Limited enrollment. Laboratory exercises in the morphology, systematics, species identification, anatomy, and adaptations of wild mammals to different habitats. Effective: 2017 Winter Quarter.

WFC 111—Biology and Conservation of Wild Birds (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B; BIS 002C; Upper division ecology course recommended. Phylogeny, distribution, migration, reproduction, population dynamics, behavior and physiological ecology of wild birds. Emphasis on adaptations to environments, species interactions, management, and conservation. GE credit: SE. Effective: 2017 Winter Quarter.

WFC 111L—Laboratory in Biology and Conservation of Wild Birds (3)
Fieldwork—3 hours; Laboratory—6 hours. Prerequisite(s): WFC 111 (can be concurrent); and Consent of Instructor. Limited enrollment. Laboratory exercises in bird species identification, anatomy, molts, age and sex, specialized adaptations, behavior, research, with emphasis on conservation of wild birds. Several weekend field trips, after class bird walks, and independent bird study are required. Limited enrollment. Effective: 2017 Winter Quarter.

WFC 120—Biology and Conservation of Fishes (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B; BIS 002C; Upper division ecology course recommended. Evolution, ecology, and conservation of marine and freshwater fishes. Effective: 2017 Winter Quarter.

WFC 120L—Laboratory in Biology and Conservation of Fishes (2)
Laboratory—3 hours. Prerequisite(s): WFC 120 (can be concurrent); and Consent of Instructor. Limited enrollment. Morphology, taxonomy, conservation, and identification of marine and freshwater fishes with emphasis on California species. Effective: 2017 Winter Quarter.

WFC 121—Physiology of Fishes (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Upper division courses in nutrition and physiology or consent of instructor. Comparative physiology, growth, reproduction, behavior, and energy relations of fishes. GE credit: SE, WE. Effective: 1997 Winter Quarter.

WFC 122—Population Dynamics and Estimation (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (MAT 016A, MAT 016B); (STA 013 or STA 013Y); (BIS 002A, BIS 002B, BIS 002C); Or the equivalent of STA 013; an upper division course in ecology. Description of bird, mammal and fish population dynamics, modeling philosophy, techniques for estimation of animal abundance (e.g., mark-recapture, change-inratio, etc.), mathematical models of populations (e.g., Leslie matrix, logistic, dynamic pool, stockrecruitment); case histories. Effective: 2018 Spring Quarter.

WFC 130—Physiological Ecology of Wildlife (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EVE 101 or ESP 100; (BIS 002A, BIS 002B, BIS 002C); Or equivalent course to ESP 100. Principles of physiological ecology, emphasizing vertebrates. Ecological, evolutionary, and behavioral perspectives on physiological mechanisms used by animals to adapt to their environment, including consideration of climate-change and other threats to biodiversity. Tropical, temperate, and polar ecosystems are highlighted. GE credit: SE. Effective: 2017 Winter Quarter.

WFC 134—Herpetology (3)
Lecture—2 hours; Term Paper. Prerequisite(s): BIS 002A; BIS 002B; BIS 002C; Upper division ecology course recommended. Evolution and ecology of the world's diverse reptiles and amphibians. Emphasis on adaptations to environments, species interactions, management, and conservation. Effective: 2017 Winter Quarter.

WFC 134L—Herpetology Laboratory (3)
Laboratory—6 hours. Prerequisite(s): WFC 134 (can be concurrent); and Consent of Instructor. Diagnostic characteristics and functional attributes of amphibians and reptiles, emphasizing ecological, bio-geographic and phylogenetic patterns. Field experience with common species of reptiles and amphibians in the Davis area. Effective: 2017 Winter Quarter.

WFC 136—Ecology of Waterfowl and Game Birds (4)
Fieldwork—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): WFC 111; or Consent of Instructor. WFC 111L strongly recommended. Detailed examination of distribution, behavior, population dynamics, and management of waterfowl and upland game birds. Effective: 2017 Winter Quarter.

WFC 141—Behavioral Ecology (4)
Film Viewing—1 hour; Lecture—3 hours. Prerequisite(s): EVE 101 or ESP 100 (can be concurrent); (BIS 002A, BIS 002B, BIS 002C); Or equivalent course. Basic theories underlying the functional and evolutionary significance of behavior, and the role of ecological constraints. Supporting empirical evidence taken mainly from studies of wild vertebrates. GE credit: SE. Effective: 2017 Winter Quarter.

WFC 144—Marine Conservation Science (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Course in introductory ecology. Class size limited to 30 students. Key differences between marine and terrestrial ecosystems, major stressors of marine ecosystems (e.g., fisheries, pollution, bioinvasions, climate change and habitat destruction) and their consequences. Laws and agencies responsible for addressing problems, and the policies used. Effective: 2015 Fall Quarter.

WFC 150—Urban Wildlife Ecology (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B; BIS 002C; Or the equivalent. Introduction to the behavior, ecology, and evolution of wild animals in urban environments. Effects of urbanization on disease, fitness, and dynamics of animal populations. Conservation and conflict management efforts in urban settings. Effective: 2014 Spring Quarter.

WFC 151—Wildlife Ecology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 002B; Or equivalent. Ecology of wild vertebrates, including habitat selection, spatial organization, demography, population dynamics, competition, predation, herbivory, energetics, and community dynamics, set in the context of human-caused degradation of environments in North America. Effective: 2015 Fall Quarter.

WFC 152—Ecology of Human-Wildlife Conflicts (3)
Lecture—3 hours. Prerequisite(s): BIS 002B; Or equivalent. Ecological approaches to managing wild vertebrates that come into conflict with agriculture, public health, or the conservation of biodiversity. Effective: 2017 Winter Quarter.

WFC 153—Wildlife Ecotoxicology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Introductory courses in organic chemistry, ecology, and physiology, or consent of instructor; ETX 101 recommended. Various forms of environmental pollution in relation to fish and wildlife, the effects and mechanisms of pollutants, effects on individuals and systems, laboratory and field ecotoxicology, examples/case histories, philosophical/management considerations. GE credit: SE, WE. Effective: 1997 Winter Quarter.

WFC 154—Conservation Biology (4)
Lecture—3 hours; Term Paper. Prerequisite(s): EVE 101 or ESP 100 (can be concurrent); (BIS 002A, BIS 002B, BIS 002C); Or the equivalent. Introduction to conservation biology and background to the biological issues and controversies surrounding loss of species and habitats. GE credit: SE, WE. Effective: 2017 Winter Quarter.

WFC 155—Habitat Conservation and Restoration (3)
Lecture—3 hours. Prerequisite(s): EVE 101 or ESP 100; Or the equivalent of ESP 100 or EVE 101; WFC 154 and ENH 160 recommended. Analysis of the characteristics of wildlife and fish habitats, the conservation of habitats, and restoration. GE credit: SE, VL, WE. Effective: 2009 Winter Quarter.

WFC 155L—Habitat Conservation and Restoration Laboratory (2)
Fieldwork—3 hours; Laboratory—3 hours. Prerequisite(s): (EVE 101 or ESP 100); WFC 155 (can be concurrent); Or the equivalent of ESP 100 or EVE 101. Analysis of the characteristics of wildlife and fish habitats, application of restoration methods, and evaluation of conservation and restoration projects in the field. Students will also participate during the term in a restoration project. Effective: 2009 Winter Quarter.

WFC 156—Plant Geography (4)
Laboratory—3 hours; Lecture—3 hours; Term Paper. Prerequisite(s): ESP 100 or EVE 101; PLB 102 or PLB 108 strongly recommended. Survey of the geographical distribution of vegetation types and habitats, with consideration of the environmental and historical factors that determine these patterns. Conservation and management approaches. Analytical field and lab techniques introduced. GE credit: SE, VL, WE. Effective: 1997 Fall Quarter.

WFC 157—Coastal Ecosystems (4)
Fieldwork—3 hours; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EVE 101; And course work in organismal biology, physical geography, and geology recommended. Overview of coastal ecosystems, physical and biological elements and processes, and coastal zone dynamics, including sandy, rocky and muddy shorelines, estuaries, dunes and coastal watersheds. Discussion of the role of historical factors and conservation, restoration, and management approaches. GE credit: SE, VL. Effective: 1997 Fall Quarter.

WFC 158—Infectious disease in ecology and conservation (3)
Lecture—3 hours. Prerequisite(s): EVE 101 or ESP 100 or VET 409; Or the equivalent. Introduction to the dynamics and control of infectious disease in wildlife, including zoonotic diseases and those threatening endangered species. Basic epidemiological models and their applications. Role of scientists in developing disease control policies. Effective: 2004 Spring Quarter.

WFC 160—Animal Coloration (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B; BIS 002C Evolutionary and ecological significance of coloration in mammals, birds, reptiles, amphibians, fish, cephalopods, crustaceans, spiders, insects, humans as well as color in fashion, plants and the military. Topics include history, protective coloration, warning coloration, mimicry, sexual dichromatism and color change. Effective: 2017 Winter Quarter.

WFC 190—Departmental Research Seminar (1)
Seminar—1 hour. Prerequisite(s): Upper division standing in the Biological Sciences. Reports and discussions of recent advances related to wildlife and fisheries biology. May be repeated up to 3 time(s). (P/NP grading only.) Effective: 2001 Fall Quarter.

WFC 191—Museum Science (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing. Principles and methods required to preserve and present biological specimens for research, teaching collections, and museums. (P/NP grading only.) Effective: 1997 Winter Quarter.

WFC 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Work experience off and on campus in all subject areas offered in the department. Internships supervised by a member of the faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

WFC 195—Field and Laboratory Research (3)
Discussion—1 hour; Laboratory—6 hours. Prerequisite(s): (WFC 110L or WFC 111L or WFC 120L); (WFC 121 or WFC 130); EVE 101; and Consent of Instructor. Or the equivalent of EVE 101 Critique and practice of research methods applied to field and/or laboratory environments of wild vertebrates. Students work independently or in small groups to design experimental protocol, analyze data, and report their findings. May be repeated twice for credit. May be repeated up to 2 time(s). GE credit: SE. Effective: 1997 Winter Quarter.

WFC 197T—Tutoring in Wildlife and Fisheries (1-5)
Variable. Prerequisite(s): Consent of Instructor. Major in Wildlife, Fish, and Conservation Biology. Experience in teaching under guidance of faculty member. (P/NP grading only.) Effective: 1997 Winter Quarter.

WFC 198—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

WFC 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

WFC 223—Conservation Biology and Animal Behavior (3)
Discussion—1.5 hours; Lecture—1.5 hours. Prerequisite(s): ECL 208 or ANB 221; and Consent of Instructor. Influences of concepts of animal behavior (functional, evolutionary, developmental, mechanistic, and methodological issues) on conservation biology theory and practice. Effective: 2003 Spring Quarter.

WFC 230—Advanced Physiological Ecology of Wildlife (4)
Discussion—1 hour; Lecture—3 hours. Advanced principles of physiological ecology. Ecological, evolutionary and behavioral perspectives on physiological mechanisms used by animals to adapt to their environment in the context of climate change and other threats to biodiversity. Primary literature will form the basis of discussion. Effective: 2015 Winter Quarter.

WFC 262—Advanced Population Dynamics (3)
Lecture—3 hours. Prerequisite(s): Graduate standing; advanced course in ecology (e.g., Evolution and Ecology 101), population dynamics (e.g., course 122), and one year of calculus; familiarity with matrix algebra and partial differential equations recommended. Logical basis for population models, evaluation of simple ecological models, current population models with age, size, and stage structure, theoretical basis for management and exemplary case histories. Emphasis on development and use of realistic population models in ecological research. (Ecology 262.) Effective: 2016 Spring Quarter.

WFC 290—Seminar (1-3)
Seminar—1-3 hours. Prerequisite(s): Consent of Instructor. Seminar devoted to a highly specific research topic in any area of wildlife or fisheries biology. Special topic selected for a quarter will vary depending on interests of instructor and students. (S/U grading only.) Effective: 1997 Winter Quarter.

WFC 290C—Research Group Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Weekly conference on research problems, progress and techniques in wildlife and fishery sciences. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

WFC 291—Seminar in Aquatic Ecology (2)
Seminar—2 hours. Prerequisite(s): Graduate standing in Biology. Presentation and analysis of assigned topics in aquatic ecology emphasizing fish, fisheries and aquatic conservation. (S/U grading only.) Effective: 1997 Winter Quarter.

WFC 292—Physiology of Fishes Seminar (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing and at least two courses in physiology. Seminar devoted to current topics concerning the physiological functioning of fishes. May be repeated twice for credit. May be repeated up to 2 time(s). (S/U grading only.) Effective: 1997 Winter Quarter.

WFC 294—Seminar in Behavioral Ecology of Predators and Prey (3)
Seminar—2 hours. Prerequisite(s): Graduate standing. Presentation and analysis of research papers on social and foraging behavior of predatory animals, antipredator strategies of prey species, co-evolution of predators and prey, and ecology of predator prey interactions. May be repeated up to 2 time(s). (Animal Behavior 294.) Effective: 2003 Winter Quarter.

WFC 295—Seminar in Wildlife Ecotoxicology (3)
Seminar—2 hours; Term Paper. Prerequisite(s): Graduate standing in Biology. Presentation and analysis of assigned and searched research papers on transport, exposure, and effects of environmental contaminants on wildlife-associated ecosystem components, especially at individual/population levels. Specific subjects vary each offering. (S/U grading only.) Effective: 1997 Winter Quarter.

WFC 297T—Supervised Teaching in Wildlife and Fisheries Biology (1-3)
Tutorial—3-9 hours. Prerequisite(s): Consent of Instructor. Meet qualifications for teaching assistant; graduate standing. Tutoring and teaching students in undergraduate courses in Wildlife, Fish, and Conservation Biology. Weekly conferences with instructor;
evaluations of teaching; preparing for and conducting demonstrations, laboratories, and discussions; preparing and grading examinations. May be repeated up to 6 unit(s) when a different course is tutored. (S/U grading only.) Effective: 1997 Winter Quarter.

WFC 298—Group Study (1-5)
Variable. Effective: 1997 Winter Quarter.

WFC 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

Courses by Subject Code

Courses by Subject Code

A | B| C | D | E | etc.

A

- AAS African American & African Studies
- ABG Animal Biology Grad Group
- ABI Animal Biology
- ABS Applied Behavioral Sciences
- ABT Applied Biological System Tech
- ACC Professional Accountancy
- AED Agricultural Education
- AGC Agricultural & Envir Chem Grad
- AGE Agricultural Economics
- AGR Agronomy
- etc.

AAS African American Studies

Courses in AAS:

AAS 010—African-American Culture and Society (4)
Discussion—1 hour; Lecture—3 hours. Critical examination of the historical, political, social, and economic factors that have affected the development and status of African-American people in contemporary society. GE credit: ACGH, DD, SS, WE. Effective: 2012 Winter Quarter.

AAS 012—Introduction to African Studies (4)
Discussion—1 hour; Lecture—3 hours. Introduction to African Studies which will focus on the various disciplinary perspectives through which African society and culture are generally studied. A survey of methods, resources and conceptual tools for the study of Africa. GE credit: AH, SS, WC, WE. Effective: 2017 Fall Quarter.

AAS 015—Introduction to African American Humanities (4)
Discussion—1 hour; Lecture—3 hours. Class size limited to 165 students. Introduction to the humanist tradition developed by writers, philosophers, and artists of African descent in the West. Attention also given to African sources, as well as European, Caribbean, Latin-American, and North American variations on this tradition. GE credit: ACGH, AH, DD. Effective: 2012 Winter Quarter.

AAS 016—Verbal and Performance Arts in Africa (4)
Lecture/Discussion—4 hours. African verbal arts; oral texts from different African cultures. Types of critical response to oral texts, role of oral artists, context and esthetics of oral performance in Africa. GE credit: AH, VL, WC. Effective: 2012 Winter Quarter.

AAS 017—Women in African Societies (4)
Lecture/Discussion—4 hours. Gender relations in traditional and contemporary African society. Involvement of African women in politics, religion, the economy, the arts. African responses to feminist theory. Images of women in African literature. GE credit: SS, WC, WE. Effective: 2012 Winter Quarter.

AAS 018—Introduction to Caribbean Studies (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the contemporary culture, peoples, politics, and societies of the Caribbean. Topics include movements of people, goods and ideas across the Atlantic world and creative productions within the Caribbean. GE credit: AH, SS, WC. Effective: 2011 Fall Quarter.

AAS 050—Black Popular Culture (4)
Discussion—1 hour; Lecture—3 hours; Term Paper. Survey of the African American images in popular culture (film, television, comedy, sports and music). GE credit: ACGH, AH, DD, VL, WE. Effective: 2012 Winter Quarter.

AAS 051—History of Afro American Dance (4)
Lecture—4 hours. Evolution of African-American dance, tracing its history and development from West and Central Africa to the United States. Investigates the social and cultural relevance of African American dance and its artistic merits through contributions from its choreographers and performers. GE credit: AH, DD, VL. Effective: 2012 Spring Quarter.

AAS 052—African Traditional Religion (4)
Discussion—2 hours; Lecture—2 hours. Introduction to traditional religions of the sub-Saharan African peoples: emphasis on myths, rituals and symbols in West, East, Central and South African indigenous religions. Examines themes: sacred kingship, divination system, women, prophecy, conversion and adaptation to Islam and Christianity. GE credit: AH, WC. Effective: 2012 Winter Quarter.

AAS 080—Introduction to Black Politics (4)
Lecture—4 hours. Introduction to the analysis of Afro-American politics, using conceptual frameworks from political science and other social sciences. Effective: 1997 Winter Quarter.

AAS 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

AAS 100—Survey of Ethnicity in the US (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Upper division standing or consent of instructor. Limited enrollment. Sociological and historical analysis of the experience, culture, and relations of and between groups considered racial and/or ethnic minorities in the United States. GE credit: ACGH, AH, DD. Effective: 2012 Winter Quarter.

AAS 101—Introduction to Research in the Afro-American Community (4)
Lecture—4 hours. Prerequisite(s): AAS 010; or Consent of Instructor. Introductory survey of Afro-American Studies methods and techniques; problems and methodology in Afro-American Studies. Effective: 1997 Winter Quarter.

AAS 107A—African Descent Communities and Culture in the Caribbean and Latin America (4)
Lecture/Discussion—4 hours. Prerequisite(s): Upper division standing. Origin and development of African descent communities and cultures in the Caribbean, and Latin America. The similarities and differences among African descent communities and cultures in terms of religious practices, music, and national identity. GE credit: WC. Effective: 2011 Fall Quarter.

AAS 107B—African Descent Communities and Culture in North America (4)
Lecture/Discussion—4 hours. Prerequisite(s): Upper division standing. Study of the origin and development of African descent communities and cultures in the U.S.A., Canada, and Mexico. GE credit: AH, DD, SS. Effective: 2017 Winter Quarter.

AAS 107C—African Descent Communities and Culture in Asia (4)
Lecture/Discussion—4 hours. Study of the origin and development of African Descent communities and cultures in Asia. GE credit: AH, SS, WC. Effective: 2015 Winter Quarter.

AAS 107D—African Descent Communities and Cultures in Europe (4)
Lecture/Discussion—4 hours. Study of the origin and development of African Descent communities and cultures in Europe. GE credit: AH, SS, WC. Effective: 2015 Spring Quarter.

AAS 110—West African Social Organization (4)
Lecture—4 hours. Ecology, population, social and political organization, and culture of West Africa in the precolonial, colonial, and post-colonial periods. GE credit: SS, WC. Effective: 2012 Winter Quarter.

AAS 111—Cultural Politics in Contemporary Africa (4)
Lecture/Discussion—4 hours. Prerequisite(s): AAS 012; Or upper division standing. Themes and style of new cultural forms in Africa as displayed in art, music, film and writing, especially in regard to blending of indigenous and foreign influences. Social and political forces shaping contemporary cultural expression. GE credit: AH, SS, WC. Effective: 2012 Winter Quarter.

AAS 123—Black Female Experience in Contemporary Society (4)
Lecture—4 hours. Prerequisite(s): Upper division standing or consent of instructor. Black female social, intellectual, and psychological development. Black women's contributions in history, literature, and social science; life experiences of Black women and philosophical underpinnings of the feminist movement. GE credit: ACGH, DD, SS. Effective: 2012 Winter Quarter.

AAS 130—Education in the African-American Community (4)
Discussion—1 hour; Fieldwork—3 hours; Lecture—2 hours. Examination of the history of the education of African Americans in the
United States. Examination and critique of contemporary theories concerning the schooling of African Americans. (Former course AAS 140.). GE credit: DD, SS. Effective: 2011 Fall Quarter.

AAS 133—The Black Family In America (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Upper division standing or consent of instructor. Analysis of social science research to examine relationship between black (African-descent) family structures, patterns of functioning, and political, economic, and social conditions in the U.S. GE credit: ACGH, DD, SS. Effective: 2012 Winter Quarter.

AAS 141—Psychology of the African American Experience (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): AAS 010; or Consent of Instructor. Introduction to the psychological issues faced by African Americans. Analysis of issues from European/Western and Afrocentric frame of reference. Emphasis on Optimal Theory, a psychological theory based on an Afrocentric world view. Effective: 1997 Winter Quarter.

AAS 145A—Black Social and Political Thought (4)
Lecture—4 hours. Prerequisite(s): AAS 010 or AAS 080; or Consent of Instructor. Exploration and analysis of Black social and political thought in the Americas. GE credit: SS. Effective: 2012 Winter Quarter.

AAS 145B—Black Intellectuals (4)
Lecture—4 hours. Prerequisite(s): (AAS 010, AAS 080, AAS 145A); or Consent of Instructor. Exposition and critical analysis of selected theoretical writings of Black intellectuals, and especially political and social thinkers, in the Americas. GE credit: DD, SS, WE. Effective: 2012 Winter Quarter.

AAS 150A—Afro-American Visual Arts Tradition: A Historical and Cultural Study (4)
Lecture—4 hours. Prerequisite(s): Upper division standing. Afro-American visual arts tradition, folk and formal, in historical and cultural context, from 1600 through Reconstruction. Effective: 1997 Winter Quarter.

AAS 150B—Afro-American Visual Arts Tradition: A Historical and Cultural Study (4)
Lecture—4 hours. Prerequisite(s): Upper division standing. Afro-American visual arts tradition, folk and formal, in historical and cultural context, from Reconstruction to the present. Effective: 1997 Winter Quarter.

AAS 151—Afro-American Vernacular Music and Verbal Arts (4)
Discussion—2 hours; Lecture—2 hours. Socio-political dimensions of Afro-American musical forms like spiritual, work song, minstrelsy blues, rhythm and blues, jazz, gospel, soul and contemporary pop, and related verbal arts like preaching, toasting, rapping. Effective: 1997 Winter Quarter.

AAS 152—Major Voices in Black World Literature (4)
Discussion—1 hour; Lecture—2 hours; Term Paper. Prerequisite(s): AAS 010 or AAS 012 or AAS 018; Upper division standing. Recurrence of cultural tropes in the works of major black world authors and formation of an African-oriented canon. Principal activities include critical reading and discovery of literature as a cultural resource. GE credit: AH, DD, WC, WE. Effective: 2012 Winter Quarter.

AAS 153—African Literature (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Completion of Entry Level Writing Requirement (ELWR). Colonial and post-colonial sub-Saharan African literature and the African oral traditions from which it emerged. Genres and themes of African literature from the nineteenth century to the present. (COM 154.) GE credit: AH, WC, WE. Effective: 2012 Spring Quarter.

AAS 155A—African-American Dance and Culture in the United States, Brazil and the Caribbean (4)
Lecture/Discussion—4 hours. Comparative study of the African American dance forms in the U.S.A., Brazil, Haiti, Cuba, Jamaica, Barbados, and Trinidad. Examination of ritual, folk, and popular dance forms and the socio/historical factors that have influenced these forms. (DRA 155A.) GE credit: AH, VL, WC. Effective: 2012 Fall Quarter.

AAS 156—Language and Identity in Africa and the African Diaspora (4)
Lecture/Discussion—4 hours. Prerequisite(s): AAS 012; Or upper division standing. Relationship between language and identity in literature from Africa and the African Diaspora. Use of pidgins, Creoles, translation from African languages and impact of language policies. GE credit: AH, DD, WC. Effective: 2012 Winter Quarter.

AAS 157—Literature and Society in South Africa (4)
Lecture/Discussion—4 hours. Prerequisite(s): Upper division standing. Political and social developments in 20th-century South Africa as illustrated by a range of South African writing. Response of different writers to race relations, impact of government policy on types and context of writing. GE credit: AH, WC, WE. Effective: 2012 Winter Quarter.

AAS 160—African-American Folklore (4)
Discussion—1 hour; Fieldwork—3 hours; Lecture—2 hours. Prerequisite(s): AAS 010 Theory and history of African American folklore and folklife, including
music, material culture, oral narrative, proverbs, and humor. African and Caribbean cultural influences on New World folk genres will be probed. Effective: 1997 Winter Quarter.

AAS 162—Islam in Africa and the Americas (4)
Lecture/Discussion—4 hours. Prerequisite(s): RST 060 or AAS 012 or AAS 110 Comparative and historical survey of Islam in the regional and cultural settings of Sub-Saharan Africa and the Americas. GE credit: AH, WC, WE. Effective: 2012 Winter Quarter.

AAS 163—African Religions in the Americas (4)
Lecture/Discussion—4 hours. Prerequisite(s): AAS 010; AAS 015; or Consent of Instructor. Comparative study of African religious heritage in the Americas: Jamaica, Trinidad, Cuba, U.S.A., Haiti, and Brazil. Emphasis on the origins and development of Candomble, Santeria, Shango, Vodun, and
Rastafarianism in the New World. GE credit: AH, WC, WE. Effective: 2012 Winter Quarter.

AAS 165—Afro-Christianity and the Black Church (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): AAS 010; AAS 015; or Consent of Instructor. Upper division standing. Examination of the historical role of Christian belief and practice as well as the institution of the Black Church in the experience of African Americans, from slavery to the present. GE credit: ACGH, DD, SS. Effective: 2012 Winter Quarter.

AAS 168—Black Documentary: History and Practice (4)
Laboratory—5 hours; Lecture—3 hours. Prerequisite(s): FMS 001; AAS 170; and Consent of Instructor. AAS 050 recommended. Study of Black documentary history and understanding of the use of the documentary form for political purposes. A discussion of documentary theory. Each student, singly or in a team, will create and carefully edit a documentary project. GE credit: AH, DD, VL, WC. Effective: 2011 Summer Session 1.

AAS 169—History of African American Television (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): AAS 050 recommended. History of the representation of African Americans in television; how the representations reflect social and political forces in American society. Role of African Americans in actively shaping their representation. GE credit: AH, DD, VL, WE. Effective: 2012 Winter Quarter.

AAS 170—African-American Film and Video (4)
Film Viewing—3 hours; Lecture—3 hours. Prerequisite(s): FMS 001; AAS 050 recommended. Comparative approach in the study of fictional film and video dealing with the African American experience drawing on film and cultural studies to examine and discuss selected works. GE credit: AH, DD, VL, WE. Effective: 2011 Fall Quarter.

AAS 171—Black African and Black European Film and Video (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): AAS 015 or AAS 050 or ENL 160 or ENL 162; or Consent of Instructor. Comparative approach in the study of dramatic films and videos that treat black life in Africa and Europe. Critical attention will focus on the imaginative construction of ethnicity, race, nationality, gender, and sexuality in each particular work. GE credit: AH, VL, WC. Effective: 2012 Spring Quarter.

AAS 172—Diaspora and New Black Identities (4)
Lecture/Discussion—3 hours; Term Paper. Critical analysis about what it means to be Black/African American in the United States today. Topics include old and new diasporas, immigration, national origin, language, religion, class, education, politics, identity and cultural heritage. GE credit: ACGH, DD, SS, WE. Effective: 2011 Fall Quarter.

AAS 175A—Black Documentary: History and Theory (4)
Film Viewing—3 hours; Lecture—3 hours. Prerequisite(s): FMS 001; AAS 170; AAS 050 recommended. Black documentary history and documentary theory. Use of black documentary for political purposes. GE credit: AH, DD, VL, WE. Effective: 2011 Fall Quarter.

AAS 175B—Black Documentary Practicum (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): AAS 175A; and Consent of Instructor. Creation of documentary projects, with students working in production crews. GE credit: AH, DD. Effective: 2012 Winter Quarter.

AAS 176—The Politics of Resources (4)
Lecture/Discussion—4 hours. Prerequisite(s): AAS 012 or AAS 110 Limited enrollment. Examination of the ways in which the processes of the extraction, purification and use of natural resources and the complex regimes of valuation and commodification they (re)produce lead to cooperation and conflict in contemporary Africa and beyond. GE credit: SS, WC. Effective: 2012 Winter Quarter.

AAS 177—Politics of Life in Africa (4)
Lecture/Discussion—4 hours. Existing (in)capacities in the structures of state and society in Africa for people to live well. Topics include institutions and practices that define state and civil society encounters in Africa; democracy, ethnicity, economic crisis, religion, citizenship, etc. GE credit: AH, SS, WC. Effective: 2012 Winter Quarter.

AAS 178—African Modernity and Globalization (4)
Lecture—4 hours. Prerequisite(s): AAS 012; or Consent of Instructor. Class size limited to 80 students. Exploration of modernity and globalization and their dimensions and impacts in/on Africa. Examination of modern necessities and constrains in Africa in relation to (neo)colonialism, transnational encounters, technology, gender, risk, ritual, identity, culture, etc. GE credit: AH, SS, WC. Effective: 2015 Winter Quarter.

AAS 180—Race and Ethnicity in Latin America (4)
Lecture/Discussion—4 hours. The social and political effects of racial and ethnic categorization in Latin America, including issues of economic production, citizenship, national belonging, and access to resources. Emphasis is on peoples of African, Indigenous, and Asian descent. GE credit: SS, WC, WE. Effective: 2012 Winter Quarter.

AAS 181—Hip Hop in Urban America (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Upper division standing or consent of instructor. Must have Junior or Senior level standing. History, aesthetics, urban context, and economics of hip-hop in the US, and its globalization. Hip-hop's four artistic elements-rap, deejaying, breakdance, and aerosol art-allow the examination of issues of race, ethnicity, and gender in youth culture and American society. GE credit: AH, DD, VL. Effective: 2012 Spring Quarter.

AAS 182—Hip Hop Culture & Globalization (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): AAS 181 preferable, not required. Investigation of hip-hop youth cultures outside the United States using globalization and Cultural Studies theories. Analysis of international hip-hop sites in Africa, Asia, Europe, South America, and the Middle East through reading, discussion, and visiting virtual sites. GE credit: AH, WC. Effective: 2014 Spring Quarter.

AAS 185—Topics in African American Film (4)
Film Viewing—3 hours; Lecture—3 hours. Prerequisite(s): AAS 170; AAS 050 recommended. Intensive study of special topics in African American film. May be repeated up to 1 time(s). GE credit: AH, DD, VL, WE. Effective: 2011 Fall Quarter.

AAS 190—Topics in African and African-Diaspora Studies (4)
Lecture/Discussion—3 hours; Term Paper—1 hour. Prerequisite(s): Upper division standing in African American and African Studies courses or consent of instructor. Intensive treatment of a special topic or problem in African or African Diaspora Studies. May be repeated once for credit when topic differs. May be repeated up to 1 time(s) topic differs. Effective: 1997 Winter Quarter.

AAS 192—Internship in African-American and African Studies (1-8)
Internship—3-24 hours. Prerequisite(s): Consent of Instructor. Completion of 12 units of upper division study in African American and African Studies courses; upper division standing. Restricted to African American and African Studies majors and minors. Supervised internship in community, government, or private institutions, in all subject areas offered by the African American and African Studies Program. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

AAS 197T—Tutoring in Afro-American Studies (1-5)
Tutorial—1-5 hours. Prerequisite(s): Consent of major committee; upper division standing with major in African American and African Studies. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. May be repeated up to 6 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

AAS 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

AAS 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

AAS 201—Critical Foundations in African American Studies (4)
Seminar—3 hours. Prerequisite(s): Graduate standing. Introduction to history of African American Studies. Topics include: research agendas, policy implications, debates, crises, and institutional frameworks. Effective: 2007 Fall Quarter.

AAS 202—Critical Foundations in African Studies (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Introduction to the history and current organization of African Studies as area of intellectual investigation. Offers students an opportunity to review research agenda and policy implications, debates, crises, and institutional frameworks surrounding the production of knowledge about Africa. Effective: 2006 Spring Quarter.

AAS 203—Critical Foundations in African Diaspora Studies (4)
Seminar—3 hours; Term Paper. Integrative conceptual framework includes History, Geography, Political Economy, Culture, Aesthetics as tools to investigate the African Diaspora. Students engage African Diaspora theories within their research projects understanding issues developing from the movement of Africans to the rest of the world. Effective: 2007 Fall Quarter.

AAS 204—Methodologies in African American and African Studies (4)
Seminar—3 hours; Term Paper. Relationship between theory and methodology, with emphasis on identifying relevant methodological approaches and constructing theoretically informed research projects for studying the experience of people of African descent whether on the African continent or in the rest of the world. Effective: 2006 Fall Quarter.

AAS 298A—Directed Group Study in African American and African Diaspora Studies (1-5)
Variable—3-15 hours. Prerequisite(s): Graduate standing. May be repeated up to 3 time(s) with consent of instructor. (S/U grading only.) Effective: 2007 Winter Quarter.

AAS 298B—Directed Group Study in African Studies (1-5)
Variable—3-15 hours. May be repeated up to 3 time(s) with consent of instructor. (S/U grading only.) Effective: 2007 Winter Quarter.

AAS 299—Directed research (1-12)
Variable—3-36 hours. (S/U grading only.) Effective: 2007 Fall Quarter.

ABG Animal Biology (Graduate Group)

Courses in ABG:

ABG 200A—Integrated Animal Biology I (3)
Lecture/Discussion—3 hours. Prerequisite(s): BIS 101; or Consent of Instructor. Or equivalent of course; graduate standing. Class size limited to 20 students; Pass One restricted to Animal Biology Graduate Group students. Natural history, management, historical and current uses, and specialized disciplinary features of model and novel animal systems used in research. Development of conceptual approaches in organismal biology to improve experimental design and interpretation of interdisciplinary research studies. Effective: 2005 Fall Quarter.

ABG 200B—Integrated Animal Biology II (3)
Lecture/Discussion—3 hours. Prerequisite(s): ABG 200A Limited enrollment; Pass One restricted to Animal Biology Graduate Group students. Natural history, management, historical and current uses, and specialized disciplinary features of model and novel animal systems used in research. Development of conceptual approaches in organismal biology to improve experimental design and interpretation of interdisciplinary research studies. Effective: 2006 Winter Quarter.

ABG 202—Grant Procurement and Administration (2)
Discussion/Laboratory—1 hour; Lecture—1 hour. Prerequisite(s): ABG 200B Class size limited to 12 graduate students; Pass One restricted to Animal Biology Graduate Group students. Topics include: structure of grants, attention to specifications, concise persuasive writing, and grant budgeting. Identify grant opportunities, write a persuasive research grant proposal, and administer grants. Effective: 2009 Fall Quarter.

ABG 203—Advanced Animal Welfare (3)
Lecture—3 hours. Advanced animal welfare. Key concepts used when evaluating and understanding the welfare of animals kept by humans. Topics include animal pain, stress, cognition, motivation and emotions. Critical discussion of primary literature. May be repeated up to 1 time(s) It is offered every other year and the topics are adjusted (as well as updated) so it would be a different course. Effective: 2016 Spring Quarter.

ABG 205—Advanced Nutritional Energetics (3)
Discussion/Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): (ABI 102, ABI 103, NPB 101); or the equivalent courses. Class size limited to 30 students. History of nutritional energetics. Evaluation of energy transformations associated with food utilization. Energy expenditures at cellular, tissue, and animal levels as affected by diet and physiological state. Current and future feeding systems. Effective: 2017 Spring Quarter.

ABG 211—Advances in Animal Biotechnology and Genetics (3)
Lecture/Discussion—3 hours. Prerequisite(s): NPB 121; BIS 101; or Consent of Instructor. Pass One restricted to graduate students. Introduction to advanced techniques used for assisted reproductive technologies in mammals and birds, genetic engineering, gene editing, stem cell biology. Offered in alternate years. Effective: 2017 Spring Quarter.

ABG 250—Mathematical Modeling in Biological Systems (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 016A; MAT 016B; STA 100; Or equivalents required; graduate standing; MAT 016C or equivalent recommended; more than one course in statistics recommended; ABI 102 or BIS 102 recommended or equivalent course in biochemistry. Limited enrollment. Model development and evaluation including sensitivity analyses using R. Four principle modeling methodologies included: algebraic functions of biological processes, physiological-based compartmental models, linear programming and meta-analysis. Fundamental background and understanding of mathematical modeling principles in biological systems. Effective: 2012 Winter Quarter.

ABG 255—Physiology of the Stress Response (2)
Lecture/Discussion—2 hours. Prerequisite(s): Graduate standing. Definition of Stress; Physiological mechanisms of adaptation to stress; Hormonal control of the systemic stress response; Mechanisms of the cellular stress response; Discussion of current trends in stress physiology and current methods for studying the stress response. (MCP 255.) Effective: 2006 Summer Session 2.

ABG 290—Seminar in Animal Biology (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Seminar on advanced topics in animal biology. Presentations by members of the Animal Biology Graduate Group and guest speakers. May be repeated for credit for credit. (S/U grading only.) Effective: 2005 Spring Quarter.

ABG 290C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Student presentations of research in Animal Biology and discussions among participating students and Animal Biology faculty. May be repeated for credit for credit. (S/U grading only.) Effective: 2005 Spring Quarter.

ABG 298—Group Study in Animal Biology (1-5)
Lecture. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated up to 2 time(s). Effective: 2006 Fall Quarter.

ABG 299—Research (1-11)
Discussion/Laboratory—3-33 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Research with a faculty member in Animal Biology Graduate Group. May be repeated for credit for credit. (S/U grading only.) Effective: 2005 Winter Quarter.

ABG 300—Methods in Teaching Animal Biology (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Practical experience in the methods and problems of teaching animal biology. Includes analysis of laboratory exercises, discussion of teaching techniques, grading scientific essays, preparing for and conducting discussion or laboratory sections, formulating quiz and exam questions under instructor supervision. May be repeated up to 3 time(s). (S/U grading only.) Effective: 2005 Spring Quarter.

ABG 396—Teaching Assistant Training Practicum (1-4)
Variable—3-12 hours. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit. (S/U grading only.) Effective: 2005 Spring Quarter.

ABG 401—Ethics and Professionalism in Animal Biology (2)
Discussion—2 hours. Restricted to graduate standing; Pass One restricted to Animal Biology graduate group students. Case studies and discussion of ethical and professional issues for animal biologists, including the use of animals in research and teaching, patenting and intellectual property, consulting and conflict of interest, scientific integrity, dealing with the media, and mentoring relationships. Effective: 2005 Spring Quarter.

ABI Animal Biology

Courses in ABI:

ABI 050A—Animal Biology Laboratory (2)
Lecture/Lab—4 hours. Scientific methods for answering questions in animal biology by doing exercises to demonstrate hypothesis testing and reporting, short laboratory, population and field experiments. Maintain notebooks, analyze data, interpret results and write reports. Effective: 2018 Winter Quarter.

ABI 050B—Animal Biology (3)
Lecture—3 hours. Prerequisite(s): BIS 001A; BIS 001B (can be concurrent) Basic biological disciplines important to an understanding of practical animal biology issues including the evolution of animal groups, genetic
mechanisms, animal physiology as it relates to maintenance and production, and aspects of comparative anatomy, behavior and ecology. Effective: 2018 Winter Quarter.

ABI 050C—Animal Biology (3)
Lecture—3 hours. Prerequisite(s): BIS 001B; BIS 001C; ABI 050A; ABI 050B Animal management and conservation. Societal concerns arising from
management and conservation issues, including economics, aesthetics, regulations, safety, public perspectives and advocacy Effective: 2018 Winter Quarter.

ABI 092—Intership in Animal Biology (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Office, laboratory or fieldwork off or on campus in research, governmental regulation, policy making, and private enterprise dealing with animal related issues of production, welfare, pest management, biodiversity and the environment. All requirements of Internship Approval Request form must be met. (P/NP grading only.) Effective: 2018 Winter Quarter.

ABI 098—Directed Group Study (1-5)
Variable—1-5 hours. - (P/NP grading only.) Effective: 2018 Winter Quarter.

ABI 099—Special Study for Unergraduate (1-5)
Variable—1-5 hours. (P/NP grading only.) Effective: 2018 Winter Quarter.

ABI 102—Animal Biochemistry and Metabolism (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): (CHE 002A, CHE 002B, CHE 008A, CHE 008B) or (CHE 118A, CHE 118B) Water and biological buffers; thermodynamics of metabolism; structure and function of biomolecules; enzyme kinetics and function; membrane biology; digestion and absorption; carbohydrate metabolism. Not open for credit to students who have completed BIS 102. Effective: 2018 Winter Quarter.

ABI 103—Animal Biochemistry and Metabolism (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): ABI 102 or BIS 102 Physiological function and metabolism of lipids and amino acids; integrative metabolism; biochemical basis for nutrient requirements; structure and function of vitamins; mineral metabolism and requirements. Not open for credit to students who have completed BIS 103. Effective: 2018 Winter Quarter.

ABI 187—Animal Biology Seminar (2)
Discussion—1 hour; Seminar—1 hour. Junior standing. Seminar leading to development of the Major Proposal for the Animal Biology major. Effective: 2018 Fall Quarter.

ABI 189—Senior Practicum (2)
Independent Study—6 hours. Prerequisite(s): ABI 050A; ABI 050B; ABI 050C; ABI 187; Junior standing. The practicum may be an experimental research project, a library research project or some other creative activity that will serve as a capstone experience for the Animal Biology major. May be repeated once for credit. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 2018 Winter Quarter.

ABI 189D—Senior Practicum Discussion (1)
Discussion—1 hour. Prerequisite(s): ABI 050A; ABI 050B; ABI 050C; ABI 187; ABI 189 (can be concurrent); Junior standing. Course helps prevent or solve problems during the students' senior practicum activity. (P/NP grading only.) Effective: 2018 Winter Quarter.

ABI 192—Internship in Animal Biology (1-12)
Variable. Prerequisite(s): Consent of Instructor. Completion of 84 units. Office, laboratory or fieldwork off or on campus in research, governmental regulations, policy making, and private enterprise dealing with animal related issues of production, welfare, pest management, biodiversity and the environment. All requirements of Intership Approval Request form must be met. (P/NP grading only.) Effective: 2018 Winter Quarter.

ABI 198—Directed Group Study (1-5)
Variable—1-5 hours. (P/NP grading only.) Effective: 2018 Winter Quarter.

ABI 199—Special Study for Advanced Unergratuate (1-5)
Variable—1-5 hours. (P/NP grading only.) Effective: 2018 Winter Quarter.

ABT Applied Biological Systems Technology

Courses in ABT:

ABT 015—Wood Properties and Fabrication (2)
Laboratory—3 hours; Lecture/Discussion—1 hour. Study of wood properties and techniques for fabrication with wood. Gain experience working with various woods and woodworking tools for specific applications. (P/NP grading only.) GE credit: OL, QL, SE, VL. Effective: 2010 Fall Quarter.

ABT 016—Metal Properties and Fabrication (2)
Laboratory—3 hours; Lecture—1 hour. Study of metal properties and of techniques for fabricating in metal. Physical principles, design considerations, effects of techniques on quality and appearance, and evaluation procedures. Experience in working
with metal. (P/NP grading only.) GE credit: QL, SE, VL. Effective: 1997 Spring Quarter.

ABT 017—Plastic Properties and Fabrication (2)
Laboratory—3 hours; Lecture—1 hour. Study of the properties of plastic materials and the fundamentals of fabrication techniques. Experience in working with common plastics, with applications to biological systems. (P/NP grading only.) GE credit: QL, SE, VL. Effective: 1997 Winter Quarter.

ABT 049—Field Equipment Operation (2)
Laboratory—3 hours; Lecture—1 hour. Operation, adjustment, and troubleshooting of farm tractors and field equipment. Principles of operation, equipment terminology and uses of tilling, cultivating, thinning, and planting equipment. Typical sequences in cropping practices. (P/NP grading only.) GE credit: QL, SE, VL. Effective: 1997 Spring Quarter.

ABT 052—Field Equipment Welding (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): ABT 016; or Consent of Instructor. Intermediate welding to include hardfacing and inert gas welding. Class projects on repair and fabrication by welding. Troubleshooting and major repair of field equipment. (P/NP grading only.) GE credit: QL, SE, VL. Effective: 2000 Winter Quarter.

ABT 098—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ABT 099—Special Study for Lower Division Students (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ABT 101—Engine Technology (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Upper division standing or consent of instructor. Principles of 2-stroke cycle, 4-stroke cycle gasoline and 4-stroke cycle diesel engine construction and operation. Engine systems, performance, troubleshooting, and overhaul. GE credit: QL, SE, VL. Effective: 2000 Winter Quarter.

ABT 110L—Experiments in Food Engineering (2)
Laboratory—6 hours. Prerequisite(s): FST 110B (can be concurrent) Use of temperature sensors; measurement of thermal conductivity and heat transfer in foods; refrigeration, freezing, concentration and dehydration of foods. GE credit: QL, SE, VL, WE. Effective: 1997 Spring Quarter.

ABT 121—Animal Housing and Environment Management (2)
Lecture—2 hours. Prerequisite(s): ANS 001 or ANS 002 Optimal structures and environments for animal growth and comfort; heat and moisture transfer principles; heating, cooling, ventilating principles and equipment; animal housing design; environmental regulations and waste management practices. GE credit: SE. Effective: 1997 Spring Quarter.

ABT 142—Equipment and Technology for Small Farms (2)
Laboratory—3 hours; Lecture—1 hour. Types and characteristics of agricultural equipment and technologies
appropriate for small commercial farming. Adjustment and calibration of equipment. Selection of and budgeting for equipment. (IAD 142.) GE credit: QL, SE, VL. Effective: 1997 Spring Quarter.

ABT 150—Introduction to Geographic Information Systems (4)
Laboratory—3 hours; Lecture—3 hours. Pass One restricted to Landscape Architecture and Sustainable Environmental Design majors. Basic concepts, principles, and methods of GIS are presented. Data structures, database design, GIS data creation, GPS, and spatial analysis. Not open for credit to students who have completed ABT 180/PLS 180 or ABT 181N. (LDA 150.) GE credit: SE, VL. Effective: 2018 Winter Quarter.

ABT 161—Water Quality Management for Aquaculture (3)
Lecture—3 hours. Prerequisite(s): BIS 001B; MAT 016B; CHE 002B Basic principles of water chemistry and water treatment processes as they relate to aquacultural systems. GE credit: QL, SE, SL, VL. Effective: 1997 Spring Quarter.

ABT 163—Aquaculture Systems Engineering (3)
Lecture—3 hours. Prerequisite(s): ABT 161 Design of aquacultural systems: design methodology, principles of fluid mechanics, site selection and facility planning, management operations, computer modeling. GE credit: OL, QL, SE, SL, VL, WE. Effective: 1997 Spring Quarter.

ABT 165—Irrigation Practices for an Urban Environment (2)
Lecture—2 hours. Prerequisite(s): PHY 001A Basic design, installation, and operation principles of irrigation systems for turf and landscape: golf courses, parks, highways, public buildings, etc. Emphasis on hardware association with sprinkler and drip/trickle systems. GE credit: QL, SE, VL. Effective: 1997 Spring Quarter.

ABT 181N—Concepts and Methods in Geographic Information Systems (4)
Lecture/Lab—8 hours. Prerequisite(s): ABT 150; LDA 150; or Consent of Instructor. Data representation and analysis in geographic information systems (GIS). Creation of spatial data sets from analog and digital sources such as aerial photography and maps; data structures, data management, database design, georeferencing, georectification, surface models, analysis, and spatial data visualization. GE credit: SE, SL, VL. Effective: 2018 Winter Quarter.

ABT 182—Environmental Analysis using GIS (4)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): ABT 150 or LDA 150; Or equivalent GIS experience and skills; general biology and/or ecology courses are recommended. Ecosystem and landscape modeling with emphasis on hydrology and solute transport. Spatial analysis of environmental risk analysis including ecological risk assessment, natural resource management. Spatial database structures, scripting, data models, and error analysis in GIS. (HYD 182.) GE credit: QL, SE, SL, VL. Effective: 2018 Winter Quarter.

ABT 190C—Research Conference for Advanced Undergraduates (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Research conferences for specialized study in applied biological systems technology. May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ABT 192—Internship in Applied Biological Systems Technology (1-5)
Internship—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing; approval of project prior to period of internship. Supervised internship in applied biological systems technology. May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ABT 197T—Tutoring in Applied Biological Systems Technology (1-5)
Tutorial. Prerequisite(s): Consent of Instructor. Upper division standing. Tutoring individual students, leading small voluntary discussion groups, or assisting the instructor in laboratories affiliated with one of the department's regular courses. May be repeated for credit if topic differs. (P/NP grading only.) GE credit: SE. Effective: 2004 Spring Quarter.

ABT 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ABT 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ABT 212—Path to Zero Net Energy (4) ***Review all entries***
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): EBS 216; or Consent of Instructor. Open to upper division or graduate students. Zero Net Energy concepts and social, technical, economic, and environmental considerations. Multidisciplinary research and analysis for clients. Effective: 2017 Fall Quarter.

ABT 212—Path to Zero Net Energy (4) ***Review all entries***
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to upper division or graduate students. Zero Net Energy concepts and social, technical, economic, and environmental considerations. Multidisciplinary research and analysis for clients. Effective: 2018 Fall Quarter.

ABT 233—Pest Control Practices (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Graduate standing or consent of instructor. Practical and theoretical considerations of pest control systems and techniques. Design, selection, and use of mechanical systems for field, orchard, greenhouse, and vector control use. Biological, legal, and environmental considerations in pest control and pesticide application. Effective: 2001 Winter Quarter.

ABT 289A—Selected Topic in Applied Biological Systems Technology: Agricultural and Natural Resources (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special topic. May be repeated for credit. Effective: 2015 Fall Quarter.

ABT 289B—Selected Topics in Applied Biological Systems Technology: Biotechnology (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special topic. May be repeated for credit. Effective: 2015 Fall Quarter.

ABT 289C—Selected Topics in Applied Biological Systems Technology: Food Technology (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special topic. May be repeated for credit. Effective: 2015 Fall Quarter.

ABT 290C—Graduate Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Research problems, progress, and techniques in applied biological systems technology. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

ABT 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

ABT 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

ABT 317—Teaching Agricultural Mechanics (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): A course in physics; 6 units related to agricultural mechanics; enrolled in Agricultural Education Teacher Credential Program. Preparation of the teacher to plan, organize, and conduct an agricultural mechanics program in secondary schools. Development of and presentation of lesson plans and teaching aids. Review of subject matter in metal fabrication, power and machinery and agricultural structures areas. Effective: 1997 Spring Quarter.

ACC Professional Accountancy

Courses in ACC:

ACC 201—Financial Reporting (4)
Lecture—4 hours. Restricted to Master of Professional Accountancy graduate students. Coverage includes the fundamentals of accounting and reporting economic events and transactions. Emphasizes the preparation of balance sheets, income statements, statements of cash flow, and statements of stockholders' equity. Not open for credit to students who have taken any Management 200A. Effective: 2016 Winter Quarter.

ACC 203—Intermediate Financial Reporting (4)
Lecture—4 hours. Prerequisite(s): ACC 201 or (MGT 200A or MGP 200A or MGB 200A) Restricted to students enrolled in the Master of Professional Accountancy degree program. Focuses on the preparation of complex financial statements. Topics include accounting recognition, measurement, and disclosure, as well as the theoretical foundations of and motivations for financial reporting choices. Not open for credit to students who have taken any Management 200A. Effective: 2015 Fall Quarter.

ACC 205—Advanced Financial Reporting (4)
Lecture—4 hours. Prerequisite(s): ACC 203 Restricted to graduate students in Graduate School of Management. Advanced treatment of recognition, measurement, and disclosure including pensions, accounting for income taxes, mergers and acquisitions, consolidations, special-purpose entities, and foreign subsidiaries. Includes accounting for governmental and nonprofit entities, as well as advanced treatment of international accounting standards. Effective: 2015 Fall Quarter.

ACC 211—Tax Reporting and Analysis (4)
Lecture—4 hours. Restricted to Master of Professional Accountancy graduate students. Introduction to the taxation of business entities and their related transactions, with an emphasis on the details of tax law and tax reporting requirements. Topics include individual, partnership, and corporate taxation, as well as tax theory. Not open for credit to students who have completed any Management 264. Effective: 2015 Fall Quarter.

ACC 213—Intermediate Tax Reporting and Analysis (4)
Lecture—4 hours. Prerequisite(s): ACC 211; (MGT 264 or MGP 264 or MGB 264) Restricted to graduate students in the Graduate School of Management. Detailed analysis of federal taxation of individuals. Topics include the timing of income recognition, deductions and credits for tax purposes, as well as the basics of property transactions. Effective: 2015 Fall Quarter.

ACC 215—Advanced Tax Reporting and Analysis (4)
Lecture—4 hours. Prerequisite(s): ACC 213 Restricted to graduate students in Graduate School of Management. Advanced treatment of complex tax transactions and entities. Topics include aspects of federal taxation of entities and the applicable impact upon individual taxpayers. Coverage includes basis analysis as applicable to pass through entities and an introduction to professional responsibilities. Effective: 2015 Fall Quarter.

ACC 217—Taxation of Individuals, Property, and Estates (4)
Lecture—4 hours. Prerequisite(s): ACC 213 Restricted to graduate students in Graduate School of Management. In-depth analysis of individual income tax issues and property transactions including non-taxable exchanges, compensation, gifts, and transfer taxes. Expanded analysis of multistate tax issues. Emphasis is on the interrelationships of complex individual transactions as well as planning techniques. Effective: 2015 Fall Quarter.

ACC 219—Taxation of Business Entities (4)
Lecture—4 hours. Prerequisite(s): ACC 213 Restricted to graduate students in Graduate School of Management. Analysis of detailed business entity tax issues including basis calculations, alternative minimum taxation, multistate and multinational taxation, stock transactions, and mergers and acquisitions. Tax planning for entities and relationships between business entities and their owners. Effective: 2015 Fall Quarter.

ACC 231—Analysis and Use of Accounting Reports (4)
Lecture—4 hours. Prerequisite(s): ACC 203 Restricted to students enrolled in the Master of Professional Accountancy degree program. Evaluation of complex financial accounting reports by managers and persons outside the firm, such as investors, creditors, and financial analysts. Topics include cash flow vs. income measurement, ratio and valuation analysis, and the effects of international accounting standards. Not open for credit to students who have completed any Management 272. Effective: 2015 Fall Quarter.

ACC 241—Auditing and the Accounting Profession (4)
Lecture—4 hours. Prerequisite(s): ACC 201; (MGT 200A or MGP 200A or MGB 200A) Restricted to Graduate School of Management students. Introduction to the audit environment, professional standards, the accounting profession, and the professional responsibilities of accountants. Integrate audit topics across the areas of financial, cost, tax and systems accounting. (S/U grading only.) Effective: 2015 Fall Quarter.

ACC 243—Auditing and Attestation Services (4)
Lecture—4 hours. Prerequisite(s): ACC 241 Restricted to graduate students in Graduate School of Management. Advanced treatment of the audit process and environment. Topics include audit planning and performance, evidence, internal controls, professional standards, and audit reports. Reviews, compilations and attestation services are examined, as are governmental agency audits. Effective: 2015 Fall Quarter.

ACC 251—Managerial Accounting and Controls (4)
Lecture—4 hours. Prerequisite(s): ACC 201; (MGT 200A or MGP 200A or MGB 200A) Restricted to graduate students in the Graduate School of Management. Analysis of management accounting systems including cost accounting, performance measurement, and compensation and reward systems. Focuses on the production of information useful for managerial decision-making, as well as the design of these systems. Not open for credit to students who have completed any Management 271. Effective: 2015 Fall Quarter.

ACC 253—Accounting Information and Control Systems (4)
Lecture—4 hours. Prerequisite(s): ACC 201; (MGT 200A or MGP 200A or MGB 200A) Restricted to graduate students in Graduate School of Management. Analysis of information systems used for accounting, recordkeeping, and control. Topics include the regulatory requirements of accounting control systems as well as their implementation and auditing considerations. Not open for credit to students who have taken any Management 271. Effective: 2015 Fall Quarter.

ACC 261—Communications for Professional Accountants (4)
Lecture—4 hours. Prerequisite(s): ACC 201; (MGT 200A or MGB 200A or MGP 200A) Restricted to graduate students in the Graduate School of Management. Overview of written and oral professional communications with an emphasis on structuring and documenting audits and reports, understanding audiences (investors, creditors, regulators, and other stakeholders), and consideration of ethical and regulatory responsibilities. Not open for credit to students who have taken any Management 268. Effective: 2015 Fall Quarter.

ACC 271—Accounting Ethics (4)
Lecture—4 hours. Prerequisite(s): ACC 201; (MGT 200A or MGP 200A or MGB 200A) Restricted to Graduate School of Management students. Analysis of accountants' professional responsibilities and ethics. Topics include the behavioral foundations of ethics in a business environment, how those elements affect accountants' integrity, objectivity, and independence. Professional standards related to accountants' conduct are also covered. Effective: 2016 Winter Quarter.

ACC 455—Audit Data Analytics (4)
Lecture—4 hours. Prerequisite(s): ACC 253 Analytical techniques and methods as related to the practice of financial statement auditing. Combines theory and the application of auditing professional standards including diagnosing problems and issues, analyzing relevant information, and reporting decision results and recommendations. Effective: 2018 Spring Quarter.

ACC 490—Topics in Accounting (1-4)
Lecture—1-4 hours. Contemporary and emerging issues in financial management accounting. Application of modern techniques of evaluation and analysis of financial information. Use of appropriate electronic database and research techniques. May be repeated for credit When topic differ, students can retake this course for credit. Effective: 2018 Spring Quarter.

AED Agricultural Education

Questions pertaining to the following courses should be directed to the instructor or Lynn Martindale; 530-754-6655.

Courses in AED:

AED 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Supervised internship off and on campus in areas of agricultural education. (P/NP grading only.) Effective: 1997 Winter Quarter.

AED 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

AED 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

AED 100—Concepts in Agricultural and Environmental Education (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Upper division standing. Philosophy and nature of formal and non-formal agricultural and environmental education programs. Emphasis on understanding the role of the teacher and observing a variety of programs. Effective: 1997 Winter Quarter.

AED 160—Vocational Education (3)
Lecture—3 hours. Philosophy and organization of vocational education, with particular reference to educational principles for agriculture commerce, home economics, and industry. Effective: 1997 Winter Quarter.

AED 171—Audiovisual Communications (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): Upper division standing. Theory and principles of audiovisual communications. Comparison of audiovisual materials such as transparencies, slides, computer- generated graphics, and videos. Operation and use of audiovisual equipment is stressed. Effective: 1997 Winter Quarter.

AED 172—Multimedia Productions (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): AED 171 recommended. Design and production of educational, technical, and professional multimedia presentations. Instructional or professional presentations using a variety of media, including slides, video, transparencies, and computer-generated graphics. Effective: 1997 Winter Quarter.

AED 190—Seminar in Agricultural Education (2)
Seminar—2 hours. Discussion of selected critical issues in agricultural education. May be repeated for credit with consent of instructor. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

AED 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Supervised internship off and on campus in areas of agricultural education. (P/NP grading only.) Effective: 1997 Winter Quarter.

AED 198—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

AED 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

AED 300—Directed Field Experience in Teaching (2)
Discussion—1 hour; Fieldwork—3 hours. Prerequisite(s): AED 100 Experience as teaching assistant in agriculture or home economics programs in public schools. May be repeated once for credit. May be repeated up to 1 time(s). (S/U grading only.) Effective: 1997 Winter Quarter.

AED 301—Planning for Instructional Programs (3)
Lecture—3 hours. Prerequisite(s): AED 100; AED 300 (can be concurrent) Major paradigms in program planning and development. Emphasis on key steps in curriculum development, including selection and organization of educational objectives, learning experiences and teaching materials and
resources. Effective: 1997 Winter Quarter.

AED 302—Teaching Methods in Agricultural Education (3)
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): AED 100; AED 300 (can be concurrent) Development of teaching strategies with special emphasis on the designing of learning experiences, instructional execution, and use of teaching aids in agricultural education. Effective: 1998 Fall Quarter.

AED 306A—Field Experience with Future Farmers of America and Supervised Experience Programs (4)
Fieldwork—6 hours; Lecture/Discussion—2 hours. Prerequisite(s): AED 306B (can be concurrent); Acceptance into a teacher education program. Develop an understanding of the Future Farmers of America and supervised occupational experience programs through planning, conducting, and evaluating actual programs. Effective: 1997 Winter Quarter.

AED 306B—Field Experience in Teaching Agriculture (5-18)
Variable. Prerequisite(s): AED 306A (can be concurrent); AED 100; AED 300; AED 301; AED 302; and Consent of Instructor. Acceptance into a teacher education program. Directed teaching including supervision of occupational experience programs and youth activities in secondary schools or community colleges. May be repeated for credit for maximum of 18 units. May be repeated up to 18 unit(s). Effective: 1997 Winter Quarter.

AED 323—Resource Development: Agricultural Education (3)
Lecture—3 hours. Prerequisite(s): AED 306A; AED 306B Selection and implementation of community resources in teaching. Effective: 1997 Winter Quarter.

AED 390—Seminar: Issues in Agricultural Education (2)
Discussion/Laboratory—4 hours. Prerequisite(s): AED 306A; AED 306B; Acceptance into a teacher education program. Discussion and evaluation of current issues, theories and research in agricultural education. (S/U grading only.) Effective: 1997 Winter Quarter.

AGC Agricultural & Environmental Chemistry (Graduate Group)

Courses in AGC:

AGC 290—Seminar (1)
Seminar—1 hour. Selected topics in agricultural and environmental chemistry, presented by students. (S/U grading only.) Effective: 1997 Winter Quarter.

AGC 298—Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. The chemistry and biochemistry of foods, nutritional chemicals, pesticides, and other special topics as they apply to agricultural and environmental chemistry. Effective: 1997 Fall Quarter.

AGC 299—Research (1-12)
Variable. Arrangements should be made well in advance with a faculty member of the Group in Agricultural and Environmental Chemistry. (S/U grading only.) Effective: 1997 Winter Quarter.

AHI Art History

Courses in AHI:

AHI 001A—Ancient Mediterranean Art (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the art and architecture of the ancient Mediterranean world, including Mesopotamia, Egypt, Greece, and Rome. GE credit: AH, VL, WC. Effective: 2002 Fall Quarter.

AHI 001B—Medieval and Renaissance Art (4)
Discussion—1 hour; Lecture—3 hours. Christian, Barbarian, Moslem, and Classical traditions in European
Art from the fourth through the sixteenth centuries. GE credit: AH, VL, WC. Effective: 1997 Winter Quarter.

AHI 001C—Baroque to Modern Art (4)
Discussion—1 hour; Lecture—3 hours. Introduction to visual analysis through study of western art 1600-present, examining major artists and movements from Europe to North America. Study of the relationship of art and artists to political, religious, social change, and to changes in ideology, patronage, audience. GE credit: AH, VL, WC. Effective: 2016 Winter Quarter.

AHI 001D—Arts of Asia (4)
Discussion—1 hour; Lecture—3 hours. Introduction to major forms and trends in the arts, architecture, and material culture of Asia from the Neolithic to the contemporary emphasizing the visual manifestation of secular and religious ideas and ideals. Not open for credit to students who have completed AHI 1DV. GE credit: AH, VL, WC. Effective: 2015 Winter Quarter.

AHI 001DY—Arts of Asia (5)
Discussion—1 hour; Lecture/Discussion—1.5 hours; Web Virtual Lecture—2.5 hours. Introduction to major forms and trends in the arts and material culture of Asia from the Neolithic to the contemporary, emphasizing the visual manifestation of secular and religious ideas and ideals. Not open for credit to students who have completed AHI 1D. GE credit: AH, VL, WC, WE. Effective: 2014 Spring Quarter.

AHI 001E—Islamic Art and Architecture (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the art and architecture of the Islamic world including the Middle East, Africa, Europe, and South Asia, from the 7th century CE to the 20th. GE credit: AH, VL, WC. Effective: 2006 Fall Quarter.

AHI 005—Understanding Visual Culture (4)
Discussion—1 hour; Lecture/Discussion—3 hours. Development of visual literacy for an increasingly visual world; critical analyses focusing on the widest variety of visual imagery: the fine arts across media and eras of world culture, television, film, and advertising. Intended for a diverse spectrum of audiences. GE credit: AH, VL, WC. Effective: 2015 Winter Quarter.

AHI 025—Understanding Architecture (4)
Discussion—1 hour; Lecture—3 hours. Development of architecture and urban design; how form, space, order are conceived and used across eras and cultures. Examines the function and organization of space, technological problems of construction, visual qualities of architecture, and social issues connected to architecture. GE credit: AH, DD, VL, WC. Effective: 2014 Fall Quarter.

AHI 098—Directed Group Study (1-5)
Discussion—1-5 hours. Prerequisite(s): Consent of Instructor. Restricted to lower division students. Directed Group Study (P/NP grading only.) Effective: 1997 Winter Quarter.

AHI 099—Special Study for Undergraduates (1-5)
Discussion—1-5 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

AHI 100—Methods of Art History (4)
Extensive Writing/Discussion—3 hours; Term Paper. Prerequisite(s): Prior completion of two upper-division Art History courses recommended. Methods of art historical research and analysis, and general issues in critical thought. Writing skills appropriate to a range of art-historical exposition. GE credit: AH, VL. Effective: 2016 Fall Quarter.

AHI 110—Cultural History of Museums (4)
Lecture/Discussion—3 hours; Term Paper. Evolution of museums in the western world from the "cabinet of curiosities" of sixteenth-century Europe to the modern "art center." The changing motives behind collecting, exhibiting, and interpretation of objects. Attention to museums' historical legacies and continuing philosophical dilemmas. GE credit: AH, VL, WC, WE. Effective: 2014 Fall Quarter.

AHI 120A—Art, Architecture, and Human Rights (4)
Lecture/Discussion—4 hours. Study of human rights as they relate to art, architecture, and cultural heritage. Examines museums, art collections, and cultural-heritage management, their relation to the cultural prerogatives of communities and indigenous groups, and protection of cultural heritage during war and conflict. (HMR 120A.) GE credit: AH, DD, SS, VL, WC, WE. Effective: 2014 Fall Quarter.

AHI 121—Politics of Public Art (4)
Lecture/Discussion—4 hours. Politics of public art. Role of contemporary artists, public monuments, urban spaces, the movie industry, photography, propaganda art, and comics in construction of political ideologies and collective identities. GE credit: AH, VL, WE. Effective: 2018 Winter Quarter.

AHI 122—Sex and Space (4)
Lecture/Discussion—4 hours. Relationship between space and sexuality. Sexual metaphors in art and architecture, gender identity formation via images and space. Diverse intersections of sexuality and art history. GE credit: AH, DD, VL, WE. Effective: 2016 Fall Quarter.

AHI 130—Landscape, Nature, and Art (4)
Lecture—3 hours; Term Paper. Interpretation of the natural world in the western world 1600-1900, with perspectives on the present; landscape painting, ideology of picturesque and sublime, landscape art and travel, reshaping the land as art; dialogues between art and science; nature as national identity. GE credit: AH, VL, WC, WE. Effective: 2014 Fall Quarter.

AHI 148—Theory and Criticism: Painting & Sculpture (4)
Lecture—3 hours; Term Paper. Prerequisite(s): ART 005 or 007 recommended. Study of forms and symbols in historic and contemporary masterpieces. (ART 148.) GE credit: AH, VL, WE. Effective: 2017 Winter Quarter.

AHI 150—Arts of Subsaharan Africa (4)
Lecture/Discussion—3 hours; Term Paper. Traditional arts and crafts of subsaharan Africa from prehistoric times to the present; the relationships among art, nature, cycles of life, and religion; art as expression of power; sculpture and culture in West and Central Africa; Colonialism and collecting. GE credit: AH, VL, WC. Effective: 2015 Winter Quarter.

AHI 151—Arts of the Indians of the Americas (4)
Lecture/Discussion—3 hours; Term Paper. Development of art in North America, emphasizing ancient Mexico. South American relationships and parallels. Recent and contemporary Indian arts and crafts from Alaska to Chile. GE credit: AH, VL, WE. Effective: 2015 Spring Quarter.

AHI 152—Arts of Oceania and Prehistoric Europe (4)
Lecture—3 hours; Term Paper. Traditional arts of aboriginal Australia, Melanesia, Polynesia, and Micronesia, as seen in their cultural contexts. Prehistoric art of Europe and the Near East. GE credit: AH, VL, WC. Effective: 1997 Winter Quarter.

AHI 154—The Hindu Temple (4)
Lecture—3 hours; Term Paper. Comparative history of architecture and symbolism of the Hindu Temple in India, Southeast Asia and the United States. Attention to the temple as expression of religious knowledge, political authority, and cultural heritage through the lens of colonialism and postcolonialism. (REL 154.) GE credit: AH, SS, VL, WC, WE. Effective: 2015 Fall Quarter.

AHI 155—The Islamic City (4)
Lecture—3 hours; Term Paper. Prerequisite(s): AHI 001E recommended. Introduction to the urban history of the Islamic world. Critical study of the historiography of the Islamic city, development of urban form, institutions and rituals, and analysis of selected themes. GE credit: AH, SS, VL, WC. Effective: 2016 Spring Quarter.

AHI 156—Arts of the Islamic Book (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Prior completion of AHI 001E recommended. Critical study of the arts of the luxury book in the pre-modern Islamic world. Representation in Islam, the relationship of word and image, the discipline of calligraphy, aesthetics and representation in Persianate painting. GE credit: AH, VL, WC. Effective: 2016 Spring Quarter.

AHI 163A—Early Chinese Art (4)
Lecture/Discussion—4 hours. Thematic and chronological examination of 3000 years of Chinese art and culture from Neolithic through Tang Dynasty (10th c. CE). Study of ceremonial and secular objects manifesting folk beliefs and belief systems of ancestor worship, Buddhism, Daoism, and Confucianism. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

AHI 163B—Chinese Painting (4)
Lecture/Discussion—4 hours. Thematic and chronological examination of Chinese painting and culture from the Tang Dynasty (7th c. CE) through the early 20th century. Issues considered include political art (made to support or protest regimes), art and the market, art and individual expression. GE credit: AH, VL, WC, WE. Effective: 2015 Winter Quarter.

AHI 163C—Early Modern Chinese Painting (4)
Lecture/Discussion—4 hours. Topics in Chinese Art History, 13th-19th century. Study of issues pertaining to self and society; gender and gendering; religion and philosophy; political engagement and protest; economy and the market; the effects created by periods of transition on visual expression. GE credit: AH, VL, WC, WE. Effective: 2014 Fall Quarter.

AHI 163D—Art from China 1900 to the Present (4)
Lecture/Discussion—4 hours. Forms of modern and avant-garde expression from China's industrialization to the 21st century. Interactions of art and politics, individual and state, art for the free market versus art for the state, expressions of modernity; China on the world stage. GE credit: AH, VL, WC, WE. Effective: 2017 Spring Quarter.

AHI 164—The Arts of Japan (4)
Lecture/Discussion—3 hours; Term Paper. Japan’s painting, architecture, decorative arts, and print heritage, ancient times to the 20th century in literary, political, intellectual, and spiritual contexts; impact of Japanese art on the West and the West’s transformative impact upon Japan’s opening in the 19th century. GE credit: AH, VL, WC. Effective: 2016 Winter Quarter.

AHI 168—Great Cities (4)
Lecture—3 hours; Term Paper. Transformation in architecture and urban form in Paris, London, and Vienna in the context of varying social, political, and economic systems as well as very different cultural traditions, concentrating on the years 1830-1914. GE credit: AH, VL, WE. Effective: 1997 Winter Quarter.

AHI 172A—Early Greek Art and Architecture (4)
Lecture—3 hours; Term Paper. Examination of the origin and development of the major monuments of Greek art and architecture from the eighth century to the mid-fifth century B.C. (CLA 172A.) GE credit: AH, VL, WE. Effective: 2015 Fall Quarter.

AHI 172B—Later Greek Art and Architecture (4)
Lecture—3 hours; Term Paper. Study of the art and architecture of later Classical and Hellenistic Greece, from the mid-fifth century to the first century B.C. (CLA 172B.) GE credit: AH, VL. Effective: 2015 Fall Quarter.

AHI 173—Roman Art and Architecture (4)
Lecture—3 hours; Term Paper. Art and architecture of Rome and the Roman Empire, from the founding of Rome through the fourth century C.E. (CLA 173.) GE credit: AH, VL, WE. Effective: 2014 Fall Quarter.

AHI 175—Architecture and Urbanism in Mediterranean Antiquity (4)
Extensive Writing; Lecture—3 hours. Architecture and urban development in the ancient Near East, Greece, and Rome. Special emphasis on the social structure of the ancient city as expressed in its architecture, and on the interaction between local traditions and the impact of Greco-Roman urbanism. (CLA 175.) GE credit: AH, VL, WC, WE. Effective: 2017 Spring Quarter.

AHI 176A—Art of the Middle Ages: Early Christian and Byzantine Art (4)
Lecture—3 hours. Term paper or gallery studies and review. Painting, sculpture and architecture of the early Christian era and Byzantine Empire: through the later Roman Empire in the West and to the final capture of Constantinople in the East. GE credit: AH, VL, WC, WE. Effective: 1997 Winter Quarter.

AHI 176B—Art of the Middle Ages: Early Medieval and Romanesque Art (4)
Lecture—3 hours. Term paper or gallery studies and review. Painting, sculpture and architecture of western Europe in the early medieval era: from the rise of the barbarian kingdoms through the twelfth century. GE credit: AH, VL, WC, WE. Effective: 1997 Winter Quarter.

AHI 176C—Art of the Middle Ages: Gothic (4)
Lecture—3 hours. Term paper or gallery studies and review. Painting, sculpture and architecture in northern Europe from the twelfth through the fifteenth centuries. GE credit: AH, VL, WC, WE. Effective: 1997 Winter Quarter.

AHI 177—Northern Renaissance Art (4)
Lecture/Discussion—3 hours; Term Paper. Artistic culture of Western and Central Europe c. 1350-1600. Topics include the development of "realism" in portraiture and landscape, prints and print culture, urbanism, science and the exotic, anti-religious artworks, religious attacks on art, contacts with Renaissance Italy. GE credit: AH, VL, WC, WE. Effective: 2015 Spring Quarter.

AHI 178B—Early Italian Renaissance Art and Architecture (4)
Lecture—3 hours; Term Paper. Fifteenth-century artists, with a focus on Florence; Donatello and Masaccio through Botticelli, in their artistic, architectural, and cultural setting; the impact of Humanism and the rebirth of classical learning. GE credit: AH, VL, WE. Effective: 2014 Fall Quarter.

AHI 178C—High and Late Italian Renaissance Art and Architecture (4)
Lecture—3 hours; Term Paper. High Renaissance and Mannerism in 16th-century Italy: Leonardo, Michelangelo, Raphael, and Titian in their artistic and cultural settings—Florence, Rome, and Venice; the architecture of Bramante, Michelangelo, and Palladio. GE credit: AH, VL, WE. Effective: 2014 Fall Quarter.

AHI 179B—Baroque Art (4)
Lecture—3 hours; Term Paper. Seventeenth-century painting, sculpture and graphic arts, including such artists as Caravaggio, Rubens, Rembrandt, and Velázquez in their political and social context. GE credit: AH, VL, WE. Effective: 2015 Winter Quarter.

AHI 182—British Art and Culture (1750-1900) (4)
Lecture—3 hours; Term Paper. British painting in relation to the position of women in society and the rise of the middle-class art market. Topics covered Hogarth and popular culture, Queen Victoria and the female gaze, and Pre-Raphaelite artists and collectors. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

AHI 183A—Art in the Age of Revolution, 1750-1850 (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Prior completion of AHI 001C recommended. Emergence of modernism in Europe from the late l8th century to the middle of the l9th century. Major artistic events viewed against a revolutionary backdrop of changing attitudes toward identity, race, and gender. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

AHI 183B—Impressionism and Post-Impressionism: Manet to 1900 (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Prior completion of AHI 001C recommended. Innovations of Impressionists, Post-Impressionists, and Symbolists in relation to social changes. Assessment of role of dealers and critics, myth of the artist-genius, and gender relations in French art and culture of the late 1800s. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

AHI 183C—Modernism in France, 1880-1940 (4)
Lecture—3 hours; Term Paper. Development of modern art in France, its social context, and its transnational aspects. Post-Impressionism, Fauvism, Cubism, Expressionism, and Surrealism are considered in relation to secessionist movements, the formation of other artistic groups, new forms of patronage, and new audiences. GE credit: AH, VL, WC, WE. Effective: 2015 Winter Quarter.

AHI 184—Twentieth Century Architecture (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Prior completion of AHI 025 recommended. Major movements in architecture of the twentieth century in Europe and America. Formal innovations are examined within the social, political, and economic circumstances in which they emerged. GE credit: AH, VL, WE. Effective: 2016 Spring Quarter.

AHI 185—Avant-Gardism and its Aftermath, 1917-1960 (4)
Lecture/Discussion—4 hours. Social, cultural, aesthetic, and theoretical development for artists and their audiences in the context of larger issues like the Mexican, Russian and German revolutions, WWI, the Depression, WWII, etc., and a critical-theoretical inquiry into questions of modernism, modernity, and avant-gardism. GE credit: AH, VL, WC. Effective: 2016 Spring Quarter.

AHI 186—Contemporary Art 1960-Present (4)
Lecture/Discussion—4 hours; Term Paper. Development of new media and aesthetics in the context of such cultural and political phenomena as the New Left, feminism, and globalization; investigation of the critical-theoretical questions of neo avant-gardism, postmodernism, and postmodernity. GE credit: ACGH, AH, VL, WE. Effective: 2014 Fall Quarter.

AHI 187—Contemporary Architecture (4)
Lecture—3 hours; Term Paper. Introduction to world architecture and urban design since circa 1966. Relation of influential styles, buildings, and architects to postmodern debates and to cultural, economic, technological and environmental change. GE credit: AH, VL, WE. Effective: 2017 Spring Quarter.

AHI 188A—The American Home (4)
Lecture/Discussion—4 hours; Term Paper. American domestic architecture and its responsiveness to changes in daily life from Colonial times to the 1960s. Vernacular developments, effects of different socioeconomic conditions, and women's role in shaping the home receive special attention. GE credit: ACGH, AH, DD, VL, WE. Effective: 2014 Fall Quarter.

AHI 188B—Architecture of the United States (4)
Lecture/Discussion—3 hours; Term Paper. Major movements from colonial times to the present. The role of buildings in a changing American society, the interplay of styles with technologies of construction, relationship between American and European developments and evolution of the architectural and planning professions. GE credit: ACGH, AH, VL, WE. Effective: 2015 Winter Quarter.

AHI 188C—American Art to 1910 (4)
Lecture/Discussion—4 hours; Term Paper. Major movements in American art from the 17th-century English-speaking colonies to the onset of World War I. GE credit: ACGH, AH, VL, WE. Effective: 2014 Fall Quarter.

AHI 189—Photography in History (4)
Lecture/Discussion—4 hours. Social, cultural, aesthetic and technical developments in the history of photography including patronage and reception, commercial, scientific, political and artistic applications, and a critical-theoretical inquiry into photography's impact on the social category "art" and the history of subjectivity. GE credit: AH, VL. Effective: 2016 Spring Quarter.

AHI 190A—Undergraduate Seminar in Art History: Mediterranean Antiquity (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated up to 2 time(s) when topic differs. GE credit: AH, OL, VL, WE. Effective: 2014 Fall Quarter.

AHI 190B—Undergraduate Seminar in Art History: Medieval (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated up to 2 time(s) when topic differs. GE credit: AH, OL, VL, WE. Effective: 2014 Fall Quarter.

AHI 190C—Undergraduate Seminar in Art History: Renaissance (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated up to 2 time(s) when topic differs. GE credit: AH, OL, VL, WE. Effective: 2014 Fall Quarter.

AHI 190D—Undergraduate Seminar in Art History: American (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated up to 2 time(s) when topic differs. GE credit: AH, OL, VL, WE. Effective: 2014 Fall Quarter.

AHI 190E—Undergraduate Seminar in Art History: Gendering of Culture (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated up to 2 time(s) when topic differs. GE credit: OL, VL, WE. Effective: 2014 Fall Quarter.

AHI 190F—Undergraduate Seminar in Art History: Chinese (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated up to 2 time(s) when topic differs. GE credit: AH, OL, VL, WE. Effective: 2014 Fall Quarter.

AHI 190G—Undergraduate Seminar in Art History: Japanese (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated up to 2 time(s) when topic differs. GE credit: AH, OL, VL, WE. Effective: 2014 Fall Quarter.

AHI 190H—Undergraduate Seminar in Art History: Modern-Contemporary (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Art History major, minor or other significant training recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated up to 2 time(s) when topic differs. GE credit: AH, OL, VL, WE. Effective: 2014 Fall Quarter.

AHI 190I—Undergraduate Seminar in Art History: 17th-18th Century (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated up to 2 time(s) when topic differs. GE credit: AH, OL, VL, WE. Effective: 2014 Fall Quarter.

AHI 190J—Undergraduate Seminar in Art History: Islamic (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated up to 2 time(s) when topic differs. GE credit: AH, OL, VL, WE. Effective: 2014 Fall Quarter.

AHI 190K—Undergraduate Seminar in Art History: 19th Century (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated up to 2 time(s) when topic differs. GE credit: AH, OL, VL, WE. Effective: 2014 Fall Quarter.

AHI 190L—Undergraduate Seminar in Art History: Architecture & Heritage (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated up to 2 time(s) when topic differs. GE credit: AH, OL, VL, WE. Effective: 2014 Fall Quarter.

AHI 192—Internship (2-12)
Internship. Supervised program of internships at professional art institutions such as museums, galleries, and art archives including collections of slides and photographs. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

AHI 194H—Special Study for Honor Students (4)
Independent Study—12 hours. Prerequisite(s): AHI 190; Or the equivalent, as determined by the major advisor. Open only to students in the Art History Honors Program. Independent study of an art historical problem culminating in the writing of an honors thesis under the supervision of a faculty guidance committee. Effective: 1997 Winter Quarter.

AHI 198—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

AHI 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

AHI 200A—Visual Theory and Interpretive Methods (4)
Discussion—3 hours; Extensive Writing—1 hour. Close study of selected recent developments in interpretive methodology used by art historians and other analysts of visual culture and the place of those developments within art history's history and in the larger field of social, cultural and historical analysis. May be repeated up to 1 time(s). Effective: 2000 Fall Quarter.

AHI 200B—Research and Writing Methods in Art History (4)
Discussion—3 hours; Term Paper. Restricted to graduate students in Art History. Development of the research, writing, and editing skills necessary for producing publishable work. Focus on reference tools used by art historians and the mechanics of scholarship, from question framing and organization of ideas to writing clear, effective prose. Effective: 2001 Winter Quarter.

AHI 200C—Thesis Writing Colloquium (1)
Auto Tutorial; Discussion—1.5 hours. Prerequisite(s): AHI 200B; Taken by all Art History M.A. students in their first year. Restricted to graduate students in Art History. Meeting concurrently with course 200B, the colloquium provides a structured, supportive environment for second-year Art History graduate students drafting masters' theses. Offers a forum for technical discussions, discussion of writing/editing procedures, and peer review of writing in progress. (S/U grading only.) Effective: 2008 Summer Session 1.

AHI 210—Museums, Art Exhibitions and Culture (4)
Extensive Writing/Discussion; Seminar—3 hours; Term Paper. Prerequisite(s): Graduate status in art history or an allied field. Class size limited to 20 students. Issues accompanying the evolution and function of museums from cabinets of curiosities in sixteenth-century Europe to modern art centers. Examination of divergent motives behind collecting, exhibiting, and interpretation of objects. Investigation of museums' historical legacies and continuing philosophical dilemmas. Effective: 2015 Winter Quarter.

AHI 250—Problems in Art Historical Research (4)
Seminar—3 hours; Term Paper. Major topics in art historical research, emphasizing special methods of
investigation, and of historical and critical analysis. May be repeated for credit. Effective: 1997 Winter Quarter.

AHI 254—Seminar in Classical Art (4)
Seminar—3 hours; Term Paper. Selected areas of special study in classical art of the Greek and Roman tradition. Course may be repeated for credit with consent of instructor. May be repeated for credit / with consent of instructor. Effective: 1997 Winter Quarter.

AHI 263—Seminar in Chinese Art (4)
Seminar—3 hours; Term Paper. Selected areas of special study in Chinese Art. May be repeated for credit with consent of instructor. May be repeated for credit /with consent of instructor. Effective: 1997 Winter Quarter.

AHI 276—Seminar in Medieval Art (4)
Seminar—3 hours; Term Paper. Selected areas of special study in medieval art from Early Christian to
late Gothic. May be repeated for credit with consent of instructor. May be repeated for credit /with consent of instructor. Effective: 1997 Winter Quarter.

AHI 278—Seminar in Italian Renaissance Art (4)
Seminar—3 hours; Term Paper. Selected areas of special study in Italian art from the fourteenth to the sixteenth century. May be repeated for credit with consent of instructor. Effective: 1997 Winter Quarter.

AHI 283—Seminar in Visual Culture and Gender (4)
Seminar—3 hours; Term Paper. Selected areas of special study in the relationship between visual culture and gender in Europe and America from 1750 to present. May be repeated for credit with consent of instructor. May be repeated for credit /with consent of instructor. Effective: 2000 Fall Quarter.

AHI 288—Seminar in European and American Architecture (4)
Seminar—3 hours; Term Paper. Exploration of selected topics in European and American architectural
history with concentration on the Modern Period. May be repeated for credit with consent of instructor. May be repeated for credit /with consent of instructor. Effective: 1997 Winter Quarter.

AHI 290—Special topics in Art History (4)
Seminar—3 hours; Term Paper. Special research seminar in the theory or methods of Art History, or in a period of Art History. Topic will vary depending on the interests of the instructor or students. May be repeated for credit topic differs and with consent of instructor. Effective: 2002 Fall Quarter.

AHI 292—Internship (1-4)
Internship—3-12 hours. Prerequisite(s): Consent of Instructor. Graduate student. Restricted to graduate students in Art History only. Supervised internship at professional art or cultural institution including museum, galleries, archives, government offices, visual resources libraries, etc. May be repeated up to 8 unit(s). (S/U grading only.) Effective: 2007 Fall Quarter.

AHI 298—Directed Group Study (1-5)
Seminar. May be repeated for credit. (S/U grading only.) Effective: 2002 Winter Quarter.

AHI 299—Individual Study (1-6)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

AHI 390—Introduction to Teaching Art History for Teaching Assistants (1)
Discussion—1 hour. Designed for teaching assistants with emphasis on problems and procedures encountered by teachers of undergraduate art history. (S/U grading only.) Effective: 1997 Winter Quarter.

AHI 396—Teaching Assistant Training Practicum (1-4)
Practice; Seminar. Prerequisite(s): Graduate standing. May be repeated for credit. (S/U grading only.) Effective: 2008 Summer Session 1.

AHI 401—Museum Training: Curatorial Principles (4)
Seminar—3 hours. Approved for graduate degree credit. Study of private and public collections. Museum personalities. Appraisal of works of art; appraisal ethics. Auction and sales: methods and catalogues. Registration. Museum technical problems. Connoisseurship. Collateral reading. Visits to museums. Seminar with assigned papers. Effective: 1997 Winter Quarter.

AHI 402—Museum Training: Exhibition Methods (4)
Seminar—3 hours. Approved for graduate degree credit. History of exhibition methods in private and public collections. Comparisons of different types of museums and their exhibition problems. Lighting and techniques of display with emphasis on actual design. Experimentation with unusual presentation forms. Effective: 1997 Winter Quarter.

AMS American Studies

Courses in AMS:

AMS 001A—Science and American Culture (4)
Discussion—1 hour; Lecture—3 hours. American science as a cultural system. Mutual influence and interaction of that system with other cultural systems including religion, social thought, art, architecture, literature, music, and common sense. GE credit: ACGH, DD, WE. Effective: 2002 Spring Quarter.

AMS 001B—Religion in American Lives (4)
Discussion—1 hour; Lecture—3 hours. Religions and spiritual practices in the Unisted States, and their interrelationships with other aspects of U.S. history, society and culture; indigenous and imported faiths, and the impact of immigration, colonization and culture contact on religious systems. GE credit: ACGH, AH, DD, SS, WE. Effective: 1997 Winter Quarter.

AMS 001C—American Lives Through Autobiography (4)
Discussion—1 hour; Lecture—3 hours. American culture as understood through the individual life stories told by Americans, with attention to the roles of gender, race, ethnicity, social class, and sexual orientation in the individual's life course. GE credit: ACGH, AH, DD, SS, WE. Effective: 2003 Winter Quarter.

AMS 001E—Nature and Culture in America (4)
Discussion—1 hour; Lecture—3 hours. Uses and abuses of nature in America; patterns of inhabitation, exploitation, appreciation, and neglect; attention to California; emphasis on metaphor as a key to understanding ourselves and the natural world; attention to models of healing: stewardship, ecology, the "rights" movement. GE credit: ACGH, AH, DD, SS, WE. Effective: 2012 Spring Quarter.

AMS 004—Freshman Seminar (2)
Seminar—2 hours. Prerequisite(s): Open only to students who have completed fewer than 40 quarter units. Class size limited to 25 students. Investigation of a special topic in American Studies through shared readings, discussions, written assignments, and special activities (such as fieldwork, site visits). Emphasis on student participation in learning. Effective: 1997 Winter Quarter.

AMS 005—Technology in American Lives (4)
Discussion—2 hours; Lecture—2 hours. Technology as both a material cultural force and a symbol in American
culture; the lives of engineers at work and play; images of the engineer and technology in popular culture; social political and ethical issues raised by technology. GE credit: AH, SS, WE. Effective: 2016 Fall Quarter.

AMS 010—Introduction to American Studies (4)
Discussion—1 hour; Lecture—3 hours. United States history, culture and society. Examination of cultural objects and social practices. Topics include popular culture (film, TV, Internet), cultural diversity, social activism, play, and communication. GE credit: ACGH, AH, DD, SS, WE. Effective: 2003 Spring Quarter.

AMS 021—Objects and Everyday Life (4)
Discussion—1 hour; Lecture—3 hours; Term Paper. Material culture (objects and artifacts ranging from everyday objects like toys and furnishings to buildings and constructed landscapes) as evidence for understanding the everyday (vernacular) lives (gender, social class, ethnicity, region, age, and other factors; collecting and displaying material. GE credit: ACGH, AH, DD, WE. Effective: 2016 Fall Quarter.

AMS 025—United States as a Business Culture (4)
Discussion—1 hour; Lecture—3 hours. Business as a cultural system and its relation to religion, politics, arts, science, technology, and material culture; business themes of success, creativity, invention, and competition in American autobiographies, fiction, advice literature, film, and television; cultures of the workplace; multinational business. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

AMS 030—Images of America and Americans in Popular Culture (4)
Discussion—1 hour; Lecture—3 hours. Investigation of verbal and visual discourses about American identity in various popular culture products, including film, television, radio, music, fiction, art, advertising, and commercial experiences; discourses about the United States in the popular culture of other societies. GE credit: ACGH, AH, DD, SS, WE. Effective: 1997 Winter Quarter.

AMS 055—Food in American Culture (4)
Discussion—1 hour; Lecture—3 hours. Relationship between food and culture; relationship between food and the social order; influences on eating habits and the tensions between them including identity, convenience, and responsibility; multiple disciplines and genres. (FST 055.) GE credit: ACGH, AH, DD, SS, WE. Effective: 2018 Winter Quarter.

AMS 059—Music and American Culture (4)
Discussion—1 hour; Lecture—3 hours. Examination of music and American culture. Studies will explore music in its cultural contexts, which may include examinations of recording and broadcasting, of race, class, and gender, the role of technolgy, and relationships between musical production, consumption and listening. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

AMS 095—Careers and Identity in American Culture (2)
Discussion—1 hour; Lecture—1 hour. Defining one's identity through the career. The life course, preparation, and choices. Personality and career. Ethics. Gender, ethnicity, sexuality, and social class in the workplace. The transnational workplace. Conflicts between the career and other social roles. Effective: 2007 Summer Quarter.

AMS 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

AMS 099—Individual Study for Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

AMS 100—Methods in American Studies (4)
Lecture/Discussion—3 hours; Term Paper. Design and implementation of interdisciplinary research, analysis and writing for American Studies and other cultural studies fields. Library and Internet research skills, project/problem definition, methods for study of texts, individuals, communities. Hand-on, skill-building, focused reading, discussion. Effective: 2008 Fall Quarter.

AMS 101A—Special Topics: Popular Culture Studies (4)
Seminar—3 hours. Intensive reading, writing, and special projects. Interdisciplinary group study of special topics in American Culture Studies, designed for non-majors as well as majors. May be repeated for credit. Effective: 1997 Winter Quarter.

AMS 101B—Special Topics: Women's Studies (4)
Seminar—3 hours. Intensive reading, writing, and special projects. Interdisciplinary group study of special topics in American Culture Studies, designed for non-majors as well as majors. May be repeated for credit. Effective: 1997 Winter Quarter.

AMS 101C—Special Topics: Material Aspects of American Culture (4)
Seminar—3 hours. Intensive reading, writing, and special projects. Interdisciplinary group study of special topics in American Culture Studies, designed for non-majors as well as majors. May be repeated for credit. Effective: 1997 Winter Quarter.

AMS 101E—Special Topics: American Lives Through Autobiography (4)
Seminar—3 hours. Intensive reading, writing, and special projects. Interdisciplinary group study of special topics in American Culture Studies, designed for non-majors as well as majors. May be repeated for credit. Effective: 1997 Winter Quarter.

AMS 101F—Special Topics: Interrelationship Between Arts and Ideas (4)
Seminar—3 hours. Intensive reading, writing, and special projects. Interdisciplinary group study of special topics in American Culture Studies, designed for non-majors as well as majors. May be repeated for credit. Effective: 1997 Winter Quarter.

AMS 101G—Special Topics: New Directions in American Culture Studies (4)
Seminar—3 hours. Intensive reading, writing, and special projects. Interdisciplinary group study of special topics in American Culture Studies, designed for non-majors as well as majors. May be repeated for credit. Effective: 1997 Winter Quarter.

AMS 101H—Special Topics: Problems in Cross-Cultural American Studies (4)
Seminar—3 hours. Intensive reading, writing, and special projects. Interdisciplinary group study of special topics in American Culture Studies, designed for non-majors as well as majors. May be repeated for credit. Effective: 1997 Winter Quarter.

AMS 110—A Decade in American Civilization (4)
Discussion—2 hours; Lecture—2 hours. Close examination of a single decade in American civilization; the connections between the history, literature, arts, customs, and ideas of Americans living in the decade. Issues and representations of race,class,gender,age,and sexuality in the decade. May be repeated for credit if decades studied are different. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Spring Quarter.

AMS 125—Corporate Cultures (4)
Discussion—1 hour; Fieldwork—1 hour; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Exploration of the small group cultures of American corporate workplaces, including the role of environment, stories, jokes, rituals, ceremonies, personal style, and play. The effects of cultural diversity upon corporate cultures, both from within and in contact with foreign corporations. Effective: 2016 Spring Quarter.

AMS 130—American Popular Culture (4)
Fieldwork—1 hour; Lecture/Discussion—3 hours. American popular expression and experience as a cultural system, and the relationship between this system and elite and folk cultures. Exploration of theories and methods for discovering and interpreting patterns of meaning in American popular culture. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Spring Quarter.

AMS 139—Feminist Cultural Studies (4)
Lecture/Discussion—4 hours. Histories, theories, and practices of feminist traditions within cultural studies. (WMS 139.) GE credit: ACGH, AH, DD, SS, VL, WE. Effective: 2016 Fall Quarter.

AMS 151—American Landscapes and Places (4)
Discussion—1 hour; Fieldwork—3 hours; Lecture—2 hours. Comparative study of several American cultural populations inhabiting a region, including their relationship to a shared biological, physical, and social environment, their intercultural relations, and their relationships to the dominant American popular and elite culture and folk traditions. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Spring Quarter.

AMS 152—The Lives of Children in America (4)
Discussion—2 hours; Lecture—2 hours. Experience of childhood and adolescence in American culture, as understood through historical, literary, artistic, and social scientific approaches. GE credit: ACGH, AH, DD, SS, WE. Effective: 1997 Winter Quarter.

AMS 153—The Individual and Community in America (4)
Discussion—2 hours; Lecture—2 hours. Interdisciplinary examination of past and present tensions between the individual and the community in American experience, as those tensions are expressed in such cultural systems as folklore, public ritual, popular entertainment, literature, fine arts, architecture, and social thought. GE credit: ACGH, AH, DD, SS, WE. Effective: 1997 Winter Quarter.

AMS 154—The Lives of Men in America (4)
Discussion—2 hours; Lecture—2 hours. Interdisciplinary examination of the lives of boys and men in America, toward understanding cultural definitions of masculinity, the ways individuals have accepted or resisted these definitions, and the broader consequences of the struggle over the social construction of gender. GE credit: ACGH, AH, DD, SS, WE. Effective: 1997 Winter Quarter.

AMS 155—Eating in America (4)
Fieldwork; Lecture—3 hours. Interdisciplinary examination of the culture of food in America. Exploration of eating as a richly symbolic event integral to how Americans express and negotiate values, politics and identity. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

AMS 156—Race, Culture and Society in the United States (4)
Discussion—2 hours; Lecture—2 hours. Interdisciplinary examination of the significance of race in the making of America; how race shapes culture, identities and social processes in the United States; the interweaving of race with gender, class and nationhood in self and community. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Spring Quarter.

AMS 157—Animals in American Culture (4)
Discussion—1 hour; Lecture—3 hours. Animals as symbols in American thought, as found in folklore, popular culture, literature, and art; customs and stories around human-animal interactions, including hunting, religion, foodways, pets, zoos, circuses, rodeos, theme parks, and scientific research on animals. GE credit: ACGH, AH, DD, SS, WE. Effective: 2000 Fall Quarter.

AMS 158—Technology and the Modern American Body (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): TCS 001; (AMS 001A or AMS 005) The history and analysis of the relationships between human bodies and technologies in modern society. Dominant and eccentric examples of how human bodies and technologies influence one another and reveal underlying cultural assumptions. (TCS 158.) GE credit: ACGH, AH, WE. Effective: 2003 Fall Quarter.

AMS 160—Undergraduate Seminar in American Studies (4)
Seminar—3 hours; Term Paper. Pass One restricted to American Studies majors; limited enrollment. Intensive reading, discussion, research, and writing by small groups in selected topics of American Studies scholarship; emphasis on theory and its application to American material. May be repeated up to 1 time(s) when content differs. Effective: 2017 Winter Quarter.

AMS 190A—Senior Thesis Research Seminar (4)
Extensive Writing; Seminar—2 hours. Research and prospectus writing for senior thesis. Effective: 2016 Spring Quarter.

AMS 190B—Senior Thesis (4)
Independent Study—12 hours. Prerequisite(s): AMS 190A; Consent of Instructor. In consultation with advisor, student writes an extended research paper on a topic proposed in course 190A. Effective: 2016 Fall Quarter.

AMS 192—Internship in American Institutions (1-12)
Internship—1-12 hours. Prerequisite(s): Consent of Instructor. Enrollment dependent on availability of intern positions, with priority to American Studies majors. Supervised internship and study within and about key organizations in American civilization at archives, museums, schools, historical societies, governmental and social agencies, etc., with attention to the techniques of participant obersvation and the collection of ethnographical data. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

AMS 197T—Tutoring in American Studies (1-5)
Tutorial—1-5 hours. Prerequisite(s): Consent of Chairperson of American Studies Program. Tutoring in lower division American Studies courses, usually in small discussion groups. Periodic meetings with the instructor in charge; reports and readings. May be repeated for credit when the tutoring is for a different course. (P/NP grading only.) Effective: 1997 Winter Quarter.

AMS 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

AMS 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of instructor and chairperson of American Studies Program. (P/NP grading only.) Effective: 1997 Winter Quarter.

AMS 220—American Folklore and Folklife (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Theory and methods for the study of the folklore and the folk customary behavior of Americans; contributions of folklore studies to scholarship in humanities and social science disciplines. Effective: 1997 Winter Quarter.

AMS 250—Cultural Study of Masculinities (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Interdisciplinary approaches to understanding the social and cultural construction of masculinities; attention to the effects of biology, gender, race, class, sexual and national identities; criticism of oral, printed, visual, and mass mediated texts, and of sicial relations and structure. (WMS 250.) Effective: 1997 Winter Quarter.

AMS 255—Food in American Culture (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Graduate standing or advanced undergraduate with consent of instructor. Interdisciplinary theories and methods for the study of food in American culture; food studies in relation to issues of identity (age, gender, ethnicity, religion, region, etc.), social relations, systems of production, and cultures of consumption. Effective: 2007 Fall Quarter.

AMS 298—Group Study (1-5)
Variable—1-5 hours. (P/NP grading only.) Effective: 1997 Winter Quarter.

AMS 299—Individual Study (1-12)
Variable—1-12 hours. (P/NP grading only.) Effective: 1997 Winter Quarter.

AMS 396—Teaching Assistant Training Practicum (1-4)
Variable—1-4 hours. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

ANB Animal Behavior

Courses in ANB:

ANB 201—Scientific Approaches to Animal Behavior Research (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Philosophical issues, goals, strategies and tools in field and laboratory research. May be repeated for credit. Effective: 1997 Winter Quarter.

ANB 210—History of Animal Behavior (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Classic, seminal papers in animal behavior. Discussion of readings and broader historical context in which papers were written. (S/U grading only.) Effective: 2002 Fall Quarter.

ANB 218A—Fundamentals of Animal Behavior (5)
Discussion—1 hour; Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Upper-division undergraduate introduction to the biology of behavior, such as PSC 101, PSC 122, PSC 123, NPB 102, NPB 150, NPB 152, WFC 141, ENT 104, or ANS 105. Survey of the phenomena and theory of animal behavior from the
perspectives of multiple biological disciplines, including evolution, ecology, psychology, genetics, neurobiology, endocrinology, and animal science. (PSC 218A.) Effective: 2007 Fall Quarter.

ANB 218B—Fundamentals of Animal Behavior (5)
Discussion—1 hour; Lecture/Discussion—4 hours. Prerequisite(s): ANB 218A or PSC 218A; or ECL 218A; consent of instructor. Survey of the phenomena and theory of animal behavior from the perspectives of multiple biological disciplines, including evolution, ecology, psychology, genetics, neurobiology, endocrinology, and animal science. (ECL 2018A and PSC 218B.) Effective: 2007 Fall Quarter.

ANB 221—Animal Behavior, Ecology and Evolution (3)
Lecture—3 hours. Prerequisite(s): NPB 102; EVE 100; EVE 101; and Consent of Instructor. Or the equivalent, graduate standing. Interface between animal behavior, ecology and evolution. New developments in behavioral ecology development and testing of hypotheses in this discipline. (PBG 221.) Effective: 2002 Winter Quarter.

ANB 230A—Interdisciplinary Approaches to Animal Behavior (3)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Analysis of literature in behavior and an allied discipline or disciplines that offer the potential, in combination, to advance the understanding of a topic in animal behavior conceptually and empirically. Topics will vary from year to year. Effective: 1997 Winter Quarter.

ANB 230B—Interdisciplinary Approaches to Animal Behavior (5)
Discussion—3 hours; Term Paper—1 hour; Workshop—4 hours. Prerequisite(s): ANB 230A; Taken the previous quarter. Development of an empirical or theoretical interdisciplinary approach to research on a current topic in animal behavior. Effective: 1997 Winter Quarter.

ANB 270—Research Conference in Behavioral Ecology (1)
Conference—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Critical presentation and evaluation of current literature and ongoing
research in behavioral ecology. Limited enrollment. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Fall Quarter.

ANB 287—Advanced Animal Behavior (2)
Seminar—2 hours. Prerequisite(s): NPB 102; (EVE 100 or EVE 101); and Consent of Instructor. Or the equivalents; graduate standing. Reading, reports and discussion on current topics in animal behavior, with a focus on topics that lie at the interface between animal behavior, ecology and evolution. May be repeated up to 2 time(s). (PBG 287.) Effective: 2002 Spring Quarter.

ANB 290—Seminar in Animal Behavior (1-3)
Seminar—1-3 hours. Prerequisite(s): Consent of Instructor. Selected topics in animal behavior. (S/U grading only.) Effective: 1997 Winter Quarter.

ANB 294—Seminar in Behavioral Ecology of Predators and Prey (3)
Seminar—2 hours. Prerequisite(s): Graduate standing. Presentation and analysis of research papers on social and foraging behavior of predatory animals, antipredator strategies of prey species, co-evolution of predators and prey, and ecology of predator prey interactions. May be repeated up to 2 time(s). (WFC 294.) Effective: 2003 Winter Quarter.

ANB 298—Group Study (1-5)
Discussion—1-5 hours; Laboratory—5-15 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Lectures and/or discussion of current issues, problems, or techniques in animal behavior. Effective: 1997 Winter Quarter.

ANB 299—Research (1-12)
Laboratory—3-36 hours. Advanced research in one of the specialty areas in animal behavior (S/U grading only.) Effective: 1997 Winter Quarter.

ANB 396—Teaching Assistant Training Practicum (1-4)
Variable. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

ANG Animal Genetics

Questions pertaining to the following courses should be directed to the instructor or to the Animal Science Advising Center in 1202 Meyer Hall; 530-754-7915.

Courses in ANG:

ANG 101—Animal Cytogenetics (3)
Discussion/Laboratory—1 hour; Laboratory—6 hours. Prerequisite(s): BIS 101; BIS 102; Or equivalent of BIS 102. Principles and techniques of cytogenetics applied to animal systems; chromosome harvest techniques, analysis of mitosis and meiosis, karyotyping, chromosome banding, cytogenetic mapping, chromosome structure and function, comparative cytogenetics. GE credit: SE. Effective: 2003 Spring Quarter.

ANG 105—Horse Genetics (2)
Lecture—2 hours. Prerequisite(s): ANS 015; BIS 101 Coat color, parentage testing, medical genetics, pedigrees, breeds, the gene map and genus Equus. Emphasis on understanding horse genetics based on the unity of mammalian genetics and making breeding decisions based on fundamental genetic concepts. GE credit: SE, SL. Effective: 2017 Winter Quarter.

ANG 107—Genetics and Animal Breeding (5)
Laboratory—3 hours; Lecture—4 hours. Prerequisite(s): BIS 101 Principles of quantitative genetics applied to improvement of livestock and poultry. Effects of mating systems and selection methods are emphasized with illustration from current breeding practices. GE credit: SE. Effective: 1997 Winter Quarter.

ANG 111—Molecular Biology Laboratory Techniques (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): BIS 002C; BIS 101; (BIS 102 or ABI 102); (BIS 103 or ABI 103) Introduction to the concepts and techniques used in molecular biology; the role of this technology in both basic and applied animal research, and participation in laboratories using some of the most common techniques in molecular biology. GE credit: SE, SL, VL, WE. Effective: 2017 Winter Quarter.

ANG 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Selected topics relating to animal genetics. (P/NP grading only.) Effective: 1997 Winter Quarter.

ANG 199—Special Study for Advanced Undergraduates (1-5)
Independent Study. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

ANG 204—Theory of Quantitative Genetics (3)
Lecture—3 hours. Prerequisite(s): ANG 107; Or the equivalent. Theoretical basis of quantitative genetics and the consequences of Mendelian inheritance. Concepts used to estimate quantitative genetic differences and basis for partitioning the phenotypic variance. Effective: 1997 Winter Quarter.

ANG 206—Advanced Domestic Animal Breeding (3)
Lecture—3 hours. Prerequisite(s): ANG 107; ANS 205; ANG 204 recommended. Procedures for the genetic evaluation of individuals to include selection indices and mixed model evaluation for single and multiple traits. Methods of estimating genetic trends. Effective: 1997 Winter Quarter.

ANG 208—Estimation of Genetic Parameters (3)
Lecture—3 hours. Prerequisite(s): ANG 107; ANS 205; ANG 204 and ANG 108 recommended. General methods for the estimation of components of variance and covariance and their application to the estimation of heritability, repeatability and genetic correlations are considered. Specific emphasis is given to procedures applicable to livestock populations under selection. Effective: 1997 Winter Quarter.

ANG 211—Genetic Engineering of Animals (2)
Lecture—1 hour; Lecture/Discussion—1 hour. Review of techniques for the genetic engineering of animals and their limitations and applications. Student-led discussions of recent papers in the field and possible future applications of genetically engineered animals in basic research and applied agricultural and medical research. (S/U grading only.) Effective: 1997 Winter Quarter.

ANG 212—Sequence Analysis in Molecular Genetics (2)
Lecture/Lab—2 hours. Prerequisite(s): BIS 101; Or the equivalent; graduate standing or consent of instructor. Use of computer algorithms and on-line databases to analyze nucleic acid and protein sequences in molecular genetics research. Effective: 2005 Winter Quarter.

ANG 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lectures and discussions of advanced topics in animal genetics. (S/U grading only.) Effective: 1997 Winter Quarter.

ANG 299—Research in Animal Genetics (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

ANE Med - Anesthesiology

Courses in ANE:

ANE 192—Internship in Anesthesiology (1-6)
Internship—3-18 hours; Project (Term Project). Prerequisite(s): Upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in anesthesia and related fields. (P/F grading only.) Effective: 1997 Winter Quarter.

ANE 199—Special Study for Advanced Undergraduates (1-5)
Variable—3-15 hours. May be repeated for credit. (P/NP grading only.) Effective: 2007 Fall Quarter.

ANE 435—Primary Care Multidisciplinary Pain Management (3)
Clinical Activity. Rotation will give 3rd year primary-care bound students an overview of the scope of Pain Medicine. May be repeated for credit. (H/P/F grading only.) Effective: 2016 Fall Quarter.

ANE 455—Externship in Anesthesiology (3-6)
Clinical Activity. Prerequisite(s): Consent of Instructor. Away clinical rotation in Anesthesiology or Pain Medicine. (H/P/F grading only.) Effective: 2017 Summer Quarter.

ANE 460—Anesthesiology Clinical Clerkship (3-18)
Discussion—2 hours; Practice—10 hours; Variable—30 hours. Prerequisite(s): Consent of Instructor. Medical student. In-depth exposure to anesthesia through informal lectures and mentoring by anesthesiologists. Emphasis on understanding and applying anesthetic principles in managing administration of general, regional, and specialized areas. (H/P/F grading only.) Effective: 1997 Spring Quarter.

ANE 461—Perioperative Medicine (3-12)
Clinical Activity—30 hours. Prerequisite(s): Successful completion of third-year clerkships; consent of IOR. Two week rotation provides a broad exposure to various patient care services within the Department of Anesthesiology and Pain Medicine to apply medical knowledge to safely care for patients. (H/P/F grading only.) Effective: 2011 Spring Quarter.

ANE 462—Perioperative Management of the Obstetric Patient (3-6)
Variable—2 hours. Prerequisite(s): Consent of Instructor. Perioperative Management of Obstetric Patient advanced clinical clerkship will offer the medical student the chance to understand and be able to apply the principles of basic science into major improvements in obstetric anesthesia patient care. May be repeated for credit. (H/P/F grading only.) Effective: 2018 Spring Quarter.

ANE 463—Multidisciplinary Pain Management (6)
Clinical Activity—30 hours; Lecture/Discussion—10 hours. Prerequisite(s): Senior medical student in good standing. Senior clerkship to expose students to all facets of treating pain in all aspects of clinical care: outpatient and inpatient settings, acute and chronic pain, end of life issues, pediatrics, rehabilitation, etc. Daily clinics, rounds, and lectures. (H/P/F grading only.) Effective: 1999 Summer Quarter.

ANE 464—Multidisciplinary Approach to the Neurosurgical Patient (3-9)
Clinical Activity—40 hours. Prerequisite(s): Consent of Instructor. Participate in the perioperative care of patients undergoing neurosurgical procedures while under the supervision of anesthesia, neurology and neurosurgical ICU residents and attending physicians. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Winter Quarter.

ANE 465—Away Acting Internship in Anesthesiology (3-18)
Clinical Activity—40 hours; Variable—3-18 hours. Prerequisite(s): Consent of Instructor. Satisfactory completion of Anesthesiology Clerkship. Work at the level of a sub intern in Inpatient and/or Outpatient settings. Expectation is to provide direct patient management. May be repeated for credit. (H/P/F grading only.) Effective: 2010 Summer Quarter.

ANE 480—Brief Introduction to Clinical Anesthesiology and Chronic Pain Management (3)
Clinical Activity—30 hours. Prerequisite(s): Second-year medical student. Daily experience in clinical anesthesiology at the preoperative screening unit, operating room, post anesthesia care unit, chronic pain management clinic with daily clinical correlation case discussions, and one-on-one interaction with faculty anesthesiologists. (H/P/F grading only.) Effective: 1997 Spring Quarter.

ANE 493A—Applied Physiology and Pharmacology (6)
Clinical Activity—4 hours; Laboratory—16 hours; Lecture—5 hours; Lecture/Lab—10 hours. Prerequisite(s): Consent of Instructor. UC Davis School of Medicine students only. Review and demonstrate the application of basic physiology and pharmacology to patient care. There will be an in-depth analysis of the physiology and pharmacology of the cardiovascular, pulmonary, nervous, renal and endocrine systems. (H/P/F grading only.) Effective: 2007 Winter Quarter.

ANE 493B—Interdisciplinary Medicine in Pain Care (6)
Clinical Activity—4 hours; Laboratory—16 hours; Lecture—5 hours; Lecture/Lab—10 hours. Prerequisite(s): Consent of Instructor. UC Davis School of Medicine students only. Integrate applied and practical neuroanatomy, physiology, pharmacology, psychology/psychiatry and social medicine in the care of patients who are receiving care for pain caused by acute or chronic medical disease or trauma. (H/P/F grading only.) Effective: 2007 Spring Quarter.

ANE 498—Individual or Group Study (1-5)
Discussion—1-5 hours; Laboratory—2-10 hours. Prerequisite(s): Interns and residents with consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics. (H/P/F grading only.) Effective: 1997 Winter Quarter.

ANE 499—Anesthesiology Research (1-18)
Laboratory—12-54 hours. Prerequisite(s): Third- or fourth-year medical students, advanced standing undergraduate and veterinary medicine students; or consent of instructor. Problems in clinical and/or laboratory research. May be repeated for credit. (H/P/F grading only.) Effective: 2018 Spring Quarter.

ANS Animal Science

Courses in ANS:

ANS 001—Domestic Animals and People (4)
Laboratory—3 hours; Lecture—3 hours. Animal domestication and factors affecting their characteristics and distribution. Animal use for food, fiber, work, drugs, research and recreation; present and future roles in society. Laboratory exercises with beef and dairy cattle, poultry, sheep, swine, laboratory animals, fish, horses, meat and dairy products. GE credit: SE, WE. Effective: 1997 Winter Quarter.

ANS 002—Introductory Animal Science (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ANS 001 and BIS 002A recommended. Open to students in Animal Science, Animal Science and Management, Agricultural and Environmental Education, and Sustainable Agriculture and Food Systems majors. Growth, reproduction, lactation, inheritance, nutrition, and disease control in domesticated animals and species used in aquaculture; the application of sciences to animal production. GE credit: SE, SL, VL, WE. Effective: 2016 Fall Quarter.

ANS 012—Animal Science: Basic Principles and Application (3)
Lecture—3 hours. Overview of domestic and global animal industries. Exploration of production systems, animal biology, genetics, anatomy, physiology, reproduction, health, behavior, research, biotechnology and welfare. GE credit: SE. Effective: 2014 Fall Quarter.

ANS 015—Introductory Horse Husbandry (3)
Lecture—3 hours. Introduction to care and use of light horses emphasizing the basic principles for selection of horses, responsibilities of ownership, recreational use and raising of foals. GE credit: QL, SE, VL. Effective: 2016 Fall Quarter.

ANS 017—Canine Behavior: Learning and Cognition (3)
Lecture—3 hours. Domestic dog behavior from basic principles of learning to complex cognitive behaviors; interaction between learning and cognition including how these processes contribute to interactions with humans; basic genetic correlates of learning and cognition. Effective: 2012 Summer Session 1.

ANS 018—Introductory Aquaculture (4)
Discussion—1 hour; Lecture—3 hours. Historical and contemporary aquacultural practices. Interaction between the aqueous culture environment and the biology of aquatic animals. Impact of economics and governmental policies on the development of aquaculture. Interaction of aquacultural practices with larger societal goals. GE credit: OL, QL, SE, SL, VL, WE. Effective: 1997 Winter Quarter.

ANS 021—Livestock and Dairy Cattle Judging (2)
Laboratory—6 hours. Prerequisite(s): ANS 001 or ANS 002 recommended. Evaluation of type as presently applied to light horses, meat animals and dairy cattle. Relationship between form and function, form and carcass quality, and form and milk production. GE credit: OL, SE. Effective: 1997 Winter Quarter.

ANS 022A—Animal Evaluation (2)
Fieldwork—30 hours; Laboratory—3 hours. Prerequisite(s): ANS 021; Or equivalent. Attendance at 3 one-day weekend field trips required. Domestic livestock species with emphasis on visual appraisal, carcass evaluation, and application of performance information. Emphasis on accurate written and oral descriptions of evaluations. Prerequisite to intercollegiate judging competition. (P/NP grading only.) GE credit: OL, SE. Effective: 1999 Fall Quarter.

ANS 022B—Animal Evaluation (2)
Fieldwork—30 hours; Laboratory—3 hours. Prerequisite(s): ANS 022A; Or equivalent. Attendance at 3 one-day weekend field trips required. Continuation of course 22A with emphasis on specific species: swine, beef cattle and sheep. Application of animal science principles to selection and management problem-solving scenarios. Prerequisite to intercollegiate judging competition. (P/NP grading only.) GE credit: OL, SE. Effective: 2000 Winter Quarter.

ANS 041—Domestic Animal Production (2)
Lecture—2 hours. Principles of farm animal management, including dairy and beef cattle, sheep, and swine. Industry trends, care and management, nutrition, and reproduction. GE credit: SE. Effective: 1997 Winter Quarter.

ANS 041L—Domestic Animal Production Laboratory (2)
Discussion—1 hour; Laboratory—3 hours. Prerequisite(s): ANS 041 (can be concurrent) Animal production principles and practices, including five field trips to dairy cattle, beef cattle, sheep, and swine operations and campus labs. (P/NP grading only.) GE credit: QL, SE, SL, VL, WE. Effective: 2016 Fall Quarter.

ANS 042—Introductory Companion Animal Biology (4)
Discussion—1 hour; Lecture—3 hours. Companion animal domestication. Historical, contemporary perspectives.
Legislation concerning companion animals. Selected topics in anatomy, physiology, genetics, nutrition, behavior and management. Scientific
methods in studying the human-animal bond. Discussions: application of biological concepts to problems related to companion animals. GE credit: QL, SE, SL, WE. Effective: 1997 Winter Quarter.

ANS 049A—Animal Management Practices: Aquaculture (2)
Discussion—1 hour; Laboratory—3 hours. Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken. (P/NP grading only.) Effective: 1998 Fall Quarter.

ANS 049B—Animal Management Practices: Beef (2)
Discussion—1 hour; Laboratory—3 hours. Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken. (P/NP grading only.) Effective: 1998 Fall Quarter.

ANS 049C—Animal Management Practices: Dairy (2)
Discussion—1 hour; Laboratory—3 hours. Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken. (P/NP grading only.) Effective: 1998 Fall Quarter.

ANS 049D—Animal Management Practices: Goats (2)
Discussion—1 hour; Laboratory—3 hours. Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken. (P/NP grading only.) Effective: 1998 Fall Quarter.

ANS 049E—Animal Management Practices: Horses (2)
Discussion—1 hour; Laboratory—3 hours. Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken. (P/NP grading only.) Effective: 1998 Fall Quarter.

ANS 049F—Animal Management Practices: Laboratory Animals (2)
Discussion—1 hour; Laboratory—3 hours. Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken. (P/NP grading only.) Effective: 1998 Fall Quarter.

ANS 049G—Animal Management Practices: Meats (2)
Discussion—1 hour; Laboratory—3 hours. Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken. (P/NP grading only.) Effective: 1998 Fall Quarter.

ANS 049H—Animal Management Practices: Poultry (2)
Discussion—1 hour; Laboratory—3 hours. Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken. (P/NP grading only.) Effective: 1998 Fall Quarter.

ANS 049I—Animal Management Practices: Sheep (2)
Discussion—1 hour; Laboratory—3 hours. Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken. (P/NP grading only.) Effective: 1998 Fall Quarter.

ANS 049J—Animal Management Practices: Swine (2)
Discussion—1 hour; Laboratory—3 hours. Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken. (P/NP grading only.) Effective: 1998 Fall Quarter.

ANS 049K—Animal Management Practices: Captive and Companion Avian (2)
Discussion—1 hour; Laboratory—3 hours. Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken. (P/NP grading only.) Effective: 2013 Winter Quarter.

ANS 090C—Research Group Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Restricted to lower division standing. Weekly conference on research problems, progress and techniques in the animal sciences. May be repeated for credit. (P/NP grading only.) Effective: 2016 Fall Quarter.

ANS 092—Internship in Animal Science (1-12)
Internship—3-18 hours. Prerequisite(s): Consent of Instructor. Restricted to lower division standing. Internship off and on campus in dairy, livestock, and aquaculture production, research and management; or in a business, industry, or agency associated with these or other animal enterprises. All requirements of Internship Approval form must be met. (P/NP grading only.) Effective: 2016 Fall Quarter.

ANS 098—Directed Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Restricted to lower division standing. (P/NP grading only.) Effective: 2016 Fall Quarter.

ANS 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Restricted to lower division standing. (P/NP grading only.) Effective: 2016 Fall Quarter.

ANS 100—Animal Physiology (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): BIS 002A; CHE 002B Pass One restricted to students in the Animal Science and Animal Science and Management majors. Basic principles of animal physiology in domesticated and captive animals with a comparative approach. Molecular, biochemical, chemical and physical aspects and their influences on function of physiological systems in animals. Not open for credit to students who have taken NPB 101. GE credit: SE. Effective: 2016 Spring Quarter.

ANS 103—Animal Welfare (4)
Discussion—2 hours; Lecture—2 hours. Prerequisite(s): ANS 104 or NPB 102 or WFC 141; or Consent of Instructor. Restricted to upper division standing. Application of principles of animal behavior and physiology to assessment and improvement of the welfare of wild, captive, and domestic animals. Topics include animal pain, stress, cognition, motivation, emotions, and preferences, as well as environmental enrichment methods. GE credit: SE, SL. Effective: 2016 Fall Quarter.

ANS 104—Principles and Applications of Domestic Animal Behavior (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANS 002 or BIS 002B Basic principles of animal behavior as applied to domesticated species. Emphasis placed on application of the principles of animal behavior. GE credit: SE. Effective: 2014 Fall Quarter.

ANS 106—Domestic Animal Behavior Laboratory (2)
Laboratory—6 hours. Prerequisite(s): ANS 104 or NPB 102; or Consent of Instructor. Research experience with the behavior of large domestic animals. Experimental design, methods of data collection and analysis, and reporting of experimental results. GE credit: QL, SE, SL, VL, WE. Effective: 2016 Fall Quarter.

ANS 112—Sustainable Animal Agriculture (3)
Lecture/Discussion—3 hours. Prerequisite(s): BIS 002B or ANS 001; STA 100 or PLS 120 recommended. Current applications of sustainable animal agriculture including the challenges of animal production, animal needs, animal well-being, and protection of the environment and resources for future food supply systems. Various scenarios for meeting sustainability objectives are evaluated using computing modeling. GE credit: OL, QL, SE, SS. Effective: 2016 Fall Quarter.

ANS 115—Advanced Horse Production (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ANS 015; BIS 101; NUT 115; (ANS 100 or NPB 101); or Consent of Instructor. Feeding, breeding, and management of horses; application of the basic principles of animal science to problems of production of all types of horses. Designed for students who wish to become professionally involved in the horse industry. GE credit: QL, SE, SL, WE. Effective: 2016 Fall Quarter.

ANS 118—Fish Production (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): WFC 120 Current practices in fish production; relationship between the biological aspects of a species and the production systems, husbandry, management, and marketing practices utilized. Emphasis on species currently reared in California. GE credit: SE. Effective: 2016 Fall Quarter.

ANS 119—Invertebrate Aquaculture (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 002B Management, breeding and feeding of aquatic invertebrates; application of basic principles of physiology, reproduction, and nutrition to production of mollusks and crustaceans for human food; emphasis on interaction of species biology and managerial techniques on production efficiencies. GE credit: SE. Effective: 2016 Fall Quarter.

ANS 120—Principles of Meat Science (3)
Lecture—3 hours. Prerequisite(s): ANS 002 Restricted to upper division standing. Anatomical, physiological, developmental, and biochemical aspects of muscle underlying the conversion of muscle to meat. Includes meat processing, preservation, microbiology, and public health issues associated with meat products. GE credit: SE. Effective: 2016 Fall Quarter.

ANS 120L—Meat Science Laboratory (2)
Discussion—1 hour; Laboratory—3 hours. Prerequisite(s): ANS 002; ANS 120 (can be concurrent) Restricted to upper division standing. Laboratory exercises and student participation in transformation of live animal to carcass and meat, structural and biochemical changes related to meat quality, chemical and sensory evaluation of meat, and field trips to packing plant and processing plant. GE credit: SE. Effective: 2016 Fall Quarter.

ANS 123—Animal Growth and Development (4)
Lecture—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): (ABI 103 or BIS 103); (ANS 100 or NPB 101) Growth and development of animals from conception to maturity, viewed from practical and biological perspectives; includes genetic, metabolic, nutritional control of cell and organism function. GE credit: OL, QL, SE, VL, WE. Effective: 2016 Fall Quarter.

ANS 124—Lactation (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (NPB 101 or ANS 100); (ABI 103 (can be concurrent) or BIS 103 (can be concurrent)) Consideration of the biochemical, genetic, physiological, nutritional, and structural factors relating to mammary gland development, the initiation of lactation, the composition of milk and lactational performance. GE credit: SE, SL. Effective: 2016 Fall Quarter.

ANS 125—Equine Exercise Physiology (3)
Lecture—3 hours. Prerequisite(s): (NPB 101 or ANS 100); ANS 015 Basic and applied physiology of the exercising horse. Includes physiological systems, gait analysis, lameness, pharmacology, sports medicine; sport horse performance evaluation and conditioning. GE credit: SE. Effective: 2016 Fall Quarter.

ANS 126—Equine Nutrition (3)
Lecture—3 hours. Prerequisite(s): ANS 015; NUT 115 Equine digestion, digestive physiology, diet development and evaluation, and the relationship of the topics to recommended feeding practices and nutritional portfolios. GE credit: SE. Effective: 2014 Fall Quarter.

ANS 127—Advanced Equine Reproduction (3)
Lecture—3 hours. Prerequisite(s): ANS 115; (ANS 100 or NPB 101) Reproductive physiology, anatomy and endocrinology of the mare and stallion. Emphasis on structure/function relationships as they are applied to improving equine reproductive management and efficiency. GE credit: SE, WE. Effective: 2016 Fall Quarter.

ANS 128—Agricultural Applications of Linear Programming (4)
Discussion—1 hour; Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): PLS 021 or ECS 015; or Consent of Instructor. Restricted to upper division standing. Applications of linear programming in agriculture, emphasizing resource allocation problems and decision making. Problems include crop production, ration formulation, and farm management. Hands-on experience in developing linear programs and interpreting the results. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

ANS 129—Environmental Stewardship in Animal Production Systems (3)
Lecture—3 hours. Prerequisite(s): (BIS 010 or (BIS 002A, BIS 002B)), CHE 002A, CHE 002B, (CHE 008A, CHE 008B) or (CHE 118A, CHE 118B); and Consent of Instructor. Management principles of environmental stewardship for grazing lands, animal feeding, operations and aquaculture operations; existing regulations, sample analyses, interpretation and utilization of data, evaluation of alternative practices, and policy development. GE credit: SE, SL. Effective: 2017 Winter Quarter.

ANS 131—Reproduction and Early Development in Aquatic Animals (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): MCB 150; WFC 120; or Consent of Instructor. Physiological and developmental functions related to reproduction, breeding efficiency and fertility of animals commonly used in aquaculture. GE credit: SE, WE. Effective: 2017 Winter Quarter.

ANS 135—Production Animal Laboratory (3)
Fieldwork; Laboratory—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): ABI 102; ABI 103; (NPB 101 or ANS 100) Pass One restricted to Animal Science and Animal Science and Management students. Biochemical methods for developing and conducting research with production animals, and interpreting and presenting data. Laboratory focus course which uses sheep as model. There may be one or two mandatory all day Saturday field trips. GE credit: SE. Effective: 2017 Winter Quarter.

ANS 136—Techniques and Practices of Fish Culture (3)
Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): ANS 002; BIS 002A; BIS 002B; BIS 002C; ((CHE 008A, CHE 008B) or (CHE 118A, CHE 118B)) Restricted to upper division standing. Daily care and maintenance of fish in residential aquariums, research and commercial facilities. Biological and environmental factors important to sound management of fish. Laboratories focus on fish culture including growth trials and biochemical assays. Not open for credit to students who have previously completed ANS 136A or ANS 137. GE credit: QL, SE, SL, VL, WE. Effective: 2017 Winter Quarter.

ANS 137—Techniques and Practices of Avian Culture (3)
Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): ANS 002; BIS 002A; BIS 002B; BIS 002C; ((CHE 008A, CHE 008B) or (CHE 118A, CHE 118B)) Restricted to upper division standing. Daily care and maintenance of birds for research, commercial production and companion or hobby uses. Biological and environmental factors important to sound management of birds. Laboratories focus on bird husbandry, management and care and include growth trials and biochemical assays. Not open for credit to students who have previously completed ANS 136B or ANS 137. GE credit: QL, SE, SL, VL, WE. Effective: 2017 Winter Quarter.

ANS 139—Experimental Animal Physiology (3)
Fieldwork—3 hours; Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): ABI 102; BIS 101; or Consent of Instructor. Restricted to seniors in the Animal Science and Animal Science and Management majors. Combination of theory and hands-on experiences in animal physiology using various experimental techniques. Practical laboratory skill development from cellular level to whole animal, in areas such as genetics, endocrinology, histology and physiological function. GE credit: SE, WE. Effective: 2016 Spring Quarter.

ANS 140—Management of Laboratory Animals (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): NPB 101 or ANS 100 Laboratory animal management procedures in view of animal physiology, health and welfare, government regulations, and experimental needs. Clinical techniques using rodents and rabbits as models. GE credit: SE. Effective: 2017 Winter Quarter.

ANS 141—Equine Enterprise Management (4)
Lecture/Discussion—4 hours. Prerequisite(s): ANS 115; ECN 001A and ECN 001B recommended. Examination of the concepts and principles involved in the operation of an equine enterprise. Essential aspects of equine enterprise management, including equine law, marketing, cash flow analysis, and impact of state and federal regulations. GE credit: SS. Effective: 1997 Winter Quarter.

ANS 142—Companion Animal Care and Management (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANS 042; BIS 101; (NPB 101 or ANS 100); ABI 102 or BIS 102 and ABI 103 or BIS 103 recommended. Management and production of companion animals. Integration of the disciplinary principles of behavior, genetics, nutrition, and physiology as related to the care of companion animals. GE credit: OL, QL, SE, SL, VL, WE. Effective: 2017 Winter Quarter.

ANS 143—Pig and Poultry Care and Management (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): NUT 115; (NPB 101 or ANS 100); ANS 041; or Consent of Instructor. Care and management of swine, broilers and turkeys as related to environmental physiology, nutrition and metabolism, disease management and reproduction. Saturday field trips. GE credit: SE, SL. Effective: 2017 Winter Quarter.

ANS 144—Beef Cattle and Sheep Production (4)
Fieldwork—2 hours; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ANS 041; NUT 115; or Consent of Instructor. Animal Genetics 107 recommended. Genetics, physiology, nutrition, economics and business in beef cattle and sheep production. Resources used, species differences, range and feedlot operations. Emphasis on integration and information needed in methods for management of livestock enterprises. One or two Saturday field trips. GE credit: OL, QL, SE, SL, VL, WE. Effective: 2017 Winter Quarter.

ANS 145—Meat Processing and Marketing (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ANS 002; Consent of Instructor. Distribution, processing and marketing of meat and meat products. Meat and meat animal grading and pricing. Government regulations and social/consumer concerns. Future trends and impact on production management practices. Includes poultry. GE credit: SE. Effective: 2017 Winter Quarter.

ANS 146—Dairy Cattle Production (5)
Discussion—1 hour; Fieldwork—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): NUT 115; or Consent of Instructor. ANG 107 recommended. Scientific principles from genetics, nutrition, physiology, and related fields applied to conversion of animal feed to human food through dairy animals. Management and economic decisions are related to animal biology considering the environment and animal well-being. Mandatory Saturday field-trip. GE credit: OL, QL, SE, SL, VL, WE. Effective: 2017 Winter Quarter.

ANS 147—Dairy Processing and Marketing (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): ANS 002; or Consent of Instructor. Restricted to upper division standing. Examination of distribution systems, processing practices, product quality, impact of government policy (domestic and foreign), marketing alternatives, and product development. GE credit: SE. Effective: 2017 Winter Quarter.

ANS 148—Enterprise Analysis in Animal Industries (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Restricted to students with upper division standing. Examination and application of decision making and problem solving in the production enterprise. The areas of production analysis, problem solving, risk analysis and cost-benefit analysis will be examined in terms of the total enterprise. GE credit: OL, QL, SS, WE. Effective: 2016 Fall Quarter.

ANS 149—Farrier Science (3)
Lecture—3 hours. Prerequisite(s): ANS 115 In-depth examination of the structure-function relationship of the equine hoof and how it relates to conformation, injury and performance. GE credit: SE. Effective: 2015 Winter Quarter.

ANS 149L—Farrier Science Laboratory (1)
Laboratory—3 hours. Prerequisite(s): ANS 149 (can be concurrent); or Consent of Instructor. Art and science of horseshoeing in equine related fields. Proper use of the tools, materials and techniques in the fabrication of shoes and safe preparation of the hoof for application of shoes. (P/NP grading only.) Effective: 1999 Spring Quarter.

ANS 170—Ethics of Animal Use (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Any basic course in composition or speech, or completion of college English requirement. Ethical issues relating to animal use in contemporary society. Integration of philosophical theories with scientific evidence relating to animal behavior, mentality, and welfare. Uses of animals in agriculture, research, and as companions. Ethical responsibilities regarding wildlife and the environment. GE credit: SL, SS, WE. Effective: 2016 Fall Quarter.

ANS 190C—Research Group Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Advanced standing. Weekly conference on research problems, progress and techniques in the
animal sciences. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

ANS 192—Internship in Animal Science (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Internship off and on campus in dairy, livestock and aquaculture production, research and management; or in a business, industry, or agency associated with these or other animal enterprises. All requirements of Internship Approval Form must be met. (P/NP grading only.) Effective: 1997 Winter Quarter.

ANS 194—Research in Animal Science (3)
Discussion—1 hour; Laboratory—6 hours. Prerequisite(s): ANS 106 or ANS 135 or ANS 136 or ANS 137 or ANS 139 or ANG 111; or ANS 133; and Consent of Instructor. Research with a faculty mentor. Weekly discussion and laboratory on specific research topic. May include a seminar to research group. Choose from sections: (1) Animal Behavior; (2) Animal Genetics; (3) Animal Nutrition; (4) Animal Physiology. May be repeated up to 4 time(s). Effective: 2016 Fall Quarter.

ANS 194HA—Undergraduate Honors Thesis in Animal Science (4)
Laboratory—9 hours; Lecture—1 hour. Prerequisite(s): (NPB 101 or ANS 100); (ABI 103 or BIS 103); and Consent of Instructor. Minimum cumulative GPA of 3.200 and selection by the Honors Selection Committee. Students will carry out a research project (chosen from faculty-suggested or approved proposals) during the academic year under the guidance of a faculty member. Upon completion, student will write a thesis and present a public seminar describing his/her research. GE credit: OL, SE. Effective: 2016 Fall Quarter.

ANS 194HB—Undergraduate Honors Thesis in Animal Science (4)
Laboratory—9 hours; Lecture—1 hour. Prerequisite(s): (NPB 101 or ANS 100); (ABI 103 or BIS 103); and Consent of Instructor. Minimum cumulative GPA of 3.200 and selection by the Honors Selection Committee. Students will carry out a research project (chosen from faculty-suggested or approved proposals) during the academic year under the guidance of a faculty member. Upon completion, student will write a thesis and present a public seminar describing his/her research. GE credit: SE, VL. Effective: 2016 Fall Quarter.

ANS 194HC—Undergraduate Honors Thesis in Animal Science (4)
Laboratory—9 hours; Lecture—1 hour. Prerequisite(s): (NPB 101 or ANS 100); (ABI 103 or BIS 103); and Consent of Instructor. Minimum cumulative GPA of 3.200 and selection by the Honors Selection Committee. Students will carry out a research project (chosen from faculty-suggested or approved proposals) during the academic year under the guidance of a faculty member. Upon completion, student will write a thesis and present a public seminar describing his/her research. GE credit: SE, WE. Effective: 2016 Fall Quarter.

ANS 197T—Tutoring in Animal Science (1-2)
Tutorial—1-2 hours. Prerequisite(s): Consent of Instructor. Animal Science or related major; upper division standing. Tutoring of students in lower division animal science courses; weekly conference with instructors in charge of courses; written critiques of teaching procedures. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 2016 Fall Quarter.

ANS 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Selected topics relating to the animal sciences. (P/NP grading only.) Effective: 1997 Winter Quarter.

ANS 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Restricted to students with upper division standing. (P/NP grading only.) Effective: 2016 Fall Quarter.

ANS 200—Strategies in Animal Production (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Examines the forces and issues in animal agriculture through the strategic management process. Effective: 1997 Winter Quarter.

ANS 206—Models in Agriculture and Nutrition (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): MAT 016B; STA 108 Basic model building principles and techniques for statistical and systems simulation models. Optimization techniques for non-linear experimental designs and management models are presented. Quantitative analysis and evaluation of linear and non-linear equations used in agriculture and nutrition. Effective: 1997 Winter Quarter.

ANS 259—Literature in Animal Science (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Critical presentation and analysis of recent journal articles in animal science. May be repeated up to 9 time(s). (S/U grading only.) Effective: 2004 Fall Quarter.

ANS 290—Seminar (1)
Seminar—1 hour. Reports and discussions of topics of interest in genetics, nutrition, and physiology as they apply to animal science. (S/U grading only.) Effective: 1997 Winter Quarter.

ANS 290C—Research Group Conference (1)
Discussion—1 hour. Prerequisite(s): Graduate standing. Weekly conference on research problems, progress and techniques in the animal sciences. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

ANS 291—Current Research in Animal Science (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Current research in animal science explored at weekly seminars presented by guest lecturers. Discussion of research presented. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

ANS 297—Supervised Teaching in Animal Science (2)
Variable—6 hours. Practical experience in teaching Animal Science at University level; curriculum design and evaluation; preparation and presentation of material. Assistance in laboratories, discussion sections, and evaluation of student work. Evaluation letter sent to the graduate advisor with copy to the student. (S/U grading only.) Effective: 1997 Winter Quarter.

ANS 298—Group Study (1-5)
Discussion—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Lectures and discussions of advanced topics in the animal sciences.

(Sect. 1, 2, 3-letter grading; from Sect. 4 on-S/U grading only.) Effective: 1997 Winter Quarter.

ANS 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

ANT Anthropology

Courses in ANT:

ANT 001—Human Evolutionary Biology (4)
Discussion—1 hour; Lecture—3 hours. Processes and course of human evolution; primatology; biological and social diversity within Homo sapiens; human paleontology. GE credit: SE, SL, WE. Effective: 1999 Fall Quarter.

ANT 001Y—Human Evolutionary Biology (Hybrid Version) (4)
Discussion/Laboratory—1 hour; Lecture/Discussion—1.5 hours; Web Virtual Lecture—1.5 hours. Evolutionary theory and mechanisms of evolution; basic population and quantitative genetics; primatology; biological and cultural diversity within Homo sapiens; paleoanthropology. Students may not take both ANT 1 and ANT 1Y for credit. GE credit: SE, SL, WE. Effective: 2017 Winter Quarter.

ANT 002—Cultural Anthropology (5)
Discussion—1 hour; Lecture—3 hours; Term Paper. Introduction to cultural diversity in its many forms and methods used by anthropologists to account for it. Relational dynamic of culture, history, and power in constituting "social facts" and "realities." Critical thinking of contemporary concerns. GE credit: ACGH, DD, SS, WC, WE. Effective: 2017 Winter Quarter.

ANT 003—Introduction to Archaeology (4)
Discussion—1 hour; Lecture—3 hours. Development of archaeology as an anthropological study; objectives
and methods of modern archaeology. GE credit: SE, SL, SS. Effective: 2015 Spring Quarter.

ANT 004—Introduction to Anthropological Linguistics (4)
Discussion—1 hour; Lecture—3 hours. Exploration of the role of language in social interaction and world view, minority languages and dialects, bilingualism, literacy, the social motivation of language change. Introduction of analytical techniques of linguistics and demonstration of their relevance to language in sociocultural issues. GE credit: SS, WC, WE. Effective: 1997 Winter Quarter.

ANT 005—Proseminar in Biological Anthropology (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. ANT 1 or ANT 1Y recommended. Course primarily for majors. Integration of related disciplines in the study of biological anthropology through discussion and research projects. Principal emphasis in human adaptation to the environment. GE credit: OL, SE, WE. Effective: 2016 Fall Quarter.

ANT 013—Scientific Method in Physical Anthropology (4)
Discussion/Laboratory—1 hour; Fieldwork—1 hour; Lecture—2 hours. Skills for scientific thinking; designing, implementing, analyzing, interpreting, presenting, and criticizing research. Collection and analysis of original data. Basic statistical methods. GE credit: OL, SE, VL, WE. Effective: 2004 Fall Quarter.

ANT 015—From Birth to Death: The Evolution of the Human Life Cycle (5)
Discussion—1 hour; Lecture—3 hours; Term Paper. Introduction to the biology of birth, childhood, marriage, the family, old age, and death. Examines comparative characteristics of nonhuman primates and other animals as well as cross-cultural variation in humans by study of selected cases. GE credit: SE, SL, WC, WE. Effective: 2018 Winter Quarter.

ANT 020—Comparative Cultures (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the anthropological study of cultural diversity. Case
studies of eight societies will be presented to illustrate and compare the distinctive features of major cultural regions of the world. Concludes with a discussion of modernization. GE credit: ACGH, AH, DD, SS, WC, WE. Effective: 1997 Winter Quarter.

ANT 023—Introduction to World Prehistory (4)
Discussion—1 hour; Lecture—3 hours. Broadly surveys patterns and changes in the human species' physical and cultural evolution from earliest evidence for "humanness" to recent development of large-scale complex societies or "civilizations." Lectures emphasize use of archaeology in reconstructing the past. GE credit: SS, WC, WE. Effective: 1997 Winter Quarter.

ANT 024—Ancient Crops and People (4)
Discussion—1 hour; Lecture—3 hours. The archaeological evidence for domestication of plants and the origins of agricultural societies. Anthropological context of agriculture and the effects on sexual division of labor, social inequality, wealth accumulation, warfare, human health, and sedentism. GE credit: SS, WC, WE. Effective: 2005 Spring Quarter.

ANT 025—Ancient Animals and People (2)
Lecture—2 hours. History of human and animal relationships and how animals have influenced social and economic structures of past societies. Why, when and how humans used animals in the context of hunting, domestication, secondary products, ritual, companionship, and conservation. GE credit: SS. Effective: 2015 Winter Quarter.

ANT 026—Mummies of the Ancient World (2)
Lecture—2 hours. Archaeological approaches for studying mummies and the process of mummification in the ancient world. Analytical techniques used, environmental factors promoting mummification, and archaeological conservation of mummified bodies. GE credit: SS, WC. Effective: 2014 Fall Quarter.

ANT 028—Prehistoric Origins of Art (2)
Lecture/Discussion—2 hours. Interdisciplinary look at the earliest evidence for art and symbolic behavior. Method and techniques to investigate Prehistoric art. Interpretative framework and relevance for understanding the role of symbolic activities in traditional societies. GE credit: SS. Effective: 2015 Winter Quarter.

ANT 029—Vikings (2)
Lecture—2 hours. History of the Vikings through the Slavic and Mediterranean regions in the East and across the vast North Atlantic region to the west. Emphasis on archaeology and sagas to understand Viking culture from the 8th to 11th centuries. GE credit: SS, WC. Effective: 2016 Spring Quarter.

ANT 030—Sexualities (4)
Lecture/Discussion—4 hours. Introduction to the study of sexuality, particularly to the meanings and social organization of same-sex sexual behavior across cultures and through time. Biological and cultural approaches will be compared, and current North American issues placed in a wider comparative context. GE credit: ACGH, AH, DD, SS, WC. Effective: 2005 Fall Quarter.

ANT 032—Drugs, Science and Culture (4)
Discussion—1 hour; Lecture—3 hours. Drugs, politics, science, society in a cultural perspective: emphasis on roles of science, government and the media in shifting attitudes toward alcohol, marijuana, Prozac and other pharmaceuticals; drug laws, war on drugs and global trade in sugar, opium, cocaine. (STS 032.) GE credit: SS, VL, WE. Effective: 2008 Fall Quarter.

ANT 034—Cultures of Consumerism (4)
Lecture/Discussion—4 hours; Term Paper. Aspects of modern consumer cultures in capitalist and socialist countries. Transformations of material cultures over the past century. Case studies on the intersections of gender, class, and culture in everyday consumption practices. GE credit: SS, WC. Effective: 2007 Fall Quarter.

ANT 050—Evolution and Human Nature (4)
Discussion—1 hour; Lecture—3 hours. Evolutionary analyses of human nature, beginning with Lamarck, Darwin, Spencer and contemporaries, and extending through social Darwinism controversies to contemporary evolutionary anthropology research on human diversity in economic, mating, life-history, and social behavior. GE credit: SE, SL, WE. Effective: 2004 Fall Quarter.

ANT 054—Introduction to Primatology (4)
Lecture/Discussion—3 hours; Term Paper. Basic survey of the primates as a separate order of mammals; natural history and evolution of primates; consideration of hypotheses for their origin. GE credit: SE, SL, WE. Effective: 2007 Fall Quarter.

ANT 098—Directed Group Study (1-5)
Variable. Primarily intended for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

ANT 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

ANT 100—Theory in Social-Cultural Anthropology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Discussion of the theoretical and philosophical developments in cultural anthropology from the 19th century to the present. No credit if taken ANT 137. GE credit: SS, WE. Effective: 2016 Fall Quarter.

ANT 101—Ecology, Nature, and Society (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 001 or ANT 002 or ESP 030 or EVE 100 or BIS 101 recommended. Interdisciplinary study of diversity and change in human societies, using frameworks from anthropology, evolutionary ecology, history, archaeology, psychology, and other fields. Topics include population dynamics, subsistence transitions, family organization, disease, economics, warfare, politics, and resource conservation. (ESP 101.) GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 103—Indigenous Peoples and Natural Resource Conservation (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 or GEL 001 or ESP 030 recommended. Integration of the interests of resident and indigenous peoples with the conservation of natural resources and ecosystems, using case study examples from both the developing and developed world. Not open for credit for students who have completed ANT 121N. (Former ANT 121N.). GE credit: ACGH, DD, OL, SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 104N—Cultural Politics of the Environment (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Political economy of environmental struggles. Relationship between social inequality (based on race, class and/or gender) and ecological degradation. Articulation of local peoples, national policy, and the international global economy in the contestation over the use of environmental resources. Not open for credit to students who have completed ANT 134N. (Former ANT 134N.). GE credit: ACGH, DD, SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 105—Evolution of Societies and Cultures (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 001 or ANT 002 or ESP 030 or EVE 100 or BIS 101 recommended. Interdisciplinary study of social and cultural evolution in humans. Culture as a system of inheritance,psychology of cultural learning, culture as an adaptive system,evolution of maladaptations, evolution of technology and institutions,evolutionary transitions in human history, coevolution of genetic and cultural variation. Only two units of credit for students who have completed ESP 101 or ANT 101 prior to fall 2004. (ESP 105.) GE credit: QL, SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 109—Visualization in Science: A Critical Introduction (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 or STS 001 or STS 020 recommended. Anthropological approaches to scientific visualization techniques, informatics, simulations. Examination of different visualization techniques toward understanding the work involved in producing them, critical assessment of their power and limits, especially when visualizations are used socially to make claims. (STS 109.) GE credit: SS, VL, WE. Effective: 2016 Fall Quarter.

ANT 110—Language and Sociocultural Anthropology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Role of language analysis and linguistic theory in the development of sociocultural anthropology. Language, culture, and thought; the linguistic accomplishment of social action; language ideology; language and social power. Language as cultural mediator of politicoeconomic process. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 117—Language and Society (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 004 or LIN 001 recommended; ANT 002 recommended. Consideration of language in its social context. Methods of data collection and analysis; identification of socially significant linguistic variables. Contributions of the study of contextualized speech to linguistic theory. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 120—Language and Culture (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 004 or LIN 001 recommended; ANT 002 recommended. Culture, cognition, meaning, and interpretation; language and the classification of experience; communication and learning in crosscultural perspective. GE credit: ACGH, DD, SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 121—Special Topics in Medical Anthropology (4)
Lecture/Discussion—4 hours. Prerequisite(s): ANT 002 recommended. Introduction to critical medical anthropology. Topics include anthropological analysis of bio-medicine, psychiatry, systems of knowledge and healing, the body, emotions, and clinical encounters in a cross-cultural perspective. (STS 121.) GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 122A—Economic Anthropology (4)
Discussion—1 hour; Lecture—3 hours. The varieties of production, exchange, and consumption behavior in precapitalist economies, their interaction with culture and social-political organization, and the theories that account for these phenomena. The effects of capitalism on precapitalist sectors. Not open for credit to students who have completed ANT 122. (Former ANT 122.). GE credit: ACGH, DD, SS, WC, WE. Effective: 2001 Winter Quarter.

ANT 122B—Anthropology and Political Economy (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Survey of anthropological approaches to the study of political organizations; inter-relationships among political institutions, economic infrastructures and cultural complexity. Not open for credit to students who have completed ANT 123A. (Former ANT 123A.). GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 123AN—Resistance, Rebellion, and Popular Movements (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Analysis of popular protest in Third World and indigenous societies ranging from covert resistance to national revolts. Comparative case studies and theories of peasant rebellions, millenarian movements, social bandits, Indian "wars", ethnic and regional conflicts, gender and class conflicts. Not open for credit to students who have completed ANT 123B. (Former ANT 123B.). GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 124—Religion in Society and Culture (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 Discussion of anthropological theories of religion with emphasis on non-literate societies. Survey of shamanism, magic and witchcraft, ritual and symbols, and religious movements. Extensive discussion of ethnographic examples and analysis of social functions of religious institutions. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

ANT 124—Religion in Society and Culture (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Discussion of anthropological theories of religion with emphasis on non-literate societies. Survey of shamanism, magic and witchcraft, ritual and symbols, and religious movements. Extensive discussion of ethnographic examples and analysis of social functions of religious institutions. GE credit: AH, WC, WE. Effective: 2018 Fall Quarter.

ANT 125A—Structuralism and Symbolism (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Survey of anthropological approaches to understanding the logic of structuralism and symbolism in cultural analysis. Focus on how structural and symbolic interpretations relate to cultural and linguistic universals and to the philosophical basis of relativism in the social sciences. (Former course 125.) GE credit: SS, WC, WE. Effective: 2017 Winter Quarter.

ANT 125B—Postmodernism(s) and Culture (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. U.S.-European postmodern condition. "Modernity" as an incomplete project for subordinated groups. The economic, social, technological and political conditions leading to postmodern aesthetics, in comparison with postcolonialism, feminism and minority discourse. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 126A—Anthropology of Development (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Theories of development and current critiques. Colonial legacies and post-colonial realities. Roles of the state and NGOs, population migrations, changing gender identities, cash-earning strategies, and sustainability issues. Stresses importance of cultural understandings in development initiatives. Case studies emphasizing non-industrial societies. Not open for credit to students who have completed ANT 126. (Former ANT 126.). GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 126B—Women and Development (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Current Third World and Western development issues concerning women in agriculture, industry, international division of labor, political movements, revolutions, politics of health, education, family and reproduction. Impact of colonialism, capitalism, the world system, and international feminism on women and development. No credit if taken ANT 131. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 127—Urban Anthropology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002; or Consent of Instructor. Survey of approaches to urban living: political structures, organization
of labor, class relations, world views. The evolution of urban life and its contemporary dilemmas. Cross-cultural comparisons discussed through
case studies. GE credit: SS, WC, WE. Effective: 1997 Winter Quarter.

ANT 128A—Kinship and Social Organization (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Comparative examination of personal kinship, descent, marriage, household and family organizations; the theories that account for variation, and recent advances in the treatment of these data. Not open for credit to students who have completed ANT 128. (Former ANT 128.). GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 128B—Self, Identity, and Family (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Exploration of self, identity, and family systems cross-culturally. Impact of class, gender, race, ethnicity, ruralization, urbanization, and globalization on notions of selfhood in different social/cultural systems. Not open for credit to students who have completed ANT 129. (Former ANT 129.). GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 129—Health and Medicine in a Global Context (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ANT 002 recommended. Recent works in medical anthropology and the science studies of medicine dealing with social and cultural aspects of global health issues such as AIDS, pandemics, clinical trials, cultural differences in illnesses, diabetes, organ trafficking, medical technologies, illness narratives, and others. (STS 129.) GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 130A—Cultural Dimensions of Globalization (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Cultural dimensions of recent economic and political developments frequently termed "globalization." GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 130BN—Migration and the Politics of Place and Identity (4)
Lecture/Discussion—4 hours. Prerequisite(s): ANT 002 recommended. Internal and international migration from an anthropological perspective, including causes, processes, and political, economic, and cultural effects of spatial mobility and displacement. Emphasizes the interplay of identity, place, and power in diverse cultural and historical contexts. Not open for credit to students who have completed ANT 123D. (Former ANT 123D.). GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 131—Ecology and Politics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Analysis of the complex interactions between ecological dynamics and political processes employing the emerging approach of political ecology. Case studies of environmental degradation (e.g., desertification, logging, mineral extraction, petroleum, water) from various cultural and geographic regions. GE credit: SS. Effective: 2016 Fall Quarter.

ANT 132—Psychological Anthropology (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. History of the relationship between anthropology and psychoanalysis. Exploration of anthropology of emotions, colonial psychology, contemporary ethno-psychiatry, studies on personhood, possession, magic, altered states, subjectivity, and definitions of the normal and the pathological in different contexts and cultures. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 133—Anthropology of Ocean Worlds (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Exploration of various oceanic cultures and their engagement with the sea. Piracy, smuggling, exchange, maritime legal regimes, offshore policing, media infrastructures, and ocean ecologies. GE credit: SS, WC, WE. Effective: 2017 Winter Quarter.

ANT 134—Buddhism in Global Culture (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Class size limited to 50 students. Buddhist meditation and ritual as a cultural system that adapts to global and local forces of change. Anthropological theory and method in understanding global culture transmission, including Buddhist reform movements in Asia and Buddhist practice in the West. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 135—Media Anthropology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Upper division standing. Examining human practices through their inscription in old and new media; evaluating the emergent fields of "cyber" and "digital" anthropology; and problematizing terms and concepts routinely deployed in studies of media worlds—platform, social media, hologram, algorithm, remediation, curation, animation. GE credit: AH, SS, VL, WC. Effective: 2017 Winter Quarter.

ANT 136—Ethnographic Film (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Overview of the use of film in anthropology and its advantages and limitations in comparison to written ethnographic descriptions. Essential features of ethnographic films. Film production in anthropological research and problems encountered in producing films in the field. GE credit: SS, VL, WC, WE. Effective: 2016 Fall Quarter.

ANT 137—Meditation and Culture (4)
Discussion—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): ANT 002 recommended. Class size limited to 50 students. Study and practice of the relation between meditation and cultural conditioning; comparison of Buddhist practice with other cultural constructions of mind, body, brain, thought, emotion, and self. Effective: 2016 Fall Quarter.

ANT 138—Ethnographic Research Methods in Anthropology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Basic concepts in and approaches to ethnographic field research. Problem formulation, research design, qualitative and quantitative data collection procedures, and techniques for organizing, retrieving, and analyzing information. Ethnographic description and constructed inference. Students will organize and conduct individual research projects. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 139AN—Race, Class, Gender Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Comparative analysis of class/race/gender inequality, concentrating on the ways in which beliefs about descent, "blood," and biological difference interact with property and marital systems to affect the distribution of power in society. Not open for credit to students who have completed ANT 139. (Former ANT 139.). GE credit: ACGH, DD, SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 139BN—Gender and Sexuality (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Gender and sexuality in foraging bands, horticultural and pastoral tribes, agricultural and industrial states. Debates on cultural evolution and distribution of gender hierarchies. Impact of politics, economics, religion, social practices, women's movements on gender and sexuality. Culture, nature and sexuality. Not open for credit to students who have completed ANT 130. (Former ANT 130.). GE credit: ACGH, DD, SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 140A—Cultures and Societies of West and Central Africa (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Ethnographic survey of West Africa and Congo Basin with analyses of representative societies which illustrate problems of general theoretical concern. Major consideration will be the continuities and discontinuities between periods prior to European contact and the present. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 140B—Cultures and Societies of East and South Africa (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Ethnographic survey of Eastern and Southern Africa with analyses of selected societies which illustrate problems of interest to anthropologists. Major consideration will be given to continuities and discontinuities between periods prior to European contact and the present. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 141B—Ethnography of California and the Great Basin (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. ANT 002 recommended. Description and analysis of the native peoples of California and the Great Basin, and their lifeways at the time of European contact. (Former course 141C.) GE credit: ACGH, DD, SS, WE. Effective: 2016 Fall Quarter.

ANT 141C—People of the Arctic: Contemporary and Historic Cultures of the Circumpolar Region (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 or ANT 003 recommended. Social, economic, political, and religious lives of Russian, American, Canadian, and Greenlandic Arctic people (Yup'ik, Iñupiat, Inuit). Topics include Arctic ecosystems, archaeological record of human occupation, ethnohistorical and ethnographic accounts, arctic people in popular culture, and contemporary issues. Effective: 2016 Fall Quarter.

ANT 142—Peoples of the Middle East (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Peoples of the Middle East (including North Africa). Discussions of class relations, kinship organization, sex/gender systems, religious beliefs and behavior, ethnic relations, political systems. Impact of world systems, political and religious movements and social change. (Former course 136.) GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 143A—Ethnology of Southeast Asia (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Patterns of culture and social organization from prehistory to the present, in the context of historical, ecological, economic, and political settings. Emphasis on the relation of ethnic minorities to national states. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 144—Contemporary Societies and Cultures of Latin America (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Introduction to contemporary social structure of Latin America. Origins, maintenance and changes in inequality: economic responses to poverty, sociocultural responses to discrimination, and political responses to powerlessness. GE credit: SS, WC, WE. Effective: 2017 Winter Quarter.

ANT 145—Performance, Embodiment, and Space in South Asia (4)
Lecture/Discussion—4 hours. Prerequisite(s): ANT 002; or Consent of Instructor. South Asian cultures and societies with a focus on performance, embodiment, and space from several disciplinary fields. Topics may include colonialism, nationalism, religious traditions, media, popular culture, cities, social movements, modernity, body-cultures, identity, gender, and diasporas. GE credit: AH, SS, WC, WE. Effective: 2005 Winter Quarter.

ANT 146N—Topics in the Anthropology of Europe (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Recent ethnographies of different nation-states and socio-political spaces in Europe. Topics include the question of old and new boundaries, historical and contemporary constructions of Europe, migration and ethnicity, citizenship, belonging, multiculturalism, and post/socialisms. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 147—Modern South Asia Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): Upper-division standing or consent of instructor. South Asian cinema of last 100 years in the context of cultural, social, and political changes. South Asian history, Independence, Partition, urban life, class, migration, postcolonial identity, diaspora, gender, sexuality, religion, sport, performance, etc. (MSA 131B and CTS 146B.) GE credit: AH, SS, VL, WC, WE. Effective: 2017 Winter Quarter.

ANT 148A—Culture and Political Economy in Contemporary China (4)
Lecture/Discussion—4 hours. Prerequisite(s): ANT 002 recommended. Examining contemporary Chinese culture and political economy through reading ethnographic studies on recent transformations in rural and urban Chinese society. Special attention is given to state power, popular culture, spatial mobility, city space, and gender. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 149A—Traditional Japanese Society (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 002 recommended. Patterns of culture and social organization from prehistoric to early twentieth-century Japan. Origins, prehistory, and traditional religious and political systems, marriage and kinship, language and culture. Changes and continuities in traditional and contemporary Japanese culture are addressed. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 149B—Contemporary Japanese Society (4)
Discussion—1 hour; Lecture—3 hours. Introduction to contemporary Japanese social structure, social organization, and patterns of culture. Analysis of ruralurban
cultural continuities and contrasts, class relations, political and economic systems, kinship, sex/gender systems, contemporary religious beliefs and behavior, conflict, consensus, and cultural stereotypes. GE credit: SS, WC, WE. Effective: 1997 Winter Quarter.

ANT 151—Primate Evolution (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 001 or BIS 002B or BIS 002C or EVE 010 recommended. Origin and relationships of the prosimians, monkeys, and apes. GE credit: SE, WE. Effective: 2016 Fall Quarter.

ANT 152—Human Evolution (5)
Discussion—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): ANT 001 recommended. Nature and results of the evolutionary processes involved in the formation and differentiation of humankind. GE credit: SE, WE. Effective: 2016 Fall Quarter.

ANT 153—Human Biological Variation (5)
Discussion—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): ANT 001 or BIS 002B recommended. Origin, adaptive significance and methods of analysis of genetic differences among human populations. Special attention given to racial differences such as those in blood groups, plasma proteins, red cell enzymes, physiology, morphology, pigmentation and dermatoglyphics. GE credit: QL, SE, WE. Effective: 2016 Fall Quarter.

ANT 154A—The Evolution of Primate Behavior (5) ***Review all entries***
Discussion—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): ANT 001 or ANT 054 or EVE 010 recommended. Examines ecological diversity and evolution of social systems of prosimians, monkeys, and apes, placing the social behavior of the primates in the context of appropriate ecological and evolutionary theory. GE credit: SE, VL, WE. Effective: 2016 Fall Quarter.

ANT 154A—The Evolution of Primate Behavior (5) ***Review all entries***
Discussion—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): ANT 001 or ANT 054 or EVE 010 recommended. Examines ecological diversity and evolution of social systems of prosimians, monkeys, and apes, placing the social behavior of the primates in the context of appropriate ecological and evolutionary theory. GE credit: SE, WE. Effective: 2018 Fall Quarter.

ANT 154B—Primate Evolutionary Ecology (5)
Discussion/Laboratory—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): ANT 001 or EVE 010 recommended. Examination of the ecology of primates within an evolutionary framework. Theoretical concepts in individual, population, and community ecology, illustrated with primate (and other vertebrate) examples, with additional discussion of primate and rainforest conservation. GE credit: QL, SE, WE. Effective: 2017 Winter Quarter.

ANT 154C—Primate Behavior: Methods & Experimental Design (2)
Lecture/Discussion—2 hours. Prerequisite(s): (ANT 054 or ANT 154A or ANT 154B or NPB 102); (STA 013 or STA 013Y or STA 032 or STA 100 or SOC 046B); ANT 154CL (can be concurrent) Pass One restricted to upper division ANT majors; concurrent enrollment in ANT 154CL required. Scientific methods of studying, describing and analyzing the behavior and ecology of primates. (P/NP grading only.) GE credit: QL, SE, SL. Effective: 2018 Spring Quarter.

ANT 154CL—Laboratory in Primate Behavior (4) ***Review all entries***
Laboratory—6 hours; Term Paper. Prerequisite(s): (ANT 054 or ANT 154A or ANT 154BN); STA 013; Or equivalent of STA 013. Design and conduct of scientific "field studies" of the behavior of group-living primates at the California National Primate Research Center. GE credit: OL, SE, WE. Effective: 2008 Fall Quarter.

ANT 154CL—Laboratory in Primate Behavior (4) ***Review all entries***
Laboratory—6 hours; Term Paper. Prerequisite(s): (ANT 054 or ANT 154A or ANT 154B or NPB 102); (STA 013 or STA 013Y or STA 032 or STA 100 or SOC 046B); ANT 154C (can be concurrent); Concurrent enrollment with ANT 154C required. Pass One restricted to upper division Anthropology majors only. Design and conduct of scientific "field studies" of the behavior of group-living primates at the California National Primate Research Center. GE credit: OL, SE, WE. Effective: 2018 Fall Quarter.

ANT 155—Primate Conservation Biology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 001 or ANT 054 recommended. Study of the taxonomic, ecological and cultural diversity of Primates and how human activities impact tropical ecosystems. Emphasis on case studies and applied research methods. Includes discussion about career opportunities in conservation. GE credit: QL, SL. Effective: 2018 Spring Quarter.

ANT 156A—Human Osteology (4)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): ANT 001 or ANT 001Y recommended. Not open to students who have previously completed course 156. Human skeleton from archaeological, forensic, and paleontological perspectives, including anatomical nomenclature, variation with sex and age, function, evolution, growth, and development of bones and teeth. Hands-on study and identification of human skeletal remains. GE credit: SE. Effective: 2016 Fall Quarter.

ANT 156B—Advanced Human Osteology (4)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): ANT 156A; Or equivalent. Human skeletons from archaeological, forensic, and paleontological contexts. Bone and tooth structure, growth, and development; measurement, statistics, and biomechanics; assessment of age, sex, weight, height, and ancestry; and indicators of illness, injuries, diet, and activities. GE credit: SE. Effective: 2009 Spring Quarter.

ANT 157—Anthropological Genetics (3)
Lecture—3 hours. Prerequisite(s): ANT 001 or BIS 002C recommended. Method and theory of genetic and genomic analysis of molecular evolution of human and non-human primate populations. Special attention to the molecular evolutionary transition to humans and genetic differences among extant human populations and their adaptive significance. GE credit: QL, SE. Effective: 2016 Fall Quarter.

ANT 157L—Laboratory in Anthropological Genetics (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): ANT 157 (can be concurrent); ANT 001 or BIS 002C recommended; enrolled in ANT 157 concurrently or following. Methods for identifying genetic variation in human blood group antigens, serum proteins and red cell enzymes (hemaglutination), general electrophoresis on starch, cellulose acetate and polyacrylamide, immunodiffusion and immunoelectrophoresis on agarase. (P/NP grading only.) GE credit: QL, SE. Effective: 2016 Fall Quarter.

ANT 158—The Evolution of Females and Males: Biological Perspective (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 001 recommended. Current theoretical frameworks for explaining the evolution of sex differences and for understanding the interrelationship between biological processes and cultural construction of gender roles. GE credit: OL, SE, WE. Effective: 2016 Fall Quarter.

ANT 159—Molecular Anthropology of Native America (4)
Seminar—3 hours; Term Paper. Prerequisite(s): ANT 001 or ANT 001Y or BIS 002B; or Consent of Instructor. Use of DNA and other genetic polymorphisms to test hypotheses regarding genetic relationships among different Native American tribal groups and about prehistoric population replacements and migrations to and within the Americas. Integration with craniometric, archaeological, paleoenvironmental, linguistic and ethnohistorical evidence. GE credit: QL, SE. Effective: 2018 Spring Quarter.

ANT 160—Neandertals and Modern Human Origins (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 001 or ANT 001Y or equivalent recommended. Origins, evolution, and disappearance of Neandertals. Emergence of humans like us in both anatomy and behavior. Interpretation of the fossil and archaeological records of Europe and Africa. Genetics of living and fossil humans. GE credit: SE. Effective: 2016 Fall Quarter.

ANT 170—Archeological Theory and Method (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 003 recommended. Introduction to history and development of archeological theory and method, with particular emphasis on the basic dependence of the latter on the former. Stress is on historical development of archaeology in the New World. GE credit: SS, WE. Effective: 2016 Fall Quarter.

ANT 172—New World Prehistory: The First Arrivals (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 003 recommended. Survey of data relating to the peopling of the New World. Cultural adaptation and development of early inhabitants of North and South America. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 173—New World Prehistory: Archaic Adaptations (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. ANT 003 recommended. Introduction to and survey of prehistoric hunting and gathering adaptations across North America with particular emphasis on the East, Southeast, Midwest, Plains, Southwest, and Northwest. GE credit: SS, WE. Effective: 2016 Fall Quarter.

ANT 174—European Prehistory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 003 recommended. Survey of the prehistory of Europe from its earliest human inhabitants, to the Neandertals and first modern humans, and through early agricultural and complex societies. Analysis and interpretation of the European archaeological record for understanding human dispersals into Europe. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 175—Andean Prehistory: Archaeology of the Incas and their Ancestors (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 003 recommended. Prehistory of the Andean region, especially Peru, from the earliest hunting and gathering societies through the Inca. Focus on the use of archaeological data to reconstruct ancient human adaptations to the varied Andean environments. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 176—Prehistory of California and the Great Basin (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. ANT 003 recommended. Description and analysis of the prehistoric peoples of California and the Great Basin from earliest times to European contact. GE credit: ACGH, DD, SS, WE. Effective: 2016 Fall Quarter.

ANT 177—African Prehistory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 003 recommended. Survey of prehistory of Africa from early human ancestors, through modern human origins, and into early agricultural and complex societies and the Bantu expansion. Analysis and interpretation of the African archaeological record, incorporating human paleontology and genetics. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 178—Hunter-Gatherers (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 003 recommended. Study and interpretation of the ancient and modern lifeway in which peoples support themselves with primitive technologies and without benefit of domesticated plants and animals. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ANT 179—Asian Prehistory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 003 recommended. Survey of the prehistory of Asia from the earliest human occupations to the rise of complex societies. Special focus on fossil and archeological records. GE credit: SS. Effective: 2016 Fall Quarter.

ANT 180—Zooarchaeology (4)
Discussion/Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): ANT 001 or ANT 003 recommended. Restricted to junior or senior standing. Theories and methods for studying animal skeletal remains from archaeological sites. Identification and quantification of zooarchaeological material, cultural and natural processes affecting animal bones pre- and postburial, and use of faunal remains for determining past human diets and past environments. GE credit: SE. Effective: 2016 Fall Quarter.

ANT 181— Archaeological Field Methods (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): ANT 003 Survey of archeological field methods and techniques. Strategies for survey and site location, mapping of artifacts and features, geophysical techniques, and hand excavation and analysis of stratigraphy. GE credit: DD, SE, SL, SS. Effective: 2017 Fall Quarter.

ANT 181L—Field Course in Archeological Methods (4)
Fieldwork—5 sessions; Lecture/Discussion—5 sessions. Prerequisite(s): ANT 181; or Consent of Instructor. On-site course using archaeological methods and techniques held at a field location in the western United States, generally California or Nevada. Incorporates basic methods of archaeological survey, mapping, and excavation. GE credit: SE. Effective: 2017 Summer Special Session.

ANT 182—Archaeometry (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): ANT 003 recommended. Scientific techniques used to study the chemical and physical properties of archaeological materials. Types of anthropological questions that can be addressed with different methods. Preparation and analysis of archaeological materials. GE credit: QL, SE, VL, WE. Effective: 2016 Fall Quarter.

ANT 183—Laboratory in Archeological Analysis (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. ANT 003 recommended. Limited enrollment. Museum preparation, advanced field investigation, and guidance in preparation of museum material for publication. May be repeated for credit with consent of instructor. GE credit: OL, QL, SE, WE. Effective: 2016 Fall Quarter.

ANT 184—Prehistoric Technology: The Material Aspects of Prehistoric Adaptation (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 003 recommended. Examination of the role of lithic, ceramic, textile and wooden implements as elements in prehistoric survival and development. Emphasis is descriptive, but the significance of material resources as factors in prehistoric adaptation, settlement patterns, and culture change are discussed. GE credit: SS, WE. Effective: 2016 Fall Quarter.

ANT 185—Lithic Analysis (4)
Lecture/Lab—4 hours. Prerequisite(s): ANT 003 recommended. Basic concepts of lithic analysis. General introduction on the place of stone tool technology in the archeological record. Physics, terminology and methodological concepts behind the study of stone tools. Review of the development of stone tool technology from its emergence. GE credit: SS. Effective: 2016 Fall Quarter.

ANT 186A—Museum Studies: Analysis of Native American Basketry (4)
Discussion/Laboratory—1 hour; Lecture/Lab—3 hours. Class size limited to 25 students. Study of ethnographic and prehistoric basketry from North America, especially California and Oregon, in a multidisciplinary anthropological context. Techniques for basketry attribution and textile analysis. GE credit: ACGH, AH, DD, OL, SS, VL, WE. Effective: 2015 Fall Quarter.

ANT 191—Topics in Anthropology (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Upper division standing. Intensive treatment of a special anthropological topic or problem. May be repeated for credit. Effective: 2017 Fall Quarter.

ANT 192—Internship in Anthropology (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Work experience off and on campus in all subject areas offered in the
Department of Anthropology under the supervision of a member of the faculty. Limited to Anthropology majors. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

ANT 194H—Special Study for Honors Students (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Open only to majors of senior standing who qualify for honors program. Independent study of an anthropological problem involving the writing
of an honors thesis. May be repeated for a total of 12 units. May be repeated up to 12 unit(s). (P/NP grading only.) GE credit: WE. Effective: 1997 Winter Quarter.

ANT 197T—Tutoring in Anthropology (1-5)
Tutorial—1-5 hours. Prerequisite(s): Upper division standing with major in Anthropology and consent of Department Chairperson. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

ANT 198—Directed Group Study (1-5)
Discussion—3 hours. Prerequisite(s): Consent of Instructor. Directed reading and group discussion of selected anthropological problems. (P/NP grading only.) Effective: 1997 Winter Quarter.

ANT 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

ANT 200—History of Anthropology (4)
Lecture/Discussion—2 hours; Term Paper. Historical development of socio-cultural theory within anthropology, from mid-19th to mid-20th Centuries. Focus on original theory texts in context of historical developments in the field as a whole. Effective: 2007 Fall Quarter.

ANT 201—Critical Readings in Ethnography (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate student in Anthropology or consent of instructor. Critical readings of selected ethnographies that examine a wide range of important topics and analytical issues in social and cultural anthropology. Emphasis on how and why ethnographic writing has changed over time and its relationship with contemporary theoretical explorations. Effective: 2005 Spring Quarter.

ANT 202—History and Theory of Biological Anthropology (4)
Seminar—3 hours; Term Paper. History of thought in biological anthropology and analysis of major theoretical problems in the field. Suggested for all first-year graduate students lacking intensive preparation in biological anthropology. Effective: 1997 Winter Quarter.

ANT 203—History and Theory of Archaeology (4)
Seminar—3 hours; Term Paper. Generally restricted to graduate students; outstanding undergraduates with extensive training in archaeology with consent of instructor. History of archaeology and archaeological theory and analysis of archaeological research methodology. Effective: 2005 Fall Quarter.

ANT 204—Contemporary Issues in Anthropological Theory (4)
Seminar—3 hours; Term Paper. Prerequisite(s): ANT 002; ANT 137; or Consent of Instructor. Advanced consideration of fundamental issues in anthropological theory.
Emphasis on critical examination of major contemporary debates between proponents of competing theories. Effective: 1997 Winter Quarter.

ANT 205—History and Theory in Anthropological Linguistics (4)
Seminar—3 hours; Term Paper. History of thought in anthropological linguistics. Consideration of the historical development of fundamental ideas in anthropological linguistics, of major theoretical issues, and of research methodology. Effective: 1997 Winter Quarter.

ANT 206—Research Design and Method in Social Anthropology (5)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Formulation of research problems and preparation of research proposals; relationships between theory and method, funding, pre-fieldwork preparations, entering the community, field research techniques, and problems of ethics; intensive work on proposal writing. May be repeated up to 1 time(s). Effective: 1997 Winter Quarter.

ANT 207—Ethnographic Writing (4)
Seminar—3 hours; Term Paper. Prerequisite(s): ANT 137; ANT 201; Or the equivalent. Relationship between conducting participant observation of others and
writing it up,emphasizing the processual rift between the reality of fieldwork and its written representation. Study of various literary genres and textual strategies used in cultural anthropology. May be repeated for credit. Effective: 1997 Winter Quarter.

ANT 210—Aspects of Culture Structure (4)
Seminar—3 hours; Term Paper. Analysis of various phases of culture, such as religion, economics, law,
and folklore. May be repeated for credit when topic differs. May be repeated for credit. Effective: 1997 Winter Quarter.

ANT 212—Political Ecology (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Interdisciplinary seminar evaluating contributions from ecological anthropology, political economy, cultural constructivism, postmodernism, and feminism towards development of theories of political ecology. Historical relationships between local/global power structures, environmental degradation, and resistance movements. Case studies of desertification, deforestation, mining, conservation, development. Effective: 1999 Spring Quarter.

ANT 216—Problems in Archeological Method (4)
Seminar—3 hours; Term Paper. Techniques for analyzing archeological data; application to various prehistoric cultures. May be repeated for credit with consent of instructor. May be repeated for credit. Effective: 1997 Winter Quarter.

ANT 217—Quantitative Modeling in Archaeology (4)
Lecture/Discussion—3 hours; Term Paper. Examination of the nature of archaeological data with a focus on the quantitative and statistical techniques available to model, analyze, display, and make sense of such data. Effective: 2007 Fall Quarter.

ANT 218—Topics in New World Prehistory (4)
Seminar—3 hours; Term Paper. Advanced study on current problems in New World Prehistory and archaeology. May be repeated for credit only if material is unique for that student and with consent of instructor. May be repeated for credit. Effective: 2008 Fall Quarter.

ANT 219—Topics in Old World Prehistory (4)
Seminar—3 hours; Term Paper. Advanced study on current problems in Old World prehistory and archaeology. May be repeated for credit only if material is unique for that student and with consent of instructor. Effective: 2008 Fall Quarter.

ANT 220—Field Course in Linguistics (4)
Laboratory—2 hours; Seminar—2 hours. Prerequisite(s): ANT 110; ANT 111 Techniques of eliciting, recording, and analyzing; work with a native
speaker. Effective: 1997 Winter Quarter.

ANT 221—Rural Transformation in Postcolonial Societies (4)
Seminar—3 hours; Term Paper. Prerequisite(s): ANT 223; ANT 265; or Consent of Instructor. Problems of rural transformation arising out of political and economic interaction between national elites and rural regional and local populations under varying conditions of induced change in postcolonial societies. Attention will be given to the implications of this interaction for rapid economic growth. May be repeated for credit. Effective: 1997 Winter Quarter.

ANT 222—Cities and Citizenship (4)
Seminar—3 hours; Term Paper—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Explores the nature of modern cities, urban socioeconomic life, and urban culture and politics from an anthropological perspective. Effective: 2000 Fall Quarter.

ANT 223—Economic Anthropology (4)
Seminar—3 hours; Term Paper. Prerequisite(s): ANT 122; or Consent of Instructor. Selected current methodological and theoretical problems in the analysis
of nonindustrial economic systems. Effective: 1997 Winter Quarter.

ANT 224—Problems in Comparative Religion (4)
Seminar—3 hours; Term Paper. Advanced study of current problems in the anthropological study of religion. Effective: 1997 Winter Quarter.

ANT 225—State and Nation in the Modern World (4)
Seminar—3 hours; Term Paper. A presentation of current anthropological theories of the origins and nature of the modern nation-state in both the First and Third Worlds, with special reference to state ideology (nationalism) and forms of control. Effective: 1997 Winter Quarter.

ANT 226—Consciousness and Resistance (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Completion of first-year graduate work or consent of instructor. Consideration of approaches to the study of social inequality, and responses of subordinated groups. Emphasis on situating approaches to contemporary social theory, concrete research problems, and political strategies. Topics: formation of consciousness and identity; collective action, accommodation to frontal resistance. Effective: 1997 Winter Quarter.

ANT 228—Culture and Power (4)
Extensive Writing; Seminar—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Exploration of one of the core paradigms within contemporary anthropological inquiry, "culture and power." Focus on how distinct theoretical perspectives--Marxism, post-Marxism, structuralism, post-structuralism, and feminism--have examined the mutually constitutive nature of culture and power. Effective: 1999 Fall Quarter.

ANT 229—Gender, Identity, and Self (4)
Seminar—3 hours; Term Paper—1 hour. Intersections of gender, identity, and selfhood cross-culturally and historically. How the self is feminized and masculinized, and interfaces with sexual, race, class, work, national, minority, and majority identities under different historical, cultural, and social structural conditions. May be repeated for credit. Effective: 1997 Winter Quarter.

ANT 230—Family Systems and Reproduction: Theory and Comparisons (4)
Lecture—1.5 hours; Seminar—1.5 hours; Term Paper. Prerequisite(s): Graduate standing in one of the social sciences including History. Comparative examination of family systems in historical context and of reproductive behaviors and strategizing. A major theme is how family-system norms specify the relative desirability of differently configured offspring sets.Cases are drawn from Western Europe and South and East Asia. Effective: 1997 Winter Quarter.

ANT 232—Political Movements (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Completion of first-year graduate work recommended. An interdisciplinary approach to political movements of protest, reform, and revolution emphasizing historical comparison and evaluation of major theoretical approaches including world systems, resource mobilization,
state and culture, rational choice, moral economy, social class and gender. Effective: 1997 Winter Quarter.

ANT 239—Problems in African Society and Culture (4)
Seminar—3 hours; Term Paper. Diachronic analyses of traditional institutions in sub-Saharan Africa. Effective: 1997 Winter Quarter.

ANT 241—Topics in North American Ethnology (4)
Seminar—3 hours; Term Paper. Advanced study on current problems in North American ethnography and culture history. May be repeated for credit with consent of instructor. May be repeated for credit. Effective: 1997 Winter Quarter.

ANT 245—Ethnology of Northern and Central Asia (4)
Seminar—3 hours; Term Paper. Prerequisite(s): A reading knowledge of German, Russian, Chinese, or Japanese. Lectures on the culture aboriginally found north of the Caucasus-Korea line. Supervised study of the primary and secondary sources. Work with
informants when available. Effective: 1997 Winter Quarter.

ANT 246—Ethnology of Europe (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Reading knowledge of a European language other than English. Supervised study of the primary and secondary sources dealing with the ethnography and ethnology of the peoples of Europe. Emphasis upon folk, peasant, and minority groups. Effective: 1997 Winter Quarter.

ANT 248—Topics in Chinese Culture and Society (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing in the social sciences, history, or the humanities. Selected topics in the anthropology of Chinese society. Focus on one or more of the following topics: state-society dynamics, family and gender, city formation and urban life, social movement, labor politics, and religion and ideology in Chinese society. May be repeated for credit when topic differs. Effective: 1999 Fall Quarter.

ANT 250—Behavioral Ecology of Primates (4)
Seminar—3 hours; Term Paper. Prerequisite(s): ANT 154A (can be concurrent); Or the equivalent, graduate standing. Concepts, issues, and hypotheses in primate behavioral ecology, with emphasis on the social and ecological determinants and consequences of variation in social organization for individuals. Effective: 2003 Fall Quarter.

ANT 252—Human Evolution Seminar (4)
Seminar—3 hours; Term Paper. Prerequisite(s): ANT 152; and Consent of Instructor. Or the equivalent of ANT 152. Study of selected topics in human evolutionary studies. Each year course will focus on one or more of the following: molecular evolution, primate evolutionary biology, Tertiary hominoids, Australopithecus, Homo erectus, archaic Homo sapiens, brain evolution. May be repeated for credit. May be repeated for credit. Effective: 1997 Winter Quarter.

ANT 253—Seminar in Human Biology (4)
Seminar—3 hours; Term Paper. Prerequisite(s): ANT 153; ANT 157; or Consent of Instructor. Study of selected topics in human biology. May be repeated for credit when topics vary. Effective: 1997 Winter Quarter.

ANT 254—Current Issues in Primate Sociobiology (4)
Seminar—3 hours; Term Paper. Prerequisite(s): ANT 154B; Or the equivalent. Analysis of primate behavior, with particular emphasis on preparation for field studies. May be repeated for credit when topic differs. May be repeated for credit. Effective: 1997 Winter Quarter.

ANT 256—Primate Conservation Biology (4)
Seminar—3 hours; Term Paper. Prerequisite(s): ANT 154; Graduate standing, or upper division undergraduates with consent of instructor. Class size limited to 10 students. Application of understanding of primate biology to conservation of primates and their habitat. Topics include evolutionary anthropology, behavioral ecology, biogeography, macroecology, population biology, and socio-ecology of primates. May be repeated up to 1 time(s) term paper differs. (S/U grading only.) Effective: 2003 Spring Quarter.

ANT 261—Modeling the evolution of social behavior (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 016C; or Consent of Instructor. Or equivalent of MAT 016C. Tools and topics in modeling the evolution of social behavior in humans and other animals. Game theory, basic population genetics, animal conflict, altruism, reciprocity, signaling, and group selection. Effective: 2003 Spring Quarter.

ANT 262—Evolution and Human Behavior (4)
Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing, or consent of instructor. Exploration of the links between behavioral ecological theory and human cultural variation, focusing on reproduction, marriage, parental investment and family structure; implications of evolutionary theory for social organization in human communities, historical and contemporary. Effective: 2005 Spring Quarter.

ANT 263—Human Applications of Foraging Theory (4)
Discussion—3 hours; Laboratory—3 hours. Foraging theory models and their use in ethnographic and archaeological analyses of human behavior, with a focus on hunter-gatherers and resource selection, patch use, population and habitat, central places, sharing, stochastic processes, population dynamics, and conservation behavior. Not open for credit to students who have completed ANT 258. Effective: 2004 Fall Quarter.

ANT 265—Language, Performance, and Power (4)
Seminar—3 hours; Term Paper. Restricted to graduate standing or consent of instructor. Exploration of the intersection between linguistic and social theories in the language-state relation and the performance of identity. Ideological sources of language differentiation; nation-building and linguistic difference. Political economic, sociolinguistic, and ethnographic approaches to understanding linguistic inequality. (LIN 265.) Effective: 2003 Fall Quarter.

ANT 270—Anthropology Colloquium Seminar (1)
Seminar—1 hour. Reports and discussions of recent advances in the four subfields of anthropology. To be presented by guest speakers. May be repeated twice for credit. May be repeated up to 2 time(s). (S/U grading only.) Effective: 1997 Winter Quarter.

ANT 280—Current Anthropology Journal Editorial Workshop (4)
Independent Study—3 hours; Workshop—1 hour. Prerequisite(s): Consent of Instructor. Students must enroll for all three quarters. Reading and offering workshop critiques of manuscripts submitted for publication, and reading and discussion of other relevant work in anthropology and human ecology. Track and edit published comments and authors' replies that accompany major features. Participation in the development of new sections for the electronic edition of the journal, including a "news and views" section and a debate section. May be repeated up to 12 unit(s) with consent of instructor. (ECL 280.) (S/U grading only.) Effective: 2000 Fall Quarter.

ANT 291—Advanced Topics in Human Behavioral Ecology (4)
Discussion—3 hours; Term Paper. Prerequisite(s): ANT 261 or ANT 262 or ANT 263; and Consent of Instructor. Or comparable experience in anthropology or related disciplines. Topically focused, critical discussion of current and emerging research in the field of human behavioral ecology, giving special attention to theory, concepts, models, and methods for the evolutionary analysis of ethnographic and archaeological evidence. May be repeated up to 1 time(s) the topic differs and the material covered is substantially different. Effective: 2004 Fall Quarter.

ANT 292—Seminar in Linguistic Anthropology (4)
Seminar—3 hours; Term Paper—1 hour. Selected topics in linguistic anthropology. May be repeated for credit
when topic differs. May be repeated for credit. Effective: 1997 Winter Quarter.

ANT 298—Group Study (1-4)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

ANT 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

ANT 299D—Dissertation Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

ANT 390—Teaching Anthropology (4)
Practice—1 hour; Seminar—3 hours. Prerequisite(s): Graduate standing in Anthropology or closely related discipline. Intellectual and practical elements of college teaching in the field of Anthropology, from curriculum design and the syllabus through grading and course evaluations, including classroom and information technology methods, and problems and rewards of teaching in higher education. Effective: 2004 Fall Quarter.

ANT 396—Teaching Assistant Training Practicum (1-4)
Variable—3-36 hours. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

APC VM - Anatomy, Physiology & Cell Biology

Courses in APC:

APC 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Internship experience off and on campus in all subject areas offered in the Department of Anatomy, Physiology & Cell Biology. Internships are supervised by a member of the faculty. May be repeated for credit. (P/NP grading only.) Effective: 2007 Winter Quarter.

APC 099—Special Study for Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2007 Winter Quarter.

APC 100—Comparative Vertebrate Organology (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (BIS 001A, BIS 001B) or (BIS 002A, BIS 002B) Functional anatomy of major organ systems in vertebrates. Each system examined from cellular to gross level in fish, birds, and mammals. Emphasis on how differentiated cell types are integrated into tissues and organs to perform diverse physiological functions. (NPB 123.) Effective: 2015 Fall Quarter.

APC 192—Internship (1-15)
Internship—3-45 hours. Prerequisite(s): Upper-division standing; approval of internship. Internship experience off and on campus in all subject areas offered in the Department of Anatomy, Physiology & Cell Biology. Internships are supervised by a member of the faculty. May be repeated for credit when topic differs. (P/NP grading only.) Effective: 2004 Spring Quarter.

APC 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

APC 199—Special Study for Advanced Undergraduates (1-5)
Laboratory—3-15 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

APC 286—Basics of Microscopy and Cellular Imaging (2)
Laboratory—2 hours; Lecture—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Class size limited to 20 students. Practical applications of basic microscope techniques used to image cells and tissues with the goal of using these techniques to generate publication quality images. Principles of light, epifluorescent, confocal and electron microscopy, their applications and limitations. Effective: 2005 Spring Quarter.

APC 290—Seminar (1)
Seminar—1 hour. Discussion and critical evaluation of advanced topics and current trends in research. (P/NP grading only.) Effective: 1997 Winter Quarter.

APC 291—Topics in Biology of Respiratory System (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Topics concerning structure and function of respiratory system. Possible topics include: lung growth, pulmonary reaction to toxicants, pulmonary inflammation, lung metabolism, biology of lung cells, tracheobronchial epithelium, nasal cavity structure and function. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

APC 298—Group Study (1-5)
Laboratory—6-15 hours. Prerequisite(s): Consent of Instructor. Effective: 1997 Winter Quarter.

APC 299—Research (1-12)
Laboratory—6-36 hours. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

ARB Arabic

Courses in ARB:

ARB 001—Elementary Arabic 1 (5)
Lecture/Discussion—5 hours. Introduction to basic Arabic. Interactive and integrated presentation of listening, speaking, reading, and writing skills, including the alphabet and basic syntax. Focus on standard Arabic with basic skills in spoken Egyptian and/or one other colloquial dialect. GE credit: AH, WC. Effective: 2014 Fall Quarter.

ARB 001A—Accelerated Intensive Elementary Arabic (15)
Lecture/Discussion—15 hours. Special 12-week accelerated, intensive summer session course that combines the work of courses ARB 1, 2, and 3. Introduction to Modern Standard Arabic through development of all language skills in a cultural context with emphasis on communicative proficiency. Not open for credit to students who have completed ARB 001, ARB 002, or ARB 003. GE credit: AH, WC. Effective: 2014 Summer Special Session.

ARB 002—Elementary Arabic 2 (5)
Lecture/Discussion—5 hours. Prerequisite(s): ARB 001; or Consent of Instructor. Continuation of basic Arabic from course 1. Interactive and integrated presentation of listening, speaking, reading, and writing skills, including syntax. Focus on standard Arabic and limited use of spoken Egyptian and/or one other colloquial dialect. GE credit: AH, WC. Effective: 2016 Spring Quarter.

ARB 003—Elementary Arabic 3 (5)
Lecture/Discussion—5 hours. Prerequisite(s): ARB 002; or Consent of Instructor. Continuation of introduction to basic Arabic from courses 1 and 2. Interactive and integrated presentation of listening, speaking, reading, and writing skills, including syntax. Focus on standard Arabic with limited use of spoken Egyptian and/or one other colloquial dialect. GE credit: AH, WC. Effective: 2016 Spring Quarter.

ARB 021—Intermediate Arabic 21 (4)
Lecture/Discussion—4 hours. Prerequisite(s): ARB 003; or Consent of Instructor. Builds on courses 1, 2, and 3. Interactive and integrated presentation of listening, speaking, reading, and writing skills, including idiomatic expression. Focus on standard Arabic with limited use of Egyptian and/or one other colloquial dialect. GE credit: AH, OL, WC. Effective: 2017 Spring Quarter.

ARB 021A—Accelerated Intensive Intermediate Arabic (15)
Lecture/Discussion—15 hours. Special 12-week accelerated, intensive summer session course that combines the work of courses ARB 21, 22, and 23. Modern Standard Arabic through development of all language skills in a cultural context with emphasis on communicative proficiency. Not open for credit to students who have completed ARB 021, ARB 022, or ARB 023. GE credit: AH, WC. Effective: 2017 Summer Special Session.

ARB 021C—Colloquial Egyptian Arabic (4)
Lecture/Discussion—3 hours; Lecture/Lab—1 hour. Prerequisite(s): ARB 003; or Consent of Instructor. Continuation of the Colloquial Egyptian Arabic covered in the first year of Arabic; courses 1, 2, and 3. May be repeated up to 1 time(s) if instruction material changes. GE credit: AH, OL, WC. Effective: 2017 Spring Quarter.

ARB 021L—Colloquial Levantine Arabic (4)
Lecture/Discussion—4 hours. Prerequisite(s): ARB 003; or Consent of Instructor. Continuation of colloquial Levantine Arabic presented in Arabic 1,2 and 3. Integrated presentation of speaking and listening skills in colloquial Levantine Arabic, with reading and writing in Modern Standard Arabic that is related to Levantine cultural production and social life. GE credit: AH, OL, WC. Effective: 2017 Fall Quarter.

ARB 022—Intermediate Arabic 22 (4)
Lecture/Discussion—4 hours. Prerequisite(s): ARB 021; or Consent of Instructor. Continuation of course 21. Interactive and integrated presentation of listening, speaking, reading, and writing, including idiomatic expression. Focus on standard Arabic with limited use of Egyptian and/or one other colloquial dialect. GE credit: AH, OL, WC. Effective: 2017 Spring Quarter.

ARB 022C—Colloquial Egyptian Arabic (4)
Lecture/Discussion—3 hours; Lecture/Lab—1 hour. Prerequisite(s): ARB 021C; or Consent of Instructor. Continuation of the Colloquial Egyptian Arabic covered in first year of Arabic; courses 1, 2, and 3 and the first quarter of Colloquial Arabic course 21C. May be repeated up to 1 time(s) if instruction material changes. GE credit: AH, OL, WC. Effective: 2017 Spring Quarter.

ARB 022L—Colloquial Levantine Arabic (4)
Lecture/Discussion—4 hours. Prerequisite(s): ARB 021L; or Consent of Instructor. Continuation of colloquial Levantine Arabic presented in Arabic 021L. Integrated presentation of speaking and listening skills in colloquial Levantine Arabic; reading and writing in Modern Standard Arabic related to Levantine social life. GE credit: AH, OL, WC. Effective: 2018 Winter Quarter.

ARB 023—Intermediate Arabic 23 (4)
Lecture/Discussion—4 hours. Prerequisite(s): ARB 022; or Consent of Instructor. Continuation of courses 21 and 22. Interactive and integrated presentation of Arabic listening, speaking, reading, and writing skills, including idiomatic expression. GE credit: AH, OL, WC. Effective: 2017 Fall Quarter.

ARB 023C—Colloquial Egyptian Arabic (4)
Lecture/Discussion—3 hours; Lecture/Lab—1 hour. Prerequisite(s): ARB 022C; or Consent of Instructor. Continuation of Colloquial Egyptian Arabic covered in course 22C. May be repeated up to 1 time(s) if instruction material changes. GE credit: AH, OL, WC. Effective: 2017 Spring Quarter.

ARB 023L—Colloquial Levantine Arabic (4)
Lecture/Discussion—4 hours. Prerequisite(s): ARB 022L; or Consent of Instructor. Continuation of colloquial Levantine Arabic presented in Arabic 022L. Integrated presentation of speaking and listening skills in colloquial Levantine Arabic; reading and writing in Modern Standard Arabic related to Levantine social life. GE credit: AH, OL, WC. Effective: 2017 Fall Quarter.

ARB 098—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Directed group study. May be repeated for credit. (P/NP grading only.) Effective: 2017 Winter Quarter.

ARB 099—Special Study for Undergraduates (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special study. May be repeated for credit. (P/NP grading only.) Effective: 2017 Winter Quarter.

ARB 101A—Readings in Arabic: 600-1850 (4)
Discussion—3 hours; Extensive Writing. Prerequisite(s): ARB 123; or Consent of Instructor. Readings in Arabic. Poetry, prose literature, and selections from texts on religion, history, politics, science, philosophy and mysticism. May be repeated up to 1 time(s) Students can repeat the course if the instructor decides that they would benefit from additional practice working on the different selections from the same texts or if 50% or more of the texts are different. GE credit: AH, OL, SS, WC, WE. Effective: 2016 Fall Quarter.

ARB 121—Advanced Arabic (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ARB 023; or Consent of Instructor. Review, refinement, and development of skills learned in intermediate Arabic through work with texts, video, and audio on cultural and social issues. Integrated approach to reading, writing, listening, speaking primarily standard Arabic, with limited use of one colloquial dialect. May be repeated up to 2 time(s) based on different readings. GE credit: AH, WC. Effective: 2011 Fall Quarter.

ARB 122—Advanced Arabic (4)
Lecture/Discussion—3 hours. Prerequisite(s): ARB 121; or Consent of Instructor. Continuation of course 121. Further development of advanced skills in reading, listening, writing, and speaking standard Arabic through work with texts, video, and audio on cultural and social issues. Limited use of one colloquial dialect. GE credit: AH, WC. Effective: 2009 Winter Quarter.

ARB 123—Advanced Arabic (4)
Lecture/Discussion—3 hours. Prerequisite(s): ARB 122; or Consent of Instructor. Continuation of course 122. Further development of advanced skills in reading, listening, writing, and speaking standard Arabic through work with texts, video, and audio on cultural and social issues. Limited use of one colloquial dialect. GE credit: AH, WC. Effective: 2009 Spring Quarter.

ARB 140—A Story for a Life: The Arabian Nights (4)
Lecture/Discussion—3 hours; Term Paper. In-depth exploration of The Arabian Nights, the best-known work of pre-modern Arabic literature and a major work of world literature. Analysis of the work in its historical context and in comparison to other frame tales in world literature. (COM 172 and MSA 121C.) GE credit: AH, WC, WE. Effective: 2016 Winter Quarter.

ARB 141—Readings in Modern Arabic Literature (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): ARB 123; or Consent of Instructor. Readings of modern Arabic poetry and fiction in original format, assisted by instructor-prepared glossaries and other supplementary material. Readings to be followed by class discussion and short writing assignments in Arabic. Open to students at advanced proficiency in Arabic. May be repeated up to 1 time(s) if reading material changes. GE credit: AH, WC. Effective: 2014 Fall Quarter.

ARB 198—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Development of reading, writing, speaking, and listening skills in advanced Arabic. Materials may include al-Kitaab Part Two or Three, news articles and broadcasts, short stories, poetry, novels, essays, scripture, prophetic traditions, audio recordings, and television and film. May be repeated up to 4 time(s) content differs. Effective: 2008 Fall Quarter.

ARB 297—Directed Independent Study (4)
Discussion—1 hour; Independent Study. Prerequisite(s): Graduate standing or consent of instructor. Restricted to graduate students. Directed Independent Study on a topic culminating in a term paper. Independent Study may only be arranged with consent of the instructor when graduate seminars are unavailable. Topic varies by instructor. May be repeated up to 5 time(s) when no graduate seminars are available and topic differs. Effective: 2015 Fall Quarter.

ARB 299—Individual Study (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. Restricted to graduate students. May be repeated for credit. (S/U grading only.) Effective: 2014 Winter Quarter.

ARB 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. Restricted to graduate students. May be repeated up to 18 time(s). (S/U grading only.) Effective: 2014 Winter Quarter.

ARE Agricultural and Resource Economics

Courses in ARE:

ARE 001—Economic Basis of the Agricultural Industry (4)
Lecture—4 hours. Agriculture and man; the agricultural industry in U.S. and world economies; production and supply, marketing and demand; agricultural
land, capital and labor markets; economic and social problems of agriculture in an urban and industrialized economy emphasizing California. GE credit: SS. Effective: 1997 Winter Quarter.

ARE 001S—Economic Basis of the Agricultural Industry (4)
Lecture—4 hours. Agriculture and man; the agricultural industry in Australia and world economies; production and supply, marketing and demand; agricultural land, capital and labor markets; economic and social problems of agriculture in an urban and industrialized economy emphasizing Australia. Taught in Australia under the supervision of a UC Davis faculty member. Not open for credit to students who have taken ARE 001. GE credit: SS, WC. Effective: 2004 Fall Quarter.

ARE 015—Population, Environment and World Agriculture (4)
Discussion—1 hour; Lecture—3 hours. Economic analysis of interactions among population, environment, natural resources and development of world agriculture. Introduces students to economic thinking about population growth, its causes and consequences
for world food demand, and environmental and technological limits to increasing food supplies. GE credit: SS, WC, WE. Effective: 1997 Winter Quarter.

ARE 018—Business Law (4)
Lecture—4 hours. Prerequisite(s): Sophomore standing. General principles of business law in the areas of contracts, business organization, real property, uniform commercial code, sales, commercial paper, employment relations, and creditor-debtor against a background of the history and functioning of our present legal system. GE credit: SS. Effective: 1997 Winter Quarter.

ARE 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Restricted to lower division students. (P/NP grading only.) GE credit: SS. Effective: 1997 Winter Quarter.

ARE 099—Special Study for Undergraduates (1-5)
Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SS. Effective: 1997 Winter Quarter.

ARE 100A—Intermediate Microeconomics: Theory of Production and Consumption (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ((ECN 001A C- or better or ECN 001AV C- or better); ECN 001B C- or better); ((MAT 016A C- or better, MAT 016B C- or better, MAT 016C C- or better) or (MAT 017A C- or better, MAT 017B C- or better) or (MAT 021A C- or better, MAT 021B C- or better)) Pass One open to Managerial Economics (AMGE), Animal Science and Management (AANM), and Textiles and Clothing (ATXC) Majors and Agricultural and Resource Economics (GARE), International Agricultural Development (GIAD), Viticulture and Enology (GVEN) and Transportation Technology and Policy (GTTP) Graduate Majors. Theory of individual consumer and market demand; theory of production and supply of agricultural products, with particular reference to the individual firm; price determination, and employment of resources under pure competition. Not open for credit to students who have completed ECN 100. GE credit: QL, SS. Effective: 2018 Winter Quarter.

ARE 100B—Intermediate Microeconomics: Imperfect Competition, Markets and Welfare Economics (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A C- or better Pass One open to Managerial Economics Majors (AMGE) and Agricultural and Resource Economics (GARE) Graduate Majors. Price determination, and employment of resources under conditions of monopoly, oligopoly, and monopolistic competition. GE credit: QL, SS. Effective: 2017 Spring Quarter.

ARE 100B—Intermediate Microeconomics: Imperfect Competition, Markets and Welfare Economics (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A C- or better; ((ECN 001A C- or better or ECN 001AV C- or better); ECN 001B C- or better); ((MAT 016A C- or better, MAT 016B C- or better, MAT 016C C- or better) or (MAT 017A C- or better, MAT 017B C- or better) or (MAT 021A C- or better, MAT 021B C- or better)) Pass One open to Managerial Economics Majors (AMGE) and Agricultural and Resource Economics (GARE) Graduate Majors. Price determination, and employment of resources under conditions of monopoly, oligopoly, and monopolistic competition. GE credit: QL, SS. Effective: 2018 Summer Session 1.

ARE 106—Econometric Theory and Applications (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A C- or better; STA 103 C- or better Pass One open to Managerial Economics Majors (AMGE) and Agricultural and Resource Economics (GARE) Graduate Majors. Statistical methods for analyzing data to solve problems in managerial economics. Topics include the linear regression model, methods to resolve data problems, and the economic interpretation of results. Not open for credit to students who have enrolled in or completed Economics 140. GE credit: QL, SS. Effective: 2017 Spring Quarter.

ARE 106—Econometric Theory and Applications (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A C- or better; (STA 013 C- or better or STA 013Y C- or better); STA 103 C- or better Pass One open to Managerial Economics Majors (AMGE) and Agricultural and Resource Economics (GARE) Graduate Majors. Statistical methods for analyzing data to solve problems in managerial economics. Topics include the linear regression model, methods to resolve data problems, and the economic interpretation of results. Not open for credit to students who have enrolled in or completed ECN 140. GE credit: QL, SS. Effective: 2018 Summer Session 1.

ARE 107—Econometrics for Business Decisions (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 106 Pass One open to Managerial Economics majors; Pass Two open to majors in the College of Agricultural and Environmental Sciences. Covers state-of-the art econometric and statistical methods for causal and predictive modeling with applications to finance and marketing. GE credit: SS. Effective: 2015 Fall Quarter.

ARE 107—Econometrics for Business Decisions (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 106; ARE 100A C- or better; (STA 013 C- or better or STA 013Y C- or better); STA 103 C- or better Pass One open to Managerial Economics majors; Pass Two open to majors in the College of Agricultural and Environmental Sciences. Covers state-of-the art econometric and statistical methods for causal and predictive modeling with applications to finance and marketing. GE credit: SS. Effective: 2018 Fall Quarter.

ARE 112—Fundamentals of Organization Management (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): Upper-division standing. Pass One restricted to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Role of organizational design and behavior in business and public agencies. Principles of planning, decision making, individual behavior, management, leadership, informal groups, conflict and change in the organization. GE credit: SS. Effective: 2017 Fall Quarter.

ARE 112—Fundamentals of Organization Management (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): Upper-division standing recommended. Pass One restricted to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Role of organizational design and behavior in business and public agencies. Principles of planning, decision making, individual behavior, management, leadership, informal groups, conflict and change in the organization. GE credit: SS. Effective: 2018 Summer Session 1.

ARE 113—Fundamentals of Marketing Management (4)
Lecture—4 hours. Prerequisite(s): ECN 001A or ECN 001AV; For non-majors only. Nature of product marketing by the business firm. Customer-product relationships, pricing and demand; new product development and marketing strategy; promotion and advertising; product life cycles; the distribution system; manufacturing, wholesaling, retailing. Government regulation and restraints. Not open for credit to students who have completed ARE 136. GE credit: SS. Effective: 2018 Winter Quarter.

ARE 115A—Economic Development (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ECN 001B Major issues encountered in emerging from international poverty, problems of growth and structural change, human welfare, population
growth and health, labor markets and internal migration. Important issues of policy concerning international trade and industrialization. (ECN 115A.) GE credit: SS, WC. Effective: 2018 Winter Quarter.

ARE 115B—Economic Development (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ECN 001B Macroeconomic issues of developing countries. Issues include problems in generating capital, conduct of monetary and fiscal policies, foreign aid and investment. Important issues of policy concerning international borrowing and external debt of developing countries. (ECN 115B.) GE credit: SS, WC. Effective: 2018 Spring Quarter.

ARE 118—Tax Accounting (4)
Lecture—4 hours. Prerequisite(s): MGT 011A; MGT 011B; ARE 018 recommended. Development and application of a framework to understand the tax effects of typical management decisions on both entities and their owners. Impacts that different methods of taxation have on business entities with emphasis on tax planning, using income and deduction strategies, retirement plans, and choice of business entity for tax minimization. Effective: 2000 Spring Quarter.

ARE 119—Intermediate Managerial Accounting (4)
Extensive Problem Solving—8 hours; Lecture—4 hours. Prerequisite(s): MGT 011A; MGT 011B Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Use of accounting information by mangers in decision making, planning, directing and controlling operations. Focuses on managerial/cost accounting theory and practice. Covers costing systems, budgeting, and financial statement analysis. GE credit: SS. Effective: 2016 Fall Quarter.

ARE 120—Agricultural Policy (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A C- or better Pass One open to Managerial Economics (AMGE), Animal Science and Management (AANM) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Analytical treatment of historical and current economic problems and governmental policies influencing American agriculture. Uses of economic theory to develop historical and conceptual understanding of the economics of agriculture; how public policy influences the nature and performance of American agriculture. GE credit: SS. Effective: 2018 Spring Quarter.

ARE 120S—Agricultural Policy (4)
Lecture—4 hours. Prerequisite(s): ARE 100A; or Consent of Instructor. Analytical treatment of historical and current economic problems and governmental policies influencing agriculture. Uses of economic theory to develop historical and conceptual understanding of the economics of agriculture; how public policy influences the nature and performance of agriculture. Taught in Australia under the supervision of a UC Davis faculty member. Not open for credit to students who have taken ARE 120. GE credit: SS, WC. Effective: 2004 Fall Quarter.

ARE 121—Economics of Agricultural Sustainability (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); MAT 012; Or equivalent of MAT 012. Pass One open to Majors in the College of Agricultural and Environmental Sciences and Graduate Majors. Application of economic concepts to agro-environmental issues relevant to agricultural sustainability. Topics include market efficiency, production externalities, government policies, agricultural trade, product differentiation, all linked to sustainability issues. Case studies include biofuels, genetically modified foods and geographically differentiated products. GE credit: SS. Effective: 2018 Winter Quarter.

ARE 121—Economics of Agricultural Sustainability (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 001A C- or better or ECN 001AV C- or better Pass One open to Majors in the College of Agricultural and Environmental Sciences and Graduate Majors. Application of economic concepts to agro-environmental issues relevant to agricultural sustainability. Topics include market efficiency, production externalities, government policies, agricultural trade, product differentiation, all linked to sustainability issues. Case studies include biofuels, genetically modified foods and geographically differentiated products. GE credit: SS. Effective: 2018 Fall Quarter.

ARE 130—Agricultural Markets (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 106 Pass One open to Managerial Economics (AMGE), Animal Science and Management (AANM) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Nature, function, organizational structure, and operation of agricultural markets; prices, costs, and margins; market information, regulation, and controls; cooperative marketing. GE credit: SS. Effective: 2016 Fall Quarter.

ARE 130—Agricultural Markets (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 106; ARE 100A C- or better; (STA 013 C- or better or STA 013Y C- or better); STA 103 C- or better Pass One open to Managerial Economics (AMGE), Animal Science and Management (AANM) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Nature, function, organizational structure, and operation of agricultural markets; prices, costs, and margins; market information, regulation, and controls; cooperative marketing. GE credit: SS. Effective: 2018 Fall Quarter.

ARE 132—Cooperative Business Enterprises (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): ECN 001A Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Study of cooperative business enterprise in the United States and elsewhere; economic theories of behavior, principles of operation, finance, decision-making, and taxation. GE credit: SS. Effective: 2016 Fall Quarter.

ARE 132—Cooperative Business Enterprises (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): (ECN 001A C- or better or ECN 001AV C- or better); (UWP 104A or UWP 101) Pass One open to Managerial Economics (AMGE) and Animal Science and Management Majors (AANM) and Agricultural and Resource Economics (GARE) Graduate Majors. Study of cooperative business enterprise in the United States and elsewhere; economic theories of behavior, principles of operation, finance, decision-making, and taxation. GE credit: SS. Effective: 2018 Fall Quarter.

ARE 135—Agribusiness Marketing Plan Development (2)
Lecture/Discussion—2 hours. Prerequisite(s): Upper division standing. Fundamental components required to develop a marketing plan. Appreciation of the concept of marketing plans, appropriate research
required, including the use of library, Internet, survey and interview instruments, government documents, market analysis, business proposition, action planning, financial evaluation and monitoring. (P/NP grading only.) GE credit: SS. Effective: 1999 Fall Quarter.

ARE 136—Managerial Marketing (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100B; ARE 106 Pass One open to Managerial Economics (AMGE), Animal Science and Management (AANM) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Application of economic theory and econometrics to the study of marketing and consumer research. Emphasis on industry structure, history, regulatory aspects, integrated brand promotion, market segmentation, optimal product mix, message placement. GE credit: SS. Effective: 2017 Fall Quarter.

ARE 136—Managerial Marketing (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100B; ARE 106; ARE 100A C- or better; (STA 013 C- or better or STA 013Y C- or better); STA 103 C- or better Pass One open to Managerial Economics (AMGE), Animal Science and Management (AANM) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Application of economic theory and econometrics to the study of marketing and consumer research. Emphasis on industry structure, history, regulatory aspects, integrated brand promotion, market segmentation, optimal product mix, message placement. GE credit: SS. Effective: 2018 Summer Session 1.

ARE 138—International Commodity and Resource Markets (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100B Pass One open to Managerial Economics (AMGE), Animal Science and Management (AANM) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Basic nature and scope of international trade in agricultural commodities, agricultural inputs, and natural resources. Market dimensions and policy institutions. Case studies to illustrate import and export problems associated with different regions and commodities. GE credit: SS. Effective: 2016 Fall Quarter.

ARE 138—International Commodity and Resource Markets (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100B; ARE 100A C- or better Pass One open to Managerial Economics (AMGE), Animal Science and Management (AANM) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Basic nature and scope of international trade in agricultural commodities, agricultural inputs, and natural resources. Market dimensions and policy institutions. Case studies to illustrate import and export problems associated with different regions and commodities. GE credit: SS. Effective: 2018 Fall Quarter.

ARE 139—Futures and Options Markets (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A C- or better; STA 103 C- or better Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. History, mechanics, and economic functions of futures and options markets; hedging; theory of inter-temporal price formation and behavior of futures and options prices; price forecasting; futures and options as policy tools. GE credit: SS. Effective: 2018 Winter Quarter.

ARE 139—Futures and Options Markets (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A C- or better; (STA 013 C- or better or STA 013Y C- or better); STA 103 C- or better Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. History, mechanics, and economic functions of futures and options markets; hedging; theory of inter-temporal price formation and behavior of futures and options prices; price forecasting; futures and options as policy tools. GE credit: SS. Effective: 2018 Fall Quarter.

ARE 140—Farm Management (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): ECN 001A or ECN 001AV Pass One open to Managerial Economics majors. Farm organization and resources; economic and technological principles in decision making; analytical techniques and management control; problems in organizing and managing the farm business. GE credit: SS. Effective: 2018 Winter Quarter.

ARE 140—Farm Management (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): ECN 001A C- or better or ECN 001AV C- or better Pass One open to Managerial Economics majors. Farm organization and resources; economic and technological principles in decision making; analytical techniques and management control; problems in organizing and managing the farm business. GE credit: SS. Effective: 2018 Fall Quarter.

ARE 142—Personal Finance (3)
Lecture—3 hours. Prerequisite(s): ECN 001B Management of income and expenditures by the household. Use of consumer credit, savings, and insurance by households. Principles of tax, retirement, and estate planning. GE credit: SS. Effective: 1997 Winter Quarter.

ARE 143—Investments (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Survey of investment institutions, sources of investment information, and portfolio theory. Analysis of the stock, bond and real estate markets from the perspective of the investor. GE credit: SS. Effective: 2017 Winter Quarter.

ARE 143—Investments (4) ***Review all entries***
Lecture—4 hours. Pass One open to upper-division Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Survey of investment institutions, sources of investment information, and portfolio theory. Analysis of the stock, bond and real estate markets from the perspective of the investor. Not open for credit to students who completed ARE 171 or ARE 171A. GE credit: SS. Effective: 2018 Summer Session 1.

ARE 144—Real Estate Economics (4)
Lecture—4 hours. Prerequisite(s): ARE 100A C- or better Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Economic theory, analysis, and institutions of real estate markets and related financial markets. Techniques for appraising property values. Cases drawn from the raw land, single family, multifamily, industrial and office real estate markets. GE credit: SS. Effective: 2018 Spring Quarter.

ARE 145—Farm and Rural Resources Appraisal (4)
Lecture/Discussion—4 hours. Pass One open to Managerial Economics (AMGE), Animal Science and Management (AANM) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Principles and procedures of the valuation process with emphasis placed on rural real estate. Course includes identification of the major physical and economic determinants of value, the three primary appraisal approaches to valuation, discussion of appraisal activity and practice. GE credit: SS. Effective: 2016 Fall Quarter.

ARE 146—Business, Government Regulation, and Society (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100B Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Variety, nature and impact of government regulation: anti-trust laws and economic and social regulation. Nature of the legislative process, promulgation of regulations, and their impact, especially as analyzed by economists. GE credit: ACGH, SS. Effective: 2016 Fall Quarter.

ARE 146—Business, Government Regulation, and Society (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100B; ARE 100A C- or better Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Variety, nature and impact of government regulation: anti-trust laws and economic and social regulation. Nature of the legislative process, promulgation of regulations, and their impact, especially as analyzed by economists. GE credit: ACGH, SS. Effective: 2018 Fall Quarter.

ARE 147—Resource and Environment Policy Analysis (3)
Lecture—3 hours. Prerequisite(s): ECN 001A or ECN 001AV Open to non-majors only. Natural resource use problems with emphasis on past and current policies and institutions affecting resource use; determinants, principles, and patterns of natural resource use; property rights; conservation; private and public resource use problems; and public issues. Students who have had or are taking ARE 100A, ECN 100, or the equivalent, may receive only 2 units of credit, so must enroll in ARE 147M instead. GE credit: SS. Effective: 2018 Spring Quarter.

ARE 147M—Resource and Environmental Policy Analysis (2)
Lecture—3 hours. Prerequisite(s): ECN 001A or ECN 001AV Open to non-majors only. Natural resource use problems with emphasis on past and current policies and institutions affecting resource use; determinants, principles, and patterns of natural resource use; property rights; conservation; private and public resource use problems; and public issues. Students who have had or are taking ARE 100A, ECN 100, or the equivalent, must enroll in this course for 2 units rather than ARE 147. GE credit: SS. Effective: 2018 Spring Quarter.

ARE 150—Agricultural Labor (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A C- or better Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Analysis of labor markets with focus on U.S. and world agriculture. Labor supply, demand, market equilibrium; why farm labor markets are different; global trends in farm labor; U.S. farm labor history; unions and collective bargaining; immigration policy. GE credit: SS. Effective: 2018 Spring Quarter.

ARE 155—Operations Research and Management Science (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A C- or better; STA 103 C- or better Pass One open to Managerial Economics (AMGE) and Animal Science and Management (AANM) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Introduction to quantitative methods used to analyze business and economic processes: decision analysis for management, mathematical programming, competitive analysis, and other methods. GE credit: QL, SS. Effective: 2017 Spring Quarter.

ARE 155—Operations Research and Management Science (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A C- or better; (STA 013 C- or better or STA 013Y C- or better); STA 103 C- or better Pass One open to Managerial Economics (AMGE) and Animal Science and Management (AANM) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Introduction to quantitative methods used to analyze business and economic processes: decision analysis for management, mathematical programming, competitive analysis, and other methods. GE credit: QL, SS. Effective: 2018 Summer Session 1.

ARE 156—Introduction to Mathematical Economics (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): ARE 100B; ARE 155 Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Linear algebra for economists; necessary and sufficient conditions in static optimization problems; implicit function theorem; economic methodology and mathematics; comparative statics; envelope theorem; Le Chatelier principle; applications to production and consumer models. GE credit: QL, SS. Effective: 2016 Fall Quarter.

ARE 156—Introduction to Mathematical Economics (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): ARE 100B; ARE 155; ARE 100A C- or better; (STA 013 C- or better or STA 013Y C- or better); STA 103 C- or better Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Linear algebra for economists; necessary and sufficient conditions in static optimization problems; implicit function theorem; economic methodology and mathematics; comparative statics; envelope theorem; Le Chatelier principle; applications to production and consumer models. GE credit: QL, SS. Effective: 2018 Fall Quarter.

ARE 157—Analysis for Operations and Production Management (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): ARE 155 Pass One open to Managerial Economics (AMGE), Animal Science and Management (AANM) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Application of economic theory and quantitative methods to analyze operations and production management problems including process strategy, quality management, location and plant layout, and inventory management. GE credit: SS. Effective: 2016 Fall Quarter.

ARE 157—Analysis for Operations and Production Management (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): ARE 155; ARE 100A C- or better; (STA 013 C- or better or STA 013Y C- or better); STA 103 C- or better Pass One open to Managerial Economics (AMGE), Animal Science and Management (AANM) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Application of economic theory and quantitative methods to analyze operations and production management problems including process strategy, quality management, location and plant layout, and inventory management. GE credit: SS. Effective: 2018 Fall Quarter.

ARE 165—Emerging Economies and Globalization (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A C- or better; ARE 115A; ARE 115B; Completion of ARE 106 and ECN 162 strongly recommended. Pass One open to Managerial Economics and graduate majors. Economic drivers and policy challenges in the major emerging markets, with an emphasis on the effects of rising incomes, population growth, urbanization, and relative wages on world markets and natural resources. GE credit: SS. Effective: 2018 Spring Quarter.

ARE 166—The Economics of Global Poverty Reduction: What Works and Why (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100B or ECN 100; ARE 106 or ECN 140; ARE 115A or ECN 115A Pass One open to Managerial Economics (AMGE) and Economics (LECN) majors only. Application of microeconomic theory and econometrics to understand causes of poverty and critically evaluate poverty alleviation policies in low income countries. Effective: 2017 Spring Quarter.

ARE 166—The Economics of Global Poverty Reduction: What Works and Why (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ARE 100B or ECN 100 or ECN 100B); (ARE 106 or ECN 140); (ARE 115A or ECN 115A) Pass One open to Managerial Economics (AMGE) and Economics (LECN) majors only. Application of microeconomic theory and econometrics to understand causes of poverty and critically evaluate poverty alleviation policies in low income countries. Effective: 2018 Fall Quarter.

ARE 171—Principles of Finance (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A C- or better; ARE 106; MGT 011A; MGT 011B Pass One open to Managerial Economics Majors and Agricultural and Resource Economics Graduate Majors. Principles of corporate financial management. Time value of money, interest rates, principles of valuation, NPV, risk and return, and cost of capital. Not open for credit to students who have completed ECN 134. Effective: 2018 Summer Session 1.

ARE 171A—Financial Management of the Firm (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 106; MGT 011A; MGT 011B Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Financial analysis at the firm level: methods of depreciation; influence of the tax structure; inventory, cash, and accounts receivable management; sources of short-term and long-term financing, and financial problem solving using a computer spreadsheet program. Not open for credit to students who have completed Economics 134. GE credit: QL, SS. Effective: 2017 Winter Quarter.

ARE 171A—Financial Management of the Firm (4) ***Review all entries Discontinued***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 106; MGT 011A; MGT 011B Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Financial analysis at the firm level: methods of depreciation; influence of the tax structure; inventory, cash, and accounts receivable management; sources of short-term and long-term financing, and financial problem solving using a computer spreadsheet program. Not open for credit to students who have completed Economics 134. GE credit: QL, SS. Effective: 2018 Summer Session 1.

ARE 171B—Financial Management of the Firm (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 171A Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Financial analysis at the firm level: methods of capital budgeting; calculating the cost of capital; dividend policies; mergers and acquisitions; and special current topics in finance. GE credit: QL, SS. Effective: 2017 Winter Quarter.

ARE 171B—Financial Management of the Firm (4) ***Review all entries Discontinued***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 171A Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Financial analysis at the firm level: methods of capital budgeting; calculating the cost of capital; dividend policies; mergers and acquisitions; and special current topics in finance. GE credit: QL, SS. Effective: 2018 Summer Session 1.

ARE 172—Financial Management of the Firm (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ARE 171A or ARE 171); ARE 106; ARE 100A C- or better; MGT 011A; MGT 011B Pass One open to Managerial Economics Majors and Agricultural and Resource Economics Graduate Majors. Financial analysis at the firm level: optimizing capital structure; minimizing the cost of capital; dividend policies; mergers and acquisitions; real options; and risk management. Effective: 2018 Summer Session 1.

ARE 173—Capital Markets (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 171 or ARE 171A Pass One Open to Managerial Economics majors and Agricultural and Resource Economics graduate majors. Introduction to asset pricing. Valuation and risk characteristics of financial assets, including stocks, bonds, futures, and options. Investors' attitudes toward risk, capital allocation, portfolio selection, the capital asset pricing model, and the efficient market hypothesis. Effective: 2018 Spring Quarter.

ARE 173—Capital Markets (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ARE 171A or ARE 171); ARE 106; ARE 100A C- or better; MGT 011A; MGT 011B Pass One Open to Managerial Economics majors and Agricultural and Resource Economics graduate majors. Introduction to asset pricing. Valuation and risk characteristics of financial assets, including stocks, bonds, futures, and options. Investors' attitudes toward risk, capital allocation, portfolio selection, the capital asset pricing model, and the efficient market hypothesis. Effective: 2018 Fall Quarter.

ARE 175—Natural Resource Economics (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100B or ECN 100; Or the equivalent. Pass One open to Managerial Economics (AMGE) and Environmental Policy Analysis and Planning (AEPP) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Economic concepts and policy issues associated with natural resources, renewable resources (ground water, forests, fisheries, and wildlife populations) and non-renewable resources (minerals and energy resources, soil). (Environmental Science and Policy 175) GE credit: SS. Effective: 2017 Winter Quarter.

ARE 175—Natural Resource Economics (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A C- or better or ECN 100A C- or better or ECN 100 C- or better Pass One open to Managerial Economics (AMGE) and Environmental Policy Analysis and Planning (AEPP) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Economic concepts and policy issues associated with natural resources, renewable resources (ground water, forests, fisheries, and wildlife populations) and non-renewable resources (minerals and energy resources, soil). (ESP 175.) GE credit: SS. Effective: 2018 Fall Quarter.

ARE 176—Environmental Economics (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100B or ECN 100 Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Role of the environment in economic activity and methods for protecting
and enhancing environmental quality; implications of market failures for public policy; design of environmental policy; theory of welfare measurement; measuring the benefits of environmental improvement. GE credit: SS. Effective: 2017 Winter Quarter.

ARE 176—Environmental Economics (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A C- or better or ECN 100A C- or better or ECN 100 C- or better Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Role of the environment in economic activity and methods for protecting
and enhancing environmental quality; implications of market failures for public policy; design of environmental policy; theory of welfare measurement; measuring the benefits of environmental improvement. GE credit: SS. Effective: 2018 Fall Quarter.

ARE 190—Topics in Managerial Economics (3)
Lecture—3 hours. Prerequisite(s): ARE 100A; STA 103; and Consent of Instructor. Selected topics in managerial economics, focusing on current research. May be repeated up to 4 time(s) when the topic differs. GE credit: SS. Effective: 2012 Fall Quarter.

ARE 192—Internship (1-6)
Internship—3-18 hours. Internship experience off and on campus in all subject areas offered in the Department of Agricultural and Resource Economics. Internships are supervised by a member of the staff. (P/NP grading only.) GE credit: SS. Effective: 1997 Winter Quarter.

ARE 194HA—Special Study for Honors Students (4)
Independent Study—3 hours; Seminar—1 hour. Prerequisite(s): ARE 100B; ARE 106; ARE 155 (can be concurrent); and Consent of Instructor. Minimum GPA of 3.500; major in Agricultural and Managerial Economics or Managerial Economics; senior standing. A program of research culminating in the writing of a senior honors thesis under the direction of a faculty adviser. GE credit: QL, SS, WE. Effective: 2000 Winter Quarter.

ARE 194HB—Special Study for Honors Students (4)
Independent Study—3 hours; Seminar—1 hour. Prerequisite(s): ARE 100B; ARE 106; ARE 155 (can be concurrent); Minimum GPA of 3.500; major in Agricultural and Managerial Economics or Managerial Economics; senior standing. A program of research culminating in the writing of a senior honors thesis under the direction of a faculty adviser. GE credit: QL, SS, WE. Effective: 2000 Winter Quarter.

ARE 197T—Tutoring in Managerial Economics (1-3)
Variable. Prerequisite(s): Senior standing in Managerial Economics and consent of Department Chairperson. Undergraduates assist the instructor by tutoring students in one of the department's regularly scheduled courses. (P/NP grading only.) GE credit: SS. Effective: 2012 Fall Quarter.

ARE 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SS. Effective: 1997 Winter Quarter.

ARE 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SS. Effective: 1997 Winter Quarter.

ARE 200A—Microeconomic Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Graduate standing. Linear and non-linear optimization theory applied to develop the theory of the profit-maximizing firm and the utility-maximizing consumer. (ECN 200A.) Effective: 2018 Winter Quarter.

ARE 200B—Microeconomic Theory (5) ***Review all entries***
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): ARE 200A Characteristics of market equilibrium under perfect competition, simple monopoly and monopsony. Emphasis on general equilibrium and welfare economics; the sources of market success and market failures. (Economics 200B) Effective: 1997 Winter Quarter.

ARE 200B—Microeconomic Theory (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 200A Characteristics of market equilibrium under perfect competition, simple monopoly and monopsony. Emphasis on general equilibrium and welfare economics; the sources of market success and market failure. (ECN 200B.) Effective: 2018 Fall Quarter.

ARE 200C—Microeconomic Theory (5) ***Review all entries***
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): ARE 200B Uncertainty and information economics. Individual decision making under uncertainty. Introduction to game theory, with emphasis on applications
to markets with firms that are imperfect competitors or consumers that are imperfectly informed. (Economics 200C) Effective: 1997 Winter Quarter.

ARE 200C—Microeconomic Theory (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 200B Uncertainty and information economics. Individual decision making under uncertainty. Introduction to game theory, with emphasis on applications to markets with firms that are imperfect competitors or consumers that are imperfectly informed. (ECN 200C.) Effective: 2018 Fall Quarter.

ARE 202A—Introduction to Applied Research Methods (3) ***Review all entries***
Lecture/Discussion—3 hours. Prerequisite(s): ARE 204A; ARE 256; ARE 200A (can be concurrent); Or the equivalent of ARE 204A and ARE 256. Study of philosophy and methodology of applied research in agricultural economics. Methods of conceptualization of researchable topics. Method of communication and constructive criticism. Effective: 1997 Winter Quarter.

ARE 202A—Introduction to Applied Research Methods (3) ***Review all entries***
Lecture/Discussion—3 hours. Prerequisite(s): ARE 204A; ARE 200A (can be concurrent); ARE 256A Study of philosophy and methodology of applied research in agricultural economics. Methods of conceptualization of researchable topics. Method of communication and constructive criticism. Effective: 2018 Fall Quarter.

ARE 202B—Applied Microeconomics I: Consumer and Producer Behavior (3)
Lecture/Discussion—3 hours. Prerequisite(s): ARE 200A; ARE 202A; ARE 200B (can be concurrent) Application of consumer and producer theory in models of individual behavior and market-level phenomena. Implications of consumer and producer theory for specification of empirical models of supply and
demand for inputs and outputs and market equilibrium displacement models. Effective: 1997 Winter Quarter.

ARE 202C—Research Design for Applied Microeconomics (3)
Lecture/Discussion—3 hours. Prerequisite(s): ARE 240A; ARE 202B Third of three courses in the Ph.D. level applied microeconomics sequence. Examines the design of empirical research and the application of econometric theory. Effective: 2014 Fall Quarter.

ARE 204A—Microeconomic Analysis I (4)
Lecture—4 hours. Prerequisite(s): ARE 100B or ECN 100; Advanced undergraduates with consent of instructor. Behavior of consumers and producers and their interactions; tools and methods needed to analyze economic behavior in the marketplace. Application of those methods to real-world problems. Effective: 2006 Fall Quarter.

ARE 204B—Microeconomic Analysis II (4)
Lecture—4 hours. Prerequisite(s): ARE 204A; or Consent of Instructor. Behavior in imperfectly competitive markets--monopoly and price discrimination; oligopoly. Introduction to noncooperative game theory. Analysis of decisions made under risk and uncertainty and imperfect information. The economics of externalities and public goods. Effective: 2006 Fall Quarter.

ARE 214—Development Economics (4)
Lecture—4 hours. Prerequisite(s): ARE 100A; ARE 100B; ECN 101; ARE 204A and ECN 160A, ECN 160B recommended. Review of the principal theoretical and empirical issues whose analysis has formed development economics. Analysis of economic development theories and development strategies and their application to specific policy issues in developing country contexts. (ECN 214.) Effective: 1997 Winter Quarter.

ARE 215A—Microdevelopment Theory and Methods I (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 200A or ARE 204A; ARE 240A recommended. Agricultural development theory, with a focus on microeconomics. Agricultural household behavior with and without imperfections and uncertainty. Analysis of rural land, labor, credit and insurance
markets, institutions, and contracts. (ECN 215A.) Effective: 1999 Fall Quarter.

ARE 215B—Open Macroeconomics of Development (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ARE 200A or ARE 204A); (ARE 214 or ARE 215A); (ARE 200D or ARE 205) Models and policy approaches regarding trade,monetary and fiscal issues, capital flows and debt are discussed in the macroeconomic framework of an open developing country. The basic analytical focus is real exchange rate and its impact on sectoral allocation of resources. (ECN 215B.) Effective: 1997 Winter Quarter.

ARE 215C—Microdevelopment Theory and Methods II (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 215A Extension of development theory and microeconomic methods. Agricultural growth and technological change; poverty and income inequality;
multisectoral, including village and regional models. Computable general equilibrium methods and applications. (ECN 215C.) Effective: 1999 Fall Quarter.

ARE 215D—Environmental and Economic Development (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 200A; (ARE 204A or ARE 275) Interdisciplinary course drawing on theoretical and empirical research on interactions between environmental resource use and economic development processes. Analysis of issues emerging at the interface of environmental and development economics. (ECN 215D.) Effective: 1998 Spring Quarter.

ARE 222—International Agricultural Trade and Policy (4)
Lecture—4 hours. Prerequisite(s): (ARE 100B or ARE 204A); ECN 160A; Or the equivalent of ECN 160A. Analysis of country interdependence through world agricultural markets. Partial equilibrium analysis is used to study the impacts of national intervention on world markets, national policy choice in an open economy
and multinational policy issues. Effective: 2014 Fall Quarter.

ARE 223—Economics of Agriculture (4)
Lecture—4 hours. Prerequisite(s): ARE 204A (can be concurrent); ARE 256A (can be concurrent); Or equivalent course(s) completed or concurrent required. Open to MS students in Agricultural and Resource Economics, Ph.D. students in Agricultural and Resource Economics and qualified students from other UC Davis graduate groups/programs. Analytic treatment of the historical development and contemporary role of agriculture in the global, U.S. and California economies. Uses economic reasoning and evidence to develop historical and conceptual understanding of the economics of agriculture, agricultural issues, and related government policies. Effective: 2015 Fall Quarter.

ARE 231—Supply and Demand for Agricultural Products (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 200A; ARE 202A; ARE 240A; or Consent of Instructor. Analysis of supply and demand for agricultural commodities emphasizing the effective use of microeconomic theory with econometric methods,
and other empirical procedures, in conducting applied analysis of supply and demand at the firm and industry level. Effective: 1999 Fall Quarter.

ARE 232—Agricultural Commodity Markets (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 200A; ARE 202A; ARE 240A; or Consent of Instructor. Economic analysis of industries that produce, market, transport, store, and process basic commodities. Analysis of market equilibrium under perfect and imperfect competition, with and without government involvement. Effective: 1999 Fall Quarter.

ARE 233—Agricultural Policy (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 200A; ARE 202A; ARE 240A; or Consent of Instructor. Nature, formation, evolution, and institutions of economic policy applied to food, agricultural, and rural issues. Examples for detailed
consideration include food security, commodity issues, and trade policy. Analytical approaches include static and dynamic welfare analysis, policy design, and political-economic analysis. Effective: 1999 Fall Quarter.

ARE 239—Econometric Foundations (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Course will prepare students for econometric theory and empirical work by examining the statistical foundation of econometrics. Special attention is paid to problems specific to non-experimental data common to social sciences. Topics from matrix algebra are also covered. (ECN 239.) Effective: 2016 Fall Quarter.

ARE 240A—Econometric Methods (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 239; or Consent of Instructor. Least squares, instrumental variables, and maximum likelihood estimation and inference for single equation linear regression model; linear restrictions; heteroskedasticity; autocorrelation; lagged dependent variables. (ECN 240A.) Effective: 2017 Fall Quarter.

ARE 240B—Econometric Methods (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 240A Topics include asymptotic theory and instrumental variables, pooled time-series cross-section estimation, seemingly unrelated regression, classical hypothesis tests, identification and estimation of simultaneous equation models, cointegration, errorcorrection models, and qualitative and limited dependent variable models. (ECN 240B.) Effective: 2000 Spring Quarter.

ARE 240C—Time Series Econometrics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 240B; or Consent of Instructor. Probability theory; estimation, inference and forecasting of time series models; trends and non-standard asymptotic theory; vector time series methods and cointegration; time series models for higher order moments and transition data; state-space modeling; the Kalman filter. (ECN 240C.) Effective: 2016 Fall Quarter.

ARE 240D—Cross Section Econometrics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 240B; or Consent of Instructor. Estimation and inference for nonlinear regression models for cross-section data; models for discrete data and for limited dependent variables; models for panel data; additional topics such as bootstrap and semiparametric regression. (Same course as Economics 240D) (ECN 240D.) Effective: 2016 Fall Quarter.

ARE 240E—Topics in Time Series Econometrics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 240C; or Consent of Instructor. Modern econometric techniques for time series data. Expand on topics covered in Economics 240A, 240B and 240C. Contents may vary from year to year. (ECN 240E.) Effective: 2016 Fall Quarter.

ARE 240F—Topics in Cross Section Econometrics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 240D; or Consent of Instructor. Modern econometrics techniques for cross-section data. Expand on topics covered in Economics 240A, 240B and 240D. Contents may vary from year to year. (ECN 240F.) Effective: 2016 Fall Quarter.

ARE 252—Optimization with Economic Applications (4)
Discussion—1 hour; Lecture—3 hours. Microeconomic topics in the framework of mathematical programming. Effective: 2013 Winter Quarter.

ARE 254—Dynamic Optimization Techniques with Economic Applications (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): ARE 253; And elementary knowledge of ordinary differential equations. Necessary and sufficient conditions in the calculus of variations and optimal control, economic interpretations, the dynamic envelope theorem and transversality conditions, infinite horizon problems and phase diagrams, local stability and comparative statics of the steady state, comparative dynamics. Effective: 1997 Winter Quarter.

ARE 254—Dynamic Optimization Techniques with Economic Applications (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): Elementary knowledge of ordinary differential equations. Necessary and sufficient conditions in the calculus of variations and optimal control, economic interpretations, the dynamic envelope theorem and transversality conditions, infinite horizon problems and phase diagrams, local stability and comparative statics of the steady state, comparative dynamics. Effective: 2018 Fall Quarter.

ARE 255—Applied Dynamic Structural Econometric Modeling (4)
Lecture—4 hours. Prerequisite(s): ARE 254 Course covers structural econometric models of static games of incomplete information, single-agent dynamic optimization problems and multi-agent dynamic games, with a focus on applications to issues relevant to the environment, energy, natural resources, agriculture, and development. Effective: 2014 Fall Quarter.

ARE 256A—Applied Econometrics I (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 106 or ECN 140; or Consent of Instructor. First of two courses in the Masters-level econometrics sequence. The linear regression model and generalizations are applied to topics in agricultural and resource economics. Tools for empirical research for problems requiring more sophisticated tools than standard regression models are emphasized. Effective: 2015 Spring Quarter.

ARE 256B—Applied Econometrics II (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 256A; or Consent of Instructor. Second of two courses in the Masters-level econometrics sequence. The linear regression model and generalizations are applied to topics in agricultural and resource economics. Tools for empirical research for problems requiring more sophisticated tools than standard regression models are emphasized. Effective: 2015 Spring Quarter.

ARE 258—Demand and Market Analysis (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): ARE 204B; ARE 256; or Consent of Instructor. Application of theoretical material covered in 204A/B, with particular focus on production theory/factor demand and imperfect competition/market power. Use of theoretical models as a foundation for empirical economic analysis, and empirical exercises. Independent research on chosen topics, with empirical application. Effective: 2011 Fall Quarter.

ARE 258—Demand and Market Analysis (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): ARE 204B; ARE 256B; or Consent of Instructor. Application of theoretical material covered in 204A/B, with particular focus on production theory/factor demand and imperfect competition/market power. Use of theoretical models as a foundation for empirical economic analysis, and empirical exercises. Independent research on chosen topics, with empirical application. Effective: 2018 Fall Quarter.

ARE 275—Economic Analysis of Resource and Environmental Policies (4)
Lecture/Discussion—4 hours. Prerequisite(s): ARE 204A Development of externality theory, market failure concepts, welfare economics, theory of renewable and non-renewable resource use, and political economic models. Applications to policy issues regarding the agricultural/environment interface and managing resources in the public domain. (ESP 275.) Effective: 1999 Spring Quarter.

ARE 276A—Environmental Economics: Externalities (4)
Lecture—4 hours. Prerequisite(s): Students should have completed the first year graduate level sequence in microeconomics and econometrics. Course introduces fundamental and recent research in environmental economics, focusing on the design, implementation and evaluation of environmental policy instruments to correct market failures. It will expose students to economic theories and empirical techniques frequently used in this field. Effective: 2014 Fall Quarter.

ARE 276B—Environmental Economics: Non-Market Valuation (4)
Lecture—4 hours. Prerequisite(s): Students should have completed the first year graduate level sequence in microeconomics and econometrics. Second PhD field course in environmental economics, covering theory and econometrics of methods for valuing nonmarket goods and environmental quality changes. Topics include revealed preference (travel cost, hedonics, sorting equilibrium) and stated preference (contingent valuation, choice experiments, conjoint analysis) techniques. Effective: 2014 Fall Quarter.

ARE 277—Natural Resource Economics (4)
Lecture—4 hours. Prerequisite(s): ARE 254; or Consent of Instructor. Application of capital theory and dynamic methods to issues of optimal use of renewable and nonrenewable resources. Examination of policy issues associated with forests, fisheries, groundwater, energy resources, watersheds, soil, global climate, and wildlife. Effective: 1999 Spring Quarter.

ARE 290—Topics in Agricultural and Resource Economics (3)
Lecture—3 hours. Selected topics in agricultural and resource economics, focusing on current research. May be repeated up to 4 time(s) for credit. Effective: 2002 Fall Quarter.

ARE 293—Analysis of California Agriculture and Resources (3)
Fieldwork—45 hours; Lecture—1.5 hours. Review and analysis of production, marketing, and resource issues facing agricultural firms in California. Application of economic theory and measurement to individual firm and industry decisions in an applied setting. Fieldwork-45 hours total, including one 5-day summer field trip. (S/U grading only.) Effective: 1997 Winter Quarter.

ARE 298—Directed Group Study (1-5)
Variable. Advanced study through special seminars, informal group studies, or group research on problems for analysis and experimentation. Sections:(1) Managerial Economics; (2) Agricultural Policy; (3) Community and Regional Development; (4) Natural Resources; (5) Human Resources; (6) Research Methods and Quantitative Analysis. Effective: 1997 Winter Quarter.

ARE 299—Individual Study (1-12)
Variable. Sections: (1) Managerial Economics; (2) Agricultural Policy; (3) Community and Regional Development; (4) Natural Resources; (5) Human Resources; (6) Research Methods and Quantitative Analysis; and (7) Dissertation Research Prospectus. (S/U grading only.) Effective: 1997 Winter Quarter.

ARE 299D—Special Study for Doctoral Dissertation (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

ARE 396—Teaching Assistant Training Practicum (1-4)
Variable—3-36 hours. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

ART Art Studio

Various of the Professional courses (400+) are not offered each year.

Courses in ART:

ART 002—Beginning Drawing (4)
Studio—6 hours. Introduction to drawing using various black and white media to articulate forms and organize space, with reference to historical and contemporary works. GE credit: AH, VL. Effective: 2015 Winter Quarter.

ART 005—Beginning Sculpture (4)
Studio—6 hours. Basic sculpture techniques using a variety of media. Form in space using cardboard, plaster, and/or cement, wood and/or metal and other media. GE credit: AH, VL. Effective: 2015 Winter Quarter.

ART 007—Beginning Painting (4)
Studio—6 hours. Introduction to techniques and concepts in the practice of painting. GE credit: AH, VL. Effective: 2016 Spring Quarter.

ART 008—Beginning Ceramic Sculpture (4)
Studio—6 hours. Introduction to ceramic sculpture construction and processes. Large scale hand-building, glazing, kilns and kiln firing technology. GE credit: AH, VL. Effective: 2016 Spring Quarter.

ART 009—Beginning Photography (4)
Studio—6 hours. Introduction to the fundamental technical, aesthetic, and formal aspects of photography. Camera skills, film developing and printing in the black and white darkroom. GE credit: AH, VL. Effective: 2015 Winter Quarter.

ART 010—Fine Art Appreciation (4)
Discussion—1 hour; Lecture—3 hours. Survey of contemporary artists since 1970. Topics explore contemporary thought within the visual arts using the forms and strategies of painting, sculpture, installation, performance, photography, and video in collaborative, ephemeral and multimedia approaches. Intended for Art and non-Art majors. GE credit: AH, VL. Effective: 2017 Winter Quarter.

ART 011—Beginning Printmaking (4)
Studio—6 hours. Introduction to printmaking techniques such as monography, relief, and intaglio. Investigation of personal imagery through use of these techniques. GE credit: AH, VL. Effective: 2015 Winter Quarter.

ART 012—Beginning Video (4)
Studio—6 hours. Production techniques of video shooting, editing, lighting, sound and effects. A conceptual framework for video-art techniques. GE credit: AH, VL. Effective: 2015 Winter Quarter.

ART 024—Introduction to Experimental Video and Film (4)
Discussion—1 hour; Lecture—3 hours; Term Paper. Evolution of moving image technologies. Shifts within avant-garde artistic practices. Conceptual and historical differences between film and video. Relationship of film and video to fine arts. GE credit: AH, VL, WE. Effective: 2013 Spring Quarter.

ART 030—Introduction to Contemporary Visual Culture (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Establishing visual literacy across the media of fine art, photography, advertising, television and film; media culture; focus on critical decoding of contemporary visual culture. GE credit: AH, VL. Effective: 1997 Winter Quarter.

ART 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Restricted to lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

ART 099—Special Study for Undergraduates (1-5)
Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

ART 101—Intermediate Painting (4)
Studio—6 hours. Prerequisite(s): ART 002; ART 007 Individualized projects exploring color and space in a variety of subject matter and approaches. Builds on basic skills and concepts from beginning drawing and painting courses. Study of historical and contemporary art in relation to studio practice. May be repeated up to 1 time(s) when topic differs. GE credit: AH, VL. Effective: 2013 Fall Quarter.

ART 102A—Advanced Painting: Studio Projects (4)
Studio—6 hours. Prerequisite(s): ART 101 Pass One restricted to Art Studio majors. Sustained development of painting for advanced students. Approaches will vary according to the instructor. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 102B—Advanced Painting: Figure (4)
Studio—6 hours. Prerequisite(s): ART 101 Pass One restricted to Art Studio majors. Advanced painting using the human figure as subject. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 102C—Advanced Painting: Special Topics (4)
Studio—6 hours. Prerequisite(s): (ART 002, ART 007, ART 101); (ART 102A or ART 102B) Pass One restricted to Art Studio majors. Special topics in painting for upper division students. Emphasis on development of a personal practice of painting informed by awareness of contemporary issues in painting and their historical background. Topics will vary with instructor. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 103A—Intermediate Drawing: Black and White (4)
Studio—6 hours. Prerequisite(s): ART 002 Pass One restricted Art Studio majors. Advanced study of drawing composition using black and white media. GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 103B—Intermediate Drawing: Color (4)
Studio—6 hours. Prerequisite(s): ART 002 Pass One restricted Art Studio majors. Study of drawing composition in color media. GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 103C—Intermediate Drawing: 3 Dimensions (4)
Studio—6 hours. Prerequisite(s): ART 002 Pass One restricted to Art Studio Major. Intermediate study of drawing composition using three dimensional media. GE credit: AH, VL. Effective: 2017 Fall Quarter.

ART 105A—Advanced Drawing: Studio Projects (4)
Studio—6 hours. Prerequisite(s): ART 002; (ART 103A or ART 103B) Pass One restricted to Art Studio majors. Exploration of composition and process in drawing. Emphasis on the role of drawing in contemporary art and on drawing as an interdisciplinary practice. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 105B—Advanced Drawing: Figure (4)
Studio—6 hours. Prerequisite(s): (ART 103A or ART 103B); ART 002 Pass One restricted Art Studio majors. Study of the figure through drawing of the model. Exploration of different methods and process of figure-drawing. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2018 Winter Quarter.

ART 110A—Intermediate Photography: Black and White Analog (4)
Studio—6 hours. Prerequisite(s): ART 009 Pass One restricted to Art Studio majors. Introduction to 35mm and medium format camera. Development of personal aesthetic and portfolio of black and white prints. GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 110B—Intermediate Photography: Digital Imaging (4)
Studio—6 hours. Prerequisite(s): ART 009 Pass One restricted to Art Studio majors. Comprehensive introduction to all elements of digital photography, including scanning, imaging software and printing. GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 111A—Advanced Photography: Special Topics (4)
Studio—6 hours. Prerequisite(s): ART 009; (ART 110A or ART 110B) Pass One open to Art Studio majors. Special topics related to photography and contemporary art practice. Multiple projects in a variety of approaches. May be repeated up to 2 time(s) when topic differs. GE credit: AH, VL. Effective: 2013 Fall Quarter.

ART 111B—Advanced Photography: Digital Imaging (4)
Studio—6 hours. Prerequisite(s): ART 009; ART 110B Pass One restricted to Art Studio majors. In-depth exploration of digital photography, including refined digital imaging techniques. Theoretical issues involved in digital media. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 112—Sound for Vision (4)
Studio—6 hours. Prerequisite(s): ART 012 or TCS 100 Pass One restricted to Art Studio majors. Sound composition and development of an audio databank. Study of repetition and phase shifts. Creation of descriptive acoustic space recordings in combination with other artistic media. Audio as stand alone or accompaniment. May be repeated up to 1 time(s). GE credit: AH. Effective: 2007 Fall Quarter.

ART 113—Interdisciplinary Art (4)
Studio—6 hours. Prerequisite(s): Upper division standing in Art Studio, Theater and Dance, Design, Technocultural Studies, or Music. Experimental interdisciplinary strategies. Use of various media in creation of collaborative or independent works. Production of participatory audio-visual works, installations, or two dimensional explorations. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 114A—Intermediate Video: Animation (4)
Studio—6 hours. Prerequisite(s): ART 012 or CTS 020; One drawing course. Pass One restricted to Art Studio majors. Exploration of animation. Relationship between drawing, digital stills, and multiple images. Animation using traditional drawing techniques, collage, and digital processes. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2018 Winter Quarter.

ART 114B—Intermediate Video: Experimental Documentary (4)
Studio—6 hours. Prerequisite(s): ART 012 or CTS 020 Pass One restricted to Art Studio majors. Experimental documentary practice. Use of interviews, voice-overs, and still and moving images. Production of alternative conceptual and visual projects. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2018 Winter Quarter.

ART 114C—Intermediate Video: Performance Strategies (4)
Studio—6 hours. Prerequisite(s): ART 012 or CTS 020 Pass One restricted to Art Studio majors. Use of video to expand performance art production. Exploration of improvisation, direction, projection, and image processing in real time. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2018 Winter Quarter.

ART 117—Advanced Video and Electronic Arts (4)
Studio—6 hours. Prerequisite(s): ART 012 or TCS 100; (ART 112 or ART 114A or ART 114B or ART 114C); Upper division standing Art Studio majors. Pass One restricted to Art Studio majors; upper division standing. Independently driven video, digital, and/or performance projects. Further development in the electronic arts ranging from video installation to performance. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 121—Reinterpreting Landscape (4)
Studio—6 hours. Prerequisite(s): ART 002; ART 007 Pass One restricted to Art Studio majors. Interpretation of landscape through painting, drawing, and related media. Emphasis on the integration of historical, cultural, natural, and artistic contexts. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 125A—Intermediate Printmaking: Relief (4)
Studio—6 hours. Prerequisite(s): ART 011 Pass One restricted to Art Studio majors. Woodcut linocut, metal-plate, relief, and experimental uses of other materials for printmaking. Additive and reductive relief techniques. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 125B—Intermediate Printmaking: Intaglio (4)
Studio—6 hours. Prerequisite(s): ART 011 Pass One restricted to Art Studio majors. Metal plate etching, aquatint, hard and soft ground, burin engraving and related printmaking techniques. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 125C—Intermediate Printmaking: Lithography (4)
Studio—6 hours. Prerequisite(s): ART 011 Pass One restricted to Art Studio majors. Stone and metal-plate lithography and other planographic printmaking methods. Exploration of the basic chemistry and printing procedure inherent in stone lithogrphay. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 125D—Intermediate Printmaking: Serigraphy (4)
Studio—6 hours. Prerequisite(s): ART 011 Pass One restricted to Art Studio majors. Printmaking techniques in silk screen and related stencil methods. Development of visual imagery using the language of printmaking. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 129—Advanced Printmaking (4) ***Review all entries***
Studio—6 hours. Prerequisite(s): ART 125A or ART 125B or ART 125C or ART 125D; Completion of two of the courses listed above. Pass One restricted to Art Studio majors. Development of intermedia printmaking. Advanced modes in print technologies: relief, serigraphy, intaglio, surface, as well as addition of digitized imagery. Production of prints using multi-plate prints and other methods. May be repeated up to 2 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 129—Advanced Printmaking (4) ***Review all entries***
Studio—6 hours. Prerequisite(s): ART 011; ART 125A or ART 125B or ART 125C or ART 125D Pass One restricted to Art Studio majors. Development of intermedia printmaking. Advanced modes in print technologies: relief, serigraphy, intaglio, surface, as well as addition of digitized imagery. Production of prints using multi-plate prints and other methods. May be repeated up to 2 time(s). GE credit: AH, VL. Effective: 2018 Fall Quarter.

ART 138—The Artist's Book (4)
Studio—6 hours. Prerequisite(s): Completion of three upper division Art Studio courses. Pass One restricted to Art Studio majors. Creation of an artist's book in an edition of three. Use of a variety of media. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 142A—Intermediate Ceramic Sculpture: Industrial Production Methods (4)
Studio—6 hours. Prerequisite(s): ART 008 Pass One restricted to Art Studio majors. Ceramic sculpture creation using two forms of industrial processes: plaster mold design, fabrication and casting; and extrusion with dies, including die fabrication. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2016 Spring Quarter.

ART 142B—Intermediate Ceramic Sculpture: Material Study (4)
Studio—6 hours. Prerequisite(s): ART 008 Pass One restricted to Art Studio majors. Study of ceramic materials and processes. Areas studied include clay and clay bodies; glaze materials through temperature, color and texture; history and technology of kilns and kiln firing. Examination of material properties and characteristics through experimentation. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2016 Spring Quarter.

ART 142C—Intermediate Ceramic Sculpture: Special Topics (4)
Studio—6 hours. Prerequisite(s): ART 008 Pass One restricted to Art Studio majors. Exploration of the ceramic surface for creative expression. Use of glazing techniques including china paint, decals, luster, and silkscreen with underglaze and overglaze as well as the use of common materials such as epoxy, paint, oil and wax. May be repeated up to 2 time(s). GE credit: AH, VL. Effective: 2016 Spring Quarter.

ART 143—Advanced Ceramic Sculpture: Studio Projects (4)
Studio—6 hours. Prerequisite(s): ART 008; ART 142A or ART 142B or ART 142C Pass One restricted to Art Studio majors. Experimentation with all techniques learned in prerequisite ceramics classes. Course will include class projects in consultation with faculty. May be repeated up to 2 time(s) Consent of instructor required for students taking the course a third time. GE credit: AH, VL. Effective: 2017 Spring Quarter.

ART 147—Theory and Criticism of Photography (4)
Lecture—3 hours; Term Paper. Prerequisite(s): ART 009 Development of camera vision, ideas, and aesthetics and their relationship to the fine arts from 1839 to the present. GE credit: AH, VL. Effective: 2012 Fall Quarter.

ART 148—Theory and Criticism: Painting & Sculpture (4)
Lecture—3 hours; Term Paper. Prerequisite(s): ART 005 or ART 007 recommended. Study of forms and symbols in historic and contemporary masterpieces. (AHI 148.) GE credit: AH, VL, WE. Effective: 2014 Fall Quarter.

ART 149—Introduction to Critical Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): AHI 001B or AHI 001C; or AHI 183F; Two of the Art History courses listed above. An overview of 20th century critical theories of culture and their relation to visual art and mass media culture. GE credit: AH, VL. Effective: 1997 Winter Quarter.

ART 150—Theory and Criticism of Electronic Media (4)
Lecture—3 hours; Term Paper. Prerequisite(s): ART 024 recommended. Study of electronic media, focusing on critique, application, and relationship to art practice. Analysis of the conceptual basis of electronic media as an artistic mode of expression. GE credit: AH. Effective: 2007 Fall Quarter.

ART 151—Intermediate Sculpture (4)
Studio—6 hours. Prerequisite(s): ART 005 Individualized explorations through multiple projects in a variety of sculpture media and techniques. Builds upon technical skills and concepts covered in course 5. May be repeated up to 2 time(s) when topic differs. GE credit: AH, VL. Effective: 2013 Fall Quarter.

ART 152A—Advanced Sculpture: Studio Projects (4)
Studio—6 hours. Prerequisite(s): ART 005; ART 151 Pass One restricted to Art Studio majors. Sculpture for advanced students. Emphasis on concept, idea development and honing technical skills. Approaches and projects will vary according to the instructor. May be repeated up to 1 time(s) topic differs. GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 152B—Advanced Sculpture: Material Explorations (4)
Studio—6 hours. Prerequisite(s): ART 005; ART 151 Pass One restricted to Art Studio majors. Primary application and exploration of a single sculpture material chosen by the student. Examination of its properties, qualities, and characteristics for three-dimensional expression. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 152C—Advanced Sculpture: Concepts (4)
Studio—6 hours. Prerequisite(s): ART 005; ART 151 Pass One restricted to Art Studio majors. Investigation of a specific idea chosen by the class. Relationship of idea to form and content. Individual development of conceptual awareness. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 152D—Advanced Sculpture: Metals (4)
Studio—6 hours. Prerequisite(s): ART 005; ART 151 Pass One restricted to Art Studio majors. Technical aspects of the use of metals in contemporary art practice. Projects assigned to demonstrate the evolution of concepts and processes. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 152E—Advanced Sculpture: Site Specific Public Sculpture (4)
Studio—6 hours. Prerequisite(s): ART 005; ART 151 Pass One restricted to Art Studio majors. Place and site specificity in contemporary sculpture. Individual and group work to conceive and fabricate sculpture in a public space. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 152F—Advanced Sculpture: Figure (4)
Studio—6 hours. Prerequisite(s): ART 005; ART 151 Pass One restricted to Art Studio majors. Exploration of historical and contemporary approaches to the body in three-dimensions. Projects based on observational and conceptual strategies. Variety of media and techniques, including clay, wax, plaster, plastics, found objects, and others. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 152G—Advanced Sculpture: The Miniature and Gigantic (4)
Studio—6 hours. Prerequisite(s): ART 005; ART 151 Pass One restricted to Art Studio majors. Exploration of scale, from the very small to the very large in a series of projects in a variety of media. Tools and techniques of enlargement and miniaturization. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2007 Fall Quarter.

ART 171—Mexican and Chicano Mural Workshop (4)
Independent Study—1 hour; Studio—8 hours. Prerequisite(s): CHI 070; and Consent of Instructor. The Mural: a collective art process that empowers students and people through design and execution of mural paintings in the tradition of the Mexican Mural Movement; introduces materials and techniques. May be repeated up to 1 time(s). (CHI 171.) GE credit: AH, VL. Effective: 1997 Winter Quarter.

ART 190—Seminar in Art Practice (4)
Studio—6 hours. Prerequisite(s): Upper division standing Art Studio major. Pass One restricted to Art Studio majors. Introduction to professional practices. Development of an artist's packet including a resume, cover letter, artist statement, and statement of purpose. Ongoing independent studio work with group critiques. Research on galleries and museums, and readings in contemporary theory and criticism. GE credit: AH, VL, WE. Effective: 2013 Spring Quarter.

ART 192—Internship (2-12)
Internship. Supervised program of internships in artists' studios and at professional art institutions such as museums, galleries, and art archives including collections of slides and photographs. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Fall Quarter.

ART 195—Expanded Field: Artist Lecture Series (1)
Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Exploration of the expanded field of practice, theory and criticism in the visual arts. Presentations and discussions with professional practitioners in the field. May be repeated up to 12 unit(s) when topic differs. (P/NP grading only.) Effective: 2012 Fall Quarter.

ART 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Restricted to lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

ART 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

ART 290—Seminar (4)
Seminar—3 hours. Original works produced for group discussion and criticism; associated topics of a contemporary and historical nature. May be repeated for credit. Effective: 1997 Winter Quarter.

ART 291—Seminar: Critical Evaluation (1)
Seminar—1 hour. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

ART 292—Seminar: Comprehensive Qualifying (1)
Seminar—1 hour. Further critical evaluation of the student's work to determine his eligibility to begin the Comprehensive Project. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

ART 299—Individual Study (1-6)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

ART 299D—Comprehensive Project (9)
Variable. An original body of work accompanied by a catalog summarizing the student's aesthetic position. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

ART 401—Museum Training: Curatorial Principles (4)
Seminar—3 hours. Approved for graduate degree credit. Study of private and public collections. Museum personalities. Appraisal of works of art; ethics of appraisal. Auction and sales: methods and catalogues. Registration. Technical problems of the museum. Connoisseurship. Collateral reading. Visits to museums. Effective: 1997 Winter Quarter.

ART 402—Museum Training: Exhibition Methods (4)
Seminar—3 hours. Approved for graduate degree credit. History of exhibition methods in private and public collections. Comparisons of different types of museums and their exhibition problems. Lighting and techniques of display with emphasis on actual design. Experimentation with unusual presentation forms. Effective: 1997 Winter Quarter.

ASA Asian American Studies

Direct questions pertaining to the following courses to the instructor or to the Department of Asian American Studies in 3102 Hart Hall; 530-752-2069.

Courses in ASA:

ASA 001—Historical Experience of Asian Americans (4)
Discussion—1 hour; Lecture—3 hours. Introduction to Asian American Studies through an overview of the history of Asians in America from the 1840s to the present within the context of the development of the United States. GE credit: ACGH, AH, DD, SS, VL, WC, WE. Effective: 1997 Winter Quarter.

ASA 002—Contemporary Issues of Asian Americans (4)
Discussion—1 hour; Lecture—3 hours. Introduction to Asian American Studies through the critical analysis of the impact of race, racism, ethnicity, imperialism, militarism, and immigration since post-World War II on Asian Americans. Topics may include sexuality, criminality, class, hate crimes, and inter-ethnic relations. GE credit: ACGH, AH, DD, SS, VL, WC, WE. Effective: 2017 Spring Quarter.

ASA 003—Social and Psychological Perspectives of Asian Americans (4)
Discussion—1 hour; Lecture—3 hours. Major psychosocial issues of Asian Americans. Theories and empirical research that address cultural values, behavioral norms, ethnic stereotypes, racism, acculturation, ethnic identity development, family communication, stressors and social support systems, academic achievement, interpersonal effectiveness, and psychopathology. GE credit: ACGH, DD, SS. Effective: 2003 Fall Quarter.

ASA 004—Asian American Cultural Studies (4)
Discussion—1 hour; Lecture—3 hours. This interdisciplinary course examines the multiple ways in which race, class, sexuality and gender, as well as the recent turn to transnationalism and postcolonial theory, have changed the ways we read Asian American literature and see art, theater and film. GE credit: ACGH, AH, DD, OL, VL, WE. Effective: 2006 Fall Quarter.

ASA 092—Internship (1-3)
Internship—3-9 hours. Prerequisite(s): Consent of Instructor. Enrollment dependent on availability of intern positions. Supervised internship in community and institutional settings related to Asian American concerns. (P/NP grading only.) Effective: 1997 Winter Quarter.

ASA 098—Directed Group Study (1-5)
Lecture—1-5 hours. Primarily intended for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

ASA 098F—Student Facilitated Course (1-4)
Variable—1-4 hours. Student-facilitated (taught) course intended for lower division students. (P/NP grading only.) Effective: 2016 Spring Quarter.

ASA 099—Special Study for Undergraduates (3-15)
Variable—3-15 hours. (P/NP grading only.) Effective: 1997 Winter Quarter.

ASA 100—Asian American Communities (4)
Lecture/Discussion—4 hours. Survey and analysis of Asian American communities within both historical and contemporary contexts. Presentation of the analytical skills, theories, and concepts needed to describe, explain, and understand the diversity of Asian American communities within the larger, dominant society. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

ASA 102—Theoretical Perspective in Asian American Studies (4)
Lecture/Discussion—4 hours. Prerequisite(s): ASA 001 or ASA 002 or ASA 003 or ASA 004; or Consent of Instructor. Upper division standing. Explores major theories of race and its intersections with class, gender, and sexuality from interdisciplinary perspective. Introduces key theoretical developments, issues, debates. Through case studies, analyzes ways various theoretical frameworks and perspectives have been incorporated into range of scholarship. Effective: 2010 Winter Quarter.

ASA 112—Asian American Women (4)
Lecture/Discussion—4 hours. Experiences of Asian American women from major ethnic subgroups comparatively examined in their social, economic and historical contexts using theoretical perspectives from social sciences, humanities/arts: identity, racialization, immigration, gender, sexuality, labor, socialization, cultural expression, social movements and feminist theorizing. GE credit: ACGH, AH, DD, SS, VL, WC, WE. Effective: 2016 Fall Quarter.

ASA 113—Asian American Sexuality (4)
Discussion/Laboratory—4 hours. Restrictive US immigration laws, labor exploitation, race-based exclusionary laws, removal and internment, anti-miscegenation laws, and other examples of social control are surveyed to assess their role in shaping the sexuality of the different Asian American groups. GE credit: ACGH, AH, DD, SS, WC, WE. Effective: 2016 Fall Quarter.

ASA 114—Asian Diasporas (4)
Lecture—4 hours. Asian diasporic communities and the experiences of its members in the United States and internationally. Community building, cyberspace, gender issues, labor, transnational practices, effects of globalization, political organizing, homeland politics, humanitarian projects, citizenship and nationalism. GE credit: ACGH, DD, SS, WC. Effective: 2016 Fall Quarter.

ASA 115—Multiracial Asian Pacific American Issues (4)
Lecture/Discussion—4 hours. Introduction to the experiences of biracial and multiracial Asian Pacific people in the U.S., concentrating on theories of race, racial identity formation, culture, media, and anti-racist struggles. Critical approaches to the analysis of popular media and academic representations. GE credit: ACGH, DD, OL, SS, WC, WE. Effective: 2016 Fall Quarter.

ASA 116—Asian American Youth (4)
Lecture—3 hours; Term Paper. Social experiences of diverse groups of Asian American youth. Ways in which youth themselves actively create cultural expressions and political interventions. GE credit: ACGH, AH, DD, OL, SS, WE. Effective: 2016 Fall Quarter.

ASA 121—Asian American Performance (4)
Lecture/Discussion—4 hours. Performance work by, for, and/or about Asian Pacific Americans including dramatic literature, performance art, dance, and film. Ethnicity, gender and sexuality, class and age as they intersect with Asian Pacific American identities in and through dramatic performance. GE credit: ACGH, AH, DD, OL, WE. Effective: 2016 Fall Quarter.

ASA 130—Asian American Literature (4)
Lecture/Discussion—4 hours. Works of Asian American literature by writers from the major ethnic subgroups, examined in their social, economic and historical contexts. Intertextual analysis of their thematic and formal elements to form an understanding of Asian American literary traditions. GE credit: ACGH, AH, DD, OL, WE. Effective: 2016 Fall Quarter.

ASA 131—Ethnicity, Culture, and the Self (4)
Discussion—1 hour; Lecture—3 hours. Cultural and social psychological influences on Asian Americans focusing on the individual. GE credit: ACGH, DD, SS. Effective: 2016 Fall Quarter.

ASA 132—Health Issues Confronting Asian Americans and Pacific Islanders (4)
Lecture/Discussion—4 hours. Health issues confronting Asian Americans and Pacific Islanders. (SPH 132.) GE credit: SS. Effective: 2009 Winter Quarter.

ASA 141—Asian Americans and the Political Culture of Fashion in the U.S. and Asia (4)
Lecture/Discussion—4 hours; Project (Term Project); Term Paper. Historical, cultural and sociopolitical development of fashion in Asia and the U.S. as it relates to the Asian Diasporas. Specific aspects of material culture: textiles, clothing and fashion. GE credit: ACGH, AH, DD, OL, SS, VL, WC, WE. Effective: 2016 Fall Quarter.

ASA 150—Filipino American Experience (4)
Discussion/Laboratory—4 hours. Examination of the relationship between the Filipino-American community, the Philippine home community and the larger American society through a critical evaluation of the historical and contemporary conditions, problems and prospects of Filipinos in the U.S. GE credit: ACGH, DD, SS, WC. Effective: 2016 Fall Quarter.

ASA 150B—Japanese American Experience (4)
Lecture—3 hours; Term Paper. Different analytical approaches to understand Japanese American history, culture and society. GE credit: ACGH, AH, DD, SS, VL, WC, WE. Effective: 2016 Fall Quarter.

ASA 150C—Chinese American Experience (4)
Lecture/Discussion—4 hours. Survey of the historical and contemporary experiences of Chinese in the United States, starting with the gold rush era and concluding with the present-day phenomenon of Chinese transnational movement to the United States and its diasporic significance. GE credit: ACGH, AH, DD, SS, VL, WC. Effective: 2016 Fall Quarter.

ASA 150D—Korean American Experience (4)
Lecture/Discussion—4 hours. Interdisciplinary survey of the historical and contemporary experiences of Koreans in the United States from the late nineteenth century to the present. GE credit: ACGH, AH, DD, SS, WC. Effective: 2016 Fall Quarter.

ASA 150E—Southeast Asian American Experience (4)
Lecture/Discussion—4 hours. Historical survey of Southeast Asian experiences with special focus on United States involvement and post 1975 migrations. Defines international and transnational conditions that led up to the large exodus and resettlement of Southeast Asians. GE credit: ACGH, AH, DD, OL, SS, WC, WE. Effective: 2016 Fall Quarter.

ASA 150F—South Asian American History, Culture, & Politics (4)
Lecture/Discussion—4 hours. South Asian American experiences, focusing on the histories, cultures, and politics of Indian, Pakistani, Bangladeshi, and Sri Lankan communities in the U.S. Interdisciplinary approaches to migration, labor, gender, racialization, ethnicity, youth, community mobilization. GE credit: ACGH, AH, DD, OL, SS, WE. Effective: 2016 Fall Quarter.

ASA 155—Asian American Legal History (4)
Lecture/Discussion—4 hours. Legal history of Asian Americans, from the mid-19th century to present. Laws and administrative policies affecting Asian American communities, including those governing immigration, social and economic participation, WWII internment, and affirmative action. GE credit: ACGH, DD, SS. Effective: 2016 Fall Quarter.

ASA 189A—Topics in Asian American Studies: History (4)
Lecture—4 hours. Intensive treatment of a topic in Asian American Studies; history. May be repeated for credit when topic differs. GE credit: ACGH, DD, SS, WC. Effective: 2016 Fall Quarter.

ASA 189B—Topics in Asian American Studies: Culture (4)
Lecture—4 hours. Intensive treatment of a topic in Asian American Studies; culture. May be repeated for credit when topic differs. GE credit: AH, SS. Effective: 2016 Fall Quarter.

ASA 189C—Topics in Asian American Studies: Physical and Mental Health (4)
Lecture—4 hours. Intensive treatment of a topic in Asian American Studies; physical and mental health. May be repeated for credit when topic differs. GE credit: SS. Effective: 2016 Fall Quarter.

ASA 189D—Topics in Asian American Studies: Policy and Community (4)
Lecture—4 hours. Intensive treatment of a topic in Asian American Studies: policy and community. May be repeated for credit when topic differs. GE credit: ACGH, DD, SS. Effective: 2016 Fall Quarter.

ASA 189E—Topics in Asian American Studies: Comparative Racial Studies (4)
Lecture—4 hours. Intensive treatment of a topic in Asian American Studies: comparative racial studies. May be repeated for credit when topic differs. GE credit: ACGH, AH, DD, OL, SS, WE. Effective: 2016 Fall Quarter.

ASA 189F—Topics in Asian American Studies: Asian Studies and Asian American Studies (4)
Lecture—4 hours. Intensive treatment of a topic in Asian American Studies: asian studies and asian american studies. May be repeated for credit when topic differs. GE credit: SS. Effective: 2016 Fall Quarter.

ASA 189G—Topics in Asian American Studies: Race, Class, Gender, and Sexuality (4)
Lecture—4 hours. Intensive treatment of a topic in Asian American Studies: race, class, gender, and sexuality. May be repeated for credit when topic differs. GE credit: SS. Effective: 2016 Fall Quarter.

ASA 189H—Topics in Asian American Studies: Society and Institutions (4)
Lecture—4 hours. Intensive treatment of a topic in Asian American Studies: society and institutions. May be repeated for credit when topic differs. GE credit: AH, SS. Effective: 2016 Fall Quarter.

ASA 189I—Topics in Asian American Studies: Politics and Social Movements (4)
Lecture—4 hours. Intensive treatment of a topic in Asian American Studies: politics and social movements. May be repeated for credit when topic differs. GE credit: ACGH, AH, DD, OL, SS, WE. Effective: 2017 Spring Quarter.

ASA 192—Internships (1-5)
Internship—3-15 hours. Prerequisite(s): Consent of Instructor. Enrollment dependent on availability of intern position with priority to Asian American Studies minors; consent of instructor. Supervised internship in community and institutional settings related to Asian American concerns. (P/NP grading only.) Effective: 1997 Winter Quarter.

ASA 194—Asian American Studies Capstone Course (4)
Extensive Writing; Lecture/Discussion—4 hours; Project (Term Project). Open to junior or senior level standing in Asian American Studies or consent of instructor. Synthesis of the approaches and methods learned by students in Asian American Studies and development of specialization in their areas of interest. Development of a research proposal for thesis project. Effective: 2017 Winter Quarter.

ASA 195—Asian American Studies Senior Thesis Seminar (4)
Extensive Writing; Lecture/Discussion—3 hours; Project (Term Project). Restricted to junior and senior level standing in Asian American Studies. Completion of ASA 194 required. Synthesis of the approaches and methods learned in Asian American Studies. Production of an original research paper on a topic of student's interest, building on the research proposal submitted in the capstone seminar. Effective: 2016 Fall Quarter.

ASA 197T—Tutoring in Asian American Studies (1-5)
Tutorial—1-5 hours. Prerequisite(s): Consent of Instructor. Tutoring in lower division Asian American Studies courses in small group discussion. Weekly meetings with instructor. May be repeated up to 1 time(s) for a given course and also for a different course. (P/NP grading only.) Effective: 2016 Fall Quarter.

ASA 198—Directed Group Study (1-5)
Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Primarily intended for upper division students. (P/NP grading only.) Effective: 2016 Fall Quarter.

ASA 198F—Student Facilitated Course (1-4)
Variable—1-4 hours. Student-facilitated (taught) course intended for upper division students. (P/NP grading only.) Effective: 2017 Fall Quarter.

ASA 199—Special Study for Advanced Undergraduates (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special study for advanced undergraduates. (P/NP grading only.) Effective: 2016 Fall Quarter.

ASA 199FA—Student Facilitated Course Development (1-4)
Variable—1-4 hours. Under the supervision of a faculty member, an undergraduate student plans and develops the course they will offer under 98F/198F. (P/NP grading only.) Effective: 2016 Spring Quarter.

ASA 199FB—Student Facilitated Teaching (1-4)
Variable—1-4 hours. Prerequisite(s): ASA 199FA Student facilitated. Under the supervision of a faculty member, an undergraduate student teaches a course under 98F/198F. (P/NP grading only.) Effective: 2016 Spring Quarter.

AST Astronomy

Courses in AST:

AST 010G—Introduction to Stars, Galaxies, and the Universe (3)
Lecture—3 hours. Non-mathematical introduction to astrophysics of the Universe beyond our solar system using concepts of modern physics. Not open for credit to students who have taken AST 002, the former AST 010, any quarter of PHY 009 or PHY 009H, or any upper-division physics course (other than PHY 137 or PHY 160). GE credit: SE, SL, VL. Effective: 2007 Summer Session 1.

AST 010L—Observational Astronomy Lab (1)
Laboratory—2.5 hours. Introduction to observations of the night sky using small telescopes in nighttime laboratory. Not open for credit to students who have taken AST 002 or AST 010. GE credit: SE, VL. Effective: 2018 Winter Quarter.

AST 010S—Astronomy of the Solar System (3)
Lecture—3 hours. Introduction to naked eye and telescopic observations of events in the night sky: positions of sun, moon, planets throughout the year. Historical perspective on how our understanding of the solar system evolved to current non-mathematical astrophysical interpretation of planetary systems. Not open for credit to students who have taken AST 002, any quarter of PHY 009 or PHY 009H, or any upper-division physics course (other than PHY 137 or PHY 160). GE credit: SE, SL, VL. Effective: 2007 Summer Session 1.

AST 025—Introduction to Modern Astronomy and Astrophysics (4)
Discussion/Laboratory—2.5 hours; Lecture—3 hours. Prerequisite(s): Good facility in high school physics and mathematics (algebra and trigonometry). Description and interpretation of astronomical phenomena using the laws of modern physics and observations by modern astronomical instruments. Gravity, relativity, electromagnetic radiation, atomic and nuclear processes in relation to the structure and evolution of stars, galaxies and the universe. Not open to students who have received credit for AST 002, AST 010G, or AST 010L. GE credit: SE, SL, VL. Effective: 2007 Fall Quarter.

ATM Atmospheric Science

Questions pertaining to the following courses should be directed to the instructor or to the Land, Air and Water Resources Teaching Center in 1150 Plant & Environmental Sciences Building; 530-752-1603.

Courses in ATM:

ATM 005—Global Climate Change (3)
Discussion—1 hour; Lecture—2 hours. Scientific concepts needed to understand climate and climate change. Principles of regional variations in climate. Understanding observed seasonal, decadal and millennial changes. Analysis of the Antarctic ozone hole, El Nino and human-induced global warming. GE credit: QL, SE, SL, VL. Effective: 2007 Spring Quarter.

ATM 006—Fundamentals of Atmospheric Pollution (3)
Lecture—3 hours. Effects of human emissions on the atmosphere: smog, ozone pollution, and ozone depletion; indoor air pollution; global warming; acid rain. Impacts of these problems on the earth, ecosystems, and humans. Strategies to reduce atmospheric pollution. GE credit: SE, SL, VL. Effective: 2003 Fall Quarter.

ATM 010—Severe and Unusual Weather (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): High school physics. Introduction to physical principles of severe and unusual weather: flood, blizzards, thunderstorms, lightning, tornadoes, and hurricanes. Emphasis on scientific perspective and human context. Not open to students who have received credit for course 100. (Former course 100.) GE credit: QL, SE, SL, VL. Effective: 1997 Spring Quarter.

ATM 060—Introduction to Atmospheric Science (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (MAT 016A or MAT 021A); PHY 007A or PHY 009A) Fundamental principles of the physics, chemistry, and fluid dynamics underlying weather and climate. Solar radiation, the greenhouse effect, and the thermal budget of the Earth. Clouds and their formation, convection, precipitation, mid-latitude storm systems. GE credit: QL, SE, VL. Effective: 2011 Fall Quarter.

ATM 092—Atmospheric Science Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Internship off and on campus in atmospheric science. Internship supervised by a member of the faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

ATM 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

ATM 099—Special Study for Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

ATM 110—Weather Observation and Analysis (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ATM 060 Acquisition, distribution and analysis of meteorological data. Vertical sounding analysis, stability indices, probability of local severe weather, weather map analysis. Use of National Weather Service analyses and forecast products. Laboratory makes use of computer-generated analyses. GE credit: OL, QL, SE, VL. Effective: 1997 Winter Quarter.

ATM 111—Weather Analysis and Prediction (3)
Lecture—3 hours. Prerequisite(s): ATM 110; ATM 121B; (ATM 111L (can be concurrent) or ATM 111LY (can be concurrent)); Knowledge of a programming language. Tools for analyzing observed properties of mid-latitude weather systems. The analysis-forecast system, including various weather forecast models. General structure and properties of mid-latitude weather systems. GE credit: QL, SE, VL. Effective: 2018 Winter Quarter.

ATM 111LY—Weather Analysis and Prediction Laboratory (2)
Laboratory—2 hours; Web Virtual Lecture—4 hours. Prerequisite(s): ATM 111 (can be concurrent) Subjective and objective analysis of weather data. Web-based learning of the analysis-forecast system and various weather forecasting situations. Weather map interpretation and forecast discussions. (P/NP grading only.) GE credit: OL, QL, SE, VL. Effective: 2013 Fall Quarter.

ATM 112—Weather Forecasting Practice (2)
Discussion—2 hours; Laboratory—1 hour. Prerequisite(s): ATM 110 Formal practice in preparing local weather forecasts. Analysis of current weather conditions and recent model performance. Verification
and discussion of prior forecast. Interpretation of current forecast model guidance. Posting of forecast. May be repeated up to 3 time(s). (P/NP grading only.) Effective: 1999 Fall Quarter.

ATM 115—Hydroclimatology (3)
Lecture—3 hours. Prerequisite(s): ATM 060 Examination of climate as the forcing function for the hydrologic system. Emphasis on seasonal variations in the relationship between precipitation and evapotranspiration for meso-scale areas. Watershed modeling of floods and drought for evaluating the effects of climatic
fluctuations. GE credit: SE, SL. Effective: 1997 Winter Quarter.

ATM 116—Modern Climate Change (3)
Lecture—3 hours. Factors that determine the Earth's climate, including natural and human-caused changes. Impacts of climate change. Possible future climates and policies to reduce human emissions of greenhouse gases. GE credit: QL, SE, SL, VL. Effective: 2017 Fall Quarter.

ATM 120—Atmospheric Thermodynamics and Cloud Physics (4)
Extensive Problem Solving—3 hours; Lecture—3 hours. Prerequisite(s): MAT 021C; PHY 009B; ATM 060 (can be concurrent) Atmospheric composition and structure, thermodynamics of atmospheric gases, thermal properties of dry and moist air, atmospheric stability; cloud nucleation, cloud growth by condensation and collision, cloud models. GE credit: QL, SE, VL. Effective: 2000 Fall Quarter.

ATM 121A—Atmospheric Dynamics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): ATM 120; MAT 021D; PHY 009B Fundamental forces of atmospheric flow; noninertial reference frames; development of the equations of motion for rotating stratified atmospheres; isobaric and natural coordinate systems; geostrophic flow; thermal wind; circulation and vorticity. GE credit: QL, SE. Effective: 2001 Winter Quarter.

ATM 121B—Atmospheric Dynamics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): ATM 121A Dynamics of fluid motion in geophysical systems; quasi-geostrophic theory; fundamentals of wave propagation in fluids; Rossby waves; gravity waves; fundamentals of hydrodynamic instability; two-level model; baroclinic instability and cyclogenesis. GE credit: QL, SE. Effective: 2001 Spring Quarter.

ATM 124—Meteorological Instruments and Observations (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): ATM 060 Modern meteorological instruments and their use in meteorological observations and measurements. Both standard and micrometeorological instruments are included. GE credit: QL, SE, SL, VL. Effective: 1997 Winter Quarter.

ATM 128—Radiation and Satellite Meteorology (4)
Discussion/Laboratory—3 hours; Extensive Problem Solving—1 hour. Prerequisite(s): ATM 060; PHY 009B; MAT 022B; MAT 021D Concepts of atmospheric radiation and the use of satellites in remote sensing. Emphasis on the modification of solar and infrared radiation by the atmosphere. Estimation from satellite data of atmospheric variables such as temperatures and cloudiness. GE credit: QL, SE, VL. Effective: 2011 Spring Quarter.

ATM 133—Biometeorology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016B; And one course in a biological discipline or consent of instructor. Atmospheric and biological interactions. Physical and biological basis for water vapor, carbon dioxide and energy exchanges with the atmosphere associated with plants and animals, including humans. Microclimate of plant canopies and microclimatic modification such as frost protection and windbreaks. GE credit: QL, SE, SL, VL. Effective: 2001 Winter Quarter.

ATM 149—Air Pollution (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021D; MAT 022B; CHE 002B C- or better; (ATM 121A or ENG 103 C- or better or ECI 100 C- or better) Physical and technical aspects of air pollution. Emphasis on geophysical processes and air pollution meteorology as well as physical and chemical properties of pollutants. (ECI 149.) GE credit: QL, SE, SL. Effective: 2018 Winter Quarter.

ATM 150—Introduction to Computer Methods in Physical Sciences (4)
Discussion/Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): MAT 022B; PHY 009B; And a computer programming course such as ECS 030; additional courses in fluid dynamics (ATM 121A or ENG 103) and in Fourier transforms (MAT 118C or PHY 104A) are helpful but not required. Enrollment limited to 12, preference to Atmospheric Science majors. Computational techniques used in physical sciences. Integral and differential equation numerical solution: mainly finite differencing and spectral (Fourier transform) methods. Time series applications (time-permitting). Specific applications drawn from meteorology. Accelerated introduction to FORTRAN including programming assignments. (P/NP grading only.) GE credit: SE. Effective: 2005 Fall Quarter.

ATM 158—Boundary-Layer Meteorology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ATM 121A Dynamics of the atmosphere nearest the Earth's surface. Friction and heat transfer. Properties of turbulent flows; statistical and spectral techniques; use and interpretation of differential equations.
Emphasis on the importance to weather, air pollution, and the world's oceans. GE credit: QL, SE, VL. Effective: 2011 Spring Quarter.

ATM 160—Introduction to Atmospheric Chemistry (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 002B Quantitative examination of current local, regional and global problems in atmospheric chemistry (including photochemical smog, acid deposition, climate change, and stratospheric ozone depletion) using fundamental concepts from chemistry. Basic chemical modeling of atmospheric reaction systems. GE credit: QL, SE, SL, VL. Effective: 2000 Winter Quarter.

ATM 192—Atmospheric Science Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Internship off and on campus in atmospheric science. Internship supervised by a member of the faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

ATM 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Three upper division units in Atmospheric Science. (P/NP grading only.) Effective: 1997 Winter Quarter.

ATM 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Three upper division units in Atmospheric Science and at least an overall B average. (P/NP grading only.) Effective: 1997 Winter Quarter.

ATM 215—Advanced Hydroclimatology (3)
Lecture—3 hours. Prerequisite(s): ATM 115 Theoretical and applied aspects of energy and mass fluxes linking the earth's surface, atmosphere, and hydrologic system. Emphasis on regional scale analysis and modeling, spatial data representation, and climate change influences on precipitation and its hydroclimatic expression. Effective: 1998 Spring Quarter.

ATM 221—Advanced Atmospheric Dynamics (3)
Lecture—3 hours. Prerequisite(s): ATM 121B Conditions for instability in stratified atmospheres; baroclinic instability; forced topographic Rossby Waves; wave-mean flow interaction theory; tropical dynamics; stratospheric dynamics. Effective: 1997 Winter Quarter.

ATM 223—Advanced Boundary-Layer Meteorology (3)
Lecture—3 hours. Prerequisite(s): ATM 230 Characteristics of the atmospheric boundary layer under convective and nocturnal conditions. Heat budget at the surface and boundary layer forcing. Similarity theory and scaling of the boundary layer. Measurement and simulation techniques. Effective: 1997 Winter Quarter.

ATM 230—Atmospheric Turbulence (3)
Lecture—3 hours. Prerequisite(s): ATM 121B or ATM 158 Dynamics and energetics of turbulence in the atmosphere including vorticity dynamics. Statistical description of turbulence; Eulerian and Lagrangian scales, spectral analysis, conditional sampling techniques. Turbulent diffusion; the closure problem, gradient-diffusion and second-order methods. Effective: 1997 Winter Quarter.

ATM 231—Advanced Air Pollution Meteorology (3)
Lecture—3 hours. Prerequisite(s): ATM 160; ATM 149A; One course in fluid dynamics. Processes determining transport and diffusion of primary and secondary pollutants. Models of chemical transformation, of the atmospheric boundary layer and of mesoscale wind fields, as applicable to pollutant dispersion problems. Effective: 1997 Spring Quarter.

ATM 233—Advanced Biometeorology (3)
Lecture/Discussion—3 hours. Prerequisite(s): ATM 133; or Consent of Instructor. Current topics in biometeorology. Physical and biological basis for water vapor, other gases, and energy exchange with the atmosphere. Topics include modeling and measuring turbulent transport from plant canopies, surface temperatures and energy budgets, bio-aerosol physics and aerobiology. Effective: 1997 Winter Quarter.

ATM 240—General Circulation of the Atmosphere (4)
Lecture/Discussion—4 hours. Prerequisite(s): ATM 121B Large-scale, observed atmospheric properties. Radiation, momentum, and energy balances derived and compared with observations. Lectures and homework synthesize observations and theories, then apply them to understand the large-scale circulations. Effective: 2000 Winter Quarter.

ATM 241—Climate Dynamics (3)
Lecture/Discussion—3 hours. Prerequisite(s): ATM 121B Dynamics of large-scale climatic variations over time periods from weeks to centuries. Description of the appropriate methods of analysis of atmospheric and oceanic observations. Conservation of mass, energy and momentum. Introduction to the range of climate simulations. Effective: 1997 Winter Quarter.

ATM 245—Climate Change, Water and Society (4)
Lecture—4 hours. Class size limited to 25 students. Integration of climate science and hydrology with policy to understand hydroclimatology and its impact upon natural and human systems. Assignments: readings, take-home examination on climate and hydrologic science, paper that integrates course concepts into a research prospectus or review article. (HYD 245 and ECL 245.) Effective: 2015 Spring Quarter.

ATM 250—Meso-Scale Meteorology (3)
Lecture—3 hours. Prerequisite(s): ATM 150; Graduate standing, a course in partial differential equations or consent of instructor. The study of weather phenomena with horizontal spatial dimensions between 2.5 and 2500 kilometers. Methods of observational study and numerical modeling of the structure and temporal behavior of these weather systems. Effective: 1997 Winter Quarter.

ATM 255—Numerical Modeling of the Atmosphere (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): ATM 121B; ENG 005; ATM 150 recommended. Principles of numerical modeling of the dynamic, thermodynamic and physical processes of the atmosphere. Hands-on experiments on model development using the shallow water equations and the primitive equations. Operational forecast models. Effective: 1997 Winter Quarter.

ATM 260—Atmospheric Chemistry (3)
Lecture—3 hours. Prerequisite(s): ATM 160 Chemistry and photochemistry in tropospheric condensed phases (fog, cloud, and rain drops and aerosol particles). Gas-drop and gas-particle partitioning of compounds and effects of reactions in condensed phases on the fates and transformations of tropospheric chemical species. Effective: 1998 Spring Quarter.

ATM 265—The Art of Climate Modeling (3)
Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): ATM 121A Over the past fifty years, global models have given us incredible insight into the Earth system. This course provides an introduction to these models, with a focus on their design and the science questions they have been built to address. Effective: 2016 Spring Quarter.

ATM 270A—Topics in Atmospheric Science: Meteorological Statistics (1-3)
Discussion—1-3 hours. Applications and concepts in meteorological statistics. Effective: 1997 Winter Quarter.

ATM 270B—Topics in Atmospheric Science: Computer Modeling of the Atmosphere (1-3)
Discussion—1-3 hours. Applications and concepts in computer modeling of the atmosphere. Effective: 1997 Winter Quarter.

ATM 270C—Topics in Atmospheric Science: Design of Experiments and Field Studies in Meteorology (1-3)
Discussion—1-3 hours. Applications and concepts in design of experiments and field studies in meteorology. Effective: 1997 Winter Quarter.

ATM 270D—Topics in Atmospheric Science: Solar and Infrared Radiation in the Atmosphere (1-3)
Discussion—1-3 hours. Applications and concepts in solar and infrared radiation in the atmosphere. Effective: 1997 Winter Quarter.

ATM 270E—Topics in Atmospheric Science: Aerosol and Cloud Physics (1-3)
Discussion—1-3 hours. Applications and concepts in aerosol and cloud physics. Effective: 1997 Winter Quarter.

ATM 270F—Topics in Atmospheric Science: Atmospheric Chemistry (1-3)
Discussion—1-3 hours. Applications and concepts in atmospheric chemistry. Effective: 1997 Winter Quarter.

ATM 270G—Topics in Atmospheric Science: General Meteorology (1-3)
Discussion—1-3 hours. Applications and concepts in general meteorology. Effective: 1997 Winter Quarter.

ATM 280A—Air Quality Policy in the Real World (4)
Project (Term Project). Prerequisite(s): (ATM 149 or ECI 149); ECI 242; Consent of Instructor. Or equivalent of ECI 242. In-depth investigation of an air quality problem with a team and mentor from government or industry. Science, engineering and policy will be involved. Findings will be presented orally and in writing. (Deferred grading only, pending completion of sequence.) Effective: 2007 Winter Quarter.

ATM 280B—Air Quality Policy in the Real World (4)
Project (Term Project). Prerequisite(s): ATM 280A; and Consent of Instructor. In-depth investigation of an air quality problem with a team and mentor from government or industry. Science, engineering and policy will be involved. Findings will be presented orally and in writing. (Deferred grading only, pending completion of sequence.) Effective: 2007 Winter Quarter.

ATM 290—Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing in Atmospheric Science or related field. Current developments in selected areas of atmospheric research. Topics will vary according to student and faculty interests. (S/U grading only.) Effective: 1997 Winter Quarter.

ATM 291A—Research Conference in Atmospheric Science; Air Quality Meteorology (1-3)
Lecture/Discussion—1-3 hours. Prerequisite(s): Consent of Instructor. Review and discussion of current literature and research in Air Quality Meteorology. May be repeated up to 6 unit(s). (S/U grading only.) Effective: 2010 Fall Quarter.

ATM 291B—Research Conference in Atmospheric Science; Biometeorology (1-3)
Lecture/Discussion—1-3 hours. Prerequisite(s): Consent of Instructor. Review and discussion of current literature and research in Biometeorology. May be repeated up to 6 unit(s). (S/U grading only.) Effective: 2010 Fall Quarter.

ATM 291C—Research Conference in Atmospheric Science; Boundary Layer Meteorology (1-3)
Lecture/Discussion—1-3 hours. Prerequisite(s): Consent of Instructor. Review and discussion of current literature and research in Boundary Layer Meteorology. May be repeated up to 6 unit(s). (S/U grading only.) Effective: 2010 Fall Quarter.

ATM 291D—Research Conference in Atmospheric Science; Climate Change (1-3)
Lecture/Discussion—1-3 hours. Prerequisite(s): Consent of Instructor. Review and discussion of current literature and research in Climate Change. May be repeated up to 6 unit(s). (S/U grading only.) Effective: 2010 Fall Quarter.

ATM 291E—Research Conference in Atmospheric Science; General Meteorology (1-3)
Lecture/Discussion—1-3 hours. Prerequisite(s): Consent of Instructor. Review and discussion of current literature and research in General Meteorology. May be repeated up to 6 unit(s). (S/U grading only.) Effective: 2010 Fall Quarter.

ATM 291F—Research Conference in Atmospheric Science; Atmospheric Chemistry (1-3)
Lecture/Discussion—1-3 hours. Prerequisite(s): Consent of Instructor. Review and discussion of current literature and research in Atmospheric Chemistry. May be repeated up to 6 unit(s). (S/U grading only.) Effective: 2010 Fall Quarter.

ATM 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

ATM 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

ATM 393—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

ATM 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

AVS Avian Sciences

Courses in AVS:

AVS 011—Introduction to Poultry Science (3)
Lecture—3 hours. The mosaic of events that have tied poultry science to other scientific disciplines and poultry to humans. Poultry science techniques and production methods from the time of domestication to the present. One field trip required. GE credit: SE. Effective: 1997 Winter Quarter.

AVS 013—Birds, Humans and the Environment (3)
Discussion—1 hour; Lecture—2 hours. Restricted to students with lower division standing. Interrelationships of the worlds of birds and humans. Lectures, discussions, field trips and projects focus on ecology, avian evolution, physiology, reproduction, flight, behavior, folklore, identification, ecotoxicology and conservation. Current environmental issues are emphasized. Half-day field trip. GE credit: SE, SL. Effective: 2017 Winter Quarter.

AVS 014L—Management of Captive Birds (2)
Fieldwork—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. One weekly discussion and field trip to study practical captive management (housing, feeding, equipment, marketing, diseases). Visit facilities rearing birds such as commercial parrots, hobbyist exotics, ostrich, raptors, waterfowl, game birds, poultry and pigeons. GE credit: SE. Effective: 1997 Winter Quarter.

AVS 015L—Captive Raptor Management (2)
Independent Study—3 hours; Laboratory—3 hours. Hands-on experience handling birds of prey. Students are taught all of the skills required to handle and care for raptors, including husbandry, biology, habitat requirements, cage design, veterinary care, rehabilitation methods, research potential and long-term care requirements. One Saturday fieldtrip. GE credit: SE. Effective: 1997 Winter Quarter.

AVS 016LA—Raptor Migration and Population Fluctuations (2)
Discussion—1 hour; Fieldwork—3 hours. Prerequisite(s): Consent of Instructor. Identify raptors: study of effects of weather, crops, agricultural practices on fluctuations in raptor species and numbers. Familiarize with literature; design a project; survey study sites; collect, computerize, analyze data, compare with previous years. Species, observations, emphasis different each quarter. One Saturday field trip. GE credit: SE. Effective: 1997 Winter Quarter.

AVS 016LB—Raptor Migration and Population Fluctuations (2)
Discussion—1 hour; Fieldwork—3 hours. Prerequisite(s): Consent of Instructor. Identify raptors: study of effects of weather, crops, agricultural practices on fluctuations in raptor species and numbers. Familiarize with literature; design a project; survey study sites; collect, computerize, analyze data, compare with previous years. Species, observations, emphasis different each quarter. One Saturday field trip. GE credit: SE. Effective: 1997 Winter Quarter.

AVS 016LC—Raptor Migration and Population Fluctuations (2)
Discussion—1 hour; Fieldwork—3 hours. Prerequisite(s): Consent of Instructor. Identify raptors: study of effects of weather, crops, agricultural practices on fluctuations in raptor species and numbers. Familiarize with literature; design a project; survey study sites; collect, computerize, analyze data, compare with previous years. Species, observations, emphasis different each quarter. One Saturday field trip. GE credit: SE. Effective: 1997 Winter Quarter.

AVS 092—Internship in the Avian Sciences (1-12)
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. Sophomore standing preferred. Internship on and off campus in poultry, game birds or exotic bird production, management and research; or in a business, industry, or agency concerned with these entities. Compliance with Internship Approval form essential. (P/NP grading only.) Effective: 1997 Winter Quarter.

AVS 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Fall Quarter.

AVS 099—Special Study for Undergraduates (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

AVS 100—Avian Biology (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B; ANS 002 preferred. Biology of domesticated poultry, specifically chickens and turkeys. Avian genetics, immunology, reproduction, growth and development, broiler and layer management. GE credit: SE. Effective: 2016 Spring Quarter.

AVS 103—Avian Development and Genomics (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B Unique features of avian development and genomics: Incubation; Staging; Egg Structure/Function; Fertilization; Pre-ovipositал; Oviposition, Cold Torpor; Post-ovipositал Development; Organogenesis, Growth; Sexual Differentiation; Extraembryonic Membranes; Mortality/Hatching; Genome Organization; Comparative Avian Genomics; Telomere Biology; Sex Chromosomes/Sex Determination; Advanced Technologies; Genome Manipulation; Mutations. GE credit: SE. Effective: 2016 Fall Quarter.

AVS 115—Raptor Biology (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; Or equivalent. Study of birds of prey: classification, distribution, habits, migration, unique anatomical and physiological adaptations, natural and captive breeding, health and diseases, environmental concerns, conservation, legal considerations, rehabilitation, and falconry. Includes two Saturday field trips. GE credit: SE. Effective: 2016 Fall Quarter.

AVS 121—Avian Reproduction (2)
Lecture—2 hours. Prerequisite(s): BIS 002A; BIS 002B Breeding cycles and reproductive strategies, egg and sperm formation, incubation, sexual development, imprinting, hormonal control of reproductive behavior and song. Species coverage includes wild and companion birds. Course has a physiological orientation. GE credit: SE, SL. Effective: 2016 Fall Quarter.

AVS 123—Management of Birds (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B Captive propagation of birds, including reproduction, genetic management, health, feeding, artificial incubation, artificial insemination, and related legal aspects, including trade and smuggling. Emphasis on exotic species and the role of captive propagation in conservation. GE credit: SE, SL, WE. Effective: 2016 Fall Quarter.

AVS 149—Egg Production Management (2)
Lecture—2 hours. Prerequisite(s): AVS 011; or Consent of Instructor. Management of commercial table egg flocks as related to environment, nutrition, disease control, economics, housing, equipment, egg processing and raising replacement pullets. Offered in alternate years. One Saturday field trip required. GE credit: SE. Effective: 2016 Fall Quarter.

AVS 150—Nutrition of Birds (1)
Lecture—1 hour. Prerequisite(s): ABI 103 (can be concurrent) or BIS 103 (can be concurrent) Principles of nutrition specific to avian species, including feedstuffs, feed additives, nutrient metabolism, energy systems, and nutritional support of egg production and growth. Use of computers for feed formulation to support production. GE credit: QL, SE. Effective: 2016 Fall Quarter.

AVS 160—Designing and Performing Experiments in Avian Sciences (2)
Laboratory—6 hours. Prerequisite(s): AVS 100 or WFC 111; or Consent of Instructor. Experiments in current problems in avian biology. Introduction to experimental design. Students choose a project, design a protocol, perform an experiment and report their findings. May be repeated for credit with consent of instructor. May be repeated for credit with consent of instructor. GE credit: SE. Effective: 2016 Fall Quarter.

AVS 170—Advanced Avian Biology (4)
Lecture/Discussion—3 hours; Project (Term Project)—1 hour. Prerequisite(s): AVS 100 or WFC 111 Ecology, behavior, functional morphology and lifehistory evolution of birds. Emphasis on the importance of body size as a principle determinant of most aspects of avian performance from lifespan to reproduction and species abundance. Analytical synthesis and critical thought emphasized. GE credit: SE. Effective: 2016 Fall Quarter.

AVS 190—Seminar in Avian Sciences (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. May be repeated up to 3 time(s). (P/NP grading only.) Effective: 2016 Fall Quarter.

AVS 192—Internship in Avian Sciences (1-12)
Laboratory—3-36 hours. Prerequisite(s): Consent of Instructor. Internship on and off campus in poultry, game birds or exotic bird production, management and research; or in a business, industry, or agency concerned with these entities. Compliance with Internship Approval form essential. (P/NP grading only.) Effective: 2016 Fall Quarter.

AVS 195—Topics in Current Research (1-3)
Lecture/Discussion; Variable—1-3 hours. Prerequisite(s): Consent of Instructor. Discussion of topics of current interest in avian sciences. May be repeated three times for credit. May be repeated up to 3 time(s). Effective: 1997 Winter Quarter.

AVS 197T—Tutoring in Avian Sciences (1-3)
Tutorial—1-3 hours. Prerequisite(s): Consent of Instructor. Tutoring of students in lower division avian sciences courses; weekly conference with instructors in charge of courses; written critiques of teaching procedures. (P/NP grading only.) Effective: 2016 Fall Quarter.

AVS 198—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Restricted to upper division students. Directed group study. (P/NP grading only.) Effective: 2017 Winter Quarter.

AVS 199—Special Study for Advanced Undergraduates (1-5)
Variable—1-5 hours. (P/NP grading only.) Effective: 1997 Winter Quarter.

AVS 203—Advanced Avian Development and Genomics (1)
Discussion—1 hour. Prerequisite(s): AVS 103 (can be concurrent); Graduate standing. In consultation with the instructor, students develop a lecture and associated instructional materials, i.e., lesson plan, including justification, reading and presentation and evaluation aids. The topic must complement a topic covered in Avian Sciences 103. Effective: 2013 Fall Quarter.

AVS 290—Seminar (1)
Seminar—1 hour. Reports and discussions of recent advances and selected topics of current interest in avian genetics, physiology, nutrition, and poultry technology. Effective: 1997 Winter Quarter.

AVS 290C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Major professors lead research discussions with their graduate students. Research papers are reviewed and project proposals
presented and evaluated. Format will combine seminar and discussion. (S/U grading only.) Effective: 1997 Winter Quarter.

AVS 297T—Supervised Teaching in Avian Sciences (1-4)
Tutorial—1-4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Tutoring of students in lower, upper division, and graduate courses in Avian Sciences; weekly conference with instructor in charge of course; written critiques of teaching methods in lectures and laboratories. (S/U grading only.) Effective: 1997 Winter Quarter.

AVS 298—Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Effective: 1997 Winter Quarter.

AVS 299—Research (1-12)
Variable—1-12 hours. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

BAX Business Analytics

Courses in BAX:

BAX 400—Foundations of Analytics (2)
Lecture—1 hour. Focuses on teaching the fundamentals of R and SQL. Introduces the topic of numerical optimization, and review the concepts of linear algebra and calculus. Effective: 2018 Summer Session 1.

BAX 401—Introduction to Business Analytics (2)
Lecture—2 hours. Introduction to the process of analyzing raw data to gain profitable business insight. Applications selected across organizational functions include prediction, process improvement, and general operational decision-making. Effective: 2017 Fall Quarter.

BAX 402—Organizational Issues in Implementing Analytics (2)
Lecture—2 hours. Review the evolution of analytics in business, how to assemble and manage analytics teams, and the decision life-cycle. Emphasis on structuring communications to improve buy-in from peers and non-quantitatively-inclined colleagues. Effective: 2018 Winter Quarter.

BAX 403—Organizational Effectiveness Workshop (2)
Lecture—2 hours. Examine leadership, communication, and project management within the business, legal and societal contexts in which analytics is applied. Emphasis on privacy, data security, responsibility, and ethics. Effective: 2017 Fall Quarter.

BAX 411—Problem Structuring (2)
Lecture—2 hours. Synthesize data-rich business challenges using analytic frameworks and techniques for modeling business problems. Emphasis on modeling uncertainty, optimizing multiple criteria, and building consensus. Effective: 2017 Fall Quarter.

BAX 421—Data Management (2)
Lecture—2 hours. Introduction to the extraction, assembly, storage and organization of data in IT systems. Effective: 2017 Fall Quarter.

BAX 422—Big Data (2)
Lecture—2 hours. Introduction to business applications involving standard, streaming, and network data. Emphasis on scalable technologies for processing and analyzing big data for diverse applications. Effective: 2017 Fall Quarter.

BAX 423—Data Design and Representation (2)
Lecture—2 hours. Students learn computational reasoning about data representations by mapping conceptual data models to relational structures and analyzing database architectures and design tradeoffs. Effective: 2017 Fall Quarter.

BAX 431—Data Visualization (2)
Lecture—2 hours. Extract insights using visualization tools in R, Python, ManyEyes, HTML/CSS, etc. Standard (histograms, boxplots, and dashboards) and specialized (3D, animation, word clouds) formats are covered. Effective: 2017 Fall Quarter.

BAX 441—Statistical Exploration and Reasoning (2)
Lecture—2 hours. Introduction to statistical reasoning and inference extraction from large data-sets. Students learn to obtain preliminary insights and form initial hypotheses through exploratory data analysis (EDA). Effective: 2017 Fall Quarter.

BAX 442—Advanced Statistics (3)
Lecture—3 hours. Continue exploring statistical reasoning using maximum likelihood estimation, Bayesian models, nonparametric models, Monte Carlo Markov Chain, time series, model specification, model selection, and dimension reduction. Effective: 2017 Fall Quarter.

BAX 443—Analytic Decision Making (3)
Lecture—3 hours. Using spreadsheets and specialized modeling tools, explore structured problem solution through meta-heuristics, Monte Carlo simulation, and mathematical optimization. Effective: 2017 Fall Quarter.

BAX 452—Machine Learning (3)
Lecture—3 hours. Construct algorithms for learning from data and analyze the process for deriving business intelligence. Coverage of supervised and unsupervised learning, neural networks, etc. Effective: 2017 Fall Quarter.

BAX 453—Application Domains (3)
Lecture—3 hours. Students explore contemporary and emerging domains for high-yield applications of analytics. Topics: social network analytics, search analytics, health care analytics, internet of things, supply chain/operations analytics, and marketing analytics. Effective: 2017 Winter Quarter.

BAX 461—Practicum Initiation (2)
Lecture—2 hours. Students form teams, scope their project in light of team capability and business opportunity, create a preliminary structure and solution approach for the core problem, and assess data quality and project risks. Effective: 2017 Fall Quarter.

BAX 462—Practicum Elaboration (2)
Lecture—2 hours. Building on problems chosen in course 461, teams refine the business opportunity and draw insights from exploratory data analysis. Effective: 2017 Fall Quarter.

BAX 463—Practicum Analysis (2)
Lecture—2 hours. Implement selected analytic approaches through iteratively refining assumptions and analysis, synchronizing client requirements with model results, and creating minimum viable prototypes. Effective: 2017 Fall Quarter.

BAX 464—Practicum Implementation (4)
Discussion; Lecture—2 hours; Project (Term Project); Term Paper. Project teams complete analysis, plan deployment and obtain client buy-in. The course culminates in a project presentation, preferably including representatives from the client organization. Effective: 2017 Fall Quarter.

BCB Biochemistry, Molecular, Cellular and Developmental Biology (Graduate Group)

Courses in BCB:

BCB 210—Molecular Genetics and Genomics (3)
Lecture/Discussion—3 hours. Prerequisite(s): BIS 101; MCB 121; Or equivalent courses. Pass One restricted to graduate students. Emphasizes molecular genetic and genomic approaches to address fundamental biological questions. Introduces and emphasizes the strengths of prokaryotic and eukaryotic model systems and serves as building block for the BMCDB core courses, which use model systems to develop their themes. Effective: 2015 Fall Quarter.

BCB 211—Macromolecular Structure and Interactions (3)
Lecture—3 hours. Prerequisite(s): BIS 102; Or the equivalent, or consent of instructor. Pass One restricted to graduate students. Conceptual and quantitative basis for macromolecular structure-function relationships. Investigation of the paradigm form follows function. Review of key elements of protein, nucleic acid, and membrane structure. Exploration of specific macromolecular associations by analyzing chemical structure and physical-chemical behavior. No credit for students that have taken BCB 221A. Effective: 2014 Fall Quarter.

BCB 212—Cell Biology (3)
Lecture—3 hours. Prerequisite(s): BIS 104; Or the equivalent, or consent of instructor. Pass One restricted to graduate students. Analysis of basic processes governing cell organization, division, and transport. Study of the integration and regulation of cell behavior in response to changes in cellular environment. No credit for students that have taken BCB 221D. Effective: 2014 Fall Quarter.

BCB 213—Developmental Biology (3)
Lecture—3 hours. Prerequisite(s): Undergraduate biology course or consent of instructor. Pass One restricted to graduate students. Fundamental principles in embryonic development that guide application of modern cellular and genetic approaches to understand developmental mechanisms. Emphasis on experimental approaches used to critically address scientific questions. Effective: 2014 Fall Quarter.

BCB 214—Molecular Biology (3)
Lecture—3 hours. Prerequisite(s): BCB 211; Or the equivalent, or consent of instructor. Pass One restricted to graduate students. Investigation of the basic cellular processes in prokaryotes and eukaryotes that govern the central dogma of molecular biology (DNA-RNA-protein). No credit for students that have taken BCB 221C. Effective: 2014 Fall Quarter.

BCB 215—Graduate Reading Course (2)
Discussion—10 hours. Prerequisite(s): Graduate standing or consent of instructor. Restricted to graduate students. Development of critical reading skills through study of major paradigm advances in specialized fields of biochemistry, molecular, cell, and developmental biology. Emphasis on active learning and student participation. Guided analysis of literature and major advances in field of study. May be repeated up to 2 time(s) if topic differs. Effective: 2014 Fall Quarter.

BCB 220L—Advanced Biochemistry Laboratory Rotations (5)
Laboratory—15 hours. Prerequisite(s): BCB 210; BCB 211 (can be concurrent); BCB 120L or the equivalent. Open to graduate students. Two five-week assignments in BMCDB research laboratories. Individual research problems with emphasis on methodological/procedural experience, experimental design, proposal writing and oral communication of results. May be repeated up to 2 time(s). Effective: 2014 Summer Session 1.

BCB 251—Molecular Mechanisms in Early Development (3)
Lecture—3 hours. Prerequisite(s): Graduate standing or consent of instructor; introductory background in developmental biology and/or cell biology recommended. Analysis of the early events of development including: germ cells and other stem cells, gametogenesis, meiosis, imprinting, fertilization, genetically-engineered organisms, egg activation and establishment of embryonic polarity with focus on cellular events including gene regulation and cell signaling. Effective: 2014 Fall Quarter.

BCB 255—Molecular Mechanisms in Pattern Formation and Development (3)
Lecture—3 hours. Prerequisite(s): Graduate standing or consent of instructor; introductory background in developmental biology and/or genetics recommended. Genetic and molecular analysis of mechanisms that control animal development after fertilization. Establishment of embryonic axes, cell fate and embryonic pattern; induction, apoptosis, tissue patterning. Critical reading of current literature in C.elegans, Drosophila, and mouse genetic model systems. Effective: 2014 Fall Quarter.

BCB 256—Cell and Molecular Biology of Cancer (3)
Lecture—1.5 hours; Seminar—1.5 hours. Prerequisite(s): BCB 210; BCB 212; BCB 213; BCB 214 Analysis of the pathologic alterations of cancer cells and therapeutic opportunities; with emphasis on animal models, tumor immunotherapy, stress response, metabolism, epigenetics, microRNAs and non-coding RNAs, and microbiota and inflammation. Effective: 2018 Spring Quarter.

BCB 257—Cell Proliferation and Cancer Genes (3)
Lecture—1.5 hours; Seminar—1.5 hours. Prerequisite(s): BCB 221C and BCB 221D or equivalent courses. Genetic and molecular alterations underlying the conversion of normal cells to cancers, emphasizing regulatory mechanisms and pathways. Critical reading of the current literature and development of experimental approaches. Effective: 2015 Fall Quarter.

BCB 290—Seminar (1)
Seminar—1 hour. Prerequisite(s): Consent of instructor and/or graduate standing. Presentation and discussion of faculty and graduate-student research. (S/U grading only.) Effective: 2011 Fall Quarter.

BCB 298—Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Group Study (S/U grading only.) Effective: 2011 Fall Quarter.

BCB 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Research (S/U grading only.) Effective: 2011 Fall Quarter.

BCM Med - Biological Chemistry

Courses in BCM:

BCM 092—Internship in Biological Chemistry (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Supervised work experience in biological chemistry and related fields (P/NP grading only.) Effective: 1997 Winter Quarter.

BCM 192—Internship in Biological Chemistry (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project prior to internship by preceptor. Supervised work experience in Biological Chemistry and related fields. (P/NP grading only.) Effective: 1997 Winter Quarter.

BCM 198—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. For undergraduate students desiring to explore particular topics in depth. Lecture and conferences may be involved. (P/NP grading only.) Effective: 1997 Winter Quarter.

BCM 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

BCM 209—Prostaglandins/Leukotrienes and Related Lipids (2)
Lecture—2 hours. Prerequisite(s): (BCP 101A and BCP 101B) or (PHC 101A and PHC 101B) or (PGG 100A and PGG 100B). Oxidative desaturation/elongation of polyunsaturated fatty acids. Biosynthesis of prostaglandins/leukotrienes from polyunsaturated fatty acids. Chemistry, biochemistry, and metabolism. Nutritional regulation. Physiological/pathophysiological implications; pharmacological and clinical relevance. Effective: 1997 Winter Quarter.

BCM 217—Molecular Genetics of Fungi (3)
Lecture—3 hours. Prerequisite(s): PLP 130; PLP 215X; BCP 101B; BOT 119; GGG 100; GGG 102A; Graduate standing in a biological science; MIC 215 recommended. Advanced treatment of molecular biology and genetics of filamentous fungi and yeasts, including gene structure, organization and regulation; secretion; control of reproduction; molecular evolution; transformation; and gene manipulation. (PLP 217.) Effective: 1997 Winter Quarter.

BCM 222—Mechanisms of Translational Control (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): BCP 201C or Consent of Instructor. Molecular mechanisms of protein synthesis and translational control in eukaryotic cells, with emphasis on mammalian cells and their viruses. An advanced graduate-level treatment of topics of current interest, with readings and discussion of primary papers from the literature. Effective: 1997 Winter Quarter.

BCM 230—Practical NMR Spectroscopy and Imaging (1)
Lecture—1 hour. Prerequisite(s): CHE 107A; CHE 107B; (PHY 009A, PHY 009B, PHY 009C; or PHY 005A, PHY 005B, PHY 005C) or consent of instructor. Basic theory, experimental methods, and instrumentation of NMR. Enables students to understand NMR spectroscopy and imaging experiments. (S/U grading only.) Effective: 1997 Winter Quarter.

BCM 231—Biological Nuclear Magnetic Resonance (3)
Lecture—3 hours. Prerequisite(s): MCB 221A; Or equivalent or consent of instructor. Principles and applications of magnetic resonance in biomedicine. Fundamental concepts and the biophysical basis for magnetic resonance
applications in areas of tissue characterization/imaging, metabolic regulation, and cellular bioenergetics. (BPH 231.) Effective: 1997 Winter Quarter.

BCM 291—Seminar in Genetic Approaches to Pathogenesis of Human Disease (1)
Seminar—1 hour. Prerequisite(s): Student in Genetics Graduate Group or consent of instructor. Current genetic approaches to understanding the pathogenesis of disease and mammalian development presented and critically discussed by faculty, fellows and students. Topics include Mendelian and non-Mendelian diseases, imprinting, homologous recombination, statistical methods, genetic epidemiology and cell cycle dependent expression. (BCM 491.) (S/U grading only.) Effective: 1999 Fall Quarter.

BCM 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be involved. Effective: 1997 Winter Quarter.

BCM 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

BCM 410A—Molecular Medicine (4)
Discussion—3 hours; Lecture—3 hours; Web Virtual Lecture—1 hour. Prerequisite(s): Consent of Instructor. Restricted to Medical Students only. Biochemistry of proteins and nucleic acids. Includes an introduction to cancer biology and a full discussion of carbohydrate metabolism. Molecular aspects of human disease are highlighted throughout the course. (P/F grading only.) Effective: 2015 Summer Quarter.

BCM 491—Seminar in Genetic Approaches to Pathogenesis of Human Disease (1)
Seminar—1 hour. Prerequisite(s): Student in Genetics Graduate Group or consent of instructor. Current genetic approaches to understanding the pathogenesis of disease and mammalian development presented and critically discussed by faculty, fellows and students. Topics include Mendelian and non-Mendelian diseases, imprinting, homologous recombination, statistical methods, genetic epidemiology and cell cycle dependent expression. (BCM 291.) (H/P/F grading only.) Effective: 1999 Fall Quarter.

BCM 493—Medical Genomics (6)
Clinical Activity—4 hours; Laboratory—12 hours; Lecture—4 hours. Prerequisite(s): Consent of Instructor. Four-week module will focus on the clinical methods and applications of medical genomics. Topics will include an introduction to the human genome and human genomics, genetic and epigenetic variation and the ethics of medical genomics. (H/P/F grading only.) Effective: 2012 Spring Quarter.

BCM 497T—Tutoring in Biological Chemistry (1-5)
Tutorial—3-15 hours. Prerequisite(s): Advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum of the School of Medicine. (H/P/F grading only.) Effective: 1997 Winter Quarter.

BCM 498—Group Study (1-5)
Variable. Prerequisite(s): Medical students with consent of instructor. (H/P/F grading only.) Effective: 1997 Winter Quarter.

BCM 499—Research (1-12)
Variable. Prerequisite(s): Medical students with consent of instructor. Research with Department of Biological Chemistry. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

BIM Engineering Biomedical

Courses in BIM:

BIM 001—Introduction to Biomedical Engineering (2)
Laboratory—3 hours; Lecture—1 hour. Pass One open to freshmen. Introduction to the field of biomedical engineering with emphasis on design, careers, and specializations, including (1) medical devices (2) cellular & tissue engineering, (3) biomechanics, (4) systems & synthetic biology, and (5) biomedical imaging. GE credit: SE. Effective: 2016 Fall Quarter.

BIM 020—Fundamentals of Bioengineering (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 002B C- or better; MAT 021D C- or better; PHY 009B Basic principles of mass, energy and momentum conservation equations applied to solve problems in the biological and medical sciences. Only two units of credit to students who have previously taken Chemical Engineering 51, Engineering 105. GE credit: QL, SE, VL. Effective: 2013 Fall Quarter.

BIM 020—Fundamentals of Bioengineering (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 002B C- or better or CHE 002BH C- or better; MAT 021D C- or better; PHY 009B Basic principles of mass, energy and momentum conservation equations applied to solve problems in the biological and medical sciences. Only two units of credit to students who have previously taken ECH 051, ENG 105. GE credit: QL, SE, VL. Effective: 2018 Fall Quarter.

BIM 088V—Introduction to Research (2)
Web Virtual Lecture—2 hours. Introduction to types of research, including the basics of joint research with a faculty mentor. Self-assessments to identify areas of interest, priorities, and fit. Literature search and library skills used in early stages of research. Research safety, integrity, and intellectual property. Effective: 2018 Winter Quarter.

BIM 089A—Topics in Biomedical Engineering (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Restricted to lower division students. Topics in Biomedical Engineering. (A) Cellular and Molecular Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 2012 Spring Quarter.

BIM 089B—Topics in Biomedical Engineering (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Restricted to lower division students. Topics in Biomedical Engineering. (B) Biomedical Imaging. May be repeated for credit when topic differs. GE credit: SE. Effective: 2012 Spring Quarter.

BIM 089C—Topics in Biomedical Engineering (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Restricted to lower division students. Topics in Biomedical Engineering. (C) Biomedical Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 2012 Spring Quarter.

BIM 099—Special Study for Undergraduates (1-5)
Variable. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 2003 Winter Quarter.

BIM 102—Cellular Dynamics (4)
Lecture/Discussion—4 hours. Prerequisite(s): BIS 002A; CHE 008B or CHE 118B Open to College of Engineering students only. Fundamental cell biology for bioengineers. Emphasis on physical concepts underlying cellular processes including protein trafficking, cell motility, cell division and cell adhesion. Current topics including cell biology of cancer and stem cells will be discussed. Only two units of credit for students who have completed BIS 104. GE credit: SE. Effective: 2017 Spring Quarter.

BIM 105—Probability and Statistics for Biomedical Engineers (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021D C- or better; ENG 006 (can be concurrent) Concepts of probability, random variables and processes, and statistical analysis with applications to engineering problems in biomedical sciences. Includes discrete and continuous random variables, probability distributions and models, hypothesis testing, statistical inference and Matlab applications. Emphasis on BME applications. GE credit: QL, SE, VL. Effective: 2013 Fall Quarter.

BIM 106—Biotransport Phenomena (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIM 020 C- or better; (BIM 116 or NPB 101); PHY 009B; MAT 022B Open to Biomedical Engineering majors only. Principles of momentum and mass transfer with applications to biomedical systems; emphasis on basic fluid transport related to blood flow, mass transfer across cell membranes, and the design and analysis of artificial human organs. GE credit: QL, SE, SL, VL. Effective: 2015 Winter Quarter.

BIM 107—Mathematical Methods for Biological Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 006 C- or better; BIM 020; MAT 022B Restricted to Biomedical Engineering majors only. Mathematical and computational modeling to solve biomedical problems. Topics include stochastic processes and Monte Carlo simulations, and partial differential equations. Introduced to numerical techniques in MATLAB. GE credit: QL, SE, VL. Effective: 2013 Fall Quarter.

BIM 108—Biomedical Signals and Control (4)
Lecture—4 hours. Prerequisite(s): MAT 022B C- or better; ENG 006; ENG 017 Restricted to Biomedical Engineering majors only. Systems and control theory applied to biomedical engineering problems. Time-domain and frequency-domain analyses of signals and systems, convolution, Laplace and Fourier transforms, transfer function, dynamic behavior of first and second order processes, and design of control systems for biomedical applications. No credit for students who have taken EEC 150A; two units of credit for students who have taken EME 171. GE credit: QL, SE. Effective: 2012 Fall Quarter.

BIM 109—Biomaterials (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): BIM 106; BIS 002A; CHE 002C Restricted to upper-division Engineering majors. Introduce important concepts for design, selection and application of biomaterials. Given the interdisciplinary nature of the subject, principles of polymer science, surface science, materials science and biology will be integrated into the course. GE credit: SE, SL, VL. Effective: 2013 Fall Quarter.

BIM 109—Biomaterials (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): BIS 002A; CHE 002C or CHE 002CH; BIM 106 Restricted to upper-division Engineering majors. Introduce important concepts for design, selection and application of biomaterials. Given the interdisciplinary nature of the subject, principles of polymer science, surface science, materials science and biology will be integrated into the course. GE credit: SE, SL, VL. Effective: 2018 Fall Quarter.

BIM 110A—Biomedical Engineering Senior Design Experience (3)
Lecture/Discussion—1 hour; Project (Term Project)—6 hours. Prerequisite(s): BIM 110L (can be concurrent); BIM 111 (can be concurrent) Restricted to senior Biomedical Engineering majors (or by consent of instructor). Application of bioengineering theory and experimental analysis to a design project culminating in the design of a unique solution to a problem. Design may be geared towards current applications in biotechnology or medical technology. Continues in course 110B. GE credit: OL, SE, SL, VL. Effective: 2017 Spring Quarter.

BIM 110B—Biomedical Engineering Senior Design Experience (3)
Lecture/Discussion—1 hour; Project (Term Project)—6 hours. Prerequisite(s): BIM 110A Application of bioengineering theory and experimental analysis to a design project culminating in the design of a unique solution to a problem. Design may be geared towards current applications in biotechnology or medical technology. GE credit: OL, SE, SL, VL. Effective: 2014 Spring Quarter.

BIM 110L—Biomedical Engineering Senior Design Lab (2)
Discussion/Laboratory—2 hours; Laboratory—3 hours. Prerequisite(s): BIM 105; BIM 108; BIM 109 Restricted to Biomedical Engineering majors. Manufacturing processes, safety, computer-aided design techniques applied to fabrication of biomedical devices. Application of engineering principles & design theory to build a functional prototype to solve a biomedical problem. Continues in 110AB. GE credit: SE. Effective: 2017 Fall Quarter.

BIM 111—Biomedical Instrumentation Laboratory (6)
Discussion/Laboratory—4 hours; Lecture—4 hours. Prerequisite(s): BIM 105; BIM 108; (ENG 100 or EEC 100); (BIM 116 or NPB 101) Open to Biomedical Engineering majors only. Basic biomedical signals and sensors. Topics include analog and digital records using electronic, hydrodynamic, and optical sensors, and measurements made at cellular, tissue and whole organism level. GE credit: SE. Effective: 2015 Fall Quarter.

BIM 116—Physiology for Biomedical Engineers (5)
Discussion—3 hours; Lecture—2 hours. Prerequisite(s): BIS 002A C- or better; PHY 009C; MAT 022B recommended. Basic human physiology for the nervous, musculoskeletal, cardiovascular, respiratory, gastrointestinal, renal, and endocrine systems. Emphasis on small group design projects and presentations in interdisciplinary topics relating biomedical engineering to medical diagnostic and therapeutic applications. GE credit: OL, SE, SL, VL, WE. Effective: 2013 Fall Quarter.

BIM 117—Modeling Strategies for Biomedical Engineering (4)
Lecture—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): BIS 002A C- or better; MAT 022A C- or better Restricted to upper division standing. Non-simulation strategies for modeling biomedical engineering systems, including natural and synthetic systems at the cell and molecular level. Formulating and testing hypotheses by translating real-world problems into appropriate mathematical models, translating mathematical results into real-world understanding, and gaining appreciation for how models contribute to the development cycle of biomedical engineering applications. GE credit: SE. Effective: 2018 Spring Quarter.

BIM 118—Microelectromechanical Systems (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): CHE 002A; ENG 017 Pass One restricted to upper division standing in Biomedical Engineering. Introduction to the theory and practice of micro-electromechanical systems (MEMS), including fundamentals of micro-nanofabrication, microscale sensing and actuation, self assembly, microfluidics and lab-on-a-chip. Weekly hands-on laboratory sections are emphasized on implementation and utilization of MEMS technologies. GE credit: SE. Effective: 2017 Winter Quarter.

BIM 125—Introduction to Design and Analysis of Experiments for BME (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIM 105 or STA 100 Basic concepts and methods in design of experiments with biomedical engineering applications. Statistical concepts and methods to study strategies to design efficient industrial experiments that can improve data quality and simplify data analysis. GE credit: SE. Effective: 2018 Winter Quarter.

BIM 126—Tissue Mechanics (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): EXB 103 or ENG 045 or ENG 045Y Structural and mechanical properties of biological tissues, including bone, cartilage, ligaments, tendons, nerves, and skeletal muscle. GE credit: SE. Effective: 2018 Spring Quarter.

BIM 140—Protein Engineering (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 002A Introduction to protein structure and function. Modern methods for designing, producing, and characterizing novel proteins and peptides. Design strategies, computer modeling, heterologous expression, in vitro mutagenesis. Protein crystallography, spectroscopic and calorimetric methods for characterization, and other techniques. GE credit: QL, SE, SL, VL. Effective: 2013 Fall Quarter.

BIM 140L—Protein Engineering Laboratory (2)
Discussion—1 hour; Laboratory—3 hours. Prerequisite(s): BIM 140 (can be concurrent); Concurrent enrollment in BIM 140 required. Optional hands-on laboratory for BIM 140. Students use the engineering design process to design, build, and test a solution to a practical problem in the field of protein engineering. Problems change each offering. GE credit: SE. Effective: 2017 Spring Quarter.

BIM 141—Cell and Tissue Mechanics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PHY 009B; ENG 006; ENG 035 Mechanical properties that govern blood flow in the microcirculation. Concepts in blood rheology and cell and tissue viscoelasticity, biophysical aspects of cell migration, adhesion, and motility. GE credit: QL, SE, VL. Effective: 2013 Fall Quarter.

BIM 142—Principles and Practices of Biomedical Imaging (4)
Lecture—4 hours. Prerequisite(s): BIM 108 (can be concurrent); MAT 022B Basic physics, engineering principles, and applications of biomedical imaging techniques including x-ray imaging, computed tomography, magnetic resonance imaging, ultrasound and nuclear imaging. GE credit: SE. Effective: 2018 Spring Quarter.

BIM 143—Biomolecular Systems Engineering: Synthetic Biology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 002A; (MAT 016C or MAT 017C or MAT 021C) Includes analysis, design, construction and characterization of molecular systems. Process and biological parts standardization, computer aided design, gene synthesis, directed evolution, protein engineering, issues of human practice, biological safety, security, innovation, and ethics are covered. GE credit: SE. Effective: 2014 Fall Quarter.

BIM 143L—Synthetic Biology Laboratory (2)
Discussion—1 hour; Laboratory—3 hours. Prerequisite(s): BIM 143 (can be concurrent); Concurrent enrollment in BIM 143 required. Optional hands-on laboratory for BIM 143. Students solve a practical problem in the field of synthetic biology by designing, building, and testing an appropriate solution or product. Problems change each offering. GE credit: SE. Effective: 2017 Spring Quarter.

BIM 144—Fundamentals of Biophotonics and Bioimaging (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 022B; PHY 009B; or Consent of Instructor. BIM 108 or equivalent helpful; Biology or Physiology course recommended. Biophotonics and bioimaging, emphasizing quantitative description of light propagation & light tissue interactions. Key technologies and illustrative applications in basic research, clinical diagnostics and therapy. GE credit: SE. Effective: 2017 Winter Quarter.

BIM 151—Mechanics of DNA (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; MAT 022B Structural, mechanical and dynamic properties of DNA. Topics include DNA structures and their mechanical properties, in vivo topological constraints on DNA, mechanical and thermodynamic equilibria, DNA dynamics, and their roles in normal and pathological biological processes. GE credit: OL, QL, SE. Effective: 2012 Fall Quarter.

BIM 152—Molecular Control of Biosystems (4)
Lecture—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): BIS 002A; PHY 009B; MAT 022B Fundamentals of molecular biomedicine covering state-of-the-art methods for quantitative understanding of gene regulation and signal transduction networks at different levels of organization in health and disease. Topics include classic genetic systems, synthetic circuits, networks disrupted in disease and cancer. GE credit: OL, SE. Effective: 2012 Fall Quarter.

BIM 161A—Biomolecular Engineering (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 002A; CHE 008B or CHE 118B Restricted to upper division standing. Introduction to the basic concepts and techniques of biomolecular engineering such as recombinant DNA technology, protein engineering, and molecular diagnostics. Three units of credit for students who have taken BIM 161S. GE credit: QL, SE. Effective: 2017 Spring Quarter.

BIM 161L—Biomolecular Engineering Laboratory (3)
Laboratory—4.5 hours; Lecture/Discussion—1.5 hours. Prerequisite(s): BIM 161A or BIS 101 Introduction to the basic techniques in biomolecular engineering. Lectures, laboratory, and discussion sessions will cover basic techniques in DNA cloning, bacterial cell culture, gene regulation, protein expression, and data analysis. GE credit: QL, SE, SL. Effective: 2013 Fall Quarter.

BIM 161S—Biomolecular Engineering: Brief Course (1)
Lecture—1 hour. Prerequisite(s): BIS 002A; CHE 008B; BIM 161L (can be concurrent) Basic concepts and techniques in biomolecular analysis, recombinant DNA technology, and protein purification and analysis. Not open for credit to students who have taken BIM 161A. GE credit: QL, SE. Effective: 2012 Summer Session 2.

BIM 162—Introduction to the Biophysics of Molecules and Cells (4)
Lecture—4 hours. Prerequisite(s): MAT 022B C- or better; PHY 009C C- or better Introduction to fundamental physical mechanisms governing structure and function of bio-macromolecules. Emphasis on a quantitative understanding of the nano- to microscale biomechanics of interactions between and within individual molecules, as well as of their assemblies, in particular membranes. GE credit: QL, SE, SL. Effective: 2013 Fall Quarter.

BIM 163—Bioelectricity, Biomechanics, and Signaling Systems (4)
Lecture—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): MAT 022B C- or better; (BIM 116 or NPB 101) Fundamentals of bioelectricity in cells, the calcium signaling system, and mechanical force generation in muscle. Combination of lecture and projects to promote learning of important concepts in hands-on projects using neurons and muscle as microcosms. GE credit: QL, SE. Effective: 2014 Fall Quarter.

BIM 167—Biomedical Fluid Mechanics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIM 106 C- or better; NPB 101 or BIM 116 Theories of fluid mechanics, including Navier Stokes Equation and Conservation Laws, will be presented to understand dynamics of human circulatory systems. Fluid dynamics will be analyzed using partial differential equations. GE credit: SE. Effective: 2017 Spring Quarter.

BIM 170—Aspects of Medical Device Design and Manufacturing (2)
Lecture—2 hours. Prerequisite(s): Consent of Instructor. Open to upper division Biomedical Engineering majors only. Survey of medical device design & impact on manufacturing operations. Introduction to medical device design process & product lifecycle. Principles of Design for Manufacturability, Design for Lean Manufacturing, and quality management systems. GE credit: SE. Effective: 2017 Winter Quarter.

BIM 171—Clinical Applications for Biomedical Device Design (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIM 116 C- or better or NPB 101 C- or better; NPB 101 recommended. Restricted to Biomedical Engineering majors only. Clinical applications for biomedical devices with emphasis in the pathophysiology of common diseases as it relates to the biodesign process, biosensors principles, in vitro diagnostics, needs assessment, and regulatory considerations. GE credit: SE. Effective: 2017 Fall Quarter.

BIM 173—Cell and Tissue Engineering (4)
Lecture/Discussion—4 hours. Prerequisite(s): BIM 106 C- or better; BIM 109 C- or better Engineering principles to direct cell and tissue behavior and formation. Cell sourcing, controlled delivery of macromolecules, transport within and around biomaterials, bioreactor design, tissue design criteria and outcomes assessment. GE credit: OL, SE, SL, WE. Effective: 2012 Fall Quarter.

BIM 189A—Topics in Biomedical Engineering; Cellular and Molecular Engineering (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Topics in Biomedical Engineering; Cellular and Molecular Engineering. May be repeated for credit topic differs. GE credit: SE. Effective: 2004 Fall Quarter.

BIM 189B—Topics in Biomedical Engineering; Biomedical Imaging (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Topics in Biomedical Engineering; Biomedical Imaging. May be repeated for credit topic differs. GE credit: SE. Effective: 2004 Fall Quarter.

BIM 189C—Topics in Biomedical Engineering; Biomedical Engineering (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Topics in Biomedical Engineering; Biomedical Engineering. May be repeated for credit topic differs. GE credit: SE. Effective: 2004 Fall Quarter.

BIM 190A—Upper Division Seminar in Biomedical Engineering (1)
Seminar—1 hour. Restricted to upper division standing. In depth examination of research topics in a small group setting. Question and answer session with faculty members. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 2006 Spring Quarter.

BIM 192—Internship in Biomedical Engineering (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Restricted to upper division majors. Supervised work experience in the Biomedical Engineering field. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 2012 Fall Quarter.

BIM 198—Directed Group Study (1-5)
Variable—3-15 hours. May be repeated up to 3 time(s) content changes. (P/NP grading only.) GE credit: SE. Effective: 2005 Fall Quarter.

BIM 199—Special Study for Advanced Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Special study for advanced undergraduates. (P/NP grading only.) GE credit: SE. Effective: 2012 Fall Quarter.

BIM 201—Scientific Communication for Biomedical Engineers (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Course is designed to improve the written and oral communication skills of first-year graduate students through writing fellowship proposals, analyzing data, and critically reviewing research papers. (S/U grading only.) Effective: 2016 Fall Quarter.

BIM 202—Cell and Molecular Biology for Engineers (4)
Lecture/Discussion—4 hours. Prerequisite(s): BIS 104 or MCB 121 Preparation for research and critical review in the field of cell and molecular biology for biomedical or applied science engineers Emphasis on biophysical and engineering concepts intrinsic to specific topics including receptor-ligand dynamics in cell signaling and function, cell motility, DNA replication and RNA processing, cellular energetics and protein sorting. Modern topics in bioinformatics and proteomics. Effective: 2000 Fall Quarter.

BIM 204—Physiology for Bioengineers (5)
Lecture—4 hours. Prerequisite(s): BIS 001A; Or equivalent; graduate standing or consent of instructor. Basic human physiology of the nervous, muscular, cardiovascular, respiratory, and renal systems and their interactions; Emphasis on the physical and engineering principles governing these systems, including control and transport processes, fluid dynamics, and electrochemistry. Effective: 2007 Fall Quarter.

BIM 209—Scientific Integrity for Biomedical Engineers (2)
Discussion—1 hour; Lecture—1 hour. Open to Biomedical Engineering majors only. Scientific integrity and ethics for biomedical engineers, with emphasis and discussion on mentoring, authorship and peer review, use of humans and animals in biomedical research, conflict of interest, intellectual property, genetic technology and scientific record keeping. (S/U grading only.) Effective: 2006 Spring Quarter.

BIM 210—Introduction to Biomaterials (4)
Lecture—4 hours. Prerequisite(s): ENG 045 or ENG 045Y; or Consent of Instructor. Mechanical and atomic properties of metallic,ceramic, and polymeric implant materials of metallic, ceramic, and polymeric implant materials; corrosion, degradation, and failure of implants;inflammation, wound and fracture healing, blood coagulation;properties of bones, joints, and blood vessels;biocompatibility of orthopaedic and cardiovascular materials. Effective: 2018 Spring Quarter.

BIM 211—Design of Polymeric Biomaterials and Biological Interfaces (4)
Lecture—4 hours. Prerequisite(s): ENG 045 or ENG 045Y; or Consent of Instructor. Open to upper division undergraduates or graduate students. Design, selection and application of polymeric biomaterials. Integration of the principles of polymer science, surface science, materials science and biology. Effective: 2018 Spring Quarter.

BIM 212—Biomedical Heat and Mass Transport Processes (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EME 165; EBS 125; ECH 153; Or equivalent. Application of principles of heat and mass transfer to biomedical systems related to heat exchange between the biomedical system and its environment, mass transfer across cell membranes and the design and analysis of artificial human organs. (MAE 212.) Effective: 2000 Winter Quarter.

BIM 213—Principles and Applications of Biological Sensors (4)
Lecture—4 hours. Prerequisite(s): CHE 002C Biological sensors based on principles of electrochemical, optical and affinity detection. Methods for integration of sensing elements (e.g. enzymes) into biosensors and miniaturization of biosensors. Effective: 2007 Fall Quarter.

BIM 214—Continuum Biomechanics (4)
Lecture—4 hours. Prerequisite(s): BIM 141; ENG 102; Or equivalent. Continuum mechanics relevant to bioengineering. Concepts in tensor calculus, kinematics, stress and strain, and constitutive theories of continua. Selected topics in bone, articular cartilage, blood/circulation, and cell biomechanics will illustrate the derivation of appropriate continuum mechanics theories. Effective: 2017 Fall Quarter.

BIM 216—Advanced topics in Cellular Engineering (4)
Lecture—4 hours. Prerequisite(s): BIM 214; or Consent of Instructor. Advanced research strategies and technologies used in the study of immune function and inflammation. Static and dynamic measurements of stress, strain, and molecular scale forces in blood and vascular cells, as well as genetic approaches to the study of disease. Effective: 2000 Spring Quarter.

BIM 217—Mechanobiology in Health and Disease (4)
Lecture/Discussion—4 hours. Prerequisite(s): BIM 106; BIS 101; NPB 101; Or equivalents. Principles by which biomechanical forces affect cell and tissue function to impact human health and disease. Emphasis on cardiovascular system: structure and function, biofluid mechanics and mechanotransduction, disease mechanisms and research methods. Cartilage, bone and other systems; current topics discussed. Effective: 2008 Spring Quarter.

BIM 218—Microsciences (4)
Lecture/Discussion—4 hours. Introduction to the theory of physical and chemical principles at the microscale. Scale effects, surface tension, microfluidic mechanics, micromechanical properties, intermolecular interactions and micro tribology. (EEC 244B.) Effective: 2011 Fall Quarter.

BIM 221—Drug Delivery Systems (4)
Lecture/Discussion—4 hours. Prerequisite(s): BIM 204 recommended but not required. Fundamental engineering and biotechnology principles critical for the formulation and delivery of therapeutic agents, including peptide/protein drugs and small molecules. Effective: 2017 Winter Quarter.

BIM 222—Cytoskeletal Mechanics (4)
Lecture/Discussion—4 hours. Prerequisite(s): BIM 202 Current topics in cytoskeletal mechanics including physical properties of the cytoskeleton and motor proteins, molecular force sensor and generator, cytoskeletal regulation of cell motility and adhesion. Effective: 2010 Fall Quarter.

BIM 223—Multibody Dynamics (4)
Lecture—4 hours. Prerequisite(s): ENG 102 Coupled rigid-body kinematics/dynamics; reference frames; vector differentiation; configuration and motion constraints; holonomicity; generalized speeds; partial velocities; mass; inertia tensor/theorems;
angular momentum; generalized forces; comparing Newton/Euler, Lagrange's, Kane's methods; computer-aided equation derivation; orientation; Euler; Rodrigues parameters. (MAE 223.) Effective: 2000 Winter Quarter.

BIM 225—Spatial Kinematics and Robotics (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): BIM 222; C Language. Spatial kinematics, screw theory, spatial mechanisms analysis and synthesis, robot kinematics and dynamics, robot workspace, path planning, robot programming, real-time architecture and software implementation. (MAE 225.) Effective: 2000 Winter Quarter.

BIM 228—Skeletal Muscle Mechanics: Form, Function, Adaptability (4)
Lecture—4 hours. Prerequisite(s): ENG 035; (ENG 045 or ENG 045Y); MAT 021D; Basic background in biology, physiology, and engineering; NPB 101 recommended. Basic structure and function of skeletal muscle examined at the microscopic and macroscopic level. Muscle adaptation in response to aging, disease, injury, exercise, and disuse. Analytic models of muscle function are discussed. Effective: 2018 Spring Quarter.

BIM 232—Skeletal Tissue Mechanics (3)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): Engineering 104B. Overview of the mechanical properties of the various tissues in the musculoskeletal system, the relationship of these properties to
anatomic and histologic structure, and the changes in these properties caused by aging and disuse. (MAE 232.) Effective: 1997 Winter Quarter.

BIM 233—Soft Tissue Mechanics (4)
Lecture—4 hours. Presentation of structure and function of musculoskeletal soft tissues: cartilage, tendon, ligament, meniscus, and intervertebral disc. Instruction in engineering principals governing the mechanical behavior of these tissues: viscoelasticity, quasilinear viscoelasticity, and biphasic theory. Effective: 2013 Fall Quarter.

BIM 239—Advanced Finite Elements and Optimization (4)
Lecture—4 hours. Prerequisite(s): ENG 180 or MAT 128C or EAD 115 Introduction to advanced finite elements and design optimization methods, with application to modeling of complex mechanical, aerospace and biomedical systems. Application of states of the art in finite elements in optimum design of components under realistic loading conditions and constraints. (EME 239.) Effective: 2007 Fall Quarter.

BIM 240—Computational Methods in Nonlinear Mechanics (4)
Lecture—4 hours. Prerequisite(s): MAT 128B or ENG 180 or EAD 115 Deformation of solids and the motion of fluids treated with state-of-the-art computational methods. Numerical treatment of nonlinear dynamics; classification of coupled problems; applications of finite element methods to mechanical, aeronautical, and biological systems. (MAE 240.) Effective: 1999 Winter Quarter.

BIM 241—Introduction to Magnetic Resonance Imaging (3)
Lecture—3 hours. Prerequisite(s): PHY 009D; MAT 022B Equipment, methods, medical applications of MRI. Lectures review basic, advanced pulse sequences, image reconstruction, display and technology
and how these are applied clinically. Lecture complements a more technical course. (course 246 can be taken concurrently.) Effective: 1999 Fall Quarter.

BIM 242—Introduction to Biomedical Imaging (4)
Lecture—4 hours. Prerequisite(s): PHY 009D; Electrical and Computer Engineering 106 or consent of instructor. Basic physics and engineering principles of image science. Emphasis on ionizing and nonionizing radiation production and interactions with the body and detectors. Major imaging systems: radiography, computed tomography, magnetic resonance, ultrasound, and optical microscopy. Effective: 2004 Fall Quarter.

BIM 243—Radiation Detectors for Biomedical Applications (4)
Lecture/Discussion—4 hours. Prerequisite(s): PHY 009D; MAT 021D; MAT 022B Radiation detectors and sensors used for biomedical applications. Emphasis on radiation interactions, detection, measurement and use of radiation sensors for imaging. Operating principles of gas, semiconductor, and scintillation detectors. Effective: 2005 Winter Quarter.

BIM 246—Magnetic Resonance Technology (3)
Lecture—3 hours. Prerequisite(s): PHY 009D; MAT 022B Course covers MRI technology at an advanced level with emphasis on mathematical descriptions and problem solving. Topics include spin dynamics, signal generation, image reconstruction, pulse sequences, biophysical basis of T1, T2, RF, gradient coil design, signal to noise, image artifacts. Effective: 1997 Winter Quarter.

BIM 251—Medical Image Analysis (4)
Lecture—4 hours. Prerequisite(s): EEC 106 Techniques for assessing the performance of medical imaging systems. Principles of digital image formation and processing. Measurements that summarize diagnostic image quality and the performance of human observers viewing those images. Definition of ideal observer and other mathematical observers that may be used to predict performance from system design features. Students will obtain hands-on experience in computer vision by completing individual Matlab assignments that they select from topics in the course. Effective: 2001 Spring Quarter.

BIM 252—Computational Methods in Biomedical Imaging (4)
Lecture—4 hours. Prerequisite(s): (BIM 105 or STA 120); (BIM 108 or EEC 150A) Analytic tomographic reconstruction from projections in 2D and
3D; model-based image reconstruction methods; maximum likelihood and Bayesian methods; applications to CT, PET, and SPECT. (EEC 205.) Effective: 2011 Fall Quarter.

BIM 254—Statistical Methods in Genomics (4)
Lecture—4 hours. Statistical approaches to problems in computational molecular biology and genomics; formulation of questions via probabilistic modeling, statistical inference methods for parameter estimation, and interpretation of results to address biological questions; application to high-impact problems in functional genomics and molecular biology. Effective: 2017 Winter Quarter.

BIM 255—Nanoscale Imaging for Molecular Medicine (3)
Lecture/Discussion—3 hours. Prerequisite(s): BIM 202 highly recommended; graduate standing. Current and emerging technologies to visualize biological structures and processes at size scales = 100 nanometers – and their application towards the advancement of molecular medicine. Technologies include superresolution optical microscopy, electron microscopy and tomography. Emphasis on quantitative imaging. (BPH 255.) Effective: 2017 Spring Quarter.

BIM 257—Fundamentals of Tissue Optics and Biomedical Applications (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Fundamentals of optical properties of tissue. Range of optical technologies and their applications to tissue characterization and diagnostics. Effective: 2011 Fall Quarter.

BIM 258—Advanced Biophotonics and Bioimaging (4)
Lecture—4 hours. Prerequisite(s): BIM 108; PHY 108; Or an equivalent undergraduate optics course to PHY 108. Quantitative basis for biophotonics and bioimaging, with an emphasis on the physical and mathematical description of optics, light propagation, and light-tissue interactions. Advantages and limitations of various optical imaging and sensing technologies. Illustrative applications in diagnostics, basic research, and therapy. Effective: 2017 Winter Quarter.

BIM 262—Cell and Molecular Biophysics for Bioengineers (4)
Lecture—4 hours. Prerequisite(s): BIM 284; Or equivalent; graduate standing; undergraduate students by consent of instructor. Introduction to fundamental mechanisms governing the structure, function, and assembly of bio-macromolecules. Emphasis is on a quantitative understanding of the nano-to-microscale interactions between and within individual molecules, as well as of their assemblies, in particular membranes. Not open for credit to students who have completed BIM 162. (ECH 269.) Effective: 2017 Winter Quarter.

BIM 264—Synthetic and Systems Engineering of Cells (4)
Lecture—4 hours. Introduction to the design, engineering, and control of biological systems for biotechnological applications and biological studies. Effective: 2016 Fall Quarter.

BIM 270—Biochemical Systems Theory (4)
Lecture—4 hours. Prerequisite(s): BIM 202 (can be concurrent); or Consent of Instructor. Systems biology at the biochemical level. Mathematical and computational methods emphasizing nonlinear representation, dynamics, robustness, and optimization. Case studies of signal-transduction cascades, metabolic networks and regulatory mechanisms. Focus on formulating and answering fundamental questions concerning network function, design, and evolution. Effective: 2004 Winter Quarter.

BIM 271—Gene Circuit Theory (4)
Lecture—4 hours. Prerequisite(s): BIM 270 or BIM 202; and Consent of Instructor. Analysis, design, and construction of gene circuits. Modeling strategies, elements of design, and methods for studying variations in design. Case studies involving prokaryotic gene circuits to illustrate natural selection, discovery of design principles, and construction of circuits for engineering objectives. Effective: 2004 Winter Quarter.

BIM 272—Tissue Engineering (3)
Lecture/Discussion—3 hours. Prerequisite(s): BIS 104 or MCB 121 Based on morphogenetic signals, responding stem cells and extracellular matrix scaffolding. Design and development of tissues for functional restoration of various organs damaged/lost due to cancer, disease and trauma. Fundamentals of morphogenetic signals, responding stem cells and extracellular matrix scaffolding. Effective: 2007 Winter Quarter.

BIM 273—Integrative Tissue Engineering and Technologies (4)
Lecture/Discussion—4 hours. Prerequisite(s): BIM 202; BIM 204; Or equivalent; strongly encourage completion of BIM 272 although not a prerequisite. Restricted to graduate standing. Engineering principles to direct cell and tissue behavior and formation. Contents include controlled delivery of macromolecules, transport within and around biomaterials, examination of mechanical forces of engineered constructs, and current experimental techniques used in the field. Effective: 2007 Spring Quarter.

BIM 281—Acquisition and Analysis of Biomedical Signals (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 100; STA 130A Restricted to upper division engineering. Basic concepts of digital signal recording and analysis; sampling; empirical modeling; Fourier analysis, random processes, spectral analysis, and correlation applied to biomedical signals. Effective: 2002 Fall Quarter.

BIM 283—Advanced Design of Experiments for Biomedical Engineers (4)
Lecture—4 hours. Open to graduate students only. Provides biomedical engineering graduate students with the tools to properly design experiments, collect and analyze data, and extract, communicate and act on information generated. Not open for credit to students who have taken EBS 265. Effective: 2017 Spring Quarter.

BIM 284—Mathematical Methods for Biomedical Engineers (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 022B; STA 130A; Or consent of instructor; upper division biomedical engineering majors, and graduate students in sciences and engineering; priority given to Biomedical Engineering graduate students. Theoretical applications of linear systems, ordinary and partial differential equations, and probability theory and random processes that describe biological systems and instruments that measure them. Students will be introduced to numerical solution techniques in MATLAB. Effective: 2007 Fall Quarter.

BIM 286—Nuclear Imaging in Medicine and Biology (4)
Lecture/Discussion—4 hours. Prerequisite(s): BIM 243; or Consent of Instructor. Radioactive decay, interaction of radiation with matter, radionuclide production, radiation detection, digital autoradiography, gamma camera imaging, single photon emission computed tomography, positron emission tomography and applications of these techniques in biology and medicine. Effective: 2005 Spring Quarter.

BIM 287—Concepts in Molecular Imaging (4)
Lecture—2 hours; Lecture/Discussion—2 hours; Term Paper. Prerequisite(s): CHE 002C; MAT 021C; PHY 009D; and Consent of Instructor. Current techniques and tools for molecular imaging. Emphasis on learning to apply principles from the physical sciences to imaging problems in medicine and biology. Effective: 2004 Spring Quarter.

BIM 288—Living Matter: Physical Biology of the Cell (3)
Lecture—3 hours. Open to any student possessing general background in any disciplines of physical or biological sciences and engineering. Introduction to the origin, maintenance, and regulation of the dynamic architecture of the cell, including cellular modes of organization, dynamics and energy dissipation, molecular transport, motility, regulation, and adaptability. (EMS 288 and BPH 288.) Effective: 2017 Winter Quarter.

BIM 289A—Selected Topics in Biomedical Engineering; Cellular and Molecular Systems Engineering (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Selected topics in Cellular and Molecular Systems Engineering. May be repeated for credit when topic differs. Effective: 2011 Fall Quarter.

BIM 289B—Selected Topics in Biomedical Engineering; Biomedical Imaging (1-5)
Variable. Prerequisite(s): Consent of Instructor. Selected topics in Biomedical Imaging. May be repeated for credit when topic differs. Effective: 2011 Fall Quarter.

BIM 289C—Selected Topics in Biomedical Engineering; Computational Bioengineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Selected topics in Computational Bioengineering. May be repeated for credit when topic differs. Effective: 2011 Fall Quarter.

BIM 289D—Selected Topics in Biomedical Engineering; Cell and Tissue Biomechanics (1-5)
Variable. Prerequisite(s): Consent of Instructor. Selected topics in Cell and Tissue Biomechanics. May be repeated for credit when topic differs. Effective: 2011 Fall Quarter.

BIM 289E—Selected Topics in Biomedical Engineering; Analysis of Human Movement (1-5)
Variable. Prerequisite(s): Consent of Instructor. Selected topics in Analysis of Human Movement. May be repeated for credit when topic differs. Effective: 2011 Fall Quarter.

BIM 290—Seminar (1)
Seminar—1 hour. Seminar in biomedical engineering (S/U grading only.) Effective: 1997 Winter Quarter.

BIM 290C—Graduate Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Individual and/or group conference on problems, progress, and techniques in biomedical engineering research. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

BIM 298—Directed Group Study (1-5)
Variable—1-5 hours. Open to graduate students in the Biomedical Engineering Graduate Group, or consent of instructor. Directed group study in Biomedical Engineering. May be repeated for credit. (S/U grading only.) Effective: 2011 Fall Quarter.

BIM 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

BIM 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

BIS Biological Sciences

Courses in BIS:

BIS 002A—Introduction to Biology: Essentials of Life on Earth (5)
Discussion—2 hours; Lecture—3 hours. Essentials of life including sources and use of energy, information storage, responsiveness to natural selection and cellularity. Origin of life and influence of living things on the chemistry of the Earth. Not open for credit to students who have completed BIS 001A with a grade of C- or better. GE credit: SE. Effective: 2013 Winter Quarter.

BIS 002B—Introduction to Biology: Principles of Ecology and Evolution (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Introduction to basic principles of ecology and evolutionary biology, focusing on the fundamental mechanisms that generate and maintain biological diversity across scales ranging from molecules and genes to global processes and patterns. Not open for credit to students who have completed BIS 001B with a grade of C- or better. GE credit: QL, SE, SL, VL. Effective: 2017 Fall Quarter.

BIS 002C—Introduction to Biology: Biodiversity and the Tree of Life (5)
Laboratory—3 hours; Lecture—4 hours. Prerequisite(s): BIS 001B C- or better or BIS 002B C- or better Introduction to organismal diversity, using the phylogenetic tree of life as an organizing theme. Lectures and laboratories cover methods of phylogenetic reconstruction, current knowledge of the tree of life, and the evolution of life's most important and interesting innovations. Not open for credit to students who have completed BIS 001C with a grade of C- or better. GE credit: OL, QL, SE, SL, VL. Effective: 2010 Fall Quarter.

BIS 005—Exploring Biological Sciences (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Enrollment limited to first year CBS students. Introduction to biology at UC Davis through discussions with faculty and speakers from industry and medicine. (P/NP grading only.) Effective: 2015 Fall Quarter.

BIS 010—Everyday Biology (4)
Discussion—1 hour; Lecture—3 hours. Everyday biological concepts using contemporary readings for non-scientists. Key topics include: personal genomics; food and health; climate and evolution; brain biology and the law. Innovative projects apply biological concepts to current events. For students not specializing in biology. Not open for credit to students who have completed BIS 002A, or 002B, or 002C, or 010V or NEM 010V or equivalent. GE credit: SE, SL, WE. Effective: 2016 Winter Quarter.

BIS 011—Issues in the Life Sciences (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): Consent of Instructor. Enrollment limited to BUSP students. The range of subjects and approaches in the field of biology, including both basic and applied research topics. Effective: 2002 Fall Quarter.

BIS 011L—Basic Life Sciences Laboratory (1)
Laboratory—3 hours. Prerequisite(s): Consent of Instructor. Limited to Biology Undergraduate Scholars Program (BUSP) students. Basic laboratory skills in life sciences research, including microbiology, molecular biology, and genetics. Effective: 2018 Winter Quarter.

BIS 020Q—Modeling in Biology (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): MAT 016B (can be concurrent) Introduction to the application of quantitative methods to biological problems. Students will use a mathematical software package to tackle problems drawn from all aspects of biology. Effective: 2005 Spring Quarter.

BIS 092—Internship in Biological Sciences (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Restricted to lower division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

BIS 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Primarily for lower division students (P/NP grading only.) Effective: 1997 Winter Quarter.

BIS 099—Special Study for Undergraduates (1-5)
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Restricted to lower division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

BIS 101—Genes and Gene Expression (4)
Lecture—4 hours. Prerequisite(s): (BIS 002A C- or better, BIS 002B C- or better); (CHE 008A or CHE 118A or CHE 128A); ((STA 013 or STA 013Y) or STA 100 or STA 102 or STA 130A); STA 100 preferred. Nucleic acid structure and function; gene expression and its regulation; replication; transcription and translation; transmission genetics; molecular evolution. GE credit: QL, SE, SL. Effective: 2018 Winter Quarter.

BIS 101D—Genes and Gene Expression Discussion (1)
Discussion—1 hour. Prerequisite(s): BIS 101 (can be concurrent); and Consent of Instructor. Discussion and problem solving related to fundamental principles of classical and molecular genetics as presented in course 101. (P/NP grading only.) Effective: 2000 Fall Quarter.

BIS 102—Structure and Function of Biomolecules (3)
Lecture—3 hours. Prerequisite(s): (BIS 001A or BIS 002A); (CHE 008B or CHE 118B or CHE 128B) Structure and function of macromolecules with emphasis on proteins, catalysis, enzyme kinetics, lipids, membranes, and proteins as machines. Only one unit of credit for students who have completed ABI 102 & 1.5 units of credit for students who have completed BIS 105. GE credit: QL, SE. Effective: 2014 Winter Quarter.

BIS 102Q—Quantitative Biomolecule Concepts (1)
Auto Tutorial; Extensive Problem Solving—1 hour. Prerequisite(s): BIS 102 (can be concurrent) Study of the quantitative concepts and mathematical models fundamental to biochemistry. GE credit: QL, SE. Effective: 2008 Spring Quarter.

BIS 103—Bioenergetics and Metabolism (3)
Lecture—3 hours. Prerequisite(s): BIS 102 Fundamentals of the carbon, nitrogen, and sulfur cycles in nature, including key reactions of biomolecules such as carbohydrates, amino acids, lipids, and nucleotides, and of energy production and use in different types of organisms. Principles of metabolic regulation. 1.5 units of credit for students who have completed BIS 105; 1 unit of credit if students who have completed ABI 103. GE credit: SE. Effective: 2013 Winter Quarter.

BIS 104—Cell Biology (3)
Lecture—3 hours. Prerequisite(s): BIS 101; (BIS 102 or BIS 105) Membrane receptors and signal transduction; cell trafficking; cell cycle; cell growth and division; extracellular matrix and cell-cell junctions; cell development; immune system. GE credit: SE. Effective: 2011 Spring Quarter.

BIS 105—Biomolecules and Metabolism (3)
Lecture—3 hours. Prerequisite(s): ((BIS 001A, BIS 001B, BIS 001C) or (BIS 002A, BIS 002B, BIS 002C)); (CHE 008B or CHE 118B or CHE 128B) Fundamentals of biochemical processes, with emphasis on protein structure and activity; energy metabolism; catabolism of sugars, amino acids, and lipids; and gluconeogenesis. 1.5 units of credit for students who have completed BIS 102 or BIS 103; no credit for students who have completed both BIS 102 and BIS 103; 1 unit of credit for students who have completed ABI 102 or ABI 103; no credit for students who have completed both ABI 102 and ABI 103. GE credit: QL, SE. Effective: 2014 Fall Quarter.

BIS 122—Population Biology and Ecology (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): (BIS 001A, BIS 001B, BIS 001C) or (BIS 002A, BIS 002B, BIS 002C); Residence at Bodega Marine Laboratory required. Biological and physical processes affecting plant and animal populations in the rich array of habitats at the Bodega Marine Laboratory ecological preserve. Emphasis on field experience, with complementing lectures to address population and community processes. (See Bodega Marine Laboratory Program) GE credit: OL, QL, SE, SL, VL, WE. Effective: 2008 Spring Quarter.

BIS 122P—Population Biology and Ecology/Advanced Laboratory Topics (5)
Discussion—1 hour; Laboratory—12 hours. Prerequisite(s): BIS 122 (can be concurrent) Residence at Bodega Marine Laboratory required. Training in scientific research, from hypothesis testing to publication, including methods of library research. Research will be related to a topic covered in course 122. Final presentation both oral and written. See Bodega Marine Laboratory Program. GE credit: SE, VL, WE. Effective: 2000 Spring Quarter.

BIS 123—Undergraduate Colloquium in Marine Science (1)
Seminar—1 hour. Prerequisite(s): Enrolled student at the Bodega Marine Laboratory. Series of weekly seminars by recognized authorities in various disciplines of marine science from within and outside the UC system. Includes informal discussion with speaker.Course will be held at Bodega Marine Laboratory.(See above description for Bodega Marine Laboratory Program.) (P/NP grading only.) Effective: 1997 Winter Quarter.

BIS 124—Coastal Marine Research (3) ***Review all entries***
Discussion/Laboratory—1 hour; Fieldwork—6 hours; Laboratory—6 hours. Prerequisite(s): (ESP 124 (can be concurrent), ESP 152 (can be concurrent), EVE 106 (can be concurrent), EVE 110 (can be concurrent), EVE 114 (can be concurrent)); Concurrent enrollment in at least one of the above listed courses; upper division standing or consent of instructor; residence at or near Bodega Marine Lab required. Student must complete the application at http://www.bml.ucdavis.edu. Independent research on topics related to the accompanying core Bodega Marine Laboratory summer courses. Students will select one instructor to be primary mentor, but integrative topics that draw on the expertise of several BML faculty members will be encouraged. May be repeated up to 2 time(s). GE credit: OL, QL, SE, VL, WE. Effective: 2006 Summer Session 1.

BIS 124—Coastal Marine Research (6) ***Review all entries***
Discussion/Laboratory—2 hours; Fieldwork—12 hours; Laboratory—12 hours. Prerequisite(s): (EVE 114 (can be concurrent) or EVE 106 (can be concurrent) or ESP 152 (can be concurrent) or ESP 124 (can be concurrent)); Concurrent enrollment in one of the above listed courses required; upper division standing or consent of instructor. Student must complete the application at http://www.bml.ucdavis.edu. Independent research on topics related to an accompanying core Bodega Marine Laboratory summer course. Students will receive training in generating hypotheses, designing experiments, collecting and analyzing data, and scientific communication. May be repeated up to 2 time(s). GE credit: OL, QL, SE, VL, WE. Effective: 2018 Summer Session 1.

BIS 132—Introduction to Dynamic Models in Modern Biology (4)
Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): MAT 016C; (STA 013 or STA 013Y); Or equivalents and one lower division course in biology or equivalent. Dynamic modeling in the biological sciences, including matrix models, difference equations, differential equations, and complex dynamics. Examples include classic models in ecology, cell biology, physiology, and neuroscience. Emphasis on understanding models, their assumptions, and implications for modern biology. GE credit: QL, SE, SL, VL, WE. Effective: 2018 Spring Quarter.

BIS 133—Collaborative Studies in Mathematical Biology (3)
Lecture/Discussion—3 hours. Prerequisite(s): MAT 016A; MAT 016B; MAT 016C; (BIS 001A or BIS 001B or BIS 001C or BIS 002A or BIS 002B or BIS 002C or BIS 010); and Consent of Instructor. Or equivalents. Interdisciplinary research and training that uses mathematics and computation to solve current problems in biology. May be repeated up to 6 time(s). GE credit: QL, SE, SL, VL, WE. Effective: 2008 Fall Quarter.

BIS 134—Systems Biology: From Biological Circuits to Biological Systems (2)
Lecture/Discussion—2 hours; Term Paper. Prerequisite(s): BIS 101; (MCB 121 or MCB 161 or PLB 113); (MAT 016A, MAT 016B, MAT 016C) or (MAT 017A, MAT 017B, MAT 017C); or Consent of Instructor. Applying systems theory to understand the properties of biological networks in a variety of model organisms. Emphasis on both local biological circuits, and genome-scale biological networks. Topics include network motifs, robustness, modeling, emergent properties and integration of networks. GE credit: OL, QL, SE, VL. Effective: 2011 Winter Quarter.

BIS 180L—Genomics Laboratory (5)
Discussion—1 hour; Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): BIS 181; BIS 183 (can be concurrent); MCB 182 Computational approaches to model and analyze biological information about genomes, transcriptomes, and proteomes. Topics include genome assembly and annotation, mRNA and small RNA profiling, proteomics, protein-DNA and protein-protein interactions, network analysis, and comparative genomics. Computer programming experience not required. Students who have received credit for taking ECS 124 or BIT 150 will receive 3 units for completing course 180L. GE credit: QL, SE, VL. Effective: 2013 Spring Quarter.

BIS 181—Comparative Genomics (3)
Lecture—3 hours. Comparison of genomes at the population and species level. Genomic techniques for mapping disease (and other) genes, reconstruction of evolutionary history and migration patterns, determination of gene function, prediction of organismal traits, and metagenomics: determination of community composition and function. GE credit: QL, SE, SL. Effective: 2012 Fall Quarter.

BIS 183—Functional Genomics (3)
Lecture—3 hours. Prerequisite(s): BIS 101; BIS 102 or BIS 105 recommended. Overview of genomic methodologies and key biological findings obtained using genome-wide analyses. RNA profiling, small RNAs, epigenomics, chromatin immunoprecipitation, protein-DNA interactions, proteomics and network analysis. GE credit: QL, SE, VL. Effective: 2012 Spring Quarter.

BIS 192—Internship in Biological Sciences (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

BIS 194H—Research Honors (2)
Independent Study—6 hours. Prerequisite(s): Senior standing. Students majoring in Biological Sciences who have completed two quarters (3-5 units per quarter) of 199 and who qualify for the honors program as defined by the current catalog. Opportunity for Biological Sciences majors to pursue intensive research culminating in the writing of a senior thesis with the guidance of faculty advisors. (P/NP grading only.) GE credit: SE, WE. Effective: 1997 Winter Quarter.

BIS 195A—Science Teaching Internship Program (4)
Internship—6 hours; Lecture/Discussion—2 hours. Prerequisite(s): Upper division standing in a science major or consent of instructor. Major in science; junior or senior status (based on units); application and interview; class size limited to 24 students. Basic teaching techniques including lesson planning, classroom management, and presentation skills. Interns spend time in K-12 science classrooms working with a master teacher observing, assisting with labs and activities, managing students, and teaching lessons. (P/NP grading only.) Effective: 2002 Spring Quarter.

BIS 195B—Science Teaching Internship (1-5)
Internship—1-5 hours. Prerequisite(s): BIS 195A Reinforcement of teaching techniques learned in 195A with additional classroom experience in K-12 science classrooms wirking with a master teacher observing, assisting with labs and activities, managing students and teaching lessons. May be repeated up to 1 time(s) with consent of instructor. (P/NP grading only.) Effective: 2002 Spring Quarter.

BIS 197T—Tutoring in Biological Sciences (1-5)
Discussion—2-6 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Assisting the instructor by tutoring students in one of the Biological Sciences' regular courses. May be repeated for credit. (P/NP grading only.) Effective: 2004 Spring Quarter.

BIS 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

BIS 199—Special Study in Biological Sciences (1-5)
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

BIS 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. College of Biological Sciences staff members may offer group study courses under this number. Effective: 1997 Winter Quarter.

BIT Biotechnology

Courses in BIT:

BIT 001Y—Introduction to Biotechnology (4)
Discussion—1 hour; Lecture—2 hours; Web Virtual Lecture—1 hour. Principles and technologies of biotechnology as applied to agriculture, the environment, and medicine. Business plans and presentation pitches for new biotechnology products. Bioinformatics approaches exploring genomic databases and DNA manipulations in silica. (BIT 001.) GE credit: SE. Effective: 2014 Spring Quarter.

BIT 091—Undergraduate Seminars in Biotechnology (1)
Seminar—1 hour. Undergraduate oriented seminar series focused on biotechnology research and product development. Speakers from campus and the private sectors discuss ongoing research, product development and biotechnology careers. (P/NP grading only.) Effective: 2017 Winter Quarter.

BIT 092—Internship in Biotechnology (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Work experience on or off campus in subject area pertaining to biotechnology or in a business, industry or agency associated with biotechnology. Internship supervised by faculty member in the animal or plant sciences. (P/NP grading only.) Effective: 1998 Fall Quarter.

BIT 098—Directed Group Study (1-5)
Variable—1-15 hours. Prerequisite(s): Consent of Instructor. Directed group study. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 2016 Fall Quarter.

BIT 099—Special Study for Undergraduates (1-5)
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1998 Fall Quarter.

BIT 150—Applied Bioinformatics (4)
Discussion/Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): BIS 101; (ECS 010 or ECS 015 or PLS 021); (PLS 120 or STA 013 or STA 013Y or STA 100); or Consent of Instructor. Limited enrollment. Concepts and programs needed to apply bioinformatics in biotechnology research. Sequence analysis and annotation and use of plant and animal databases for students in biological and agricultural sciences. Two units of credit for students who have completed ECS 124. GE credit: SE, VL. Effective: 2018 Spring Quarter.

BIT 160—Principles of Plant Biotechnology (3)
Lecture—3 hours. Prerequisite(s): (BIS 001A or BIS 002A); (BIS 101 or PLS 152) Principles and concepts of plant biotechnology including recombinant DNA technology, molecular biology, genomics, cell and tissue culture, gene transfer and crop improvement strategies using transgenic crops. Not open for credit to students who have completed PLB 160. (Former course PLB 160.). GE credit: SE. Effective: 2008 Winter Quarter.

BIT 161A—Genetics and Biotechnology Laboratory (6)
Laboratory—9 hours; Lecture—3 hours. Prerequisite(s): PLS 152 or BIS 101; and Consent of Instructor. Techniques of genetic analysis at the molecular level including recombinant DNA, gene mapping and basic computational biology. Not open for credit to students who have completed PLB 161A. GE credit: SE. Effective: 2010 Winter Quarter.

BIT 161B—Plant Genetics and Biotechnology Laboratory (4)
Laboratory—8 hours; Lecture—1 hour. Prerequisite(s): PLS 152 or BIS 101; and Consent of Instructor. Advanced techniques of genetic analysis at the molecular and cellular levels, including transformation, gene expression and analysis of transgenic plants. Not open for credit to students who have taken PLB 161B. (Former course PLB 161B.). GE credit: SE, SL. Effective: 2011 Fall Quarter.

BIT 171—Professionalism and Ethics in Genomics and Biotechnology (3)
Discussion—2 hours; Lecture—1 hour. Prerequisite(s): Upper division standing in a natural science major. Real and hypothetical case studies to illustrate ethical issues in genomics and biotechnology. Training and practice in difficult ethical situations and evaluating personal and social consequences. GE credit: SE, SL, WE. Effective: 2005 Winter Quarter.

BIT 188—Undergraduate Research Proposal (3)
Lecture/Discussion—3 hours. Prerequisite(s): Upper division standing. Preparation and review of a scientific proposal. Problem definition, identification of objectives, literature survey, hypothesis generation, design of experiments, data analysis planning, proposal outline and preparation. (PLS 188.) GE credit: OL, SE, WE. Effective: 2009 Spring Quarter.

BIT 189L—Laboratory Research in Genomics and Biotechnology (2-5)
Discussion—1 hour; Laboratory—3-12 hours. Prerequisite(s): BIT 188; and Consent of Instructor. Formulating experimental approaches to current questions in biotechnology; performance of proposed experiments. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2000 Spring Quarter.

BIT 192—Internship in Biotechnology (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Work experience on or off campus in a subject area pertaining to biotechnology or in a business, industry or agency associated with biotechnology. Internship supervised by faculty member in the animal or plant sciences. (P/NP grading only.) Effective: 1998 Fall Quarter.

BIT 194H—Honors Thesis in Biotechnology (1-2)
Independent Study—3-6 hours. Prerequisite(s): BIT 188; BIT 189L; Consent of Instructor. Senior standing in Biotechnology with 3.250 GPA or higher. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis. (P/NP grading only.) GE credit: SE, WE. Effective: 2016 Winter Quarter.

BIT 198—Directed Group Study (1-5)
Variable—1-15 hours. Prerequisite(s): Consent of Instructor. Directed group study. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 2016 Fall Quarter.

BIT 199—Special Study for Advanced Undergraduates (1-5)
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1998 Fall Quarter.

BPH Biophysics (Graduate Group)

Courses in BPH:

BPH 200A—Current Techniques in Biophysics (3)
Lecture—3 hours. Prerequisite(s): BIS 102; CHE 110A; Or equivalents. Current Technqiues in Biophysics. Topics in 200A include mathematical methods, modeling, mass spectrometry, stochastic process, scanning probe microscopy, electron microscopy, fluorescence, membrane diffusion/mechanics, and single particle tracking. (S/U grading only.) Effective: 2009 Winter Quarter.

BPH 200B—Current Techniques in Biophysics (3)
Lecture—3 hours. Prerequisite(s): CHE 110A; BIS 102; Or equivalent of BIS 102. Current Techniques in Biophysics. Topics include protein folding, membrane structure and dynamics, Raman spectroscopy, fluorescence resonance energy transfer, time resolved fluorescence, quantum dot, fluorescence imaging,esr, high resolution nmr, and in vivo nmr. (S/U grading only.) Effective: 2007 Spring Quarter.

BPH 200LA—Biophysics Laboratory (3)
Laboratory—18 hours. Prerequisite(s): BPH 200 (can be concurrent) One five-week laboratory assignment in the research laboratory of a Biophysics Graduate Group faculty member. Individual research problems with emphasis on methodological/procedural experience and experimental design. May be repeated up to 4 time(s). Effective: 1997 Winter Quarter.

BPH 200LB—Biophysics Laboratory (6)
Laboratory. Prerequisite(s): BPH 200 (can be concurrent) Two fiveweek laboratory assignments in the research laboratories
of Biophysics Graduate Group faculty members. Individual research problems with emphasis on methodological/procedural experience and experimental design. May be repeated up to 2 time(s). Effective: 1997 Winter Quarter.

BPH 231—Biological Nuclear Magnetic Resonance (3)
Lecture—3 hours. Prerequisite(s): MCB 221A; or Consent of Instructor. Or the equivalent. Principles and applications of magnetic resonance in biomedicine. Fundamental concepts and the biophysical basis for magnetic resonance
applications in areas of tissue characterization/imaging, metabolic regulation, and cellular bioenergetics. (BCM 231.) Effective: 1997 Winter Quarter.

BPH 241—Membrane Biology (3)
Lecture—3 hours. Prerequisite(s): BIS 102; BIS 103; BIS 104; or Consent of Instructor. Advanced topics on membrane biochemistry and biophysics. Relationship of the unique properties of biomembranes to their roles in cell biology and physiology. Effective: 2017 Winter Quarter.

BPH 255—Nanoscale Imaging for Molecular Medicine (3)
Lecture/Discussion—3 hours. Prerequisite(s): BIM 202 highly recommended; graduate standing. Current and emerging technologies to visualize biological structures and processes at size scales = 100 nanometers – and their application towards the advancement of molecular medicine. Technologies include superresolution optical microscopy electron microscopy and tomography. Emphasis on quantitative imaging. (BIM 255.) Effective: 2017 Spring Quarter.

BPH 271—Optical Methods in Biophysics (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): BIS 102; EAD 108B; CHE 110A; Or equivalents. Principal optical techniques used to study biological structures and their related functions. Specific optical techniques useful in the studies of protein-nucleic acid, protein-membrane and protein-protein interactions. Biomedical applications of optical techniques. Effective: 2017 Spring Quarter.

BPH 288—Living Matter: Physical Biology of the Cell (3)
Lecture—3 hours. Open to any student possessing general background in any disciplines of physical or biological sciences and
engineering. Introduction to the origin, maintenance, and regulation of the dynamic architecture of the cell, including cellular modes of organization, dynamics and energy dissipation, molecular transport, motility, regulation, and adaptability. (BIM 288 and EMS 288.) Effective: 2017 Winter Quarter.

BPH 290—Biophysics Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Presentation of current research by experts in biophysics. May be repeated for credit. (S/U grading only.) Effective: 2004 Winter Quarter.

BPH 290C—Research Conference in Biophysics (1)
Discussion—1 hour. Prerequisite(s): BPH 299 (can be concurrent); Graduate standing in Biophysics and/or consent of instructor. Presentation and discussion of faculty and graduate-student research in biophysics. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

BPH 293—Introduction to Research Topics (1)
Seminar—1 hour. Presentation of current research activities of the Biophysics Graduate Group faculty. Facilitation of students in developing their research interest, and promoting collegial interactions. May be repeated up to 1 time(s) if topics differ. (S/U grading only.) Effective: 2003 Fall Quarter.

BPH 298—Group Study (1-5)
Variable—1-5 hours. (S/U grading only.) Effective: 1997 Winter Quarter.

BPH 299—Research (1-12)
Variable—3-36 hours. (S/U grading only.) Effective: 1997 Winter Quarter.

BPT Biophotonics

Courses in BPT:

BPT 201—Current Topics in Biophotonics and Bioimaging Research (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Designed to help graduate students develop and maintain familiarity with the current and past literature in the field of Biophotonics and Bioimaging research and related areas. May be repeated up to 4 time(s) when subject differs. Effective: 2016 Fall Quarter.

BST Biostatistics (Graduate Group)

Courses in BST:

BST 222—Biostatistics: Survival Analysis (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 131C Incomplete data; life tables; nonparametric methods; parametric methods; accelerated failure time models; proportional hazards models; partial likelihood; advanced topics. (STA 222.) Effective: 2002 Fall Quarter.

BST 223—Biostatistics: Generalized Linear Models (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 131C Likelihood and linear regression; generalized linear model; Binomial regression; case-control studies; dose-response and bioassay; Poisson regression; Gamma regression; quasi-likelihood models; estimating equations; multivariate GLMs. (STA 223.) Effective: 2002 Fall Quarter.

BST 224—Analysis of Longitudinal Data (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): (BST 222 or STA 222); (BST 223 or STA 223); STA 232B; or Consent of Instructor. Standard and advanced methodology, theory, algorithms, and applications relevant for analysis of repeated measurements and longitudinal data in biostatistical and statistical settings. (STA 224.) Effective: 2005 Spring Quarter.

BST 225—Clinical Trials (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): BST 223 or STA 223; or Consent of Instructor. Basic statistical principles of clinical designs, including bias, randomization, blocking, and masking. Practical applications of widely-used designs, including dose-finding, comparative and cluster randomization designs. Advanced statistical procedures for analysis of data collected in clinical trials. (STA 225.) Effective: 2005 Spring Quarter.

BST 226—Statistical Methods for Bioinformatics (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): BST 131C or Consent of Instructor; Data analysis experience recommended. Standard and advanced statistical methodology, theory, algorithms, and applications relevant to the analysis of -omics data. (STA 226.) Effective: 2007 Winter Quarter.

BST 252—Advanced Topics in Biostatistics (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): BST 222; BST 223 Biostatistical methods and models selected from the following: genetics, bioinformatics and genomics;longitudinal or functional data; clinical trials and experimental design; analysis of environmental data; dose-response, nutrition and toxicology; survival analysis; observational studies and epidemiology; computer-intensive or Bayesian methods in biostatistics. May be repeated for credit with consent of advisor when topic differs. (STA 252.) Effective: 2002 Fall Quarter.

BST 290—Seminar in Biostatistics (1)
Seminar—1 hour. Restricted to graduate standing. Seminar on advanced topics in the field of biostatistics. Presented by members of the Biostatistics Graduate Group and other guest speakers. May be repeated up to 12 time(s). (S/U grading only.) Effective: 2002 Fall Quarter.

BST 298—Directed Group Study (1-5)
Variable—3-15 hours. Special topics in Biostatistics appropriate for group study at the graduate level. May be repeated for credit. Effective: 2004 Spring Quarter.

BST 299—Special Study for Biostat Graduate Students (1-12)
Variable—3-36 hours. Special topics in Biostatistics appropriate for directed individual study on advanced topics not otherwise covered in the Biostatistics curriculum. May be repeated for credit. (S/U grading only.) Effective: 2004 Spring Quarter.

BST 299D—Dissertation Research (1-12)
Variable—3-36 hours. Prerequisite(s): and Consent of Instructor. Advancement to Candidacy for Ph.D. Research in Biostatistics under the supervision of major professor. May be repeated for credit. (S/U grading only.) Effective: 2004 Spring Quarter.

CAR Med - Internal: Cardiology

Courses in CAR:

CAR 192—Internship in Cardiology (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project by preceptor prior to internship. Supervised work experience in cardiology. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

CAR 199—Cardiology Research (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special study by individual arrangement in cardiovascular medicine. Work will include directed readings, laboratory and discussions. (P/NP grading only.) Effective: 1997 Winter Quarter.

CAR 220—Basic Science in Cardiology (1)
Lecture—1 hour. Prerequisite(s): Graduate or medical student status. Fundamentals underlying cardiovascular medicine. Including hemodynamics, neural control of the circulation, biochemistry and some experimental design and statistics. Experts in each of these fields will give current information in their areas. (S/U grading only.) Effective: 1997 Winter Quarter.

CAR 299—Cardiology Research (1-12)
Variable—40 hours. Prerequisite(s): Consent of Instructor. Research or special studies. (S/U grading only.) Effective: 2010 Spring Quarter.

CAR 401—Clinical Cardiology Clerkship: Kaiser (3-18)
Clinical Activity—1-5 hours. Prerequisite(s): Third- and fourth-year medical students with advance approval by Division of Cardiology. Limited enrollment. Emphasis placed on history taking and physical examination of pediatric and adult patients with congenital and acquired cardiovascular disease. Hospital rounds in CCU and elsewhere. Roles of ECG, PCG, and cardiac fluoroscopy, etc., in office cardiology will be evaluated. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

CAR 460—Cardiology Clinical Clerkship (3-18)
Clinical Activity—2-12 hours. Prerequisite(s): IMD 430; Third- and fourth-year medical students in good academic standing with consent of instructor. Limited enrollment. Participation with members of subspecialty consultation service in initial clinical evaluation, work-up, management, and follow-up of patients with cardiologic disorders. Two outpatient clinics per week. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

CAR 461—Management of Coronary Artery Disease: Coronary Care Unit (3-18)
Clinical Activity. Prerequisite(s): Completion of second-year of medical school and advance approval by Division of Cardiology. Limited enrollment. Research in laboratory and exercise testing to be determined by instructor. Current methods of clinical research involving certain aspects of diagnosis and treatment. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

CAR 464—Preventive Cardiology (3-6)
Clinical Activity; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Completion of third-year medical school. Clinical experience, weekly seminar and reading on primary and secondary prevention of cardiovascular disease. Will be carried out in Lipid and Hypertension Clinics, Exercise Laboratory, Cardiac Care Unit, Cardiac Catheterization, and Cardiac Surgery services. (H/P/F grading only.) Effective: 1997 Winter Quarter.

CAR 480—Insights in Cardiology (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Medical student in good academic standing and approval by Division of Cardiology. Students attend one or more cardiovascular medicine clinics: general, hypertension, arrhythmia. Introduction to the diagnosis/treatment of common cardiovascular problems. (H/P/F grading only.) Effective: 1997 Winter Quarter.

CAR 493—Gender Specific Medicine SSM (6)
Clinical Activity—4 hours; Laboratory—16 hours; Lecture—5 hours; Lecture/Lab—10 hours. Prerequisite(s): Consent of Instructor. UC Davis School of Medicine students only. Special Studies Module, a four week course on the topic:Basic Science Principles Relating to Gender Specific Medicine. (OBG 493.) (H/P/F grading only.) Effective: 2007 Spring Quarter.

CAR 498—Special Group Study: EKG Unit (1-12)
Variable. Prerequisite(s): Medical student with advance approval by monthly attending faculty. Limited enrollment. Special group study in cardiology for medical students in EKG unit. May include lectures, directed reading, and/or discussion groups. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

CAR 499—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Approval by Division of Cardiology. (H/P/F grading only.) Effective: 1997 Winter Quarter.

CDM Cinema and Digital Media

Courses in CDM:

CDM 072—Introduction to Games (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Introduction to the history, theory, and practice of play. Survey of both analog and digital games. Overview of gaming cultures, aesthetics, industries, and technologies. (ENL 072.) GE credit: AH, VL. Effective: 2017 Fall Quarter.

CDM 092—Internship (1-12)
Internship—1-12 hours. Prerequisite(s): Consent of Instructor. Supervised internship, on or off campus, in the area of cinema and digital media. May be repeated for credit. (P/NP grading only.) Effective: 2018 Fall Quarter.

CDM 098—Directed Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Directed group study in cinema and digital media. May be repeated for credit when topics differ. (P/NP grading only.) Effective: 2018 Fall Quarter.

CDM 099—Special Study for Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Special study for undergraduates in cinema and digital media. May be repeated for credit. (P/NP grading only.) Effective: 2018 Fall Quarter.

CDM 105—Feminist Media Production (6) ***Review all entries***
Fieldwork—6 hours; Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): CTS 020; or equivalent and one course in Women and Gender Studies, or consent of instructor. Media production as a mode of cultural criticism, furthering feminist and social justice goals. Fundamentals of camera, editing and distribution via a social engagement model. Study and hands-on response to key historic and contemporary feminist and social justice media discourses. (WMS 165) GE credit: ACGH, AH, DD, SS, VL. Effective: 2017 Winter Quarter.

CDM 105—Feminist Media Production (6) ***Review all entries***
Fieldwork—6 hours; Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): (CTS 020 or CDM 020); or two WMS courses Media production as a mode of cultural criticism, furthering feminist and social justice goals. Fundamentals of camera, editing and distribution via a social engagement model. Study and hands-on response to key historic and contemporary feminist and social justice media discourses. (WMS 165.) GE credit: ACGH, AH, DD, SS, VL. Effective: 2018 Fall Quarter.

CDM 163—Art & Cinema: Between the White Cube and the Black Box (4)
Film Viewing—3 hours; Lecture—3 hours. Current debates between cinema studies and contemporary art. Issues covered include, experimental modes of filming, montaging, installing, screening, and displaying images between the White Cube (gallery/museum) and the Black Box (cinema). GE credit: AH, OL, VL, WE. Effective: 2017 Winter Quarter.

CDM 192—Internship (1-12)
Internship—1-12 hours. Prerequisite(s): Consent of Instructor. Upper division standing Supervised internship, on or off campus, in the area of cinema and digital media. May be repeated for credit. (P/NP grading only.) Effective: 2018 Fall Quarter.

CDM 197T—Tutoring in Cinema and Digital Media (1-5)
Tutorial—1-5 hours. Prerequisite(s): Consent of Instructor. Consent of Department Chair. Leading small voluntary discussion groups affiliated with departmental courses under the supervision of the course instructor. May be repeated up to 10 unit(s). (P/NP grading only.) Effective: 2018 Summer Session 1.

CDM 198—Directed Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Directed group study in cinema and digital media. For students with upper division standing. May be repeated for credit when topic differs. (P/NP grading only.) Effective: 2018 Fall Quarter.

CDM 199—Special Study for Advanced Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Special study in cinema and digital media. For advanced undergraduates with upper division standing. May be repeated for credit. (P/NP grading only.) Effective: 2018 Fall Quarter.

CDM 396—Teaching Assistant Training Practicum (1-4)
Variable—3-12 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Teaching assistant training practicum. May be repeated for credit. (S/U grading only.) Effective: 2018 Fall Quarter.

CGS Cognitive Science Program

Courses in CGS:

CGS 001—Introduction to Cognitive Science (4)
Lecture/Discussion—4 hours. Pass One open to Cognitive Science majors only. Introduction to the interdisciplinary cognitive scientific approach to the study of mind, drawing concepts and methods from psychology, philosophy, linguistics, artificial intelligence, and other disciplines. (PHI 010.) GE credit: SE, SL. Effective: 2017 Fall Quarter.

CGS 107—Neuroeconomics/Reinforcement Learning and Decision Making (4)
Lecture—3 hours; Term Paper. Prerequisite(s): (PSC 100 or PSC 100Y or PSC 135 or ECN 100A or ARE 100A or NPB 162 or NPB 163); (STA 013 or STA 013Y or STA 100 or PSC 103A); or Consent of Instructor. Theoretical and empirical approaches to neuroeconomics (neuroscience of decision making) from psychology, neuroscience, economics, and computer science. Neuroscience of judgment and decision making, behavioral economics, and reinforcement learning. (ECN 107 and PSC 133.) GE credit: SL, SS. Effective: 2018 Spring Quarter.

CGS 138—Consciousness and Cognition (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; (PSC 100 or PSC 100Y or PSC 135) Current theoretical and empirical evidence in the study of cognition and consciousness. Theories of consciousness, psychological and neural basis of conscious and unconscious processes such as attention, intentionality, and dreams. (PSC 138.) Effective: 2018 Spring Quarter.

CGS 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special study for advanced undergraduates. May be repeated for credit. (P/NP grading only.) Effective: 2017 Winter Quarter.

CHA Med - Cell Biology & Human Anatomy

Courses in CHA:

CHA 101—Human Gross Anatomy (4)
Lecture—4 hours. Prerequisite(s): BIS 002A; Concurrent enrollment in EXB 106L or CHA 101L strongly recommended. Upper division students only; Pass One open to upper division Exercise Biology or Anthropology majors only; Pass Two open to Seniors in any major; open enrollment at the start of the quarter for upper division students in any major. Detailed study of the gross anatomical structure of the human body, with emphasis on function and clinical relevance to students entering health care professions. (EXB 106.) GE credit: SE. Effective: 2010 Fall Quarter.

CHA 101L—Human Gross Anatomy Laboratory (3)
Laboratory—9 hours. Prerequisite(s): BIS 002A; (EXB 106 (can be concurrent) or CHA 101 (can be concurrent)); If EXB 106 or CHA 101 is not taken concurrently, it must have been already completed. Upper division students only; Pass One open to upper division Exercise Biology or Anthropology majors only; Pass Two open to Seniors in any major; open enrollment at the start of the quarter for upper division students in any major; mandatory attendance on first day of lab. Detailed study of prosected human cadavers in small group format with extensive hands-on experience. (EXB 106L.) GE credit: SE. Effective: 2010 Fall Quarter.

CHA 102—Human Microscopic Anatomy: Structure and Function of Human Tissues and Organ Systems (4.5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): BIS 104 Limited enrollment. Course complements Gross Anatomy by extending the study of structure to the microscopic level. Shows how cells are assembled into tissues, and tissues into organs, with an emphasis on demonstrating how microscopic structure explains function. GE credit: SE. Effective: 2017 Winter Quarter.

CHA 103—Human Clinical Neuroanatomy (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHA 101; or Consent of Instructor. Open to upper division students. Clinically relevant anatomy of the normal human nervous system, including external and internal anatomy of the brain, spinal cord, and cranial nerves. Blood supply to the brain and spinal cord. Functional neuroanatomy of motor, sensory, and cognitive systems. Application of neuroanatomical principles relevant to clinical problem solving for students entering health care professions. (NEU 103.) GE credit: SE. Effective: 2018 Spring Quarter.

CHA 192—Internship in Morphology (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; laboratory science experience including some chemistry; approval of project by preceptor prior to period of internship. Experience of supervised internship in research laboratories of members of the department. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHA 197T—Tutoring in Cell Biology and Human Anatomy (1-5)
Discussion—1 hour; Laboratory—6-9 hours. Prerequisite(s): CHA 101 B or better; and Consent of Instructor. Provides laboratory instruction in gross and microscopic human anatomy, with small groups of undergraduates under the supervision of the instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHA 198—Directed Group Study (1-5)
Discussion—1-10 hours. Prerequisite(s): Consent of Instructor. Directed reading, discussion, and/or laboratory experience on selected topics. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHA 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHA 200—Graduate Human Gross Anatomy (6)
Laboratory—6 hours; Lecture—4 hours. Prerequisite(s): Consent of Instructor. Open only to full-time graduate students. Lectures on human gross anatomy and cadaver dissection laboratory. Topics arranged by region; emphasis on osteology, neuromuscular anatomy, cardiovascular anatomy, gastrointestinal anatomy and anatomy of reproductive systems. Only 2 units of credit for students who have completed CHA 101. Effective: 2008 Winter Quarter.

CHA 202—Microscopic Anatomy for Researchers (3)
Discussion/Laboratory—3 hours; Lecture—2 hours. Open to graduate students in the biomedical sciences (no consent required); advanced undergraduates seeking research careers in the biomedical sciences (consent of instructor required). The growing importance of the use of gene knock-out studies and imaging technology requires significant understanding of basic anatomy. Designed to familiarize students in diverse fields with anatomical, cellular and tissue organization of typical animal models. Effective: 2017 Spring Quarter.

CHA 203—Neurobiology (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Two upper division or one graduate course in Neurobiology. Physiology and anatomy of the normal human nervous system in an integrated format. Effective: 2004 Spring Quarter.

CHA 290—Seminar (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

CHA 290C—Research Group Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate student with research experience (may be taken concurrently). Discussion of problems, progress and literature groups relevant to current research undertaken by laboratory groups Human Anatomy. (S/U grading only.) Effective: 1997 Winter Quarter.

CHA 298—Advanced Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Effective: 1997 Winter Quarter.

CHA 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

CHA 400—Developmental, Gross & Radiologic Anatomy (7.5)
Laboratory—5 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Medical students only. Integrated presentation of developmental, gross and radiologic anatomy. Embryology and radiology correlated with the dissection of the entire body. Embryology from implantation to birth. (P/F grading only.) Effective: 2011 Summer Quarter.

CHA 402—Cell and Tissue Biology (4.5)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Medical student only. Microscopic structure of the basic cells, tissues and organs of the body with an emphasis on how structure explains function. Analysis and identification of sectioned material at the light microscopic and ultrastructural levels. (P/F grading only.) Effective: 2011 Summer Quarter.

CHA 403—Medical Neuroanatomy (5)
Discussion/Laboratory—1 hour; Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): CHA 400; Block 1. Restricted to medical students only. Anatomy of the normal human nervous system, to include gross external and internal morphology of brain and spinal cord, and function neuroanatomy of motor, sensory and cognitive systems. Incorporates application of neuroanatomy to clinical problem solving. (HPH 403.) (P/F grading only.) Effective: 2007 Summer Quarter.

CHA 493B—Anatomy Medical Education Special Study Module (6)
Auto Tutorial—6 hours; Clinical Activity—14 hours; Independent Study—10 hours; Seminar—10 hours. Prerequisite(s): Consent of Instructor. UC Davis School of Medicine students only. Attend all of the lectures and laboratory sessions for course 400 and 402 during the four-week section (approximately seven anatomy labs and three to four histology labs);tutor first-year students during the laboratory sessions; prepare and present a clinical correlate session. (H/P/F grading only.) Effective: 2007 Spring Quarter.

CHA 497T—Tutoring in Human Anatomy (1-5)
Tutorial—3-15 hours. Prerequisite(s): Advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum for the School of Medicine. (H/P/F grading only.) Effective: 1997 Winter Quarter.

CHA 498—Advanced Group Study (1-12)
Variable. Prerequisite(s): Medical students, interns, and residents with consent of instructor. Directed reading and group discussions and/or laboratory experience on selected topics. (H/P/F grading only.) Effective: 1997 Winter Quarter.

CHA 499—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (H/P/F grading only.) Effective: 1997 Winter Quarter.

CHE Chemistry

Chemistry Placement Requirement. Students who enroll in Chemistry 002A, 002AH or Workload Chemistry 041C must satisfy the Chemistry Placement Requirement. Students who do not meet the placement requirements will be administratively dropped from these Chemistry courses. For more information about the placement requirements, see

https://chemistry.ucdavis.edu/undergraduate/general-chemistry-series/chemistry-placement-requirements.

The Student Academic Success Center (SASC) provides review materials, workshops, drop-in and group tutoring, and additional resources.

Chemistry Graduate Students Tutors are also listed on the Department of Chemistry website at https://chemistry.ucdavis.edu/undergraduate/tutors-chemistry.

Courses in CHE:

CHE 002A—General Chemistry (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): High school chemistry and physics, and concurrent enrollment in mathematics at or above the level of MAT 012 strongly recommended; any one of the following: (A) SAT Mathematics score = 600+; (B) ACT Mathematics score = 27+; (C) AP Chemistry exam score of = 3+; (D) SAT Chemistry subject test score = 700+; (E) UC Davis Chemistry Placement Examination score = 24+ on first attempt; in lieu of A-E, either completion of ALEKS online Preparatory Chemistry course with 100% Pie Mastery or completion of Workload 41C with a grade of C or better (Workload 41C offered in fall quarter only to students who do not meet A-E). Periodic table, stoichiometry, chemical equations, physical properties and kinetic theory of gases, atomic and molecular structure and chemical bonding. Laboratory experiments in stoichiometric relations, properties and collection of gases, atomic spectroscopy, and introductory quantitative analysis. Not open for credit to students who have taken CHE 002AH. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

CHE 002AH—Honors General Chemistry (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. High school chemistry and physics. Any ONE of the following: (A) SAT Mathematics score = 670+; (B) ACT Mathematics score = 30+; (C) AP Chemistry exam score = 4+; (D) SAT Chemistry subject test score = 700+; (E) UC Davis Chemistry Placement Examination score = 33+ on first attempt; (F) UC Davis Chemistry Placement Examination score = 30+ AND UC Davis Mathematics Placement Examination score = 45+, both on first attempts; consent of instructor. Limited enrollment course with a more rigorous treatment of material covered in course 2A. Students completing course 2AH can continue with course 2BH or 2B. Not open for credit to students who have taken CHE 002A. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

CHE 002B—General Chemistry (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): CHE 002A C- or better or CHE 002AH C- or better Continuation of course 2A. Condensed phases and intermolecular forces, chemical thermodynamics, chemical equilibria, acids and bases, solubility. Laboratory experiments in thermochemistry, equilibria, and quantitative analysis using volumetric methods. Not open for credit to students who have taken CHE 002BH. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

CHE 002BH—Honors General Chemistry (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): CHE 002A or CHE 002AH C or better; MAT 021B (can be concurrent); or Consent of Instructor. CHE 2A with consent of instructor. Limited enrollment course with a more rigorous treatment of material covered in course 2B. Students completing course 2BH can continue with course 2CH or 2C. Not open for credit to students who have taken CHE 002B. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

CHE 002C—General Chemistry (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): CHE 002B C- or better or CHE 002BH C- or better Continuation of course 2B. Kinetics, electrochemistry, spectroscopy, structure and bonding in transition metal compounds, application of principles to chemical reactions. Laboratory experiments in selected analytical methods and syntheses. Not open for credit to students who have taken CHE 002CH. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

CHE 002CH—Honors General Chemistry (5)
Discussion/Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): CHE 002B or CHE 002BH C or better; MAT 021C (can be concurrent); or Consent of Instructor. CHE 002B with consent of instructor Limited enrollment course with a more rigorous treatment of material covered in course 2C. Not open for credit to students who have taken CHE 002C. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

CHE 003A—Chemistry for Life Sciences: Determining Structure and Predicting Properties (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): High high school chemistry and physics strongly recommended; satisfactory score on the Chemistry and Mathematics Placement Examinations or satisfactory completion of the ALEKS Summer Chemistry Prep Course; a satisfactory grade in WKL 041C ('P' or 'C' or better) will suffice in lieu of a satisfactory Chemistry Placement Examination score. Concurrent enrollment with course 2A, 2B, 2C, 2AH, 2BH, 2CH prohibited; not open for enrollment to students who have completed CHE 2C or 2CH with a C- or better. Integrated General and Organic Chemistry intended for majors in the life sciences. Core concepts of chemical composition, structure and properties. Includes phase changes, separation methods, composition, spectroscopy, atomic and molecular structure, periodicity, bonding, charge distribution, intermolecular forces, and physical properties. Only 3 units credit for students who have completed CHE 002A or CHE 002AH with a C- or better; only 1 unit of credit to students who have completed CHE 002B or CHE 002BH with a C- or better. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

CHE 003B—Chemistry for Life Sciences: Predicting and Characterizing Chemical Change (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 003A C- or better; Note: C- or better in CHE 002A or 002AH does not satisfy the prerequisite requirement. Concurrent enrollment with course 2A, 2B, 2C, 2AH, 2BH, 2CH prohibited. Continuation of course 3A covering core concepts of characterization of chemical processes and predicting chemical changes. Includes modeling chemical reactions, understanding proportions/stoichiometry, tracking energy, activation energy, reaction kinetics, thermodynamics, and equilibrium. Only 3 units credit for students who have completed CHE 002B or CHE 002BH with a C- or better. GE credit: QL, SE, SL. Effective: 2017 Winter Quarter.

CHE 003C—Chemistry for Life Sciences: Controlling Processes and Synthetic Pathways (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 003B C- or better; Note: C- or better in CHE 002B or 002BH does not satisfy the prerequisite requirement. Concurrent enrollment with course 2A, 2B, 2C, 2AH, 2BH, 2CH prohibited. Continuation of course 3B covering core concepts of harnessing energy, controlling reaction extent, and organic chemistry synthetic pathways. Includes acids and bases, thermodynamics, chemical equilibria, organic chemistry terminology and mechanisms. Only 3 units credit for students who have completed CHE 002C or CHE 002CH with a C- or better. GE credit: QL, SE, SL. Effective: 2017 Spring Quarter.

CHE 008A—Organic Chemistry: Brief Course (2)
Lecture—2 hours. Prerequisite(s): CHE 002B C- or better or CHE 002BH C- or better With course 8B, an introduction to the nomenclature, structure, chemistry, and reaction mechanisms of organic compounds. Intended for students majoring in areas other than organic chemistry. No credit to students who have completed CHE 118A or 128A. GE credit: SE. Effective: 2016 Fall Quarter.

CHE 008B—Organic Chemistry: Brief Course (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 008A or CHE 118A or CHE 128A Laboratory concerned primarily with organic laboratory techniques and the chemistry of the common classes of organic compounds. Lecture portion a continuation of course 8A. Varying credit hours according to courses taken previously and corresponding expected workload for this course; full credit to students who complete CHE 118A or 128A; 3 units credit to students who have completed CHE 128A and CHE 129A (students who have completed CHE 129A are exempt from the laboratory portion of CHE 008B); 2 units credit to students who have completed CHE 128B; 1 unit credit to students who have completed CHE 118B or CHE 128B and CHE 129A (students who have completed CHE 118B are exempt from the laboratory portion of CHE 008B). GE credit: SE. Effective: 2016 Fall Quarter.

CHE 010—Concept of Chemistry (4)
Lecture—4 hours. Survey of basic concepts and contemporary applications of chemistry. Designed for non-science majors and not as preparation for Chemistry 2A. Not open for credit to students who have had CHE 002A; but students with credit for CHE 010 may take CHE 002A for full credit. GE credit: SE, SL. Effective: 1997 Winter Quarter.

CHE 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Primarily for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHE 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHE 100—Environmental Water Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 002C or CHE 002CH Practical aspects of water chemistry in the environment, including thermodynamic relations, coordination chemistry, solubility calculations, redox reactions and rate laws. Computer modeling of the evolution in water chemistry from contact with minerals and gases. Effective: 2016 Winter Quarter.

CHE 103A—Chemistry for Life Sciences: Determining Organic Structures and Properties (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 002C C- or better or CHE 002CH C- or better; (CHE 008A or CHE 118A or CHE 128A) Not open for enrollment to students who have completed course 008B, 118B, 118C, 128B, 128C with a C- or better. Continuation of course 3C. Core concepts of organic structure, nomenclature, functional groups, organic acids and bases, resonance and delocalization, aromaticity, intermolecular forces, three-dimensional structure and conformational analysis, spectroscopy. Only 3 Units of credit for students who have completed CHE 008A with a C- or better; only 2 units of credit for students who have completed CHE 118A or CHE 128A with a C- or better; not open for credit to students who have completed CHE 008B, CHE 118B, CHE 118C, CHE 128B, CHE 128C with a C- or better. GE credit: SE, SL. Effective: 2017 Fall Quarter.

CHE 103B—Chemistry for Life Sciences: Predicting and Controlling Organic Pathways (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 103A C- or better Not open for enrollment to students who have completed course 008B, 118B, 118C, 128B, or 128C with a C- or better. Continuation of course 103A. Core concepts of functional group transformations, synthesis, mechanisms, sustainable chemistry, structure and function of biomolecules, organic reactions in biological systems, molecular design, detection, separation, and identification of organic molecules. Not open for credit to students who have completed CHE 008B, CHE 118B, CHE 118C, CHE 128B, or CHE 128C. GE credit: SE, SL. Effective: 2018 Winter Quarter.

CHE 104—Forensic Applications of Analytical Chemistry (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): CHE 002C or CHE 002CH Theory and application of standard methods of chemical analysis to evidentiary samples. Use and evaluation of results from screening tests, FTIR, GC and GCMS to various sample types encountered in forensics. Effective: 2016 Winter Quarter.

CHE 105—Analytical and Physical Chemical Methods (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): CHE 110A (can be concurrent) or CHE 107B (can be concurrent) Fundamental theory and laboratory techniques in; analytical and physical chemistry, errors and data analysis methods, basic electrical circuits in instruments, advanced solution equilibria, potentiometric analysis, chromatographic separations, UV-visible spectroscopy, lasers. GE credit: QL, SE, SL. Effective: 2016 Spring Quarter.

CHE 107A—Physical Chemistry for the Life Sciences (3)
Lecture—3 hours. Prerequisite(s): CHE 002C or CHE 002CH; (MAT 016C or MAT 017C or MAT 021C); (PHY 007C or PHY 009C or PHY 009HC) Physical chemistry intended for majors in the life science area. Introductory development of classical and statistical thermodynamics including equilibrium processes and solutions of both non-electrolytes and electrolytes. The thermodynamic basis of electrochemistry and membrane potentials. GE credit: SE. Effective: 2017 Spring Quarter.

CHE 107B—Physical Chemistry for the Life Sciences (3)
Lecture—3 hours. Prerequisite(s): CHE 107A Continuation of course 107A. Kinetic theory of gases and transport processes in liquids. Chemical kinetics, enzyme kinetics and theories of reaction rates. Introduction to quantum theory, atomic and molecular structure, and spectroscopy. Application to problems in the biological sciences. GE credit: SE. Effective: 2016 Fall Quarter.

CHE 108—Molecular Biochemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 128C or CHE 118C Pass One open to Chemistry majors. Chemical principles and experimental methods applied to the biological sciences to understand the molecular structure and function of proteins, nucleic acids, carbohydrates, and membrane lipids. Effective: 2016 Winter Quarter.

CHE 110A—Physical Chemistry: Introduction to Quantum Mechanics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (PHY 007C or PHY 009C or PHY 009HC); (CHE 002C or CHE 002CH); (MAT 016C or MAT 017C or MAT 021C); Completion of Mathematics 21D, 22A, and 22AL, and Physics 9C or 9HC, strongly recommended. Introduction to the postulates and general principles of quantum mechanics. Approximations based on variational method and time independent perturbation theory. Application to harmonic oscillator, rigid rotor, one-electron and many-electron atoms, and homo-and hetero-nuclear diatomic molecules. GE credit: QL, SE. Effective: 2017 Spring Quarter.

CHE 110B—Physical Chemistry: Properties of Atoms and Molecules (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 110A Group theory. Application of quantum mechanics to polyatomic molecules and molecular spectroscopy. Intermolecular forces and the gas, liquid
and solid states. Distributions, ensembles and partition functions. Transport properties. Effective: 1999 Fall Quarter.

CHE 110C—Physical Chemistry: Thermodynamics, Equilibria and Kinetics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 110B Development and application of the general principles of thermodynamics and statistical thermodynamics. Chemical kinetics, rate laws for chemical reactions and reaction mechanisms. Effective: 1999 Fall Quarter.

CHE 115—Instrumental Analysis (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): CHE 105; (CHE 110B (can be concurrent) or (CHE 107A, CHE 107B)) Intermediate theory and laboratory techniques in analytical and physical chemistry. Advanced data analysis methods and goodness-of-fit criteria. Fourier-transform spectroscopic methods and instrumentation. Mass spectrometry. Electrochemistry. Liquid chromatography. GE credit: QL, SE, WE. Effective: 2006 Fall Quarter.

CHE 118A—Organic Chemistry for Health and Life Sciences (4)
Discussion/Laboratory—1.5 hours; Lecture—3 hours. Prerequisite(s): CHE 002C C- or better or CHE 002CH C- or better The 118A, 118B, 118C series is for students planning professional school studies in health and life sciences. A rigorous, in-depth presentation of basic principles with emphasis on stereochemistry and spectroscopy and preparations and reactions of nonaromatic hydrocarbons, haloalkanes, alcohols and ethers. Only 2 units credit for students who have completed course CHE 008A; not open for credit to students who have completed CHE 008B or CHE 128A. GE credit: SE, SL. Effective: 2017 Spring Quarter.

CHE 118B—Organic Chemistry for Health and Life Sciences (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 118A or CHE 128A Continuation of course 118A, with emphasis on spectroscopy and the preparation and reactions of aromatic hydrocarbons, organometallic
compounds, aldehydes and ketones. Only one unit of credit to students who completed course CHE 128B.; not open for credit to students who have completed 8 or more units of CHE 128 and CHE 129 courses. GE credit: SE, SL. Effective: 2017 Fall Quarter.

CHE 118C—Organic Chemistry for Health and Life Sciences (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 118B or (CHE 128B, CHE 129A) Open to students changing from the CHE 128 course sequence only if they have completed prior organic laboratory work (at least course CHE 129A). Continuation of course 118B, with emphasis on the preparation, reactions and identification of carboxylic acids and their derivatives, alkyl and acyl amines, ß-dicarbonyl compounds, and various classes of naturally occurring, biologically important compounds. Not open for credit to students who have completed course CHE 128C. GE credit: SE, SL. Effective: 2018 Winter Quarter.

CHE 121—Introduction to Molecular Structure and Spectra (4)
Lecture—4 hours. Prerequisite(s): CHE 110B Modern theoretical and experimental methods used to study problems of molecular structure and bonding; emphasis on spectroscopic techniques. Effective: 1997 Winter Quarter.

CHE 122—Chemistry of Nanoparticles (3)
Lecture—3 hours. Prerequisite(s): CHE 110C (can be concurrent) or CHE 107B (can be concurrent) Chemical and physical aspects of inorganic nanoparticles. Topics include synthesis, structure, colloidal behavior, catalytic activity, size and shape dependency of physical properties, analytical methods and applications. Effective: 2016 Winter Quarter.

CHE 124A—Inorganic Chemistry: Fundamentals (3)
Lecture—3 hours. Prerequisite(s): CHE 002C or CHE 002CH Symmetry, molecular geometry and structure, molecular orbital theory of bonding (polyatomic molecules and transition metals), solid state chemistry, energetics and spectroscopy of inorganic compounds. GE credit: SE. Effective: 2016 Fall Quarter.

CHE 124B—Inorganic Chemistry: Main Group Elements (3)
Lecture—3 hours. Prerequisite(s): CHE 124A Synthesis, structure and reactivity of inorganic and heteroorganic
molecules containing the main group elements. Effective: 1997 Winter Quarter.

CHE 124C—Inorganic Chemistry: d and f Block Elements (3)
Lecture—3 hours. Prerequisite(s): CHE 124A Synthesis, structure and reactivity of transition metal complexes,
organometallic and bioinorganic chemistry, the lanthanides and actinides. Effective: 1997 Winter Quarter.

CHE 124L—Laboratory Methods in Inorganic Chemistry (2)
Laboratory—6 hours. Prerequisite(s): CHE 124B or CHE 124C (can be concurrent) The preparation, purification and characterization of main group and
transition metal inorganic and organometallic compounds. Effective: 2000 Spring Quarter.

CHE 125—Advanced Methods in Physical Chemistry (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): CHE 110C (can be concurrent); CHE 115 Advanced theory and laboratory techniques in analytical and physical chemistry. Advanced spectroscopic methods. Thermodynamics. Kinetics.
Chemical literature. Digital electronics and computer interfacing. Laboratory measurements and vacuum techniques. GE credit: QL, SE, WE. Effective: 2000 Spring Quarter.

CHE 128A—Organic Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 002C C or better or CHE 002CH C or better Introduction to the basic concepts of organic chemistry with emphasis on stereochemistry and the chemistry of hydrocarbons. Designed primarily for majors in chemistry. Chemistry majors should enroll in course 129A concurrently. Only two units credit allowed for students who have completed CHE 008A; not open for credit to students who have completed courses CHE 008B or 118A. GE credit: SE. Effective: 2017 Winter Quarter.

CHE 128B—Organic Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 128A; or Consent of Instructor. Continuation of course 128A with emphasis on the chemistry of alcohols, ethers, their sulfur analogs, and carbonyl compounds. Introduction to the application of spectroscopic methods to organic chemistry. Introduction to synthesis of moderately complex organic molecules. Full credit to students who completed CHE 008B or CHE 118A; not open for credit to students who have completed CHE 118B. GE credit: SE. Effective: 2017 Winter Quarter.

CHE 128C—Organic Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 128B Continuation of course 128B with emphasis on enolate condensations and the chemistry of amines, phenols, and sugars; selected biologically important compounds. Full credit to students who completed CHE 118B; Not open for credit to students who have completed CHE 118C. GE credit: SE. Effective: 2017 Winter Quarter.

CHE 129A—Organic Chemistry Laboratory (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): (CHE 002C C or better or CHE 002CH C or better); CHE 128A (can be concurrent) Introduction to laboratory techniques of organic chemistry. Emphasis on methods used for separation and purification of organic compounds. Full credit to students who completed CHE 008B; not open for credit to students who have completed CHE 118B. GE credit: SE. Effective: 2017 Winter Quarter.

CHE 129B—Organic Chemistry Laboratory (2)
Laboratory—6 hours. Prerequisite(s): CHE 129A; CHE 128B (can be concurrent) Continuation of course 129A. Emphasis on methods used for synthesis and isolation of organic compounds. Not open for credit to students who have completed CHE 118C. GE credit: SE. Effective: 2017 Winter Quarter.

CHE 129C—Organic Chemistry Laboratory (2)
Laboratory—6 hours. Prerequisite(s): CHE 128C (can be concurrent); CHE 129B continuation of course 129B Effective: 1997 Winter Quarter.

CHE 130A—Pharmaceutical Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 118C or CHE 128C Examination of the design principles and experimental methods used in pharmaceutical and medicinal chemistry. Effective: 2006 Fall Quarter.

CHE 130B—Pharmaceutical Chemistry (3)
Lecture—2 hours; Lecture/Lab—1 hour. Prerequisite(s): CHE 130A (can be concurrent) Continuation of course 130A with emphasis on case studies of various drugs and the use of computational methods in drug design. Effective: 2017 Spring Quarter.

CHE 130C—Case Studies in Pharmaceutical Chemistry (1)
Independent Study; Seminar—2 hours. Prerequisite(s): CHE 130A (can be concurrent); CHE 130B (can be concurrent) Seminar. Exploration of medicinal and pharmaceutical chemistry topics through seminars presented by professional chemists (and allied professionals). Designed to highlight career opportunities for students with a degree in pharmaceutical chemistry. (P/NP grading only.) Effective: 2017 Spring Quarter.

CHE 131—Modern Methods of Organic Synthesis (3)
Lecture—3 hours. Prerequisite(s): CHE 128C or CHE 118C Introduction to modern synthetic methodology in organic chemistry with emphasis on retrosynthetic analysis, reaction mechanisms, and application to multistep syntheses of pharmaceuticals and natural products. GE credit: SE. Effective: 2016 Fall Quarter.

CHE 135—Advanced Bio-organic Chemistry Laboratory (3)
Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): CHE 130B (can be concurrent) Separation, purification, identification and biological evaluation of organic compounds using modern methods of synthesis, computational chemistry and instrumentation. Emphasis on pharmaceutical and medicinal substances. Effective: 2017 Fall Quarter.

CHE 145—Good Quality Practices (3)
Discussion—1 hour; Laboratory—6 hours. Prerequisite(s): CHE 118B or CHE 129B Open to Chemistry and science majors. Preparation for work in GQP laboratories in both research and industry. Context within GQP-Good Quality Practices (GMP Good Manufacturing Practice, GCP Good Clinical Practices). Lab practice in GQP skills. GE credit: SE. Effective: 2016 Winter Quarter.

CHE 150—Chemistry of Natural Products (3)
Lecture—3 hours. Prerequisite(s): CHE 118C or CHE 128C Chemistry of terpenes, steroids, acetogenins, and alkaloids: isolation, structure determination, biosynthesis, chemical transformations, and total synthesis. GE credit: SE. Effective: 2017 Winter Quarter.

CHE 192—Internship in Chemistry (1-6)
Internship—3-18 hours. Prerequisite(s): Upper division standing; project approval by faculty sponsor prior to enrollment. Supervised internship in chemistry; requires a final written report. May be repeated up to 6 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

CHE 194HA—Undergraduate Honors Research (2)
Independent Study—2 hours. Prerequisite(s): Open only to chemistry majors who have completed 135 units and who qualify for the honors program. Original research under the guidance of a faculty advisor, culminating in the writing of an extensive report. Effective: 1997 Winter Quarter.

CHE 194HB—Undergraduate Honors Research (2)
Independent Study—2 hours. Prerequisite(s): Open only to chemistry majors who have completed 135 units and who qualify for the honors program. Original research under the guidance of a faculty advisor, culminating in the writing of an extensive report. Effective: 1997 Winter Quarter.

CHE 194HC—Undergraduate Honors Research (2)
Independent Study—2 hours. Prerequisite(s): Open only to chemistry majors who have completed 135 units and who qualify for the honors program. Original research under the guidance of a faculty advisor, culminating in the writing of an extensive report. Effective: 2005 Fall Quarter.

CHE 195—Careers in Chemistry (1)
Seminar—2 hours. Prerequisite(s): Junior or senior standing in Chemistry. Designed to give Chemistry undergraduate students an in-depth appreciation of career opportunities with a bachelors degree in chemistry. Professional chemists (and allied professionals) describe research and provide career insights. (P/NP grading only.) Effective: 2001 Fall Quarter.

CHE 197—Projects in Chemical Education (1-4)
Discussion/Laboratory. Prerequisite(s): Consent of Instructor. Participation may include development of laboratory experiments, lecture demonstrations, autotutorial modules or assistance with laboratory sessions. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

CHE 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of instructor based upon adequate preparation in chemistry, mathematics and physics. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHE 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of instructor based upon adequate preparation in chemistry, mathematics, and physics. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHE 201—Chemical Uses of Symmetry and Group Theory (3)
Lecture—3 hours. Prerequisite(s): CHE 124A; CHE 110B; or Consent of Instructor. Symmetry elements and operations, point groups, representations of
groups. Applications to molecular orbital theory, ligand field theory, molecular vibrations, and angular momentum. Crystallographic symmetry. Effective: 1997 Winter Quarter.

CHE 204—Mathematical Methods in Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 110C Graduate standing in Chemistry. Introduction to mathematical and numerical methods in chemistry. Real and complex functions. Methods of integration. Differential equations. Linear algebra and matrices. Special functions. Integral transforms. Statistics. Effective: 2005 Fall Quarter.

CHE 205—Symmetry, Spectroscopy, and Structure (3)
Lecture—3 hours. Prerequisite(s): CHE 201; Or equivalent. Vibrational and rotational spectra; electronic spectra and photoelectron spectroscopy; magnetism; electron spin and nuclear quadrapole resonance spectroscopy; nuclear magnetic resonance spectroscopy; other spectroscopic methods. Effective: 1997 Winter Quarter.

CHE 209—Special Topics in Physical Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 210A; CHE 211A Graduate standing in Chemistry. Advanced topics in physical chemistry, biophysical chemistry or chemical physics chosen from areas of current research interest. May be repeated for credit when topics differ. Effective: 2005 Fall Quarter.

CHE 210A—Quantum Chemistry: Introduction and Stationary-State Properties (3)
Lecture—3 hours. Prerequisite(s): CHE 110B; CHE 110C; or Consent of Instructor. Stationary-state quantum chemistry: postulates of quantum mechanics,
simple solutions, central field problems and angular momenta, hydrogen atom, perturbation theory, variational theory, atoms and molecules. Effective: 1997 Winter Quarter.

CHE 210B—Quantum Chemistry: Time-Dependent Systems (3)
Lecture—3 hours. Prerequisite(s): CHE 210A Matrix mechanics and time-dependent quantum chemistry: matrix formulation of quantum mechanics, Heisenberg representation, time-dependent perturbation theory, selection rules, density matrices, and miscellaneous molecular properties. Effective: 1997 Winter Quarter.

CHE 210C—Quantum Chemistry: Molecular Spectroscopy (3)
Lecture—3 hours. Prerequisite(s): CHE 210B Molecular spectroscopy: Born-Oppenheimer approximation, rotational, vibrational and electronic spectroscopy, spin systems, and molecular photophysics. Effective: 1997 Winter Quarter.

CHE 211A—Advanced Physical Chemistry: Statistical Thermodynamics (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Principles and applications of statistical mechanics; ensemble theory; statistical thermodynamics of gases, solids, liquids, electrolyte solutions and polymers; chemical equilibrium. Effective: 1997 Winter Quarter.

CHE 211B—Statistical Mechanics (3)
Lecture—3 hours. Prerequisite(s): CHE 211A Statistical mechanics of nonequilibrium systems, including the rigorous kinetic theory of gases, continuum mechanics transport in dense fluids, stochastic processes, brownian motion and linear response theory. Effective: 1997 Winter Quarter.

CHE 212—Chemical Dynamics (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Introduction to modern concepts in chemical reaction dynamics for graduate students in chemistry. Emphasis will be placed on experimental techniques as well as emerging physical models for characterizing chemical reactivity at a microscopic level. Effective: 1997 Winter Quarter.

CHE 215—Theoretical and Computational Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 211A; CHE 210B; or Consent of Instructor. Mathematics of wide utility in chemistry, computational methods for guidance or alternative to experiment, and modern formulations of chemical theory. Emphasis will vary in successive years. May be repeated for credit. Effective: 1997 Winter Quarter.

CHE 216—Magnetic Resonance Spectroscopy (3)
Lecture—3 hours. Prerequisite(s): CHE 210A; CHE 210B (can be concurrent) Quantum mechanics of spin and orbital angular momentum, nuclear magnetic resonance, theory of chemical shift and multiplet structures, electron spin resonance, theory of gtensor in organic and transition ions, spin Hamiltonians, nuclear quadrupolar resonance, spin relaxation processes. Effective: 1997 Winter Quarter.

CHE 217—X-Ray Structure Determination (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Introduction to x-ray structure determination; crystals, symmetry, diffraction geometry, sample preparation and handling, diffraction apparatus and data collection, methods of structure solution and refinement, presentation of results, text, tables and graphics,
crystallographic literature. Effective: 1997 Winter Quarter.

CHE 218—Macromolecules: Physical Principles (3)
Lecture—3 hours. Prerequisite(s): CHE 110A; CHE 110B; CHE 110C; Or equivalent. Relationship of higher order macromolecular structure to subunit composition; equilibrium properties and macromolecular dynamics; physical chemical determination of macromolecular structure. Effective: 2001 Winter Quarter.

CHE 219—Spectroscopy of Organic Compounds (4)
Laboratory—2.5 hours; Lecture—3 hours. Prerequisite(s): CHE 128C; Or equivalent. Identification of organic compounds and investigation of stereochemical and reaction mechanism phenomena using spectroscopic methods--principally NMR, IR and MS. Effective: 2006 Fall Quarter.

CHE 219L—Laboratory in Spectroscopy of Organic Compounds (1)
Laboratory—2.5 hours. Prerequisite(s): CHE 219 (can be concurrent) Restricted to Chemistry graduate students only or consent of instructor Practical application of NMR, IR and MS techniques for organic molecules. Effective: 2009 Summer Session 1.

CHE 221A—Special Topics in Organic Chemistry (3)
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. Effective: 1997 Winter Quarter.

CHE 221B—Special Topics in Organic Chemistry (3)
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. Effective: 1997 Winter Quarter.

CHE 221C—Special Topics in Organic Chemistry (3)
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. Effective: 1997 Winter Quarter.

CHE 221D—Special Topics in Organic Chemistry (3)
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. Effective: 1997 Winter Quarter.

CHE 221E—Special Topics in Organic Chemistry (3)
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. Effective: 1997 Winter Quarter.

CHE 221F—Special Topics in Organic Chemistry (3)
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. Effective: 1997 Winter Quarter.

CHE 221G—Special Topics in Organic Chemistry (3)
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. Effective: 1997 Winter Quarter.

CHE 221H—Special Topics in Organic Chemistry (3)
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. Effective: 1997 Winter Quarter.

CHE 222—Chemistry of Nanoparticles (3)
Lecture/Discussion—3 hours. Prerequisite(s): CHE 110C; Or equivalent. Chemical and physical aspects of inorganic nanoparticles, including synthesis, purification, reactivity, characterization, and applications for technology. Emphasis is on problems from the current literature. Not open for credit to students who have taken CHE 122. Effective: 2009 Winter Quarter.

CHE 226—Principles of Transition Metal Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 124A; or equivalent. Electronic structures, bonding, and reactivity of transition metal compounds. Effective: 1997 Winter Quarter.

CHE 228A—Bio-inorganic Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 226; or Consent of Instructor. Defines role of inorganic chemistry in the functioning of biological systems by identifying the functions of metal ions and main group compounds in biological systems and discussing the chemistry of model and isolated biological compounds. Offered every third year. Effective: 1997 Winter Quarter.

CHE 228B—Main Group Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 226; or Consent of Instructor. Synthesis, physical properties, reactions and bonding of main group compounds. Discussions of concepts of electron deficiency, hypervalency,
and non-classical bonding. Chemistry of the main group elements will be treated systematically. Offered every third year. Effective: 1997 Winter Quarter.

CHE 228C—Solid-State Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 124A; CHE 110B; CHE 226; Or equivalent. Design and synthesis, structure and bonding of solid-state compounds; physical properties and characterization of solids; topics of current interest such as low-dimensional materials, inorganic polymers, materials for catalysis. Offered every third year. Effective: 1997 Winter Quarter.

CHE 228D—Homogeneous Catalysis (3)
Lecture—3 hours. Prerequisite(s): CHE 226 Overview of homogeneous catalysis and related methods, with emphasis on kinetics, mechanisms, and applications for organic synthesis. The related methods may include cluster, colloid, phase transfer, enzymatic, heterogeneous and polymer-supported catalysis. Offered every third year. Effective: 2001 Fall Quarter.

CHE 228E—Magnetochemistry (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): CHE 124A or CHE 201; Or an equivalent class from either Physics or Chemical Engineering and Materials Science. Covers the basic principles and concepts of magnetism, methods used for characterization of magnetic properties, as well as specific state-of-the-art magnetic materials and topics from the recent chemistry literature. Effective: 2016 Winter Quarter.

CHE 231A—Organic Synthesis: Methods and Strategies (4)
Discussion/Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 128C; Or equivalent. Current strategies and methods in synthetic organic chemistry. Focus on construction of carbon frameworks, control of relative and absolute stereochemistry and retrosynthetic strategies. Use of databases and molecular modeling software in multistep strategies. Effective: 2017 Winter Quarter.

CHE 231B—Advanced Organic Synthesis (3)
Lecture—3 hours. Prerequisite(s): CHE 231A Current strategies and methods in synthetic organic chemistry. Continuation of course 231A. Organic synthesis of complex target molecules. Stereochemical considerations and asymmetric synthesis. Organometallics for selective transformations. Carbocyclic and heterocyclic ring formation. Effective: 2016 Fall Quarter.

CHE 233—Physical-Organic Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 128A; CHE 128B; CHE 128C; CHE 110A; CHE 110B; CHE 110C; Or equivalent. Introduction to elementary concepts in physicalorganic chemistry including the application of simple numerical techniques in characterizing and modeling organic reactions. Effective: 1997 Winter Quarter.

CHE 235—Organometallic Chemistry in Organic Synthesis (3)
Lecture—3 hours. Prerequisite(s): CHE 128C Current trends in use of organometallics for organic synthesis; preparations, properties, applications, and limitations of organometallic reagents derived from transition and/or main group metals. Effective: 1997 Winter Quarter.

CHE 236—Chemistry of Natural Products (3)
Lecture—3 hours. Prerequisite(s): CHE 128C; Or equivalent. Advanced treatment of chemistry of naturally occurring compounds isolated from a variety of sources. Topics will include isolation, structure determination, chemical transformations, total synthesis,
biological activity, and biosynthesis. Biosynthetic origin will be used as a unifying theme. Effective: 1997 Winter Quarter.

CHE 237—Bio-organic Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 128C; Or equivalent. Structure and function of biomolecules; molecular recognition; enzyme reaction mechanisms; design of suicide substrates for enzymes; enzyme engineering; design of artificial enzymes and application of enzymes in organic synthesis. Effective: 1997 Winter Quarter.

CHE 238—Introduction to Chemical Biology (3)
Lecture—3 hours. Prerequisite(s): CHE 118C or CHE 128C; Or equivalent; CHE 130A, CHE 130B and BIS 102, BIS 103, and BIS 104, or the equivalents recommended. Synthesis of complex molecules in nature. Use of biosynthetic pathways in synthesis of new chemical entities. Applications of small molecules in chemical genetics and structural biology. Solving biological problems using synthetic biomolecules. Effective: 2009 Winter Quarter.

CHE 240—Advanced Analytical Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 110A; CHE 115; Or equivalent. Numerical treatment of experimental data; thermodynamics of electrolyte and non-electrolyte solutions; complex equilibria in aqueous and non-aqueous solutions; potentiometry and specific ion electrodes; mass transfer in liquid solutions; fundamentals of separation science, including column, gas and liquid chromatography. Effective: 1997 Winter Quarter.

CHE 241A—Surface Analytical Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 110C; Or equivalent. Concepts of surfaces and interfaces: physical properties, unique chemistry and electronic effects. Focus on gas-solid interfaces, with some discussion of liquid-solid interfaces. Effective: 2002 Fall Quarter.

CHE 241B—Laser and X-ray Spectroscopy (3)
Lecture—3 hours. Prerequisite(s): CHE 110B; Or equivalent. Concepts and mechanisms of light-matter interactions. Chemical applications of modern spectroscopic methods, including multiphoton spectroscopy, time-resolved laser and x-ray photolysis, and phase-contrast x-ray imaging. Effective: 2002 Fall Quarter.

CHE 241C—Mass Spectrometry (3)
Lecture—3 hours. Prerequisite(s): CHE 110C; CHE 115; Or equivalent. Mass spectrometry and related methods with emphasis on ionization methods, mass analyzers, and detectors. Related methods may include ion-molecule reactions, unimolecular dissociation of organic and bio-organic compounds, and applications in biological and environmental analysis. Effective: 2002 Winter Quarter.

CHE 241D—Electroanalytical Chemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 110C; CHE 115; Or equivalent. Electroanalytical chemistry with consideration of mass transfer and electrode kinetics for polarizable electrodes. Current-potential curves for a variety of conditions, including both potentiostatic and galvanostatic control, and their application in chemical analysis. Effective: 2002 Winter Quarter.

CHE 241E— Microscopy and Imaging Techniques (3)
Lecture—3 hours. Prerequisite(s): CHE 110C; CHE 115; Or equivalent. Introduction to modern microscopy and imaging techniques: scanning tunneling, atomic force, far-field optical, fluorescence, scanning near-field optical, and scanning electron microscopy. Application to nanoscience and analytical and bioanalytical chemistry. Some laboratory demonstrations. Effective: 2002 Fall Quarter.

CHE 245—Mechanistic Enzymology (3)
Lecture—3 hours. Advanced topics in chemical kinetics relevant to enzymes, enzyme kinetics, theory of enzyme catalysis, and the analysis of a selection of organic enzyme reaction mechanisms by the tools introduced in the first part of the course. Effective: 2013 Fall Quarter.

CHE 261—Current Topics in Chemical Research (2)
Lecture—2 hours. Prerequisite(s): Graduate standing in Chemistry or consent of instructor. Designed to help chemistry graduate students develop and maintain
familiarity with the current and past literature in their immediate field of research and related areas. May be repeated for credit when topics differ. Effective: 1997 Winter Quarter.

CHE 263—Introduction to Chemical Research Methodology (3)
Discussion/Laboratory—9 hours. Prerequisite(s): CHE 293; and Consent of Instructor. Graduate student standing in Chemistry. Introduction to identification, formulation, and solution of meaningful
scientific problems including experimental design and/or theoretical analyses of new and prevailing techniques, theories and hypotheses. May be repeated for credit when topic differs. (S/U grading only.) Effective: 1997 Winter Quarter.

CHE 264—Advanced Chemical Research Methodology (6)
Discussion/Laboratory—18 hours. Prerequisite(s): CHE 263; or Consent of Instructor. Applications of the methodology developed in course 263 to experimental and theoretical studies. Advanced methods of interpretation of results are developed. Includes the preparation of manuscripts for publication. May be repeated for credit for credit when topic differs. (S/U grading only.) Effective: 1997 Winter Quarter.

CHE 290—Seminar (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

CHE 293—Introduction to Chemistry Research (1)
Discussion—2 hours. Designed for incoming graduate students preparing for higher degrees in chemistry. Group and individual discussion of research activities in the Department and research topic selection. (S/U grading only.) Effective: 1997 Winter Quarter.

CHE 294—Presentation of Chemistry Research (1)
Seminar—2 hours. Prerequisite(s): Graduate standing. Restricted to graduate students in Chemistry who have not yet given their departmental presentation. Introduces first- and second-year Chemistry graduate students to the process of giving an effective research presentation. Advanced Ph.D. students give formal seminars describing the design and execution of their research projects. May be repeated up to 3 time(s). (S/U grading only.) Effective: 2009 Winter Quarter.

CHE 295—Careers in Chemistry (1)
Seminar—2 hours. Prerequisite(s): Graduate standing in Chemistry. Designed to give Chemistry graduate students an in-depth appreciation of career opportunities with a M.S. or Ph.D. degree in chemistry. Professional chemists (and allied professionals) give seminars describing both research and career insights. May be repeated up to 3 time(s). (S/U grading only.) Effective: 2001 Fall Quarter.

CHE 296—Research in Pharmaceutical Chemistry (6)
Laboratory—18 hours. Prerequisite(s): CHE 130A; CHE 130B; CHE 135; CHE 233 (can be concurrent); and Consent of Instructor. Restricted to students in the Integrated B.S./M.S. Program in Chemistry. Laboratory provides qualified graduate students with the opportunity to pursue original investigation in Pharmaceutical Chemistry and allied fields in order to fulfill the letter-graded research requirement of the Integrated B.S./M.S. Program in Chemistry (Pharmaceutical Chemistry Emphasis). May be repeated up to 3 time(s) when topic differs. Effective: 2009 Fall Quarter.

CHE 298—Group Study (1-5)
Variable. Effective: 1997 Winter Quarter.

CHE 299—Research (1-12)
Variable. The laboratory is open to qualified graduate students who wish to pursue original investigation. Students wishing to enroll should communicate with the department well in advance of the quarter in which the work is to be undertaken. (S/U grading only.) Effective: 1997 Winter Quarter.

CHE 390—Methods of Teaching Chemistry (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): Consent of Instructor. Graduate student standing in Chemistry. Practical experience in methods and problems of teaching chemistry. Includes analyses of texts and supporting material, discussion of teaching techniques, preparing for and conducting of discussion sessions and student laboratories. Participation in the teaching program required for Ph.D. in chemistry. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

CHE 392—Advanced Methods of Teaching Chemistry (2)
Lecture—2 hours. Prerequisite(s): CHE 390 Advanced topics in teaching chemistry. Analysis and discussion of curricular design, curricula materials, teaching methods and evaluation. For students who are planning a career in teaching chemistry. (S/U grading only.) Effective: 1997 Winter Quarter.

CHI Chicano Studies

Courses in CHI:

CHI 010—Introduction to Chicana/o Studies (4)
Discussion—1 hour; Lecture—3 hours. Analysis of the situation of the Chicana/o (Mexican-American) people, emphasizing their history, literature, political movements, education and related areas. GE credit: ACGH, AH, DD, OL, SS, WE. Effective: 1997 Winter Quarter.

CHI 021—Chicana/o and Latina/o Health Care Issues (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHI 010 Overview of health issues of Chicanas/os and Latinas/os in the State of California; role of poverty/lack of education in limited access to health care. GE credit: OL, WE. Effective: 1997 Winter Quarter.

CHI 021S—Chicana/o and Latina/o Health Care Issues (4)
Lecture—4 hours. Prerequisite(s): SPA 003 or SPA 003V or SPA 003Y; Or equivalent. Overview of health issues of Chicanas/os and Latinas/os in the State of California; role of poverty/lack of education and limited access to health care. All course instruction for this course will be in Spanish. This course is taught abroad. Not open for credit to students who have completed CHI 021. GE credit: OL, WC, WE. Effective: 2018 Spring Quarter.

CHI 023—Qualitative Research Methods (4)
Discussion—1 hour; Lecture/Discussion—3 hours. Dominant models of qualitative inquiry in educational and social science research as well as mestizo approaches to research with latinos. Emphasis given to choosing and designing culturally appropriate strategies to investigate latino health, education, social context, and policy issues. GE credit: AH, OL, SS, WE. Effective: 2005 Spring Quarter.

CHI 030—United States Political Institutions and Chicanas/ os (4)
Discussion/Laboratory—3 hours; Term Paper. Overview of the major political institutions and ideologies of the United States and the Chicana/o people's historical and contemporary role in, effects from, and responses to them. Theory, method and critical analysis. GE credit: ACGH, DD, OL, SS, WE. Effective: 1997 Winter Quarter.

CHI 040—Comparative Health: Top Leading Causes of Death (4)
Discussion—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): STA 013 or STA 013Y; or Consent of Instructor. Introduction to the epidemiology of the leading causes of death for ethnic/racial minorities. Assessment of disproportionate rates at which ethnic/racial minorities suffer and die from chronic and infectious diseases and injuries and statistical methods used to calculate these rates. Not open for credit to students who have completed CHI 040S. GE credit: QL, SE, WE. Effective: 2018 Spring Quarter.

CHI 040S—Comparative Health: Leading Causes of Death (4)
Lecture—4 hours. Prerequisite(s): STA 013 or STA 013Y; or Consent of Instructor. Introduction to epidemiology of leading causes of death for ethnic/racial minorities. Assessment of disproportionate rates at which ethnic/racial minorities suffer & die from chronic and infectious diseases & injuries & statistical methods used to calculate these rates. Offered abroad. Not open for credit to students who have completed CHI 040. GE credit: QL, SE, WC, WE. Effective: 2018 Spring Quarter.

CHI 050—Chicana and Chicano Culture (4)
Discussion—1 hour; Lecture—3 hours. Interdisciplinary survey of Chicana/o cultural representation in the 20th century. Examines Chicana/o culture within a national and transnational context. Explores how Chicano cultural forms and practices intersect with social/material forces, intellectual formations and cultural discourses. (Former course 20.) GE credit: ACGH, AH, DD, WC, WE. Effective: 1997 Winter Quarter.

CHI 060—Chicana and Chicano Representation in Cinema (4)
Discussion—1 hour; Film Viewing—2 hours; Lecture—3 hours. Introductory-level study of Chicana and Chicano representation in cinema. Depiction of Chicana and Chicano experience by Chicana/o filmmakers, as well as by non-Chicanos, including independent filmmakers and the commercial industry. GE credit: ACGH, AH, DD, VL, WE. Effective: 2005 Spring Quarter.

CHI 065—New Latin American Cinema (4)
Discussion—1 hour; Film Viewing—3 hours; Lecture/Discussion—2 hours. Historical, critical, and theoretical survey of the cinemas of Latin America and their relationship to the emergence of U.S. Latino cinema. Emphasis on representation and social identity including gender, sexuality, class, race and ethnicity GE credit: AH, VL, WC, WE. Effective: 2005 Spring Quarter.

CHI 070—Survey of Chicana/ o Art (4)
Lecture—4 hours. Survey of contemporary Chicana/o art in context of the social turmoil from which it springs. Includes political use of the poster and the mural, the influence of the Mexican mural and graphic movement, and social responsibility of the artist. GE credit: ACGH, AH, DD, VL, WC, WE. Effective: 1997 Winter Quarter.

CHI 073—Chicana/ o Art Expression Through Silk Screen (4)
Laboratory—4 hours; Studio—8 hours. Introductory level studio course using silk screen and basic printing
techniques to explore and develop images of Chicana/o cultural themes and expressions. Students will experiment with images and symbols from
their immediate environment/culture. Integrated approach to Chicana/o philosophy of art. GE credit: ACGH, AH, DD, OL, VL, WC. Effective: 1997 Winter Quarter.

CHI 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): CHI 010; or Consent of Instructor. Academic guidance combined with internship in community agencies serving Mexican/Latina/Latino/Chicana/Chicano clients. Students will use their bilingual skills and knowledge of history, culture, economics, politics and social issues. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2004 Fall Quarter.

CHI 098—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHI 099—Special Study for Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHI 100—Chicana/ Chicano Theoretical Perspective (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): CHI 010; CHI 050 Critical examination of emerging Chicana/o Studies theoretical perspectives in light of contemporary intellectual frameworks in the social sciences, arts, and humanities. Includes analysis of practices of self-representation, and socio-cultural developments in the Chicana/o community. GE credit: ACGH, DD, SS, WC, WE. Effective: 1997 Winter Quarter.

CHI 110—Sociology of the Chicana/o Experience (4)
Lecture/Discussion—4 hours. Prerequisite(s): CHI 010 or SOC 001 The Chicana/o experience in the American society and economy viewed from theoretical perspectives. Immigration, history of integration of Chicana/o labor into American class structure, education inequality, ethnicity, the family and Chicana/o politics. (Former course Sociology 110.) GE credit: ACGH, DD, OL, SS, WE. Effective: 1997 Winter Quarter.

CHI 111—Chicanas/Mexicanas in Contemporary Society (4)
Lecture/Discussion—4 hours. Prerequisite(s): CHI 010 or CHI 050; (WMS 050 or HIS 169B) Analysis of the role and status of Chicanas/Mexicanas in contemporary society. Special emphasis on their historical role, the political, economic and social institutions that have affected their status, and their contributions to society and their community. (Former course 102.) GE credit: ACGH, DD, SS, WE. Effective: 1997 Winter Quarter.

CHI 112—Globalization, Transnational Migration, and Chicana/o and Latina/o Communities (4)
Lecture—4 hours. Prerequisite(s): CHI 010 Chicana/o and Latina/o migration experiences within a global context. Topics include national and/or transnational migration in Mexico, Central America, and the United States. GE credit: ACGH, DD, OL, SS, WE. Effective: 2005 Winter Quarter.

CHI 113—Latin American Women's Engagement in Social Movements (4)
Lecture/Discussion—3 hours; Term Paper. Examination of how women of different racial/ethnic and class backgrounds in Latin America challenge their marginalization. Exploration of US foreign policy, its effects on Latin American's institutions and on Latin American citizens. Using Chicana feminist perspective. GE credit: ACGH, DD, SS, WC, WE. Effective: 2013 Fall Quarter.

CHI 114—Women of Color Reproductive Health and Reproductive Politics in a Global Perspective (4)
Lecture/Discussion—3 hours; Term Paper. Study contemporary issues in reproductive health and reproductive politics, both globally and in the U.S., for women of color. GE credit: ACGH, DD, SS, WC, WE. Effective: 2013 Fall Quarter.

CHI 114S—Women of Color Reproductive Health and Gender Politics in Cuba and the US (4)
Lecture/Discussion—3 hours; Term Paper. Study of contemporary issues in reproductive health, reproductive politics, and gender politics both in Cuba and in the U.S., for women of color. GE credit: ACGH, DD, SS, WC, WE. Effective: 2015 Spring Quarter.

CHI 120—Chicana/ o Psychology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHI 021; Introductory psychology course recommended. Introduction to the field of Chicana/o psychology. Analysis of socio-cultural context of Chicanas/os and Latinas/os. Special attention to issues of ethnic identity development, bilingualism, and development of self esteem. Impact of minority experience, migration, acculturation are examined. GE credit: ACGH, DD, OL, SS, WE. Effective: 1997 Winter Quarter.

CHI 121—Chicana/ o Community Mental Health (4)
Lecture—3 hours; Term Paper. Prerequisite(s): CHI 010; or CHI 020. Mental health needs, problems, and service utilization patterns of Chicanas/os and Latinas/os will be analyzed. An analysis of social service policy, and the economic context of mental health programs. GE credit: ACGH, DD, OL, SS, WE. Effective: 1997 Winter Quarter.

CHI 122—Psychology Perspectives Chicana/o and Latina/o Family (4)
Lecture—4 hours. Prerequisite(s): CHI 010; and Consent of Instructor. Introductory psychology course highly recommended. Role of migration and acculturation on family structure and functioning. From a psychological and Chicana/o Studies perspective, contemporary gender roles and variations in family structures are examined. Special topics include family violence, addiction, family resilience and coping
strategies. GE credit: SS, WE. Effective: 1997 Winter Quarter.

CHI 122S—Psychology Perspectives Chicana/o and Latina/o Family (4)
Lecture—4 hours. Role of migration and acculturation on family structure and functioning. From a psychological and Chicana/o Studies perspective, contemporary gender roles and variations in family structures are examined. Special topics include family violence, addiction, family resilience and coping strategies. This course is taught abroad. Not open for credit to students who have completed CHI 122. GE credit: OL, SS, WC, WE. Effective: 2006 Spring Quarter.

CHI 123—Psychological perspectives on Chicana/o and Latina/o Children and Adolescents (4)
Lecture—3 hours; Term Paper. Prerequisite(s): CHI 010 or CHI 021 Restricted to upper division standing. Psychological and educational development of Chicano/Latino children and adolescents, with particular attention to the formation of ethnic, gender, class, race, and sexual identities. GE credit: ACGH, DD, OL, SS, WE. Effective: 2005 Spring Quarter.

CHI 125S—Latino Families in the Age of Globalization: Migration and Transculturation (4)
Lecture/Discussion—4 hours. Prerequisite(s): SPA 003 or the equivalent highly recommended. Impact of globalization on Latino families in the American continent. Relationships of political structure, economics and family. Intimate partner violence, child maltreatment and alcohol/drug abuse in contemporary Latino families. Offered in a Spanish speaking country GE credit: OL, SS, WC, WE. Effective: 2007 Spring Quarter.

CHI 130—United States-Mexican Border Relations (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Upper division standing. Theories of U.S.-Mexican border relations, with an overview of the political, economic, and social relationships and an in-depth
analysis of immigration issues, border industrialization, women's organizations, economic crises, and legal issues. GE credit: ACGH, DD, SS, WE. Effective: 1997 Winter Quarter.

CHI 131—Chicanas in Politics and Public Policy (4)
Lecture/Discussion—4 hours. Prerequisite(s): CHI 030 or POL 001 Historical and political analysis of Chicana/Latina political involvement and activities in the general political system, women's movement, Chicano movement, and Chicana movement. Course also examines the public policy process and the relationship of Chicanas/Latinas to public policy formation. GE credit: ACGH, DD, OL, SS, WE. Effective: 1997 Winter Quarter.

CHI 131S—Chicanas in Politics and Public Policy (4)
Lecture/Discussion—4 hours. Historical and political analysis of Chican/Latina political involvement and activities in the general political system, women's movement, Chicano/a movement. Course also examines the public policy process and the relationship of Chicanas/Latinas to public policy formation. Offered Abroad. Not open for credit to students who have completed CHE 131. GE credit: OL, SS, WC, WE. Effective: 2006 Spring Quarter.

CHI 132—Political Economy of Chicana/o Communities (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Upper division standing; lower division Chicana/o Studies course recommended. Historical and contemporary study of political and economic forces which define and influence the development of Chicana/o communities. Includes critiques of traditional and Marxian theories and concepts applicable to Chicana/o communities, case studies of Chicana/o communities,especially in California and Texas. GE credit: ACGH, DD, OL, WE. Effective: 1997 Winter Quarter.

CHI 135S—Transnational Latina/o Political Economy (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 003 or SPA 003V or SPA 003Y; or Consent of Instructor. Or equivalent; ECN 001A and ECN 001B recommended. Intensive reading, discussion and research on selected topics from Latin America and the US with regard to immigrant and native communities. Topics include comparative immigration and macroeconomic policies in the US and Latin America.Offered in a Spanish speaking country. GE credit: OL, WC, WE. Effective: 2018 Spring Quarter.

CHI 140A—Quantitative Methods: Chicano/Latino Health Research (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): Two years of high school algebra or the equivalent in college. Focuses on measuring Latino/Chicano health outcomes using a quantitative approach. Assesses main types of study designs and addresses measurement of disease frequency and health effects. GE credit: ACGH, DD, QL, SE. Effective: 2006 Spring Quarter.

CHI 141—Community-Based Participatory Research and Chicana/o and Latina/o Health (4)
Lecture/Discussion—3 hours; Term Paper. Overview of CBPR, as well as methodological CBPR considerations in building community partnerships, community assessment, issue analysis, research planning, data gathering, and data sharing with Chicana/o and Latina/o communities in particular. GE credit: DD, WE. Effective: 2015 Spring Quarter.

CHI 145S—Bi-National Health (5)
Lecture—5 hours. Prerequisite(s): BIS 001A; BIS 001B; BIS 001C; (SPA 021 or SPA 021V or SPA 021Y or SPA 031); or Consent of Instructor. Upper division standing only. Examination of health status and intervention strategies presented in public health care settings, private clinics and by indigenous healers in Mexico. Analysis of impact of high risk diseases. Offered in a Spanish speaking country under supervision of UC Davis faculty/lecturer GE credit: OL, WC, WE. Effective: 2018 Spring Quarter.

CHI 146S—Public Health in Latin America (5)
Lecture/Discussion—4 hours; Term Paper. Critical examination of emerging Public Health issues in Latin America in light of economic, political and social conditions. Contemporary behavioral frameworks used in public health. Includes analysis of clinical medicine and health care systems. Effective: 2011 Fall Quarter.

CHI 147S—Indigenous Healing and Biodiversity in Latin America (5)
Lecture—4 hours; Term Paper. Contrast between western and traditional healing practices in Latin America and the role of the natural environment in creating sustainable health delivery systems. Questions of health status attributable to public health and environmental risk factors. GE credit: OL, WC, WE. Effective: 2011 Fall Quarter.

CHI 150—The Chicana and Chicano Movement (4)
Lecture—3 hours; Term Paper. Development of the Chicano Movement within the context of the socio-political movements of the 1960’s in a national and global perspective. Ideological/political perspectives and the implications for political strategies. GE credit: ACGH, AH, DD, SS, WC, WE. Effective: 2005 Spring Quarter.

CHI 154—The Chicana/o Novel (4)
Lecture—4 hours. Prerequisite(s): Intermediate Spanish or consent of instructor. Introduction to the forms and themes of the Chicana/o novel with special attention to the construction of gender, nationality, sexuality, social class, and the family by contemporary Chicana/o novelists. Bilingual readings, lectures, discussions, and writing in Spanish.(Former course Spanish 126A.) GE credit: ACGH, AH, DD, OL, WC, WE. Effective: 1997 Winter Quarter.

CHI 155—Chicana/o Theater (4)
Lecture—4 hours. Prerequisite(s): Intermediate Spanish or consent of instructor. Examination of the formal and thematic dimensions of Chicana/o theater in the contemporary period with special emphasis on El Teatro Campesino and Chicana Feminist Theater. Bilingual readings, lectures, discussions, and writing in Spanish. (Former course Spanish 126B.) GE credit: ACGH, AH, DD, OL, VL, WC, WE. Effective: 1997 Winter Quarter.

CHI 156—Chicana/o Poetry (4)
Lecture—4 hours. Prerequisite(s): Intermediate Spanish or consent of instructor. Survey of Chicana/o poetry with special emphasis on its thematic and formal dimensions. Bilingual readings, lectures, discussions, and writing in Spanish. (Former course Spanish 126C.) GE credit: ACGH, AH, DD, OL, WC, WE. Effective: 1997 Winter Quarter.

CHI 157—Chicana and Chicano Narrative (4)
Lecture/Discussion—3 hours; Term Paper. Exploration of contemporary forms of the Chicana and Chicano narrative, encompassing visual art, fiction, poetry, film, theater, and creative nonfiction. Exposure to a variety of artists and scholars whose work shapes our evolving understanding of the Chicana/o experience GE credit: ACGH, AH, DD, VL, WC, WE. Effective: 2013 Fall Quarter.

CHI 160—Mexican Film and Greater Mexican Identity (4)
Film Viewing—1 hour; Lecture/Discussion—4 hours. Prerequisite(s): Intermediate Spanish. Survey of the role Mexican cinema plays in consolidation and contestation of post-revoluationary Mexican state and in the formation of a Greater Mexican cultural identity including Chicana/o identity. Showcases genres, perios, auteurs, movements and emphasis on gendered and sexualized narratives. GE credit: AH, VL, WC, WE. Effective: 2001 Winter Quarter.

CHI 161—Queer Latinidad (4)
Lecture/Discussion—3 hours; Term Paper/Discussion. Introduction to queer Latina and Latino studies with a focus on Chicana and Chicano theory and cultural production. GE credit: ACGH, AH, DD, SS, WE. Effective: 2015 Fall Quarter.

CHI 165—Chicanas, Latinas and Mexicanas in Commercial Media (4)
Laboratory—2 hours; Lecture/Discussion—4 hours. Prerequisite(s): CHI 060; Or other film or feminist theory course; conversational fluency in Spanish. The portrayal of Chicanas, Latinas and Mexicanas in commercial media. The relation between the representation of Chicana, Latina, and Mexicana women in commercial television and cinema and the role of women in Mexican and U.S. societies. GE credit: AH, VL, WC, WE. Effective: 1997 Fall Quarter.

CHI 170—Contemporary Issues in Chicano Art (4)
Lecture—4 hours. Issues and conflicts in the dismantling of the Contemporary Chicano Art Movement. Response and challenge to the dominant culture. GE credit: ACGH, AH, DD, VL, WC, WE. Effective: 2007 Winter Quarter.

CHI 171—Mexican and Chicano Mural Workshop (4)
Independent Study—1 hour; Studio—8 hours. Prerequisite(s): CHI 070; and Consent of Instructor. The Mural: a collective art process that empowers students and people through design and execution of mural paintings in the tradition of the Mexican Mural Movement; introduces materials and techniques. May be repeated up to 1 time(s). (ART 171.) GE credit: AH, VL. Effective: 1997 Winter Quarter.

CHI 172—Chicana/o Voice/Poster Silk Screen Workshop (4)
Independent Study—1 hour; Studio—8 hours. Prerequisite(s): CHI 070 or CHI 073; and Consent of Instructor. The poster as a voice art form used by Chicanas/os and other people of color to point to the defects of social and political existence and the possibility for change, from the Chicana/o artists' perspective. May be repeated up to 1 time(s). GE credit: AH, OL, VL, WC. Effective: 1997 Winter Quarter.

CHI 180—Grant Writing in the Chicana/o/Latina/o Community (4)
Lecture—4 hours. Prerequisite(s): CHI 010 or CHI 023; or Consent of Instructor. Upper division standing. Overview of key elements for grant writing. Topics include community needs assessments, development of human subjects protocols, data collection, methods, evaluation designs and community based methodologies for grant development applications in the Latino community. Effective: 2006 Spring Quarter.

CHI 181—Chicanas and Latinas in the U.S.: Historical Perspectives (4)
Lecture/Discussion—4 hours. Prerequisite(s): CHI 010 or WMS 050 Historical issues in the lives of Chicanas and Latinas in the U.S. and their diverse countries of origin. GE credit: ACGH, AH, DD, SS, WE. Effective: 2017 Fall Quarter.

CHI 182—Race and Juvenile Justice (4)
Lecture—4 hours. Prerequisite(s): CHI 010; Or equivalent. Individual and institutinal respnses to "troublesome" youth of color through history and in contemporary siciety. Emphasis on how race, as well as ethnicity, class, and gender have informed the treatment of "delinquent" youth. GE credit: ACGH, DD, OL, SS, WE. Effective: 2007 Winter Quarter.

CHI 184—Latino Youth Gangs in Global Perspective (4)
Lecture—3 hours; Term Paper. Comparative analysis of Latino youth gangs in Europe, Latin America, and the United States. Social, economic, political, and cultural factors leading to youth gangs as well as the responses are considered within a global perspective. Not open for credit to students who have completed CHI 184S. GE credit: ACGH, DD, OL, SS, WC, WE. Effective: 2013 Fall Quarter.

CHI 184S—Latino Youth Gangs in Global Perspective (4)
Lecture/Discussion—12 hours. Comparative analysis of Latino youth gangs in Europe, Latin America, and the United States. Social, economic, political, and cultural factors leading to youth gangs as well as the responses to the youths are considered within a global perspective. Not open for credit to students who have completed CHI 184. GE credit: ACGH, DD, OL, SS, WC, WE. Effective: 2013 Fall Quarter.

CHI 192—Internship in the Chicana/Chicano/Latina/Latino Community (1-12)
Internship—3-36 hours. Prerequisite(s): (CHI 010 or CHI 021 or CHI 050); (SPA 003 or SPA 003V); Or equivalent of SPA 003. Academic guidance combined with internship in community agencies serving Mexican/Latina/Latino/Chicana/Chicano clients. Use of bilingual skills and knowledge of history, culture, economics, politics and social issues. Internship project required. May be repeated up to 12 unit(s). (P/NP grading only.) GE credit: OL. Effective: 2018 Winter Quarter.

CHI 192S—Internship (1-12)
Internship. Prerequisite(s): (CHI 010 or CHI 021 or CHI 050); (SPA 003 or SPA 003V or SPA 003Y); and Consent of Instructor. Or equivalent of SPA 003, SPA 003V, SPA 003Y. Internship May be repeated for credit. (P/NP grading only.) Effective: 2018 Spring Quarter.

CHI 194HA—Senior Honors Research Project (2-5)
Independent Study—6-15 hours. Prerequisite(s): Consent of Instructor. Senior standing in Chicana/o Studies major. Student is required to read, research, and write Honors Thesis on Chicana/o Studies topics. GE credit: OL, WE. Effective: 1997 Winter Quarter.

CHI 194HB—Senior Honors Research Project (2-5)
Independent Study—6-15 hours. Prerequisite(s): Consent of Instructor. Senior standing in Chicana/o Studies major. Student is required to read, research, and write Honors Thesis on Chicana/o Studies topics. GE credit: OL, WE. Effective: 1997 Winter Quarter.

CHI 194HC—Senior Honors Research Project (2-5)
Independent Study—6-15 hours. Prerequisite(s): Consent of Instructor. Senior standing in Chicana/o Studies major. Student is required to read, research, and write Honors Thesis on Chicana/o Studies topics. GE credit: OL, WE. Effective: 1997 Winter Quarter.

CHI 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Upper division standing and consent of Program Chairperson. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHI 198S—Directed Group Study (1-5)
Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2006 Winter Quarter.

CHI 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Upper division standing and consent of Program Chairperson. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHI 199S—Special Study for Advanced Undergraduates (1-5)
Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2006 Winter Quarter.

CHI 230—Chicano/Latino Hispanic Politics (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Two undergraduate courses in Chicana/o Studies or consent of instructor. Examination of Chicano/Latino political experiences. Evaluate theories, ideology, and practice of Chicano politics. Brief history of Chicano/Latino/Hispanic political activity, comparisons among political modes, gendered politics, and understanding relationships among Chicano, Mexican, American and world politics. Effective: 1997 Spring Quarter.

CHI 241—Community Based Health Research (4)
Lecture/Discussion—3 hours; Term Paper. Provides knowledge and skills to plan and implement public health projects that highlight the intersection of social determinants of health within a community empowerment framework. (S/U grading only.) Effective: 2017 Fall Quarter.

CHI 298—Group Study for Graduate Students (1-5)
Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit when topics differs. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

CHI 299—Special Study for Graduate Students (1-12)
Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

CHI 396—Teaching Assistant Training Practicum (1-4)
Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit. (S/U grading only.) Effective: 2004 Spring Quarter.

CHN Chinese

Courses in CHN:

CHN 001—Elementary Chinese (5)
Lecture/Discussion—5 hours. Prerequisite(s): No background in Chinese or placement exam or consent of instructor. Developing elementary level skills of listening, speaking, reading and writing in Mandarin Chinese in everyday communication settings. Introduction of fundamentals of pronunciation, grammar, and Chinese characters will be introduced. GE credit: AH, OL, WC. Effective: 2016 Fall Quarter.

CHN 001A—Accelerated Intensive Elementary Chinese (15)
Lecture/Discussion—15 hours. Prerequisite(s): No background in Chinese or placement exam or consent of instructor. Introduction and practice in contexts of pronunciation, writing system, basic grammar and vocabulary as basis of communicative competency in Mandarin Chinese within a special nine-week intensive course which combines courses 1, 2 and 3. Not open for credit to students who have completed CHN 001, CHN 002, or CHN 003. GE credit: AH, OL, WC. Effective: 2016 Fall Quarter.

CHN 001BL—Accelerated Written Chinese I (5)
Lecture—5 hours. Prerequisite(s): Placement exam or consent of instructor. Trainings on all the communicative skills of listening, speaking, reading, and writing for students who already have elementary level ability to understand or speak Mandarin Chinese. Emphases on standard Mandarin pronunciation, Chinese characters, and discourse level conversations. Not open for credit to students who have completed CHN 008. GE credit: AH, OL, WC. Effective: 2016 Fall Quarter.

CHN 001CN—Mandarin for Cantonese Speakers I (5)
Lecture—5 hours. Prerequisite(s): Placement exam or consent of instructor. Training in spoken Mandarin, particularly in the phonetic transcription system known as pinyin, for students who already read and write Chinese. Not open for credit to students who have completed CHN 007. GE credit: AH, OL, WC. Effective: 2016 Fall Quarter.

CHN 002—Elementary Chinese (5)
Lecture/Discussion—5 hours. Prerequisite(s): CHN 001; Or placement exam or consent of instructor. Continuation of elementary level skill development in listening, speaking, reading and writing Mandarin Chinese in everyday communication settings. Continued introduction of basic vocabulary and characters as well as core grammar, and further train pronunciation. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 002BL—Accelerated Written Chinese II (5)
Lecture—5 hours. Prerequisite(s): CHN 001BL; Or placement exam or consent of instructor. Further trainings on all the communicative skills of listening, speaking, reading, and writing for students that already have elementary level ability to understand or speak Mandarin Chinese. Emphases on standard Mandarin pronunciation, Chinese characters, and discourse level conversations. Not open for credit to students who have completed CHN 018. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 002CN—Mandarin for Cantonese Speakers II (5)
Lecture—5 hours. Prerequisite(s): CHN 001CN; Or placement exam or consent of instructor. Continuation of course 1CN. Training in spoken Mandarin for students who can already read and write Chinese. Not open for credit to students who have completed CHN 017. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 003—Elementary Chinese (5)
Lecture/Discussion—5 hours. Prerequisite(s): CHN 002; Or placement exam or consent of instructor. Continuation of elementary level skill development in listening, speaking, reading and writing Mandarin Chinese in everyday communication settings. Continued introduction of basic vocabulary and characters as well as core grammar, and further train pronunciation. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 003BL—Accelerated Written Chinese III (5)
Lecture—5 hours. Prerequisite(s): CHN 002BL; Or placement exam or consent of instructor. Continuation of course 2BL with further trainings on all the communicative skills of listening, speaking, reading, and writing with emphases on standard Mandarin pronunciation, Chinese characters, and discourse level conversations in more communication settings. Not open for credit to students who have completed CHN 028. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 003CN—Mandarin for Cantonese Speakers III (5)
Lecture—5 hours. Prerequisite(s): CHN 002CN; Or placement exam or consent of instructor. Continuation of course 2CN. Prepares students for entering upper division courses in Chinese. Not open for credit to students who have completed CHN 027. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 004—Intermediate Chinese (5)
Lecture/Discussion—5 hours. Prerequisite(s): CHN 003 or placement exam or consent of instructor. Continuation of intermediate-level communication skills in spoken and written Mandarin, based on language skills developed in course 3. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 004A—Accelerated Intensive Intermediate Chinese (15)
Lecture/Discussion—15 hours. Prerequisite(s): CHN 003 or CHN 001A or placement exam or consent of instructor. Special nine-week accelerated, intensive summer session course that combines the work of courses 4, 5, and 6. Intermediate-level training in spoken and written Chinese in cultural and communicative contexts, based on language skills developed in course 3 or 1A. Not open to students who have completed CHN 004, CHN 005, or CHN 006. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 005—Intermediate Chinese (5)
Lecture/Discussion—5 hours. Prerequisite(s): CHN 004 or placement exam or consent of instructor. Training continues at intermediate-level in spoken and written Chinese in cultural contexts, based on language skills developed in course 4. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 006—Intermediate Chinese (5)
Lecture/Discussion—5 hours. Prerequisite(s): CHN 005; CHN 005 or placement exam or consent of instructor. Intermediate-level training in spoken and written Chinese in cultural contexts, based on language skills developed in course 5. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 007—Chinese Business Culture (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Open to non-heritage students who have no prior knowledge of, or background in, the Chinese language; anyone who has taken Chinese language classes before or after being enrolled at UC Davis, or anyone who is currently enrolled in a Chinese language class, or who speaks any Mandarin or Chinese dialect (e.g., Cantonese), cannot take the course for credit without the instructor's permission. Introduction to business culture of China. Basic conversation and Romanization of Chinese words. GE credit: AH, OL, SS, WC. Effective: 2015 Winter Quarter.

CHN 010—Modern Chinese Literature (In English) (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Introductory course requiring no knowledge of Chinese language or history. Reading and discussion of short stories and novels and viewing of two films. Designed to convey a feeling for what China has experienced in the twentieth century. Not open for credit to students who have already taken, or are taking concurrently, CHN 104. GE credit: AH, WC. Effective: 2008 Spring Quarter.

CHN 011—Great Books of China (in English) (4)
Discussion—1 hour; Lecture—3 hours. Selected readings in English translation are supplemented with background information on periods, authors and the interrelationships of culture, literature and social change. Methods of analysis are introduced and applied in class discussions. GE credit: AH, WC. Effective: 1997 Winter Quarter.

CHN 050—Introduction to the Literature of China and Japan (4)
Lecture/Discussion—4 hours. Methods of literary analysis and their application to major works from the various genres of Chinese and Japanese literature (in translation),
including film. East Asian cultural traditions will also be introduced. (JPN 050.) GE credit: AH, WC. Effective: 2012 Fall Quarter.

CHN 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHN 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHN 100A—Chinese Intellectual Traditions: Daoist Traditions (4)
Lecture/Discussion—4 hours. Prerequisite(s): A course in Chinese history recommended. English-language survey of key Daoist texts and scholarship. Topics include Daoist concepts of the cosmos, the natural world, scripture, the body, and immortality; Daoist divinities; Daoism and the state. (RST 175A.) GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 100B—Confucian Traditions (4)
Lecture/Discussion—4 hours. Key aspects of the Confucian tradition in dynastic China. Major themes addressed include ritual, classical studies, and Confucian influences on the Chinese family and state. GE credit: AH, WC. Effective: 2014 Fall Quarter.

CHN 101—Chinese Film (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. English language survey of Chinese film, from its inception to the end of the twentieth century. Chinese films as important texts for understanding national, transnational, racial, gender, and class politics of modern China. (CTS 147A.) GE credit: AH, VL, WC. Effective: 2016 Spring Quarter.

CHN 102—Chinese American Literature (In English) (4)
Lecture/Discussion—3 hours; Term Paper/Discussion—1 hour. English language survey of Chinese American literature which reflects cultural roots in China before immigration and the diaspora experience in the United States after immigration. Memory, nostalgia, national identities, cross-cultural communication, globalization, and trans-national politics. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 103—Modern Chinese Drama (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. English language survey of modern Chinese spoken drama in the twentieth century and its major playwrights, in the context of Chinese history and the interaction of Chinese culture with other cultures. GE credit: AH, VL, WC. Effective: 2016 Spring Quarter.

CHN 104—Modern Chinese Fiction (in English) (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. English language survey of Chinese fiction as it evolved amidst the great historical, social and cultural changes of the twentieth century. Thorough study of the most influential writers and genres. GE credit: AH, WC. Effective: 2016 Fall Quarter.

CHN 105—Western Influences on Twentieth-Century Chinese Literature (in English) (4)
Discussion—1 hour; Lecture—3 hours. Introduction of Western literary thought into modern China, the experimentation with Western literary forms and techniques, and the development of Marxism in contemporary literary writing. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 106—Chinese Poetry (in English) (4)
Discussion—1 hour; Lecture—3 hours. Organized topically and chronologically, the lyric tradition is explored from the dawn of folk songs down to modern expressions of social protest. Topics include friendship, love, oppression, war, parting, death, ecstasy and beauty. All readings are in English. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 107—Traditional Chinese Fiction (in English) (4)
Discussion—1 hour; Lecture—3 hours. English-language course studying the dawn of Chinese fiction and its development down to modern times. Combines survey history with close reading of representative works such as The Story of the Stone and
famous Ming-Qing short stories. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 108—Poetry of China and Japan (in English) (4)
Discussion—1 hour; Lecture—3 hours. A comparative approach to Chinese and Japanese poetry, examining poetic practice in the two cultures; includes a general outline of the two traditions, plus study of poetic forms, techniques, and distinct treatments of universal themes: love, nature, war, etc. (JPN 108.) GE credit: AH, WC. Effective: 1997 Winter Quarter.

CHN 109A—Topics in Chinese Literature; Crime and Punishment (4)
Discussion—1 hour; Lecture—3 hours. Topics in Chinese literature; crime and punishment. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 109C—Topics in Chinese Literature; Women Writers (in English) (4)
Discussion—1 hour; Lecture—3 hours. Topics in Chinese literature; women writers. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 109D—Topics in Chinese Literature; The Knight-Errant (in English) (4)
Discussion—1 hour; Lecture—3 hours. Topics in Chinese literature; the knight-errant. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 109E—Topics in Chinese Literature; The City in Fiction (in English) (4)
Discussion—1 hour; Lecture—3 hours. Topics in Chinese literature; the city in fiction. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 109G—Topics in Chinese Literature; The Literature of Twentieth-Century Taiwan (in English) (4)
Discussion—1 hour; Lecture—3 hours. Topics in Chinese literature; the literature of twentieth-century Taiwan. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 109H—Topics in Chinese Literature; Popular Literature (in English) (4)
Discussion—1 hour; Lecture—3 hours. Topics in Chinese literature; popular literature. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 109I—Topics in Chinese Literature; Scholar & The Courtesan (in English) (4)
Discussion—1 hour; Lecture—3 hours. Topics in Chinese literature; the scholar and the courtesan. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 110—Great Writers of China: Texts and Context (in English) (4)
Discussion—1 hour; Lecture—3 hours. Examination of major theoretical concepts and interpretive methods in the study of literature by using examples from the Chinese tradition; discussions of classical and modern works with an emphasis on the relations between literature, author, society, and culture. GE credit: AH, WC. Effective: 2017 Spring Quarter.

CHN 111—Modern Chinese: Reading and Discussion (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHN 006 C- or better or CHN 003BL C- or better or CHN 004A C- or better; Or placement exam or consent of instructor. Building on Chinese 6/3BL, further development of communication skills in Modern Standard Mandarin-speaking environments. Reading of dialogues/articles pertaining to contemporary China. GE credit: AH, OL, WC. Effective: 2017 Spring Quarter.

CHN 111A—Intensive Third-Year Chinese (12)
Lecture/Discussion—13.3 hours. Prerequisite(s): CHN 006 or CHN 003BL or CHN 004A; Or placement exam or consent of instructor. Not open to students who have completed course 111, 112, or 113. Nine-week intensive summer course combines courses 111, 112, and 113. Training at intermediate-high and advanced-low level in spoken and written Chinese in cultural and communicative contexts based on language skills developed in course 6. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 112—Modern Chinese: Reading and Discussion (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHN 111; Or placement exam or consent of instructor. Further development of communication skills from course 111 in Modern Standard Mandarin-speaking environments. Reading dialogues/articles pertaining to contemporary China issues and discussing ethical, moral, aesthetic, social, and cultural concerns. GE credit: AH, OL, WC. Effective: 2018 Winter Quarter.

CHN 113—Modern Chinese: Reading and Discussion (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHN 112; Or placement exam or consent of instructor. Continuation of course 112, further developing communication skills in Modern Standard Mandarin-speaking environments. Read dialogues/articles pertaining to contemporary China issues and discuss ethical, moral, aesthetic, social, and cultural concerns. Study strategies for moving between simplified and traditional Chinese characters. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 114—Introduction to Classical Chinese (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHN 112; Consent of Instructor. Or equivalent language proficiency. Introduction to the language in which, until the twentieth century, most official, documentary, scholarly, and belle-lettristic Chinese literature was written. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 115—Introduction to Classical Chinese II (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHN 114; or Consent of Instructor. Continuation of enhancing classical Chinese reading skills with literature ranging from the prose found in Han dynasty historical works, Six Dynasties anecdotal literature, and Tang occasional texts, as well as the poetic shi and fu genres. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 116—Introduction to Classical Chinese III (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHN 115; or Consent of Instructor. Translations of extended readings in the original sources and brief analyses of syntax. These sources will include texts written by well-known figures from the eighth through fifteenth centuries, composing in a wide variety of genres. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 120—Advanced Chinese (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHN 113; Or placement exam or consent of instructor. Evaluation of readings from various genres (literature, newspapers, TV and movies, etc.) develop advanced reading, writing, aural comprehension, and formal/professional speech skills in Mandarin Chinese. Chinese society/cultural studies, especially those sociocultural issues reflected in the language used in learning materials. May be repeated up to 1 time(s) Course material is different for each quarter of an academic year. Students may repeat course one time but repeat class cannot be for the same quarter taken in a previous academic year. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

CHN 130—Readings in Traditional Chinese Fiction (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHN 111; Or equivalent language proficiency. Examination of representative works of traditional Chinese fiction popular from the 12th Century until the 17th and 18th centuries. Translations in English of the Chinese texts will be available to students as reference. May be repeated up to 1 time(s). GE credit: AH, VL, WC. Effective: 2016 Spring Quarter.

CHN 131—Readings in Traditional Chinese Poetry (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHN 111; Consent of Instructor. Or equivalent language proficiency. Traditional Chinese poetry from its beginnings to the golden ages of Tang and Song, surveying forms and poets that best reveal the Chinese poetic sensibility and the genius of the language of Chinese poetry. GE credit: AH. Effective: 2016 Spring Quarter.

CHN 132—Readings in Modern Chinese Poetry (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHN 111; Consent of Instructor. Or equivalent language proficiency. Chinese poetry from the Literary Revolution of 1917 to the present, surveying works that embody exciting innovations and reflect the modernity of twentieth-century Chinese society and culture. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 133—Readings in Modern Chinese Prose and Drama (4)
Lecture—4 hours. Prerequisite(s): CHN 111; Or equivalent language proficiency. Literary works and scholarly essays on selected topics of Chinese prose and drama, development of a deep understanding of Chinese culture and society through sophisticated reading materials of these two important genres of the modern period. Conducted in Chinese. May be repeated up to 2 unit(s) when topic differs. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 134—Chinese Film in Chinese Language (4)
Film Viewing—3 hours; Lecture—3 hours. Prerequisite(s): CHN 111; Or equivalent language proficiency. Chinese film and scholarly essays on Chinese cinema and film history. Develop a deep understanding of Chinese culture and society through viewing and studying Chinese films in the Chinese language. GE credit: AH, OL, SS, VL, WC. Effective: 2016 Spring Quarter.

CHN 140—Readings in Classical Chinese (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Study and philological analysis of selected texts from the first millennium of Imperial China. May be repeated up to 2 time(s). GE credit: AH. Effective: 1997 Winter Quarter.

CHN 150—Fifth-Year Chinese: Selected Topics in Chinese Language, Literature, and Culture (4)
Lecture/Discussion—4 hours. Prerequisite(s): CHN 120; Or placement exam or consent of instructor. Examination of literary works and scholarly essays on selected topics of Chinese culture and society. Development of a deep understanding of Chinese culture and society through sophisticated Chinese speaking and writing exercises. May be repeated up to 3 time(s) when topic differs. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

CHN 160—The Chinese Language (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): CHN 006 (can be concurrent) or CHN 003BL (can be concurrent) or CHN 003CN (can be concurrent) or CHN 004A (can be concurrent); Or placement exam or consent of instructor. LIN 001 recommended. Evaluation of the Chinese language viewed in its linguistic context, synchronically and diachronically. Historical phonology, classical and literary language, rise of written vernacular, descriptive grammar of modern standard Chinese, dialectal variation, and sociolinguistic factors. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CHN 160—The Chinese Language (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): CHN 006 (can be concurrent) or CHN 003BL (can be concurrent) or CHN 003CN (can be concurrent) or CHN 004A (can be concurrent); Or placement exam or consent of instructor. LIN 001 recommended. Introduction to structural features of Chinese (Mandarin) sounds, lexicon, grammar, and writing (characters), as well as relevant dialectal and sociolinguistic issues of the language. GE credit: AH, WC. Effective: 2018 Fall Quarter.

CHN 192—Chinese Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing and consent of instructor. Work experience in the Chinese language, with analytical term paper on a topic approved by instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHN 194H—Senior Thesis Honors Project (1-5)
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. Senior standing and qualification for the Chinese honors program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in Chinese literature, civilization, or language studies. May be repeated up to 8 unit(s). (P/NP grading only.) GE credit: AH, WC, WE. Effective: 2017 Fall Quarter.

CHN 197T—Tutoring in Chinese (1-4)
Tutorial—1-4 hours. Prerequisite(s): Consent of Department. Leading of small voluntary discussion groups affiliated with one of the Department's regular courses. May be repeated up to 4 unit(s). (P/NP grading only.) Effective: 2016 Summer Session 1.

CHN 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Summer Session 1.

CHN 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

CHN 297—Directed Independent Study (4)
Conference—1 hour; Independent Study; Term Paper. Prerequisite(s): Consent of Instructor. Restricted to graduate students. Directed independent study on a topic culminating in a term paper. Independent studies may only be arranged with consent of the instructor and when graduate seminars are unavailable. May be repeated up to 5 time(s). Effective: 2017 Winter Quarter.

CHN 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

CHN 396—Teaching Assistant Training Practicum (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Any course taught by a graduate student under the direction of the Director. May be repeated for credit. (S/U grading only.) Effective: 2016 Spring Quarter.

CLA Classics

Courses in CLA:

CLA 001—Ancient Near East and Early Greece: 3000-500 B.C.E. (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the literature, art, and social and political institutions of ancient Mesopotamia, Egypt, Palestine, and early Greece from 3000 to 500 B.C.E. GE credit: AH, WC, WE. Effective: 2015 Fall Quarter.

CLA 002—Ancient Greece and the Near East: 500 to 146 B.C.E. (4)
Lecture—3 hours; Term Paper. Introduction to the literature, art and thought and the political and social institutions and values of Greece and its eastern Mediterranean neighbors-the Persians, Egyptians, and Judeans. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

CLA 003—Rome and the Mediterranean: 800 B.C.E. to 500 C.E. (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the history, literature, material culture, political and social institutions and values of Roman Civilization, with an emphasis on the development of the Roman Empire and the interactions of Roman culture with other Mediterranean cultures. GE credit: AH, WC, WE. Effective: 2008 Spring Quarter.

CLA 004—Late Antiquity (4)
Discussion—1 hour; Lecture—3 hours. History and culture of the Roman and Byzantine empires from the third to the eighth century. Transformation of the classical Mediterranean world through political and cultural interactions, rise of Christianity and Islam, beginning of the medieval period in Europe. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

CLA 010—Greek, Roman, and Near Eastern Mythology (3)
Lecture—3 hours. Examination of major myths of Greece, Rome, and the Ancient Near East; their place in the religion, literature and art of the societies that produced them; their subsequent development, influence and interpretation. GE credit: AH, VL, WC. Effective: 1997 Winter Quarter.

CLA 010Y—Greek, Roman, and Near Eastern Mythology - Hybrid (3)
Lecture—2 hours; Web Virtual Lecture—1 hour. Examination of major myths of Greece, Rome, and the Ancient Near East; their place in the religion, literature and art of the societies that produced them; their subsequent development, influence and interpretation. GE credit: AH, VL, WC. Effective: 2016 Winter Quarter.

CLA 015—Women and Gender in Classical Antiquity (4)
Lecture/Discussion—3 hours; Term Paper. Lives and roles of women and men in ancient Greece and Rome. Readings from history, philosophy, medical and legal documents, literature and myth. GE credit: AH, VL, WC, WE. Effective: 2011 Fall Quarter.

CLA 020—Pompeii AD 79 (4)
Lecture—3 hours; Term Paper. Roman life in an urban community at the time of the eruption of Vesuvius. Slide presentations of the archeological evidence will be supplemented by selected readings from Petronius' Satyricon and other ancient authors. GE credit: AH, VL, WC, WE. Effective: 1997 Winter Quarter.

CLA 025—The Classical Heritage in America (4)
Lecture/Discussion—3 hours; Term Paper. Classical heritage in the New World, with emphasis on the United States from its colonial past to the present day. The reception of Greco-Roman thought and values as expressed in art, architecture, education, law, government, literature, and film. GE credit: ACGH, AH, WE. Effective: 2011 Fall Quarter.

CLA 030—Greek and Latin Elements in English Vocabulary (3)
Lecture—3 hours. Knowledge of Latin and Greek not required. Elements of Greek and Latin vocabulary for increased understanding of English word formation and improved ability to understand and retain unfamiliar words. Emphasis on Greek and Latin elements but other languages not neglected. Not open for credit to students who have completed CLA 030F. GE credit: AH. Effective: 2014 Fall Quarter.

CLA 030F—Greek and Latin Elements in English Vocabulary (3)
Lecture—3 hours. Restricted to incoming freshmen. Knowledge of Latin and Greek not required. Elements of Greek and Latin vocabulary for increased understanding of English word formation and improved ability to understand and retain unfamiliar words. Emphasis on Greek and Latin elements but other languages not neglected. Not open for credit to students who have completed CLA 030. GE credit: AH. Effective: 2014 Fall Quarter.

CLA 031—Greek and Latin Elements in Technical Vocabulary (3)
Lecture—3 hours. Knowledge of Greek and Latin not required. Elements of Greek and Latin vocabulary to increase understanding of English word formation in medical, scientific and technical terminology and improve ability to understand and retain unfamiliar terms. GE credit: AH. Effective: 1997 Winter Quarter.

CLA 040—Life and Economy in the Ancient Mediterranean World (4)
Lecture/Discussion—3 hours; Term Paper. Characterization of ancient Mediterranean economies, with emphasis on Greece and Rome. Utilization of archaeological, art historical, and literary evidence. Craft production, labor specialization, trade networks, ancient technology, urban growth, agricultural productivity, coinage systems, and household economies. GE credit: AH, VL, WC, WE. Effective: 2016 Fall Quarter.

CLA 050—Ancient Science (4)
Discussion—1 hour; Lecture—3 hours. Study of science in ancient Greece and Rome; consideration of its social context; concentration on the basic concepts of physics, the world of medicine and biology, the history of mathematics, and the practices of astronomy, astrology and meteorology. (STS 050.) GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

CLA 051—Ancient Medicine (4)
Discussion—1 hour; Lecture—3 hours. Medicine in ancient Greece and Rome; physiological conceptions of the body within scientific and social frameworks; exploration of sanitation technology and health in antiquity; medical treatment of the female body; medicine and the economy. (STS 051.) GE credit: AH, WC, WE. Effective: 2016 Winter Quarter.

CLA 098—Directed Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. May be repeated up to 2 time(s). (P/NP grading only.) Effective: 2007 Fall Quarter.

CLA 101A—Topics in Ancient Mediterranean Civilizations (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Topics may be ordered by time or place (e.g. Hellenistic Egypt) or by theme or genre (e.g. slavery in the ancient world). May be repeated up to 2 time(s) when topic differs. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

CLA 101B—Topics in Greek Civilization (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Topics may be ordered by time or place (e.g. the world of Homer) or by theme or genre (e.g. the Greek art of war). May be repeated up to 2 time(s) when topic differs. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

CLA 101C—Topics in Roman Civilization (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Topics may be ordered by time or place (e.g. Julius Caesar and his age) or by theme or genre (e.g. gladiators: blood in the arena). May be repeated up to 2 time(s) when topic differs. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

CLA 101D—Topics in Classical Receptions (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Topics in classical reception from late antiquity to the present. Topics may be ordered by time or place (e.g. the classical tradition in Washington, D.C.) or by theme or genre (e.g. cinematic representations of the ancient world). May be repeated up to 2 time(s) when topic differs. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

CLA 101E—Topics in Ancient Science (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): CLA 050 or CLA 051; or Consent of Instructor. Topics may be ordered by discipline (e.g. ancient medicine), historical figure (e.g. Galen) or topic (e.g. science and the economy). May be repeated up to 2 time(s) when topic differs. GE credit: AH, WE. Effective: 2016 Spring Quarter.

CLA 102—Film and the Classical World (4)
Film Viewing—2.5 hours; Lecture—3 hours. Prerequisite(s): A lower division Classics course or consent of instructor. Classical World as portrayed in films. Viewings and discussions of modern versions of ancient dramas, modern dramas set in the Ancient Mediterranean world, and films imbued with classical themes and allusions. Supplementary readings in ancient literature and mythology. GE credit: AH, WE. Effective: 2016 Spring Quarter.

CLA 103—Love and Beauty in the Ancient World (4)
Extensive Writing; Lecture/Discussion—3 hours. Philosophical and literary traditions connecting love, beauty, and goodness in ancient thought. Moral and ethical implications, ideologies of sexuality and gender; transmission into the medieval and modern world. GE credit: AH, WC, WE. Effective: 2017 Fall Quarter.

CLA 105—Theory and Practice of Greek and Roman Mythology (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Thematically focused study of mythological narratives. Emphasis on the historical development of myths and the variety of theoretical approaches for the study of myth. GE credit: AH, WE. Effective: 2016 Fall Quarter.

CLA 110—Origins of Rhetoric (4)
Lecture—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Issues in the development of rhetoric from its origins in ancient Greece to A.D.430. Special attention to works of Plato, Aristotle, Cicero, and Quintilian. Role of grammar and rhetoric in schools of Roman Empire. The Christian rhetoric of Saint Augustine. Not open for credit to students who have completed RCM 110 or CMN 110. (Former course RCM 110.). GE credit: AH, WE. Effective: 2016 Spring Quarter.

CLA 111—Forms of Knowledge in the Ancient World (4)
Extensive Writing; Lecture/Discussion—3 hours. History of knowledge preservation and transfer in the ancient Mediterranean. Oral tradition, technology, innovations, forms of writing, libraries, ancient scholarship, cultural exchange and influence. GE credit: AH, VL, WC, WE. Effective: 2017 Fall Quarter.

CLA 120—Greek and Roman Historiography (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Survey of Greek and Roman historical writing in English translation. Authors to be read may include Herodotus, Thucydides, Sallust, Livy, and Tacitus. Focus on the development of historical writing as a literary genre. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

CLA 125—Roman Political Thought (4)
Lecture—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Survey of Roman thinking about politics, as expressed both in formal theorizing and in a variety of other contexts, including oratory, historiography, and epic. Study of Roman political reflection in its historical, cultural, and literary context. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

CLA 140—Homer and Ancient Epic (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Reading of the classical epics of Homer (Iliad, Odyssey) and Virgil (Aeneid) in English. Discussion of techniques of composition, the beliefs and values of their respective societies, and the generic tradition of ancient epic. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

CLA 141—Greek and Roman Comedy (4)
Conference—1 hour; Lecture—3 hours. Prerequisite(s): A lower division Classics course or consent of instructor. Readings in Aristophanes, Menander, Plautus, and Terence; lectures on the development of ancient comedy. GE credit: AH, WE. Effective: 2016 Spring Quarter.

CLA 142—Greek and Roman Novel (4)
Lecture—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Examination of the ancient Greek romances and their development into the grotesque realism of Petronius' Satyricon, and the religious mysticism of Apuleius' The Golden Ass. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

CLA 143—Greek Tragedy (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Reading in English of selected plays of Aeschylus, Sophocles, and Euripides. Discussion of the development and influence of Athenian tragedy. GE credit: AH, WE. Effective: 2016 Fall Quarter.

CLA 150—Socrates and Classical Athens (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Study of the major sources of our knowledge of Socrates, assessment of his role in the politics and culture of ancient Athens, his method of teaching, and his place in Western thought. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

CLA 170—Cultural Interactions in the Ancient Mediterranean World (4)
Lecture/Discussion—3 hours; Term Paper. Exploration of the role of colonial encounters in the spread of ideas throughout the ancient Mediterranean from an archaeological and artistic perspective. Emphasis on material and literary expressions of culture, trade routes, and theories pertaining to culture contact. GE credit: AH, VL, WC, WE. Effective: 2016 Fall Quarter.

CLA 171—Mediterranean Bronze Age Archaeology (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): A lower division Classics course or consent of instructor. Archaeological monuments of the ancient Near East, including Egypt and Mesopotamia, and of Greece and Crete during the Bronze Age. Special emphasis on the problems of state formation and on the co-existence and collapse of Bronze Age societies. GE credit: AH, WC. Effective: 2016 Spring Quarter.

CLA 172A—Early Greek Art and Architecture (4)
Lecture—3 hours; Term Paper. Examination of the origin and development of the major monuments of Greek art and architecture from the eighth century to the mid-fifth century B.C. (AHI 172A.) GE credit: AH, VL, WE. Effective: 2015 Fall Quarter.

CLA 172B—Later Greek Art and Architecture (4)
Lecture—3 hours; Term Paper. Study of the art and architecture of later Classical and Hellenistic Greece, from the mid-fifth century to the first century B.C. (AHI 172B.) GE credit: AH, VL. Effective: 2015 Fall Quarter.

CLA 173—Roman Art and Architecture (4)
Lecture—3 hours; Term Paper. Art and architecture of Rome and the Roman Empire, from the founding of Rome through the fourth century C.E. (AHI 173.) GE credit: AH, VL, WE. Effective: 2014 Fall Quarter.

CLA 174—Greek Religion and Society (4)
Lecture—3 hours; Term Paper. Prerequisite(s): A lower division Classics course or consent of instructor. Cults, festivals, and rituals of Greek religious practice and their relationship to Greek social and political institutions, and to Greek private life. Includes discussion of major sanctuaries at Olympia, Delphi, Athens, and others. GE credit: AH, WC. Effective: 2017 Winter Quarter.

CLA 175—Architecture and Urbanism in Mediterranean Antiquity (4)
Extensive Writing; Lecture—3 hours. Architecture and urban development in the ancient Near East, Greece, and Rome. Special emphasis on the social structure of the ancient city as expressed in its architecture, and on the interaction between local traditions and the impact of Greco-Roman urbanism. (AHI 175.) GE credit: AH, VL, WC, WE. Effective: 2017 Spring Quarter.

CLA 176—Roman Religions (4)
Extensive Writing; Lecture/Discussion—3 hours. Roman religion from republic to empire. Gods, rituals, and festivals at Rome; sacrifice, sacred places, magic. Gender roles, social status, national identity. Influences from other cultures, especially Egypt and the eastern Mediterranean. GE credit: AH, WC, WE. Effective: 2017 Fall Quarter.

CLA 190—Senior Seminar (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Completion of one upper division course in Latin, Greek or Hebrew or consent of instructor. Advanced interdisciplinary study of a problem in the ancient Mediterranean world using the techniques of history, archaeology, art history and philology. May be repeated for credit. GE credit: AH, WE. Effective: 1997 Winter Quarter.

CLA 194HA—Special Study for Honors Students (3)
Discussion—1 hour; Independent Study; Term Paper. Prerequisite(s): Admission to the Honors Program; consent of faculty member supervising honors thesis. Directed reading, research and writing culminating in the completion of a senior honors thesis under the direction of faculty advisor. (P/NP grading only.) GE credit: AH. Effective: 2003 Fall Quarter.

CLA 194HB—Special Study for Honors Students (3)
Discussion—1 hour; Independent Study; Term Paper. Prerequisite(s): Admission to the Honors Program and consent of faculty member supervising honors thesis. Directed reading, research, and writing culminating in the completion of a senior honors thesis under the direction of faculty advisor. (P/NP grading only.) GE credit: AH. Effective: 2004 Winter Quarter.

CLA 197TC—Community Tutoring in Classical Languages (1-5)
Tutorial—1-5 hours. Prerequisite(s): Consent of Instructor. Supervised instruction of Greek or Latin in nearby schools by qualified students in department. May be repeated up to 5 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

CLA 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1999 Fall Quarter.

CLA 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1999 Fall Quarter.

CLA 200A—Approaches to the Classical Past (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate student status or consent of instructor. Survey of major areas of classical scholarship, with special emphasis on the continuing impact of Mediterranean antiquity on later literature, history, art, and culture. Effective: 2016 Fall Quarter.

CLA 200B—Approaches to the Classics Past (4)
Independent Study—4 hours. Prerequisite(s): CLA 200A; Graduate student status or consent of instructor. Restricted to graduate students. Research project on major area of Classical scholarship, with special emphasis on the continuing impact of Mediterranean antiquity on later literature, history, art, and culture. Effective: 2016 Fall Quarter.

CLA 201—Introduction to Classical Philology (4)
Seminar—3 hours; Term Paper. Survey of major contemporary areas of classical scholarship with special attention devoted to current problems in literary and textual criticism. Effective: 1997 Winter Quarter.

CLA 202—Homer (4)
Seminar—3 hours; Term Paper. Readings in the Iliad and Odyssey: the origins and transmission of the
poems. Effective: 1997 Winter Quarter.

CLA 203—Vergil (4)
Seminar—3 hours; Term Paper. Reading of selected books of the Bucolics, Georgics, and Aeneid. Emphasis will be placed on the study of Vergilean poetic language. Effective: 1997 Winter Quarter.

CLA 204—Greek and Roman Comedy (4)
Seminar—3 hours; Term Paper. Historical and critical problems in Aristophanes or New Comedy. May be repeated for credit. Effective: 1997 Winter Quarter.

CLA 205—Latin Lyric and Elegy (4)
Seminar—3 hours; Term Paper. Critical examination of the works of Catullus, Horace, or Propertius. May be repeated for credit. Effective: 1997 Winter Quarter.

CLA 206—Greek Historiography (4)
Seminar—3 hours; Term Paper. Development of historical writing in Greece. May be repeated for credit. Effective: 1997 Winter Quarter.

CLA 207—Greek Drama (4)
Seminar—3 hours; Term Paper. Literary and philological analysis of the plays of Euripides, Sophocles, or Aeschylus. May be repeated for credit. Effective: 1997 Winter Quarter.

CLA 299—Research (1-12)
Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

CLA 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (S/U grading only.) Effective: 2012 Fall Quarter.

CLH Clinical Research

Course in CLH:

CLH 200—Introduction to Clinical Research (3)
Independent Study—3 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. One of the following degrees: MD, DDS, DMD, OD, ND, DO, PharmD, DVM, PhD or DNS in nursing. Application and acceptance into the Clinical Research Graduate Group, K30 program or other SOM/CTSC training programs. Introduction to the CRGG program and overview of major clinical research topics. Overview of basic clinical skills needed to accomplish CRGG mentored research project. (S/U grading only.) Effective: 2008 Summer Special Session.

CLH 201—Strategies for Grant Writing (2)
Lecture—2 hours. Prerequisite(s): Consent of Instructor. Completed one of the following degrees: MD, DDS, DMD, OD, ND, DO, PharmD, DVM, PhD or DNS in nursing. Application and acceptance into the Clinical Research Graduate Group, K30 program or other SOM/CTSC training program. Practical skills and strategies to create successful grant proposals in NIH style/format. Generating ideas, identifying and accessing research resources, grant components, specific aims, background and significance, preliminary studies, budgets, and bios. Matriculation through UC system, and resubmissions. (Former course MDS 461CR.) (S/U grading only.) Effective: 2008 Summer Special Session.

CLH 202—Introduction to Clinical Epidemiology and Study Design (3)
Discussion—10 hours; Lecture—25 hours. Prerequisite(s): Consent of Instructor. Completed one of the following degrees: MD, DDS, DMD, OD, ND, DO, PharmD, DVM, PhD or DNS in nursing; application and acceptance into the Clinical Research Graduate Group, (K30) program, or other SOM/CTSC training programs. Anatomy and physiology of conducting clinical epidemiologic research. Familiarity with three basic study designs (cross-sectional, case-control, and cohort). Discussion of principles of measurements in clinical epidemiological studies, basic methods for analyzing data, and ethical issues involved in conducting research. (S/U grading only.) Effective: 2008 Summer Special Session.

CLH 203—Methods in Clinical Research (3)
Discussion—1 hour; Independent Study—10 hours; Lecture—4 hours. Prerequisite(s): Consent of Instructor. Completed one of the following degrees: MD, DDS, DMD, OD, ND, DO, PharmD, DVM, PhD or DNS in nursing; application and acceptance into the Clinical Research Graduate Group, K30 program or other SOM traing programs. Overview of major approaches to clinical research, including health services research techniques, informatics, GCRC, and preclinical methodologies to enhance clinical projects. Overview of UCD clinical research support infrastructure. Methodologies applicable to clinical research and its multi-disciplinary perspective. (S/U grading only.) Effective: 2015 Spring Quarter.

CLH 204—The Ethics of Research (1)
Lecture—1 hour. Prerequisite(s): Consent of Instructor. Priority given to those with acceptance into the Clinical Research Graduate Group, K12, T32 or other SOM/CTSC training program. Acquire information about ethical responsibilities; Explore major questions in ethics; Apply ethical principles, concepts and values; Gain an appreciation of the role of trust in scientific research. Recommend three quarters of CLH204. Must enroll in Fall to continue through Spring. May be repeated up to 3 unit(s). (S/U grading only.) Effective: 2016 Fall Quarter.

CLH 207—Team Science (1)
Lecture/Discussion—1 hour. Prerequisite(s): Participation in CTSC Research Education and Training Programs, or consent of instructor. Restricted to 25 students. Today's scientific challenges necessitate cross-disciplinary engagement and high collaboration levels. This course offers guidance on how best to engage in team science to pursue complex questions, work effectively with team members, and produce high impact research that meets society's needs. (S/U grading only.) Effective: 2015 Winter Quarter.

CLH 208—Introduction to Grant Writing, I (2)
Extensive Writing; Lecture/Discussion—2 hours. First in a two-quarter series. Scholars are encouraged to enroll in both classes. The two-course sequence provides training in practical aspects of competitive grant writing. The focus is NIH, but information will apply to other funding agencies. (S/U grading only.) Effective: 2014 Fall Quarter.

CLH 209—Introduction to Grant Writing, II (1)
Lecture/Discussion—1 hour. Prerequisite(s): CLH 208; Consent of Instructor. Restricted to students who have completed course 208. Second in a two-quarter series. Two-course sequence provides training in practical aspects of competitive grant writing. (S/U grading only.) Effective: 2016 Fall Quarter.

CLH 210Y—Principles and Methods of Comparative Effectiveness Research (4)
Discussion—2 hours; Project (Term Project)—6 hours; Web Electronic Discussion; Web Virtual Lecture—4 hours. Prerequisite(s): Consent of Instructor. Familiarity with research methodology, and a course in introductory statistics. Provides an introduction to Comparative Effectiveness Research (CER) and methods for conducting CER. (S/U grading only.) Effective: 2015 Winter Quarter.

CLH 211—Critical Assessment of the Biomedical Literature (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Exposes students to topical issues and controversies in the design of interdisciplinary translational research, with an emphasis on critical assessment of the biomedical and health sciences literature. The course extends students' knowledge of study design through practical application. May be repeated up to 3 unit(s). (S/U grading only.) Effective: 2016 Fall Quarter.

CLH 212—Introduction to Stem Cell Biology (3)
Lecture/Discussion—3 hours. Open to graduate students with a fundamental knowledge of cell biology. Introduction to Stem Cell Biology. Each week will focus on different aspects of stem cells, including general concepts, stem cells in lower organisms, embryonic stem cells and cellular reprogramming. Effective: 2016 Spring Quarter.

CLH 214A—Biodesign I (2)
Lecture—2 hours. Prerequisite(s): Consent of Instructor. Prior approval by instructor required; student must commit to taking both courses; Biodesign I and Biodesign II. Focuses on the principles of needs identification and invention of biomedical technologies. Two part course provides a basic understanding of the elements of the innovation process and how to translate these principles into biomedical device design. Effective: 2016 Fall Quarter.

CLH 214B—Biodesign II (2)
Lecture—2 hours. Prerequisite(s): CLH 214A; Consent of Instructor. Prior approval by instructor required; student must commit to taking both courses; Biodesign I and Biodesign II. Focuses on the implementation of biomedical technologies and translational process. Two part course provides a basic understanding of the elements of the innovation process and how to translate these principles into biomedical device design. Effective: 2017 Winter Quarter.

CLH 220—Basics of Stem and Progenitor Cells (1)
Lecture—1 hour. Prerequisite(s): MCP 200L; MCP 200; Consent of Intructor; Graduate standing. This is a lecture course designed for graduate students who have experience in cell culture techniques. It is designed to give a broad overview of the field and current cells of interest to the greater research community. (S/U grading only.) Effective: 2007 Spring Quarter.

CLH 222—Ethical Issues in Stem Cell Biology (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Critical presentation and analysis of recent articles in stem cell biology and small group discussions of the ethical issues surrounding this area of research. (S/U grading only.) Effective: 2007 Winter Quarter.

CLH 230—Congestive Heart Failure, Mechanism of Disease (3)
Lecture/Discussion—2 hours; Project (Term Project). Prerequisite(s): Consent of Instructor. Graduate standing. Underlying mechanisms of cardiomyopathy and heart failure. Presentation of fundamental knowledge of and recent basic research on heart failure. Student team projects: investigation and presentation of a research topic and bench research project to advance research in the same area. Effective: 2008 Summer Session 1.

CLH 231—Current Techniques in Clinical Research (2)
Clinical Activity—3 hours; Lecture—1 hour. Prerequisite(s): CLH 250; and Consent of Instructor. Graduate standing. Current techniques used in clinical research such as electrophysiology, cardiovascular surgery, cardiac catheterization and echocardiography, team science, and patient management. Lectures are presented by experts on each technique, with an emphasis on use in translational research. (S/U grading only.) Effective: 2006 Fall Quarter.

CLH 233—Molecular Mechanisms of Disease: Cancer (3)
Lecture/Discussion—2 hours; Project (Term Project)—3 hours. Prerequisite(s): Consent of Instructor. Restricted to students pursuing the designated emphasis in Translational Research; graduate standing. Cutting edge of research on underlying mechanisms of cancer development, progression and prevention—clinical trials/drug development, signaling pathways and molecular mechanisms of cancer development, recent basic research on cancer stem cells, genetics and epigenetic events and animal models used. Effective: 2013 Fall Quarter.

CLH 240—Predoctoral Clinical Research Training Program Research Integration (1)
Discussion—0.5 hours; Seminar—0.5 hours. Prerequisite(s): Consent of Instructor. Enrollment in the Predoctoral Clinical Research Training Program in the CTSC, School of Medicine. Alternating sessions: journal club, seminar/discussion, and research integration sessions. May be repeated up to 3 time(s). (S/U grading only.) Effective: 2007 Fall Quarter.

CLH 244—Introduction to Medical Statistics (4)
Lecture—4 hours. Introduction to statistical methods and software in clinical, laboratory and population medicine. Graphical and tabular presentation of data, probability, binomial, Poisson, normal, t-, F-, and Chi-square distributions, elementary nonparametric methods, simple linear regression and correlation, life tables. Only one unit of credit for students who have completed STA 100 or MPM 402. (SPH 244.) Effective: 2017 Winter Quarter.

CLH 245—Biostatistics for Biomedical Science (4)
Lecture—4 hours. Prerequisite(s): CLH 244 or SPH 244; Consent of Instructor. Or equivalent. Analysis of data and design of experiments for laboratory data. (SPH 245.) Effective: 2015 Spring Quarter.

CLH 246—Biostatistics for Clinical Research (4)
Lecture—4 hours. Prerequisite(s): CLH 245 or SPH 245 Emphasizes critical biostatistics for clinical research and targets biomedical audience. Students will develop understanding for basic planning and analysis of clinical studies and learn to develop collaborations with biostatisticians. May be repeated for credit. (SPH 246.) Effective: 2015 Winter Quarter.

CLH 247—Statistical Analysis for Laboratory Data (4)
Lecture—4 hours. Prerequisite(s): CLH 245 or SPH 245 Statistical methods for experimental design and analysis of laboratory data including gene expression arrays, RNA-Seq, and mass spec. (SPH 247.) Effective: 2015 Spring Quarter.

CLH 250—Integrating Medicine Into Basic Science (6)
Clinical Activity—8 hours; Discussion—6 hours; Lecture—3.75 hours; Seminar—2.5 hours. Graduate standing; acceptance into HHMI Integrating Medicine into Basic Science program. Four-week summer institute consisting of didactic lectures, reading assignments, group discussions, and clinical rotations to acculturate students to the human medical environment; integrate medical principles, physiology and pathophysiology into basic research; introduce high-impact clinical studies related to medicine and health. (S/U grading only.) Effective: 2006 Fall Quarter.

CLH 290A—Hot Topics in Clinical Research (1)
Seminar—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Seminars presented by guest lecturers on subjects of their own research activities May be repeated for credit. (S/U grading only.) Effective: 2006 Fall Quarter.

CLH 290B—Hot Topics in Stem Cell Biology (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Seminars presented by guest lecturers on subjects of their own research (S/U grading only.) Effective: 2006 Fall Quarter.

CLH 290C—Literature in Stem Cell Biology (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Critical presentation and analysis of recent journal articles in stem cell biology by students. May be repeated for credit. (S/U grading only.) Effective: 2006 Fall Quarter.

CLH 290D—Literature in Translational Research (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Critical presentation and analysis of recent journal articles in translational research by students. May be repeated for credit. (S/U grading only.) Effective: 2009 Fall Quarter.

CLH 298—Group Study in Clinical Research (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Restricted to students enrolled in the Mentored Clinical Research Training Program. Special topics in Clinical Research appropriate for group study at the graduate level. May be repeated for credit. (S/U grading only.) Effective: 2006 Winter Quarter.

CLH 299—Clinical Research (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Restricted to students enrolled in the Mentored Clinical Research Training Program. Independent research and special topics in clinical research appropriate for graduate level. May be repeated for credit. (S/U grading only.) Effective: 2006 Fall Quarter.

CMN Communication

Students must have satisfied the Entry Level Writing requirement before taking any course in Communication.

Courses in CMN:

CMN 001—Introduction to Public Speaking (4)
Discussion—2 hours; Lecture—2 hours. Practice in the preparation and delivery of speeches based on principles and strategies of informing and persuading audiences drawn from the social sciences and humanities. GE credit: AH, OL, SS, WE. Effective: 2017 Winter Quarter.

CMN 003—Interpersonal Communication Competence (4)
Discussion—2 hours; Lecture—2 hours. Communication competence in professional settings. Managing face-to-face and virtual teams. Leadership, conflict management and negotiation skills. Communication in diverse organizations. Leveraging communication networks. Effective interviewing. GE credit: SS, WE. Effective: 2018 Spring Quarter.

CMN 003V—Interpersonal Communication Competence (4)
Web Electronic Discussion—2 hours; Web Virtual Lecture—2 hours. Communication competence in professional settings. Managing face-to-face and virtual teams. Leadership, conflict management and negotiation skills. Communication in diverse organizations. Leveraging communication networks. Effective interviewing. GE credit: SS, WE. Effective: 2018 Spring Quarter.

CMN 003Y—Interpersonal Communication Competence (4)
Discussion—2 hours; Web Virtual Lecture—2 hours. Communication competence in professional settings. Managing face-to-face and virtual teams. Leadership, conflict management and negotiation skills. Communication in diverse organizations. Leveraging communication networks. Effective interviewing. GE credit: SS, WE. Effective: 2018 Spring Quarter.

CMN 005—Global English and Communication (4)
Discussion—2 hours; Lecture—2 hours. English as a global language and its uses in intercultural communication. Cultural, historical, and political dimensions of varieties of English spoken around the world. Experiential grounding in strategies for increasing interpretive and verbal communicative competence for a globalized world. (LIN 005.) GE credit: AH, OL, SS, WC. Effective: 2012 Spring Quarter.

CMN 010V—Introduction to Communication (4)
Web Electronic Discussion—1 hour; Web Virtual Lecture—3 hours. Basic principles of communication and communication processes; models of communication; foundations of empirical research in communication; contexts of communication and communication research, including interpersonal, intercultural, news, entertainment, mediated, and others. Not open for credit to students who have taken CMN 010Y. GE credit: SS. Effective: 2016 Fall Quarter.

CMN 010Y—Introduction to Communication (4)
Discussion—1 hour; Web Virtual Lecture—3 hours. Basic principles of communication and communication processes; models of communication; foundations of empirical research in communication; contexts of communication and communication research including interpersonal, intercultural, news, entertainment, mediated, and others. Not open for credit to students who have taken CMN 010V. GE credit: SS. Effective: 2017 Winter Quarter.

CMN 012Y—Data Visualization in the Social Sciences (4)
Laboratory—1.5 hours; Lecture—2 hours; Web Virtual Lecture—1.5 hours. Introduction to quantitative data across the social sciences (Communications, Political Science, Psychology, Sociology, and other disciplines). Transforming data, describing data, producing graphs, visual reasoning, and interpretations. (SOC 012Y, POL 012Y, and PSC 012Y.) GE credit: QL, VL. Effective: 2016 Spring Quarter.

CMN 076—Video Games and Virtual Environments (4)
Discussion—1 hour; Lecture—3 hours. Impact of video games on players and society. Topics include motivations for playing games; cognitive, emotional, and behavioral effects, including violence and addiction; interpersonal and group processes in online games; virtual communities; and video games for education. GE credit: SS, VL. Effective: 2015 Winter Quarter.

CMN 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

CMN 101—Communication Theories (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Forms, functions, development, and testing of communication theory, with emphasis on social scientific approaches. Survey and comparison of significant micro and macro theories and models of face-to-face and mediated communication. Application of theories to real world problems. GE credit: SS. Effective: 2011 Fall Quarter.

CMN 101—Communication Theories (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Forms, functions, development, and testing of communication theory, with emphasis on social scientific approaches. Survey and comparison of significant micro and macro theories and models of face-to-face and mediated communication. Application of theories to real-world problems. Not open for credit to students who have taken CMN 101Y. GE credit: SS. Effective: 2018 Fall Quarter.

CMN 101Y—Communication Theories (4)
Discussion—1 hour; Web Virtual Lecture—3 hours. Forms, functions, development, and testing of communication theory, with emphasis on social scientific approaches. Survey and comparison of significant micro and macro theories and models of face-to-face and mediated communication. Application of theories to real-world problems. Not open for credit to students who have taken CMN 101. GE credit: SS. Effective: 2018 Fall Quarter.

CMN 102—Empirical Methods in Communication (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 013 or STA 013Y; Or equivalent of STA 013. Social scientific research methods employed in Communication. Topics include research design, measurement, sampling, questionnaire construction, survey research, experimental design, content analysis and qualitative field methods. GE credit: SS. Effective: 2018 Winter Quarter.

CMN 110—Communication Networks (4)
Discussion/Laboratory—1 hour; Lecture/Discussion—3 hours. Theoretical approaches to communication networks, practical applications of network studies, and network analysis tools. Friendship, political discussion, social support, organizational, social media, and disease transmission networks are examined. Impact of emerging technologies on network creation, maintenance, and expansion. GE credit: SS. Effective: 2017 Fall Quarter.

CMN 111—Gender Differences in Communication (4)
Lecture—4 hours. Pass One open to Communication majors only. Examination of communication differences between men and women as sources of male/female stereotypes, misunderstandings, dilemmas, and difficulties (real and imagined). Treatment of genders as cultures. Topics include male/female differences in discursive practices and patterns, language attitudes, and relationship dynamics. Not open for credit to students who have taken CMN 103. GE credit: DD, SS. Effective: 2015 Fall Quarter.

CMN 112—Theories of Persuasion (4)
Lecture/Discussion—4 hours. Pass One open to Communication majors only. Theories and models of persuasion that account for the effects of source, channel and audience factors on message recipients. Examination of message strategies for altering attitudes and gaining compliance. Contexts of application include interpersonal relationships, advertising, politics, and health. Not open for credit to students who have taken CMN 152. GE credit: SS. Effective: 2015 Fall Quarter.

CMN 114—Communication and Cognition (4)
Lecture/Discussion—4 hours. Pass One open to Communication majors only. Relationship between communication and cognition in interpersonal and mediated contexts. Discourse comprehension and production, impact of language attitudes on social judgments, the effects of information processing on decision making. Not open for credit to students who have completed CMN 138. GE credit: SS, WE. Effective: 2018 Winter Quarter.

CMN 120—Interpersonal Communication (4)
Lecture—4 hours. Pass One open to Communication majors only. Theories and principles of interpersonal communication related to perception, verbal and nonverbal channels, mutual understanding, and relationship development. Communication processes in face-to-face and technologically-mediated encounters. Consideration of different relationship contexts, including friendships, dating and family relationships, and the workplace. Not open for credit to students who have completed CMN 134. GE credit: SS. Effective: 2016 Winter Quarter.

CMN 121—Language Use in Conversation (4)
Lecture/Discussion—4 hours. Pass One open to Communication majors only. Examination of how people use language in social interaction, how they exchange meaning during conversation, and how their use of language plays a central role in turn-taking, speech acts, attitude formation, figurative speech, politeness, and other aspects of conversation. Not open for credit to students who have taken CMN 105. GE credit: SS. Effective: 2016 Spring Quarter.

CMN 122—Nonverbal Communication (4)
Lecture—4 hours. Pass One open to Communication majors only. Examination of the interaction between nonverbal communication and verbal communication channels in influencing outcomes in interpersonal relationships. Underlying functions served by nonverbal communication are considered. Not open for credit to students who have completed CMN 135. GE credit: SS. Effective: 2015 Fall Quarter.

CMN 123—Intercultural Communication (4)
Seminar—3 hours; Term Paper. Major concepts and theories of intercultural communication. Topics include cultural similarities and differences in verbal and nonverbal communication; dimensions of cultural variations, barriers to intercultural communication, and intercultural communication competence. Not open for credit to students who have taken CMN 137. GE credit: DD, SS. Effective: 2016 Winter Quarter.

CMN 124—Family Communication (4)
Lecture/Discussion—4 hours. Theories and research on family communication. Communication in courtship, marriage, and relational dissolution. Processes and outcomes of parent-child, sibling, family roles, and inter-generational communication. Interaction patterns associated with marital/family satisfaction, maintenance, divorce, and dysfunction. Cultural influences on family communication. GE credit: SS. Effective: 2017 Fall Quarter.

CMN 130—Group Communication (4)
Discussion—1 hour; Lecture—3 hours. Communication processes in the development and maintenance of effective groups and teams in organizations. Examination of both face-to-face and computer-mediated group interaction. Topics include group development, power, norms, cohesion, decision making, problem solving, creativity, conflict management, working remotely, and leadership. GE credit: SS. Effective: 2014 Fall Quarter.

CMN 131—Strategic Communication in Public Relations (4) ***Review all entries***
Lecture/Discussion—4 hours. Pass One open to Communication majors only. Principles, evolution, and professional practice of public relations. Planning and execution of effective, ethical communication strategies and campaigns. Distribution of messages through traditional and new media, including social media. Cultivation of relationships between organizations and their publics. Crisis communication management. GE credit: SS. Effective: 2015 Fall Quarter.

CMN 131—Strategic Communication in Public Relations (4) ***Review all entries***
Lecture/Discussion—4 hours. Principles, evolution, and professional practice of public relations. Planning and execution of effective, ethical communication strategies and campaigns. Distribution of messages through traditional and new media, including social media. Cultivation of relationships between organizations and their publics. Crisis communication management. GE credit: SS, WE. Effective: 2018 Fall Quarter.

CMN 132—Social Media for Public Relations (4)
Lecture/Discussion—4 hours. Prerequisite(s): CMN 131 Uses of social media technologies in contemporary public relations practice. Social and behavioral theories of social media processes and effects. Strategies and tools for authoring content that builds relationships and creates conversations with key publics. GE credit: SS. Effective: 2016 Fall Quarter.

CMN 136—Organizational Communication (4)
Lecture—4 hours. Pass One open to Communication majors only. Organizational communication theory and practice is examined with an emphasis on the use of effective communication strategies for achieving organizational goals. GE credit: SS. Effective: 2016 Spring Quarter.

CMN 139—Advanced Organizational Communication (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): CMN 136 Pass One open to Communication majors only. Communication processes within and among social organizations. Examines formal organizations as information processing systems. Topics include general systems theory, input-output analysis, structural-functionalism, cybernetics, organizational network analysis, organization environments, organizations as cultures, organizational learning, information technologies, and communication diagnostic/auditing strategies. GE credit: SS, WE. Effective: 2011 Fall Quarter.

CMN 140—Introduction to Mass Communication (4)
Discussion—1 hour; Lecture—3 hours. History of mass media and media research traditions. Organization and economics of the media industry. Media policy, law, regulation and ethics. Impact of the media on individuals and society. Traditional, new and emerging communication technologies. GE credit: SS. Effective: 2017 Fall Quarter.

CMN 141—Media Effects: Theory and Research (4)
Lecture/Discussion—4 hours. Pass One open to Communication majors only. Social scientific studies of the effects of mass media messages on audience members' actions, attitudes, beliefs, and emotions. Topics include the cognitive processing of media messages, television violence, political socialization, cultivation of beliefs, agenda-setting, and the impact of new technologies. GE credit: SS. Effective: 2018 Winter Quarter.

CMN 142—Newsmaking (4)
Lecture/Discussion—4 hours. Pass One open to Communication majors only. The making of news. How journalists construct news and how consumers and newsmakers use it. Effects of news, technology’s challenges to journalism, and the relationship of news to other institutions. GE credit: ACGH, SS. Effective: 2018 Winter Quarter.

CMN 143—Analysis of Media Messages (4)
Lecture/Discussion—3 hours; Term Paper. Pass One open to Communication majors only. Examination of alternative approaches to the analysis, interpretation, and evaluation of media messages, including those disseminated through broadcasting, print, and new technologies. GE credit: ACGH, SS, WE. Effective: 2018 Winter Quarter.

CMN 144—Media Entertainment (4)
Lecture/Discussion—3 hours; Term Paper. Pass One open to Communication majors only. Effects and appeal of media entertainment, emphasizing emotional reactions. Topics include key concepts of entertainment research such as mood management, and the respective features and emotional/social-psychological effects of genres such as comedy, mystery, thriller, sports, music, horror, and erotica. GE credit: SS, WE. Effective: 2017 Spring Quarter.

CMN 145—Political Communication (4)
Extensive Writing; Lecture/Discussion—3 hours. Pass One open to Communication majors only. Relationships among the mass media, citizens, and politics, production of political news, campaign strategies, and citizens' attitudes and behaviors. Frameworks for mediated politics, the news, and elite discourse and campaign messages. GE credit: ACGH, SS, WE. Effective: 2018 Winter Quarter.

CMN 146—Communication Campaigns (4)
Lecture/Discussion—4 hours; Term Paper. Pass One open to Communication majors only. Strategic uses of media and interpersonal communication channels in health, environmental advocacy, and political campaigns. Emphasis on general principles relevant to most campaign types, including public information, social marketing, and media advocacy campaigns. GE credit: SS. Effective: 2016 Fall Quarter.

CMN 147—Children, Adolescents, and the Media (4)
Lecture/Discussion—4 hours. Open to Communication majors only on Pass 1. Research on the adaptive and maladaptive effects of media (e.g., television, movies, video games, social media) on the social, emotional, cognitive, and physical development of youth, considering the protective role of parents, teachers, ethics, and policy. GE credit: SS. Effective: 2016 Fall Quarter.

CMN 148—Contemporary Trends In Media (4)
Lecture/Discussion—4 hours. Pass One open to Communication majors only. Global trends in media, including media and globalization, impacts of the new media economy, media and security, and effects of ownership on media content and culture. GE credit: OL, SS, WC. Effective: 2017 Spring Quarter.

CMN 150V—Computational Social Science (4)
Web Electronic Discussion—2 hours; Web Virtual Lecture—2 hours. Nontechnical survey of modern computational research methods. Web scraping, artificial intelligence, visualizing social networks, and computer simulations. Hands-on use of diverse software applications. Professors from all ten UC campuses contribute. GE credit: QL, SS. Effective: 2017 Winter Quarter.

CMN 151—Simulating Communication Processes (4)
Lecture/Discussion—3 hours; Term Paper. Simulations of communication and sociality using agent-based models. Focus on strategic behavior, cooperation, coordination, self-organization, information diffusion, and other communication phenomena. No programming skills assumed. GE credit: QL, SS, WE. Effective: 2018 Fall Quarter.

CMN 161—Health Communication (4)
Extensive Writing; Lecture/Discussion—3 hours. Health communication theories and research. Health literacy, social support and coping, doctor-patient interaction, health communication campaigns, media influences on health, and applications of new technologies in health promotion. GE credit: SS, WE. Effective: 2017 Fall Quarter.

CMN 165—Media and Health (4)
Lecture/Discussion—4 hours. Content and effects of health messages in the media. Topics include health news reporting; portrayals of disease, disability, death and health-related behaviors; promotion of drugs and other health products; and tobacco and alcohol advertising. GE credit: SS, WE. Effective: 2018 Winter Quarter.

CMN 170—Digital Technology and Social Change (4)
Lecture/Discussion—4 hours. Conceptual understanding of how digital communication technologies transform our lives through social media, mobile connectivity, globalization, and big data. Contexts of application include education, health, entrepreneurship, democracy, and poverty. Not open for credit to students who have completed CMN 170V. GE credit: SS. Effective: 2016 Spring Quarter.

CMN 170V—Digital Technology and Social Change (4)
Web Electronic Discussion—1 hour; Web Virtual Lecture—3 hours. Conceptual understanding of how digital technologies transform our lives, through social media, mobile connectivity, globalization, big data, and artificial intelligence. Context of course include education, health, entrepreneurship, democracy, among others. Not open for credit to students who have completed CMN 170. GE credit: SS. Effective: 2016 Winter Quarter.

CMN 172—Interpersonal Technologies (4)
Discussion—1 hour; Lecture—3 hours. Pass One open to Communication majors only. Theories and research findings on how people use technologies for interpersonal and relational purposes, including impression formation, self-presentation, deception, anonymity, friendship maintenance, online dating, and emotional expression. GE credit: SS. Effective: 2017 Fall Quarter.

CMN 174—Social Media (4-6)
Lecture/Discussion—4 hours. Application of communication theories to the study and design of social media. Examination of social media in contexts such as political activism and collaboration. Topics include online credibility, participatory culture, viral media and privacy. GE credit: ACGH, SS, WE. Effective: 2018 Spring Quarter.

CMN 176—Video Games Theory and Research (4)
Discussion/Laboratory—2 hours; Lecture/Discussion—2 hours. Communication theory and research on the uses and effects of video games. Research methods available for investigating game use and the impact of games on behavior. Application of those methods in a research project. GE credit: SS. Effective: 2018 Winter Quarter.

CMN 178—Persuasive Technologies (4)
Lecture/Discussion—3 hours; Term Paper. Designing and testing ethical, technology-based communication interventions in the domains of health, marketing, education, and environment. Social media, mobile apps, wearable devices, recommendation systems, serious games, and augmented reality. GE credit: SS, WE. Effective: 2017 Fall Quarter.

CMN 180—Current Topics in Communication (4)
Lecture/Discussion—4 hours. Prerequisite(s): CMN 101; CMN 102; Or a research methods course equivalent to CMN 102. Pass One open to Communication majors only. Group study of a special topic in communication. May be repeated up to 1 time(s) when topic differs. GE credit: SS. Effective: 2011 Fall Quarter.

CMN 189A—Proseminar in Social Interaction (4)
Seminar—3 hours; Term Paper. Prerequisite(s): CMN 101; CMN 102; CMN 136; and Consent of Instructor. Open to Communication majors only. Reading, discussion, research, and writing on a selected topic in the specialty of social interaction. Potential topics include relationship initiation, maintenance, and deterioration; communication failure; nonverbal communication; conversational management; semantics and pragmatics of languages; and family/marital communication. May be repeated for credit when topic differs. GE credit: SS, WE. Effective: 2011 Fall Quarter.

CMN 189B—Proseminar in Mass Communication (4)
Seminar—3 hours; Term Paper. Prerequisite(s): CMN 101; CMN 102; CMN 140; and Consent of Instructor. Open to Communication majors only. Reading, discussion, research, and writing on a selected topic in the specialty of mass communication. Potential topics include, agenda-setting, the cultivation of beliefs, television violence, media portrayals of underprivileged groups, mediated political discourse, interactive technologies, and international/global communications. May be repeated for credit when topic differs. GE credit: SS, WE. Effective: 2011 Fall Quarter.

CMN 189C—Proseminar in Health Communication (4)
Seminar—3 hours; Term Paper. Prerequisite(s): CMN 101; CMN 102; (CMN 161 or CMN 165); and Consent of Instructor. Open to Communication majors only. Reading, discussion, research, and writing on a selected topic in health communication. Potential topics include health communication design and evaluation, media advocacy, physician-patient interaction, uses of communication technologies in health settings, and health-related advertising. May be repeated for credit when topic differs. GE credit: SS, WE. Effective: 2011 Fall Quarter.

CMN 189D—Proseminar in Organizational Communication (4)
Seminar—3 hours; Term Paper. Prerequisite(s): CMN 101; CMN 102; CMN 136; and Consent of Instructor. Open to Communication majors only. Reading, discussion, research, and writing on a selected topic in the specialty of organizational communication. Potential topics include organizational networks, organizational conflict and its resolution, mediation, bargaining and negotiation, superior-subordinate interaction, leadership styles, and inter-organizational communication. May be repeated for credit when topic differs. GE credit: SS, WE. Effective: 2011 Fall Quarter.

CMN 192—Internship in Communication (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Communication majors who have completed 20 units of upper division communication courses. Open to Communication majors only. Supervised work experience requiring the application of communication principles and strategies or the evaluation of communication practices in a professional setting. Relevant experiences include public relations, advertising, sales, human resources, health promotion, political campaigns, journalism, and broadcasting. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2016 Fall Quarter.

CMN 194H—Senior Honors Thesis (4)
Project (Term Project)—3 hours; Seminar—1 hour. Prerequisite(s): Senior standing and approval by Honors Committee. Directed reading, research, and writing culminating in the preparation of honors thesis under direction of faculty advisor. GE credit: SS, WE. Effective: 1997 Winter Quarter.

CMN 197T—Tutoring in Communication (2-4)
Laboratory—1-2 hours; Seminar—1-2 hours. Prerequisite(s): Upper division standing with major in Communication and consent of Department Chairperson. Tutoring in undergraduate Communication courses, including leadership of discussion groups affiliated with departmental courses. May be repeated up to 6 unit(s). (P/NP grading only.) Effective: 1997 Fall Quarter.

CMN 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

CMN 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

CMN 201—Theoretical Perspectives on Communication (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing in Communication. Open to Communication graduate students only. Social scientific study of Communication. Research on interpersonal, organizational, mass, political, and health communication; communication technologies (e.g., video games, social media, persuasive technologies); and communication network analysis. Effective: 2017 Fall Quarter.

CMN 202—Communication Theory Construction (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Alternative meta-theoretical perspectives for theory generation in communication inquiry. Processes of construct explication, operationalization and theory construction. Emphasis on the critique of extant communication theories and the development of theory construction skills. Effective: 2006 Winter Quarter.

CMN 203—Scientific Methods for Communication (4)
Seminar—3 hours; Term Paper. Prerequisite(s): CMN 201; CMN 202; PSC 204A; PSC 204B; Or equivalents. Social scientific research methods commonly employed in Communication. Topics include research design measurement sampling questionnaire construction survey research experimental design evaluation research content analysis and qualitative field methods. Effective: 2014 Winter Quarter.

CMN 204—Biological Foundations of Communication (4)
Lecture/Discussion—3 hours; Term Paper. Communibiological, evolutionary, neuroscience, and neurophysiological perspectives on communication. Methodologies for examining human physiological responses to messages, such as heart rate, skin conductance, electromyography, and cortical activity. Effective: 2017 Fall Quarter.

CMN 210—Experimental Methods and Analysis in Communication (4)
Lecture—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing; one course in inferential statistics. Experimental designs in communication. Topics include: causation; threats to validity; conceptualization, operationalization, and measurement; hypothesis testing; ethics; data analysis software focusing on the analysis of variance and planned contrasts; and the practical and effective implementation and writing of experiments. Effective: 2010 Fall Quarter.

CMN 211—Survey Research Methods in Communication (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing; one course in inferential statistics. Methods for designing personal interview, phone, mail, and web-based surveys in communication. Topics include: sampling strategies, sources of error and bias in survey designs, questionnaire construction, cognitive interviewing, interviewer behavior, and analysis of complex survey data using standard software packages. Effective: 2011 Winter Quarter.

CMN 212—Web Science Research Methods (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Applications of data science to web-based communication research. Design, implementation, analysis, and reporting of studies using online data. Use of Python to scrape, organize, analyze, and visualize web data. Effective: 2018 Spring Quarter.

CMN 213—Theory Development in Communication Inquiry (4) ***Review all entries Discontinued***
Seminar—4 hours. Effective: 2005 Fall Quarter.

CMN 213—Simulation Methods in Communication Research (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Simulation methods for modeling human communication. Single and multiple agent approaches to developing process theories of cooperation, coordination, strategic behavior, information and innovation diffusion, and other aspects of sociality. Effective: 2018 Fall Quarter.

CMN 214—Mass Communication Theory and Research (4) ***Review all entries Discontinued***
Seminar—4 hours. Effective: 2005 Fall Quarter.

CMN 214—Analysis of Communication Networks (4) ***Review all entries***
Lecture/Discussion—3 hours; Term Paper. Theoretical and analytic issues pertaining to network perspectives on communicating and organizing. Consideration of structural and dynamic features of communication networks. Introduction to network analysis software and various analysis techniques. Effective: 2018 Fall Quarter.

CMN 220—Persuasion Theories and Message Design ()
Prerequisite(s): Consent of Instructor. Graduate standing. Major social scientific theories and perspectives on attitude change and persuasion. Application of persuasion theories and principles to persuasive message design in applied contexts. Effective: 2005 Fall Quarter.

CMN 221—Communication and Cognition (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Explores the cognitive structures and processes that enable the production, comprehension and interpretation of messages in face-to-face and mediated communication contexts. Explores the communication outcomes associated with these processes. Effective: 2005 Fall Quarter.

CMN 222—Risk Communication (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Theories and models of individual risk information processing. Media depictions of threats and risk-related information and their potential effects on audiences. Implications for the design and implementation of messages concerning threat and risk. Effective: 2005 Fall Quarter.

CMN 230—Social Interaction Theory and Research (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Survey of theories and research on social interaction and interpersonal communication. Covers communication codes, individual differences in communication, communication and relationship development, family communication, conflict, cognitive and emotional processes underlying social interaction, social influence, intercultural communication, and nonverbal behavior. Effective: 2005 Fall Quarter.

CMN 231—Tactics of Interpersonal Influence (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Achievement of interpersonal goals in social interaction. Topics include message production; tactics, strategies and planning; anticipating potential obstacles; resisting and thwarting goals; plan recognition; and goal detection. Examined goals include compliance gaining, attitude change, ingratiation, information seeking, comforting, and deception. Effective: 2005 Fall Quarter.

CMN 232—Health Communication (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Health communication theories and research traditions. Topics include consumer health information seeking; physician-patient interaction; information, social marketing, "edutainment," and media advocacy campaigns; social networks and coping; media influences on health; and new communication technologies in health promotion and healthcare delivery. (SPH 232.) Effective: 2011 Fall Quarter.

CMN 233—Persuasive Technologies for Health (4)
Lecture/Discussion—3 hours; Term Paper. Theorizing, designing and evaluating ethical technology-based health communication interventions. Uses of social media, mobile communication apps, wearable devices, computer-generated tailored messages, educational games, and computational approaches in health promotion and healthcare delivery. (SPH 233.) Effective: 2017 Fall Quarter.

CMN 234—Intercultural Communication (4)
Seminar—3 hours; Term Paper. Restricted to graduate standing. Theories and research on intercultural communication. Topics include national, racial, and ethnic similarities and differences in communication practices; cultural beliefs and values; identity and conflict; and technological influences on intercultural communication. Methodological issues in intercultural communication research are also examined. Effective: 2016 Spring Quarter.

CMN 235—Health Communication Campaigns (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Restricted to graduate students. Principles of health communication campaign planning, implementation and evaluation. Strategies for changing health behaviors, shaping policy, and improving healthcare organizations' relations with stakeholders. (SPH 235.) Effective: 2017 Fall Quarter.

CMN 243—Media and Health (4)
Seminar—3 hours; Term Paper. Restricted to graduate standing. Survey of research on media and health. Topics include health news coverage; depictions of health, illness and disability in entertainment; health campaigns; advertising of health products and services; and the influence of gaming and other new media on health behaviors. Effective: 2010 Fall Quarter.

CMN 244—Organizational Communication (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Theory and research on communication processes in organizations. Effective: 1997 Winter Quarter.

CMN 250—Mediated Communication Theory and Research (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Survey of major theories on the intended and unintended effects of mediated communication. Topics include media's effects on learning, political behavior, interpersonal violence, sexual socialization, consumer behavior, race relations, gender socialization, and cultural processes. Effective: 2005 Fall Quarter.

CMN 251—Digital Technology and Social Change (4)
Seminar—3 hours; Term Paper. Conceptual, theoretical, and international consideration of how digital communication technologies transform social organization and development. Topics include social media, big data, political revolutions, e-democracy, digital divide, e-education, e-health, entrepreneurship, public policies, poverty reduction, technological innovations, microfinance, and entertainment. Not open to students who have taken CMN 251Y. Effective: 2017 Spring Quarter.

CMN 251Y—Digital Technology and Social Change (4)
Discussion—2 hours; Web Virtual Lecture—2 hours. Discussion and research on how digital technologies transform our lives through social media, mobility, big data, global connectivity, and artificial intelligence; changing business, health, democracy, globalization, families, dating, and education. Not open to students who have taken CMN 251. Effective: 2017 Fall Quarter.

CMN 252—Computer-Mediated Communication (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Effective: 2005 Fall Quarter.

CMN 253—Children, Adolescents, and the Media (4)
Lecture/Discussion—3 hours; Term Paper. Theory and research on the uses and effects of traditional and new media on children and adolescents, emphasizing social, emotional, cognitive, and physical development. Methodological approaches and ethical issues in studies of underage populations. Parent and family mediation of effects. Effective: 2017 Winter Quarter.

CMN 254—Communication Campaigns (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Strategic uses of media and interpersonal channels to promote social change through social marketing, information, and media advocacy campaigns. Focus on theory-based interventions in a variety of applied contexts. Effective: 2005 Fall Quarter.

CMN 255—Social Media (4)
Seminar—3 hours; Term Paper. Theoretical, conceptual and analytic issues pertaining to social media research. Topics include motivation, participation, virality, and social-technical capital. Examination of social media in various contexts. Introduction to online behavioral data collection and analysis methods. Effective: 2014 Fall Quarter.

CMN 256—Communication Perspective on Video Games (4)
Seminar—3 hours; Term Paper. Review of theory and research on the uses and effects of video games and virtual environments developed for entertainment and education. Study of the research methods available for documenting and measuring game use and effects on behavior. Effective: 2014 Fall Quarter.

CMN 259—Cognitive Approaches to Media (4)
Seminar—3 hours; Term Paper. Restricted to graduate standing. Interdisciplinary examination of cognitive approaches to mediated communication. Application of studies on mediated message processing, cognitive and emotional information processing, psychophysiology, and neuroscience to mass communication. Review of media research and methods on attention, memory, motivation, and limited capacity. Effective: 2014 Fall Quarter.

CMN 260—Political Communication (4)
Lecture/Discussion—3 hours; Term Paper. Theories and research on the connections between media, politics, and citizens in the digital age. Critical framework for understanding the nature of mediated politics by assessing inter-relationships between production of news, political elites' campaign strategies, and behaviors of citizens. Effective: 2017 Winter Quarter.

CMN 270—Diffusion of Innovations (4)
Seminar—3 hours; Term Paper. Communication processes by which information and innovations spread through social systems. Models of diffusion, including spatial, network, time dependent, semantic and cognitive frameworks. Impact of communication technologies on diffusion. Practical application of diffusion models in a variety of contexts. Effective: 2015 Spring Quarter.

CMN 271—Communication Networks (4)
Seminar—3 hours; Term Paper. Theoretical, conceptual, and analytic issues pertaining to network perspectives on communicating and organizing. Consideration of both structural and dynamic features of communication networks. Examination of the impact of emerging technologies on communication networks. Introduction to network analysis software. Effective: 2014 Fall Quarter.

CMN 280—Special Topics in Social Interaction (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Reading, discussion, research, and writing on a selected topic in the specialty of social interaction. May be repeated for credit May be repeated when topics differ. Effective: 2005 Fall Quarter.

CMN 281—Special Topics in Mediated Communication (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Reading, discussion, research, and writing on a selected topic in the speciality of mediated communication. May be repeated for credit May be repeated when topics differ. Effective: 2005 Fall Quarter.

CMN 282—Special Topics in Health Communication (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Reading, discussion, research and writing on a focused topic in health communication. May be repeated for credit when topics differ. Effective: 2016 Fall Quarter.

CMN 283—Special Topics in Organizational Communication (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Reading, discussion, research, and writing on a selected topic in the specialty of organizational communication. May be repeated for credit May be repeated when topics differ. Effective: 2005 Fall Quarter.

CMN 298—Group Study (1-5)
Lecture—3 hours. (S/U grading only.) Effective: 1997 Winter Quarter.

CMN 299—Individual Study (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

CMN 299R—Thesis/Dissertation Research and Writing (1-12)
Independent Study—3-36 hours. Prerequisite(s): Consent of Instructor. Graduate standing in Communication. Students in the Department of Communication graduate programs conduct dissertation research and writing under the supervision of a faculty member. May be repeated up to 21 time(s) Across campus, students use the course 299 numbers to reach the 12-unit requirement for full time student status. In saying that students may repeat this "course" 21 times, we assumed that students would complete their doctoral programs within seven years (five is the norm). The value 21 was based on the calculation 3 quarters * 7 years. (S/U grading only.) Effective: 2017 Winter Quarter.

CMN 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

CNS Consumer Sciences

Questions pertaining to the following courses should be directed to the Food Science Advising office in 1204 RMI South.

Courses in CNS:

CNS 092—Internship in Consumer Science (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Internship on and off campus in a consumer science related area. (P/NP grading only.) Effective: 1997 Winter Quarter.

CNS 100—Consumer Behavior (3)
Lecture—3 hours. Prerequisite(s): Preparation in areas of psychology or sociology and economics recommended. Provides a set of behavioral concepts and theories useful in understanding consumer behavior on the part of the individual, business, and social organizations. Conceptual models to help guide and understand consumer research will be presented. GE credit: SS, WE. Effective: 1997 Winter Quarter.

CNS 192—Internship in Consumer Science (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of a minimum of 84 units. Internship on and off campus in a consumer science related area (P/NP grading only.) Effective: 1997 Winter Quarter.

CNS 198—Directed Group Study (1-5)
(P/NP grading only.) Effective: 1997 Winter Quarter.

CNS 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

CNS 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

CNS 396—Teaching Assistant Training Practicum (1-4)
Variable. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

CTS Cinema & Technocultural Studies

Courses in CTS:

CTS 012—Introduction to Media Computation (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Introduction to key computational ideas necessary to understand and produce digital media. Fundamentals of programming are covered as well as analysis of how media are represented and transmitted in digital form. Aimed primarily at non-computer science students. (ECS 012.) GE credit: AH, SE, VL. Effective: 2013 Fall Quarter.

CTS 020—Filmmaking Foundations (5)
Film Viewing—2 hours; Laboratory—3 hours; Lecture—3 hours; Project (Term Project). Prerequisite(s): CTS 005 or TCS 005 and/or FMS 001 recommended. Introduction to filmmaking concepts, principles, and methods. Hands-on exercises build critical and creative capacities. Emphasis on form, content and the historical dialectic between classical narrative filmmaking conventions and artists' challenges to these conventions. Weekly Lab, Lab Preparation, and Evening Screening. GE credit: AH, VL. Effective: 2013 Fall Quarter.

CTS 040A—Media History 1, Guttenberg to Oppenheimer (4)
Discussion—1 hour; Extensive Writing; Film Viewing—2 hours; Lecture—3 hours. History of Media to 1945, with particular focus on mechanically reproduced mass media technologies including the printing press, the newspaper, photography, cinema, radio and early computing technology. Analysis of inter-related cultural and political topics. (STS 040A.) GE credit: AH, OL, SS, VL, WE. Effective: 2014 Fall Quarter.

CTS 040B—Media History 2 1945-Present (4)
Discussion—1 hour; Extensive Writing; Film Viewing—2 hours; Lecture—3 hours. Prerequisite(s): CTS 040A History of media from 1945 to present, with particular focus on the development of the computer, digital network and internet technologies in the context of other media infrastructures like radio, television and satellite networks. Analysis of inter-related cultural/political topics. (STS 040B.) GE credit: AH, OL, SS, VL, WE. Effective: 2015 Winter Quarter.

CTS 041A—History of Cinema from 1895 to 1945 (4)
Discussion—1 hour; Extensive Writing; Film Viewing—3 hours; Lecture—2 hours. Examination of the cultural context of the emergence of cinema. Discussion of cinema as a product of the age of industrialization and conquest, as well as an element of urban culture, and mass transportation. GE credit: AH, OL, VL, WC, WE. Effective: 2014 Fall Quarter.

CTS 041B—History of Cinema from 1945 to the present (4)
Discussion—1 hour; Extensive Writing; Film Viewing—3 hours; Lecture—2 hours. Examination of cinema in the postwar period. Study of world cinema trends and the economic and socio-political conditions enabling innovative work in the film industry. GE credit: AH, OL, VL, WC, WE. Effective: 2014 Fall Quarter.

CTS 116—Design on Screen (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Analysis of the contribution of outstanding designers for cinema, television and filmed entertainment. Study of diverse aesthetic theories of production design and art direction, costume design, or cinematography. Introductory principles and practice, history. May be repeated up to 2 time(s) when topic differs. (DRA 116.) GE credit: AH, VL. Effective: 2013 Fall Quarter.

CTS 124E—Costume Design for Film (4)
Lecture/Discussion—4 hours. Prerequisite(s): DRA 024; or Consent of Instructor. Pass One restricted to Theatre and Dance majors. Theory and practice of the art and business of film costume design. Script analysis, costume research, developing design concepts, budgeting, and current production practices and methods. Execution of designs for period and contemporary films. Viewing of current films. (DRA 124E.) GE credit: AH, OL, VL. Effective: 2017 Spring Quarter.

CTS 146A—Modern Iranian Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): Upper division standing, or consent of instructor. Iranian cinema of the 20th century in the context of profound cultural and social changes in Iran especially since the Iranian Revolution. Productions by representative directors such as Kiarostami, Makhmalbaf, Bahram Beizaie are included. Knowledge of Persian not required. (MSA 131A.) GE credit: AH, OL, VL, WC, WE. Effective: 2013 Fall Quarter.

CTS 146B—Modern South Asia Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): Upper-division standing or consent of instructor. South Asian cinema of last 100 years in the context of cultural, social, and political changes. South Asian history, Independence, Partition, urban life, class, migration, postcolonial identity, diaspora, gender, sexuality, religion, sport, performance, etc. (MSA 131B and ANT 147.) GE credit: AH, SS, VL, WC, WE. Effective: 2017 Winter Quarter.

CTS 147A—Chinese Film (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): HIS 009A; Or any course on traditional China; upper division standing. English language survey of Chinese film, from its inception to the end of the twentieth century. Chinese films as important texts for understanding national, transnational, racial, gender, and class politics of modern China. (CHN 101.) GE credit: AH, VL, WC. Effective: 2014 Winter Quarter.

CTS 148B—Japanese Literature on Film (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Survey of films based on works of Japanese literature, emphasis on pre-modern and early modern texts. Introduction to major directors of Japan, with a focus on cinematic adaptation. Lectures and readings in English. Films in Japanese with English subtitles. (JPN 156.) GE credit: AH, VL, WC, WE. Effective: 2016 Winter Quarter.

CTS 150—Media Theory (5)
Discussion—1 hour; Extensive Writing; Film Viewing—3 hours; Lecture—2 hours. Critical and theoretical approaches to the emergence of new technologies since the invention of photography. Examine various approaches to media (formalist, semiotic, structuralist, Frankfurt School, cybernetics, visual and gamer theory). (STS 151.) GE credit: AH, OL, SS, VL, WE. Effective: 2014 Fall Quarter.

CTS 162—Surveillance Technologies and Social Media (4)
Film Viewing—3 hours; Lecture—3 hours; Term Paper. Prerequisite(s): TCS 001 or STS 020 Study of the ubiquitous presence of CCTV, face recognition software, global tracking systems, biosensors, and data mining practices that have made surveillance part of our daily life. Study boundaries between security and control, information and spying. (STS 162.) GE credit: ACGH, AH, OL, SS, VL, WE. Effective: 2015 Winter Quarter.

CTS 172—Video Games and Culture (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): TCS 001 or ENL 003 or STS 001; Or equivalent of courses listed above. Critical approaches to the study of video games, focusing on formal, historical, and cultural modes of analysis. History of software and hardware in North American and global contexts. Relations of games to society, politics, economics, literature, media, and the arts. (STS 172 and ENL 172.) GE credit: ACGH, AH, SS, VL. Effective: 2014 Fall Quarter.

CTS 174—Acting for Camera (4)
Lecture/Lab—6 hours. Prerequisite(s): Consent of Instructor. Analysis and practice of acting skills required for camera work and digital media. May be repeated up to 8 unit(s) when instructor differs. (DRA 174.) Effective: 2013 Spring Quarter.

DER Med - Dermatology

Courses in DER:

DER 192—Internship in Cutaneous Biology (1-4)
Internship—8-20 hours. Prerequisite(s): Upper division standing or consent of instructor. Approval of project prior to internship by preceptor. Supervised work experience involving research on the skin. Final report. (P/NP grading only.) Effective: 1997 Winter Quarter.

DER 199—Special Study in Cutaneous Biology (1-4)
Variable. Prerequisite(s): Advanced undergraduate standing and/or consent of instructor. Special study by individual arrangement of specialized topics in biology of skin. Work may be assigned readings, laboratory research or a combination. (P/NP grading only.) Effective: 1997 Winter Quarter.

DER 299—Research in Cutaneous Biology (1-12)
Laboratory—3-36 hours. Prerequisite(s): Consent of Instructor. Independent research in cellular and biochemical mechanisms of cutaneous biology and pathology. (S/U grading only.) Effective: 1997 Winter Quarter.

DER 420—Integumentary System (2)
Clinical Activity—0.25 hours; Lecture/Discussion—3 hours. Prerequisite(s): Approval of School of Medicine Committee on Student Promotions. Restricted to Medical students only; student must have passed all SOM Year 1 courses. Cell biology, pathology, and physical diagnosis of the skin. Recognition of normal variations, and common or important dermatoses. Patient demonstrations of select conditions. (P/F grading only.) Effective: 2013 Fall Quarter.

DER 460—Dermatology Clinical Clerkship (3-9)
Clinical Activity—40 hours. Prerequisite(s): Completion of three years of medical school; or consent of instructor. Limited enrollment. Observation and participation in dermatology clinics/practice and participation in Ward Rounds and Dermatology Clinics at UC Davis Medical Center, Kaiser, and private practitioner offices. May be repeated for credit. (H/P/F grading only.) Effective: 2011 Summer Quarter.

DER 465—Specialty Externship in Dermatology (3-16)
Clinical Activity—30 hours. Prerequisite(s): Consent of Instructor. Externship provides in-depth exposure to one of a variety of sub-specialties in Dermatology. May be repeated for credit. (H/P/F grading only.) Effective: 2011 Summer Quarter.

DER 466—Away Acting Internship in Dermatology (3-18)
Clinical Activity—40 hours; Lecture—6 hours; Variable—3-18 hours. Prerequisite(s): Consent of Instructor. Work at the level of a sub intern in Inpatient and/or Outpatient settings. Expectation is to provide direct patient management. May be repeated for credit. (H/P/F grading only.) Effective: 2010 Summer Quarter.

DER 470—Introduction to Dermatopathology (6)
Clinical Activity—20 hours; Independent Study—20 hours; Lecture/Discussion—6 hours. Prerequisite(s): Consent of Instructor. Previous rotation in a Dermatology Clerkship. Restricted to fourth year medical student. Integrated, multi-specialty approach to the microscopic diagnosis of inflammatory and neoplastic skin disorders. (H/P/F grading only.) Effective: 2010 Spring Quarter.

DER 475—Telehealth in Dermatology (6)
Clinical Activity—4 hours; Project (Term Project)—36 hours. Restricted to Medical students. Introduction to the application of telehealth in dermatology to provide diagnoses, consultation, treatment, and education. Participate in teledermatology clinics with remote sites throughout California, conduct telehealth project(s), and review the latest literature in telehealth application in improving healthcare access. May be repeated up to 6 unit(s) for additional time needed to complete telehealth project or to work on new telehealth projects. (H/P/F grading only.) Effective: 2012 Winter Quarter.

DER 480—Insights in Dermatology (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. First- and second- year medical students in good academic standing. Clinical experience limited to observation of delivery of dermatologic care and attendance at some conferences. (H/P/F grading only.) Effective: 1997 Winter Quarter.

DER 495—Wound Healing: From Bench to Bedside (6)
Auto Tutorial—15 hours; Clinical Activity—12 hours; Laboratory—8 hours; Term Paper. Prerequisite(s): Consent of Instructor. Restricted to medical students only. An integrated, multi-specialty approach to clinical soft tissue wound healing. (H/P/F grading only.) Effective: 2001 Summer Quarter.

DER 498—Special Topics in Clinical Dermatology (1-6)
Independent Study—3-18 hours. Prerequisite(s): Medical students with consent of instructor. Individually arranged study of special topics in clinical dermatology
determined by student and instructor. Assigned readings and/or clinical examination of selected patients. (H/P/F grading only.) Effective: 1997 Winter Quarter.

DER 499—Research in Cutaneous Biology (1-12)
Laboratory—3-36 hours. Prerequisite(s): Consent of Instructor. Research, either laboratory or clinical, on ongoing projects within the department under supervision of faculty. (H/P/F grading only.) Effective: 1997 Winter Quarter.

DES Design

Questions pertaining to the following courses should be directed to the instructor or to the Design Advising office in 107 Art; 530-752-6244. Scheduling of classes is subject to change; please contact the Advising office to confirm when a course is offered.

Courses in DES:

DES 001—Introduction to Design (4)
Discussion—1 hour; Lecture—3 hours. Priority given to Design majors. Introduction to design discipline through readings, writing, visual problem solving, and critical analysis. Topics: design principles and elements, vocabulary, color theory, Gestalt principles, conceptualization strategies. Role of designer and products in contemporary culture including social responsibility and sustainability. GE credit: AH, VL. Effective: 2013 Spring Quarter.

DES 014—Design Drawing (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001 (can be concurrent); Students with a background in drawing or Advanced Placement Art Studio units are encouraged to submit a portfolio for review to waive this course. Priority given to Design majors. Drawing as a tool for design. Basic skills in objective observation and representation, including line, shape, tone, and space. Drawing as a tool for formulating and working through design problems. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 015—Form and Color (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001 (can be concurrent); or Consent of Instructor. Priority given to Design majors. Understanding color, form and composition as ways of communicating design concepts and content. Color theory, color mixing, interaction of color. Design principles and elements. Gestalt theory. Explores a variety of materials, media and presentation techniques. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 016—Graphic Design and Computer Technology (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001 (can be concurrent); or Consent of Instructor. Priority given to Design majors. Introduction to digital tools with emphasis on graphic design including theory, practice and technology. Includes principles of color, resolution, pixels, vectors, image enhancement, layout, visual organization, visual hierarchy, typography. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 021—Drafting and Perspective (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001 (can be concurrent); or Consent of Instructor. Priority given to Design majors. Introduction to mechanical drafting, including scaled drawing, orthogonal projection, isometric, axonometric and perspective. Includes basic rendering techniques. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 040A—Energy, Materials, and Design Over Time (4)
Discussion—1 hour; Lecture—3 hours. Global history of design across time, viewed through the lens of the effects of the creation and discovery of new energy sources, processes, and materials on design. (SAS 043.) GE credit: AH, WC. Effective: 2018 Spring Quarter.

DES 040B—Ideologies of Design (4)
Discussion—1 hour; Lecture—3 hours. Priority to Design majors. Introduction to the history and theory of design in particular relation to political, philosophical, cultural, economic, and environmental debates and objectives. GE credit: AH, WE. Effective: 2014 Spring Quarter.

DES 040C—Design for Aesthetics and Experience (4)
Discussion—1 hour; Lecture—3 hours. Priority to Design majors. Global historical survey of design's engagement with changing notions of aesthetics and experience. Relates transformations in the theory, production, and reception of all aspects of design (objects, landscapes, architectures, etc.) to larger cultural, social, and political contexts. Not open for credit to students who have taken DES 40 or DES 140. GE credit: AH, DD, WE. Effective: 2014 Spring Quarter.

DES 050—Introduction to Three-Dimensional Design (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; or Consent of Instructor. Priority given to Design majors. Design concept development and detailing as it relates to the making of objects, structures and models using form, scale and materials. Product design and rapid prototyping methods using a range of techniques for advancing the design process. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 070—Introduction to Textile Design Structures (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001 (can be concurrent); or Consent of Instructor. Priority to Design majors. Introduction to diverse methods for creating textile structures. Exploration of the creative potential of hand-constructed textiles, manipulation of fabric to create dimensional surfaces, and the basics of building and joining fabric structures. Only two units of credit to students who have completed DES 023 or DES 24; not open for credit for students who have completed both DES 023 and DES 024. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 077—Introduction to Structural Design for Fashion (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001 (can be concurrent); or Consent of Instructor. Priority given to Design majors. Study and practice of designing clothing for the human body. Emphasis on flat pattern development, structural joining sequences and the development of three-dimensional garments from two-dimensional drawings. Not open for credit to students who have completed DES 077A. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

DES 107—Advanced Structural Design for Fashion (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; DES 077; or Consent of Instructor. Priority given to Design majors. Advanced study and practice of designing clothing for the human body through pattern development and structural joining. Emphasis on draping techniques and advanced conceptualization for fashion design. GE credit: AH, VL. Effective: 2017 Spring Quarter.

DES 111—Coding for Designers (4)
Studio—6 hours. Prerequisite(s): DES 001; DES 015; DES 016; or Consent of Instructor. Pass One restricted to Design majors. Programming concepts/skills for design. Algorithm-based design and development flowcharts. Pseudo-code entry level programming. Principles of coding logic syntax structure. Analysis of history. Development iteration presentation of design projects. Not open for credit to students who completed DES 037. GE credit: SE, VL. Effective: 2018 Spring Quarter.

DES 113—Photography and Digital Imaging (4)
Studio—6 hours. Prerequisite(s): DES 001; DES 015; DES 016 Pass One restricted to Design majors. Digital imaging techniques using black/white and color. Critical analysis of photographs and the role of photography in society. Explore use and meaning of single, sequence and single composite images. Not open for credit to students who have taken DES 031. GE credit: AH, VL. Effective: 2017 Fall Quarter.

DES 115—Letterforms and Typography (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. Priority given to Design majors. Fundamentals of letterforms and typography. Characteristics of typefaces; formatting and composition of type. Principles of legibility, visual hierarchy, grid systems, and the integration of type and image. Not available for credit to students who have completed DES 022. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 116—Visual Communication: Graphic Design Studio (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; DES 115; or Consent of Instructor. Priority given to Design majors. Multiple, conceptually-linked assignments focusing on the fundamental choices designers make in translating concepts into effective graphic form. Problem finding and analysis of audience needs. Design process from research and initial concepts to project prototypes. Not open for credit to students who have completed DES 152 or DES 152A. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 117—Interactive Media I (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. Priority to Design majors. Practice of creating interactive visual media for network-based applications and principles of human computer interaction. Responsive design. User-centered research, information architecture, interface and interaction. Analysis of usability. Development and presentation of design production materials and completed interactive projects. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 126—Design Ethnography (4)
Lecture/Lab—6 hours. Prerequisite(s): DES 001; or Consent of Instructor. Pass One restricted to Design majors. Practical introduction to design ethnography through project-based work. Tools and methods, observation, interviews, fieldnotes, and synthesis of qualitative data. Exploration of participatory design. Examination of the ethical questions. GE credit: AH. Effective: 2017 Spring Quarter.

DES 127A—Sustainable Design (4)
Lecture/Discussion—4 hours. Prerequisite(s): DES 001 Priority to Design majors. Principles, practice and materials of contemporary sustainable design in the context of environmental crisis. History of sustainable design in relation to the fields of textiles, visual communication, interior architecture, exhibition design and lighting. GE credit: AH, VL. Effective: 2015 Winter Quarter.

DES 127B—Studio Practice in Sustainable Design (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 127A; DES 001; or Consent of Instructor. Priority to Design majors. Analysis and practice of sustainable design within studio context. Design project that incorporate the reuse of post consumer waste; standard materials vs. sustainable materials; Cradle to Cradle philosophy and practice. Field trips required. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 128—BioDesign Theory and Practice (4)
Lecture/Discussion—3 hours; Term Paper. Pass One restricted to Design and Art History majors. Recent biological theories and their influence upon design theory and practice; includes bio-based materials in contemporary design. GE credit: VL. Effective: 2017 Winter Quarter.

DES 131—Global Fashion and Product Design (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. Priority given to Design majors. Exploration of materials, embellishments, and structural techniques derived from historic and contemporary world cultures. Emphasis on unique qualities of individual expression applied to hand made textiles, fashion and textile products. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 132A—Textile Design: Woven Structures (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. Priority given to Design majors. Foundation course in handwoven textile structure and design, emphasizing yarn identification, basic drafting, basic weaves and their derivatives explored in context of original color effects and yarn combinations. May be repeated up to 1 time(s) with consent of instructor. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 132B—Loom-Constructed Textile Design (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; DES 132A; or Consent of Instructor. Priority to Design majors. Intermediate level study of complex fabric structure with emphasis on pattern in relation to surface, dimension, and material. May be repeated up to 1 time(s) with consent of instructor. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 134A—Introduction to Interior Design - Residential (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 021 or DES 150A); or Consent of Instructor. Priority to Design majors. Introduction to the theory and practice of interior design with focus on residential spaces. Basic methods of design conceptualization, development, and presentation. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 134B—Introduction to Interior Design - Commercial and Technical Spaces (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 021 or DES 150A); or Consent of Instructor. Pass One priority given to Design majors. Introduction to the theory and practice of interior design with focus on small commercial and technical spaces. Archetypal spaces, non-residential building systems, ADA accessibility, design programming and research methods. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 135A—Furniture Design and Detailing (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. Priority given to Design majors. Development of designs for contemporary furniture. Consideration of behavioral and physical requirements, cultural and historic expression, and structural and aesthetic qualities. Process includes research, drawings, and construction of scale models. Required field trip. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 135B—Furniture Design and Prototyping (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. Priority given to Design majors. Design and construction of full size prototype furniture based on preliminary work completed in course 135A. Material technology, construction methods, and finishes discussed. Development of shop drawings and furniture construction. Required field trip. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 136A—Lighting Technology and Design (4)
Laboratory—4 hours; Lecture/Discussion—2 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. Priority to Design majors. Introduction to lighting design and technology. Understanding the role of lighting and vision in the development of functional and aesthetically pleasing environments. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 136B—Designing with Light - Industrial Design (4)
Laboratory—4 hours; Lecture/Discussion—2 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; DES 136A; or Consent of Instructor. Priority to Design majors. Design and manipulation of light sources, luminaires, and lighting controls to enhance the functional and aesthetic impact of interior and exterior spaces. Industrial design projects explore lighting effects, light distribution characteristics, and luminaire design. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 137A—Daylighting and Interior Design (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. Priority to Design majors. Emphasis on understanding the effect of daylight on the perception of interior designs as well as on vision, luminous and thermal comfort, health and energy efficiency. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 137B—Daylighting Design Studio (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. Priority to Design majors. Introduction to daylighting through observation of its effects on interior designs using scale models of interior designs of choice and photographing them outdoors and in CLTC’s Heliodon to understand year-round performance. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 138—Materials and Methods in Interior Design (4)
Lecture/Discussion—3 hours; Project (Term Project)—1 hour. Prerequisite(s): DES 001; or Consent of Instructor. Priority to Design majors. Introduction to the finish materials used for interior design with special emphasis on sustainable and recycled products. Performance factors, relative costs and energy impacts, installation conditions and construction details, and design potential for a full range of interior materials. GE credit: AH, VL, WE. Effective: 2016 Fall Quarter.

DES 142A—World Textiles: Eastern Hemisphere (4)
Lecture—4 hours. Social contexts, meanings, aesthetics, stylistic developments, and methods significant in eastern hemisphere textiles. Emphasis on Japan, China, Indonesia, Oceania, Southern and Central Asia, Africa. GE credit: AH. Effective: 2016 Fall Quarter.

DES 142B—World Textiles: Western Hemisphere (4)
Lecture—4 hours. Social context, aesthetics, stylistic developments and methods significant in western hemisphere textiles. Emphasis on the Middle East, Europe, and the Americas up to contemporary times. Two required field trips. GE credit: AH. Effective: 2016 Fall Quarter.

DES 143—History of Fashion (4)
Discussion—1 hour; Lecture—3 hours. Priority to Design majors. History of fashion design from the earliest times to the present focusing on the ancient Middle East and Common Era North America and Europe. Emphasis on aesthetic, functional, social, economic, political and cultural aspects of clothing and personal adornment. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 144—History of Interior Architecture (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Pass One priority to Design majors. Thematic survey of interior architecture. Emphasis on dwellings in their cultural settings and development of modern interior design theories. Interiors considered in relation to buildings' exteriors, sites, and uses. GE credit: AH, WE. Effective: 2017 Fall Quarter.

DES 145—History of Visual Communication (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): DES 001; or Consent of Instructor. Priority to Design majors. Historical developments of visual communication, concentrating on the technological and aesthetic development of graphic design; origins and manifestations of current issues in visual communication; provide framework for analysis of current and future trends in visual communication. GE credit: AH, VL, WE. Effective: 2016 Fall Quarter.

DES 149—Information Design: Principles and Practice (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Upper division standing or consent of instructor. Restricted to students with upper division standing. Design principles and visual strategies for effective information display; analysis of contemporary and historical examples of visual representations and visual narratives in science, humanities, and the arts; emergence of digital methods for interactive data presentation. GE credit: AH, VL. Effective: 2014 Winter Quarter.

DES 150A—Computer-Assisted Drawing for Designers (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. DES 021 preferred. Priority given to Design majors. Computer assisted drawing and modeling using a mid-level, multi-use CAD program. Basic architectural drawing and modeling technique in both two-dimensional and three-dimensional CAD environments. Not open for credit to students who have taken DES 150. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 150B—Computer-Assisted Presentations for Interior Architecture (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; DES 150A; or Consent of Instructor. DES 021 recommended. Priority given to Design majors. Computer-assisted architectural presentation including the development of complex 3D models, techniques of photo-realistic rendering and computer simulation of movement through architectural and interior space. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 151—Type in Motion (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. DES 115 recommended. Priority given to Design majors. Fundamentals of creating motion-based, screen-based typography. Consideration of narrative structures, movement assemblage, and other visual languages, synthesized within a nuanced understanding of typography within digital space. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 154—Visual Communication: Message Campaign Design (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 115; DES 116; DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. Priority given to Design majors. Principles and application of visual design strategies for projects that address a broad public audience. Emphasis on design for social awareness/interaction/benefit. Creation of public visual-media campaign. Not open for credit to students who have completed DES 152B. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 155A—Pattern, Form and Surface (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; DES 115; (DES 014 or DES 021); DES 015; DES 016; (DES 031 or DES 113); or Consent of Instructor. Priority given to Design majors. Experimental approaches to form-making through an examination of pattern, form, and surface in historical and contemporary contexts. Explorations of alternative design processes, methods, and materials that open up new possibilities for content creation and invention in design practice. GE credit: VL. Effective: 2017 Fall Quarter.

DES 156—Graphitecture: Architecture in the Age of New Media (4)
Studio—6 hours. Prerequisite(s): DES 001; DES 014; DES 015; DES 016 Priority to Design majors. New media and its impact on environmental design; analysis of contemporary projects at the intersection of architecture and new media; time-based strategies of representation; digital narrative. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 157—Interactive Media II (4) ***Review all entries***
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; (DES 037 or DES 111); DES 117; or Consent of Instructor. Priority to Design majors. Technical and conceptual aspects of creating web sites that address current trends, such as CSS for type and position and interactivity with ActionScript. Attention to conceptual framework, visual design and user interaction design. Research and written pre-production materials required. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 157—Interactive Media II (4) ***Review all entries***
Studio—6 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; (DES 037 or DES 111); DES 117; or Consent of Instructor. Priority to Design majors. Conceptual approaches, technical practice for interactive media using the front-end stack (html, css, js). Conceptual framework, user experience, visual interface and interaction design. Research and written pre-production materials required. GE credit: AH, VL. Effective: 2018 Fall Quarter.

DES 159—Design for Understanding (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; DES 115; DES 116; or Consent of Instructor. DES 117 recommended. Pass One open to Design majors. Principles of effective information display including aspects of language, structure, legibility, sequencing, and context. Analysis of historical examples of typographic, diagrammatic, and cartographic excellence. User-centered research. Development and presentation of iterative design prototypes. Design that informs, connects, and inspires. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 160—Textile Surface Design: Patterns and Resists (4)
Studio—6 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; or Consent of Instructor. Pass one restricted to Design majors. Use of traditional and contemporary processes to create images and patterns on fabric using a variety of dyes, including direct applications, bound and mechanical resists, and surface additives. GE credit: AH, VL. Effective: 2017 Fall Quarter.

DES 161—Textile Surface Design: Screen and Digital Printing (4)
Studio—6 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016 Pass One restricted to Design majors. Design of textiles and screen printing on fabrics; soft-product development; integration of hand-produced and digitally generated imagery on cloth. GE credit: AH, VL. Effective: 2017 Spring Quarter.

DES 165—Studio Practices in Industrial Design (4) ***Review all entries***
Studio—6 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; (DES 051 or DES 150A); or Consent of Instructor. Pass One restricted to Design majors. 3D studio methods for design, including: historic and contemporary developments in industrial design; innovation in material and fabrication technology; design based projects for everyday objects including soft goods, electronics, transportation. GE credit: SE, VL. Effective: 2018 Winter Quarter.

DES 165—Studio Practices in Industrial Design (4) ***Review all entries***
Studio—6 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 050; or Consent of Instructor. Pass One restricted to Design majors. 3D studio methods for design, including: historic and contemporary developments in industrial design; innovation in material and fabrication technology; design based projects for everyday objects including soft goods, electronics, transportation. GE credit: SE, VL. Effective: 2018 Fall Quarter.

DES 166—Human Centered Design (4)
Studio—6 hours. Prerequisite(s): DES 001; DES 014; DES 015 Pass One restricted to Design majors. Human-centered approach to problem solving, ethnography, ideation, project framing, rapid prototypes, visual communication, and experiential learning. Creative approaches to graphic design, industrial design, fashion, business, and entrepreneurship. GE credit: AH, VL. Effective: 2017 Fall Quarter.

DES 167—Prototyping: From Objects to Systems (4) ***Review all entries***
Studio—6 hours. Prerequisite(s): DES 001; DES 014; DES 015; DES 050; or Consent of Instructor. Pass One restricted to Design majors. Exploration of rapid prototyping techniques for objects, interactive experiences, services and organizations. Understanding of additive manufacturing, foam models, digital interfaces and business models. GE credit: SE, VL. Effective: 2017 Fall Quarter.

DES 167—Prototyping: From Objects to Systems (4) ***Review all entries***
Studio—6 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; or Consent of Instructor. Pass One restricted to Design majors. Exploration of rapid prototyping techniques for objects, interactive experiences, services and organizations. Understanding of additive manufacturing, foam models, digital interfaces and business models. GE credit: SE, VL. Effective: 2018 Fall Quarter.

DES 169—Advanced Explorations in Textile Design (4)
Studio—6 hours. Prerequisite(s): DES 001; DES 014 or DES 021; DES 015; DES 016; DES 160 or DES 161; or Consent of Instructor. DES 070 recommended. Pass One restricted to Design majors. Advanced exploration of textile design aimed at developing unique textiles for a specific end product such as a fashion collection, functional interior design, art textile or surface design competition. May be repeated up to 1 time(s) with consent of instructor; topics and themes change yearly; criteria is 1) space with first priority to students not previously taken the course and 2) course content must be sufficiently different from the previous time the student took the course. GE credit: AH. Effective: 2017 Spring Quarter.

DES 170—Experimental Fashion & Textile Design (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. Priority to Design majors. Experimental approaches to fashion and textile design. Emphasis on developing conceptual ideas and translating them into one-of-a-kind garments and soft products. Exploration of a variety of current topics including sustainability, pattern design, new technologies, and social activism. May be repeated up to 1 time(s) with consent of instructor. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 171—Fashion Drawing: Technical and Illustration (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. Priority to Design majors. Exploration of fashion design processes for industry within the social and physical context. Emphasis on two-dimensional conceptualization of ideas, garment construction, and ideation processes utilizing commercial textiles. Field trip required. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 177—Computer-Assisted Fashion Design (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 077; DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. Priority to Design majors. Advanced exploration of apparel design processes for industry and personal expression with emphasis on computer-assisted design applications. Field trip required. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 178—Design and Wearable Technology (4)
Studio—6 hours. Prerequisite(s): DES 001; DES 014; DES 015; DES 016; or Consent of Instructor. Pass One restricted to Design majors. Introduction to wearable technology and related technologies. Emphasis on designing, and fabricating prototypes of wearable technology for value-added designs and to improve quality of life. GE credit: AH, VL. Effective: 2017 Spring Quarter.

DES 179—Fashion Design: Signature Collection (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 077; (DES 107 or DES 177); DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. Priority to Design majors. Advanced exploration of fashion design with an emphasis on professional portfolio development and presentation. Emphasis on conceptualizing, designing, and fabricating a cohesive line of wearable garments suitable for presenting in a public fashion show. May be repeated up to 1 time(s). Not open for credit to students who have taken more than 8 units of DES 191A. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 180A—Advanced Interior Design: Institutional Spaces (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 021 or DES 150A); or Consent of Instructor. Priority to Design majors. Advanced interior design problems focused on complex institutional spaces. Introduction to building codes related to interior design. Integration of building systems with interior design solutions. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 180B—Advanced Interior Architecture (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): (DES 180A or DES 134B); DES 134A; or Consent of Instructor. Priority to Design majors. Advanced problems in interior architectural design emphasizing space planning for corporate and institutional environments. Field trips required. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 185—Exhibition Design (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. DES 150A recommended. Priority to Design majors. Design of cultural and commercial exhibition environments, including exhibition development and object selection, spatial planning and architectural finishes, object placement and staging, interpretive strategies, exhibition and promotional graphics. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 186—Environmental Graphic Design (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): DES 001; (DES 014 or DES 021); DES 015; DES 016; or Consent of Instructor. DES 115 recommended. Priority to Design majors. Design of informational and directional graphics for the built environment. Application and integration of typography, imagery and symbols into the architectural landscape. Development of universal wayfinding and graphic navigational systems to help people find their way. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 187—Narrative Environments (4)
Lecture/Discussion—2 hours; Studio—4 hours. Prerequisite(s): (DES 185 or DES 186); (DES 014 or DES 021); DES 001; DES 015; DES 016; or Consent of Instructor. Priority to Design majors. Design of storytelling environments and multi-sensory experiences for cultural, commercial, entertainment and public spaces. Interpretive planning and design for specific exhibit audiences. Manipulation of objects and the communication of complex ideas in the exhibition environment. GE credit: AH, VL. Effective: 2016 Fall Quarter.

DES 190—Proseminar (1)
Seminar—1 hour. Prerequisite(s): Design major or consent of instructor. Philosophies of design explored through discussion and presentation of research results. May be repeated up to 3 time(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

DES 191A—Workshops in Design (4-12)
Seminar—1 hour; Studio—3 hours. Prerequisite(s): DES 014; DES 015; and Consent of Instructor. Upper division standing. Faculty initiated workshops featuring advanced studies and applications of original work in Design: Costume. Letter grading by contract. Field trips included. Credit limited to 12 units in one section or a combination of sections. Effective: 1997 Winter Quarter.

DES 191B—Workshops in Design (4-12)
Seminar—1 hour; Studio—3 hours. Prerequisite(s): DES 014; DES 015; and Consent of Instructor. Upper division standing. Faculty initiated workshops featuring advanced studies and applications of original work in Design: Environment. Letter grading by contract. Field trips included. Credit limited to 12 units in one section or a combination of sections. Effective: 1997 Winter Quarter.

DES 191C—Workshops in Design (4-12)
Seminar—1 hour; Studio—3 hours. Prerequisite(s): DES 014; DES 015; and Consent of Instructor. Upper division standing. Faculty initiated workshops featuring advanced studies and applications of original work in Design: Graphics. Letter grading by contract. Field trips included. Credit limited to 12 units in one section or a combination of sections. Effective: 1997 Winter Quarter.

DES 191D—Workshops in Design (4-12)
Seminar—1 hour; Studio—3 hours. Prerequisite(s): DES 014; DES 015; and Consent of Instructor. Upper division standing. Faculty initiated workshops featuring advanced studies and applications of original work in Design: Textiles. Letter grading by contract. Field trips included. Credit limited to 12 units in one section or a combination of sections. Effective: 1997 Winter Quarter.

DES 192—Internship (1-6)
Internship—3-18 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Enrollment limited to 3 units per quarter or 6 units per IV session. Supervised internship, off and on campus, in areas of design including
environmental, costume, textile, museum, display and interior design. (P/NP grading only.) Effective: 1997 Winter Quarter.

DES 194HA—Special Study for Honors Students (3)
Independent Study—9 hours. Prerequisite(s): Consent of Instructor. Qualification for Letters and Science Honors Program; senior standing; approval of Design Honors Program proposal by the Curriculum Committee and major advisor. Limited enrollment. Preparation and presentation of a culminating project. Supervision of an instructor in one of the creative or scholarly areas of Design. Effective: 2013 Spring Quarter.

DES 194HB—Special Study for Honors Students (3)
Independent Study—9 hours. Prerequisite(s): DES 194HA; and Consent of Instructor. Qualification for Letters and Science Honors Program; senior standing. Limited enrollment. Preparation and presentation of a culminating project. Supervision of an instructor in one of the creative or scholarly areas of Design. Effective: 2013 Spring Quarter.

DES 197T—Tutoring in Design (1-5)
Discussion—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Leading of small discussion groups or studio meetings affiliated with
one of the department's regular courses. (P/NP grading only.) Effective: 1997 Winter Quarter.

DES 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

DES 198F—Student-Taught Course (1-4)
Variable—1-4 hours. Student-facilitated (taught) course intended for upper division students (P/NP grading only.) Effective: 2016 Fall Quarter.

DES 199—Special Study of Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

DES 199FA—Student Facilitated Course Development (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Planning and development for student led course 198F under the supervision of a faculty member. (P/NP grading only.) Effective: 2017 Fall Quarter.

DES 199FB—Student Facilitated Teaching (1-4)
Variable—1-4 hours. Prerequisite(s): DES 199FA; and Consent of Instructor. Student-facilitated course under the supervision of a faculty member, an undergraduate student teaching a course under 98F/198F. (P/NP grading only.) Effective: 2018 Spring Quarter.

DES 221—Theory and Issues in Design (4)
Independent Study; Seminar—3 hours. Prerequisite(s): Graduate standing in Design or consent of instructor. Perspectives on theoretical and aesthetic issues related to the design professions such as methodology in historical and contemporary contexts, implications of technology on design theory and practice, and design relationships to environmental sustainability, recycling, and other social issues. Effective: 2011 Spring Quarter.

DES 222—Research Methods and Critical Writing for Design (4)
Independent Study; Seminar—3 hours. Prerequisite(s): DES 221; Graduate standing in Design or consent of instructor. Focused on research methods and critical writing related to design topics including case studies, original and secondary sources, critical reviews. Expectation of a paper meeting professional standards suitable for publication from each student at end of course. May be repeated up to 1 time(s). Effective: 2006 Fall Quarter.

DES 223—Profesional Practice and Ethics in Design (4)
Independent Study; Seminar—3 hours. Prerequisite(s): DES 221; DES 222; Graduate standing in Design or consent of instructor. Introduce students to issues of professional design practice: business ethics, contracts and business practices, social responsibility through case studies, guest lectures and field trips, and readings. Short written assignments and presentations will be required. Effective: 2006 Fall Quarter.

DES 224—Seminar in Design Research and Teaching (4)
Discussion—2 hours; Extensive Writing—4 hours; Independent Study—6 hours. Prerequisite(s): DES 221; DES 222; DES 223; and Consent of Instructor. Concurrent academic appointment (TA) in DES 142A, DES 142B, DES 143, DES 144, DES 145; graduate standing in Design. Student will work closely with instructor on a research and writing project related to subject matter of undergraduate history courses noted above with the goal of introducing student to advanced historical research processes and development of writing skills. May be repeated up to 2 time(s). Effective: 2007 Fall Quarter.

DES 225—Studio Practice in Design (4)
Studio—6 hours. Prerequisite(s): DES 221 Restricted to graduate standing in Design or consent of instructor. Students work together on a collective project to experience the multiple phases of design through an iterative process. Design projects will be geared towards relevance in contemporary social, cultural and political contexts. May be repeated up to 2 time(s). Effective: 2017 Fall Quarter.

DES 290—Seminar in Design (4)
Seminar—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Selected topics in design methodology, research, communication, and education. May be repeated for credit. Effective: 1997 Winter Quarter.

DES 292—Practicum in Design (1-12)
Variable—3-36 hours. Prerequisite(s): Graduate standing in Design or consent of instructor. Interaction with a working professional in the student's field of interest to apply theories and concepts to working practice. (S/U grading only.) Effective: 2014 Fall Quarter.

DES 298—Directed Group Study for Graduate Students (1-5)
Studio. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

DES 299—Individual Focused Study (1-12)
Variable—3-36 hours. Prerequisite(s): Graduate standing in Design or consent of instructor. Advanced study in studio practice on independent projects with faculty consultation. May be repeated for credit. (S/U grading only.) Effective: 2017 Winter Quarter.

DES 299D—Project Concentration (1-12)
Variable—3-36 hours. Prerequisite(s): Graduate standing in Design or consent of instructor; minimum of 22 units must be taken in Project Concentration and Individual Focused Study. Student creates a body of original work at a professional level, with
written and visual documentation of process and concepts underlying the project, culminating in public presentation. (S/U grading only.) Effective: 2014 Fall Quarter.

DES 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

DRA Dramatic Art

Courses in DRA:

DRA 001—Theatre, Performance and Culture (4)
Discussion—1 hour; Lecture—3 hours. Not open to students who have completed DRA 001S. Introductory investigation of the nature of performance, moving from performance theory to consideration of various manifestations of performance including theatre, film and media, performance art, dance, sports, rituals, political and religious events, and other "occasions." GE credit: AH, DD, VL, WE. Effective: 2013 Fall Quarter.

DRA 001S—Theatre, Performance and Culture (4)
Discussion—1 hour; Lecture—3 hours. Not open to students who have completed DRA 001. Introductory investigation of the nature of performance, moving from performance theory to consideration of various manifestations of performance including theatre, film and media, performance art, dance, sports, rituals, political and religious events, and other "occasions." For Short Term Programs Abroad. Effective: 2005 Spring Quarter.

DRA 002—Acting: The Basics: History and Practice (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the historical evolution of the actor – from ancient Greece & Asia to the Hollywood icon & postdramatic performer – and the practical foundations of acting for stage and screen. Onstage opportunities within lecture course structure. GE credit: AH, OL, VL. Effective: 2015 Winter Quarter.

DRA 005—Understanding Performance: Appreciation of Modern Theatre, Dance, Film and Performance Art for the Humanities and Sciences (4)
Discussion/Laboratory—1 hour; Lecture/Discussion—3 hours. Relevance of theatre and performance to modern culture, science and society. Approaches to theatre/dance/media/performance art, integrated into Mondavi Centre for the Arts and Theatre and Dance Department programs. (SAS 041.) GE credit: AH, DD, OL, VL, WC, WE. Effective: 2015 Winter Quarter.

DRA 010—Introduction to Acting (4)
Discussion/Laboratory—4 hours. Fundamentals of movement, speech, theatre games, and improvisation. Selected reading and viewing of theatre productions. Intended for students not specializing in Dramatic Art. GE credit: OL, VL. Effective: 2015 Spring Quarter.

DRA 011—Introduction to Presentation Skills (2)
Lecture/Lab—4 hours. Class size limited to 20 students. Development of clear oral and physical communication skills that build confidence, presentational style and clarity for students whose command of English is at a basic level. Effective: 2013 Spring Quarter.

DRA 014—Introduction to Contemporary Dance (4)
Laboratory—3 hours; Lecture—3 hours. Introduction to basic issues and methods in contemporary dance. Focus on preparing the student for dancing and dance-making through basic techniques of improvisation and composition. Consideration of dance as a cultural practice. GE credit: VL. Effective: 2012 Fall Quarter.

DRA 020—Introduction to Dramatic Art (4)
Discussion—1 hour; Lecture—3 hours. Understanding and appreciation of both the distinctive and collaborative contributions of playwright, actor, director, and designer to the total work of dramatic art. Study of plays from the major periods of dramatic art in their cultural contexts. GE credit: AH, VL, WC, WE. Effective: 2013 Fall Quarter.

DRA 021A—Fundamentals of Acting (4)
Laboratory—4 hours; Lecture—2 hours. Open to students planning to major in Theatre and Dance. Physical and psychological resources of the actor. Experience in individual and group contact and communication, theatre games, advanced improvisation, sound and movement dynamics. Viewing of theatre productions. GE credit: OL, VL. Effective: 2016 Fall Quarter.

DRA 024—Visual Aspects of Dramatic Art (4)
Lecture/Discussion—4 hours. Understanding and appreciation of the visual aspects of dramatic art: theatre architecture, scenery, lighting, costume, and makeup. GE credit: AH, VL. Effective: 2013 Fall Quarter.

DRA 025—Technical Aspects of Dramatic Production (3)
Lecture—3 hours. Technical principles of dramatic production emphasizing the three areas of scenic, costume and lighting studios. Subjects covered include basic tools, materials and equipment, production practices; and the interdisciplinary and collaborative nature of dramatic production. Effective: 1997 Winter Quarter.

DRA 026—Performing Arts Production Management (3)
Lecture—3 hours. Theoretical study of performing arts administration and backstage operations from audition through performance. Techniques of scheduling,
production management, stage management, technical direction, audience control, box office, promotion, safety, accommodations for persons with
disabilities and emergency procedures. Effective: 1997 Winter Quarter.

DRA 028—Entertainment Engineering and Management: Stagecraft to Stage Management (4)
Lecture/Discussion—4 hours. Introduction to technical production and management in theatre and dance. Topics include stage management, theatrical mechanics, backstage protocols, scenic construction, properties, lighting, basic shop tools, costume shop use and construction, basic make-up, sound equipment, graphics and robotics for theatre. GE credit: AH. Effective: 2015 Spring Quarter.

DRA 030—Theatre Laboratory (1-5)
Project (Term Project)—2 hours. Prerequisite(s): Consent of Instructor. Projects in acting, production, scene design, costuming, lighting, directing, and playwriting. Participation in departmental productions. May be repeated up to 11 unit(s). Effective: 2016 Spring Quarter.

DRA 040A—Beginning Modern Dance (2)
Discussion/Laboratory—4 hours. Fundamentals of modern dance focusing primarily on the development of techniques and creative problem solving. Basic anatomy, dance terminology, and a general overview of modern dance history. May be repeated up to 2 time(s) Non-dance majors can only repeat the course once; dance majors may apply to the dance faculty advisor for permission to repeat more times; dance is a repetitive practice that involves constant reiteration and demands this for improvement and better understanding of the somatic and proprioceptive skills. GE credit: AH, VL. Effective: 2017 Spring Quarter.

DRA 040B—Intermediate Modern Dance (2)
Discussion/Laboratory—4 hours. Prerequisite(s): DRA 040A; or Consent of Instructor. Modern dance techniques. Basic anatomy, dance terminology and a general overview of modern dance history. May be repeated up to 1 time(s) For Dance majors, further repeats negotiated with faculty advisor in dance. GE credit: AH, VL. Effective: 2016 Spring Quarter.

DRA 041A—Beginning Jazz Dance (2)
Discussion/Laboratory—4 hours. Fundamentals of jazz dance; includes warm-ups, dance techniques and combinations. Basic anatomy, dance terminology and general overview of jazz dance history. May be repeated up to 1 time(s). Effective: 2017 Spring Quarter.

DRA 041B—Intermediate Jazz Dance (2)
Discussion/Laboratory—4 hours. Prerequisite(s): DRA 041A; or Consent of Instructor. Warm-ups, dance techniques and combinations at the intermediate level. Basic anatomy, dance terminology and a general overview of jazz styles of historically significant jazz choreographers and leading contemporary jazz choreographers. May be repeated up to 1 time(s) with consent of instructor. Effective: 2016 Spring Quarter.

DRA 042A—Beginning Ballet (2)
Discussion/Laboratory—4 hours. Fundamentals of ballet, focusing on the development of technique through proper alignment, quality, and rhythm. Basic anatomy, ballet terminology, and dance history. May be repeated for credit with consent of instructor. GE credit: AH, VL. Effective: 2016 Spring Quarter.

DRA 042B—Intermediate Ballet (2)
Discussion/Laboratory—4 hours. Prerequisite(s): DRA 042A; or Consent of Instructor. Barre and center work at the intermediate level. Development and
refinement of technique through proper alignment, rhythmic, and qualitative understanding. Anatomy, ballet terminology, and dance history. May be repeated for credit with consent of instructor. GE credit: AH, VL. Effective: 2016 Spring Quarter.

DRA 043A—Contact Improvisation Dance (2)
Lecture/Lab—4 hours. Fundamentals of contact improvisation and its applications to all forms of dance, performance, sports, physical safety and health. Solo improvisation, safety, communication, alignment, basic lifting and weight-sharing, intuition, developing relaxed readiness and personal expression. May be repeated up to 2 time(s). GE credit: AH, VL. Effective: 2014 Fall Quarter.

DRA 043B—Intermediate Contact Improvisation (2)
Lecture/Lab—4 hours. Prerequisite(s): DRA 043A; or Consent of Instructor. Building on the fundamentals. Reviewing basics, extended improvising, skillfully working with partners of different sizes and abilities, advanced lifting, advanced safety practices, embracing risk and disorientation, subtle nuances of communication. May be repeated up to 2 time(s). GE credit: AH, VL. Effective: 2016 Spring Quarter.

DRA 044A—Beginning Hip Hop Dance (2)
Discussion/Laboratory—4 hours. Fundamentals of Hip Hop dance focusing on developing a fluid movement vocabulary, facility in body isolations, intricate rhythmic patterning, quick shifts of weight and mastering dance combinations. Discussions on Hip Hop dance history, styles and terminology. May be repeated up to 1 time(s). Effective: 2002 Fall Quarter.

DRA 044B—Intermediate Hip Hop Dance (2)
Discussion/Laboratory—4 hours. Prerequisite(s): DRA 044A; or Consent of Instructor. Expansion of Hip Hop dance vocabulary by focusing on mastering body isolations and intricate rhythmic techniques, complex dance combinations, advanced across the floor sequences. May be repeated up to 1 time(s). Effective: 2002 Fall Quarter.

DRA 055—Contemporary Local, National and Global Theatre, Dance and Performance (4)
Lecture/Discussion—4 hours. Introduction a range of contemporary theatre, dance and performance in local, national and international settings. Training in critical approaches to and aesthetic appreciation of these forms. Emphasis varies based on instructor. GE credit: AH, DD, VL, WC. Effective: 2015 Fall Quarter.

DRA 056A—History of Theatre and Dance I: Myth, Magic and Madness (4)
Lecture/Discussion—4 hours. Exploration of aesthetic movements in various disciplines of theatre and dance from the origins to 1550. Examination of Greek, Roman, Sanskrit, Kathakali, Chinese, Japanese, Mesoamerican, Medieval European, and Indigenous theatre and dance including oral, ritual and shamanic performance. Offered once a year. GE credit: AH, VL, WC. Effective: 2014 Fall Quarter.

DRA 056B—History of Theatre and Dance II: Romance, Revenge and Rebellion (4)
Lecture/Discussion—4 hours. Exploration of aesthetic movements in various disciplines of theatre and dance from 1550 to 1850. Examination of genres related to romance, revenge and rebellion using European, North and South American, and Asian examples. Offered once a year. GE credit: AH, VL, WC. Effective: 2015 Winter Quarter.

DRA 056C—History of Theatre and Dance III: Sex, Society and the State (4)
Lecture/Discussion—4 hours. Exploration of aesthetic movements in various disciplines of theatre and dance from 1850-1968. Examination of melodrama, popular theatre, naturalism, psychological realism, and the avant-garde using European, North and South American, Asian, and African examples. Offered once a year. GE credit: AH, VL, WC. Effective: 2015 Spring Quarter.

DRA 092—Internship in Dramatic Art (1-12)
Variable—1-12 hours. Prerequisite(s): Consent of instructor and department chairperson. Restricted to lower division students with less than 84 units completed. Internship outside the Department of Theatre and Dance enabling students to practice their skills. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2006 Fall Quarter.

DRA 098—Directed Group Study (1-5)
Primarily for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

DRA 099—Special Study for Undergraduates (1-5)
(P/NP grading only.) Effective: 1997 Winter Quarter.

DRA 111—Advanced Presentation Skills (2)
Lecture/Lab—4 hours. Class size limited 20 students. Development of clear oral and physical communication skills that build confidence, presentational style and clarity for students whose command of English is at a competent to fluent level. GE credit: OL. Effective: 2013 Spring Quarter.

DRA 111S—Representation and Identity in Culture and Cinema (4)
Film Viewing—4 hours; Lecture/Discussion—2 hours. Issues of personal and collective identity via study of film narratives from different cultures. Reflection of dominant cultural identities in film. Taught in Australia. Effective: 2006 Spring Quarter.

DRA 114—Theatre on Film (4)
Film Viewing—2 hours; Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Study of six/eight plays on film, using mixed casts and raising issues of diversity. Focus: sociohistorical context for production and reception, interpretation and analysis of topics (gender, ethnicity, age, politics, philosophy), and filming, screenwriting, design, and acting/directing for film. GE credit: AH, SS, VL. Effective: 2016 Fall Quarter.

DRA 115—Advanced Study of Major Film Makers (4)
Film Viewing—2 hours; Lecture/Discussion—3 hours. Analysis of the contribution of some outstanding film creators. Study of diverse aesthetic theories of the cinema and their application to selected films. May be repeated for credit when different film creator studied, or studied with a different methodological approach. GE credit: VL. Effective: 2016 Spring Quarter.

DRA 116—Design on Screen (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Analysis of the contribution of outstanding designers for cinema, television and filmed entertainment. Study of diverse aesthetic theories of production design and art direction, costume design, or cinematography. Introductory principles and practice, history. May be repeated up to 2 time(s) when topic differs. (CTS 116.) GE credit: AH, VL. Effective: 2013 Fall Quarter.

DRA 120—Intermediate Acting/Gateway: The Actor's Toolkit (4)
Lecture/Lab—6 hours. Prerequisite(s): DRA 021A; or Consent of Instructor. Limited enrollment. Implementation of acting tools drawn predominantly from Stanislavsky’s ‘system’. Gateway into the Advanced Acting courses. GE credit: OL, VL. Effective: 2013 Spring Quarter.

DRA 121A—Advanced Acting: Scene Study and Script Analysis (4)
Lecture/Lab—6 hours. Prerequisite(s): DRA 120; and Consent of Instructor. Limited enrollment. In-depth study, analysis and performance of texts from different eras, genres and styles. Implementation of tools to undertake independent preparation of character creation. May be repeated up to 8 unit(s) Since acting requires repetition to habituate the body and imagination to new practices, this course may be taken twice. New scripts and scenes must be undertaken in the repetition. GE credit: OL, VL. Effective: 2013 Spring Quarter.

DRA 121B—Advanced Acting: Rehearsal Processes and Practices (4)
Lecture/Lab—6 hours. Prerequisite(s): DRA 120; and Consent of Instructor. Limited enrollment. Development of rehearsal practice and etiquette, using a variety of scenes from different eras and genres. May be repeated up to 8 unit(s) The course has been established to enable visiting artists in residence to undertake the instruction, as well as faculty. Therefore, this course may be taken twice, as students will be exposed to different professional practitioners' working processes. New etudes, scripts and scenes must be undertaken in the repetition. GE credit: OL, VL. Effective: 2013 Spring Quarter.

DRA 121C—Advanced Acting: Character and Style (4)
Lecture/Lab—6 hours. Prerequisite(s): DRA 120; and Consent of Instructor. Limited enrollment. Study of psycho-physical techniques to create characters with an emphasis on non-realistic styles. May be repeated up to 8 unit(s) Since acting requires repetition to habituate the body and imagination to new practices, this course may be taken twice. New scripts and scenes must be undertaken in the repetition. GE credit: OL, VL. Effective: 2012 Fall Quarter.

DRA 122A—Advanced Acting: Devising and Collaboration (4)
Lecture/Lab—6 hours. Prerequisite(s): DRA 120; and Consent of Instructor. Limited enrollment. Study and practice of various devising techniques, to collaborate on and produce a series of short etudes and dramatic scenes/short plays. May be repeated up to 8 unit(s) Since acting requires repetition to habituate the body and imagination to new practices, this course may be taken twice. New scripts and scenes must be undertaken in the repetition. GE credit: OL, VL. Effective: 2016 Spring Quarter.

DRA 122B—Advanced Acting: Shakespeare and His Contemporaries (4)
Lecture/Lab—6 hours. Prerequisite(s): DRA 120; and Consent of Instructor. Limited enrollment. Study and performance of classical texts (monologues and dialogues), with a focus on Shakespeare and the Elizabethan world view. May be repeated up to 8 unit(s) Since acting requires repetition to habituate the body and imagination to new practices, this course may be taken twice. New monologues and scenes must be undertaken in the repetition. GE credit: OL, VL. Effective: 2013 Spring Quarter.

DRA 122C—Advanced Acting: Special Topics in Acting (4)
Lecture/Lab—6 hours. Prerequisite(s): DRA 120; and Consent of Instructor. Restricted to Theatre and Dance majors; limited enrollment. Intensive study and practical exploration of a specialized area; for example, World Theatre, Social Theatre, Physical Theatre, Musical Theatre, the Ancient Greeks, etc. May be repeated up to 8 unit(s). GE credit: AH, OL, VL. Effective: 2016 Fall Quarter.

DRA 124A—Principles of Theatrical Design: Scenery (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Pass One restricted to Theatre and Dance majors. Scene design processes, working drawings, sketching techniques, scale models, methods and materials of scenery construction. GE credit: AH, VL. Effective: 2018 Winter Quarter.

DRA 124B—Principles of Theatrical Design: Scenery (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Pass One restricted to Theatre and Dance majors. Analysis of plays in terms of scene design, elements of design, execution of designs for modern and period plays. GE credit: AH, VL. Effective: 2018 Winter Quarter.

DRA 124C—Principles of Theatrical Design: Lighting (4)
Lecture/Lab—4 hours. Prerequisite(s): Consent of Instructor. Pass One restricted to Theatre and Dance majors. Theories of lighting the stage, equipment and control systems, execution of lighting plots. GE credit: AH, VL. Effective: 2018 Winter Quarter.

DRA 124D—Principles of Theatrical Design: Costume (4)
Lecture/Discussion—4 hours. Prerequisite(s): DRA 024; Consent of Instructor. Pass one restricted to Theatre and Dance majors. Source materials for theatrical costuming, selecting fabrics, elements of design, analysis of plays in terms of costume design, execution of designs for modern and period plays. GE credit: AH, OL, VL. Effective: 2018 Winter Quarter.

DRA 124E—Costume Design for Film (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Pass One restricted to Theatre and Dance majors. Theory and practice of the art and business of film costume design. Script analysis, costume research, developing design concepts, budgeting, and current production practices and methods. Execution of designs for period and contemporary films. Viewing of current films. (CTS 124E.) GE credit: AH, OL, VL. Effective: 2018 Winter Quarter.

DRA 125—Scenic Painting: Studio (4)
Laboratory—3 hours; Lecture—2 hours; Studio—1 hour. Prerequisite(s): DRA 024 or DRA 028; or Consent of Instructor. upper division standing in Theatre and Dance, Art Studio, or Design. Scene painting techniques, practices and materials including color mixing and matching, wood graining, faux painting techniques, glazing, creating foliage, stone and brick. May be repeated up to 1 time(s) with consent of instructor. GE credit: AH, VL. Effective: 2016 Spring Quarter.

DRA 126—Principles of Performing Arts Stage Management (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Stage management principles for theatre, dance, musical theatre, music, and concerts. The dynamical role of the stage manager in the performing arts, upper-management team. Effective: 2014 Fall Quarter.

DRA 127A—Principles of Directing (4)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Director's creative approach to the play and to its staging. GE credit: VL. Effective: 2016 Spring Quarter.

DRA 127B—Principles of Directing (4)
Laboratory—4 hours; Lecture—2 hours; Rehearsal. Prerequisite(s): DRA 127A; or Consent of Instructor. Director's creative approach to the actor. GE credit: VL. Effective: 2016 Spring Quarter.

DRA 128—Principles of Theatre Sound (3)
Laboratory—3 hours; Lecture/Discussion—2 hours. Fundamentals of sound, sound equipment, and sound design as used in modern theatre and other performance venues. Assembly, set-up, and operation of basic theatre sound reinforcement system, recording system, and theatrical playback system. Effective: 2004 Winter Quarter.

DRA 130—Approaches to Theatrical Design: Practice and Theory (4)
Seminar—2 hours; Studio—4 hours. Prerequisite(s): DRA 124A or DRA 124B or DRA 124C or DRA 124D or DRA 124E; Upper division standing in Theatre and Dance, Art Studio or Design; or consent of instructor. Advanced design study in specific areas including but not limited to: research, design styles and concepts, new materials and techniques, scenery, lighting, costume, makeup, photography, projections, computer technology, spectacle and special effects, and alternative theatre forms and genres. May be repeated up to 3 time(s) when topic differs; when instructor differs. GE credit: AH, VL. Effective: 2016 Spring Quarter.

DRA 135—Voice in Performance (2)
Performance Instruction—4 hours. Prerequisite(s): DRA 021B; or Consent of Instructor. Progression of exercises to free, develop and strengthen the voice, as a human and then as an actor's instrument with emphasis on how the voice works, to freeing the channel for sound, to interpersonal communication. May be repeated up to 2 time(s). Effective: 2009 Fall Quarter.

DRA 140A—Dance Composition (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): DRA 040A or DRA 041A or DRA 042A; or Consent of Instructor. Introduction to the craft of choreography. Compose phrases and present movement studies based on the elements of choreography: motivation, space, time, force/energy. GE credit: VL. Effective: 2016 Spring Quarter.

DRA 140B—Dance Composition (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): DRA 140A Continuation of the study of choreography, focusing on the development of group choreography: duets, trios, quartets and group work, form, and accompaniment. Effective: 1999 Spring Quarter.

DRA 140C—Dance Composition (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): DRA 140A; DRA 140B Continuation of study of choreography focusing on sequencing movements for groups. The relation between dance and allied mediums of music, sets, costumes and lighting. Students conceptualize a choreographic issue and explore it through creation of short dance studies. Effective: 1999 Spring Quarter.

DRA 141—Introduction to the Fundamentals of Movement (4)
Lecture/Discussion—4 hours. Introduction to fundamentals of movement that combines intellectual and kinesthetic understanding of the body's skeletal and muscular systems. Explorations based on theories of various body mind specialists including Laban, Feldenkrais, Bartenieff and Sweigard as well as the eastern discipline of Yoga. GE credit: VL. Effective: 2014 Fall Quarter.

DRA 142—History of Modern Dance (4)
Lecture/Discussion—4 hours. Modern Dance tradition, focusing on its theorizations of individual and social identity. Students will write and choreograph analyses of principle dances in this tradition. GE credit: AH, VL, WE. Effective: 2015 Winter Quarter.

DRA 143—Dance and Movement Studio (1-4)
Discussion/Laboratory—2-8 hours. Prerequisite(s): Consent of Instructor. Special studies in dance and movement such as African, Balinese,
Baroque, Chinese, European, and stage combat. Offered as needed for stage productions. May be repeated up to 8 unit(s). GE credit: AH, VL. Effective: 2016 Spring Quarter.

DRA 144—Introduction to Traditional Chinese Physical Culture (4)
Lecture/Discussion—4 hours. Traditional Chinese Wushu practices, explored through practical work in dance laboratory conditions. Integration of practice with conceptual analysis; contemporary social, educational and artistic applications. GE credit: AH, SS. Effective: 2011 Fall Quarter.

DRA 144A—Introduction to Traditional Chinese Embodied Culture (4)
Lecture/Discussion—4 hours. Traditional Chinese Wushu practices, explored through practical work in dance laboratory conditions. Integration of practice with conceptual analysis; contemporary social, educational and artistic applications. GE credit: AH, DD, SS, VL, WC. Effective: 2014 Winter Quarter.

DRA 144B—Traditional Chinese Physical Culture (4)
Lecture/Discussion—4 hours. Prerequisite(s): DRA 144A Traditional Chinese Wushu practices, explored through practical work in dance laboratory conditions. Integration of practice with conceptual analysis; contemporary social, educational and artistic applications. May be repeated up to 2 time(s) when content and instructor varies and if student progression is required. GE credit: AH, DD, SS, VL, WC. Effective: 2014 Winter Quarter.

DRA 144C—Daoist Philosophy in Traditional Chinese Movement Culture (4)
Lecture/Discussion—4 hours. Prerequisite(s): DRA 144B Daoist practices of movement and their relation to daoist philosophy, explored through work in dance laboratory conditions. Integration of practice with conceptual analysis, and critical philosophy around values and ethical action. May be repeated up to 2 time(s) when content or instructor varies and if student progression is required. GE credit: AH, DD, VL, WC. Effective: 2014 Winter Quarter.

DRA 145—Directed Choreography Projects (4)
Lecture/Lab—6 hours. Prerequisite(s): DRA 140A; DRA 140B; DRA 140C; or Consent of Instructor. Conceptualization, creation, casting, rehearsing, and concert presentation of complete dances, with students integrating elements of stagecraft and directing the on-stage rehearsals. Effective: 1999 Winter Quarter.

DRA 146A—Professional Track Modern Dance I (4)
Lecture/Lab—6 hours. Prerequisite(s): Consent of Instructor. Professionally oriented performance training. Rigorous, consistent training regimen based on traditional modern dance technique. Breath and voice, skeletal and muscular placement, moving from the spine, contraction technique, movement intention. May be repeated up to 2 time(s). GE credit: VL. Effective: 2016 Spring Quarter.

DRA 146B—Professional Track Modern Dance II (4)
Lecture/Lab—6 hours. Prerequisite(s): DRA 146A; and Consent of Instructor. Body and space relationships in solos, duets and group work; stylistic variations of Graham technique; works of Paul Taylor. May be repeated up to 1 time(s). GE credit: VL. Effective: 2016 Spring Quarter.

DRA 146C—Professional Track Modern Dance III (4)
Lecture/Lab—6 hours. Prerequisite(s): DRA 146A; DRA 146B; and Consent of Instructor. Continuation of course 146B. Time as a theatrical device, sustaining movement and non-movement, phrasing, musicality. May be repeated up to 1 time(s). GE credit: VL. Effective: 2017 Winter Quarter.

DRA 150—American Theatre and Drama (4)
Lecture—4 hours. The history of the theatre from Colonial times to the present. Readings of selected plays. GE credit: ACGH, AH, DD, VL, WE. Effective: 2014 Winter Quarter.

DRA 151S—Australian Performance and Culture (4)
Lecture/Discussion—2 hours; Seminar—2 hours. Australian performance and theatre practices as a product of its culture of origin. Relationships between art and society. Taught in Australia. Effective: 2006 Spring Quarter.

DRA 154—Asian Theatre and Drama: Contexts and Forms (4)
Lecture/Discussion—4 hours. Selected Asian plays and performance forms in their cultural and artistic contexts; myth, ritual and the theatre; performance training, visual presentation of the text; political theatre; intercultural performance-the fusion of Asian and Western traditions. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

DRA 155—Representing Race in Performance (4)
Lecture—4 hours. Representation and performance of "race" in American culture featuring different sub-headings such as "African American Theatre" or "Asian-Americans on Stage." May be repeated up to 1 time(s) when topic differs. GE credit: AH, DD, WE. Effective: 2012 Spring Quarter.

DRA 155A—African American Dance and Culture in the United States, Brazil and the Caribbean (4)
Lecture/Discussion—4 hours. Comparative study of the African American dance forms in the U.S.A.,

Brazil, Haiti, Cuba, Jamaica, Barbados, and Trinidad. Examination of ritual, folk, and popular dance forms and the socio/historical factors that have influenced these forms. (AAS 155A.) GE credit: AH, VL, WC. Effective: 2012 Fall Quarter.

DRA 155B—Ancient and Contemporary Greek Theatre and Dance (6)
Discussion/Laboratory—10 hours; Performance Instruction—10 hours; Seminar—13 hours. Origins of early theatres and the first actors, playwrights and dancers and their powerful influence on western performance and thought up to present day. Offered in Greece. GE credit: AH. Effective: 2011 Fall Quarter.

DRA 156AN—Performance Analysis (4)
Discussion—1 hour; Lecture—3 hours. Performance on the stage, in the street, in everyday life, ritual, and in politics. Satire, irony, creative protest and performance. Social movements, the state, and performance as tactical intervention. GE credit: AH, DD, WE. Effective: 2016 Spring Quarter.

DRA 156B—Theatre in History and Place: Local, National and Global Conditions for Production (4)
Discussion—1 hour; Lecture—3 hours. Exploration of local, national and global issues in theatre production, with special attention to historical changes in social and political contexts for performance. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

DRA 156C—Modern Aesthetic Movements in Performance (4)
Discussion—1 hour; Discussion/Laboratory—3 hours. Important movements in performance, especially theatre and dance, from realism to the present. Primary emphasis on Western traditions though others may be studied. GE credit: AH, WE. Effective: 2017 Spring Quarter.

DRA 156D—Theatre History Through Shakespeare (4)
Extensive Writing; Lecture—4 hours. Shakespeare's plays, theatre history, and theatre today. European contexts from 1590-2004 and international theatre from 20th century. Stagecraft, different media (print, stage, film), social/political environments, design, and cultural change (gender, sexuality and ethnicity). May be repeated up to 1 time(s). GE credit: AH, OL, WC, WE. Effective: 2014 Spring Quarter.

DRA 158—Performance Studies Undergraduate Seminar (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. DRA 156AN recommended. Focused inquiry into a particular genre, period, movement, artist, or theme in performance. Philosophical and aesthetic issues as well as historical and cultural performance contexts. In-depth research projects in relationship to the subject of inquiry. May be repeated for credit. GE credit: WE. Effective: 2016 Spring Quarter.

DRA 159—Contemporary Experimental Performance, Theatre and Drama (4)
Extensive Writing; Lecture/Discussion—3 hours. Evaluation and examination of the "New Theatre;" its experimental and innovative nature since the 1960s. Dance, film, stage, performance art and public acts of a performative nature. May be repeated up to 3 time(s) if content differs. GE credit: AH, DD, VL, WC, WE. Effective: 2014 Spring Quarter.

DRA 159S—Contemporary Experimental Performance, Theatre and Drama (4)
Lecture/Discussion—4 hours. Evaluation and examination of the "New Theatre;" its experimental and innovative nature since the 1960s. Dance, film, stage, performance art and public acts of a performative nature. May be repeated up to 12 unit(s) if instructor or content varies. GE credit: AH, WE. Effective: 2015 Winter Quarter.

DRA 160A—Principles of Playwriting (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Analysis of dramatic structure; preparation of scenarios; the composition of plays. GE credit: WE. Effective: 2018 Winter Quarter.

DRA 160B—Principles of Playwriting (4)
Lecture—4 hours. Prerequisite(s): DRA 160A; and Consent of Instructor. Analysis of dramatic structure; preparation of scenarios; the composition of plays. GE credit: WE. Effective: 2016 Spring Quarter.

DRA 170—Media Theatre (4)
Lecture—1 hour; Performance Instruction—1 hour; Rehearsal—2 hours. New media and application of in theatre devising and performance. Emphasis on collaborative process in relationship to integration of emerging technologies and formation of new theatrical works. Development of collaborative performance through lecture, demonstration, improvisation and experimentation. May be repeated up to 1 time(s). GE credit: AH, VL. Effective: 2017 Spring Quarter.

DRA 174—Acting for Camera (4)
Lecture/Lab—6 hours. Prerequisite(s): Consent of Instructor. Analysis and practice of acting skills required for camera work and digital media. May be repeated up to 8 unit(s) when instructor differs. (CTS 174.) Effective: 2013 Spring Quarter.

DRA 175—Small Scale Film Production (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Lecture and intensive workshop teaching small-scale film production. Appointments as a(n) director, director of photography, actor, writer, lighting designer, sound designer and other critical positions are used to produce and submit a short film to a film festival. May be repeated up to 2 time(s). (TCS 175.) Effective: 2011 Fall Quarter.

DRA 180—Theatre Laboratory (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Projects in acting, production, scene design, costuming, lighting, directing, and playwriting. Participation in departmental productions. May be repeated for credit. Effective: 2016 Spring Quarter.

DRA 180A—Theatre Laboratory: Performance (1-5)
Rehearsal—12 hours. Prerequisite(s): Consent of Instructor. Limited enrollment. Rehearsal and performance of a production directed or choreographed by visiting Granada Artists-in-Residence and/or faculty, and/or the UG Edge Festival. May be repeated for credit Since each production involves different scripts, directions, challenges of rehearsal practices and performance processes, it is possible for students to appear in a variety of productions in the course of their education. Admission by audition. Effective: 2013 Spring Quarter.

DRA 180B—Theatre Laboratory: Design (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Design-related participation in theatre and dance productions involves research, creation and implementation of design concept in collaboration with the director and other members of the production team. May be repeated for credit Because each theatrical piece is conceived and produced afresh with new source material, scripts, and production style the challenges and assignments for the designers will be new each and every time they design a show. GE credit: AH, VL. Effective: 2016 Spring Quarter.

DRA 180C—Theatre Laboratory: Management, Directing, other Production Team (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Participation in theatre and dance production in management, direction, choreography, dramaturgy, writing or other production related role; research, creation and implementation of production concept in collaboration with members of the production team and cast. May be repeated up to 5 unit(s) May repeat multiple times but only for a total of five units. Permission to repeat is required from the Dramatic Art department. Effective: 2014 Fall Quarter.

DRA 180D—Theatre Laboratory: Crew (2-4)
Laboratory—6-12 hours. Prerequisite(s): Consent of Instructor. Participation in theatre and dance productions as backstage running crew which will involve skill development, rehearsal and execution of performance. May be repeated for credit. Effective: 2013 Spring Quarter.

DRA 180E—Theatre Laboratory: Scenic (1-4)
Laboratory—3-12 hours. Prerequisite(s): Consent of Instructor. Practical experience working on scenery and properties for theatre and dance department productions. Study and execution of basic scenery and prop engineering, construction, painting, rigging. Study of techniques, materials, tools, and equipment use. Skill development, professional etiquette. Safety training requirement. May be repeated for credit. Effective: 2013 Spring Quarter.

DRA 180F—Theatre Laboratory: Costume (1-4)
Laboratory—3-12 hours. Prerequisite(s): Consent of Instructor. Practical experience working on costumes for theatre and dance department productions. Study and execution of basic costume construction techniques and materials, tools, and equipment use. Skills development, professional etiquette. Safety training requirement. May be repeated for credit. Effective: 2013 Spring Quarter.

DRA 180G—Theatre Laboratory: Lighting/Sound/Projection (1-4)
Laboratory—3-12 hours. Prerequisite(s): Consent of Instructor. Practical experience working on lighting, sound or projections for theatre and dance department productions. Study and execution of basic techniques, materials, tools, and equipment use. Skill development, professional etiquette. Safety training requirement. May be repeated for credit. Effective: 2013 Spring Quarter.

DRA 192—Internships in Theatre and Dance (1-12)
Internship—3-36 hours. Theatre production experience in creative, technical or management areas. Experience in galleries, performance sites, or theatre/dance/physical theatre companies. May be repeated up to 12 unit(s). Not open to students who have completed DRA 192S. (P/NP grading only.) Effective: 2004 Fall Quarter.

DRA 192S—Internships in Theatre and Dance (1-12)
Internship—3-36 hours. Theatre production experience in creative, technical or management areas. Experience in galleries, performance sites, or theatre/dance/physical theatre companies. This course is offered in Sydney, Australia. May be repeated up to 12 unit(s). Not open to students who have completed DRA 192. (P/NP grading only.) Effective: 2005 Spring Quarter.

DRA 194HA—Special Study for Honors Students (3)
Independent Study—9 hours. Prerequisite(s): Qualification for Letters and Science Honors Program and admission to Theatre and Dance Senior Honors Program. Preparation and presentation of a culminating project, under the supervision of an instructor, in one of the creative or scholarly areas of Theatre and Dance. (P/NP grading only.) Effective: 2016 Spring Quarter.

DRA 194HB—Special Study for Honors Students (3)
Independent Study—9 hours. Prerequisite(s): Qualification for Letters and Science Honors Program and admission to Theatre and Dance Senior Honors Program. Preparation and presentation of a culminating project, under the supervision of an instructor, in one of the creative or scholarly areas of Theatre and Dance. Effective: 2016 Spring Quarter.

DRA 195—Senior Capstone Experience (2)
Lecture/Discussion—1 hour; Project (Term Project). Open to Theatre and Dance Majors who have completed 135 or more units. Capstone experience for majors. Examination, reflection and synthesis on development. Discussion of professional development and translatable skills. Individual project and development of portfolio. (P/NP grading only.) GE credit: AH, WE. Effective: 2016 Fall Quarter.

DRA 197T—Tutoring in Dramatic Art (1-5)
Tutorial—1-5 hours. Prerequisite(s): Consent of Instructor. Upper division or graduate standing with major in Theatre and Dance; consent of department chairperson. Leading of small voluntary groups affiliated with one of the department's regular courses. May be repeated for credit. (P/NP grading only.) Effective: 2016 Spring Quarter.

DRA 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

DRA 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

DRA 200—Methods and Materials in Theatre Research (4)
Seminar—3 hours; Term Paper. Essential research tools in theatre and related fields; bibliographies,
primary sources; methods of evaluating and presenting evidence; delineating research areas in the field. Effective: 1997 Winter Quarter.

DRA 211—Advanced Voice and Speech (3)
Laboratory—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open only to Dramatic Arts Students and Ph.D. students with an emphasis in Performance and Theatre. Review a progression of exercises to free, develop and strengthen the voice, first as a human instrument, and then as an actor's instrument using various texts such as Shakespeare, Ibsen and contemporary plays. Required for the M.F.A. degree in Acting. May be repeated up to 2 time(s). Effective: 2016 Spring Quarter.

DRA 212—Advanced Stage Movement (3)
Laboratory—6 hours. Prerequisite(s): Consent of Instructor. Graduate standing in the MFA Program. Open to advanced undergraduates by consent of instructor. Application of modes of exploration, breath placement, and the use of imagery as well as Laban's effort/shape system as a method of analysis in classic and modern plays. May be repeated for credit. Effective: 2016 Spring Quarter.

DRA 221—Special Problems in Advanced Acting (4)
Laboratory—4 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Advanced acting problems arising from differences in the type and style of plays selected from Greece to the present. May be repeated for credit. Effective: 1997 Winter Quarter.

DRA 224A—Seminar in Theatrical Design: Ancient Worlds--Early 17th Century (4)
Project (Term Project)—2 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Group study while focusing primarily on one discipline: scenic, costume or lighting design. Periods covered: Greek, Medieval, Renaissance, Shakespearean, Jacobean, early 17th century. Design projects include script analysis, research of period style, fashion, character development, developing design concepts, presentation skills. Effective: 2016 Spring Quarter.

DRA 224B—Seminar in Theatrical Design: Mid 17th Century to 1900 (4)
Project (Term Project)—2 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Group study focusing primarily on one discipline: scenic, costume or lighting design. Periods covered: Cavalier, Restoration 18th century opera and ballet, 19th century drama. Design projects include script analysis, research of period style, fashion, character development, developing design concepts,presentation skills. Effective: 2016 Spring Quarter.

DRA 224C—Seminar in Theatrical Design: the 20th Century (4)
Project (Term Project)—2 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Group study focusing primarily on one discipline-scenic, costume or lighting design. 20th century genres covered: Realism, Brecht, Musicals, Contemporary Dance, short narrative film. Design projects include script analysis, research of period style, fashion, character development, developing design concepts, presentation skills. Effective: 2016 Spring Quarter.

DRA 224D—Seminar in Theatrical Design: Contemporary Concepts (4)
Project (Term Project)—2 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Group study focusing primarily on one discipline: scenic, costume or lighting design. Emphasis on contemporary design concepts for new works and classics: Shakespeare, modern dance, concept plays and musicals. Script and character analysis for design in performance, research, design projects. Effective: 2016 Spring Quarter.

DRA 224E—Seminar in Theatrical Design: Advanced Concepts (4)
Project (Term Project)—2 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Group study focusing primarily on one discipline: scenic, costume or lighting design. Emphasis on special issues in contemporary design concepts for new works and classics. Script and character analysis for design in performance, research, design projects. Effective: 2016 Spring Quarter.

DRA 225—Performance Design Studio: Techniques and Media (2)
Studio—2 hours. Prerequisite(s): DRA 224A (can be concurrent) or DRA 224B (can be concurrent) or DRA 224C (can be concurrent) or DRA 224D (can be concurrent) or DRA 224E (can be concurrent); Consent of Instructor. Exploration and development of techniques and skills in the performance design process. Drafting, model building, drawing, painting and rendering, costume drawing, color theory, lighting techniques, design portfolio preparation and presentation. May be repeated up to 5 time(s). Effective: 2016 Spring Quarter.

DRA 228—Seminar in Directing Theory: Non-Realism (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Modern directing theory as it applies to non-realistic theatre; development of directorial concepts for production of selected non-realistic plays-Greek to the present; emphasis on textual analysis. Effective: 2016 Spring Quarter.

DRA 229—Special Problems in Directing (4)
Laboratory—2 hours; Rehearsal—4 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Projects in directing scenes selected from plays from ancient Greece to the present. May be repeated up to 2 time(s). Effective: 2014 Spring Quarter.

DRA 230—Advanced Problems in Choreography and Performance (2)
Discussion/Laboratory—2 hours. Prerequisite(s): Consent of Instructor. Explores contemporary issues of choreography and performance in depth and how those issues pertain to performance work. Focus will include contemporary thought on representation, legibility, new forms, and cultural attitudes. May be repeated up to 6 time(s). Effective: 2012 Winter Quarter.

DRA 244—Critical Approaches to Traditional Systems of Body Movement (4)
Discussion/Laboratory—6 hours; Project (Term Project); Term Paper. Prerequisite(s): Consent of Instructor. Introduction to traditional systems for body movement, development of critical approaches to them, and experiments in how they inform training and practice in theatre, dance, and performance. May be repeated up to 5 time(s). Effective: 2016 Fall Quarter.

DRA 250—Modern Theatre (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Theatre of Europe and America, 1860-1940, with emphasis on the relationship of the dramas of the period to the physical circumstances under which they were produced. Effective: 2016 Spring Quarter.

DRA 251—Scoring and Scripting in Performance (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Process of weaving together various performance elements brought into play by the artists in their respective disciplines. The "script" is the thread from which the artists' "scores" will layer and transform the "script" into performance for specific time, place, spectators. Effective: 2016 Spring Quarter.

DRA 252—Performance: Concepts of Space, Place, and Time (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Innovative theories of creating performance spaces, establishing a sense of place, and communicating the concept of time explored through collaborative interaction. Research includes traditional principles, site-specific spaces and consideration of various tempi from music and movement. Effective: 2016 Spring Quarter.

DRA 253—Approaches to Collaboration (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Exploration of different approaches to collaboration among artists in different media and their influence on the creative process. Effective: 2016 Spring Quarter.

DRA 254—Performing Identities/Personae (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Historical and contemporary theories of constructing stage identities. Discussion and project collaborations based on theories. Questions of identity related to ethnicity, gender or sexual orientation. Effective: 2016 Spring Quarter.

DRA 255—Composition in the Arts (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Examine manner in which specific elements utilized by actors, dancers, directors, choreographers, and designers are combined or related to form a whole in space and time, as well as methods of sequencing used by each discipline to produce artistic products. May be repeated up to 1 time(s). Effective: 2016 Spring Quarter.

DRA 256—Visual Language for Performance (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Restricted to graduate students. Exploration of different approaches and methods to the visual elements of performance. Focus on design and style for different media and genres, storytelling through visual elements of performance. Effective: 2017 Winter Quarter.

DRA 257—Interdisciplinary Seminar in Theatre, Dance and Performance (1)
Project (Term Project)—1.5 hours; Seminar—1.5 hours. Prerequisite(s): Consent of Instructor. Restricted to students enrolled in the MFA in Dramatic Art; students taking the PhD in Performance Studies or the DE in Studies in Performance and Practice may apply to enroll. Interdisciplinary seminar for first and second year MFA students in Theatre and Dance. Topics range from current practice in dance, theatre, film and performance, to leading edge developments by outstanding practitioners in the field. May be repeated up to 2 time(s). Effective: 2017 Spring Quarter.

DRA 259—Topics in Contemporary Theatre and Performance (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Special topics designed to study in depth aspects of contemporary
performance including performance analysis, cultural and historical context, modes of production, theoretical and political entailments, and issues of spectatorship (e.g., "Brecht and After," "British Theater," "Race and Gender in Performance." May be repeated up to 5 time(s). Effective: 2016 Spring Quarter.

DRA 260—Approaches and Methodologies to Studies in Performance and Practice (4)
Project (Term Project); Seminar—3 hours; Term Paper. Prerequisite(s): Admission to any graduate program in the University and consent of instructor. Preference to students enrolled in the Designated Emphasis in Studies in Performance and Practice. Instruction is offered a variety of disciplinary approaches and methodologies in Performance and Practice, with a focus is on cross-disciplinary learning and research. Usually offered each quarter. May be repeated for credit when content differs. Effective: 2016 Fall Quarter.

DRA 265A—Performance Studies: Modes of Production (4)
Project (Term Project); Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Introduces students to the literature of performance production in a
variety of media: theatre, dance, film, video, computer-based, looking at cultural, aesthetic, rhetorical and political theory. Usually offered in alternate years. Maybe repeated for credit with different topical matter/instructor. May be repeated up to 3 time(s) topic differs. Effective: 2016 Fall Quarter.

DRA 265B—Peformance Studies: Signification and the Body (4)
Project (Term Project); Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Introduces students to analysis of the body in performance, drawing on theoretical models from several fields. May be repeated up to 3 time(s) when topic differs. Effective: 2016 Fall Quarter.

DRA 265C—Performance Studies: Performance and Society (4)
Project (Term Project); Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Introduces students to the role of performance (broadly defined), in everyday life, sociopolitical negotiation, identity, social movements, the media, and the state. May be repeated up to 3 time(s) when topic differs. Effective: 2016 Fall Quarter.

DRA 265D— Performance studies: Theory, History, Criticism (4)
Project (Term Project); Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Introduction to the theory, history and criticism, informing performance studies. May be repeated up to 3 time(s) when topic differs. Effective: 2016 Fall Quarter.

DRA 280—Theatre Laboratory (1-12)
Variable. Prerequisite(s): Consent of Instructor. Advanced practice in acting, designing, directing, playwriting, and technical theatre. May be repeated for credit. Effective: 2016 Fall Quarter.

DRA 298—Group Study (1-5)
Prerequisite(s): Consent of Instructor. Effective: 1997 Winter Quarter.

DRA 299—Individual Study (1-12)
Variable. Prerequisite(s): Consent of Instructor. Individual study. (S/U grading only.) Effective: 2016 Fall Quarter.

DRA 299D—Dissertation Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Dissertation research. (S/U grading only.) Effective: 2016 Fall Quarter.

DRA 396—Teaching Assitant Training Practicum (1-4)
Variable. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2016 Spring Quarter.

DRA 413—Stage Make-up (1)
Lecture/Lab—2 hours. Prerequisite(s): Consent of Instructor. Approved for graduate degree credit. Lectures, demonstrations, and practical work in aspects of theatrical make-up. Effective: 1997 Winter Quarter.

EAD Engineering Applied Science - Davis

Courses in EAD:

EAD 230—Topics in Computational Fluid Dynamics (3)
Lecture—3 hours. Prerequisite(s): EAD 210A; EAD 210B; or Consent of Instructor. Hands-on approach to numerical methods for compressible fluid flow.Readings and discussions of solution strategies will be complemented with programming exercises and projects to give first-hand experience with performance and accuracy of several computational methods;from upwind differencing to Godunov methods. Effective: 2000 Fall Quarter.

EAD 289A—Special Topics in Applied Science: Atomic, Molecular, and Optical Physics (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Special topic in Atomic, Molecular, and Optical Physics. May be repeated up to 5 unit(s) per segment when topic differs. Effective: 2008 Fall Quarter.

EAD 289B—Special Topics in Applied Science: Chemical Physics (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Special topic in Chemical Physics. May be repeated up to 5 unit(s) per segment when topic differs. Effective: 2008 Fall Quarter.

EAD 289C—Computational Physics: Computational Physics (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Special topic in Computational Physics. May be repeated up to 5 unit(s) per segment when topic differs. Effective: 2008 Fall Quarter.

EAD 289D—Special Topics in Applied Science: Biophotonics/Biotechnology (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Special topic in Biophotonics/Biotechnology. May be repeated up to 5 unit(s) per segment when topic differs. Effective: 2008 Fall Quarter.

EAD 289E—Special Topics in Applied Science: Materials Science (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Special topic in Materials Science. May be repeated up to 5 unit(s) per segment when topic differs. Effective: 2008 Fall Quarter.

EAD 289F—Special Topics in Applied Science: Imaging Science and Photonics (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Special topic in Imaging Science and Photonics. May be repeated up to 5 unit(s) per segment when topic differs. Effective: 2008 Fall Quarter.

EAD 289G—Special Topics in Applied Science: Nonlinear Optics (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Special topic in Nonlinear Optics. May be repeated up to 5 unit(s) per segment when topic differs. Effective: 2008 Fall Quarter.

EAD 289H—Special Topics in Applied Science: Plasma/Fusion Energy Physics (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Special topic in Plasma/Fusion Energy Physics. May be repeated up to 5 unit(s) per segment when topic differs. Effective: 2008 Fall Quarter.

EAD 289I—Special Topics in Applied Science: Quantum Electronics (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Special topic in Quantum Electronics. May be repeated up to 5 unit(s) per segment when topic differs. Effective: 2008 Fall Quarter.

EAD 289J—Special Topics in Applied Science: Condensed Matter/Statistical Physics (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Special topic in Condensed Matter/Statistical Physics. May be repeated up to 5 unit(s) per segment when topic differs. Effective: 2008 Fall Quarter.

EAD 289K—Special Topics in Applied Science: Classical Optics (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Special topic in Classical Optics. May be repeated up to 5 unit(s) per segment when topic differs. Effective: 2008 Fall Quarter.

EAD 289L—Special Topics in Applied Science: Microwave and Millimeter-Wave Technology (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Special topic in Microwave and Millimeter-Wave Technology. May be repeated up to 5 unit(s) per segment when topic differs. Effective: 2008 Fall Quarter.

EAD 289M—Special Topics in Applied Science: Synchrotron Radiation Science (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Special topic in Synchrotron Radiation Science. May be repeated up to 5 unit(s) per segment when topic differs. Effective: 2008 Fall Quarter.

EAD 289N—Special Topics in Applied Science: Space Physics (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Special topic in Space Physics. May be repeated up to 5 unit(s) per segment when topic differs. Effective: 2008 Fall Quarter.

EAD 290—Seminar (1-2)
Seminar—1-2 hours. (S/U grading only.) Effective: 1997 Winter Quarter.

EAD 290C—Graduate Research Group Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

EAD 298—Group Study (1-5)
Lecture—3-15 hours. (S/U grading only.) Effective: 1997 Winter Quarter.

EAD 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

EAE Aerospace Science and Engineering

Courses in EAE:

EAE 001—Introduction to Aerospace Science Engineering (1)
Lecture—1 hour. Description of the field of aerospace engineering with examples from industry, government, and research. Aerospace engineering principles, ethics, and responsibilities. (P/NP grading only.) Effective: 2002 Fall Quarter.

EAE 010—From the Wright Brothers to Drones and Quadcopters (2)
Lecture—2 hours. History of aircraft and its influence on society. Topics covered will include Unmanned Aerial Vehicles, safety considerations, economics and privacy issues. Aerodynamics, stability and control will also be introduced. GE credit: SE, SS. Effective: 2015 Summer Session 1.

EAE 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

EAE 126—Theoretical and Computational Aerodynamics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ENG 180 C- or better or EAD 115 C- or better or MAT 128C C- or better or EME 115 C- or better); EAE 127 C- or better Development of general equations of fluid motion. Study of flow field kinematics and dynamics. Flow about a body. Thin airfoil theory. Viscous effects. Applications of numerical methods to wing analysis and design. GE credit: SE. Effective: 2013 Fall Quarter.

EAE 127—Applied Aircraft Aerodynamics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EME 106 C- or better Principles, governing equations, and predictive theories for aircraft aerodynamics. Lift and drag of 2D airfoils, 3D wings, and high-lift devices. GE credit: SE, WE. Effective: 2017 Fall Quarter.

EAE 129—Stability and Control of Aerospace Vehicles (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 102 C- or better Restricted to upper division standing. Aircraft and spacecraft stability and control. Derivation of fundamental equations of motion for aircraft/spacecraft. Fundamentals of feedback. Aircraft flight control systems. Spacecraft attitude control systems. GE credit: SE. Effective: 2017 Fall Quarter.

EAE 130A—Aircraft Performance and Design (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): EAE 127 C- or better; EAE 129 C- or better (can be concurrent) Major aircraft design experience with multiple realistic constraints including aerodynamics, performance analysis, weight estimation, stability and control, and appropriate engineering standards. GE credit: SE. Effective: 2017 Fall Quarter.

EAE 130B—Aircraft Performance and Design (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): EAE 130A C- or better Restricted to upper division standing. Major aircraft design experience including detailed design, cost analysis, analysis of aircraft structure, propulsion system, aerodynamics, aircraft handling qualities, manufacturing, or meeting relevant engineering standards. GE credit: OL, SE. Effective: 2017 Fall Quarter.

EAE 133—Finite Element Methods in Structures (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 104 C- or better Open to College of Engineering Students. Introduction to the aerospace structural design process. History of aircraft and spacecraft materials. Effects of loading beyond elastic limit. Deflections and stresses due to combined loading. Virtual work principles, and finite element methods. Applications to aerospace structures. GE credit: SE. Effective: 2011 Fall Quarter.

EAE 135—Aerospace Structures (4)
Lecture—4 hours. Prerequisite(s): ENG 104 C- or better; EAE 126 or EAE 127 recommended. Analysis and design methods used in aerospace structures. Shear flow in open, closed and multicell beam cross-sections, buckling of flat and curved sheets, tension field beams, local buckling. GE credit: SE. Effective: 2017 Fall Quarter.

EAE 137—Structural Composites (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 104 C- or better Overview of materials and technology for creating structures from fiber reinforced resin matrix composite material systems. Elementary design analysis and case studies emphasizing aeronautical applications. GE credit: SE. Effective: 2010 Fall Quarter.

EAE 138—Aircraft Propulsion (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EME 106 C- or better Analysis/design of modern aircraft gas turbine engines. Development/application of cycle performance prediction techniques. Introduction to design of inlets, compressors, burners, turbines, and nozzles. Cycle design for specific applications. GE credit: SE. Effective: 2017 Fall Quarter.

EAE 140—Rocket Propulsion (4)
Lecture—4 hours. Prerequisite(s): EME 106 C- or better Restricted to upper division standing. Fluid and thermodynamics of rocket engines, liquid and solid rocket propulsion. Space propulsion concepts and space mission requirements. Not open for credit to students who have taken identical EAE 189A prior to Fall Quarter 2013. GE credit: SE. Effective: 2016 Winter Quarter.

EAE 141—Space Systems Design (4)
Discussion—2 hours; Lecture—2 hours. Prerequisite(s): ENG 102 C- or better; EME 106 C- or better Introduction to space systems design including space project organization, requirements definition and specification, concepts formulation, system tradeoffs, subsystem design. Prototype space mission concepts are presented and a multidisciplinary mission design is developed that considers all relevant architecture elements. GE credit: SE. Effective: 2013 Fall Quarter.

EAE 142—Orbital Mechanics (4)
Lecture—4 hours. Prerequisite(s): ENG 102 C- or better Restricted to upper division standing. Satellite orbits, multistage rockets, current global boosters, and new technologies. Design application problems include satellites, trajectory optimizations, and interplanetary trajectories. Not open for credit to students who have completed EAE 189B prior to Fall Quarter 2013. GE credit: SE. Effective: 2013 Fall Quarter.

EAE 189C—Flight Simulation and Testing in Design of Aircraft and Spacecraft (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 102; and Consent of Instructor. Teaches flight test techniques together with data analysis methods to prepare students for any type of flight testing including fixed wing, rotary wing and launch vehicles. GE credit: SE. Effective: 2013 Fall Quarter.

EAE 198—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

EAE 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

EAP Education Abroad Program

Courses in EAP:

EAP 090X—International Education Seminar (1)
Seminar—1 hour. Prerequisite(s): Open to lower division applicants for EAP or UC Davis study abroad and international internship programs. Seminar examines the academic, cultural, and personal issues of study abroad, including academic programs abroad, country-specific history and culture, cross-cultural experiences, culture shock, racial and gender issues. May be repeated for credit. (P/NP grading only.) Effective: 1998 Winter Quarter.

EAP 180—Education Abroad: Special Topics (1-12)
Discussion/Laboratory—3 hours; Lecture/Discussion—3-12 hours. Prerequisite(s): Minimum GPA requirement for each study abroad program as specified in the written agreement between UC Davis and the host institution; prerequisites for language courses may also apply. Students who participate in approved international programs take this course up to 12 units while studying abroad. May be repeated for credit May be repeated for credit; credits will be reviewed by departments and Dean's Office to determine how they fulfill UC Davis requirements. Effective: 2014 Winter Quarter.

EAP 190X—International Education Seminar (1)
Seminar—1 hour. Prerequisite(s): Open to upper division applicants for EAP or UC Davis study abroad and international internship programs. Seminar examines the academic, cultural, and personal issues of study abroad, including academic programs abroad, country-specific history and culture, cross-cultural experiences, culture shock, racial and gender issues. May be repeated for credit. (P/NP grading only.) Effective: 1998 Winter Quarter.

EAP 192—Internship in Education Abroad (1-12)
Internship—3-36 hours. Prerequisite(s): Participation in a study abroad program. Internship with Education Abroad program, potentially either at university or abroad. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2017 Winter Quarter.

EAS East Asian Studies

Courses in EAS:

EAS 088—Korean Society: Late 19th Century to the Present (4)
Lecture/Discussion—4 hours. Modern Korean society (late 19th Century to contemporary period), emphasizing the perseverance and transformations of traditional social and cultural patterns. Effective: 2001 Winter Quarter.

EAS 113—Cinema and Society in China (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): HIS 190C; HIS 193; or Consent of Instructor. Knowledge of Chinese not required. Viewing and analysis of one Chinese film with English subtitles each week, followed by discussion and short essays. Cinematic technique, social values and film topics from 1930s to today. Not open for credit to students who have completed CHN 113. Effective: 1997 Winter Quarter.

EAS 190—East Asian Studies Seminar (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Upper division standing or consent of instructor. Political, social, cultural, and economic issues in East Asia. Topic varies each year. May be repeated for credit when topic differs. Effective: 2004 Summer Session 2.

EAS 192—East Asian Studies Seminar (1-12)
Internship—3-36 hours; Term Paper. Prerequisite(s): Consent of Instructor. Upper division standing. Work experience in the East Asian Studies field, with analytical term paper on a topic approved by the instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

EAS 194H—Special Study for Honors Students (1-5)
Independent Study—1-5 hours. Prerequisite(s): Open only to majors of senior standing who qualify for Honors Program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in East Asian Studies culture, society, or language. (P/NP grading only.) Effective: 1997 Winter Quarter.

EAS 196A—Honors Seminar (4)
Conference—2 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. GPA of 3.500 in the major; senior standing. A two-quarter research project culminating in an Honors thesis. A grade of B or higher must be earned to qualify the student for honors distinction at graduation. (P/NP grading only.) Effective: 1997 Winter Quarter.

EAS 196B—Honors Seminar (4)
Conference—2 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. GPA of 3.500 in the major, senior standing. A two-quarter research project culminating in an Honors thesis. A grade of B or higher must be earned to qualify the student for honors distinction at graduation. (P/NP grading only.) Effective: 1997 Winter Quarter.

EAS 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

EBS Engineering Biological Systems

Courses in EBS:

EBS 001—Foundations of Biological Systems Engineering (4)
Laboratory—6 hours; Lecture—2 hours; Project (Term Project). Open only to students in Biological Systems Engineering. Introduction to engineering and the engineering design process with examples drawn from the field of biological systems engineering. Introduction to computer-aided design and mechanical fabrication of designs. Students work on a quarter-long group design project. GE credit: OL, QL, SE, SL, VL. Effective: 2009 Fall Quarter.

EBS 075—Properties of Materials in Biological Systems (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): BIS 002A; PHY 009C (can be concurrent) Properties of typical biological materials; composition and structure with emphasis on the effects of physical and biochemical properties on design of engineered systems; interactions of biological materials with typical engineering materials. GE credit: QL, SE, SL, VL, WE. Effective: 2016 Fall Quarter.

EBS 090C—Research Group Conference in Biological Systems Engineering (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Lower division standing in Biological Systems Engineering or Food Engineering. Research group conference. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

EBS 092—Internship in Biological Systems Engineering (1-5)
Internship. Prerequisite(s): Consent of Instructor. Lower division standing; project approval prior to period of internship. Supervised work experience in biological systems engineering. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

EBS 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Group study of selected topics; restricted to lower division students. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

EBS 099—Special Study for Lower Division Students (1-5)
Variable. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

EBS 103—Fluid Mechanics Fundamentals (4)
Lecture—4 hours. Prerequisite(s): PHY 009B Fluid mechanics axioms, fluid statics, kinematics, velocity fields for one-dimensional incompressible flow and boundary layers, turbulent flow time averaging, potential flow, dimensional analysis, and macroscopic balances to solve a range of practical problems. (HYD 103N.) GE credit: QL, SE, VL. Effective: 2005 Spring Quarter.

EBS 114—Principles of Field Machinery Design (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): ENG 102; ENG 104 Traction and stability of vehicles with wheels or tracks. Operating principles of field machines and basic mechanisms used in their design. GE credit: QL, SE, VL, WE. Effective: 1998 Spring Quarter.

EBS 115—Forest Engineering (3)
Lecture—3 hours. Prerequisite(s): ENG 104 Applications of engineering principles to problems in forestry including those in forest regeneration, harvesting, residue utilization, and transportation. GE credit: QL, SE, SL, VL. Effective: 2016 Fall Quarter.

EBS 120—Power Systems Design (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 017; ENG 102; ENG 103; ENG 105 Design and performance of power devices and systems including combustion engines, electric generators and motors, fluid power systems, fuels, and emerging technologies. Selection of units for power matching and optimum performance. GE credit: QL, SE, SL, VL, WE. Effective: 2002 Fall Quarter.

EBS 125—Heat Transfer in Biological Systems (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EBS 075; ENG 105; BIS 002A; BIS 002B; BIS 002C Fundamentals of heat transfer with application to biological systems. Steady and transient heat transfer. Analysis and simulation of heat conduction, convection and radiation. Heat transfer operations. GE credit: OL, QL, SE, VL, WE. Effective: 2009 Spring Quarter.

EBS 127—Mass Transfer and Kinetics in Biological Systems (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EBS 125 Fundamentals of mass transfer and kinetics in biological systems. Molecular diffusion and convection. Thermodynamics and bioenergetics. Biological and chemical rate equations. Heterogeneous kinetics. Batch and continuous reaction processes. Mass transfer operations. GE credit: QL, SE, VL, WE. Effective: 2009 Fall Quarter.

EBS 128—Biomechanics and Ergonomics (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): STA 100; ENG 102 Limited enrollment. Anatomical, physiological, and biomechanical bases of physical ergonomics. Human motor capabilities, body mechanics, kinematics and anthropometry. Use of bioinstrumentation, industrial surveillance techniques and the NIOSH lifting guide. Cumulative trauma disorders. Static and dynamic biomechanical modeling. Emphasis on low back, shoulder and hand/wrist biomechanics. GE credit: QL, SE, SL, VL, WE. Effective: 2000 Spring Quarter.

EBS 130—Modeling of Dynamic Processes in Biological Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EBS 075; (ENG 006 or ECS 030); MAT 022B C- or better Techniques for modeling processes through mass and energy balance, rate equations, and equations of state. Computer problem solution of models. Example models include package design, evaporation, respiration heating, thermal processing of foods, and plant growth. GE credit: QL, SE, SL, VL. Effective: 2011 Fall Quarter.

EBS 135—Bioenvironmental Engineering (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EBS 125; EBS 130 Biological responses to environmental conditions. Principles and engineering design of environmental control systems. Overview of environmental pollution problems and legal restrictions for biological systems, introduction of environmental quality assessment techniques, and environmental pollution control technologies. GE credit: QL, SE, SL, VL, WE. Effective: 1998 Spring Quarter.

EBS 144—Groundwater Hydrology (4)
Lecture—4 hours. Prerequisite(s): MAT 016B or MAT 021A; HYD 103 or ENG 103 recommended. Fundamentals of groundwater flow and contaminant hydrology. Occurrence, distribution, and movement of groundwater. Well-flow systems. Aquifer tests. Well construction operation and maintenance. Groundwater exploration and quality assessment. Agricultural threats to groundwater quality: fertilizers, pesticides, and salts. (HYD 144.) GE credit: QL, SE, SL, VL. Effective: 2003 Fall Quarter.

EBS 145—Irrigation and Drainage Systems (4)
Lecture—4 hours. Prerequisite(s): EBS 103 or HYD 103N Engineering and scientific principles applied to the design of surface, sprinkle and micro irrigation systems and drainage systems within economic, biological, and environmental constraints. Interaction between irrigation and drainage. GE credit: QL, SE, SL, VL. Effective: 2016 Fall Quarter.

EBS 147—Runoff, Erosion and Water Quality Management (3)
Fieldwork; Lecture/Lab—3 hours. Prerequisite(s): (PHY 007B or PHY 009B); (MAT 016C or MAT 017C or MAT 021C); (ECI 142 or HYD 141 or ESM 100); or equivalent. Practical hydrology and runoff water quality management from disturbed watersheds. Development of hillslope and soils restoration concepts and practice, modeling and application. (HYD 147.) GE credit: SE. Effective: 2018 Spring Quarter.

EBS 161—Kinetics and Bioreactor Design (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EBS 127 Provide the basic principles of reactor design for bioprocess applications. This course emphasizes the following topics: 1) kinetics and reactor engineering principles; 2) bio-reaction kinetics; and 3) bioreactor design. GE credit: QL, SE, VL. Effective: 2012 Spring Quarter.

EBS 165—Bioinstrumentation and Control (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 100 Instrumentation and control for biological production systems. Measurement system concepts, instrumentation and transducers for sensing
physical and biological parameters, data acquisition and control. GE credit: QL, SE, SL, VL, WE. Effective: 1998 Fall Quarter.

EBS 170A—Engineering Design and Professional Responsibilities (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): EBS 001; ENG 102; ENG 104 Engineering design including professional responsibilities. Emphasis on project selection, data sources, specifications, human factors, biological materials, safety systems, and professionalism. Detailed design proposals will be developed for courses 170B and 170BL. GE credit: OL, QL, SE, SL, VL, WE. Effective: 1998 Spring Quarter.

EBS 170B—Engineering Projects: Design (2)
Discussion—2 hours. Prerequisite(s): EBS 170A; EBS 170BL (can be concurrent); EBS 170BL required concurrently. Individual or group projects involving the design of devices, structures, or systems to solve specific engineering problems in biological systems. Project for study is jointly selected by student and instructor. GE credit: OL, QL, SE, SL, VL, WE. Effective: 2006 Spring Quarter.

EBS 170BL—Engineering Projects: Design Laboratory (1)
Laboratory—3 hours. Prerequisite(s): EBS 170B (can be concurrent); EBS 170B required concurrently. Individual or group projects involving the design of devices, structures, or systems to solve specific engineering problems in biological systems. GE credit: OL, QL, SE, SL, VL, WE. Effective: 2006 Spring Quarter.

EBS 170C—Engineering Projects: Design Evaluation (1)
Discussion—1 hour. Prerequisite(s): EBS 170B; EBS 170CL (can be concurrent); EBS 170CL required concurrently. Individual or group projects involving the fabrication, assembly and testing of components, devices, structures, or systems designed to solve specific engineering problems in biological systems. Project for study
previously selected by student and instructor in course 170B. GE credit: OL, QL, SE, SL, VL, WE. Effective: 1999 Winter Quarter.

EBS 170CL—Engineering Projects: Design Evaluation (2)
Laboratory—6 hours. Prerequisite(s): EBS 170C (can be concurrent); EBS 170C required concurrently. Individual or group projects involving the fabrication, assembly and testing of components, devices, structures, or systems designed to solve specific engineering problems in biological systems. GE credit: OL, QL, SE, SL, VL, WE. Effective: 1999 Winter Quarter.

EBS 175—Rheology of Biological Materials (3)
Lecture—3 hours. Prerequisite(s): EBS 103 or ENG 103 Fluid and solid rheology, viscoelastic behavior of foods and other biological materials, and application of rheological properties to food and biological systems (i.e., pipeline design, extrusion, mixing, coating). GE credit: QL, SE, VL. Effective: 2016 Fall Quarter.

EBS 189A—Special Topics in Biological Systems Engineering; Agricultural Engineering (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing in Engineering. Special topics in Agricultural Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1998 Fall Quarter.

EBS 189B—Special Topics in Biological Systems Engineering; Aquacultural Engineering (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing in Engineering. Special topics in Aquacultural Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1998 Fall Quarter.

EBS 189C—Special Topics in Biological Systems Engineering; Biomedical Engineering (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing in Engineering. Special topics in Biomedical Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1998 Fall Quarter.

EBS 189D—Special Topics in Biological Systems Engineering; Biotechnical Engineering (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing in Engineering. Special topics in Biotechnical Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1998 Fall Quarter.

EBS 189E—Special Topics in Biological Systems Engineering; Ecological Systems Engineering (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing in Engineering. Special topics in Ecological Systems Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1998 Fall Quarter.

EBS 189F—Special Topics in Biological Systems Engineering; Food Engineering (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing in Engineering. Special topics in Food Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1998 Fall Quarter.

EBS 189G—Special Topics in Biological Systems Engineering; Forest Engineering (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing in Engineering. Special topics in Forest Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1998 Fall Quarter.

EBS 190C—Research Group Conference in Biological Systems Engineering (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing in Biological Systems Engineering of Food Engineering. Research group conference. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

EBS 192—Internship in Biological Systems Engineering (1-5)
Internship. Prerequisite(s): Consent of Instructor. Upper division standing; approval of project prior to period of internship. Supervised work experience in biological systems engineering. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

EBS 197T—Tutoring in Biological Systems Engineering (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Tutoring individual students, leading small voluntary discussion groups, or assisting the instructor in laboratories affiliated with one of the department's regular courses. May be repeated for credit topic differs. (P/NP grading only.) GE credit: SE. Effective: 2004 Winter Quarter.

EBS 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

EBS 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

EBS 200—Research Methods in Biological Systems Engineering (2)
Lecture—2 hours. Prerequisite(s): Graduate standing. Planning, execution and reporting of research projects. Literature review techniques and proposal preparation. Record keeping and patents. Uncertainty analysis in experiments and computations. Graphic analysis. Oral and written presentation of research results, manuscript preparation, submission and review. Effective: 1997 Spring Quarter.

EBS 205—Continuum Mechanics of Natural Systems (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021D; MAT 022B; PHY 009B Continuum mechanics of static and dynamic air, water, earth and biological systems using hydraulic, heat and electrical conductivity; diffusivity; dispersion; strain; stress; deformation gradient; velocity gradient; stretch and spin tensors. (HYD 205.) Effective: 2002 Fall Quarter.

EBS 215—Soil-Machine Relations in Tillage and Traction (3)
Lecture—3 hours. Prerequisite(s): EBS 114 Mechanics of interactions between agricultural soils and tillage and traction devices; determination of relevant physical properties of soil; analyses of stress and strains in soil due to machine-applied loads; experimental and analytical methods for synthesizing characteristics
of overall systems. Effective: 1997 Winter Quarter.

EBS 216—Energy Systems (4)
Lecture/Discussion—4 hours. Prerequisite(s): ENG 105; or equivalent. Theory and application of energy systems. Systems analysis, energy conversion technologies, environmental considerations, economics and system optimization. (EGG 200.) Effective: 2018 Spring Quarter.

EBS 218—Solar Thermal Engineering (4)
Lecture/Discussion—4 hours. Prerequisite(s): Course in heat transfer. Analysis and design of solar energy collection systems. Sun-earth geometry and estimation of solar radiation. Steady-state and dynamic models of solar collectors. Modeling of thermal energy storage devices. Computer simulation. Effective: 2014 Spring Quarter.

EBS 220—Pilot Plant Operations in Aquacultural Engineering (3)
Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): (ECI 243A, ECI 243B) or (ABT 161, ABT 163) Topics in water treatment as they apply to aquaculture operations. Laboratory study of unit operations in aquaculture. Effective: 1997 Winter Quarter.

EBS 228—Occupational Musculoskeletal Disorders (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Epidemiology and etiology of occupational musculoskeletal disorders (MSDs) with focus on low back and upper extremities disorders; anatomical and biomechanical functions of lower back and upper extremities; MSDs risk factors assessment and control; research opportunities related to MSDs. Effective: 2002 Spring Quarter.

EBS 231—Mass Transfer in Food and Biological Systems (3)
Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing. Application of mass transfer principles to food and biological systems. Study of mass transfer affecting food quality and shelf life. Analysis of mass transfer in polymer films used for coating and packaging foods and controlling release of biologically active compounds. Effective: 1997 Spring Quarter.

EBS 233—Analysis of Processing Operations: Drying and Evaporation (3)
Lecture—3 hours. Prerequisite(s): Course in food or process engineering, familiarity with FORTRAN. Diffusion theory in drying of solids. Analysis of fixed-bed and continuous-flow dryers. Steady-state and dynamic models to predict performance evaporators: multiple effects, mechanical and thermal recompression, control systems. Effective: 1997 Winter Quarter.

EBS 235—Advanced Analysis of Unit Operations in Food and Biological Engineering (3)
Lecture—3 hours. Prerequisite(s): EBS 132 Analysis and design of food processing operations. Steady state and dynamic heat and mass transfer models for operations involving phase change such as freezing and frying. Separation processes including membrane applications in food and fermentation systems. Effective: 1997 Winter Quarter.

EBS 237—Thermal Process Design (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): Course in heat transfer. Heat transfer and biological basis for design of heat sterilization of foods and other biological materials in containers or in bulk. Effective: 1997 Spring Quarter.

EBS 239—Magnetic Resonance Imaging in Biological Systems (3)
Lecture—3 hours. Prerequisite(s): Graduate standing. Theory and applications of magnetic resonance imaging to biological systems. Classical Bloch model of magnetic resonance. Applications to be studied are drying of fruits, flow of food suspensions, diffusion of moisture, and structure of foods. Effective: 1997 Winter Quarter.

EBS 240—Infiltration and Drainage (3)
Lecture—3 hours. Prerequisite(s): SSC 107; ENG 103 Aspects of multi-phase flow in soils and their application to infiltration and immiscible displacement problems. Gas phase transport and entrapment during infiltration, and oil-water-gas displacement will be considered. Effective: 1999 Fall Quarter.

EBS 241—Sprinkle and Trickle Irrigation Systems (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): EBS 145; HYD 115 Computerized design of sprinkle and trickle irrigation systems. Consideration of emitter mechanics, distribution functions and water yield functions. Effective: 1997 Winter Quarter.

EBS 242—Hydraulics of Surface Irrigation (3)
Lecture—3 hours. Prerequisite(s): EBS 145; HYD 115 Mathematical models of surfaceirrigation systems for prediction of the ultimate disposition of water flowing onto a field. Quantity of runoff and distribution of infiltrated water over field length as a function of slope, roughness, infiltration and inflow rates. Effective: 1997 Winter Quarter.

EBS 243—Water Resource Planning and Management (3)
Lecture—3 hours. Prerequisite(s): HYD 141; Or equivalent. Applications of deterministic and stochastic mathematical programming techniques to water resource planning, analysis, design, and management. Water allocation, capacity expansion, and reservoir operation. Conjunctive use of surface water and groundwater. Water quality management. Irrigation planning and operation models. (HYD 243.) Effective: 1997 Fall Quarter.

EBS 245—Waste Management for Biological Production Systems (3)
Lecture—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Characterization of solid and liquid wastes from animal, crop, and food production systems. Study of methods and system design for handling, treatment, and disposal/utilization of these materials. Effective: 1997 Spring Quarter.

EBS 260—Analog Instrumentation (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 100 Instrument characteristics: generalized instrument models, calibration, and frequency response. Signal conditioning: operational amplifier
circuits, filtering, and noise. Transducers: motion, force, pressure, flow, temperature, and photoelectric. Effective: 1997 Winter Quarter.

EBS 262—Computer Interfacing and Control (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 100; EBS 165 Procedural and object-oriented programming in C++, analog and digital signal conversion, data acquisition and computer control. Effective: 2000 Winter Quarter.

EBS 265—Design and Analysis of Engineering Experiments (5)
Lecture—3 hours; Lecture/Discussion—2 hours. Prerequisite(s): STA 100; ASE 120; or an introductory course in statistics. Simple linear, multiple, and polynomial regression, correlation, residuals, model selection, one-way ANOVA, fixed and random effect models, sample size, multiple comparisons, randomized block, repeated measures, and Latin square designs, factorial experiments, nested design and subsampling, split-plot design, statistical software packages. Effective: 2000 Spring Quarter.

EBS 267—Renewable Bioprocessing (3)
Lecture—3 hours. Prerequisite(s): EBS 160; (BIS 101 or MIC 102) Applications of biotechnology and bioprocess engineering toward the use of agricultural and renewable feedstocks for the production of biochemicals. Design and modeling of microbial- and plant-based production systems including associated fermentation, extraction, and purification processes. Effective: 2005 Winter Quarter.

EBS 268—Polysaccharides Surface Interactions (3)
Lecture—3 hours. Prerequisite(s): Graduate students in science or engineering. Study of fundamental surface science theories as applied to physical and chemical interactions of carbohydrates and polysaccharides. (ECH 268.) Effective: 2017 Winter Quarter.

EBS 270—Modeling and Analysis of Biological and Physical Systems (3)
Lecture—3 hours. Prerequisite(s): Familiarity with a programming language. Mathematical modeling of biological systems: model development; analytical and numerical solutions. Case studies from various specializations within Biological and Agricultural Engineering. Effective: 2001 Spring Quarter.

EBS 275—Physical Properties of Biological Materials (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Selected topics on physical properties, such as mechanical, optical, rheological, and aerodynamic properties, as related to the design of harvesting, handling, sorting, and processing equipment. Techniques for measuring and recording physical properties of biological materials. Effective: 1997 Winter Quarter.

EBS 289A—Selected Topics in Biological Systems Engineering; Animal Systems Engineering (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Animal Systems Engineering. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EBS 289B—Selected Topics in Biological Systems Engineering; Aquacultural Engineering (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Aquacultural Engineering. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EBS 289C—Selected Topics in Biological Systems Engineering; Biological Engineering (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Biological Engineering. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EBS 289D—Selected Topics in Biological Systems Engineering; Energy Systems (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Energy Systems. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EBS 289E—Selected Topics in Biological Systems Engineering; Environmental Quality (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special topic in Environmental Quality. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EBS 289F—Selected Topics in Biological Systems Engineering; Food Engineering (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Food Engineering. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EBS 289G—Selected Topics in Biological Systems Engineering; Forest Engineering (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Forest Engineering. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EBS 289H—Selected Topics in Biological Systems Engineering; Irrigation and Drainage (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Irrigation and Drainage. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EBS 289I—Selected Topics in Biological Systems Engineering; Plant Production and Harvest (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Plant Production and Harvest. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EBS 289J—Selected Topics in Biological Systems Engineering; Postharvest Engineering (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Postharvest Engineering. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EBS 289K—Selected Topics in Biological Systems Engineering; Sensors and Actuators (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Sensors and Actuators. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EBS 290—Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Weekly seminars on recent advances and selected topics in biological systems engineering. Course theme will change from quarter to quarter. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

EBS 290C—Graduate Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Research problems, progress and techniques in biological systems engineering. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

EBS 298—Group Study (1-5)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

EBS 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

EBS 390—Supervised Teaching in Biological and Agricultural Engineering (1-3)
Laboratory—3 hours; Tutorial—3-9 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Tutoring and teaching students in undergraduate courses offered in the Department of Biological and Agricultural Engineering. Weekly conferences with instructor; evaluation of teaching. Preparing for and
conducting demonstrations, laboratories and discussions. Preparing and grading exams. May be repeated up to 6 unit(s). (S/U grading only.) Effective: 1997 Winter Quarter.

COM Comparative Literature

Note. Many courses in Comparative Literature require that students have met the Entry Level Writing Requirement (ELWR) for the University of California.

Courses in COM:

COM 001—Major Books of Western Culture: The Ancient World (4)
Lecture/Discussion—4 hours. Prerequisite(s): Completion of Entry Level Writing Requirement. Introduction, through class discussion and frequent written assignments, to some of the major books of western civilization such as The Odyssey, Aeneid, Bible, and Augustine's Confessions. GE credit: AH, WC, WE. Effective: 2010 Spring Quarter.

COM 002—Major Books of Western Culture: From the Middle Ages to the Enlightenment (4)
Lecture/Discussion—4 hours. Prerequisite(s): Completion of Entry Level Writing Requirement. Introduction to the methods of inquiry applied to critical reading and the practice of writing. Focus on texts from the European Middle Ages to the eighteenth century; critical analysis of the historical-cultural developments in this period. GE credit: AH, WC, WE. Effective: 2010 Spring Quarter.

COM 003—Major Books of Western Culture: The Modern Crisis (4)
Lecture/Discussion—4 hours. Prerequisite(s): Completion of Entry Level Writing Requirement. Introduction, through class discussion and frequent written assignments, to the major literature and thought of the late eighteenth to the mid-twentieth century. GE credit: AH, WC, WE. Effective: 2010 Spring Quarter.

COM 004—Major Books of the Contemporary World (4)
Lecture/Discussion—4 hours. Prerequisite(s): Completion of entry level writing requirement. Comparative study of selected major Western and non-Western texts composed in the period from 1945 to the present. Intensive focus on writing about these texts, with frequent papers written about these works. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

COM 005—Fairy Tales, Fables, and Parables (4)
Discussion—1 hour; Lecture—3 hours. An introduction to fairy tales, fables, and parables as recurrent forms in literature, with such readings as tales from Aesop and Grimm, Chaucer and Shakespeare, Kafka and Borges, Buddhist and Taoist parables, the
Arabian Nights, and African American folklore. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 006—Myths and Legends (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the comparative study of myths and legends, excluding
those of Greece and Rome, with readings from Near Eastern, Teutonic, Celtic, Indian, Japanese, Chinese, African and Central American literary
sources. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 007—Literature of Fantasy and the Supernatural (4)
Discussion—1 hour; Lecture—3 hours. The role of fantasy and the supernatural in literature: tales of magic, hallucination, ghosts, and metamorphosis, including diverse authors such as Shakespeare, P'u Sung-Ling, Kafka, Kawabata, Fuentes, and Morrison. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 008—Utopias and their Transformations (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. A consideration, in literary works from different ages, of visionary and rational perceptions of a lost paradise, Golden Age, or Atlantis-and of the inhuman nightmares that can result from perversions of the utopian dream of perfection. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

COM 009—The Short Story and Novella (4)
Lecture/Discussion—3 hours; Term Paper. An introduction to shorter forms of prose fiction by major authors of different countries, with special emphasis on the modern period. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 010A—Master Authors in World Literature; Gilgamesh, Ramayana, Beowulf, Nibelungenlied (2)
Lecture/Discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Gilgamesh, Ramayana, Beowulf, Nibelungenlied. May be repeated for credit in different subject area. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 010B—Master Authors in World Literature; Metamorphoses, Decameron, Arabian Nights, Canterbury Tales (2)
Lecture/Discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Metamorphoses, Decameron, Arabian Nights, Canterbury Tales. May be repeated for credit in different subject area. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 010C—Master Authors in World Literature; Chanson de Roland, El Cid, Igor's Campaign, Morte D'Arthur (2)
Lecture/Discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Chanson de Roland, El Cid, Igor's Campaign, Morte D'Arthur. May be repeated for credit in different subject area. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 010D—Master Authors in World Literature; Sakuntala, Tristan and Isolde, Aucassin and Nicolette, Gawain and the Green Knight (2)
Lecture/Discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Sakuntala, Tristan and Isolde, Aucassin and Nicolette, Gawain and the Green Knight. May be repeated for credit in different subject area. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 010E—Master Authors in World Literature; Swift, Rabelais, La Celestina, Simplicissimus (2)
Lecture/Discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Swift, Rabelais, La Celestina, Simplicissimus. May be repeated for credit in different subject area. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 010F—Master Authors in World Literature; Cervantes, Saikaku, Fielding, Voltaire (2)
Lecture/Discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Cervantes, Saikaku, Fielding, Voltaire. May be repeated for credit in different subject area. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 010G—Master Authors in World Literature; Machiavelli, Shakespeare, Lope de Vega/Calderón, Molière/Racine, Lessing/Schiller (2) (2)
Lecture/Discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Machiavelli, Shakespeare, Lope de Vega/Calderón, Molière/Racine, Lessing/Schiller. May be repeated for credit in different subject area. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 010H—Master Authors in World Literature; Goethe, Byron, Stendhal, Pushkin, Lermontov (2)
Lecture/Discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Goethe, Byron, Stendhal, Pushkin, Lermontov. May be repeated for credit in different subject area. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 010I—Master Authors in World Literature; Hoffmann, Gogol, Poe, Hawthorne, Maupassant, Chekhov, Melville (2)
Lecture/Discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Hoffmann, Gogol, Poe, Hawthorne, Maupassant, Chekhov, Melville. May be repeated for credit in different subject area. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 010J—Master Authors in World Literature; Flaubert, Twain, Turgenev, Galdós, Ibsen (2)
Lecture/Discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Flaubert, Twain, Turgenev, Galdós, Ibsen. May be repeated for credit in different subject area. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 010K—Master Authors in World Literature; Balzac, Dostoevski/Tolstoi, Hardy, Shaw, Strindberg (2)
Lecture/Discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Balzac, Dostoevski/Tolstoi, Hardy, Shaw, Strindberg. May be repeated for credit in different subject area. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 010L—Master Authors in World Literature; Unamuno, Svevo, Conrad, Gide, Kafka, Faulkner (2)
Lecture/Discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Unamuno, Svevo, Conrad, Gide, Kafka, Faulkner. May be repeated for credit in different subject area. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 010M—Master Authors in World Literature; Rilke/Yeats, Joyce/Woolf, Mann/Céline, Bulgakov/Tanizaki, O'Neill/Brecht, Lorca/Pirandello (2)
Lecture/Discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Rilke/Yeats, Joyce/Woolf, Mann/Céline, Bulgakov/Tanizaki, O'Neill/Brecht, Lorca/Pirandello. May be repeated for credit in different subject area. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 010N—Master Authors in World Literature; Camus/Sartre, García Márquez/Grass, Borges/Sarraute, Bellow/Nabokov, Beckett/Pinter, Genet/Dürrenmatt (2)
Lecture/Discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Camus/Sartre, García Márquez/Grass, Borges/Sarraute, Bellow/Nabokov, Beckett/Pinter, Genet/Dürrenmatt. May be repeated for credit in different subject area. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 011—Travel and the Modern World (4)
Extensive Writing; Lecture/Discussion—3 hours. Examination of travel as a quintessential human activity and experience of global modernity and cross-cultural encounters from the 18th to the 21st century with an emphasis on German-speaking culture. Travelogues, literature, art, memoirs, and films in English translation. (GER 011.) GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

COM 012—Introduction to Women Writers (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Completion of entry level writing requirement. Survey of fiction, drama, and poetry by women writers from all continents. Concerns of women compared in light of their varied social and cultural traditions. Literary analysis of voice, imagery, narrative strategies and diction. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

COM 013—Dramatic Literature (3)
Lecture—3 hours. Prerequisite(s): Completion of entry level writing requirement. Introduction, through careful reading of selected plays, to some of the major forms of Western drama, from the earliest tragedies of ancient Greece to the contemporary American theater. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

COM 014—Introduction to Poetry (3)
Lecture/Discussion—3 hours. Prerequisite(s): Completion of entry level writing requirement. Comparative study of poetry in a variety of lyric and other poetic forms from different historical periods and different linguistic, national, and cultural traditions. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

COM 020—Humans and the Natural World (4)
Lecture/Discussion—3 hours; Term Paper. Changing relationship between humans and the natural environment in ancient and modern authors as Virgil, Li Po, Basho, Darwin, and Thoreau. GE credit: AH, WC, WE. Effective: 2007 Fall Quarter.

COM 022—Literature of the Abnormal Psyche (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of Entry Level Writing Requirement. Representations of the human psyche in literature and other media (film, visual arts, music) spanning cultures and historical contexts. Depictions of abnormal psychological states, including madness, obsession, and self-fragmentation. Textual interpretation informed by psychological theories. Rhetorical persuasion and nuanced argumentation. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

COM 024—Animals in Literature (4)
Lecture—3 hours; Term Paper/Discussion. Prerequisite(s): Completion of Entry Level Writing Requirement. Study of literary texts from various periods and cultures whose theme is the representation of animals. GE credit: AH, WC, WE. Effective: 2012 Fall Quarter.

COM 025—Ethnic Minority Writers in World Literature (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ELWR (Entry Level Writing Requirement). Consideration of a broad range of writers who speak from an ethnic perspective different from the nominally or politically dominant culture of their respective countries and who explore the challenges faced by characters significantly affected by their ethnic minority status. GE credit: AH, WC, WE. Effective: 2011 Winter Quarter.

COM 053A—Literature of East Asia (4)
Lecture—3 hours; Term Paper. Introduction to representative masterpieces of East Asia with readings
from such works as The Story of the Stone, The Peach Blossom Fan, T'ang and Sung poetry, classical Japanese poetry, drama, and travel diaries, and The Tale of Genji. GE credit: AH, OL, WC, WE. Effective: 2015 Spring Quarter.

COM 053B—Literature of South Asia (4)
Lecture—3 hours; Term Paper. Introduction to representative masterpieces of South Asia with readings
from such works as the Mahabharata and Ramayana, The Cloud Messenger, Shakuntala, The Little Clay Cart, and the stories and poems of both
ancient and modern India and Southeast Asia. GE credit: AH, OL, WC, WE. Effective: 2015 Spring Quarter.

COM 053C—Literatures of the Islamic World (4)
Lecture—3 hours; Term Paper. Introduction to classical Islamic culture through translations of literature primarily from Arabic and Persian, as well as other languages. Topics include the concept of the self, society and power, spirituality, the natural world, the cosmos, and the supernatural. GE credit: AH, OL, WC, WE. Effective: 2015 Fall Quarter.

COM 090X—Lower Division Seminar (1-2)
Seminar—1-4 hours. Prerequisite(s): Consent of Instructor. Examination of a special topic in a small group setting. Effective: 1997 Winter Quarter.

COM 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Restricted to lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 100—World Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): Completion of entry level writing requirement, upper division standing, or consent of instructor. Comparative, cross-cultural study of a topic, theme, or movement in world cinema beyond the boundary of a single national tradition. Topics may include "postsocialist cinemas in East Europe and Asia," "cinema and globalization," and "popular Asian cinemas" May be repeated up to 3 time(s) the topic differs. GE credit: AH, VL, WC, WE. Effective: 2017 Spring Quarter.

COM 110—Hong Kong Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): Completion of entry level writing requirement, upper division standing, or consent of instructor. Hong Kong cinema, its history, industry, styles, genres, directors, and stars. Special attention to its polyglot, multicultural, transnational, colonial, and postcolonial environment. GE credit: AH, VL, WC, WE. Effective: 2017 Spring Quarter.

COM 112—Japanese Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Upper-division standing Introduction to Japanese cinema from early silent films to the present. Explores important directors, genres, stars, themes and techniques in relation to specific historical and cultural contexts. Lectures and readings in English. Films in Japanese with English subtitles. GE credit: AH, VL, WC, WE. Effective: 2018 Spring Quarter.

COM 120—Writing Nature: 1750 to the Present (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. Study of representations, descriptions, and discussions of humankind's problematical relationship with the non-human world in texts written in a variety of European and American traditions between 1750 and the present. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

COM 135—Women Writers (4)
Lecture/Discussion—3 hours; Term Paper. An exploration of women's differing views of self and society as revealed in major works by female authors of various times and cultures. Readings, principally of fiction, will include such writers as Lady Murasaki, Mme de Lafayette, and Charlotte Bronte. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 138—Gender and Interpretation in the Renaissance (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. Critical analysis of Renaissance texts with primary focus on issues such as human dignity, education and gender politics; "high" and "low" culture and its relation to literary practices. (ITA 141.) GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

COM 139—Shakespeare and the Classical World (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. Shakespeare's representations of the classical world in the light of selected ancient texts and Renaissance conceptions of Antiquity, with special attention to the depiction of politics and history. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

COM 140—Thematic and Structural Study of Literature (4)
Lecture/Discussion—3 hours; Term Paper. Interpretation of selected works illustrating the historical evolution
of themes, as well as of formal and structural elements. May be repeated for credit. GE credit: AH, WE. Effective: 1997 Winter Quarter.

COM 141—Introduction to Critical Theoretical Approaches to Literature and Culture (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. Introduction to critical theory and its use for interpreting literary texts, film, and media forms in global culture. (CRI 101.) GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

COM 142—Critical Reading and Analysis (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Close reading of selected texts; scrutiny of very limited amount of material, with attention to the problems of texts in translation. GE credit: AH, WE. Effective: 1997 Winter Quarter.

COM 144—The Grotesque (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. Study of the "grotesque" in selected texts from the Renaissance to the 20th century, with attention to the "grotesque" as a means of social, cultural, and political commentary, as well as of aesthetic innovation. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

COM 145—Representations of the City (4)
Discussion—1 hour; Extensive Writing; Lecture—2 hours. Exploration of the representation of the city in major translated literary texts from a variety of literary traditions and periods. Emphasis on the diversity of urban experience in literature. Topics include public and private space, memory, and gender. GE credit: AH, WC, WE. Effective: 2004 Spring Quarter.

COM 146—Myth in Literature (4)
Lecture—3 hours; Term Paper. Prerequisite(s): COM 006 recommended. Comparative study of different versions of one or more central myths, with attention to their cultural settings, artistic and literary forms of representation, as well as to their psychological dimensions. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 147—Modern Jewish Writers (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. Problems of the modern Jewish experience from the perspective of the writer's construction of the self in relation to the future and to the non-Jew. Draws upon Russian, German, Yiddish, and American traditions. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

COM 148—Mystical Literatures of South Asia and the Middle East (4)
Lecture/Discussion—3 hours; Term Paper. Exploration of the comparative mystical literatures of major religious traditions, with a focus on those produced in South Asia and the Middle East, although including other traditions. GE credit: AH, WC, WE. Effective: 2010 Fall Quarter.

COM 151—Colonial and Postcolonial Experience in Literature (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. A literary introduction to the cultural issues of colonialism and postcolonialism through reading, discussing and writing on narratives which articulate diverse points of view. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

COM 152—Literature of the Americas (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. Study of the various stylistic, historical, social and cultural factors that contribute to a hemispheric vision of American literature, encompassing works by Canadian, United States, Caribbean, Brazilian, and Spanish-American writers. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

COM 152S—Literature of the Americas (Taught in Latin America) (4)
Fieldwork—6 hours; Lecture/Discussion—6 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. Various stylistic, historical, social, and cultural factors that contribute to a hemispheric vision of American literature, encompassing works by Canadian, United States, Caribbean, Brazilian, and Spanish-American writers. Course taught abroad. May be repeated up to 1 time(s). GE credit: AH, VL, WC, WE. Effective: 2016 Fall Quarter.

COM 153—The Forms of Asian Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. Introduction to distinctive Asian literary forms, such as haiku, noh, the Chinese novel and tale, through reading of major works. Comparison with Western genres and study of native and Western critical traditions. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

COM 154—African Literature (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Completion of Entry Level Writing Requirement (ELWR). Colonial and post-colonial sub-Saharan African literature and the African oral traditions from which it emerged. Genres and themes of African literature from the nineteenth century to the present. (AAS 153.) GE credit: AH, WC, WE. Effective: 2012 Spring Quarter.

COM 155—Classical Literatures of the Islamic World 600-1900 (4)
Lecture—3 hours; Term Paper. Major texts from Arabic, Persian, Ottoman Turkish and Urdu literature with attention to historical and cross-cultural context. Includes epic, romance, various genres of lyric poetry, fairy tales, historical and religious stories, mystical and philosophical narratives, and essays. GE credit: AH, OL, WC, WE. Effective: 2014 Fall Quarter.

COM 156—The Ramayana (4)
Lecture—3 hours; Term Paper. Exploration of the Indian epic, Ramayana, through the lens of literature, performance, and visual art. Emphasis on the text's diversity and its contemporary global relevance. Topics include Ramayanas in Southeast Asia, and in various South Asian diaspora communities. (RST 158.) GE credit: AH, WC, WE. Effective: 2015 Spring Quarter.

COM 157—War and Peace in Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): COM 001 or COM 002 or COM 003; or Consent of Instructor. Through study of a few major works from Western and non-Western literature the course seeks to illuminate the way in which literature from antiquity to the present has dealt with the antinomy peace/war through the ages. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 158—The Detective Story as Literature (4)
Lecture—3 hours; Term Paper. Study of the origins, literary and social background, development and
implications of the literature of detection in a comparative context. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 159—Women in Literature (4)
Lecture—3 hours; Term Paper. Prerequisite(s): COM 001, COM 002, COM 003, or COM 004 or the equivalent recommended. Portrayals of women in literature, comparing selected heroines who represent a particular theme, period, or genre. Texts range around the globe and from ancient to modern works, such as Lysistrata, Emma, Hedda Gabler, The Makioka Sisters, and Top Girls. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 160A—The Modern Novel (4)
Lecture/Discussion—3 hours; Term Paper. The changing image of man and his world as seen in novels by such writers as Joyce, Proust, and Mann. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 160B—The Modern Drama (4)
Lecture/Discussion—3 hours; Term Paper. Readings in representative authors such as Ibsen, Strindberg, Chekhov, Pirandello and Brecht. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 161A—Tragedy (4)
Lecture/Discussion—3 hours; Term Paper. Persistent and changing aspects of the tragic vision in literature from ancient times to the present. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 161B—Comedy (4)
Lecture/Discussion—3 hours; Term Paper. Comic attitudes towards life in literary works of different ages. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 162—Writing Love and War in South Asia (4)
Lecture—3 hours; Term Paper. Comparative study of the themes and motifs of love and war in the literature of South Asia. Includes a discussion of Sanskrit epics, classical erotic court poetry, medieval heroic poetry, mystical compositions and colonial and post-colonial fiction. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

COM 163—Biography and Autobiography (4)
Lecture/Discussion—3 hours; Term Paper. Portrayals of a human life in biographies and/or autobiographies of different countries and ages. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 164A—The European Middle Ages (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. Medieval literary genres as the foundation for modern literary forms. Topics and themes as love, God, vision, nature, history and politics, and sign theory. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

COM 164B—The Renaissance (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. Literature, new science, gender, politics, and exploration in European Renaissance. Readings in Petrarch, Machiavelli, Montaigne, Tasso, Ariosto, Stampa, Shakespeare, Labé and Aphra Behn. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

COM 164C—Baroque and Neoclassicism (4)
Lecture/Discussion—3 hours; Term Paper. Readings in major authors such as Calderón, Corneille, Pascal, Racine, Milton, and Grimmelshausen, with consideration of the tension between the expansive energies of the "baroque" and the restraints of dogma and reason. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 164D—The Enlightenment (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. Enlightenment writers such as Swift, Voltaire, Sterne, Rousseau, Wollstonecraft, and Kant. Emphasis on the revolutionary impact of eighteenth-century philosophical ideas and literary forms on modern political, social, and aesthetic culture. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

COM 165—Caribbean Literatures (4)
Lecture/Discussion—4 hours. Prerequisite(s): Completion of entry level writing requirement. Comparative approach to the multi-lingual, multi-cultural literatures of the Caribbean. Works from English, French, and Spanish speaking regions with special attention to problems of identity, diaspora and resistance, class, gender, race. Not open to students who have completed COM 165S. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

COM 165S—Caribbean Literatures (4)
Lecture/Discussion—4 hours. Restricted to upper division standing in the student's discipline of origin. Comparative approach to the multi-lingual, multi-cultural literatures of the Caribbean. Works from English, French, and Spanish speaking regions with special attention to problems of identity, diaspora and resistance, class, gender, race. Taught at the University of Havana, Cuba. Not open to students who have completed COM 165. GE credit: AH, WC, WE. Effective: 2004 Fall Quarter.

COM 166—Literatures of the Modern Middle East (4)
Lecture/Discussion—3 hours; Term Paper. Major translated works in modern Middle Eastern and North African Literature, including Arabic, Hebrew, Persian, and Turkish. Social and historical formation, with topics such as conflict and coexistence, journeys, and displaced people, gender and family. GE credit: AH, WC, WE. Effective: 2007 Fall Quarter.

COM 166A—The Epic (4)
Lecture/Discussion—3 hours; Term Paper. Study of various forms of epic poetry in both the oral and literary
traditions. May be repeated for credit in different subject area. May be repeated for credit. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 166B—The Novel (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. The novel as global genre: picaresque, epistolary, Bildungsroman, historical novel, contemporary forms. May be repeated up to 1 time(s). GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

COM 167—Comparative Study of Major Authors (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Pivotal works of artists in the Western mainstream, such as Dante, Shakespeare, Cervantes, Goethe, Tolstoi, Proust, and Joyce. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 168A—Romanticism (4)
Discussion—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. Introduction to the Romantic movement with emphasis upon Romantic concepts of the self, irony, love, the imagination and artistic creativity, and the relationship of the individual to nature and society. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

COM 168B—Realism and Naturalism (4)
Discussion—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Novels and plays by Dickens, Zola, Flaubert, Dreiser, Ibsen, and Strindberg investigate marriage and adultery, the city and its perils, the hardships of industrialization, the war between the sexes, the New Woman, and other 19th-century themes. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 169—The Avant-Garde (4)
Lecture/Discussion—3 hours; Term Paper. Studies in movements such as surrealism, expressionism and the absurd. GE credit: AH, WE. Effective: 1997 Winter Quarter.

COM 170—The Contemporary Novel (4)
Lecture—3 hours; Term Paper. Study of important novels from different parts of the world, including
Asia, Africa, Latin America, Europe, and the United States, in the period from the Second World War to the present. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 172—A Story for a Life: The Arabian Nights (4)
Lecture/Discussion—3 hours; Term Paper. In-depth exploration of The Arabian Nights, the best-known work of pre-modern Arabic literature and a major work of world literature. Analysis of the work in its historical context and in comparison to other frame tales in world literature. (ARB 140 and MSA 121C.) GE credit: AH, WC, WE. Effective: 2016 Winter Quarter.

COM 175—Shahnameh: The Persian Book of Kings (4)
Lecture/Discussion—3 hours; Term Paper. In-depth analysis of the Persian Book of Kings (Shahnameh) by Abu al-Qasim Ferdowsi (d. 1020 CE) in its historical context with a comparative perspective on the role of this work in Persian and world literature. (MSA 121A.) GE credit: AH, WC, WE. Effective: 2015 Winter Quarter.

COM 180—Selected Topics in Comparative Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of Subject A requirement and at least one course in literature. Study of a selected topic or topics appropriate to student and faculty
interests and areas of specialization of the instructor. May be repeated up to 1 time(s). GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

COM 180S—Selected Topics in Comparative Literature (Taught Abroad) (4)
Extensive Writing; Fieldwork—6 hours; Lecture/Discussion—6 hours. Prerequisite(s): Subject A, and at least one course in literature, or consent of instructor. Study of selected topics appropriate to student and faculty interests and areas of specialization of the instructor. May be repeated once for credit when topic differs. May be repeated up to 1 time(s). GE credit: AH, WC, WE. Effective: 2007 Fall Quarter.

COM 192—Internship in Comparative Literature (1-12)
Internship—1-12 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Restricted to Comparative Literature majors. Internships in fields where students can practice their skills. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2013 Fall Quarter.

COM 194H—Special Study for Honors Students (1-5)
Independent Study—1-5 hours. Prerequisite(s): Consent of Instructor. Open only to majors of senior standing who qualify for Honors Program. Guided research, under the direction of a faculty member approved by the Program Director, leading to a senior honors thesis on a comparative topic. May be repeated for credit. (P/NP grading only.) GE credit: AH, WE. Effective: 1997 Winter Quarter.

COM 195—Senior Seminar in Comparative Literature (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Senior standing as a Comparative Literature major or minor or consent of instructor. Open only to Comparative Literature majors or minors in or consent of instructor. Advanced study of selected topics and texts in Comparative Literature, with explicit emphasis on the theoretical and interpretive approaches that define Comparative Literature as a discipline and distinguish it from other literary disciplines. Required for the major. GE credit: AH, WE. Effective: 2012 Fall Quarter.

COM 197T—Tutoring in Comparative Literature (1-5)
Discussion—2-4 hours. Prerequisite(s): Consent of Instructor. Upper division standing with declared major in Comparative Literature. Tutoring in undergraduate courses including leadership in small voluntary discussion groups affiliated with current courses offered by Comparative Literature. May be repeated up to 6 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 198—Directed Group Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

COM 210—Topics and Themes in Comparative Literature (4)
Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing in Comparative Literature, English, or a foreign-language literature, or consent of instructor. Comparative, interpretive study of the treatment of specific topics and themes in literary works from various periods, societies, and cultures, in light of these works' historical and sociocultural contexts. May be repeated for credit. Effective: 1997 Winter Quarter.

COM 214—Approaches to Lyric Poetry (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Analysis and interpretation of poetic texts in different historical
periods and national literatures, with consideration of major theoretical developments in the understanding of poetic discourse. Effective: 1998 Fall Quarter.

COM 215—Forms of the Spiritual Quest (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor; knowledge of at least one foreign language. An exploration, culminating in a research paper, of changing forms of the quest for transcendence in different cultures, mainly in major works of Western literature, but also in other traditions and from the perspectives of other disciplines. Effective: 1997 Winter Quarter.

COM 220—Literary Genres (4)
Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing in Comparative Literature, English, or a foreign-language literature or consent of instructor. Comparative literature of major works in a particular genre from various linguistic, national, and cultural traditions, with particular attention to historical developments within the genre and to genre theory. May be repeated for credit. Effective: 1997 Winter Quarter.

COM 238—Gender and Interpretation (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Study of how literary texts from different periods, societies, and
cultures represent gender roles and gender hierarchy, building on recent work on gender in anthropology, literature, psychology, and women's studies. Effective: 1998 Fall Quarter.

COM 250A—Research in Primary Literature (4)
Project (Term Project). Individually guided research in the primary literature of concentration, under the supervision of a faculty member culminating in a conference paper. Required of M.A. and Ph.D. candidates. Effective: 2011 Fall Quarter.

COM 250B—Research in Second Literature (4)
Project (Term Project). Individually guided research in the secondary literature of concentration, under the supervision of a faculty member, culminating in a paper. Required of Ph.D. candidates. Effective: 2011 Fall Quarter.

COM 250C—Research in Third Literature or Special Topic (4)
Conference—1 hour; Independent Study—8 hours; Term Paper. Individually guided research, under the supervision of a faculty member, in the third literature of concentration or on a special topic culminating in a paper. Required of Ph.D. candidates. Effective: 2016 Winter Quarter.

COM 250D—Dissertation Prospectus (4)
Independent Study. Individually guided writing of the dissertation prospectus under supervision of a faculty member. Must be taken prior to completion of the qualifying exam. Required of Ph.D. candidates. (S/U grading only.) Effective: 2006 Spring Quarter.

COM 255—Proseminar: Comparative Literature: Past, Present, Future (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing. Restricted to graduate students. History, theory, and methodology of comparative literature. Issues of national literature, world literature, and comparative literature. Relation of comparative literature to other disciplines and diverse expressions. Discussion of current problems in teaching and research in comparative literature. Required for MA/PhD. Effective: 2016 Winter Quarter.

COM 260—Contexts of the 19th-Century Novel (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Development in 19th-century history, culture, and society in relation
to major trends in the 19th-century novel. Effective: 1998 Fall Quarter.

COM 297—Directed Independent Study in Primary, Secondary, or Third Literature (4)
Conference—1 hour; Independent Study—8 hours; Term Paper. Prerequisite(s): Consent of Instructor. Restricted to graduate students. Directed Independent Study in Primary, Secondary, or Third Literature culminating in term paper. Only for languages with no graduate course offerings. May be repeated for credit when no seminars are available and topic differs. Effective: 2016 Spring Quarter.

COM 298—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

COM 299—Individual Study (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

COM 299D—Special Study for the Doctoral Dissertation (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

COM 390—Teaching Comparative Literature in College (4)
Discussion—2 hours; Lecture—2 hours. Prerequisite(s): Appointment as a Comparative Literature Associate Instructor or consent of instructor. Restricted to graduate students. Discussion of the theory and practice of teaching composition at the college level in a department of comparative literature in relation to the major cultural and social developments and with specific application to the introductory courses 1, 2, 3, 4. (S/U grading only.) Effective: 2016 Winter Quarter.

COM 392—Teaching Internship in Comparative Literature (2)
Discussion—2 hours. Restricted to graduate students. Regular consultations between the student instructor teaching Comparative Literature courses and a supervisor. Specifically designed for first-time TAs in COM 5, 6, 7, and 10. Instruction in the teaching of writing in a literature course, grading of papers, leading discussions. (S/U grading only.) Effective: 2016 Winter Quarter.

COM 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

CRD Community & Regional Development

Courses in CRD:

CRD 001—The Community (4)
Discussion—1 hour; Lecture—3 hours. Basic concepts of community analysis and planned social change. The dynamics of community change through case studies of communities including peasant, urban ghetto, suburban mainline, and California
farm workers. GE credit: ACGH, DD, OL, SS, VL, WE. Effective: 2012 Fall Quarter.

CRD 002—Ethnicity and American Communities (4)
Discussion—1 hour; Lecture—3 hours. Historical and cultural survey of the role of various ethnic groups in
the development of American communities. Examines ethnicity as a cultural factor, ethnicity as power and issues related to selected American ethnic groups. GE credit: ACGH, DD, SS, WE. Effective: 2012 Fall Quarter.

CRD 020—Food Systems (4)
Laboratory—3 hours; Lecture—3 hours. Social aspects of agri-food systems. Social science perspectives applied to food and agricultural sustainability in relation to ecology, knowledge, technology, power, governance, labor, social difference, and social movements. Social and environmental effects of commodity chains in comparative global context. GE credit: OL, SS, VL, WE. Effective: 2012 Fall Quarter.

CRD 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Supervised internship, off and on campus, in community and institutional settings. (P/NP grading only.) Effective: 2012 Fall Quarter.

CRD 098—Directed Group Study for Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2012 Fall Quarter.

CRD 099—Special Study for Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 2012 Fall Quarter.

CRD 118—Technology and Society (4)
Discussion—1 hour; Extensive Writing; Lecture—3 hours; Term Paper. Prerequisite(s): CRD 001 or CRD 002 or SOC 001 or ANT 002 Impact of technology on labor relations, employment, industrial development and international relations. Internal relations of technology development and deployment. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

CRD 140—Dynamics of Regional Development (4)
Extensive Writing; Lecture—4 hours; Project (Term Project); Term Paper. Prerequisite(s): CRD 001 or CRD 002 or SOC 001 or ANT 002 Industrial cluster formation and institutions. Technology, labor relations and interfirm linkages in global value chains. California and other regions are used as case studies. GE credit: SS, WE. Effective: 2016 Fall Quarter.

CRD 141—Organization of Economic Space (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CRD 001 or CRD 002 or SOC 001 or ANT 002 Globalization and technological restructuring of economic activity focusing on new spatial patterns of production and circulation and their implications for workers, communities and societies, both in the U.S. and around the globe. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

CRD 142—Rural Change in the Industrialized World (4)
Discussion—1 hour; Extensive Writing; Lecture—3 hours; Term Paper. Prerequisite(s): CRD 001 or CRD 002 or SOC 001 or ANT 002 Geography of rural environment with emphasis on rural restructuring. Demographics, community, economy, governance, agriculture, and environmental conservation in rural areas of industrialized world. Case studies from and comparisons drawn between North America, Europe, Australia, New Zealand, and Japan. GE credit: SS, WE. Effective: 2016 Fall Quarter.

CRD 147—Community Youth Development (4)
Extensive Writing/Discussion; Lecture/Discussion—4 hours; Project (Term Project); Term Paper. Community influences on youth well-being, youth as agents of community change, and policies to support healthy communities for young people. Special emphasis on disparities in youth well-being related to race, class, immigration status, gender, sexual-orientation. GE credit: DD, OL, SS, VL, WE. Effective: 2016 Fall Quarter.

CRD 149—Community Development Perspectives on Environmental Justice (4)
Extensive Writing/Discussion; Lecture/Discussion—4 hours; Project (Term Project); Term Paper. Environmental justice social movements; inequitable distribution of pollution on low-income communities of color; histories, policies, and innovations associated environmental justice movements in the United States and around the world. GE credit: DD, OL, SS, VL, WE. Effective: 2016 Fall Quarter.

CRD 151—Community Field Research: Theory and Analysis (4)
Extensive Writing; Lecture—4 hours; Project (Term Project). Prerequisite(s): CRD 001; STA 013 or STA 013Y or SOC 046B; Any upper division Community and Regional Development course is recommended. Emphasis on the design and analysis of community research considering the relationship between theory and practice. Study of community research methods, including structural analysis, elite interviewing, and ethnographic approaches. Course requires design and completion of field research project. GE credit: ACGH, DD, OL, SS, VL, WE. Effective: 2017 Fall Quarter.

CRD 152—Community Development (4)
Extensive Writing; Lecture—4 hours; Project (Term Project); Term Paper. Prerequisite(s): CRD 001 or CRD 151 or SOC 002 or ANT 002 or ASA 100 or CHI 132 or AAS 101 Introduction to principles and strategies of community organizing and development. Examination of non-profit organizations, citizen participation, poverty reduction, community needs assessment, and regional development strategies. Comparison of community development approaches of the U.S.A./California with other western and non-western societies. GE credit: ACGH, DD, SS, WC, WE. Effective: 2016 Fall Quarter.

CRD 153A—International Community Development: Asia (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): CRD 001 or ANT 002 or IAD 010 or SOC 001 or SOC 002 or POL 001 Examination and analysis of community development efforts in Japan and the impact of global forces in different settings. Alternative strategies with emphasis on self-reliance and locally controlled development. Course is based in Kyoto, Japan, and includes field trips. GE credit: OL, SS, VL, WC, WE. Effective: 2016 Fall Quarter.

CRD 153A—International Community Development: Asia (4) ***Review all entries***
Lecture/Discussion—3 hours; Project (Term Project)—3 hours. Prerequisite(s): Consent of Instructor. 2.000 GPA; good academic standing. For summer and quarter abroad versions, limited to 30 students; for the Seminar Abroad version, limited to 15 students; this allows for the small group learning methodology as well as the active collaboration with in-country university students; available for undergraduate and graduate students; applications through UC Davis Study Aboard accepted on a first-come, first-reserved basis for qualified applicants. Examination and analysis of community development efforts in a range of Asian countries and the impact of global forces in different settings. Includes classroom lectures, workshops, field trips, and collaborative action research projects. GE credit: OL, SS, WC, WE. Effective: 2018 Fall Quarter.

CRD 153B—International Community Development: Europe (4)
Lecture—4 hours. Prerequisite(s): ANT 002 or IAD 010 or CRD 001 or CRD 002 or SOC 001 or SOC 002 or POL 001 Examination and analysis of community development efforts in Europe and the impact of global forces in different settings. Alternative strategies with emphasis on self-reliance and locally controlled development. Based in Freiburg, Germany, including field trips to France and Switzerland. GE credit: SS, WC. Effective: 2016 Fall Quarter.

CRD 153C—International Community Development: Africa (4)
Fieldwork—2 hours; Lecture—2 hours. Prerequisite(s): CRD 001 or CRD 002 or ANT 002 or IAD 010 or SOC 001 or SOC 002 or POL 001 Examination and analysis of community development efforts in Africa and the impact of global forces in urban and rural settings. Focus on strategies that promote self-reliance and locally controlled development. Course based in South Africa, includes field trips. GE credit: SS, WC. Effective: 2016 Fall Quarter.

CRD 154—Social Theory and Community Change (4)
Extensive Writing; Lecture/Discussion—4 hours; Project (Term Project); Term Paper. Prerequisite(s): CRD 001 or SOC 001 or ANT 002 Comparative overview of the dominant social science paradigms for the study of community development and change. Among the paradigms discussed are functionalism, conflict theory/Marxism, structuralism, methodological individualism, reflexive modernity. GE credit: ACGH, DD, OL, SS, VL, WC, WE. Effective: 2016 Fall Quarter.

CRD 156—Community Economic Development (5)
Laboratory—2 hours; Lecture—4 hours. Prerequisite(s): CRD 152 or PLS 021 or ECS 015; and Consent of Instructor. How government and community organizations help firms grow and create jobs through local economic development corporations, small business centers, revolving loan funds, incubators, and other programs. Techniques to analyze community economic potential and identification of appropriate intervention tools. Group project. GE credit: QL, SS, WE. Effective: 2016 Fall Quarter.

CRD 157—Politics and Community Development (4)
Lecture—4 hours. Analyzes political, economic and sociocultural forces shaping the form and function of local communities in the U.S. Considers theories of the state, the community and social change and case studies of actual community development in comparative historical perspective. GE credit: ACGH, DD, SS, WE. Effective: 2016 Fall Quarter.

CRD 158—Small Community Governance (4)
Fieldwork—30 hours; Lecture/Discussion—3 hours. Prerequisite(s): CRD 001 or SOC 001 or POL 001 Governing institutions and political processes in rural and small urban places. Local government organization, community autonomy, leadership, political change, policy development, and select policy issues including public finance. Field research on political processes or policy issues in select communities. Effective: 2016 Fall Quarter.

CRD 162—People, Work and Technology (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): CRD 001 or SOC 001 or ANT 001; Upper division standing recommended. Restricted to upper division standing. Analysis of the relationship between work, technology, and human experience. Theories of the causes and consequences of labor process change; impacts of race/ethnicity, class, gender, and citizenship status on work; responses of workers, communities, and policy-makers to workplace changes. Effective: 2016 Fall Quarter.

CRD 162—People, Work and Technology (5) ***Review all entries***
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): CRD 001 or SOC 001 or ANT 001; Upper division standing recommended. Analysis of the relationship between work, technology, and the human experience. Theories of the causes and consequences of labor process, changes under capitalism and globalization, impacts of race/ethnicity, class, gender, and citizenship status on work in the United States and globally; responses of workers, communities, and policy-makers to workplace changes. GE credit: ACGH, DD, SS, WE. Effective: 2018 Fall Quarter.

CRD 164—Theories of Organizations and their Role in Community Change (5)
Laboratory—2 hours; Lecture—4 hours. Prerequisite(s): (STA 013 or STA 013Y or SOC 046B); (CRD 001 or CRD 002 or SOC 001 or ANT 002) Planned change within and through community organizations. Private voluntary organizations, local community associations, and local government. Relationship between community organizations and social capital. Collaborative original data gathering and professional report writing. GE credit: ACGH, DD, OL, SS, VL, WE. Effective: 2018 Spring Quarter.

CRD 171—Housing and Social Policy (4)
Lecture—4 hours; Term Paper. Social impact, economics, and politics of housing in the United States. Special attention given to federal, state, and local policy and program strategies to produce and preserve affordable housing and inclusive neighborhoods. Effective: 2016 Fall Quarter.

CRD 172—Social Inequality: Issues and Innovations (4)
Extensive Writing; Lecture/Discussion—4 hours; Project (Term Project); Term Paper. Prerequisite(s): CRD 001 or CRD 002 or SOC 001 or ANT 002; Upper division standing recommended. Focus on the dimensions, causes, and means of alleviating social inequality in the U.S. Examination and analysis of major theories and forms (class, race/ethnicity, gender, and citizenship status) of inequality. Policy-based and grassroots approaches to change. Effective: 2016 Fall Quarter.

CRD 176—Comparative Ethnicity (4)
Lecture—4 hours; Term Paper. Prerequisite(s): CRD 001 or CRD 002 or SOC 001 or ANT 002; Upper division standing recommended. Role of ethnicity in shaping social systems and interaction. Analytical approaches to and issues arising from the study of ethnicity, through utilization of data from a range of different societies. GE credit: ACGH, DD, SS, WC, WE. Effective: 2016 Fall Quarter.

CRD 180—Transnational Community Development (4)
Extensive Writing; Lecture/Discussion—4 hours; Project (Term Project); Term Paper. Prerequisite(s): CRD 001 or ANT 002 or SOC 001 The effects of grassroots, non-state, non-corporate actors from abroad on local, national and international development. Socioeconomic, political, and cultural implications of transnational actions undertaken by international non-governmental organizations, individual migrants, and migrant grassroots civic organizations. GE credit: SS, WC, WE. Effective: 2012 Fall Quarter.

CRD 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Supervised internship, off and on campus, in community and institutional
settings. (P/NP grading only.) Effective: 2012 Fall Quarter.

CRD 194HA—Special Study for Honors Students (4)
Independent Study—3 hours; Project (Term Project); Seminar—1 hour; Term Paper. Prerequisite(s): Consent of Instructor. Completion of 135 units at the time of enrollment; GPA 3.500 in the major; GPA 3.300 in overall standing; completion of at least four upper division courses; agreement of a faculty member to serve as thesis advisor. Community and Regional Development Honors is a program of direct reading, research and writing culminating in the preparation of a Senior Honors Thesis under the direction of a faculty advisor. Effective: 2012 Fall Quarter.

CRD 194HB—Special Study for Honors Student (4)
Independent Study—3 hours; Project (Term Project); Seminar—1 hour; Term Paper. Prerequisite(s): Consent of Instructor. Completion of 135 units at the time of enrollment; GPA 3.500 in the major; GPA 3.300 in overall standing; completion of at least four upper division courses; agreement of a faculty member to serve as thesis advisor. Community and Regional Development Honors is a program of direct reading, research and writing culminating in the preparation of a Senior Honors Thesis under the direction of a faculty advisor. Effective: 2012 Fall Quarter.

CRD 197T—Tutoring in Community and Regional Development (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing; completion of course to be tutored. Assisting instructor in one of the Community and Regional Development's regular courses by tutoring individual students or small groups of students in a laboratory, in voluntary discussion groups, or other voluntary activities. May be repeated up to 10 unit(s). (P/NP grading only.) Effective: 2013 Fall Quarter.

CRD 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2012 Fall Quarter.

CRD 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 2012 Fall Quarter.

CRD 240—Community Development Theory (4)
Lecture/Discussion—4 hours. Introduction to theories of community development and different concepts of community, poverty, and development. Emphasis on building theory, linking applied development techniques to theory, evaluating development policy, and examining case studies of community development organizations and projects. (GEO 240.) Effective: 2014 Winter Quarter.

CRD 241—The Economics of Community Development (4)
Seminar—4 hours. Prerequisite(s): Graduate standing. Economic theories and methods of planning for communities. Human resources, community services and infrastructure, industrialization and technological change, and regional growth. The community's role in the greater economy. (GEO 241.) Effective: 2015 Spring Quarter.

CRD 242—Community Development Organizations (4)
Seminar—4 hours. Prerequisite(s): CRD 240; and Consent of Instructor. Class size limited to 15 students. Theory and praxis of organizations with social change agendas at the community level. Emphasis on non-profit organizations and philanthropic foundations. Effective: 2012 Fall Quarter.

CRD 242S—Community Development Organizations (International) (4)
Fieldwork—10 hours; Lecture—5 hours; Workshop—5 hours. Prerequisite(s): CRD 240 Class size limited to 10 students. Theory and praxis of organizations with social change agendas at the community level. Emphasis on local governance, non-profit organizations and philanthropic foundations at an international level. Effective: 2012 Fall Quarter.

CRD 243—Critical Environmental Justice Studies (4)
Extensive Writing; Seminar—4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students only. Application of social science theories of race, ethnicity, class, gender, and power to understand the production and contestation of environmental inequities. Effective: 2017 Fall Quarter.

CRD 244—Political Ecology of Community Development (4)
Lecture—4 hours. Prerequisite(s): Graduate standing. Community development from the perspective of geographical political ecology. Social and environmental outcomes of the dynamic relationship between communities and land-based resources, and between social groups. Cases of community conservation and development in developing and industrialized countries. (GEO 254.) Effective: 2014 Winter Quarter.

CRD 245—The Political Economy of Urban and Regional Development (4)
Lecture—4 hours. Prerequisite(s): CRD 157; CRD 244; Or equivalent. How global, political and economic restructuring and national and state policies are mediated by community politics; social production of urban form; role of the state in uneven development; dynamics of urban growth and decline; regional development in California. (GEO 245.) Effective: 2014 Spring Quarter.

CRD 246—The Political Economy of Transnational Migration (4)
Lecture—4 hours. Prerequisite(s): Graduate standing. Theoretical perspectives and empirical research on social, cultural, political, and economic processes of transnational migration to the U.S. Discussion of conventional theories will precede contemporary comparative perspectives on class, race, ethnicity, citizenship, and the ethnic economy. (GEO 246.) Effective: 2014 Winter Quarter.

CRD 247—Transformation of Work (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing in history or social science degree program or consent of instructor. Exploration of the ways that the experience, organization, and systems of work are being reconfigured in the late twentieth century. The impacts of economic restructuring on local communities and workers. Effective: 2012 Fall Quarter.

CRD 248—Social Policy, Welfare Theories and Communities (4)
Seminar—4 hours. Prerequisite(s): Graduate standing. Theories and comparative histories of modern welfare states and social policy in relation to legal/normative, organizational, and administrative aspects. Analysis of specific social issues within the U.S./California context. Not open for credit to students having completed CRD 248A and CRD 248B. (GEO 248.) Effective: 2013 Fall Quarter.

CRD 248A—Social Policy, Welfare Theories and Communities I (2)
Seminar—2 hours. Prerequisite(s): Graduate standing. Theories and comparative histories of modern welfare states. Theories of welfare and social policy in relation to normative, organizational, and administrative aspects of welfare and social policy. Effective: 2017 Winter Quarter.

CRD 248B—Social Policy, Welfare Theories and Communities II (2)
Seminar—2 hours. Prerequisite(s): Graduate standing. Concurrent enrollment in course 248A. Analysis of a specific set of social issues within the US/California context. Issues may include poverty, hunger, housing, health, family, disability, economic opportunity, affirmative action orientations, gender, old age, or special social groups. Effective: 2017 Winter Quarter.

CRD 249—Media Innovation and Community Development (4)
Seminar—4 hours. Open to graduate students. Role of innovative media in communities and social change. Studies historical, practical and theoretical issues involving media in community organizing, social justice movements, democracy initiatives, and economic justice. Effective: 2014 Spring Quarter.

CRD 250—Professional Skills for Community Development (4)
Extensive Writing/Discussion; Fieldwork; Lecture/Discussion—2 hours; Project (Term Project)—2 hours. Prerequisite(s): CRD 240 Priority enrollment for Masters and Ph.D. students in Community and Regional Development. Help students develop the practical skills needed to work professionally in organizations that are involved in community development. Provides an overview of community development planning, project management, and consultation skills. Effective: 2016 Fall Quarter.

CRD 290—Seminar (1)
Seminar—1 hour. Analysis of research in applied behavioral sciences. (S/U grading only.) Effective: 2016 Fall Quarter.

CRD 292—Graduate Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Individually designed supervised internship, off campus, in community or institutional setting. Developed with advice of faculty mentor. May be repeated for credit Student may register in more than one internship section per term. (S/U grading only.) Effective: 2012 Fall Quarter.

CRD 293—Community Development Graduate Proseminar (1)
Lecture/Discussion—1 hour. Prerequisite(s): Enrollment in Community Development graduate group. Restricted to first year Community Development graduate students only. Introduction to graduate training in Community Development. Seminar designed to introduce students entering graduate work in the Community Development Graduate Group to its ongoing activities. (S/U grading only.) Effective: 2012 Fall Quarter.

CRD 298—Group Study (1-5)
Variable. Effective: 2012 Fall Quarter.

CRD 299—Research (1-12)
Variable. (S/U grading only.) Effective: 2012 Fall Quarter.

CRD 396—Teaching Assistant Training Practicum (1-4) ***Review all entries***
Variable—3-12 hours. Prerequisite(s): Graduate Standing. May be repeated for credit. (S/U grading only.) Effective: 2012 Fall Quarter.

CRD 396—Teaching Assistant Training Practicum (1-4) ***Review all entries Discontinued***
Variable—3-12 hours. Prerequisite(s): Graduate Standing. May be repeated for credit. (S/U grading only.) Effective: 2018 Fall Quarter.

CRI Critical Theory

Courses in CRI:

CRI 101—Introduction to Critical Theoretical Approaches to Literature and Culture (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. Introduction to critical theory and its use for interpreting literary texts, film, and media forms in our present global culture. (COM 141.) GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

CRI 200A—Approaches to Critical Theory (4)
Seminar—3 hours; Term Paper. Restricted to Graduate students. Critical overview of modern theoretical texts (e.g., semiotics, hermeneutics, deconstruction, social and cultural critique, feminist theory, psychoanalysis). Effective: 2016 Spring Quarter.

CRI 200B—Problems in Critical Theory (4)
Seminar—3 hours; Term Paper. Restricted to Graduate students. Focused study of a particular critical theoretical approach, school or perspective. Topics may include but are not limited to: critical approaches to the study of literature, culture, film, historiography, visual culture, the body, and aesthetics. May be repeated for credit when topic differs and with consent of instructor. Effective: 2016 Spring Quarter.

CRI 200C—History of Critical Theory (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate student standing. Restricted to Graduate students. Critical analysis and discussion of pre-twentieth century theories of literary and cultural criticism. Topics may include but are not limited to: ancient and early modern philosophy; nature and culture in the Renaissance; theories of Mimesis from antiquity to the Renaissance. May be repeated for credit when topic differs and with consent of instructor. Effective: 2016 Spring Quarter.

CRI 201—Critical Theory Special Topics (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate student standing. Application of theoretical principles to one specific research topic. May be repeated for credit with consent of instructor when topic differs. Effective: 2016 Spring Quarter.

CRI 202—Visual Culture (4)
Lecture/Discussion—4 hours. Restricted to Graduate student standing. Analysis of image production in the contemporary world (photography, film, television, advertising, etc.) and their effects on individual subjectivities and collective social identities. Effective: 2016 Spring Quarter.

CRI 298—Directed Group Study (1-5)
Seminar—3 hours. Prerequisite(s): Consent of Instructor. Restricted to Graduate student standing. Effective: 2016 Spring Quarter.

CRI 299—Individual Study (1-12)
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. Graduate student standing. (S/U grading only.) Effective: 2016 Spring Quarter.

CST Cultural Studies

Courses in CST:

CST 200A—Histories of Cultural Studies (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing or consent of instructor required. Undergraduate coursework in the humanities or social sciences recommended. Histories and traditions of cultural studies internationally; multiple legacies of cultural studies as a field of inquiry in various geographical contexts; foregrounds important critical perspectives resulting from social and intellectual movements world-wide. Effective: 2000 Fall Quarter.

CST 200B—Theories of Cultural Studies (4)
Lecture/Discussion—4 hours. Prerequisite(s): CST 200A; or Consent of Instructor. Definitions of "critical" scholarship and examination of various contexts in which cultural studies theory has emerged worldwide. Both mainstream and alternative theoretical traditions, such as those developed by people of color and by other minoritized groups. Effective: 2000 Fall Quarter.

CST 200C—Practices of Cultural Studies (4)
Lecture/Discussion—4 hours. Prerequisite(s): CST 200A; CST 200B; or Consent of Instructor. Methodological and practical applications of cultural studies research. Critical analyses of ethnography, textual analysis, social change, community development, and identity formation. Emphasis given to students' unique versions of cultural studies practices. Effective: 2000 Fall Quarter.

CST 204—History and Theory of Sexualities (4)
Lecture/Discussion—4 hours. Prerequisite(s): CST 200A (can be concurrent); or Consent of Instructor. Studies of sexuality in feminist, literary, historical, and cultural studies research, specifically examining the emergence of "sexuality" as a field of research and the relationship of sexuality studies to cultural forms, subjectivity, and social relations generally. May be repeated up to 2 time(s). Effective: 2014 Spring Quarter.

CST 206—Studies in Race Theory (4)
Lecture/Discussion—4 hours. Prerequisite(s): CST 200A (can be concurrent); or Consent of Instructor. Theoretical framework for the critical study of race, drawing on contemporary cultural studies and postcolonial scholarship in order to understand the social production of "race" as a category for organizing social groups and determining group processes. Effective: 2000 Fall Quarter.

CST 208—Studies in Nationalism, Transnationalism, and Late Capitalism (4)
Lecture/Discussion—4 hours. Prerequisite(s): CST 200A (can be concurrent); or Consent of Instructor. Contemporary theories of nation, nationalism, postcolonialism, and transnationalism. Specific attention to the relationship between cultural production and the formation of ideas about nation and nationalism, including examination of both "legitimizing" and resistant discourses. Effective: 2000 Fall Quarter.

CST 210—Memory, Culture, and Human Rights (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Restricted to graduate students. Explores the multiple convergences among memory, culture, and human rights. Discusses diverse approaches to how societal actors in different historical, cultural, and national settings, construct meanings of past political violence, inter-group conflicts, and human rights struggles. (HMR 200B.) Effective: 2013 Fall Quarter.

CST 212—Studies in the Rhetorics of Culture (4)
Lecture/Discussion—4 hours. Prerequisite(s): CST 200A (can be concurrent); or Consent of Instructor. Survey of critical and analytical approaches to the study of texts. Examination of multi-mediated objects to understand their cultural import by focusing on discursive production, dispersal, and reception processes, and related shifts in power relations. Effective: 2000 Fall Quarter.

CST 214—Studies in Political and Cultural Representations (4)
Lecture/Discussion—4 hours. Prerequisite(s): CST 200A (can be concurrent); Consent of graduate advisor required. Framework for the analysis of political and popular cultural representations. Emphasis on concepts, theories, and methodologies illuminating dominant and vernacular cultural representation, appropriation, and innovation in transnational contexts. May be repeated up to 4 time(s) when topic differs. Effective: 2003 Fall Quarter.

CST 250—Research Seminar (4)
Seminar—4 hours. Prerequisite(s): CST 200A; CST 200B; CST 200C; or Consent of Instructor. Designed to facilitate student interaction and promote student research by guiding students through the production of a publishable essay. Essays submitted, distributed, and discussed by seminar participants. May be repeated up to 12 unit(s). Effective: 2000 Fall Quarter.

CST 270A—Individually Guided Research in Cultural Studies (4)
Discussion—1 hour; Extensive Writing; Independent Study—2 hours. Prerequisite(s): CST 200C; CST 250; and Consent of Instructor. Individually guided research, under the supervision of a faculty member, on a Cultural Studies topic related to the student's proposed dissertation project to produce a dissertation prospectus. Effective: 2003 Fall Quarter.

CST 270B—Individually Guided Research in Cultural Studies (4)
Discussion—1 hour; Extensive Writing; Independent Study—2 hours. Prerequisite(s): CST 200C; CST 250; and Consent of Instructor. Individually guided research, under the supervision of a faculty member, on a Cultural Studies topic related to the student's proposed dissertation project to produce a dissertation prospectus. Effective: 2003 Fall Quarter.

CST 270C—Individually Guided Research in Cultural Studies (4)
Discussion—1 hour; Extensive Writing; Independent Study—2 hours. Prerequisite(s): CST 200C; CST 250; and Consent of Instructor. Individually guided research, under the supervision of a faculty member, on a Cultural Studies topic related to the student's proposed dissertation project to produce a dissertation prospectus. Effective: 2003 Fall Quarter.

CST 290—Colloquium (1)
Lecture—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Designed to provide cohort identity and faculty student exchange. Opportunity to present papers, hear guest lecturers, and see faculty presentations, gather for organizational and administrative news, exchange information, and make announcements. May be repeated up to 12 unit(s). (S/U grading only.) Effective: 2000 Fall Quarter.

CST 295—Special Topics (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Special topics courses offered according to faculty and student interests and demands. May be repeated for credit with consent of advisor. Effective: 2000 Fall Quarter.

CST 298—Group Research (1-5)
May be repeated for credit. (S/U grading only.) Effective: 2002 Spring Quarter.

CST 299—Directed Research (1-5)
May be repeated for credit. (S/U grading only.) Effective: 2002 Spring Quarter.

CST 299D—Dissertation Research (1-12)
Independent Study—3-36 hours. Prerequisite(s): Advancement to doctoral candidacy. May be repeated for credit. (S/U grading only.) Effective: 2004 Winter Quarter.

CST 396—Teaching Assistant Training Practicum (1-4)
Variable—3-12 hours. Prerequisite(s): Graduate standing. May be repeated for credit. (S/U grading only.) Effective: 2004 Winter Quarter.

DEB Designated Emphasis, Biotechnology

Courses in DEB:

DEB 263—Biotechnology Fundamentals and Application (2)
Lecture—2 hours. Prerequisite(s): BIS 101; BIS 102; MIC 102; or Consent of Instructor. Must be a graduate student in good standing. Fundamentals of molecular biology and chemical engineering involved in recombinant DNA technology. Topics: principles of rate processes of biological systems, optimization of bioreactors, and issues related to overexpression and production of recombinant molecules. Participation in student-directed team projects. Effective: 2016 Winter Quarter.

DEB 282—Biotechnology Internship (7-12)
Internship—21-36 hours. Prerequisite(s): Graduate standing and Consent of Instructor. Open only to students participating in the Designated Emphasis in Biotechnology program. Research at a biotechnology company or interdisciplinary cross-college lab for a minimum of 3 months as part of the Designated Emphasis in Biotechnology Program. (S/U grading only.) Effective: 2017 Winter Quarter.

DEB 294—Current Progress in Biotechnology (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Seminars presented by guest lecturers on subjects of their own research activities. May be repeated for credit. (ECH 294.) (S/U grading only.) Effective: 2018 Winter Quarter.

DVM VM - Veterinary Clinical Rotation

Courses in DVM:

DVM 444—Equine Ophthalmology (1.5-18)
Clinical Activity. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Ongoing education, training, and experience in an ophthalmic specialty practice dealing with equine patients. Learn to take histories related to ocular problems, to competently examine an eye, and to perform basic diagnostic procedures. May be repeated up to 23 unit(s) with consent of instructor. Effective: 2018 Spring Semester.

DVM 445—California Animal Health and Food Safety Laboratory - Davis (1.5-18) ***Review all entries***
Clinical Activity. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Overview of how CAHFS interfaces with the production animal industry and practitioners. Understanding of the laboratory approach to the diagnosis of predominately production animal diseases. May be repeated up to 23 unit(s) with consent of instructor. Effective: 2017 Summer Semester.

DVM 445—California Animal Health and Food Safety Laboratory - Davis (1.5-18) ***Review all entries***
Clinical Activity. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Overview of how CAHFS interfaces with the production animal industry and practitioners. Understanding of the laboratory approach to the diagnosis of predominately production animal diseases. May be repeated up to 23 unit(s) with consent of instructor. Effective: 2018 Fall Semester.

DVM 446—Pre-approved Externship (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Approved program of study to receive training and experience in specific areas outside the School of Veterinary Medicine. These include private practice, industry, and academic institutions and allow students to pursue specific career paths with excellent educational opportunities. May be repeated up to 23 unit(s). Effective: 2016 Spring Semester.

DVM 446—Pre-approved Externship (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Approved program of study to receive training and experience in specific areas outside the School of Veterinary Medicine. These include private practice, industry, and academic institutions and allow students to pursue specific career paths with excellent educational opportunities. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 447—Education and Leadership (1.5-18) ***Review all entries***
Variable—1.5-18 hours. Prerequisite(s): Consent of Instructor. Third- and/or fourth-year standing in the School of Veterinary Medicine. Gain knowledge and experience in aspects of veterinary education and leadership. Students will work under faculty mentorship to assist in the delivery of the content in a block in years 1, 2 or 3 of the curriculum. Effective: 2014 Spring Semester.

DVM 447—Educational Leadership (1.5-18) ***Review all entries***
Variable—1.5-18 hours. Prerequisite(s): Consent of Instructor. Third- and/or fourth-year standing in the School of Veterinary Medicine. To gain knowledge and experience in various aspects of veterinary education and leadership, students will work under faculty mentorship to assist in the delivery of the content in a block in years 1, 2 or 3 of the curriculum. This could be in the form of co-presenting a lecture, co-teaching a lab, facilitating a PBL, or other content-related activities deemed appropriate by faculty. Effective: 2018 Fall Semester.

DVM 448—California Animal Health and Food Safety Laboratory - San Bernardino (1.5-18) ***Review all entries***
Clinical Activity. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Overview of how CAHFS interfaces with the production animal industry and practitioners. Understanding of the laboratory approach to the diagnosis of predominately production animal diseases. May be repeated up to 23 unit(s) with consent of instructor. Effective: 2017 Summer Semester.

DVM 448—California Animal Health and Food Safety Laboratory - San Bernardino (1.5-18) ***Review all entries***
Clinical Activity. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Overview of how CAHFS interfaces with the production animal industry and practitioners. Understanding of the laboratory approach to the diagnosis of predominately production animal diseases. May be repeated up to 23 unit(s) with consent of instructor. Effective: 2018 Fall Semester.

DVM 449—Externship (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Approved program of study to receive training and experience outside the School of Veterinary Medicine. Opportunities include private practice and provides first-hand experiences in diagnostic and therapeutic capabilities and management and business methods in the private sector. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 449—Externship (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Approved program of study to receive training and experience outside the School of Veterinary Medicine. Opportunities include private practice and provides first-hand experiences in diagnostic and therapeutic capabilities and management and business methods in the private sector. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 450—Cardiology (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Diagnostic techniques of history taking, cardiac physical examination, electrocardiography, radiography, echocardiography, and cardiac catheterization and medical, interventional, and surgical therapy of cardiac disorders will be taught along with the etiology and pathophysiology of various cardiac disorders. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 450—Cardiology (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Diagnostic techniques of history taking, cardiac physical examination, electrocardiography, radiography, echocardiography, and cardiac catheterization and medical, interventional, and surgical therapy of cardiac disorders will be taught along with the etiology and pathophysiology of various cardiac disorders. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 451—Clinical Pathology (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Focus on the practical use and application of laboratory testing in a practice setting to facilitate optimal management of patients. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 451—Clinical Pathology - VMTH (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Focus on the practical use and application of laboratory testing in a practice setting to facilitate optimal management of patients. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 452—Small Animal Community Medicine (1.5-18) ***Review all entries***
Variable—1.5-518 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Practice wellness care in pediatric and adult patients, address medical management of geriatric patients, and develop a practical, problem-oriented approach to routine medical issues presenting in general practice. Effective: 2014 Spring Semester.

DVM 452—Community Practice (1.5-18) ***Review all entries***
Variable—1.5-518 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Practice wellness care in pediatric and adult patients, address medical management of geriatric patients, and develop a practical, problem-oriented approach to routine medical issues presenting in general practice. Effective: 2018 Fall Semester.

DVM 453—Small Animal Community Surgery--Gourley (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. General surgery service to include instruction in physical exams, basic anesthesia, pain management and routine surgeries. Sample surgeries include routine spays and neuters, cystotomy, mass removal, digit amputation, encluceation, etc. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 453—Community Surgery - Gourley Clinical Teaching Center (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. General surgery service to include instruction in physical exams, basic anesthesia, pain management and routine surgeries. Sample surgeries include routine spays and neuters, cystotomy, mass removal, digit amputation, encluceation, etc. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 454—Companion Avian and Exotic Pet Medicine (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Basic components of husbandry, nutrition, handling, diseases, medical and surgical treatment of companion exotics including avian (companion and wildlife), small exotic mammal, reptilian, amphibian and aquatic animal patients. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 454—Companion Avian and Pet Exotics (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Basic components of husbandry, nutrition, handling, diseases, medical and surgical treatment of companion exotics including avian (companion and wildlife), small exotic mammal, reptilian, amphibian and aquatic animal patients. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 455—Dentistry/Oral Surgery (1.5-18) ***Review all entries***
Variable—1.5-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Examination, diagnosis and treatment of small animals presenting with oral or dental diseases. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 455—Dentistry / Oral Surgery (1.5-18) ***Review all entries***
Variable—1.5-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Examination, diagnosis and treatment of small animals presenting with oral or dental diseases. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 456—Dermatology (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Exposure to veterinary dermatology. Learn the importance of obtaining a good history, performing a good physical examination and characterizing lesions. Various diagnostic and therapeutic techniques specific to dermatology will be demonstrated. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 456—Dermatology (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Exposure to veterinary dermatology. Learn the importance of obtaining a good history, performing a good physical examination and characterizing lesions. Various diagnostic and therapeutic techniques specific to dermatology will be demonstrated. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 457—Equine Emergency and Critical Care (1.5-18) ***Review all entries***
Variable—1.5-518 hours. Prerequisite(s): Fourth-year standing in the School of Veterinary Medicine. In-depth training and hands-on experience in various facets of equine emergency case management, including the diagnosis, management, and treatment of equine emergency patients. May be repeated up to 23 unit(s). Effective: 2016 Summer Semester.

DVM 457—Equine Emergency Surgery (1.5-18) ***Review all entries***
Variable—1.5-518 hours. Prerequisite(s): Fourth-year standing in the School of Veterinary Medicine. In-depth training and hands-on experience in various facets of equine emergency case management, including the diagnosis, management, and treatment of equine emergency patients. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 458—Equine Emergency Nights (1.5-18)
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Provide service for emergency surgical and medical management for all equine and camelid emergencies; i.e., colic, wounds, musculoskeletal injuries, septic foals, dystocia, and neurologic and ophthalmologic emergencies. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 459—Equine Field Service (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. On-farm practical experience in the diagnosis, treatment and prevention of equine disease problems. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 459—Equine Field Service (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. On-farm practical experience in the diagnosis, treatment and prevention of equine disease problems. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 460—Equine Medicine--General (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Learn and practice the highest level of equine internal medicine with the goal to generate or implement a problem-oriented approach to clinical problems, determine a diagnostic work-up, prognosis and treatment plan for patients. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 460—Equine Medicine In House (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Learn and practice the highest level of equine internal medicine with the goal to generate or implement a problem-oriented approach to clinical problems, determine a diagnostic work-up, prognosis and treatment plan for patients. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 461—Theriogenology (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Routine reproductive management in small and large animals in a tertiary referral setting at the VMTH. Participate in weekly clinical and endocrinology rounds. May be repeated up to 23 unit(s). Effective: 2015 Summer Semester.

DVM 461—Theriogenology (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Routine reproductive management in small and large animals in a tertiary referral setting at the VMTH. Participate in weekly clinical and endocrinology rounds. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 462—Equine Surgery and Lameness (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Advanced training and experience in equine surgery services to manage all orthopedic and non-orthopedic elective surgical disorders as well as equine lameness disorders. May be repeated up to 23 unit(s). Effective: 2015 Summer Semester.

DVM 462—Equine Surgery and Lameness (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Advanced training and experience in equine surgery services to manage all orthopedic and non-orthopedic elective surgical disorders as well as equine lameness disorders. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 463—Farrier Shop and Equine Sports Medicine (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Introduction to the normal structure and function of the equine foot. Principles of corrective shoeing for many lameness disorders. May be repeated up to 23 unit(s). Effective: 2015 Summer Semester.

DVM 463—Farrier and Sports Medicine (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Introduction to the normal structure and function of the equine foot. Principles of corrective shoeing for many lameness disorders. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 464—Small Animal Community Surgery--CCAH (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. General surgery service to include instruction in physical exams, basic anesthesia, pain management and routine surgeries. Surgeries include routine spays and neuters and other minor procedures such as simple mass removals. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 464—Community Surgery - CCAH (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. General surgery service to include instruction in physical exams, basic anesthesia, pain management and routine surgeries. Surgeries include routine spays and neuters and other minor procedures such as simple mass removals. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 465—Equine Surgery and Lameness II (1.5-18)
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Advanced training and experience in equine surgery services to manage all orthopedic and non-orthopedic elective surgical disorders as well as equine lameness disorders. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 466—Small Animal Medicine B (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Improve clinical skills required to manage cases in the Small Animal Service including comprehensive histories, preforming complete physical examinations, obtaining samples, interpreting results, conducting special procedures and assisting faculty and residents in the diagnosis, prevention, management and treatment of disease. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 466—Internal Medicine B (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Improve clinical skills required to manage cases in the Small Animal Service including comprehensive histories, performing complete physical examinations, obtaining samples, interpreting results, conducting special procedures and assisting faculty and residents in the diagnosis, prevention, management and treatment of disease. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 467—Small Animal Outpatient Medicine (1.5-18)
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Exposure to general medicine outpatient cases and to develop a practical, problem oriented approach to routine medical issues presenting in general practice. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 468—California Animal Health and Food Safety Laboratory - Tulare (1.5-18) ***Review all entries***
Clinical Activity. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Overview of how CAHFS interfaces with the production animal industry and practitioners. Understanding of the laboratory approach to the diagnosis of predominately production animal diseases. May be repeated up to 23 unit(s) with consent of instructor. Effective: 2017 Summer Semester.

DVM 468—California Animal Health and Food Safety Laboratory - Tulare (1.5-18) ***Review all entries***
Clinical Activity. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Overview of how CAHFS interfaces with the production animal industry and practitioners. Understanding of the laboratory approach to the diagnosis of predominately production animal diseases. May be repeated up to 23 unit(s) with consent of instructor. Effective: 2018 Fall Semester.

DVM 469—California Animal Health and Food Safety Laboratory - Turlock (1.5-18) ***Review all entries***
Clinical Activity. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Overview of how CAHFS interfaces with the production animal industry and practitioners. Understanding of the laboratory approach to the diagnosis of predominately production animal diseases. May be repeated up to 23 unit(s) with consent of instructor. Effective: 2017 Summer Semester.

DVM 469—California Animal Health and Food Safety Laboratory - Turlock (1.5-18) ***Review all entries***
Clinical Activity. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Overview of how CAHFS interfaces with the production animal industry and practitioners. Understanding of the laboratory approach to the diagnosis of predominately production animal diseases. May be repeated up to 23 unit(s) with consent of instructor. Effective: 2018 Fall Semester.

DVM 470—Food Animal Preceptorship (1.5-18)
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Individual animal medicine and surgery as well as herd reproductive programs on the farm. A regular client base with a variety of species
is served: dairy cattle, beef cattle, goats and sheep. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 471—Livestock Medicine and Surgery (1.5-18) ***Review all entries***
Variable—1.5-518 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Hands-on clinical experience diagnosing, treating, and managing medical and surgical diseases of primary care and referral cases involving dairy cattle, beef cattle, sheep, dairy goats, meat goats, and pigs. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 471—Livestock Medicine and Surgery In House (1.5-18) ***Review all entries***
Variable—1.5-518 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Hands-on clinical experience diagnosing, treating, and managing medical and surgical diseases of primary care and referral cases involving dairy cattle, beef cattle, sheep, dairy goats, meat goats, and pigs. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 472—Livestock Reproduction/Herd Health (1.5-18) ***Review all entries***
Variable—1.5-518 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Exposure to individual animal medicine and surgery as well as herd reproductive programs on the farm. A regular client base with a variety of species is served: dairy cattle, beef cattle, goats and sheep. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 472—Livestock Reproduction / Herd Health (1.5-18) ***Review all entries***
Variable—1.5-518 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Exposure to individual animal medicine and surgery as well as herd reproductive programs on the farm. A regular client base with a variety of species is served: dairy cattle, beef cattle, goats and sheep. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 473—Dairy Production Medicine--Tulare (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Advanced training and experience in a clinical dairy health and production medicine delivery system. Exposure to contemporary dairy production and population medicine programs. Develop ability to communicate with producers and farm employees. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 473—Dairy Production Medicine - Tulare (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Advanced training and experience in a clinical dairy health and production medicine delivery system. Exposure to contemporary dairy production and population medicine programs. Develop the ability to communicate with producers and farm employees. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 474—Equine Emergency/Critical Care Medicine (1.5-18)
Variable—1.5-518 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. In-depth training and hands-on experience in various facets of equine emergency case management, including the diagnosis, management, and treatment of both equine emergency medical and surgical patients. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 475—Lab Animal Medicine (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Provide exposure to various management activities and techniques used by laboratory animal veterinarians both antemortem & postmortem to support animal research primarily involving rodents but may include many vertebrates from fish to non-human primates. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 475—Laboratory Animal Medicine (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Provide exposure to various management activities and techniques used by laboratory animal veterinarians both antemortem & postmortem to support animal research primarily involving rodents but may include many vertebrates from fish to non-human primates. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 476—Large Animal Anesthesia (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Advanced training and experience in anesthetic management, acute care problem-solving and decision-making of healthy and physiologically stressed large animal patients. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 476—Large Animal Anesthesia (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Advanced training and experience in anesthetic management, acute care problem-solving and decision-making of healthy and physiologically stressed large animal patients. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 477—Large Animal Radiology (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Training in the art of making quality radiographs of large animal patients and interpreting radiographic studies. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 477—Large Animal Radiology (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Training in the art of making quality radiographs of large animal patients and interpreting radiographic studies. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 478—Large Animal Ultrasonography (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Hands-on experience in the ultrasonographic diagnosis of primarily musculoskeletal injuries and abdominal disorders in horses and the occasional non-equine patient. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 478—Large Animal Ultrasonography (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Hands-on experience in the ultrasonographic diagnosis of primarily musculoskeletal injuries and abdominal disorders in horses and the occasional non-equine patient. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 479—Small Animal Emergency -- Nights (1.5-18)
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Emergency practice includes the immediate recognition, evaluation, and care of patients with acute illness and injury. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 480—Neurology/Neurosurgery (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Provide specialized veterinary care for animals with neurological diseases; i.e., disorders of the brain, inner ear, spinal cord, and vertebrae and diseases affecting muscles, nerves and the neuromuscular junction. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 480—Neurology / Neurosurgery (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Provide specialized veterinary care for animals with neurological diseases; i.e., disorders of the brain, inner ear, spinal cord, and vertebrae and diseases affecting muscles, nerves and the neuromuscular junction. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 481—Nutrition (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Advanced training and experience in the principles and practice of small animal clinical nutrition. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 481—Nutrition (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Advanced training and experience in the principles and practice of small animal clinical nutrition. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 482—Oncology (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Advanced training and experience in diagnosis, staging, medical management, and prognostication of cancer in animal patients. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 482—Medical Oncology (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Advanced training and experience in diagnosis, staging, medical management, and prognostication of cancer in animal patients. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 483—Ophthalmology (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Ongoing education, training, and experience in an ophthalmic specialty practice dealing with companion and exotic species. Learn to take histories related to ocular problems, to competently examine an eye, and to perform basic diagnostic procedures. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 483—Small Animal Ophthalmology (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Ongoing education, training, and experience in an ophthalmic specialty practice dealing with companion and exotic species. Learn to take histories related to ocular problems, to competently examine an eye, and to perform basic diagnostic procedures. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 484—Small Animal Orthopedic Surgery (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Lameness examinations and treatments for all orthopedic diseases to include osteoarthritis, developmental diseases, trauma-induced injuries and cancer. Both medical and surgical treatments are used and presented to owners in an evidenced based fashion. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 484—Orthopedic Surgery (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Lameness examinations and treatments for all orthopedic diseases to include osteoarthritis, developmental diseases, trauma-induced injuries and cancer. Both medical and surgical treatments are used and presented to owners in an evidenced based fashion. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 485—Anatomic Pathology (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Advanced training and experience to develop a general understanding of the nature of common pathologic lesions and their interpretation in light of clinical history. Postmortem techniques and practice in writing descriptions of gross lesions. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 485—Anatomic Pathology (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Advanced training and experience to develop a general understanding of the nature of common pathologic lesions and their interpretation in light of clinical history. Postmortem techniques and practice in writing descriptions of gross lesions. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 486—Primate Medicine (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Acquire skills to perform physical examinations, blood collection, cystocentesis, catheter placement, fluid therapy, basic wound care, bandaging, suturing, amputations, and orogastric tube feedings. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 486—Primate Medicine (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Acquire skills to perform physical examinations, blood collection, cystocentesis, catheter placement, fluid therapy, basic wound care, bandaging, suturing, amputations, and orogastric tube feedings. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 487—Radiation Oncology (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Staging and treatment of patients with cancer and use of radiation therapy in the treatment of cancer in companion animals. Management of clinical patients, the indications for radiation therapy and technical aspects treatment planning and dose calculations. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 487—Radiation Oncology (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Staging and treatment of patients with cancer and use of radiation therapy in the treatment of cancer in companion animals. Management of clinical patients, the indications for radiation therapy and technical aspects treatment planning and dose calculations. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 488—Shelter Medicine (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Exposure to all areas in a variety of shelters in the Sacramento and Bay Area. Accompany Shelter Medicine Program personnel on consultations; depending on schedule. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 488—Shelter Medicine / Surgery (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Exposure to all areas in a variety of shelters in the Sacramento and Bay Area. Accompany Shelter Medicine Program personnel on consultations; depending on schedule. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 489—Physical Rehabilitation and Integrative Medicine (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Participate in physical rehabilitation evaluation to diagnose movement dysfunction, design and effectively implement an evidence-based treatment plan to restore, maintain or enhance optimal physical function after injury, surgery or disability. Emphasis on development of observation and manual assessment skills. May be repeated up to 23 unit(s). Effective: 2015 Summer Semester.

DVM 489—Integrative Medicine (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Participate in physical rehabilitation evaluation to diagnose movement dysfunction, design and effectively implement an evidence-based treatment plan to restore, maintain or enhance optimal physical function after injury, surgery or disability. Emphasis on development of observation and manual assessment skills. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 490—Small Animal Anesthesia (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Experience in anesthetizing small animals in a clinical setting. May be repeated up to 23 unit(s). Effective: 2014 Summer Semester.

DVM 490—Small Animal Anesthesia (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Experience in anesthetizing small animals in a clinical setting. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 491—Small Animal Emergency (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Emergency practice includes the immediate recognition, evaluation, and care of patients with acute illness and injury. May be repeated up to 23 unit(s). Effective: 2015 Summer Semester.

DVM 491—Small Animal Emergency (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Emergency practice includes the immediate recognition, evaluation, and care of patients with acute illness and injury. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 492—Small Animal Intensive Care Unit (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Gain and demonstrate competence in both the immediate and ongoing care of a diverse group of critically ill small animal patients. Gain proficiency in invasive procedures, cardiopulmonary resuscitation, stabilization of the respiratory distress patient and hemodynamic stabilization. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 492—Intensive Care Unit (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Gain and demonstrate competence in both the immediate and ongoing care of a diverse group of critically ill small animal patients. Gain proficiency in invasive procedures, cardiopulmonary resuscitation, stabilization of the respiratory distress patient and hemodynamic stabilization. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 493—Small Animal Medicine A (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Improve clinical skills required to manage cases in the Small Animal Service including comprehensive histories, preforming complete physical examinations, obtaining samples, interpreting results, conducting special procedures and assisting faculty and residents in the diagnosis, prevention, management and treatment of disease. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 493—Internal Medicine A (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Improve clinical skills required to manage cases in the Small Animal Service including comprehensive histories, preforming complete physical examinations, obtaining samples, interpreting results, conducting special procedures and assisting faculty and residents in the diagnosis, prevention, management and treatment of disease. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 494—Small Animal Radiology (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Participate in technical aspects of producing radiographs, interpreting radiographic and other diagnostic imaging studies and performing diagnostic ultrasound exams. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 494—Small Animal Radiology (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Participate in technical aspects of producing radiographs, interpreting radiographic and other diagnostic imaging studies and performing diagnostic ultrasound exams. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 495—Small Animal Soft Tissue Surgery (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Participate in management of cases referred for advanced surgical techniques to include all aspects of case management from hospital admission to discharge including daily case rounds. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 495—Soft Tissue Surgery (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Participate in management of cases referred for advanced surgical techniques to include all aspects of case management from hospital admission to discharge including daily case rounds. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 496—Behavior (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Understand the importance of behavior in companion animal practice, primarily that of dogs and cats. Apply the knowledge to prevent and treat problematic behaviors in companion animals. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 496—Behavior (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Understand the importance of behavior in companion animal practice, primarily that of dogs and cats. Apply the knowledge to prevent and treat problematic behaviors in companion animals. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 497—Research (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Third- and/or fourth-year standing in the School of Veterinary Medicine. Research rotations are designed for combined degree students who require a period of time (up to 19 weeks) to complete a discrete portion of their thesis work. May be repeated up to 30 unit(s). Effective: 2014 Spring Semester.

DVM 497—Research (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Third- and/or fourth-year standing in the School of Veterinary Medicine. Research rotations are designed for combined degree students who require a period of time (up to 19 weeks) to complete a discrete portion of their thesis work. May be repeated up to 30 unit(s). Effective: 2018 Fall Semester.

DVM 498—Fish Health (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Focus on the application of basic fish health principles to address current problems as experienced by fish as held for research, as large populations in state fish hatcheries and as part of the collection of large public/private aquaria. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 498—Aquatic Medicine (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Focus on the application of basic fish health principles to address current problems as experienced by fish as held for research, as large populations in state fish hatcheries and as part of the collection of large public/private aquaria. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

DVM 499—Zoological Medicine (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Experience in order to become proficient in performing physical examinations and collecting diagnostic samples form a variety of non-domestic animals. Majority of the rotations spent providing patient care at the Sacramento Zoo. May be repeated up to 23 unit(s). Effective: 2014 Spring Semester.

DVM 499—Zoological Medicine (1.5-18) ***Review all entries***
Variable—1-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year standing in the School of Veterinary Medicine. Experience in order to become proficient in performing physical examinations and collecting diagnostic samples form a variety of non-domestic animals. Majority of rotation time spent providing patient care at the Sacramento Zoo. May be repeated up to 23 unit(s). Effective: 2018 Fall Semester.

ECH Engineering Chemical

Courses in ECH:

ECH 001—Design of Coffee–An Introduction to Chemical Engineering (3)
Laboratory—2 hours; Lecture—1 hour; Project (Term Project)—1 hour. Non-mathematical introduction to how chemical engineers think, illustrated by elucidation of the process of roasting and brewing coffee. Qualitative overview of the basic principles of engineering analysis and design. Corresponding experiments testing design choices on the sensory qualities of coffee. Not open for credit to students who have completed ECM 1, ECM 5, or ECH 5. GE credit: SE, SL, VL. Effective: 2017 Spring Quarter.

ECH 005—Introduction to Analysis and Design in Chemical Engineering (3)
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): MAT 021A; MAT 021B (can be concurrent) Quantitative introduction to the engineering principles of analysis and design. Applications of differential and integral calculus. Laboratory experiments using coffee to illustrate chemical engineering concepts and to conduct an engineering design competition. Only two units of credit to students who have completed ECM 001 or ECH 001; not open for credit to students who have completed ECM 005. GE credit: QL, SE. Effective: 2017 Winter Quarter.

ECH 051—Material Balances (4)
Lecture—4 hours. Prerequisite(s): MAT 021C C- or better; MAT 021D (can be concurrent) Application of the principle of conservation of mass to single and multicomponent systems in chemical process calculations. Studies of batch, semi-batch, and continuous processes involving mass transfer, phase change, and reaction stoichiometry. Not open for credit to students who have completed ECH 151. GE credit: SE. Effective: 2017 Fall Quarter.

ECH 060—Engineering Problem Solving Using MATLAB (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021C Problem solving in chemical, biochemical and materials engineering using MATLAB. Programming styles, data structures, working with lists, functions and rules. Applications drawn from material balances, statistics, numerical methods, bioinformatics, transport phenomena, kinetics, and computational analysis. GE credit: QL, SE. Effective: 2017 Spring Quarter.

ECH 080—Chemical Engineering Profession (1)
Lecture/Discussion—1 hour; Term Paper. Professional opportunities and professional responsibilities of chemical engineers. Opportunities and needs for post-baccalaureate education. Relationship of chemical engineering to contemporary issues. GE credit: SE, SS. Effective: 2017 Winter Quarter.

ECH 090X—Honors Discussion Section (1)
Discussion—1 hour. Open only to students in the Chemical Engineering or Biochemical Engineering Honors Programs. Examination of special topics covered in selected lower-division courses through additional readings, discussions, collaborative work, or special activities which may include projects, laboratory experience or computer simulations. Repeat credit allowed if topic differs. May be repeated for credit When topic differs. Effective: 2017 Fall Quarter.

ECH 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. Directed Group Study. (P/NP grading only.) GE credit: SE. Effective: 2017 Winter Quarter.

ECH 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special Study for Undergraduates (P/NP grading only.) GE credit: SE. Effective: 2017 Winter Quarter.

ECH 140—Mathematical Methods in Biochemical and Chemical Engineering (4)
Laboratory—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): MAT 022B; (ECH 060 or ENG 006); or equivalents of ECH 060 or ENG 006. Mathematical methods for solving problems in chemical and biochemical engineering, with emphasis on transport phenomena. Fourier series and separation of variables. Sturm-Liouville eigenvalue problems. Similarity transformations. Tensor analysis. Finite difference methods for solving time-dependent diffusion problems. Not open for credit to students who have completed ECH 159. GE credit: SE. Effective: 2017 Spring Quarter.

ECH 141—Fluid Mechanics for Biochemical and Chemical Engineers (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): ECH 140; ECH 051 (can be concurrent) Principles and applications of fluid mechanics in chemical and biochemical engineering. Hydrostatics. The stress tensor and Newton's law of viscosity. Not open for credit to students who have completed course 150B. GE credit: QL, SE. Effective: 2017 Winter Quarter.

ECH 141—Fluid Mechanics for Biochemical and Chemical Engineers (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): ECH 051 C- or better; ECH 140 Principles and applications of fluid mechanics in chemical and biochemical engineering. Hydrostatics. The stress tensor and Newton's law of viscosity. Not open for credit to students who have completed ECH 150B. GE credit: QL, SE. Effective: 2019 Winter Quarter.

ECH 142—Heat Transfer for Biochemical and Chemical Engineers (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): ECH 051 C- or better; ECH 141 Conduction, convection, and radiation of thermal energy in applications to chemical and biochemical engineering. Derivation of thermal and mechanical energy equations. Thermal boundary layers. Macroscopic balances. Applications: heat transfer in tubes, channels, and integrated circuits, and analysis of heat exchangers. Not open for credit to students who have completed course 153. GE credit: QL, SE. Effective: 2017 Winter Quarter.

ECH 142—Heat Transfer for Biochemical and Chemical Engineers (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): ECH 141 Conduction, convection, and radiation of thermal energy in applications to chemical and biochemical engineering. Derivation of thermal and mechanical energy equations. Thermal boundary layers. Macroscopic balances. Applications: heat transfer in tubes, channels, and integrated circuits, and analysis of heat exchangers. Not open for credit to students who have completed ECH 153. GE credit: QL, SE. Effective: 2019 Spring Quarter.

ECH 143—Mass Transfer for Biochemical and Chemical Engineers (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): ECH 051 C- or better; ECH 141 Derivation of species conservation equations describing convective and diffusive mass transfer. Fick's law and the Stefan-Maxwell constitutive equations. Mass transfer coefficients. Multicomponent mass transfer across gas/liquid interfaces. Applications include drying, heterogeneous chemical reactions, and membrane separations. GE credit: SE. Effective: 2017 Winter Quarter.

ECH 143—Mass Transfer for Biochemical and Chemical Engineers (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): ECH 141 Derivation of species conservation equations describing convective and diffusive mass transfer. Fick's law and the Stefan-Maxwell constitutive equations. Mass transfer coefficients. Multicomponent mass transfer across gas/liquid interfaces. Applications include drying, heterogeneous chemical reactions, and membrane separations. GE credit: SE. Effective: 2019 Spring Quarter.

ECH 144—Rheology and Polymer Processing (3)
Lecture/Discussion—3 hours. Prerequisite(s): ECH 141 Deformation in steady shear, unsteady shear, and elongational flows. Linear and non-linear viscoelastic constitutive models. The principle of material indifference and admissibility of constitutive equations. Introduction to the unit operations of polymer processing. Not open for credit to students who have completed ECH 150C. GE credit: SE. Effective: 2017 Winter Quarter.

ECH 145A—Chemical Engineering Thermodynamics Laboratory (3)
Discussion—2 hours; Extensive Writing; Laboratory—2 hours. Prerequisite(s): ECH 152A; ECH 152B (can be concurrent) Open to majors in Chemical Engineering, Chemical Engineering/Materials Science, & Biochemical Engineering. Laboratory experiments in chemical engineering thermodynamics. GE credit: SE, WE. Effective: 2017 Winter Quarter.

ECH 145B—Chemical Engineering Transport Lab (3)
Discussion—2 hours; Extensive Writing; Laboratory—2 hours. Prerequisite(s): ECH 141; ECH 145A Open to majors in Chemical Engineering, Chemical Engineering/Materials Science, & Biochemical Engineering. Laboratory experiments in chemical engineering transport phenomena. GE credit: SE, WE. Effective: 2017 Spring Quarter.

ECH 148A—Chemical Kinetics and Reaction Engineering (3)
Lecture—3 hours. Prerequisite(s): ECH 143; ECH 152B Ideal chemical reactors. Rate laws and stoichiometry. Design and
analysis of isothermal reactors with multiple reactions. Not open for credit to students who have taken ECH 146. GE credit: SE. Effective: 2017 Winter Quarter.

ECH 148B—Chemical Kinetics and Reaction Engineering (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECH 148A Design and analysis of non-isothermal reactors. Reactions in packed beds with pressure drop. Adsorption and heterogeneous catalysis. Transport limitations. Not open for credit to students who have taken ECH 146. GE credit: SE. Effective: 2017 Winter Quarter.

ECH 152A—Chemical Engineering Thermodynamics (3)
Lecture—3 hours. Prerequisite(s): ECH 060 or ENG 006; or equivalents. Application of principles of thermodynamics to chemical processes. Not open for credit to students who have completed ENG 105 or ENG 105A. GE credit: SE. Effective: 2017 Spring Quarter.

ECH 152B—Chemical Engineering Thermodynamics (4)
Lecture/Discussion—4 hours. Prerequisite(s): ECH 152A Continuation of course 152A. GE credit: SE. Effective: 2017 Spring Quarter.

ECH 155—Chemical Engineering Kinetics and Reactor Design Laboratory (4)
Discussion—1 hour; Laboratory—6 hours; Term Paper. Prerequisite(s): ECH 145B; ECH 148A; ECH 148B (can be concurrent); ECH 157 (can be concurrent); Upper division English composition requirement (can be concurrent). Open to majors in Chemical Engineering, Chemical Engineering/Materials Science, and Biochemical Engineering. Laboratory experiments in chemical kinetics, reactor design and process control. Not open for credit to students who have taken ECH 155B. GE credit: OL, SE, VL, WE. Effective: 2017 Spring Quarter.

ECH 155A—Chemical Engineering Laboratory (4)
Discussion—1 hour; Laboratory—6 hours; Term Paper. Prerequisite(s): ECH 141 (can be concurrent); ECH 142 (can be concurrent); ECH 143 (can be concurrent); Satisfaction of the upper division English composition requirement. Open to majors in Chemical Engineering, Chemical Engineering/Materials Science, Biochemical Engineering, Biomedical Engineering, and Biological Systems Engineering. Laboratory experiments in transport phenomena, chemical kinetics, and thermodynamics. GE credit: OL, QL, SE, VL, WE. Effective: 2017 Winter Quarter.

ECH 155B—Chemical Engineering Laboratory (4)
Discussion—1 hour; Extensive Writing—1 hour; Laboratory—6 hours. Prerequisite(s): ECH 143 (can be concurrent); ECH 155A; Satisfaction of the upper division English composition requirement. Open to majors in Chemical Engineering, Chemical Engineering/Materials Science, Biochemical Engineering, Biomedical Engineering, Food Engineering, and Biosystems Engineering. Continuation of course 155A. Laboratory experiments in transport phenomena, chemical kinetics, and thermodynamics. GE credit: QL, SE, VL, WE. Effective: 2017 Winter Quarter.

ECH 157—Process Dynamics and Control (4)
Lecture/Discussion—4 hours. Prerequisite(s): ECH 140 Fundamentals of dynamics and modeling of chemical processes. Design and analysis of feedback control of chemical processes. GE credit: QL, SE. Effective: 2017 Winter Quarter.

ECH 158A—Process Economics and Green Design (4)
Lecture/Discussion—4 hours. Prerequisite(s): ECH 142; ECH 143 Senior design experience in process and product creation and design with multiple realistic constraints. Cost accounting and capital investment estimation. Profitability analysis techniques. Green chemistry, health risk assessment and life cycle assessment concepts. GE credit: SE, SL, SS, VL. Effective: 2017 Winter Quarter.

ECH 158B—Separations and Unit Operations (4)
Lecture—4 hours. Prerequisite(s): ECH 158A Senior design experience with multiple realistic constraints. Heuristic and rigorous design of chemical process equipment. Separation by filtration, distillation and extraction. Synthesis of reactor and separation networks, heat and power integration. GE credit: QL, SE. Effective: 2017 Winter Quarter.

ECH 158C—Plant Design Project (4)
Discussion/Laboratory—2 hours; Project (Term Project)—2 hours. Prerequisite(s): ECH 158B or ECH 161C Senior design experience for chemical and biochemical processes. Impact of multiple realistic constraints. Design, costing and profitability analysis of complete plants. Use of computer-aided design techniques. GE credit: SE, SS, VL. Effective: 2018 Winter Quarter.

ECH 160—Fundamentals of Biomanufacturing (3)
Lecture—3 hours. Prerequisite(s): MIC 102 or BIS 102 or ABI 102 Principles of large scale bioreactor production of metabolites, enzymes, and recombinant proteins including the development of strains/cell lines, fermentor/bioreactor design, monitoring and operation, product recovery and purification, and biomanufacturing economics. Not open for credit to students who have completed ECH 161C or both ECH 161A and ECH 161B; only two units of credit to students who have completed either ECH 161A or ECH 161B. GE credit: QL, SE, VL. Effective: 2017 Winter Quarter.

ECH 161A—Biochemical Engineering Fundamentals (4)
Lecture/Discussion—4 hours. Prerequisite(s): ECH 148A Biokinetics; bioreactor design and operation; transport phenomena in bioreactors; microbial, plant, and animal cell cultures. GE credit: QL, SE, VL. Effective: 2017 Winter Quarter.

ECH 161B—Bioseparations (4)
Lecture/Discussion—4 hours. Prerequisite(s): ECH 143 Product recovery and purification of biochemicals. Cell disruption, centrifugation, filtration, membrane separations, extraction, and chromatographic separation. GE credit: QL, SE. Effective: 2017 Winter Quarter.

ECH 161C—Biotechnology Facility Design and Regulatory Compliance (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECH 161A (can be concurrent), ECH 161B (can be concurrent)) or MCB 263 (can be concurrent); Course(s) required concurrently. Design of biotechnology manufacturing facilities. Fermentation and purification equipment, and utility systems. Introduction to current good manufacturing practices, regulatory compliance, and documentation. GE credit: QL, SE, SL, SS, VL. Effective: 2017 Winter Quarter.

ECH 161L—Bioprocess Engineering Laboratory (4)
Discussion—1 hour; Laboratory—9 hours; Term Paper. Prerequisite(s): (ECH 161A, ECH 161B) or VEN 186 or (BIS 103, MCB 120L) Pass One restricted to chemical/biochemical engineering majors. Laboratory experiments in the operation and analysis of bioreactors; determination of oxygen mass transfer coefficients in bioreactors and ion exchange chromatography. GE credit: QL, SE, VL, WE. Effective: 2017 Winter Quarter.

ECH 166—Catalysis (3)
Lecture—3 hours. Prerequisite(s): ECH 148A; and Consent of Instructor. Principles of catalysis based on an integration of principles of physical, organic, and inorganic chemistry and chemical kinetics and chemical reaction engineering. Catalysis in solution; catalysis by enzymes; catalysis in swellable polymers; catalysis in microscopic cages (zeolites); catalysis on surfaces. GE credit: SE. Effective: 2017 Winter Quarter.

ECH 169—The Design of Cocktails: Applied Thermodynamics and Transport Phenomena in Mixed Drinks (1)
Discussion/Laboratory—1 hour. Prerequisite(s): ECH 145B; ECH 152B; and Consent of Instructor. Enrollment by permission of instructors only; limited to students over 21 years old. Scientific and engineering principles underlying the preparation of mixed drinks. Thermodynamics and kinetics of ice crystallization; phase diagram of ethanol-water-ice mixtures; mass transfer of aromatics; solubility of sucrose and carbon dioxide; colloidal behavior of dispersed solids and emulsified oils. Corresponding laboratory experiments testing the effect of design choices on the sensory quality of cocktails. (P/NP grading only.) GE credit: SE. Effective: 2018 Spring Quarter.

ECH 170—Introduction to Colloid and Surface Phenomena (3)
Lecture—3 hours. Prerequisite(s): CHE 110A Introduction to the behavior of surfaces and disperse systems. Fundamentals will be applied to the solution of practical problems in colloid science. Course should be of value to engineers, chemists, biologists, soil scientists, and related disciplines. GE credit: SE. Effective: 2017 Winter Quarter.

ECH 190C—Research Group Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing in Chemical Engineering. Research group conferences. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 2017 Winter Quarter.

ECH 190X—Honors Discussion Section (1)
Discussion—1 hour. Open only to students in the Chemical Engineering or Biochemical Engineering Honors Programs. Examination of special topics covered in selected upper division courses through additional readings, discussions, collaborative work, or special activities which may include projects, laboratory experience or computer simulations. May be repeated for credit when topic differs. Effective: 2017 Fall Quarter.

ECH 192—Internship in Chemical or Biochemical Engineering (1-5)
Internship—3-15 hours. Prerequisite(s): Consent of Instructor. Completion of a minimum of 84 units; project approval before period of internship. Supervised work experience in Chemical or Biochemical Engineering. May be repeated for credit when project differs. (P/NP grading only.) GE credit: SE. Effective: 2017 Winter Quarter.

ECH 198—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Group study. (P/NP grading only.) GE credit: SE. Effective: 2017 Winter Quarter.

ECH 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special study. (P/NP grading only.) GE credit: SE. Effective: 2017 Winter Quarter.

ECH 206—Biochemical Engineering (3)
Lecture—3 hours. Prerequisite(s): MIC 102; MIC 102L; BIS 101; BIS 102; BIS 103; MCB 120L; MCB 200A; or Consent of Instructor. FST 205 recommended. Interaction of chemical engineering, biochemistry, and microbiology. Mathematical representations of microbial systems. Kinetics of growth, death, and metabolism. Continuous fermentation, agitation, mass transfer and scale-up in fermentation systems, product recovery, enzyme technology. Effective: 2017 Winter Quarter.

ECH 226—Enzyme Engineering (3)
Lecture—3 hours. Prerequisite(s): MIC 102; MIC 102L; BIS 102; BIS 103; MCB 122; MCB 120L; MCB 200A; or Consent of Instructor. Application of basic biochemical and engineering principles of practical enzymatic processes. Lectures cover large scale production and separation of enzymes, immobilized enzyme systems, enzyme related biotechnology, reactor design and optimization, and new application of enzymes in genetic engineering. Effective: 2017 Winter Quarter.

ECH 245—Micro- and Nano-Technology in Life Sciences (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Survey of biomedical device design from the engineering and biological perspectives; micro-/nano-fabrication and characterization techniques; surface chemistry and mass transfer; essential biological processes and models; proposal development skills to merge aforementioned themes in a multidisciplinary project. (EEC 245 and EMS 245.) Effective: 2017 Winter Quarter.

ECH 246—Advanced Biochemical Engineering (2)
Lecture—2 hours. Prerequisite(s): ECH 206; or Consent of Instructor. Advances in the field of biotechnology including genetic engineering, enzyme engineering, fermentation science, and renewable resources development. The important results of original research will be evaluated for understanding of the fundamental principles and for potential practical application. Effective: 2017 Winter Quarter.

ECH 252—Statistical Thermodynamics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECH 152B; ENG 105B or the equivalent. A treatment of the statistical basis of thermodynamics;introduction to statistical mechanics; discussion of the laws of thermodynamics; application of thermodynamic relationships to phase and chemical reaction equilibrium; introduction to molecular simulations and the evaluation of thermodynamic properties from molecular simulations. Effective: 2017 Winter Quarter.

ECH 253A—Advanced Fluid Mechanics (4)
Lecture—4 hours. Prerequisite(s): ECH 141; ECH 259 Kinematics and basic principles of fluid flow. Principles of constitutive equations. Navier-Stokes equations for Newtonian fluids. Survey of rectilinear creeping flow, lubrication flow and boundary layer theory. Effective: 2017 Winter Quarter.

ECH 253B—Advanced Heat Transport (4)
Lecture—4 hours. Prerequisite(s): ECH 142; ECH 259; Or the equivalent. Fundamental energy postulates and derivation of microscopic and macroscopic energy equations. Mechanisms of conduction. Isotropic, thermoelastic and anisotropic materials solution problems using Greens functions and perturbation theory. Effective: 2017 Winter Quarter.

ECH 253C—Advanced Mass Transfer (4)
Lecture—4 hours. Prerequisite(s): ECH 253A; Or the equivalent. Kinematics and basic conservation principles for multicomponent systems. Constitutive equations for momentum, heat and mass transfer, applications to binary and ternary systems. Details of diffusion with reaction, and the effects of concentration. Effective: 2017 Winter Quarter.

ECH 254—Colloid and Surface Phenomena (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Graduate standing in science or engineering or consent of instructor. Thermodynamics and rate processes at interfaces. These fundamental processes will be applied to determine the collective properties
of thin films and membranes, self-assembled systems, liquid crystals and colloidal systems. Experimental techniques in surface analysis. Effective: 2017 Winter Quarter.

ECH 256—Chemical Kinetics and Reaction Engineering (4)
Lecture—4 hours. Prerequisite(s): ECH 146; Or the equivalent. Analysis of the performance of chemical reactors and design of chemical reactors based on the principles of chemical kinetics and transport phenomena. Consideration of noncatalytic/catalytic reactions in single fluid phases and emphasis on reactions in multiphase mixtures, especially gas-solid reactors. Effective: 2017 Winter Quarter.

ECH 259—Advanced Engineering Mathematics (4)
Lecture—4 hours. Prerequisite(s): MAT 021D; MAT 022A; MAT 022B Applications of methods of applied mathematics to the analytical and numerical solution of linear and nonlinear ordinary and partial differential equations arising in the study of transport phenomena. Effective: 2017 Winter Quarter.

ECH 261—Molecular Modelling of Soft and Biological Matter (4)
Lecture/Discussion—4 hours. Prerequisite(s): EMS 247 or ECH 252; or equivalent course in advanced thermodynamics/statistical mechanics. Modern molecular simulation techniques with a focus on soft matter like polymers, biologically relevant systems, and glasses. Effective: 2017 Winter Quarter.

ECH 262—Transport Phenomena in Multiphase Systems (3)
Discussion/Laboratory—3 hours. Prerequisite(s): ECH 253C Heat, mass and momentum transfer in multiphase, multicomponent systems with special emphasis on transport processes in porous media. Derivation of the averaging theorem and application of the method of volume averaging to multicomponent, reacting systems. Effective: 2017 Winter Quarter.

ECH 263—Rheology and Mechanics of Non-Newtonian Fluids (3)
Lecture—3 hours. Prerequisite(s): ECH 253A; ECH 259; or Consent of Instructor. Mechanics of polymer solutions and suspension, especially the development of properly invariant constitutive equations. Topics include: viscometry, linear and nonlinear viscoelasticity, continuum mechanics, kinetic theory. Effective: 2017 Winter Quarter.

ECH 265—Emulsions, Microemulsions and Bilayers (3)
Lecture—3 hours. Prerequisite(s): An undergraduate course in physical chemistry. Thermodynamic and mechanical descriptions of surfactant-laden interfaces. Forces between and within interfaces. Physics of micelle and microemulsion formation. Structure and stability of emulsions. Properties of phospholipid bilayers, with emphasis on vesicles. Effective: 2017 Winter Quarter.

ECH 267—Advanced Process Control (3)
Lecture—3 hours. Prerequisite(s): ECH 157; Or the equivalent. Advanced course in analysis and synthesis of linear multivariable systems. Emphasis on frequency domain techniques and applications to chemical processes. Topics include singular value analysis, internal model control, robust controller design methods as well as self-tuning control techniques. Effective: 2017 Winter Quarter.

ECH 268—Polysaccharides Surface Interactions (3)
Lecture—3 hours. Prerequisite(s): Graduate students in science or engineering. Study of fundamental surface science theories as applied to physical and chemical interactions of carbohydrates and polysaccharides. (EBS 268.) Effective: 2017 Winter Quarter.

ECH 269—Cell and Molecular Biophysics for Bioengineers (4)
Lecture—4 hours. Prerequisite(s): BIM 284; or equivalent; graduate standing; undergraduate students by consent of instructor. Introduction to fundamental mechanisms governing the structure, function, and assembly of bio-macromolecules. Emphasis is on a quantitative understanding of the nano-to-microscale interactions between and within individual molecules, as well as of their assemblies, in particular membranes. Not open for credit to students who have completed BIM 162. (BIM 262.) Effective: 2017 Winter Quarter.

ECH 289A—Special Topics in Chemical Engineering; Fluid Mechanics (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Fluid Mechanics. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289B—Special Topics in Chemical Engineering; Nonlinear Analysis and Numerical Methods (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Nonlinear Analysis and Numerical Methods. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289C—Special Topics in Chemical Engineering; Process Control (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Process Control. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289D—Special Topics in Chemical Engineering; Chemistry of Catalytic Processes (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Chemistry of Catalytic Processes. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289E—Special Topics in Chemical Engineering; Biotechnology (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Biotechnology. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289F—Special Topics in Chemical Engineering; Interfacial Engineering (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Interfacial Engineering. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289G—Special Topics in Chemical Engineering; Molecular Thermodynamics (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Molecular Thermodynamics. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289H—Special Topics in Chemical Engineering; Membrane Separations (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Membrane Separations. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289I—Special Topics in Chemical Engineering; Advanced Materials Processing (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Advanced Materials Processing. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289J—Special Topics in Chemical Engineering; Novel Experimental Methods (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Novel Experimental Methods. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289K—Special Topics in Chemical Engineering; Advanced Transport Phenomena (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Advanced Transport Phenomena. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 289L—Special Topics in Chemical Engineering; Biomolecular Engineering (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Biomolecular Engineering. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

ECH 290—Seminar (1)
Seminar—1 hour. Seminar. (S/U grading only.) Effective: 2017 Winter Quarter.

ECH 290C—Graduate Research Group Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Research problems, progress and techniques in chemical engineering. May be repeated for credit. (S/U grading only.) Effective: 2017 Winter Quarter.

ECH 294—Current Progress in Biotechnology (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Seminars presented by guest lecturers on subjects of their own research activities. May be repeated for credit. (BIT 294.) (S/U grading only.) Effective: 2018 Winter Quarter.

ECH 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Group study. (S/U grading only.) Effective: 2017 Winter Quarter.

ECH 299—Research (1-12)
Variable. Research. (S/U grading only.) Effective: 2017 Winter Quarter.

ECH 390—Teaching of Chemical Engineering (1) ***Review all entries***
Discussion—1 hour. Prerequisite(s): Qualifications and acceptance as teaching assistant and/or associate-in in chemical engineering. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated up to 2 time(s). (S/U grading only.) Effective: 2017 Winter Quarter.

ECH 390—Teaching of Chemical Engineering (1) ***Review all entries***
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Qualifications and acceptance as teaching assistant and/or associate-in in chemical engineering. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit. (S/U grading only.) Effective: 2018 Fall Quarter.

ECI Engineering Civil & Environmental

Courses in ECI:

ECI 003—Civil Infrastructure and Society (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): MAT 021A (can be concurrent) Pass One restricted to lower division students; Civil Engineering majors. Introduction to civil infrastructure and its relationship with society and the natural environment. Exposure to innovative research on civil engineering and environmental systems. Participation in laboratory experiments illustrative of the solution of representative but simplified engineering problems. Not open for credit to upper division students. GE credit: OL, SE, SS. Effective: 2016 Winter Quarter.

ECI 016—Spatial Data Analysis (2)
Laboratory—3 hours; Lecture—1 hour. Restricted to Civil Engineering and Biological Systems Engineering majors; non-majors accommodated on a space-available basis. Computer-aided design and geographic information systems in civil engineering practice. GE credit: QL, SE. Effective: 2010 Spring Quarter.

ECI 019—C Programming for Civil and Environmental Engineers (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): MAT 021A (can be concurrent) Pass One open to Civil Engineering majors and Optical Science and Engineering majors. Computational problem solving techniques for Civil and Environmental Engineering applications using structured C programming. Algorithm design applied to realistic problems. GE credit: SE. Effective: 2011 Winter Quarter.

ECI 040—Introduction to Environmental Engineering (4)
Lecture—4 hours. Prerequisite(s): CHE 002B Pass One open to students in the College of Engineering. Introduction to topics in environmental engineering; discussion on influence of literary work, art, and media on the evolution of environmental engineering practice, relevant laws, and regulations; presentations of historical case studies. GE credit: AH. Effective: 2017 Winter Quarter.

ECI 090X—Lower Division Seminar (1-4)
Seminar—1-4 hours. Prerequisite(s): Consent of Instructor. Examination of a special topic in a small group setting. May be repeated for credit. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 092—Internship for Engineering (1-5)
Internship. Prerequisite(s): Lower division standing; approval of project prior to period of internship. Supervised work experience in civil engineering. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 100—Introduction to Fluid Mechanics for Civil and Environmental Engineers (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 035 C- or better; MAT 022B C- or better; PHY 009B C- or better Pass One restricted to Civil Engineering, Environmental Engineering and Hydrology majors. Fluid flow in civil & environmental engineering, basis for design, buoyancy, hydrostatics, gravity dams, hydraulic modeling: similarity & scaling, conservation laws, flow in bends, nozzles, pipes, pumps, turbines, complimentary lab experiments. Not open for credit to students who have taken ENG 103. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 114—Probabilistic Systems Analysis for Civil Engineers (4)
Lecture—4 hours. Prerequisite(s): MAT 021C C- or better Probabilistic concepts and models in engineering. Statistical analysis of engineering experimental and field data. Introduction to stochastic processes and models of engineering systems. Not open for credit to students who have completed STA 120. GE credit: QL, SE. Effective: 2013 Fall Quarter.

ECI 115—Computer Methods in Civil & Environmental Engineering (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (ENG 006 or ECS 030); MAT 022B Open to Civil Engineering majors only. Presentation, implementation and application of numerical algorithms and computer models for the solution of practical problems in Civil and Environmental Engineering. GE credit: SE. Effective: 2013 Fall Quarter.

ECI 119—Parallel Processing for Engineering Applications. (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): C programming or consent of instructor. Fundamental skills in parallel computing for engineering applications; emphasis on structured parallel programming for distributed memory parallel clusters. No credit allowed for students who have taken ECI 119B. GE credit: SE. Effective: 2005 Spring Quarter.

ECI 123—Urban Systems and Sustainability (4)
Lecture—4 hours. Prerequisite(s): Upper division standing. Systems-level approach of how to evaluate and then modify sustainability of urban systems based on interaction with natural environments. Topics include: definition/metrics of urban sustainability; system analyses of urban systems; enabling technology, policies, legislation; measures and modification of ecological footprints. GE credit: ACGH, DD, SE, SL, SS, WE. Effective: 2006 Fall Quarter.

ECI 125—Building Energy Performance (4)
Lecture—4 hours. Prerequisite(s): Upper division standing in Engineering. Open to students in the College of Engineering. Mechanisms of energy consumption in buildings including end uses, thermal loads, ventilation, air infiltration, thermal energy distribution, and HVAC systems; energy performance simulation; methods and strategies of energy efficiency. GE credit: SE. Effective: 2011 Winter Quarter.

ECI 130—Structural Analysis (4)
Lecture—4 hours. Prerequisite(s): ENG 104 C- or better; MAT 022A Open to Civil Engineering majors. Elastic structural analysis of determinate and indeterminate trusses, beams and frames. Plastic bending and limit analysis. GE credit: QL, SE. Effective: 2014 Winter Quarter.

ECI 131—Matrix Structural Analysis (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 104 C- or better; ENG 006 Open to Engineering majors only. Matrix formulation and computer analysis of statically indeterminate structures. Stiffness and flexibility formulations for elastic structures. Finite element methods for elasticity and bending problems. GE credit: SE. Effective: 2013 Fall Quarter.

ECI 132—Structural Design: Metallic Elements (4)
Lecture—4 hours. Prerequisite(s): ECI 130 Design of metallic beams, columns, and other members for various types of loading and boundary conditions; design of connections between members; member performance within structural systems. GE credit: SE, VL. Effective: 2013 Fall Quarter.

ECI 135—Structural Design: Concrete Elements (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECI 130 Restricted to Civil Engineering, Civil Engineering/Materials Science and Engineering, and Materials Science and Engineering majors only. Strength design procedures for columns, rectangular beams, T-beams and beams of general cross-section. Building code requirements for bending, shear, axial load, combined stresses and bond. Introduction to prestressed concrete. GE credit: QL, SE. Effective: 2013 Fall Quarter.

ECI 136—Building Design (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (ECI 130 or ECI 131); (ECI 135 or ECI 132) Design of a building structure for a specific need under the multiple constraints of safety, serviceability, cost and aesthetics. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 137—Construction Principles and Project Management (4)
Laboratory—3 hours; Lecture—3 hours. Restricted to upper division standing in Engineering. Project management, with civil engineering construction and design applications, including project scope, schedule, resources, cost, quality, risk, and control. Construction industry overview. Interactions between planning, design, construction, operations. Construction operations analysis. Contract issues. Project management software, field trips, guest lectures. GE credit: ACGH, OL, QL, SE, SS, VL, WE. Effective: 2013 Fall Quarter.

ECI 138—Earthquake Loads on Structures (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECI 130 or ECI 131 Determination of loads on structures due to earthquakes. Methods of estimating equivalent static lateral forces; response spectrum and time history analysis. Concepts of mass, damping and stiffness for typical structures. Design for inelastic behavior. Numerical solutions and Code requirements. GE credit: SE. Effective: 2013 Fall Quarter.

ECI 139—Advanced Structural Mechanics (4)
Lecture—4 hours. Prerequisite(s): ENG 104 C- or better Review of stress, strain, equilibrium, compatibility, and elastic material behavior. Plane stress and plane strain problems in elasticity; energy methods. Theories for unsymmetric bending, straight and curved beams. Beams on elastic foundations; stresses in plates and shells; elastic stability. GE credit: QL, SE. Effective: 2013 Fall Quarter.

ECI 140A—Environmental Analysis of Aqueous Systems (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 002B C- or better Pass One restricted to Environmental Engineering majors. Introduction to "wet chemical" and instrumental techniques commonly used in the examination of water and wastewater and associated data analysis. Not open for credit to students who have taken ECH 140 or CHE 100. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 140B—Chemical Principles for Environmental Engineers (4)
Lecture—4 hours. Prerequisite(s): CHE 002B C- or better Aqueous chemistry; equilibrium relationships; carbonate system; thermodynamics; kinetics & rate laws; precipitation, adsorption, & volatilization phenomenon; oxidation & reduction reactions; pH, pE and predominance diagrams; organic chemicals. Not open for credit to students who have taken ECI 140. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 140C—Biological Principles for Environmental Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 140A C- or better or ECI 140B C- or better Fundamental microbiology concepts for environmental engineers; provides background needed for the application of water and wastewater treatment, bioremediation, air pollution control and biotransformations in environmental engineered systems. Only two units of credit for students who have taken MIC 101 or MIC 102. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 140D—Water and Wastewater Treatment System Design (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (ENG 103 C- or better or ECI 100 C- or better); (ECI 140 C- or better or ECI 140A C- or better or ECI 140B C- or better or ECI 140C C- or better or ECI 148A C- or better) Evaluation and design of water and wastewater treatment systems. Not open for credit to students who have taken ECI 148B. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 141—Engineering Hydraulics (3)
Lecture—3 hours. Prerequisite(s): ENG 103 C- or better or ECI 100 C- or better Nature of flow of a real fluid; flow in pipes; open channel flow; turbomachinery; fluid forces on objects: boundary layers, lift and drag. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 141L—Engineering Hydraulics Laboratory (1)
Laboratory—3 hours. Prerequisite(s): ECI 141 (can be concurrent) Open to Engineering students only. Laboratory experiments and demonstrations on flow measurements, sluice gates, hydraulic jump, flow characteristics, and centrifugal pumps. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 142—Engineering Hydrology (4)
Lecture—4 hours. Prerequisite(s): ECI 141 (can be concurrent) Restricted to students in the College of Engineering. The hydrologic cycle. Evapotranspiration, interception, depression storage and infiltration. Streamflow analysis and modeling. Flood routing through channels and reservoirs. Frequency analysis of hydrologic variables. Precipitation analysis for hydrologic design. Hydrologic design. GE credit: QL, SE. Effective: 2013 Fall Quarter.

ECI 143—Green Engineering Design and Sustainability (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Upper division standing. Restricted to upper division standing; Pass One restricted to Civil Engineering majors. Application of concepts, goals and metrics of sustainability, green engineering and industrial ecology to engineering design. Other course topics include life-cycle assessments, analysis of environmental management systems, and economics of pollution prevention and sustainability. GE credit: QL, SE, SL, SS. Effective: 2017 Winter Quarter.

ECI 144—Groundwater Systems Design (4)
Lecture—4 hours. Prerequisite(s): ECI 141 Groundwater occurrence, distribution, and movement; groundwater flow systems; radial flow to wells and aquifer testing; aquifer management; groundwater contamination; solute transport by groundwater; fate and transport of subsurface contaminants. Groundwater supply and transport modeling. GE credit: SE. Effective: 2005 Spring Quarter.

ECI 144L—Groundwater Systems Design Laboratory (1)
Laboratory—3 hours. Prerequisite(s): ECI 144 (can be concurrent); ECI 144 required concurrently. Computer modeling of groundwater flow under regional gradient, well injection/withdrawal, and natural and engineered boundary conditions. Use of Groundwater Vistas computer program. Effective: 2010 Fall Quarter.

ECI 145—Hydraulic Structure Design (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): ECI 141 C- or better Project-based course on the design of an integrated urban drainage system with focus on consideration of design alternatives, multiple realistic constraints, quantification of uncertainty, codes and standards, technical drawing and cost analysis. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 146—Water Resources Simulation (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 103 C- or better or ECI 100 C- or better Computer simulation techniques in the analysis, design and operation of surface water systems; modeling concepts and practices with application to surface runoff; water quality in rivers and streams and dispersion of contaminants in water bodies. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 148A—Water Quality Management (4)
Lecture—4 hours. Prerequisite(s): CHE 002B C- or better Basic concepts of water quality measurements and regulations. Introduction to physical, biological and chemical processes in natural waters. Fundamentals of mass balances in water and wastewater treatment. GE credit: SE. Effective: 2013 Fall Quarter.

ECI 149—Air Pollution (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021D; MAT 022B; CHE 002B C- or better; (ATM 121A or ENG 103 C- or better or ECI 100 C- or better) Physical and technical aspects of air pollution. Emphasis on geophysical processes and air pollution meteorology as well as physical and chemical properties of pollutants. (ATM 149.) GE credit: QL, SE, SL. Effective: 2018 Winter Quarter.

ECI 150—Air Pollution Control System Design (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECI 149 C- or better or ATM 149 C- or better Design and evaluation of air pollution control devices and systems. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 153—Deterministic Optimization and Design (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): MAT 021C; MAT 022A; Computer programming course. Operations research. Optimization techniques such as linear programming, dynamic programming, and non-linear programming. Applications in civil engineering disciplines, including multiple realistic constraints, through computer-based course projects. GE credit: QL, SE, SL. Effective: 2013 Fall Quarter.

ECI 155—Water Resources Engineering Planning (4)
Lecture—4 hours. Prerequisite(s): (ENG 106 or ECN 001A or ECN 001AV); ECI 114 Basic engineering planning concepts; role of engineering, economic, environmental and social information and analysis; institutional, political and legal aspects. Case studies and computer models illustrate the planning of water resource systems. GE credit: QL, SE, SL, SS, WE. Effective: 2018 Winter Quarter.

ECI 161—Transportation System Operations (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021C C- or better; PHY 009A C- or better Principles of transportation system operations; traffic characteristics and methods of measurement; models of transportation operations and congestion applied to urban streets and freeways. GE credit: QL, SE. Effective: 2016 Fall Quarter.

ECI 163—Energy and Environmental Aspects of Transportation (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): ECN 001A or ECN 001AV or ENG 106 Engineering, economic, and systems planning concepts. Analysis and evaluation of energy, air quality and selected environmental attributes of transportation technologies. Strategies for reducing pollution and petroleum consumption in light of institutional and political constraints. Evaluation of vehicle emission models. (ESP 163.) GE credit: SE, SL, SS, WE. Effective: 2018 Spring Quarter.

ECI 165—Transportation Policy (3)
Lecture—3 hours. Transportation and associated environmental problems confronting urban areas, and prospective technological and institutional solutions. Draws upon concepts and methods from economics, engineering, political science and environmental studies. GE credit: QL, SE, SS. Effective: 2013 Fall Quarter.

ECI 171—Soil Mechanics (4)
Lecture—4 hours. Prerequisite(s): (ENG 103 (can be concurrent) or ECI 100 (can be concurrent)); ENG 104 C- or better; ECI 171L (can be concurrent); ECI 171L required concurrently. Restricted to Civil Engineering and Environmental Engineering majors only. Soil formations, mass-volume relationships, soil classification, effective stress, soil-water-void relationships, compaction, seepage, capillarity, compressibility, consolidation, strength, states of stress and failure, lateral earth pressures, and slope stability. GE credit: SE. Effective: 2018 Spring Quarter.

ECI 171L—Soil Mechanics Laboratory (1)
Laboratory—3 hours. Prerequisite(s): ECI 171 (can be concurrent); ECI 171 required concurrently. Laboratory studies utilizing standard testing methods to determine physical, mechanical and hydraulic properties of soil and demonstration of basic principles of soil behavior. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 173—Foundation Design (4)
Lecture—4 hours. Prerequisite(s): ECI 171 Foundation analysis and design, including site characterization, evaluation of shallow and deep foundation alternatives, evaluation of bearing capacity and settlements, design of retaining structures, and case-based design experiences. GE credit: SE. Effective: 2018 Winter Quarter.

ECI 175—Geotechnical Earthquake Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 171 C- or better Tectonics, faults, site response, and probabilistic ground motion prediction equations. Cyclic loading and liquefaction of soil elements and layers. Empirical procedures and field tests for evaluation of triggering and consequences, of liquefaction. GE credit: SE. Effective: 2017 Fall Quarter.

ECI 179—Pavement Engineering (4)
Discussion/Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 104 C- or better Pavement types (rigid, flexible, unsurfaced, rail), their applications (roads, airfields, ports, rail) and distress mechanisms. Materials, traffic and environment characterization. Empirical and mechanistic-empirical design procedures. Maintenance, rehabilitation and reconstruction; construction quality; asphalt concrete mix design. GE credit: QL, SE, SL, VL. Effective: 2013 Fall Quarter.

ECI 189A—Selected Topics in Civil Engineering; Environmental Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Environmental Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189B—Selected Topics in Civil Engineering; Hydraulics and Hydrologic Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Hydraulics and Hydrologic Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189C—Selected Topics in Civil Engineering; Engineering Planning (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Engineering Planning. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189D—Selected Topics in Civil Engineering; Geotechnical Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Geotechnical Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189E—Selected Topics in Civil Engineering; Structural Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Structural Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189F—Selected Topics in Civil Engineering; Structural Mechanics (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Structural Mechanics. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189G—Selected Topics in Civil Engineering; Transportation Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Transportation Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189H—Selected Topics in Civil Engineering; Transportation Planning (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Transportation Planning. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189I—Selected Topics in Civil Engineering; Water Resources Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Water Resources Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 189J—Selected Topics in Civil Engineering; Water Resources Planning (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Water Resources Planning. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECI 190C—Research Group Conferences in Civil and Environmental Engineering (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing in Civil and Environmental Engineering. Research group conferences. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 192—Internship in Engineering (1-5)
Internship. Prerequisite(s): Upper division standing; approval of project prior to the period of the internship. Supervised work experience in civil engineering. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 193A—Civil and Environmental Engineering Senior Design (4) ***Review all entries***
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): (ECI 140D C- or better) or (ECI 171 C- or better, ECI 171L C- or better) or (ECI 132 C- or better or ECI 135 C- or better) or (ECI 161 C- or better or ECI 163 C- or better) or (ECI 141 C- or better, ECI 141L C- or better); and Consent of Instructor. And one ECI major depth course with a C- or better. Students must be in final year of study. Open to seniors in Civil Engineering and Environmental Engineering only; students must be in their final year of study. Culminating design experience for civil engineering and environmental engineering majors. Student teams work closely with faculty, city officials or consulting clients to propose, implement and validate a unique solution to a real-world problem. GE credit: OL, SE, WE. Effective: 2018 Winter Quarter.

ECI 193A—Civil and Environmental Engineering Senior Design (4) ***Review all entries***
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): (ECI 140D C- or better) or (ECI 171 C- or better, ECI 171L C- or better) or (ECI 132 C- or better or ECI 135 C- or better) or (ECI 161 C- or better or ECI 163 C- or better) or (ECI 141 C- or better, ECI 141L C- or better); and Consent of Instructor. And one other ECI major depth course with a C- or better; students must be in their final year of study. Open to seniors in Civil Engineering and Environmental Engineering only. Culminating design experience for civil engineering and environmental engineering majors. Student teams work closely with faculty, city officials or consulting clients to propose, implement and validate a unique solution to a real-world problem. GE credit: OL, SE, WE. Effective: 2018 Fall Quarter.

ECI 193B—Civil and Environmental Engineering Senior Design (4)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): ECI 193A Open to seniors in Civil Engineering and Environmental Engineering only. Culminating design experience for civil engineering and environmental engineering majors. Student teams work closely with faculty, city officials or consulting clients to propose, implement and validate a unique solution to a real-world problem. GE credit: OL, SE, VL, WE. Effective: 2017 Fall Quarter.

ECI 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ECI 199—Special Study for Advanced Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Special study. (P/NP grading only.) GE credit: SE. Effective: 2016 Fall Quarter.

ECI 201—Introduction to Theory of Elasticity (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 104 Fundamental equations of elasticity in three dimensions; plane stress and plane strain; flexture and torsion of bars of various shapes. Introduction to variational and approximate methods. Effective: 1997 Winter Quarter.

ECI 203—Inelastic Behavior of Solids (3)
Lecture—3 hours. Prerequisite(s): ECI 201 Fundamentals of theories of plasticity, viscoelasticity and viscoplasticity for solids. Macroscopic constitutive modelling for engineering materials, e.g., metals, polymers, soils, etc., and microscopic motivation. Effective: 1997 Winter Quarter.

ECI 205—Continuum Mechanics (3)
Lecture—3 hours. Prerequisite(s): ECI 201 Tensor formulation of the field equations for continuum mechanics, including large deformation effects. Invariance and symmetry requirements. Introduction to nonlinear thermoelasticity and thermodynamics. Solution of three-dimensional problems. Selected topics. Effective: 1998 Winter Quarter.

ECI 206—Fracture Mechanics (4)
Lecture—4 hours. Prerequisite(s): ECI 201; ENG 104 Linear and nonlinear fracture mechanics, stress analysis, energy concepts, brittle fracture criteria, path independent integrals, Dugdale-Barenblatt model, general cohesive zone models, ductile fracture criteria, crack tip fields for stationary and propagating cracks, fatigue. Application of numerical methods for fracture mechanics. Effective: 2006 Winter Quarter.

ECI 211—Advanced Matrix Structural Analysis (4)
Lecture—4 hours. Prerequisite(s): ECI 131 Analysis of complex frameworks by the displacement method; treatment of tapered beams, curved beams, and beams on elastic foundations; partially rigid connections; geometric and material nonlinearities; buckling; flexibility-based formulations; FEM-software for nonlinear analysis of structures. Effective: 2003 Winter Quarter.

ECI 212A—Finite Element Procedures in Applied Mechanics (4)
Lecture—4 hours. Prerequisite(s): EAD 115 or (MAT 128A, MAT 128B (can be concurrent)) Weighted-residual and Rayleigh-Ritz methods. Weak/variational formulation and development of discrete equations using finite element approximations. Application to one- and two-dimensional problems (heat conduction). Effective: 2003 Winter Quarter.

ECI 212B—Finite Elements: Application to Linear and Non-Linear Structural Mechanics Problems (4)
Lecture—4 hours. Prerequisite(s): ECI 212A Application to linear and nonlinear structural mechanics problems. Linear elasticity, weak form, and finite element approximation. Incompressible media problems. Non-linear problems with material nonlinearity. Effective: 2003 Winter Quarter.

ECI 213—Analysis of Structures Subjected to Dynamic Loads (4)
Lecture—4 hours. Prerequisite(s): ECI 211 (can be concurrent) Analysis of structures subjected to earthquake, wind and blast loading; distributed, consistent and lumped mass techniques; computer implementation; nonlinear response spectrum; frequency and time domain analysis; seismic protection of structures; numerical methods in linear and nonlinear structural dynamics. Effective: 2012 Fall Quarter.

ECI 214—Probabilistic Seismic Hazard Analysis and Design Ground Motions (4)
Lecture—4 hours. Probabilistic seismic hazard analysis for use in developing design spectra and for seismic risk analyses, including the development of earthquake ground motion time series for use in dynamic analyses of structures. Effective: 2016 Winter Quarter.

ECI 216—Meshfree Methods and Partition of Unity Finite Elements (4)
Lecture—4 hours. Prerequisite(s): ECI 201; ECI 212A Advanced discretization techniques such as meshfree methods and partition of unity finite elements for the Galerkin solution of boundary-value problems in solid and structural mechanics. Application of meshfree and extended finite element methods in computational fracture. Effective: 2016 Winter Quarter.

ECI 221—Theory of Plates and Introduction to Shells (3)
Lecture—3 hours. Prerequisite(s): ECI 201 (can be concurrent) Development of classical and refined plate theories. Application to isotropic, orthotropic and composite plates. Solutions for rectangular
and circular plates. Membrane theory for axisymmetric shells and bending of circular shells. Effective: 1997 Winter Quarter.

ECI 223—Advanced Dynamics, Signal Processing, and Smart Structures Technology (4)
Lecture—4 hours. Prerequisite(s): ECI 213; Or equivalent. Signal processing and system identification of structures under dynamic excitations; Fourier and Laplace transforms; data acquisition and sensor design fundamentals; sensor technologies/techniques for nondestructive evaluation; structural control; actuators and dampers for smart structures; piezoelectrics and acoustic emissions; micro- and nano-fabrication. Effective: 2011 Winter Quarter.

ECI 232—Advanced Topics in Concrete Structures (4)
Lecture—4 hours. Prerequisite(s): ECI 130; ECI 135; ECI 138; Graduate standing. Ductility of reinforced concrete; strength of two-way slabs; modified compression field theory. Effective: 2001 Fall Quarter.

ECI 233—Advanced Design of Steel Structures (4)
Lecture—4 hours. Prerequisite(s): (ECI 130 or ECI 131); ECI 132 Review of Load and Resistance Factor Design (LRFD); steel-plate girder design; plastic design of indeterminate systems; moment frames and bracing systems; connection design; seismic design of steel structures; vibration of flooring systems; steel-concrete composite design. Effective: 2004 Winter Quarter.

ECI 234—Prestressed Concrete (4)
Lecture—4 hours. Prerequisite(s): ECI 135; (ECI 130 or ECI 131) Survey of methods and applications; prestressing materials and systems; prestress losses; flexural design; design for shear and torsion; deflection computation and control; continuous beams and indeterminate structures; floor systems; partial prestressing; design of compression members; strut-and-tie models. Effective: 2003 Fall Quarter.

ECI 235—Cement Composites (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 104 Applications of cement composites; materials selection and proportioning; component and composite properties; hydration reactions and microstructure development; mechanisms of failure; nondestructive test methods; fiber reinforcement; concrete durability; novel reinforcing materials; ferrocement; repair and retrofit technologies; applications to structural design. Effective: 2002 Fall Quarter.

ECI 236—Design of Fiber Reinforced Polymer Composite Structures (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECI 135 Basics of mechanics and design of polymer matrix composites: composite classification, manufacturing process, micromechanical property determination, classical lamination theory, strength theories, first-ply-failure, test methods, design practice, strengthening and retrofitting of existing reinforced concrete structures. Effective: 2008 Winter Quarter.

ECI 237—Bridge Design (4)
Lecture—4 hours. Prerequisite(s): ECI 130; ECI 135; ECI 234 recommended. Open to Graduate Students only. Bridge types, behavior and construction characteristics; design philosophy, details according to Caltrans and American Association of State Highway and Transportation Officials codes, principles; seismic design and retrofit of concrete bridges; modern bridges using advanced fiber reinforced polymer composites; fieldtrip required. Effective: 2007 Fall Quarter.

ECI 238—Performance-Based Seismic Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 138; ECI 213 Modern seismic design; performance-based seismic design; seismic hazard; seismic demands: linear and nonlinear procedures; performance assessment: deterministic and probabilistic procedure; review of FEMA-350, FEMA-356, ATC-40 and other performance-based guidelines. Effective: 2005 Spring Quarter.

ECI 240—Water Quality (4)
Lecture—4 hours. Prerequisite(s): ECI 141; ECI 142 Quality requirements for beneficial uses of water. Hydrologic cycle of quality. Hydromechanics in relation to quality of surface and groundwaters; transport and fate of waterborne pollutants. Heat
budget for surface waters; predictive methods; introduction to water quality modeling. Effective: 2000 Fall Quarter.

ECI 241—Environmental Reactive Chemical Transport Modeling (4)
Lecture—4 hours. Prerequisite(s): CHE 002A or CHE 002B or ECI 149; Or equivalent. Modeling of reactive chemical transport in air and water including kinetic reactions, equilibrium reactions, and phase partitioning. Emphasis on numerical solution schemes and programming techniques to provide deeper insight into model performance and limitations. Effective: 2014 Fall Quarter.

ECI 242—Air Quality (4)
Lecture—4 hours. Prerequisite(s): ENG 105; ECI 141; ECI 149; Or equivalents. Factors determining air quality. Effects of air pollutants. Physical and chemical fundamentals of atmospheric transport and reaction. Introduction to dispersion modeling. Effective: 2002 Fall Quarter.

ECI 243A—Water and Waste Treatment (4)
Lecture—4 hours. Prerequisite(s): ECI 148A; Or the equivalent. Characteristics of water and airborne wastes; treatment processes and process kinetics; treatment system design. Effective: 1999 Fall Quarter.

ECI 243B—Water and Waste Treatment (4)
Lecture—4 hours. Prerequisite(s): ECI 243A Continuation of course 243A. Aeration, thickening, biological processes, design of biological treatment systems. Effective: 2000 Winter Quarter.

ECI 243L—Pilot Plant Laboratory (4)
Discussion—1 hour; Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): ECI 243A; ECI 243B (can be concurrent); or Consent of Instructor. Graduate standing. Laboratory investigation of physical, chemical, and biological processes for water and wastewater treatment. Effective: 2016 Winter Quarter.

ECI 244—Life Cycle Assessment for Sustainable Engineering (4)
Lecture—4 hours. Prerequisite(s): Graduate standing. Life cycle assessment methodology is taught emphasizing applications to infrastructure and energy systems. Life cycle design, life cycle cost methods, other tools from industrial ecology, and links to policy are covered as well. Effective: 2011 Fall Quarter.

ECI 245A—Applied Environmental Chemistry: Inorganic (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 105; ECI 140; CHE 002B; Or the equivalent of CHE 002B; CHE 002C or CHE 107A recommended. Chemistry of natural and polluted waters. Topics include chemical, kinetic and equilibrium principles, redox reactions, gas solution and solid-solution equilibria, thermodynamics, carbonate systems, coordination chemistry, interfacial phenomena. Effective: 2000 Spring Quarter.

ECI 245B—Applied Environmental Chemistry: Organic (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 128A; CHE 128B; CHE 128C; Or the equivalent; CHE 002C or CHE 107A recommended. Transport and transformation of organic chemicals in the environment.
Topics include application of thermodynamics to predict solubility and activity coefficients; distribution of organic chemicals between the aqueous phase and air, solvent, or solid phases; chemical, photochemical and biological transformation reactions. Effective: 2001 Spring Quarter.

ECI 246N—Understanding Climate Change: Causes and Consequences (4)
Lecture—4 hours. Open to graduate students. Diverse physical processes that govern climate and drive climate change. Observational, experimental and modeling techniques and methods used in the development of our scientific understanding of the Earth system. Effective: 2016 Spring Quarter.

ECI 247—Aerosols (4)
Lecture—4 hours. Prerequisite(s): ENG 103; ENG 105; ECI 141; ECI 149 Behavior of airborne particles including particle formation, modification, and removal processes. Effective: 2002 Fall Quarter.

ECI 247L—Aerosols Laboratory (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): ECI 247 Methods of generation and characterization of aerosols. Detailed topics may include flow rate measurement, aerosol generation, aerosol collection, ions measurement, metals measurement, and carbon measurement. May be repeated up to 1 time(s). Effective: 2002 Fall Quarter.

ECI 248—Biofilm Processes (4)
Lecture—4 hours. Prerequisite(s): SSC 111 or SSC 211 or ECI 243B; or Consent of Instructor. Calculus and basic cell molecular biology are recommended. Natural and engineered biofilms, including biofilm occurrence and development, spatial structure, microbial processes, fundamental and applied research tools, biofilm reactors, beneficial uses, and detrimental effects. Effective: 2004 Spring Quarter.

ECI 249—Probabilistic Design and Optimization (4)
Lecture—4 hours. Prerequisite(s): ECI 114; ECI 153; ENG 106; Or equivalents. Design by optimization for probabilistic systems, decision theory, the value of information, probabilistic linear programming, probabilistic dynamic programming, nonlinear probabilistic optimization. Applications in civil engineering design, project evaluation, and risk management. Effective: 2006 Winter Quarter.

ECI 250—Civil Infrastructure System Optimization and Identification (4)
Lecture—4 hours. Prerequisite(s): MAT 021C; MAT 022A; Programming course; EAD 115 and mathematical modeling course recommended. Restricted to graduate standing. Applied mathematics with a focus on modeling, identifying, and controlling dynamic, stochastic, and underdetermined systems. Applications in transportation networks, water resource planning, and other civil infrastructure systems. Effective: 2005 Spring Quarter.

ECI 251—Transportation Demand Analysis (4)
Lecture—4 hours. Prerequisite(s): ECI 114; Or the equivalent. Procedures used in urban travel demand forecasting. Principles and assumptions of model components (trip generation, trip distribution, model split). New methods of estimating travel demand. Computer exercises using empirical data to calibrate models and forecast travel demand. Effective: 1999 Fall Quarter.

ECI 252—Sustainable Transportation Technology and Policy (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): ECI 165 Role of technical fixes and demand management in creating a sustainable transportation system. Emphasis on technology options, including alternative fuels, electric propulsion, and IVHS. Analysis of market demand and travel behavior, environmental impacts, economics and politics. (ESP 252.) Effective: 2000 Fall Quarter.

ECI 253—Dynamic Programming and Multistage Decision Processes (4)
Lecture—4 hours. Prerequisite(s): MAT 021C; MAT 022A; Programming course; EAD 115 recommended. Operations research. Optimization techniques with a focus on dynamic programming in treating deterministic, stochastic, and adaptive multistage decision processes. Brief review of linear programming and non-linear programming. Applications in transportation networks and other civil infrastructure systems. Effective: 2005 Spring Quarter.

ECI 254—Exploring Data from Built Environment Using R (4)
Laboratory—3 hours; Lecture—3 hours. Introduction to modern data science, specifically data acquisition, exploratory data analysis, visualization, and beginning data analysis using R. Emphasizes computational reasoning and working with tabular and non-standard data. Focus will be on data generated in the built environment. (Geography 279.) Effective: 2017 Fall Quarter.

ECI 256—Urban Traffic Management and Control (4)
Lecture—4 hours. Prerequisite(s): ECI 114 Basic concepts, models, and methods related to the branch of traffic science that deals with the movement of vehicles on a road network, including travel speed, travel time, congestion concepts, car-following and hydrodynamic traffic models. Effective: 2000 Fall Quarter.

ECI 257—Flow in Transportation Networks (4)
Lecture—4 hours. Prerequisite(s): ECI 153; ECI 161 or ECI 256 recommended. Elements of graph theory, a survey of pertinent optimization techniques, extremal principles in network flow problems, deterministic equilibrium assignment, stochastic equilibrium assignment, extensions of equilibrium assignments and dynamic transportation network assignment. Effective: 2000 Winter Quarter.

ECI 259—Asphalt and Asphalt Mixes (4)
Lecture—4 hours. Prerequisite(s): ECI 179; or Consent of Instructor. Asphalts and asphalt mix types and their use in civil engineering structures, with primary emphasis on pavements. Asphalt, aggregate properties and effects on mix properties. Design, construction, recycling. Recent developments and research. Effective: 2006 Winter Quarter.

ECI 260—Sediment Transport (4)
Lecture—4 hours. Prerequisite(s): ECI 141; Or equivalent. Sediment transport in hydrologic systems. Process-oriented course which will emphasize how sediment moves and the physical processes that affect sediment transport. Field trip. Effective: 2006 Winter Quarter.

ECI 264A—Transport, Mixing and Water Quality in River and Lakes (4)
Lecture—4 hours. Prerequisite(s): ECI 141; ECI 240 Principal causes of mixing and transport in rivers, lakes and reservoirs, and their impacts on water quality. Case studies of specific lakes and rivers. Effective: 2000 Fall Quarter.

ECI 264B—Transport, Mixing and Water Quality in Estuaries and Wetlands (4)
Lecture—4 hours. Prerequisite(s): ECI 141; ECI 240 Principal causes of mixing and transport in estuaries and wetlands, and their impacts on water quality. Topics include advection/diffusion; tides; transverse mixing; longitudinal dispersion; sediment transport; nutrient cycling; computer modeling of estuaries. Case studies of specific systems. Effective: 2000 Spring Quarter.

ECI 265—Stochastic Hydrology and Hydraulics (4)
Lecture—4 hours. Prerequisite(s): ECI 266; or Consent of Instructor. Physics-based stochastic methods in modeling hydrologic and hydraulic processes; theory for modeling hydrologic-hydraulic governing equations as stochastic partial differential equations applied to various hydrologic-hydraulic processes under uncertainty, including transport, open channel flow, overland flow, soil water flow, and groundwater. Effective: 2015 Winter Quarter.

ECI 266—Applied Stochastic Methods in Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 114 or MAT 131 or STA 130A or STA 131A or MAT 118A (can be concurrent) Stochastic processes classification; Gaussian random fields; stochastic calculus in mean square; Ito and Stratonovich stochastic differential equations; Fokker-Planck equation; stochastic differential equations
with random coefficients. Effective: 1999 Fall Quarter.

ECI 267—Water Resource Management (3)
Lecture—3 hours. Prerequisite(s): ECI 114; ECI 141; ECI 142; ECI 153 recommended. Engineering, institutional, economic, and social basis for managing local and regional water resources. Examples in the context of California's water development and management. Uses of computer modeling to improve water management. (GEO 212.) Effective: 2013 Fall Quarter.

ECI 268—Infrastructure Economics (3)
Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ENG 106; Or the equivalent. Economics applied to infrastructure engineering planning, operations, maintenance, and management problems; microeconomic and macroeconomic theories; benefit-cost analysis; effect of uncertainty; optimization economics; non-classical economics; public finance. Effective: 2018 Spring Quarter.

ECI 269—Transportation-Air Quality: Theory and Practice (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECI 149; Or the equivalent. Health and regulatory
aspects of airborne pollutants. Principles of modeling
vehicle emissions. Conformity issues and the regulatory
framework. Regional and micro-scale modeling. Effective: 1999 Fall Quarter.

ECI 270—Advanced Water Resources Management (3)
Lecture—3 hours. Prerequisite(s): ECI 153; ECI 267; Or the equivalent. Discussion of technical papers related to planning theory, system maintenance, regionalization, multi-objective methods, risk analysis, institutional issues, pricing model application, economic development, forecasting, operations, and other topics. Effective: 1997 Winter Quarter.

ECI 271—Inverse Problems (4)
Lecture—4 hours. Prerequisite(s): ECI 114; ECI 144; Or equivalents. Inverse calibration of distributed parameter models, using data representing model outputs. Forward and inverse mappings, stability, uniqueness, identifiability. Optimization formulation of inverse problems, maximum likelihood and other objective functions, indirect and direct approaches, solution by UCODE in hands-on project format. Effective: 2010 Fall Quarter.

ECI 272A—Advanced Hydrogeology (4)
Lecture—4 hours. Prerequisite(s): ECI 144; MAT 118A recommended. Flow in confined, unconfined, and leaky aquifers. Geological aspects of aquifers. Regional groundwater flow and hydraulics of pumping and recharging wells. Identification of aquifer parameters. Isotope hydrogeology and recharge estimation. Effective: 2000 Fall Quarter.

ECI 272B—Advanced Hydrogeology (4)
Lecture—4 hours. Prerequisite(s): ECI 212A; ECI 272A Processes of subsurface flows and transport. Numerical methods of subsurface fluid flow and transport systems. Flow in the unsaturated zone. Fresh water-salt water interface in coastal aquifers. Macrodispersion. Identification of regional aquifer parameters. Modeling of aquifer systems. Effective: 2000 Fall Quarter.

ECI 272C—Multiphase Reactive Transport (4)
Lecture—4 hours. Prerequisite(s): ECI 142; ECI 144; ECI 148A Multicomponent reactive transport including multiple phases. Advective/dispersive transport, chemical equilibria, and mass transformation kinetics. Natural chemical/microbiological processes including sorption, complexation, biodegradation, and diffusive mass transfer. Eulerian and Lagrangean averaging methods. Applications to contaminant remediation problems in river and subsurface hydrology. Effective: 2004 Fall Quarter.

ECI 273—Water Resources Systems Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 114; ECI 153; Or the equivalent. Planning and management of water resource systems. Deterministic and stochastic simulation and optimization techniques. Capacity design and operation of reservoir systems for water supply, hydropower, flood control, and environmental objectives. Effective: 2018 Winter Quarter.

ECI 275—Hydrologic Time-Series Analysis (4)
Lecture—4 hours. Prerequisite(s): ECI 114; ECI 142 Application of statistical methods for analysis and modeling of hydrologic series. Statistical simulation and prediction of hydrologic sequences using time series methodology. Effective: 2003 Fall Quarter.

ECI 276—Watershed Hydrology (4)
Lecture—4 hours. Prerequisite(s): ECI 142; Or the equivalent. Analysis and mathematical modeling of hydrologic processes taking place in a watershed. Precipitation analysis and modeling. Theory of overland flow and its kinematic wave approximation.Analysis and modeling of saturated and unsaturated subsurface flow processes taking place on a hill slope. Effective: 1997 Winter Quarter.

ECI 277A—Computational River Mechanics I (4)
Lecture—4 hours. Prerequisite(s): EAD 115 (can be concurrent); ECI 141 (can be concurrent) Unsteady open channel flows, computation of water surface profiles, shallow water equations, St. Venant equations, method of characteristics, finite difference methods, stability and accuracy of explicit and implicit schemes, flood routing in simple and compound channels, advection of plumes. Not open for credit to students who have taken ECI 277. Effective: 2004 Fall Quarter.

ECI 277B—Computational River Mechanics II (4)
Lecture—4 hours. Prerequisite(s): ECI 277A Open channel flows, physical aspects of river mechanics, formulation of depth-averaged equations, boundary conditions, coordinates transformation and grid generation, finite-difference solution techniques, applications to two-dimensional momentum and pollutant transport in rivers. Effective: 2004 Fall Quarter.

ECI 277C—Turbulence and Mixing Processes (4)
Lecture—4 hours. Prerequisite(s): Graduate standing. Nature of turbulent flows, conservation equations, momentum, heat and mass transport in free and wall-bounded flows, body forces and mixing, roughness effects, turbulence modeling and simulation. Effective: 2004 Fall Quarter.

ECI 278—Hydrodynamics (3)
Lecture—3 hours. Prerequisite(s): ECI 141 Perturbation methods. Basic water waves. Governing equations for fluid motion on a rotating earth. Rotation effects, vorticity dynamics, Ekman layer. Stratification effects, internal waves and turbulent mixing. Combined effects. Effective: 1997 Winter Quarter.

ECI 279—Advanced Mechanics of Fluids (4)
Lecture—4 hours. Prerequisite(s): ECI 141 Rotational flows. Navier-Stokes equations and solutions for laminar flow; boundary layer equations and solution techniques. Nature of turbulence. Reynolds equations. Introduction to turbulence modeling. Effective: 1997 Winter Quarter.

ECI 280A—Nonlinear Finite Elements for Elastic-Plastic Problems (4)
Lecture—4 hours. Prerequisite(s): Consent of Instructor. State of the art finite element methods and tools for elasticplastic problems, including computational techniques based on the finite element method and the theory of elastoplasticity. Effective: 2008 Spring Quarter.

ECI 280B—Nonlinear Dynamic Finite Elements (4)
Lecture—4 hours. Prerequisite(s): Consent of Instructor. State of the art computational methods and tools for analyzing linear and nonlinear dynamics problems. Effective: 2009 Spring Quarter.

ECI 281A—Advanced Soil Mechanics (4)
Lecture—4 hours. Prerequisite(s): ECI 171 Consolidation and secondary compression. Preloading and wick drains. Seepage and seepage pressures. Filtration, drainage, and dewatering. Shear strength: friction, cohesion, dilatancy and critical states. Effective: 2004 Fall Quarter.

ECI 281B—Advanced Soil Mechanics (5)
Laboratory—3 hours; Lecture—4 hours. Prerequisite(s): ECI 281A Site investigation and soil characterization within the context of slope stability analysis. Effective: 2014 Spring Quarter.

ECI 282—Pavement Design and Rehabilitation (4)
Lecture—4 hours. Prerequisite(s): ECI 179; or Consent of Instructor. Advanced pavement design and structural/functional condition evaluation for concrete and asphalt pavements. Highways, airfields, port facilities; new facilities, rehabilitation, reconstruction. Mechanistic-empirical procedures, materials, climate and traffic characterization. Use of current design methods; recent developments and research. Effective: 2004 Winter Quarter.

ECI 283—Physico-Chemical Aspects of Soil Behavior (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECI 171 Study of the geotechnical behavior of soils considering formation, transport, mineralogy, soil-fluid-electrolyte systems, surface tension, particle mechanics, shape, fabric, and structure. Laboratories demonstrate effects of fundamental interparticle forces (contact, Van Der Waals, capillarity and chemical). Effective: 2012 Fall Quarter.

ECI 284—Theoretical Geomechanics (4)
Lecture—4 hours. Prerequisite(s): ECI 171 Elasticity, plasticity, micromechanics, coupled behavior and large deformations for geomaterials. Prediction of stress-strain-volume change behavior of geomaterials. Monotonic and cyclic loading, anisotropy, bifurcation of deformation. Effective: 2004 Winter Quarter.

ECI 286—Advanced Foundation Design (4)
Lecture—4 hours. Prerequisite(s): ECI 173 Design and analysis of pile and pier foundations, including seismic effects; deep excavation systems; tie-back, nailing, and anchor systems; coffer dams; loads on buried conduits; ground modification techniques; and other related topics. Effective: 2004 Spring Quarter.

ECI 287—Geotechnical Earthquake Engineering (4)
Lecture—4 hours. Prerequisite(s): ECI 138; ECI 281A Characteristics and estimation of earthquake ground motions; wave propagation and local site response; liquefaction potential and remediation; residual strength and stability considerations; ground deformations; dynamic soil-structure interaction. Effective: 2004 Spring Quarter.

ECI 288—Earth and Rockfill Dams (4)
Lecture—4 hours. Prerequisite(s): ECI 281A; ECI 281B (can be concurrent) Site selection; design considerations; layout; seismic effects including considerations of fault movements; construction; environmental considerations, instrumentation; maintenance remediation and retrofit of existing dams. Effective: 2004 Winter Quarter.

ECI 289A—Selected Topics in Civil Engineering; Environmental Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Environmental Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289B—Selected Topics in Civil Engineering; Hydraulics and Hydrologic Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Hydraulics and Hydrologic Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289C—Selected Topics in Civil Engineering; Engineering Planning (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Engineering Planning. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289D—Selected Topics in Civil Engineering; Geotechnical Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Geotechnical Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289E—Selected Topics in Civil Engineering; Structural Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Structural Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289F—Selected Topics in Civil Engineering; Structural Mechanics (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Structural Mechanics. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289G—Selected Topics in Civil Engineering; Transportation Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Transportation Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289H—Selected Topics in Civil Engineering; Transportation Planning (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Transportation Planning. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 289I—Selected Topics in Civil Engineering; Water Resources Engineering (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Directed group study in Water Resources Engineering. May be repeated for credit. Effective: 1997 Winter Quarter.

ECI 290—Seminar (1)
Seminar—1 hour. Discussion of current graduate research, and guest lectures on recent advances. Oral presentation of individual study. Course required of graduate degree candidates. (S/U grading only.) Effective: 1997 Winter Quarter.

ECI 290C—Graduate Research Group Conference (1)
Discussion—1 hour. Research problems, progress, and techniques in civil engineering. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

ECI 296—Topics in Water and Environmental Engineering (1)
Seminar—2 hours. Seminars presented by visiting lecturers, UC Davis faculty and, graduate students. May be repeated for credit. (S/U grading only.) Effective: 2000 Winter Quarter.

ECI 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

ECI 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

ECI 390—The Teaching of Civil Engineering (1)
Discussion—1 hour. Prerequisite(s): Meet qualifications for teaching assistant and/or associate-in in Civil Engineering. Participation as teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated up to 9 unit(s). (S/U grading only.) Effective: 1997 Winter Quarter.

ECL Ecology

Courses in ECL:

ECL 200AN—Principles and Applications of Ecology (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): STA 102; MAT 016A; MAT 016B; or Consent of Instructor. First course in Ecology (e.g., Environmental Science and Policy 100). Pass One open to graduate majors. Course covers principles of community structure and functioning, species diversity patterns, ecosystem ecology and biogeochemistry, landscape ecology, biogeography and phylogenetics. Effective: 2017 Winter Quarter.

ECL 200BN—Principles and Applications of Ecology (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): STA 102; MAT 016A; MAT 016B; or Consent of Instructor. First course in Ecology (e.g., Environmental Science and Policy 100). Pass One open to graduate majors. Provides a broad background in the principles and applications of ecology, and serves as a foundation for advanced ecology courses. Topics include ecophysiology, behavioral ecology, population ecology, genetics and evolution. Emphasis on historical developments, current understanding, and real world applications. Effective: 2017 Winter Quarter.

ECL 203—Physiological Ecology (3)
Lecture—3 hours. Prerequisite(s): EVE 101 or EST 100; NPB 110 or PLB 111 or EST 129; elementary calculus. A comparative examination of several animal groups addressing fundamental physiological mechanisms that shape the ecology of each animal group. Effective: 1997 Winter Quarter.

ECL 205—Community Ecology (4)
Discussion—2 hours; Lecture—2 hours. Prerequisite(s): An upper division course in Ecology. Introduction to literature and contemporary research into processes structuring ecological communities. Effective: 1997 Winter Quarter.

ECL 206—Concepts and Methods in Plant Community Ecology (4)
Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Introductory courses in statistics and plant ecology. Principles and techniques of vegetation analysis, including structure, composition, and dynamics. Emphasis given to sampling procedures,
association analysis, ordination, processes and mechanisms of succession, and classification. Most techniques are demonstrated or conducted during field trips and laboratories. Effective: 1997 Winter Quarter.

ECL 207—Plant Population Biology (3)
Discussion/Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): Advanced undergraduate ecology course (e.g., ESP 100, EVE 101, ENT 104 or PLB 117), and advanced undergraduate course in genetics and/or evolution (e.g., BIS 101 or EVE 100). Introduction to theoretical and empirical research in plant population biology. Emphasis placed on linking ecological ecological and genetic approaches to plant population biology. (PBG 207.) Effective: 2000 Winter Quarter.

ECL 208—Issues in Conservation Biology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Introductory biology (e.g. BIS 002B) and an upper division organismal biology class. Graduate-level introduction to current research in conservation biology. Course will emphasize reading and discussing primary literature. Specific topics will reflect the research interests of UC Davis conservation biology faculty. Effective: 1997 Winter Quarter.

ECL 210N—Environmental Policy and Human Ecology (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Graduate standing in Anthropology, Ecology, Political Science, Sociology Graduate Groups, or consent of instructor. Principles drawn from social science, ecology and evolution to study of human populations and behavior, emphasizing environmental/resource issues. These principles form a synthetic framework that articulates elements drawn from the social sciences as well as biology. Effective: 2013 Spring Quarter.

ECL 212A—Environmental Policy Process (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Course in public policy (e.g., ESP 160); environmental law (e.g., ESP 161); course in statistics (e.g., SOC 106 or ARE 106). Introduction to selected topics of the policy process and applications to the field of environmental policy. Develops critical reading skills, understanding of policy theory, and an ability to apply multiple theories to the same phenomena. (ESP 212A and ENV 200C.) Effective: 2017 Fall Quarter.

ECL 212B—Environmental Policy Evaluation (4)
Discussion—1 hour; Lecture—2 hours; Seminar—2 hours. Prerequisite(s): (STA 108 or ARE 106); ARE 176; Intermediate microeconomics (e.g., ECN 100); policy analysis (e.g., ESP 168A or the equivalent). Method and practice, philosophical basis, and political role of policy analysis. Reviews basic concepts from economic theory; how and why environmental problems emerge in a market economy; and tools necessary for solving environmental problems. (ESP 212B and ENV 200B.) Effective: 2018 Winter Quarter.

ECL 214—Marine Ecology: Concepts and Practice (3)
Discussion—1.5 hours; Fieldwork—1.5 hours; Lecture—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing or one course in ecology, one course in evolution or genetics; survey course in marine ecology recommended. Critical review and analysis of concepts and practices in modern marine ecology at the interface of several fields of study including oceanography, evolution, behavior, and physiology. Emphasis on critical thinking, problem solving, and hands-on study. Two field trips required. Effective: 2016 Fall Quarter.

ECL 215—Social Ecological Systems (3)
Lecture/Discussion—3 hours. Prerequisite(s): Completion of core courses for specific graduate programs, for example Ecology 200A/B. Overview of social-ecological systems that links environmental policy and decision-making to ecological processes. Delves deeper into different social science topics related to this broader idea. Applying of course readings to case studies chosen by students and a final paper. Effective: 2016 Fall Quarter.

ECL 216—Ecology and Agriculture (4)
Lecture—3 hours; Term Paper. Prerequisite(s): EVE 011; or Consent of Instructor. Ecological principles as relevant to agriculture. Integration of ecological approaches into agricultural research to increase ecosystem functions and services. Topics include crop autoecology, biotic interactions among crops and pests, ecosystem and landscape ecology. Not open for credit to students who have completed VCR 216. (Former course VCR 216). Effective: 2011 Fall Quarter.

ECL 219—Ecosystem Biogeochemistry (4)
Discussion/Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): Introductory courses in ecology/biology and soils are recommended; undergraduates accepted with consent of instructor. Multi-disciplinary analysis of energy and nutrient transfers within terrestrial ecosystems. Examination of processes and inter- and intra-system interactions between the atmosphere, biosphere, lithosphere, and hydrosphere. Laboratory section uses biogeochemical simulation models to examine case studies. (SSC 219.) Effective: 1997 Winter Quarter.

ECL 225—Terrestrial Field Ecology (4)
Fieldwork—12 hours; Seminar—1 hour. Prerequisite(s): Introductory ecology and introductory statistics or consent of instructor. A field course conducted over spring break and four weekends at Bodega
Bay, emphasizing student projects. Ecological hypothesis testing, data gathering, analysis, and written and oral presentation of results will be stressed. (ENT 225 and PBG 225.) Effective: 1997 Spring Quarter.

ECL 231—Mathematical Methods in Population Biology (3)
Lecture—3 hours. Prerequisite(s): MAT 016C or MAT 021C; Or the equivalent. Mathematical methods used in population biology. Linear and nonlinear difference equation and differential equation models are studied, using stability analysis and qualitative methods. Partial differential equation models are introduced. Applications to population biology models are stressed. (PBG 231.) Effective: 1997 Spring Quarter.

ECL 232—Theoretical Ecology (3)
Lecture—3 hours. Examination of major conceptual and methodological issues in theoretical ecology. Model formulation and development will be emphasized. Topics will vary from year to year. May be repeated for credit. Effective: 1997 Winter Quarter.

ECL 233—Computational Methods in Population Biology (3)
Discussion/Laboratory—1 hour; Lecture/Lab—2 hours. Prerequisite(s): A course in theoretical ecology (e.g., ECL 231 or an equivalent to ESP 121 from your undergraduate institution) or consent of instructor; no programming experience required. Numerical methods for simulating population dynamics using the computational software package R. Emphasis placed on model formulation and development, theoretical concepts and philosophical principles to guide simulation efforts, model parameterization, and implementing simulations with R. (PBG 233.) (S/U grading only.) Effective: 2013 Fall Quarter.

ECL 242—Ecological Genetics: Applied Genetics for Ecology, Health, and Conservation of Natural Populations (3)
Discussion—0.5 hours; Laboratory—0.5 hours; Lecture—2 hours. Prerequisite(s): Undergraduate genetics and ecology/conservation biology courses recommended. Restricted to graduate students, 2nd or 3rd year veterinary students; advanced undergraduate students with consent of instructor. Introduction to the field of applied ecological genetics to include applications in conservation ecology, population genetics, population biology, wildlife health and disease ecology. Effective: 2017 Spring Quarter.

ECL 243—Ecological Genomics (4)
Lecture/Discussion—3 hours; Term Paper/Discussion. Prerequisite(s): ECL 242; Or equivalent training in ecology and genetics according to the discretion of the instructors. Genomics concepts, technologies, and analyses for ecology research. Mixture of lecture, discussion of recent literature, hands-on training in data analysis and experimental design, and research proposal preparation and evaluation. One all-day field trip is required. Effective: 2015 Fall Quarter.

ECL 245—Climate Change, Water and Society (4)
Lecture—4 hours. Class size limited to 25 students. Integration of climate science and hydrology with policy to understand hydroclimatology and its impact upon natural and human systems. Assignments: readings, take-home examination on climate and hydrologic science, paper that integrates course concepts into a research prospectus or review article. (HYD 245 and ATM 245.) Effective: 2015 Spring Quarter.

ECL 262—Advanced Population Dynamics (3)
Lecture—3 hours. Prerequisite(s): Graduate standing; advanced course in ecology (e.g., Evolution and Ecology 101), population dynamics (e.g., Wildlife, Fish, and Conservation 122), and one year of calculus; familiarity with matrix algebra and partial differential equations recommended. Logical basis for population models, evaluation of simple ecological models, current population models with age, size, and stage structure, theoretical basis for management and exemplary case histories. Emphasis on development and use of realistic population models in ecological research. (WFC 262.) Effective: 2016 Spring Quarter.

ECL 271—Research Conference in Ecology (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Critical presentation and evaluation of current literature and ongoing research in ecology. Requirements include active participation in weekly discussions and the presentation of a paper or chapter once per quarter. May be repeated for credit. (PBG 271.) (S/U grading only.) Effective: 2014 Winter Quarter.

ECL 280—Current Anthropology Journal Editorial Workshop (4)
Independent Study—3 hours; Workshop—1 hour. Prerequisite(s): Consent of Instructor. Students must enroll for all three quarters. Reading and offering workshop critiques of manuscripts submitted for publication, and reading and discussion of other relevant work in anthropology and human ecology. Track and edit published comments and authors' replies that accompany major features. Participation in the development of new sections for the electronic edition of the journal, including a "news and views" section and a debate section. May be repeated up to 12 unit(s) with consent of instructor. (ANT 280.) (S/U grading only.) Effective: 2000 Fall Quarter.

ECL 290—Seminar in Ecology (1-4)
Seminar—1-4 hours. Prerequisite(s): Consent of Instructor. Topics in ecology. Students are expected to present an oral seminar on a particular aspect of the general topic under consideration. (S/U grading only.) Effective: 2011 Fall Quarter.

ECL 296—Topics in Ecology and Evolution (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Seminars presented by visiting lecturers, UC Davis faculty, and graduate students. May be repeated for credit. (PBG 292.) (S/U grading only.) Effective: 1997 Winter Quarter.

ECL 297T—Tutoring in Ecology (1-4)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing in ecology. Teaching ecology including conducting discussion groups for regular departmental courses under direct guidance of staff. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

ECL 298—Group Study (1-5)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

ECL 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

ECN Economics

Courses in ECN:

ECN 001A—Principles of Microeconomics (4)
Discussion—1 hour; Lecture—3 hours. Course 1A and 1B may be taken in either order. Analysis of the allocation of resources and the distribution of income through a price system; competition and monopoly; the role of public policy; comparative economic systems. GE credit: ACGH, QL, SS. Effective: 2004 Fall Quarter.

ECN 001AV—Principles of Microeconomics (4)
Web Electronic Discussion—1 hour; Web Virtual Lecture—3 hours. Analysis of the allocation of resources and the distribution of income through a price system; competition and monopoly; the role of public policy; comparative economic systems. GE credit: ACGH, QL, SS. Effective: 2017 Fall Quarter.

ECN 001B—Principles of Macroeconomics (4)
Discussion—1 hour; Lecture—3 hours. Course 1A and 1B may be taken in either order. Analysis of the economy as a whole; determinants of the level of income, employment and prices; money and banking, economic fluctuations, international trade, economic development; the role of public policy. GE credit: ACGH, QL, SS. Effective: 2004 Fall Quarter.

ECN 090X—Lower Division Seminar (1-2)
Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Limited enrollment. Examination of a special topic in Economics through shared readings, discussions, and written assignments. Effective: 1997 Winter Quarter.

ECN 092—Internship and Field Work (1-12)
Internship—3-36 hours; Term Paper. Prerequisite(s): MGT 011A; MGT 011B; and Consent of Instructor. Junior or senior standing; availability of internship position or approved field work project; stock-brokerage interns must have completed Management 11A-11B. Intensive study of practical application of concepts in economics, stressing research methods and empirical analysis. (P/NP grading only.) Effective: 1997 Winter Quarter.

ECN 098—Group Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Primarily for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

ECN 099—Individual Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

ECN 100—Intermediate Micro Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A C- or better or ECN 001AV C- or better); ECN 001B C- or better; ((MAT 016A C- or better, MAT 016B C- or better) or (MAT 021A C- or better, MAT 021B C- or better) or (MAT 017A C- or better, MAT 017B C- or better)) Price and distribution theory under conditions of perfect and imperfect competition. General equilibrium and welfare economics. Not open for credit to students who have taken ARE 100A or ARE 100B. Effective: 2018 Spring Quarter.

ECN 100A—Intermediate Micro Theory: Consumer and Producer Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A C- or better or ECN 001AV C- or better); ECN 001B C- or better; (MAT 016A C- or better or MAT 017A C- or better or MAT 021A C- or better); (MAT 016B C- or better or MAT 017B C- or better or MAT 021B C- or better) Consumer and producer theory. Equilibrium and welfare analysis. Topics include competitive markets, consumer and producer surplus at an intermediate level. Not open for credit to students that have taken ARE 100A or ECN 100. Effective: 2018 Winter Quarter.

ECN 100B—Intermediate Micro Theory: Imperfect Competition and Market Failure (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 100A Imperfect competition and market failure. Topics include exchange, monopoly, game theory, uncertainty, asymmetric information, and public goods. Not open for credit to students that have taken ARE 100B. Effective: 2017 Fall Quarter.

ECN 101—Intermediate Macro Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A C- or better or ECN 001AV C- or better); ECN 001B C- or better; ((MAT 016A C- or better, MAT 016B C- or better) or (MAT 021A C- or better, MAT 021B C- or better) or (MAT 017A C- or better, MAT 017B C- or better)) Theory of income, employment and prices under static and dynamic conditions, and long term growth. Effective: 2018 Winter Quarter.

ECN 102—Analysis of Economic Data (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ECN 001B; (STA 013 or STA 013Y or STA 032); (MAT 016A or MAT 017A or MAT 021A); (MAT 016B or MAT 017B or MAT 021B); or Consent of Instructor. Analysis of economic data to investigate key relationships emphasized in introductory micro and macro economics. Obtaining, transforming, displaying data; statistical analysis of economic data; basic univariate and multivariate regression analysis. Only two units of credit for students who have completed ECN 140 or ARE 106, and STA 108. GE credit: VL. Effective: 2018 Winter Quarter.

ECN 103—Economics of Uncertainty and Information (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 100 or (ARE 100A, ARE 100B)), (MAT 016A or MAT 017A or MAT 021A), (MAT 016B or MAT 017B or MAT 021B) Optimal decisions under uncertainty, expected utility theory, economics of insurance, asymmetric information, signalling in the job market, incentives and Principal-Agent theory, optimal search strategies and the reservation price principle. Effective: 2018 Winter Quarter.

ECN 106—Decision Making (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ((MAT 016A C- or better, MAT 016B C- or better) or (MAT 017A C- or better, MAT 017B C- or better) or (MAT 021A C- or better, MAT 021B C- or better)); (STA 013 C- or better or STA 013Y C- or better or STA 032 C- or better); or Consent of Instructor. Descriptive and normative analysis of individual decision making, with applications to personal, professional, financial, and public policy decisions. Emphasis on decision making under uncertainty and over time. Heuristics and biases in the psychology of decisions; overcoming decision traps. Effective: 2018 Winter Quarter.

ECN 107—Neuroeconomics/Reinforcement Learning and Decision Making (4)
Lecture—3 hours; Term Paper. Prerequisite(s): (PSC 100 or PSC 100Y or PSC 135 or ARE 100A or ECN 100A or NPB 162 or NPB 163); (STA 013 or STA 013Y or STA 100 or PSC 103A); or Consent of Instructor. Theoretical and empirical approaches to neuroeconomics (neuroscience of decision making) from psychology, neuroscience, economics, and computer science. Neuroscience of judgment and decision making, behavioral economics, and reinforcement learning. (PSC 133 and CGS 107.) GE credit: SL, SS. Effective: 2018 Spring Quarter.

ECN 110A—World Economic History Before the Industrial Revolution (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ECN 001B Development and application of analytical models to explain the nature and functioning of economies before the Industrial Revolution. Examples will be drawn from a variety of societies, including England, China, Polynesia, and Pre-Columbian America. GE credit: SS. Effective: 2018 Spring Quarter.

ECN 110B—World Economic History Since the Industrial Revolution (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ECN 001B Development and application of analytical models to explain the nature and functioning of economies since the Industrial Revolution. Examples will be drawn from a variety of societies, including England, China, Germany, and India. GE credit: SS. Effective: 2018 Winter Quarter.

ECN 111A—Economic History (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ECN 001B; or Consent of Instructor. Survey of economic change in the United States from Colonial times to 1865; reference to other regions in the Western Hemisphere. GE credit: SS. Effective: 2018 Spring Quarter.

ECN 111B—Economics History (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV) or ECN 001B; or Consent of Instructor. Survey of economic change in the United States from 1865 to the post World War II era. GE credit: SS. Effective: 2018 Spring Quarter.

ECN 115A—Economic Development (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ECN 001B Major issues encountered in emerging from international poverty, including problems of growth and structural change, human welfare,
population growth and health, labor markets and internal migration. Important issues of policy concerning international trade and industrialization. (ARE 115A.) GE credit: SS, WC. Effective: 2018 Winter Quarter.

ECN 115B—Economic Development (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ECN 001B Major macroeconomic issues of developing countries. Issues include problems in generating capital, conduct of monetary and fiscal
policies, foreign aid and investment. Important issues of policy concerning international borrowing and external debt of developing countries. (ARE 115B.) GE credit: SS, WC. Effective: 2018 Spring Quarter.

ECN 115BY—Economic Development (4)
Lecture—1.5 hours; Term Paper; Web Virtual Lecture—1.5 hours. Prerequisite(s): ECN 001A; ECN 001B Major macroeconomic issues of developing countries. Issues include problems in generating capital, conduct of monetary and fiscal
policies, foreign aid and investment. Important issues of policy concerning international borrowing and external debt of developing countries. GE credit: SS. Effective: 2016 Fall Quarter.

ECN 116—Comparative Economic Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 100 or (ARE 100A, ARE 100B)), (MAT 016B or MAT 017B or MAT 021B) Economics analysis of the relative virtues of capitalism and socialism, including welfare economics. Marxian exploitation theory, the socialist calculation debate (Hayek and Lange), alternative capitalist systems (Japan, Germany, U.S.) and contemporary models of market socialism. GE credit: WC. Effective: 2016 Fall Quarter.

ECN 121A—Industrial Organization (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ECN 001B; (ECN 100 or (ARE 100A, ARE 100B)); or Consent of Instructor. Appraisal of the role of competition and monopoly in the American economy; market structure, conduct, and economic performance of a variety of industries. GE credit: SS. Effective: 2018 Winter Quarter.

ECN 121B—Industrial Organization (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ECN 001B; (ECN 100 or (ARE 100A, ARE 100B)); or Consent of Instructor. Study of antitrust and economic regulation. Emphasis on applying theoretical models to U.S. industries and case studies, including telecommunications, software, and electricity markets. Topics include natural monopoly, optimal and actual regulatory mechanisms, deregulation, mergers, predatory pricing, and monopolization. GE credit: ACGH. Effective: 2018 Winter Quarter.

ECN 122—Theory of Games and Strategic Behavior (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (MAT 016A, MAT 016B) or (MAT 021A, MAT 021B) or (MAT 017A, MAT 017B); or Consent of Instructor. Introduction to game theory. Explanation of the behavior of rational individuals with interacting and often conflicting interests. Non-cooperative and cooperative theory. Applications to economics, political science and other fields. Effective: 2016 Fall Quarter.

ECN 125—Energy Economics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 100 or (ARE 100A, ARE 100B); or Consent of Instructor. Pass One open to Economics and Graduate School of Management majors. Application of theoretical and empirical models to examine efficiency in energy production and use. Energy and environmental policy, market structure and power, global climate change, optimal regulation, and real-world applications; e.g., California electricity crisis. GE credit: SS. Effective: 2017 Spring Quarter.

ECN 130—Public Microeconomics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 100 or (ARE 100A, ARE 100B); or Consent of Instructor. Public expenditures; theory and applications. Efficiency and equity of competitive markets; externalities, public goods, and market failures; positive and normative aspects of public policy for expenditure, including benefit-cost analysis. Topics include consumer protection, pollution, education, poverty and crime. Effective: 2016 Fall Quarter.

ECN 131—Public Finance (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 100 or (ARE 100A, ARE 100B) Economic burden of taxation; equity and efficiency considerations in tax design; structure and economic effects of the U.S. tax system (including personal income tax, corporation income tax, and property tax); tax loopholes; recent developments; tax reform proposals. Effective: 2016 Fall Quarter.

ECN 132—Health Economics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 100 or (ARE 100A, ARE 100B)), (ECN 102 or ECN 140 or ARE 106 or STA 108); or Consent of Instructor. The health care market, emphasizing the role and use of economics. Individual demand, provision of services by doctors and hospitals, health insurance, managed care and competition, the role of government access to health care. Effective: 2018 Winter Quarter.

ECN 133Y—Poverty, Inequality and Public Policy (4)
Discussion—2 hours; Web Virtual Lecture—2 hours. Prerequisite(s): (ECN 001A or ECN 001AV) or ECN 001B Class size limited to 99; 3 sections of 33 each. Examination of the economics of poverty and inequality in the United States, including measurement, trends, and related policies. Effective: 2018 Spring Quarter.

ECN 134—Financial Economics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ECN 001B; (ECN 100 or (ARE 100A, ARE 100B)), (MAT 016A or MAT 017A or MAT 021A), STA 013 General background and rationale of corporation; finance as resource allocation over time; decision making under uncertainty and the role of information; capital market and interest rate structure; financial decisions. Students who have completed ARE 171A may not receive credit for this course. Effective: 2018 Winter Quarter.

ECN 135—Money, Banks, and Financial Institutions (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 100 or (ARE 100A, ARE 100B)), ECN 101, (STA 013 or STA 013Y) Banks and the banking system. Uncertainty and asymmetric information in the lending process; efficiency of competitive equilibrium in lending markets. Regulation and the conduct of monetary policy. Effective: 2018 Winter Quarter.

ECN 136—Topics in Macroeconomic Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 101 Advanced Topics in macroeconomics theory. The course develops the theoretical and empirical analysis of a specific field of macroeconomics. Possible topics include, business cycle theories, growth theory, monetary economics, political economics and theories of unemployment and inflation. Effective: 2007 Fall Quarter.

ECN 137—Macroeconomic Policy (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 100 or (ARE 100A, ARE 100B)), ECN 101, (STA 013 or STA 013Y) Theory and practice of macroeconomic policy, both monetary and fiscal. Effective: 2018 Spring Quarter.

ECN 140—Econometrics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 100 or (ARE 100A, ARE 100B)), ECN 101, (STA 013 or STA 013Y), (MAT 016A or MAT 017A or MAT 021A), (MAT 016B or MAT 017B or MAT 021B) Pass One open to Economics Majors. Problems of observation, estimation and hypotheses testing in economics through the study of the theory and application of linear regression models. Critical evaluation of selected examples of empirical research and exercises in applied economics. Only two units of credit allowed to students who have completed two or more of the following courses: ECN 102, ARE 106 or STA 108. Effective: 2018 Winter Quarter.

ECN 145—Transportation Economics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 100 or (ARE 100A, ARE 100B)), ((MAT 016A, MAT 016B) or (MAT 017A, MAT 017B)), (STA 013 or STA 013Y), ECN 102, ECN 140, (ARE 106 or STA 108); or Consent of Instructor. Intended for advanced Economics undergraduates. Examination of fundamental problems of planning and financing transportation "infrastructure" (roads, ports, airports). The economics of the automobile industry, as well as the impact of government regulation and deregulation in the airlines and trucking industries. Effective: 2018 Spring Quarter.

ECN 151A—Economics of the Labor Market (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 100 or (ARE 100A, ARE 100B) Theory of labor supply and demand; determination of wages and employment in the labor market. Policy issues: labor force participation by married women; minimum wages and youth unemployment; effect of unions on wages. Effective: 2016 Fall Quarter.

ECN 151B—Economics of Human Resources (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 100 or (ARE 100A, ARE 100B) Human resource analysis; introduction to human capital theory and economics of education; the basic theory of wage differentials, including theories of labor market discrimination; income distribution; poverty. Policy issues; negative income tax; manpower training programs; incomes policy. Effective: 2016 Fall Quarter.

ECN 152—Economics of Education (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 100 C- or better or (ARE 100A C- or better, ARE 100B C- or better)), ECN 102 C- or better, (MAT 016B C- or better or MAT 017B C- or better or MAT 021B C- or better), (STA 013 C- or better or STA 013Y C- or better or STA 032 C- or better); or Consent of Instructor. Application of theoretical and empirical tools of economics to the education sector. Demand for Education; Education Production and Market Structures in Education. Policy applications: class size reduction, school finance equalization, accountability, and school choice. Effective: 2018 Spring Quarter.

ECN 160A—International Microeconomics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 100 or (ARE 100A, ARE 100B); or Consent of Instructor. International grade theory: impact of trade on the domestic and world economies; public policy toward external trade. Only 2 units of credit allowed to students who have completed ECN 162. Effective: 2016 Fall Quarter.

ECN 160B—International Macroeconomics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ECN 001B; (ECN 100 or (ARE 100A, ARE 100B)), ECN 101; or Consent of Instructor. Macroeconomic theory of an open economy. Balance of payments adjustment mechanism, international monetary economics issues; international financial institutions and their policies. Only 2 units of credit allowed to students who have completed ECN 162. Effective: 2018 Winter Quarter.

ECN 162—International Economic Relations (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ECN 001B; or Consent of Instructor. International trade and monetary relations, trade policy, exchange rate policy, policies toward international capital migration and investment. Emphasis on current policy issues. Course intended especially for
non-majors. Not open for credit to students who have completed course 160A or 160B. GE credit: SS, WC. Effective: 2018 Winter Quarter.

ECN 171—Economy of East Asia (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 001A or ECN 001AV); ECN 001B; or Consent of Instructor. Intensive reading, discussion and research on selected topics from the economies of the countries of East Asia. Consult department for course scheduling. Effective: 2018 Spring Quarter.

ECN 190—Topics in Economics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Selected topics in economic analysis and public policy. Variable content. May be repeated for credit topics differ. Effective: 2007 Fall Quarter.

ECN 190X—Upper-Division Seminar (1-4)
Seminar—1-4 hours. Prerequisite(s): ECN 100; ECN 101; and Consent of Instructor. In-depth examination at an upper division level of a special topic in Economics. Emphasis on focused analytical work. May not be repeated for credit. Limited enrollment. Effective: 2007 Fall Quarter.

ECN 192—Internship (1-6)
Internship—3-18 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Internship experience off and on campus in all subject areas offered in the Department of Economics. Supervised by a member of the staff. May be repeated for credit. (P/NP grading only.) Effective: 2014 Winter Quarter.

ECN 194HA—Special Study for Honors Students (4)
Independent Study—3 hours; Seminar—1 hour. Prerequisite(s): Major in Economics with senior standing; consent of instructor and completion of 135 units with a minimum GPA of 3.500 in courses counted toward the major. A program of research culminating in the writing of a senior honors thesis under the direction of a faculty advisor. Effective: 1997 Winter Quarter.

ECN 194HB—Special Study for Honors Students (4)
Independent Study—3 hours; Seminar—1 hour. Prerequisite(s): Major in Economics with senior standing; consent of instructor and completion of 135 units with a minimum GPA of 3.500 in courses counted toward the major. A program of research culminating in the writing of a senior honors thesis under the direction of a faculty advisor. Effective: 1997 Winter Quarter.

ECN 197T—Tutoring in Economics (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of instructor and chairperson. Undergraduates assist the instructor by tutoring students in one of the department's regularly scheduled courses. May be repeated up to 10 unit(s). (P/NP grading only.) Effective: 2004 Fall Quarter.

ECN 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

ECN 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

ECN 200A—Microeconomic Theory (5) ***Review all entries***
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): Graduate standing. Linear and non-linear optimization theory applied to develop the theory of the profit-maximizing firm and the utility-maximizing consumer. (Agricultural and Resource Economics 200A.) Effective: 1997 Winter Quarter.

ECN 200A—Microeconomic Theory (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Graduate standing. Linear and non-linear optimization theory applied to develop the theory of the profit-maximizing firm and the utility-maximizing consumer. (ARE 200A.) Effective: 2018 Fall Quarter.

ECN 200B—Microeconomic Theory (5) ***Review all entries***
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): ECN 200A Characteristics of market equilibrium under perfect competition, simple monopoly and monopsony. Emphasis on general equilibrium and welfare economics; the sources of market success and market failure. (Agricultural and Resource Economics 200B.) Effective: 1997 Winter Quarter.

ECN 200B—Microeconomic Theory (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200A Characteristics of market equilibrium under perfect competition, simple monopoly and monopsony. Emphasis on general equilibrium and welfare economics; the sources of market success and market failure. (ARE 200B.) Effective: 2018 Fall Quarter.

ECN 200C—Microeconomic Theory (5) ***Review all entries***
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): ECN 200B Uncertainty and information economics. Individual decision making under uncertainty. Introduction to game theory, with emphasis on applications
to markets with firms that are imperfect competitors or consumers that are imperfectly informed. (Agricultural and Resource Economics 200C.) Effective: 1997 Winter Quarter.

ECN 200C—Microeconomic Theory (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200B Uncertainty and information economics. Individual decision making under uncertainty. Introduction to game theory, with emphasis on applications to markets with firms that are imperfect competitors or consumers that are imperfectly informed. (ARE 200C.) Effective: 2018 Fall Quarter.

ECN 200D—Macroeconomic Theory (5) ***Review all entries***
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): ECN 101; MAT 021A; MAT 021B; MAT 021C Macro static theory of income, employment, and prices. Effective: 1997 Winter Quarter.

ECN 200D—Macroeconomic Theory (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 101; MAT 021A; MAT 021B; MAT 021C; or equivalent courses. Macro static theory of income, employment, and prices. Effective: 2018 Fall Quarter.

ECN 200E—Macroeconomic Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200B (can be concurrent); ECN 200D Macrodynamic theory of income, employment, and prices. Effective: 1997 Winter Quarter.

ECN 201A—History of Economic Thought (4)
Discussion—1 hour; Lecture—3 hours. Economic thought from the classical Greece era to modern times. Effective: 1997 Winter Quarter.

ECN 201B—History of Economic Thought II (4)
Discussion—1 hour; Lecture—3 hours. Origins and emergence of modern economic analysis. Effective: 1997 Winter Quarter.

ECN 203A—Advanced Economic Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200A; ECN 200B Advanced topics in general equilibrium theory and welfare economics: existence, determinateness and efficiency; intertemporal economies; uncertainty. Effective: 2007 Fall Quarter.

ECN 203B—Advanced Economic Theory: Game Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200A; ECN 200B; ECN 200C Covers the most recent developments in game theory, with the focus changing from year to year. Main topics are: refinements Nash equilibrium, repeated games, evolution, social situations, bounded rationality, and bargaining theory. Effective: 1997 Winter Quarter.

ECN 203C—Topics in Economic Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200A; ECN 200B; ECN 200C Selected topics in contemporary microeconomic theory. May be repeated
for credit with the consent of the Graduate Studies Committee. May be repeated for credit. Effective: 1997 Winter Quarter.

ECN 210A—Economic History (4)
Lecture/Discussion—4 hours. Economic history of the eastern hemisphere in the modern period. Medieval Europe or other regions may be studied, depending on student interest. Effective: 1997 Winter Quarter.

ECN 210B—Economic History (4)
Lecture/Discussion—4 hours. The United States from Colonial times to the present. Other areas of the
western hemisphere may be studied, according to student interest. Effective: 1997 Winter Quarter.

ECN 210C—Economic History (4)
Seminar—4 hours. Prerequisite(s): A graduate course in economic history. Selected topics and issues, emphasis on current research. (Quarter offered to be flexible.) Effective: 1997 Winter Quarter.

ECN 214—Development Economics (4)
Lecture—4 hours. Prerequisite(s): ARE 100A; ARE 100B; ECN 101; ARE 204/ECN 204 and ECN 160A-ECN 160B recommended. Review of the principal theoretical and empirical issues whose analysis has formed development economics. Analysis of economic development theories and development strategies and their application to specific
policy issues in developing country contexts. (ARE 214.) Effective: 1997 Winter Quarter.

ECN 215A—Microdevelopment Theory and Methods I (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200A or ECN 204; ECN 240A recommended. Agricultural development theory, with a focus on microeconomics. Agricultural household behavior with and without market imperfections and uncertainty. Analysis of rural land, labor, credit and insurance
markets, institutions, and contracts. (ARE 215A.) Effective: 1999 Fall Quarter.

ECN 215B—Open Macroeconomics of Development (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ARE 200A or ECN 200A); (ARE 204 or ECN 204); (ECN 214 or ECN 215A); ECN 200D or ECN 205 Models and policy approaches regarding trade, monetary and fiscal issues, capital flows and debt are discussed in the macroeconomic framework of an open developing country.The basic analytical focus is real exchange rate and its impact on sectoral allocation of resources. (ARE 215B.) Effective: 1997 Winter Quarter.

ECN 215C—Microdevelopment Theory and Methods II (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 215A Extension of development theory and microeconomic methods. Agricultural growth and technological change; poverty and income inequality; multisectoral, including village and regional models. Computable general equilibrium methods and applications. (ARE 215C.) Effective: 1999 Fall Quarter.

ECN 215D—Environmental and Economic Development (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200A; (ECN 204 or ARE 275) Interdisciplinary course drawing on theoretical and empirical research on interactions between environmental resource use and economic development processes. Analysis of issues emerging at the interface of environmental and development economics. (ARE 215D.) Effective: 1998 Spring Quarter.

ECN 216—Energy and Climate Policy (4)
Extensive Writing/Discussion; Lecture—3 hours. Prerequisite(s): ECN 100A or ARE 100A; or Consent of Instructor. Pass One restricted to graduate students in the following programs: Economics, Energy Graduate Group, and Transportation Technology and Policy Graduate Group. Fundamentals of energy technology, economics, and policy. Survey and analysis of current and prospective climate policies at the local and global level, including but not limited to cap-and-trade, emissions offsets, intensity standards, technology standards, mandates and subsidies. (EEG 202.) Effective: 2018 Spring Quarter.

ECN 221A—The Theory of Industrial Organization (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200A; ECN 200B; ECN 200C Game theory is used to analyze strategic interaction of firms in industries. Topics include models of competition, product differentiation, entry-deterring strategies, contractual arrangements, vertical control and antitrust issues. Effective: 2001 Fall Quarter.

ECN 221B—Empirical Analysis in Industrial Organization (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 221A; ECN 240B Recent empirical work in industrial organization. Topics include empirical analysis of cartels, product differentiation, innovation and technological change, and imperfect competition in international markets. Effective: 2002 Winter Quarter.

ECN 221C—Industrial Organization and Regulation (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 221A; ECN 240B Optimal regulation of natural monopoly. Topics include regulatory mechanisms for single and multiple output firms under symmetric and asymmetric information, optimality without regulation, the economic theory of regulation, and empirical studies of regulation and deregulation. Effective: 2002 Spring Quarter.

ECN 230A—Public Economics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200C Measures of deadweight loss and consumer surplus; optimal commodity and income taxation; tax incidence; policy issues in personal taxation, corporate taxation, and social insurance; the evaluation of effective tax rates. Effective: 2001 Fall Quarter.

ECN 230B—Public Economics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 240A; ECN 240B Effects of government policies on economic behavior; labor supply, program participation, investment, consumption and savings. Effective: 2016 Fall Quarter.

ECN 230C—Public Economics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200C; ECN 240B Advanced topics in economics of the public sector, with emphasis on current research. Topics may vary from year to year. Effective: 2001 Fall Quarter.

ECN 233—Poverty and Public Policy (4)
Lecture/Discussion—4 hours. Interdisciplinary course covering qualitative and quantitative U.S. based poverty research. Topics include measurement, statistics, theories and evidence on the causes and consequences of poverty, and the history and efficacy of major anti-poverty programs. Effective: 2016 Fall Quarter.

ECN 235A—Macroeconomics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200D; or Consent of Instructor. Frontiers of applied/empirical macroeconomics. Evidence and lessons from macroeconomic history for The Great Depression, financial crises, efficient markets, parity conditions, capital flows, default, financial crises, exchange rates, growth, and other current empirical research topics. Effective: 2016 Fall Quarter.

ECN 235B—Macroeconomics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200D; or Consent of Instructor. Search theory, theory of real-world markets characterized by search frictions, with applications: Labor economics: models of unemployment and wages differentials; Financial economics: determination of asset prices in OTC financial markets; Monetary Economics: foundations for money as a medium of exchange. Effective: 2016 Fall Quarter.

ECN 235C—Macroeconomics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200D; or Consent of Instructor. Basic numerical methods for analytically intractable problems in economics. Techniques presented applicable in a wide range of fields including macroeconomics, econometrics, resource economics, labor economics, economic theory, international trade, finance, game theory, public finance, contract theory, and others. Effective: 2016 Fall Quarter.

ECN 235D—Macroeconomics (4)
Discussion—1 hour; Lecture—3 hours. Selected topics in Macroeconomics. May be repeated for credit May be repeated for credit with the approval of the Economics Graduate Studies Committee. Effective: 2017 Winter Quarter.

ECN 239—Econometric Foundations (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Course will prepare students for econometric theory and empirical work by examining the statistical foundation of econometrics. Special attention is paid to problems specific to non-experimental data common to social sciences. Topics from matrix algebra are also covered. (ARE 239.) Effective: 2016 Fall Quarter.

ECN 240A—Econometric Methods (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 239; or Consent of Instructor. Least squares, instrumental variables, and maximum likelihood estimation and inference for single equation linear regression model; linear restrictions; heteroskedasticity; autocorrelation; lagged dependent variables. (ARE 240A.) Effective: 2017 Fall Quarter.

ECN 240B—Econometric Methods (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 240A Topics include asymptotic theory and instrumental variables, pooled time-series cross-section estimation, seemingly unrelated regression, classical hypothesis tests, identification and estimation of simultaneous equation models, cointegration, errorcorrection models, and qualitative and limited dependent variable models. (ARE 240B.) Effective: 2000 Spring Quarter.

ECN 240C—Time Series Econometrics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 240B; or Consent of Instructor. Probability theory; estimation, inference and forecasting of time series models; trends and non-standard asymptotic theory; vector time series methods and cointegration; time series models for higher order moments and transition data; state-space modeling and the Kalman filter. (ARE 240C.) Effective: 2016 Fall Quarter.

ECN 240D—Cross Section Econometrics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 240B; or Consent of Instructor. Estimation and inference for nonlinear regression models for cross-section data; models for discrete data and for limited dependent variables; models for panel data; additional topics such as bootstrap and semiparametric regression.
(Same course as Agricultural & Resource Economics 240D) (ARE 240D.) Effective: 2016 Fall Quarter.

ECN 240E—Topics in Time Series Econometrics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 240C; or Consent of Instructor. Modern econometric techniques for time series data. Expand on topics covered in Economics 240A, 240B and 240C. Contents may vary from year to year. (ARE 240E.) Effective: 2016 Fall Quarter.

ECN 240F—Topics in Cross Section Econometrics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 240D; or Consent of Instructor. Modern econometrics techniques for cross-section data. Expand on topics covered in Economics 240A, 240B and 240D. Contents may vary from year to year. (ARE 240F.) Effective: 2016 Fall Quarter.

ECN 250A—Labor Economics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECN 150A and ECN 150B) or the equivalent. Philosophy, theory and history of American and foreign labor movements; union structure, organization and collective bargaining under changing labor market conditions; current labor market issues. Effective: 1997 Winter Quarter.

ECN 250B—Labor Economics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 151A; or Consent of Instructor. ECN 204 or ECN 200A recommended. Microeconomic theory of labor supply and labor demand, estimation of labor supply and demand functions; human capital theory; labor market analysis. Effective: 1997 Winter Quarter.

ECN 260A—International Economics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200A or ECN 204 Theory of trade determinants; gains from trade; tariffs and effective protection; economic unions. Effective: 1997 Winter Quarter.

ECN 260B—International Economics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200D; ECN 200E Balance of payments adjustment mechanisms; foreign exchange markets
theories of balance of payments policy and international monetary mechanisms. Effective: 1997 Winter Quarter.

ECN 260CN—International Investment and Trade (4)
Seminar—4 hours. Prerequisite(s): ECN 260A Analysis of foreign investment and its links to trade; theories of the firm as they relate to firm's export and investment decisions; and an introduction to the political economy of trade policies. Effective: 1999 Winter Quarter.

ECN 260D—Topics in International Macroeconomics (4)
Seminar—4 hours. Prerequisite(s): ECN 260B; or Consent of Instructor. Survey of current literature in international macroeconomic theory. Effective: 1998 Spring Quarter.

ECN 260E—Topics in International Trade (4)
Seminar—4 hours. Prerequisite(s): ECN 260A; ECN 260B Current literature in international trade theory. Effective: 1999 Winter Quarter.

ECN 260F—International Macroeconomic Policy (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 260B Theory and practice of international macroeconomic policy. Topics include exchange rate regimes, international financial institutions, crises and current topics. Effective: 2011 Fall Quarter.

ECN 270A—Economics of Growth (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200D; ECN 200E Modern theories and empirics of economic growth beginning with the neoclassical theories up to current endogenous growth models. Emphasis on the analysis of human capital and growth, technological innovation, its diffusion and empirical evidence on growth. Effective: 2002 Fall Quarter.

ECN 270B—Economics of Growth (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200D; ECN 200E Empirical analysis of growth patterns and growth models. Emphasis on the relationship between macroeconomic management and long-term growth; the use of foreign capital in accelerating growth and its occasional mishaps; the comparison of growth performance in East Asia and Latin America since WW2; the experiences of centrally-planned economies and transitions to market-based growth; and the transformation from an industrial economy to a knowledge economy. Effective: 2003 Winter Quarter.

ECN 270C—Economics of Growth (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 200D; ECN 200E Institutional bases; politics; contracts and commitment; money and finance; malthusian dynamics; modern economic growth; transition of industrialization; dual economies, core and periphery; sources of convergence and divergence; openness and growth; resources, demography, and geography; institutions, imperialism, and class conflicts. Effective: 2003 Spring Quarter.

ECN 280—Orientation to Economic Research (2)
Discussion—2 hours. Course tries to bridge the gap between students' classwork and their subsequent research. It deals with topics such as the origination of a research project, some mechanics of empirical research and hints on the submission of research papers. (S/U grading only.) Effective: 1997 Winter Quarter.

ECN 290—Topics in Economics (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Selected topics in economic analysis and public policy, focusing on current research. May be repeated for credit. Effective: 1997 Winter Quarter.

ECN 291—Contemporary Economics Seminar (2)
Seminar—2 hours. Prerequisite(s): Graduate standing in Economics. Seminar series on topics of current interest. May be repeated for credit. (S/U grading only.) Effective: 2007 Fall Quarter.

ECN 298—Group Study (1-5)
Discussion—1-5 hours. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

ECN 299—Individual Study (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

ECN 299D—Dissertation Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

ECN 397—Teaching of Economics (2)
Lecture/Discussion—2 hours. Prerequisite(s): Graduate standing in economics. Teaching of economics: methods of instruction, organization of courses,
examination and evaluation procedures. (S/U grading only.) Effective: 1997 Winter Quarter.

ECS Engineering Computer Science

Courses in ECS:

ECS 010—Introduction to Programming (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Two years of high school algebra. Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, Electrical Engineering Majors only. Hands-on introduction to computation, through programming and problem solving. Two units of credit for students who have taken course 12 or Engineering 6. Not open to students who have completed course 30. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

ECS 010—Introduction to Programming (4) ***Review all entries Discontinued***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Two years of high school algebra. Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, Electrical Engineering Majors only. Hands-on introduction to computation, through programming and problem solving. Two units of credit for students who have taken course 12 or Engineering 6. Not open to students who have completed course 30. GE credit: QL, SE, SL. Effective: 2018 Fall Quarter.

ECS 012—Introduction to Media Computation (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Introduction to key computational ideas necessary to understand and produce digital media. Fundamentals of programming are covered as well as analysis of how media are represented and transmitted in digital form. Aimed primarily at non-computer science students. Two units of credit for students that have taken ECS 010 or ECS 030 or ENG 006. (CTS 012.) GE credit: AH, SE, VL. Effective: 2015 Spring Quarter.

ECS 015—Introduction to Computers (4)
Laboratory—3 hours; Lecture—3 hours. Computer uses in modern society. Emphasis on uses in non-scientific disciplines. Includes word processing, spreadsheets, web-page creation, elementary programming, basic computer organization, the Internet, the uses of computers and their influence on society. Course not intended for CS or CSE majors. Only two units of credit allowed to students who have completed PLS 021; not open for credit to students who have completed ECS 030. GE credit: QL, SE, WE. Effective: 2013 Fall Quarter.

ECS 020—Discrete Mathematics For Computer Science (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016A C- or better or MAT 017A C- or better or MAT 021A C- or better Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, and Cognitive Science Majors only. Discrete mathematics of particular utility to computer science. Proofs by induction. Propositional and first-order logic. Sets, functions, and relations. Big-O and related notations. Recursion and solutions of recurrence relations. Combinatorics. Probability on finite probability spaces. Graph theory. GE credit: QL, SE. Effective: 2017 Winter Quarter.

ECS 030—Programming and Problem Solving (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016A (can be concurrent) or MAT 017A (can be concurrent) or MAT 021A (can be concurrent); Prior experience with basic programming concepts (variable, loops, conditional statements) recommended. Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, Electrical Engineering, and Cognitive Science Majors only. Introduction to computers and computer programming, algorithm design, and debugging. Elements of good programming style. Programming in the C language. Use of basic UNIX tools. GE credit: QL, SE. Effective: 2017 Spring Quarter.

ECS 030—Programming and Problem Solving (4) ***Review all entries Discontinued***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016A (can be concurrent) or MAT 017A (can be concurrent) or MAT 021A (can be concurrent); Prior experience with basic programming concepts (variable, loops, conditional statements) recommended. Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, Electrical Engineering, and Cognitive Science Majors only. Introduction to computers and computer programming, algorithm design, and debugging. Elements of good programming style. Programming in the C language. Use of basic UNIX tools. GE credit: QL, SE. Effective: 2018 Fall Quarter.

ECS 032A—Introduction to Programming (4)
Discussion—1 hour; Lecture—3 hours. Not open to students who have completed ECS 036A. Introduction to programming and problem solving in Python. Aimed primarily at non-major students. No credit to students who completed previous ECS 010, ECS 030 or higher. GE credit: SE. Effective: 2018 Fall Quarter.

ECS 032B—Introduction to Data Structures (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 010 C- or better or ECS 030 C- or better or ECS 032A C- or better or ECS 036A C- or better Design and analysis of data structures using Python; trees, heaps, searching, sorting, and graphs. No credit to students who completed ECS 036C or ECS 060 or higher. GE credit: SE. Effective: 2018 Fall Quarter.

ECS 034—Software Development in UNIX and C/C++ (5)
Discussion—1 hour; Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): ECS 032B C- or better; or Consent of Instructor. UNIX Operating system tools and programming environment. Methods for debugging and verification. Principles of C and object-oriented programming in C++. Extensive programming. Only three units of credit for students who have previously taken ECS 036B. GE credit: SE. Effective: 2018 Fall Quarter.

ECS 036A—Programming and Problem Solving (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Prior experience with basic programming concepts (variable, loops, conditional statements) required; must satisfy computer science placement exam, or C- or better in ECS 32A. Pass One restricted to Computer Science, Computer Science and Engineering, Computer Engineering, Electrical Engineering, and Cognitive Science majors only. Computers and computer programming for students with some prior experience, algorithm design, and debugging. Good programming style. Use of basic UNIX tools. Two units if completed ECS 032A; no credit for students who have completed ECS 032B or previous course ECS 030. GE credit: SE. Effective: 2018 Fall Quarter.

ECS 036B—Software Development and Object-Oriented Programming in C++ (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 030 C- or better or ECS 036A C- or better Pass One restricted to Computer Science, Computer Science and Engineering, Computer Engineering, Electrical Engineering, and Cognitive Science majors only. Object-oriented programming in C++. Basic data structures and their use. Writing good programs of increased complexity and efficiency. Methods for debugging and verification. Not open for credit to students who have taken ECS 034, previous course ECS 040 or ECS 060. GE credit: SE. Effective: 2018 Fall Quarter.

ECS 036C—Data Structures, Algorithms, and Programming (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 040 C- or better or ECS 036B C- or better Pass One restricted to Computer Science, Computer Science and Engineering, Computer Engineering, Electrical Engineering, and Cognitive Science majors only. Design and analysis of data structures for a variety of applications; trees, heaps, searching, sorting, hashing, and graphs. Extensive programming. Not open for credit to students who have taken ECS 032B or previous ECS 060. GE credit: SE. Effective: 2018 Fall Quarter.

ECS 040— Software Development and Object-Oriented Programming (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 030 C- or better; Or equivalent. Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, Electrical Engineering, and Cognitive Science Majors only. Elements of program design, style, documentation, efficiency. Methods for debugging and verification. Operating system tools. Principles and use of object-oriented programming in C++. Basic data structures and their use. GE credit: SE. Effective: 2018 Winter Quarter.

ECS 040— Software Development and Object-Oriented Programming (4) ***Review all entries Discontinued***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 030 C- or better; Or equivalent. Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, Electrical Engineering, and Cognitive Science Majors only. Elements of program design, style, documentation, efficiency. Methods for debugging and verification. Operating system tools. Principles and use of object-oriented programming in C++. Basic data structures and their use. GE credit: SE. Effective: 2018 Fall Quarter.

ECS 050—Computer Organization and Machine-Dependent Programming (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 040 C- or better Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, and Cognitive Science Majors only. Comparative study of different hardware architectures via programming in the assembly languages of various machines. Role of system software in producing an abstract machine. Introduction to I/O devices and programming. Only one unit of credit allowed for students who have taken EEC 070. GE credit: SE. Effective: 2017 Winter Quarter.

ECS 060—Data Structures and Programming (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 040 C- or better Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, and Cognitive Science Majors only. Design and analysis of data structures for a variety of applications. Trees, heaps, searching, sorting, hashing, graphs. Extensive programming. GE credit: QL, SE. Effective: 2017 Spring Quarter.

ECS 060—Data Structures and Programming (4) ***Review all entries Discontinued***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 040 C- or better Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, and Cognitive Science Majors only. Design and analysis of data structures for a variety of applications. Trees, heaps, searching, sorting, hashing, graphs. Extensive programming. GE credit: QL, SE. Effective: 2018 Fall Quarter.

ECS 089A—Special Topics in Computer Science; Computer Science Theory (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Computer Science Theory. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 089B—Special Topics in Computer Science; Architecture (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Architecture. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 089C—Special Topics in Computer Science; Programming Languages and Compilers (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Programming Languages and Compilers. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 089D—Special Topics in Computer Science; Operating Systems (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Operating Systems. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 089E—Special Topics in Computer Science; Software Engineering (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Software Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 089F—Special Topics in Computer Science; Databases (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Databases. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 089G—Special Topics in Computer Science; Artificial Intelligence (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Artificial Intelligence. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 089H—Special Topics in Computer Science; Computer Graphics (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Computer Graphics. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 089I—Special Topics in Computer Science; Networks (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Networks. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 089J—Special Topics in Computer Science; Computer-Aided Design (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Computer-Aided Design. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 089K—Special Topics in Computer Science; Scientific Computing (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Scientific Computing. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 089L—Special Topics in Computer Science; Computer Science (1-5)
Laboratory; Lecture. Prerequisite(s): Consent of Instructor. Special topics in Computer Science. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 092—Internship in Computer Science (1-5)
Internship. Prerequisite(s): Lower division standing; project approval prior to period of internship. Supervised work experience in computer science. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

ECS 098—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

ECS 098F—Student Facilitated Course (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Student facilitated course intended primarily for lower division students. (P/NP grading only.) Effective: 2016 Winter Quarter.

ECS 099—Special Study for Lower Division Students (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

ECS 113—Computer Security for Non-Majors (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Programming skill at the level of ECS 015. Principles, mechanisms, implementation, and sound practices of computer security and data protection. Cryptography, authentication and access control. Internet security. Malicious software. Common vulnerabilities. Practical security in everyday life. Course not intended for CS or CSE majors. No credit allowed to students who have completed ECS 153 or ECS 155. GE credit: SE. Effective: 2018 Winter Quarter.

ECS 120—Theory of Computation (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 020 or MAT 108 Pass One open to Computer Science, Computer Science Engineering, and Computer Engineering Majors only. Fundamental ideas in the theory of computation, including formal languages, computability and complexity. Reducibility among computational problems. GE credit: QL, SE. Effective: 2016 Fall Quarter.

ECS 122A—Algorithm Design and Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 020; ECS 060 Pass One open to Computer Science, Computer Science Engineering, and Computer Engineering Majors only. Complexity of algorithms, bounds on complexity, analysis methods. Searching, sorting, pattern matching, graph algorithms. Algorithm design techniques: divide-conquer, greedy, dynamic programming. Approximation methods. NP-complete problems. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 122B—Algorithm Design and Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 122A Pass One open to Computer Science, Computer Science Engineering, and Computer Engineering Majors only. Theory and practice of hard problems, and problems with complex algorithm solutions. NP-completeness, approximation algorithms, randomized algorithms, dynamic programming and branch and bound. Theoretical analysis, implementation and practical evaluations. Examples from parallel, string, graph, and geometric algorithms. GE credit: QL, SE. Effective: 2016 Fall Quarter.

ECS 124—Theory and Practice of Bioinformatics (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): (ECS 010 or ECS 030 or ENG 006); (STA 012 or STA 013 or STA 013Y or STA 032 or STA 100 or STA 131A or MAT 135A or BIM 105); (BIS 002A or MCB 010) Pass One open to Computer Science, Computer Science Engineering, and Biotechnology majors only. Fundamental biological, mathematical and algorithmic models underlying bioinformatics and systems biology; sequence analysis, database search, genome annotation, clustering and classification, functional gene networks, regulatory network inference, phylogenetic trees, applications of common bioinformatics tools in molecular biology and genetics. GE credit: SE. Effective: 2018 Spring Quarter.

ECS 127—Cryptography (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 020 or MAT 108 Pass One open to Computer Science and Computer Science Engineering Majors only. Introduction to the theory and practice of cryptographic techniques used in computer security. Encryption (secret-key and public-key), message authentication, digital signatures, entity authentication, key distribution, and other cryptographic protocols. The social context of cryptography. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

ECS 129—Computational Structural Bioinformatics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 002A or MCB 010; College level programming course. Pass One open to Computer Science, Computer Science Engineering, and Biotechnology majors only. Fundamental biological, chemical and algorithmic models underlying computational structural biology; protein structure and nucleic acids structure; comparison of protein structures; protein structure prediction; molecular simulations; databases and online services in computational structural biology. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 130—Scientific Computation (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ECS 030 or ENG 006); (MAT 022A or MAT 067) Pass One open to Computer Science and Computer Science Engineering Majors only. Matrix-vector approach using MATLAB for floating-point arithmetic, error analysis, data interpolation, least squares data fitting, quadrature, zeros, optimization and matrix eigenvalues and singular values. Parallel computing for matrix operations and essential matrix factorizations. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 132—Probability and Statistical Modeling for Computer Science (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 040; (ECS 050 or EEC 070); MAT 021C; (MAT 022A or MAT 067) Pass One open to Computer Science and Computer Science Engineering Majors only. Univariate and multivariate distributions. Estimation and model building. Markov/Hidden Markov models. Applications to data mining, networks, security, software engineering and bioinformatics. GE credit: QL, SE. Effective: 2016 Fall Quarter.

ECS 140A—Programming Languages (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 050 or EEC 070; ECS 060 Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, and Cognitive Science Majors only. Syntactic definition of programming languages. Introduction to programming language features including variables, data types, data abstraction, object-orientedness, scoping, parameter disciplines, exception handling. Non-imperative programming languages. Comparative study of several high-level programming languages. GE credit: SE. Effective: 2017 Winter Quarter.

ECS 140B—Programming Languages (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 140A Pass One open to Computer Science and Computer Science Engineering Majors only. Continuation of programming language principles. Further study of programming language paradigms such as functional and logic; additional programming language paradigms such as concurrent (parallel); key implementation issues for those paradigms; and programming language semantics. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 142—Compilers (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 020; ECS 140A; ECS 120 recommended. Pass One open to Computer Science and Computer Science Engineering Majors only. Principles and techniques of lexical analysis, parsing, semantic analysis, code generation, and code optimization. Implementation of compilers. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 145—Scripting Languages and Their Applications (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Programming skill at the level of ECS 060. Pass One open to Computer Science and Computer Science Engineering Majors only. Goals and philosophy of scripting languages, with Python and R as prime examples. Applications include networking, data analysis and display, and graphical user interfaces (GUIs). GE credit: SE. Effective: 2016 Fall Quarter.

ECS 150—Operating Systems and System Programming (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 040; (ECS 050 or EEC 070 or EEC 170) Pass One open to Computer Science, Computer Science Engineering, and Computer Engineering Majors only. Basic concepts of operating systems and system programming. Processes and interprocess communication/synchronization; virtual memory, program loading and linking; file and I/O subsystems; utility programs. Study of a real operating system. GE credit: SE. Effective: 2017 Fall Quarter.

ECS 152A—Computer Networks (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 060; (ECS 132 or EEC 161 or MAT 135A or STA 131A or STA 120 or STA 032) Pass One open to Computer Science and Computer Science Engineering Majors only. Overview of computer networks, TCP/IP protocol suite, computer-networking applications and protocols, transport-layer protocols, network architectures, Internet Protocol (IP), routing, link-layer protocols, local area and wireless networks, medium access control, physical aspects of data transmission, and network-performance analysis. Only 2 units of credit for students who have taken ECS 157. (EEC 173A.) GE credit: SE. Effective: 2016 Fall Quarter.

ECS 152B—Computer Networks (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 152A or EEC 173A Pass One open to Computer Science and Computer Science Engineering Majors only. TCP/IP protocol suite, computer networking applications, client-server and peer-to-peer architectures, application-layer protocols, transport-layer protocols, transport-layer interfaces, sockets, network programming, remote procedure calls, and network management. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 152C—Advanced Topics in Computer Networks

(4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 173A or ECS 152A Advanced topics in computer networks, wireless networks, multimedia networking, traffic analysis and modeling, network design and management, network simulation and performance analysis, and design projects in communication networks. (EEC 173B.) GE credit: SE. Effective: 2014 Fall Quarter.

ECS 153—Computer Security (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 150; ECS 152A Pass One open to Computer Science and Computer Science Engineering Majors only. Principles, mechanisms, and implementation of computer security and data protection. Policy, encryption and authentication, access control, and integrity models and mechanisms; network security; secure systems; programming and vulnerabilities analysis. Study of an existing operating system. Not open for credit to students who have completed course 155. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 153—Computer Security (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 150; (ECS 152A or EEC 173A) Pass One open to Computer Science and Computer Science Engineering Majors only. Principles, mechanisms, and implementation of computer security and data protection. Policy, encryption and authentication, access control, and integrity models and mechanisms; network security; secure systems; programming and vulnerabilities analysis. Study of an existing operating system. Not open for credit to students who have completed ECS 155. GE credit: SE. Effective: 2018 Fall Quarter.

ECS 154A—Computer Architecture (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 050 or EEC 070 Pass One open to Computer Science and Computer Science Engineering Majors only. Introduction to digital design. Interfacing of devices for I/O, memory and memory management. Input/output programming, via wait loops, hardware interrupts and calls to operating system services. Hardware support for operating systems software. Only one unit of credit allowed for students who have taken EEC 170. GE credit: SE. Effective: 2017 Winter Quarter.

ECS 154B—Computer Architecture (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 154A or (EEC 170, EEC 180A) Pass One open to Computer Science and Computer Science Engineering Majors only. Hardwired and microprogrammed CPU design. Memory hierarchies. Uniprocessor performance analysis under varying program mixes. Introduction to pipelining and multiprocessors. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 158—Programming on Parallel Architectures (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 150; ECS 154B recommended. Pass One open to Computer Science and Computer Science Engineering Majors only. Techniques for software development using the shared-memory and message-passing paradigms, on parallel architectures and networks of workstations. Locks, barriers, and other techniques for synchronization. Introduction to parallel algorithms. GE credit: SE. Effective: 2018 Winter Quarter.

ECS 160— Software Engineering (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 140A Pass One open to Computer Science and Computer Science Engineering Majors only. Requirements, specification, design, implementation, testing, and verification of large software systems. Study and use of software engineering methodologies. Team programming. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 161—Modern Programming Tools (4)
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): ECS 040; or equivalent. Pass One open to Computer Science and Computer Science Engineering Majors only. Concepts and practice of collaborative software development using modern software tools. GE credit: SE. Effective: 2017 Fall Quarter.

ECS 162—Web Programming (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): ECS 030; Or equivalent programming experience in C and the Unix environment. Pass One open to Computer Science and Computer Science Engineering Majors only. Technical aspects of building websites, including both server-side and client-side software development. GE credit: SE, VL. Effective: 2017 Fall Quarter.

ECS 163—Information Interfaces (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 060 Pass One open to Computer Science and Computer Science Engineering Majors only. Art and science of information visualization and interfaces for information systems. Design principles of human-computer interaction. Visual display and navigation of nonspatial and higher dimensional data. Implementations, performance issues, tradeoffs, and evaluation of interactive information systems. GE credit: SE, VL. Effective: 2016 Fall Quarter.

ECS 165A—Database Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 060 Pass One open to Computer Science and Computer Science Engineering Majors only. Database modeling and design (E/R model, relational model), relational algebra, query languages (SQL), file and index structures, query processing, transaction management. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 165B—Database Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 165A Pass One open to Computer Science and Computer Science Engineering Majors only. Data modeling (object-relational, graph-based, spatiotemporal models). Querying semistructured data (XML). Database theory (normalization, integration, provenance). Database programming (stored procedures, embedded SQL, web programming). Advanced topics (data warehousing, parallel data processing). GE credit: SE. Effective: 2016 Fall Quarter.

ECS 170—Introduction to Artificial Intelligence (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 060 Pass One open to Computer Science and Computer Science Engineering Majors only. Design and implementation of intelligent computer systems. Knowledge representation and organization. Memory and inference. Problem solving. Natural language processing. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 171—Machine Learning (4)
Discussion—1 hour; Lecture—3 hours. Pass One open to Computer Science and Computer Science Engineering Majors only. Introduction to machine learning. Supervised and unsupervised learning, including classification, dimensionality reduction, regression and clustering using modern machine learning methods. Applications of machine learning to other fields. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 173—Image Processing and Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (MAT 067 or MAT 022A C- or better); ECS 060 Pass One open to Computer Science and Computer Science Engineering Majors only. Techniques for automated extraction of high-level information from images generated by cameras, three-dimensional surface sensors, and medical devices. Typical applications include detection of objects in various types of images and describing populations of biological specimens appearing in medical imagery. GE credit: SE. Effective: 2016 Fall Quarter.

ECS 174—Computer Vision (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 060; (STA 032 or STA 131A or MAT 135A or EEC 161 or ECS 132) recommended; (MAT 022A or MAT 067) recommended. Pass One open to Computer Science and Computer Science and Engineering Majors only. Computer vision is the study of enabling machines to "see" the visual world (e.g., understand images and videos). Explores several fundamental topics in the area, including feature detection, grouping and segmentation, and recognition. GE credit: SE. Effective: 2018 Spring Quarter.

ECS 175—Computer Graphics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 060; (MAT 022A or MAT 067) Pass One open to Computer Science and Computer Science Engineering Majors only. Principles of computer graphics, with a focus on interactive systems. Current graphics hardware, elementary operations in two-and three-dimensional space, geometric transformations, camera models and interaction, graphics system design, standard graphics APIs, individual projects. GE credit: SE, VL. Effective: 2016 Fall Quarter.

ECS 177—Scientific Visualization

(4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 175 Pass One open to Computer Science and Computer Science Engineering Majors only. Computer graphics techniques for generating images of various types of measured or computer-simulated data. Typical applications for these graphics techniques include study of air flows around car bodies, medical data, and molecular structures. GE credit: SE, VL. Effective: 2016 Fall Quarter.

ECS 178—Geometric Modeling (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 175 Pass One open to Computer Science and Computer Science Engineering Majors only. Interactive graphics techniques for defining and manipulating geometrical shapes used in computer animation, car body design, aircraft design, and architectural design. GE credit: SE, VL. Effective: 2016 Fall Quarter.

ECS 188—Ethics in an Age of Technology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Upper division standing. Pass One open to Computer Science and Computer Science Engineering Majors only. Foundations of ethics. Views of technology. Technology and human values. Costs and benefits of technology. Character of technological change. Social context of work in computer science and engineering. GE credit: SL, SS, WE. Effective: 2018 Winter Quarter.

ECS 189A—Special Topics in Computer Science; Computer Science Theory (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Computer Science Theory. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189B—Special Topics in Computer Science; Architecture (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Architecture. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189C—Special Topics in Computer Science; Programming Languages and Compilers (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Programming Languages and Compilers. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189D—Special Topics in Computer Science; Operating Systems (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Operating Systems. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189E—Special Topics in Computer Science; Software Engineering (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Software Engineering May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189F—Special Topics in Computer Science; Databases (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic Databases. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189G—Special Topics in Computer Science; Artificial Intelligence (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Artificial Intelligence. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189H—Special Topics in Computer Science; Computer Graphics (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Computer Graphics. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189I—Special Topics in Computer Science; Networks (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Networks. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189J—Special Topics in Computer Science; Computer-Aided Design (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Computer-Aided Design. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189K—Special Topics in Computer Science; Scientific Computing (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Scientific Computing. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189L—Special Topics in Computer Science; Computer Science (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Computer Science. May be repeated for credit when topic differs. GE credit: SE. Effective: 1997 Winter Quarter.

ECS 189M—Special Topics in Computer Security; Computer Security (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Computer Security. May be repeated for credit when topic differs. Effective: 2009 Spring Quarter.

ECS 189N—Special Topics in Bioinformatics and Computational Biology (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Bioinformatics and Computational Biology. May be repeated for credit when topic differs. Effective: 2009 Spring Quarter.

ECS 190C—Research Group Conferences in Computer Science (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing in Computer Science and Engineering. Research group conferences. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

ECS 190X—Senior Seminar (2)
Seminar—2 hours. Prerequisite(s): Senior standing. Examination of a special topic in a small group setting. Effective: 1997 Winter Quarter.

ECS 192—Internship in Computer Science (1-5)
Internship. Prerequisite(s): Completion of a minimum of 84 units; project approval prior to period of internship. Supervised work experience in computer science. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

ECS 193A—Senior Design Project (3)
Lecture/Discussion—3 hours. Prerequisite(s): ECS 160 (can be concurrent); Senior standing in Computer Science or Computer Science and Engineering or consent of instructor. Pass One open to Computer Science Engineering Majors only; Pass Two open to Computer Science and Computer Science Engineering Majors only. Responding to real-life client design challenges, student teams plan, implement, and evaluate large-scale projects involving computer and computational systems. The project is supervised by a faculty member. Students must take course 193A and 193B to receive credit. GE credit: SE. Effective: 2017 Winter Quarter.

ECS 193B—Senior Design Project (3)
Lecture/Discussion—3 hours. Prerequisite(s): ECS 193A IP or better Pass One open to Computer Science Engineering Majors only; Pass Two open to Computer Science and Computer Science Engineering Majors only. Responding to real-life client design challenges, student teams plan, implement, and evaluate large-scale projects involving computer and computational systems. The project is supervised by a faculty member. Students must take course 193A and 193B to receive credit. GE credit: SE. Effective: 2017 Spring Quarter.

ECS 197T—Tutoring in Computer Science (1-3)
Discussion—1 hour; Discussion/Laboratory—3-6 hours. Prerequisite(s): Consent of Instructor. Restricted to upper-division standing. Tutoring in computer science courses, especially introductory courses. (P/NP grading only.) Effective: 2014 Fall Quarter.

ECS 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

ECS 198F—Student Facilitated Course (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Student facilitated course intended primarily for upper division students. (P/NP grading only.) Effective: 2016 Winter Quarter.

ECS 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

ECS 199FA—Student Facilitated Course Development (1-4)
Variable—1-4 hours. Under the supervision of a faculty member, an undergraduate student plans and develops the course they will offer under 98F/198F. (P/NP grading only.) Effective: 2016 Winter Quarter.

ECS 199FB—Student Facilitated Teaching (1-4)
Variable—1-4 hours. Prerequisite(s): ECS 199FA; Consent of Instructor. STU FAC. Under the supervision of a faculty member, an undergraduate student teaches a course under 98F/198F. (P/NP grading only.) Effective: 2016 Winter Quarter.

ECS 201A—Advanced Computer Architecture (4)
Lecture—3 hours; Term Paper. Prerequisite(s): (ECS 154B or EEC 170); ECS 150 Pass 1 and Pass 2 open to Graduate Students in Computer Science only. Modern research topics and methods in computer architecture. Design implications of memory latency and bandwidth limitations. Performance enhancement via within-processor and between-processor parallelism. Term project involving student-proposed extensions/modifications of work in the research literature. Not open for credit to students who have completed ECS 250A. Effective: 2016 Spring Quarter.

ECS 201B—High-Performance Uniprocessing (4)
Lecture—3 hours; Term Paper. Prerequisite(s): ECS 201A Pass 1 and Pass 2 open to Graduate Students in Computer Science only. Maximizing uniprocessor performance. Barriers to high performance; solutions to the problems; historical and current processor designs. Not open for credit to students who have completed ECS 250B. Effective: 2016 Spring Quarter.

ECS 201C—Parallel Architectures (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): ECS 201A Evolution of parallel architectures from special-purpose machines to commodity servers. Emphasis on recent machines and applications that drive them. Not open for credit to students who have completed ECS 250C. Effective: 2003 Spring Quarter.

ECS 203—Novel Computing Technologies (4)
Lecture—3 hours; Project (Term Project)—1 hour. Prerequisite(s): ECS 201A Pass One and Pass Two open to Graduate Students in Computer Science only. Novel computing technologies that could revolutionize computer architecture. Quantum computing technologies, including algorithms, devices, and fault tolerance. A survey of other unconventional technologies including nanoscale electronics, MEMS devices, biological devices, and nanotechnology. Effective: 2016 Spring Quarter.

ECS 220—Theory of Computation (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 120; ECS 122A Pass 1 and Pass 2 open to Graduate Students in Computer Science only. Time and space complexity classes. Reductions, completeness, and the role of randomness. Logic and undecidability. Effective: 2016 Spring Quarter.

ECS 221—Computational Methods in Systems and Synthetic Biology (4)
Discussion—1 hour; Lecture—3 hours. Pass 1 and Pass 2 open to Graduate Students in Computer Science only. Computational methods related to systems and synthetic biology. An overview of machine learning techniques related to the analysis of biological data, biological networks. Predictive modeling and simulation of biological systems. Topics on biological circuit construction. Effective: 2016 Spring Quarter.

ECS 222A—Design and Analysis of Algorithms (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 122A; STA 031A recommended. Pass One and Pass Two open to Graduate Students in Computer Science only. Techniques for designing efficient algorithms, analyzing their complexity and applying these algorithms to a broad range of applications. Methods for recognizing and dealing with difficult problems. Effective: 2016 Spring Quarter.

ECS 222B—Advanced Design and Analysis of Algorithms (4)
Lecture—3 hours; Project (Term Project)—1 hour. Prerequisite(s): ECS 222A Pass One and Pass Two open to Graduate Students in Computer Science only. Advanced topics in complexity theory. Problem classification. The classes P, NP, P-space, co-NP. Matching and network flow algorithms. Matrix multiplication. Approximation algorithms. Effective: 2016 Spring Quarter.

ECS 223—Parallel Algorithms (4)
Discussion/Laboratory—3 hours; Project (Term Project)—1 hour. Prerequisite(s): ECS 222A Pass One and Pass Two open to Graduate Students in Computer Science only. Models of parallel computer systems including PRAMs, loosely coupled systems and interconnection networks. Parallel algorithms for classical problems and general techniques for their design and analysis. Proving lower bounds on parallel computation in several settings. Effective: 2016 Spring Quarter.

ECS 224—String Algorithms and Applications in Computational Biology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 122A Pass One and Pass Two open to Graduate Students in Computer Science only. Algorithms that operate on strings. Pattern matching, sets of patterns, regular expression pattern matching, suffix trees and applications, inexact similarity, parametric sequence alignment, applications to DNA sequencing and protein database searching. Effective: 2016 Spring Quarter.

ECS 225—Graph Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Graduate standing in electrical engineering or computer science or consent of instructor. Open to Graduate Students in Computer Science only. Fundamental concepts. Planar graphs: Kuratowski's theorem. Packings and coverings. Menger's theorem, representation of cuts, Hamilton graphs, rigid graphs, chordal graphs, graph coloring, graph isomorphism, applications and some algorithms. Effective: 2018 Winter Quarter.

ECS 226—Computational Geometry (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 175; ECS 222A Pass One and Pass Two open to Graduate Students in Computer Science only. Mathematics of unstructured data. Algorithms for data structures such as Voronoi diagrams, oct-trees, and arrangements. Applications in computer graphics, concentrating on problems in three-dimensions. Effective: 2016 Spring Quarter.

ECS 227—Modern Cryptography (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 220 or ECS 222A Pass One and Pass Two open to Graduate Students in Computer Science only. Modern cryptography as a discipline emphasizing formal definitions and proofs of security. One-way functions, pseudo-randomness, encryption, digital signatures, zero-knowledge, secure protocols. Effective: 2016 Spring Quarter.

ECS 228—Cryptograpy for E-Commerce (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 222A Pass One and Pass Two open to Graduate Students in Computer Science only. Cryptographic primitives and protocols of importance to e-commerce, present and future, including content distribution mechanisms, payment mechanisms, pricing mechanisms, anonymity and privacy mechanisms, fair exchange mechanisms. Effective: 2016 Spring Quarter.

ECS 229—Advanced Computational Structural Bioinformatics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Graduate standing. Pass One and Pass Two open to Graduate Students in Computer Science only. Algorithmic problems in structural biology; protein structure classification; protein structure prediction (including comparative modeling and ab initio protein structure prediction); molecular simulations (molecular dynamics and Monte Carlo simulations). Effective: 2016 Spring Quarter.

ECS 230—Applied Numerical Linear Algebra (4)
Discussion—1 hour; Discussion/Laboratory—3 hours. Prerequisite(s): ECS 130 or EAD 209 or MAT 167 Pass One and Pass Two open to Graduate Students in Computer Science only. Numerical linear algebra (NLA) with emphasis on applications in engineered systems; matrix factorizations; perturbation and rounding error analyses of fundamental NLA algorithms. Effective: 2016 Spring Quarter.

ECS 231—Large-Scale Scientific Computation (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 130 Pass One and Pass Two open to Graduate Students in Computer Science only. Algorithms and techniques for large-scale scientific computation, including basics for high performance computing, iterative methods, discrete approximation, fast Fourier transform, Poisson solvers, particle methods, spectral graph partition and its applications. Effective: 2016 Spring Quarter.

ECS 234—Computational Functional Genomics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 124; Graduate standing in Computer Science or Life Sciences. Pass One and Pass Two open to Graduate Students in Computer Science only. Bioinformatics methods for analysis and inference of functional relationships among genes using large-scale genomic data, including methods for integration of gene expression, promoter sequence, TF-DNA binding and other data, and approaches in modeling of biological networks. Effective: 2016 Spring Quarter.

ECS 235A—Computer and Information Security (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): ECS 150; ECS 152A recommended. Pass One and Pass Two open to Graduate Students in Computer Science only. Modern topics in computer security, including: protection, access control, operating systems security, network security, applied cryptography, cryptographic protocols, secure programming practices, safe languages, mobile code, malware, privacy and anonymity, and case studies from real-world systems. Not open for credit to students who have taken ECS 235. Effective: 2016 Fall Quarter.

ECS 235B—Foundations of Computer and Information Security (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): ECS 235A; (ECS 120 and ECS 150 recommended.) Pass One and Pass Two open to Graduate Students in Computer Science only. Theoretical foundations of methods used to protect data in computer and communication systems. Access control matrix and undecidability of security; policies; Bell-LaPadula, Biba, Chinese Wall models; non-interference and non-deducibility; information flow and the confinement problem. Not open for credit to students who have taken ECS 235. Effective: 2016 Fall Quarter.

ECS 236—Computer Security: Intrusion Detection Based Approach (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 150; ECS 153 recommended. Pass One and Pass Two open to Graduate Students in Computer Science only. Concepts of intrusion detection, anomaly detection based on machine learning, signature-based detection using pattern matching, automated response to attacks using artificial intelligence planning, tracing intruders based on principal component analysis, security policy languages. Effective: 2016 Spring Quarter.

ECS 240—Programming Languages (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 140A; ECS 142 Pass One and Pass Two open to Graduate Students in Computer Science only. Advanced topics in programming languages, including formal syntax and semantics, the relation between formal semantics and verification, an introduction to the lambda calculus. Additional topics will include language design principles, alternative programming languages, in-depth semantic theory and models of language implementation. Effective: 2016 Spring Quarter.

ECS 242—Translation of Programming Languages (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECS 240 Pass One and Pass Two open to Graduate Students in Computer Science only. Lexical analysis, parsing, storage management, symbol table design, semantic analysis and code generation. LR, LALR grammars. Compilercompilers. Effective: 2016 Spring Quarter.

ECS 243—Code Generation and Optimization (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 201A or EEC 270 Pass One and Pass Two open to Graduate Students in Computer Science only. Compiler optimizations for performance, code size and power reduction. Topics include control- and data-flow analysis, redundancy elimination, loop and cache optimizations, register allocation, local and global instruction scheduling, and modulo scheduling. Effective: 2016 Fall Quarter.

ECS 244—Principles of Concurrent Programming (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECS 020; ECS 150 Pass One and Pass Two open to Graduate Students in Computer Science only. Fundamental concepts and applications of concurrent programs; concurrent program verification and derivation; synchronization mechanisms in programming languages; distributed programming techniques; case studies of languages. Effective: 2016 Spring Quarter.

ECS 247—Concurrent Programming Languages (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECS 140A; ECS 150 Pass One and Pass Two open to Graduate Students in Computer Science only. Language design parameters. Models of parallel machines. Load balancing. Scalability. Portability. Efficiency measures. Design and implementation techniques for several classes of concurrent programming languages (such as object-oriented, functional, logic, and constraint programming languages). Effective: 2016 Fall Quarter.

ECS 251—Operating Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 150 Pass One and Pass Two open to Graduate Students in Computer Science only. Models, design, implementation, performance evaluation in operating systems. Algorithms, internal architectures for single processor OS and distributed systems. Concurrency control, recovery, security. OS kernel-level programming. Special topics embedded systems, real-time system, device driver, NPU (Network Processor Unit). Effective: 2016 Spring Quarter.

ECS 252—Computer Networks (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECS 152B Pass 1 and Pass 2 open to Graduate Students in Computer Science only. Internet protocol based computer networks applications, transport, network layer protocols. High speed LAN technologies: Ethernet, Asynchronous Transfer Mode (ATM). Delay models in data networks: analysis of multiaccess techniques in polling, ring, random access networks. Multimedia applications requirements and design. Effective: 2016 Spring Quarter.

ECS 253—Network Theory and Applications (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): MAT 022A; MAT 022B; (STA 013 or STA 013Y or STA 120); Experience with computer software, or consent of instructor. Pass One and Pass Two open to Graduate Students in Mechanical and Aerospace Engineering and Computer Science only. Develops the mathematical theory underlying growth, structure and function of networks with applications to physical, social, biological and engineered systems. Topics include network growth, resilience, epidemiology, phase transitions, software and algorithms, routing and search control, cascading failures. (Mechanical & Aeronautical Engineering 253.) Effective: 2018 Spring Quarter.

ECS 253—Network Theory and Applications (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): MAT 022A; MAT 022B; (STA 013 or STA 013Y or STA 120); Experience with computer software, or consent of instructor. Develops the mathematical theory underlying growth, structure and function of networks with applications to physical, social, biological and engineered systems. Topics include network growth, resilience, epidemiology, phase transitions, software and algorithms, routing and search control, cascading failures. (MAE 253.) Effective: 2018 Fall Quarter.

ECS 255—Resource Management in Wireless Communication Networks (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 252A Advanced research issues in wireless communication networks, including multi-user diversity and cross-layer optimization, basic network information theory, MIMO systems and the impact on networks, and dynamics spectrum management. Effective: 2009 Winter Quarter.

ECS 256—Performance Evaluation (4)
Lecture—3 hours; Project (Term Project)—1 hour. Prerequisite(s): ECS 020; ECS 152A; STA 131A; (EEC 170 or (ECS 154A, ECS 154B)); ECS 150 recommended. Pass One and Pass Two open to Graduate Students in Computer Science only. Use of simulation and queueing theory in computer and communication system design. Applications to processor scheduling, memory hierarchies; I/O systems; packet and circuit switched networks; fault-tolerance; computer networks applications. Not open for credit to students who have completed ECS 256A. Effective: 2016 Fall Quarter.

ECS 257—Mobile and Wireless Networks (4)
Independent Study—1 hour; Lecture—3 hours. Prerequisite(s): ECS 252 Pass One and Pass Two open to Graduate Students in Computer Science only. Fundamental techniques in design of second generation wireless networks: cellular network and protocols, medium access techniques, handoff control, signaling and mobility management, wireless data works, Internet mobility and Personal Communication Services (PCS). Third generation wideband systems, novel technologies, adhoc networks. Effective: 2016 Fall Quarter.

ECS 258—Networking Architecture and Resource Management (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): ECS 152A or EEC 173A Pass One and Pass Two open to Graduate Students in Computer Science and Electrical and Computer Engineering only. Concepts and design principles of computer networks. Network architectures, protocol mechanisms and implementation principles (transport/network/data-link layers), network algorithms, router mechanisms, design requirements of applications, network simulation, modeling and performance analysis. (EEC 273.) Effective: 2016 Fall Quarter.

ECS 259—Optical Networks (4)
Independent Study—1 hour; Lecture—3 hours. Prerequisite(s): ECS 252 Pass One and Pass Two open to Graduate Students in Computer Science only. Optical networks. Enabling technologies. Multiplexing techniques. WDM. Broadcast networks. Wavelength-routed networks. Network architectures. Protocols. Network algorithms. Device-network interface. Optimization problems. Effective: 2016 Fall Quarter.

ECS 260—Software Engineering (4)
Lecture—3 hours; Project (Term Project)—3 hours. Prerequisite(s): ECS 142; ECS 160 recommended. Pass One and Pass Two open to Graduate Students in Computer Science only. Advanced techniques for domain-specific software reuse. Effective: 2016 Fall Quarter.

ECS 261—Program Verification (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PHI 112; or MAT 125 or familiarity with first-order logic; knowledge of an integrative and functional programming language. Methods of proving correctness of programs with respect to formal
specifications, with attention to those suited for employing automated deduction.Logic background, symbolic execution, techniques suited to iterative programming, methods from denotational semantics, termination, dynamic logic and proofs of concurrent programs. Effective: 1997 Fall Quarter.

ECS 262—Formal Specification (3)
Lecture—3 hours. Prerequisite(s): ECS 261 Pass One and Pass Two open to Graduate Students in Computer Science only. Formal specification of modules, and its relationship to topdown programming development and verification. Abstract data types, together with methods for specifying them. Implementations and proofs of implementation. Using specifications to reason about programs. Parameterized types. Constructing good formal specifications. Effective: 2016 Fall Quarter.

ECS 265—Distributed Database Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 165A Pass One and Pass Two open to Graduate Students in Computer Science only. Concepts of distributed database systems and architectures, distributed database design, distributed query processing and optimization, transaction management and concurrency control, heterogeneous and multidatabase systems. Effective: 2016 Fall Quarter.

ECS 266—Spatial Databases (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 165A Concepts, models, and architectures for spatial databases, spatial access methods, query processing, spatio-temporal data management, moving objects, spatial data mining. <p> Effective: 2008 Winter Quarter.

ECS 267—Wide-Area Distributed Information Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 152B or ECS 165A Pass One and Pass Two open to Graduate Students in Computer Science only. Wide-area distributed information systems, data broadcast, multicast, publish/subscribe, service differentiation, information retrieval, Web caching. Effective: 2016 Fall Quarter.

ECS 268—Scientific Data And Workflow Management <p> (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 165A Scientific data integration, metadata, knowledge representation, ontologies, scientific workflow design and management. <p> Effective: 2008 Winter Quarter.

ECS 270—Artificial Intelligence (3)
Lecture—3 hours. Prerequisite(s): ECS 140A; ECS 172 Pass One and Pass Two open to Graduate Students in Computer Science only. Concepts and techniques underlying the design and implementation of models of human performance on intelligent tasks. Representation of high-level knowledge structures. Models of memory and inference. Natural language and story understanding. Common sense planning and problem solving. Effective: 2016 Fall Quarter.

ECS 271—Machine Learning and Discovery (4)
Lecture—3 hours; Project (Term Project)—1 hour. Prerequisite(s): ECS 170 Pass One and Pass Two open to Graduate Students in Computer Science only. Artificial intelligence techniques for knowledge acquisition by computers. Fundamental problems in machine learning and discovery. Systems that learn from examples, analogies, and solved problems. Systems that discover numerical laws and qualitative relationships. Projects centering on implementation and evaluation. Effective: 2016 Fall Quarter.

ECS 272—Information Visualization (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECS 163 or ECS 175 recommended. Pass One and Pass Two open to Graduate Students in Computer Science only. Advanced topics in information visualization: perceptually effective display methods, color design and selection, interaction models and techniques, focus-context techniques, distortion methods, large graph visualization techniques, visual data mining methods, and evaluation methods. Effective: 2016 Fall Quarter.

ECS 273—Applied Visual Computing (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Graduate standing. Visual computing paradigms, current visualization technologies, principles of 3-d graphics, user interface designs, and exploratory visualization. Effective: 2002 Winter Quarter.

ECS 274—Automated Deduction (4)
Lecture—3 hours. Prerequisite(s): PHI 112; or MAT 125 or familiarity with first order logic. Techniques of mechanical theorem proving. Methods based on resolution and termrewriting. Decision procedures. Induction. Applications to program verification, question/answering and plan generation. Study existing mechanical theorem provers. Effective: 1997 Fall Quarter.

ECS 275A—Advanced Computer Graphics (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECS 175 or ECS 177 or ECS 178 Pass One and Pass Two open to Graduate Students in Computer Science only. Advanced topics in computer graphics. Hidden surface models, rendering of various surface types, subdivision methods, shading techniques, anti-aliasing, modeling techniques. Effective: 2016 Fall Quarter.

ECS 275B—Advanced Computer Graphics (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECS 175 or ECS 177 or ECS 178 Pass 1 and Pass 2 open to Graduate Students in Computer Science only. Advanced topics in computer graphics and geometric modeling. Topics taken from advanced research papers in computer graphics, image synthesis, visualization and geometric modeling. Discussion of current research in the field. Effective: 2016 Spring Quarter.

ECS 276—Advanced Volume Visualization (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 177 Pass One and Pass Two open to Graduate Students in Computer Science only. Applications, available tools and techniques, the challenges confronting the field of volume visualization, and some of the advanced topics in the field. Primary emphasis on advanced software and hardware techniques to achieve interactive visualization. Effective: 2016 Fall Quarter.

ECS 277—Advanced Visualization (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 177 Visualization of 3D data, including scalar fields, vector fields, and medical data. Effective: 2000 Fall Quarter.

ECS 278—Computer-Aided Geometric Design (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ECS 175 Pass One and Pass Two open to Graduate Students in Computer Science only. Mathematical techniques for the definition and manipulation of curves and surfaces. Bezier curves and surfaces, B-spline curves and surfaces, subdivision surfaces, wavelets. Integration into various computer graphics rendering models, visualization systems and computer-aided design systems. Effective: 2016 Fall Quarter.

ECS 279—Computer Animation (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 175; or ECS 275. Pass One and Pass Two open to Graduate Students in Computer Science only. Course surveys current research and fundamental techniques that lie behind character animation tools. Emphasis on improving expressive aspects of movement and how physics, motion capture data, the arts and psychology literature, and interactive techniques can be used towards this goal. Effective: 2016 Fall Quarter.

ECS 280—Virtual Reality Technology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 175 Pass One and Pass Two open to Graduate Students in Computer Science only. Fundamentals and principles of Virtual Reality (VR) technology. Potential and limits for its useful application. Developing a complete virtual reality application. Effective: 2016 Spring Quarter.

ECS 289A—Special Topics in Computer Science; Computer Science Theory (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Computer Science Theory. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289B—Special Topics in Computer Science; Architecture (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Architecture. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289C—Special Topics in Computer Science; Programming Languages and Compilers (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Programming Languages and Compilers. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289D—Special Topics in Computer Science; Operating Systems (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Operating Systems. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289E—Special Topics in Computer Science; Software Engineering (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Software Engineering. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289F—Special Topics in Computer Science; Databases (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Databases. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289G—Special Topics in Computer Science (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Artificial Intelligence. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289H—Special Topics in Computer Science; Computer Graphics (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Computer Graphics. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289I—Special Topics in Computer Science (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Networks. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289J—Special Topics in Computer Science; Computer-Aided Design (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Computer-Aided Design. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289K—Special Topics in Computer Science; Scientific Computing (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Scientific Computing. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289L—Special Topics in Computer Science; Computer Science (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Computer Science. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

ECS 289M—Special Topics in Computer Science; Security (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Security. May be repeated for credit when topic differs. Effective: 2001 Winter Quarter.

ECS 289N—Special Topics in Bioinformatics and Computational Biology (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topic in Bioinformatics and Computational Biology. May be repeated for credit when topic differs. Effective: 2009 Spring Quarter.

ECS 290—Seminar in Computer Science (1)
Seminar—1 hour. Participating seminar; discussion and presentation of current research and development in computer science. (S/U grading only.) Effective: 1997 Winter Quarter.

ECS 290C—Graduate Research Group Conference (1)
Discussion—1 hour. Research problems, progress and techniques in computer science. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

ECS 293A—Research in Computer Science (1)
Lecture—1 hour. Prerequisite(s): Graduate standing in computer science. Pass One and Pass Two open to Graduate Students in Computer Science only. Study of research topics in computer science, PhD level research methodologies (experimental, applied and theoretical). Study skills necessary to successfully find/solve significant research problems. Finding and successful interacting with a research advisor. Ethical issues in research/collaborative work. (S/U grading only.) Effective: 2016 Fall Quarter.

ECS 293B—Research in Computer Science (1)
Lecture—1 hour. Prerequisite(s): Graduate standing in computer science; ECS 293A recommended. Pass One and Pass Two open to Graduate Students in Computer Science only. Study of PhD level research methodologies (experimental, applied and theoretical), presenting research results for the computer science community. Study skills necessary to successfully find/solve significant research problems. (S/U grading only.) Effective: 2016 Fall Quarter.

ECS 298—Group Study (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

ECS 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

ECS 390—The Teaching of Computer Science (1)
Discussion—1 hour. Prerequisite(s): Meet qualifications for teaching assistant and/or associate-in in Computer Science. Pass One and Pass Two open to Graduate Students in Computer Science only. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit. (S/U grading only.) Effective: 2016 Spring Quarter.

ECS 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

EDU Education

Courses in EDU:

EDU 065A—Foundations for University Success; Introduction to the University System (2)
Fieldwork; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Student must be a part of an approved Foundations for University Success program. Introduction to resources supporting first year student academic success and transition to a tier one research university. (P/NP grading only.) Effective: 2017 Summer Session 2.

EDU 065B—Foundations for University Success; Introduction to Research at a Tier 1 University (2)
Fieldwork; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Student must be a part of an approved Foundations for University Success program. Development of important skills necessary for research including critical thinking, study skills, writing skills, and presentation skills. (P/NP grading only.) Effective: 2017 Summer Session 2.

EDU 065C—Foundations for University Success; Internships, Graduate School and Careers (2)
Fieldwork; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Student must be a part of an approved Foundations for University Success program. Resources to explore academic and career connections and opportunities including internships, volunteer opportunities, graduate schools and careers. (P/NP grading only.) Effective: 2017 Summer Session 2.

EDU 081—Learning in Science and Mathematics (2)
Fieldwork—2 hours; Lecture/Discussion—2 hours. Limited to 26 students per section. Exploration of how students learn and develop understanding in science and mathematics classrooms. Introduction to case studies and interview techniques and their use in K-6 classrooms to illuminate factors that affect student learning. (GEL 081.) (P/NP grading only.) GE credit: SS, VL, WE. Effective: 2007 Winter Quarter.

EDU 092—Internship (1-3)
Internship—3-9 hours. Prerequisite(s): Consent of Instructor. Enrollment dependent on availability of intern placements. Internship as a teacher's aide or tutor in K-12 classrooms under the supervision of a faculty member. May be repeated for credit. (P/NP grading only.) Effective: 2001 Fall Quarter.

EDU 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Primarily for lower division students. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

EDU 100—Introduction to Schools (4)
Fieldwork—3 hours; Lecture—3 hours. Study of occupational concerns of teachers; skills for observing classroom activities; school organization and finance; school reform movement; observing, aiding, and tutoring in schools. GE credit: ACGH, DD, OL, SS. Effective: 2016 Fall Quarter.

EDU 110—Educational Psychology: General (4)
Lecture/Discussion—4 hours. Learning processes, cognitive development, individual differences, testing and evaluation. GE credit: SS, WE. Effective: 2016 Fall Quarter.

EDU 114—Quantitative Methods in Educational Research (4)
Lecture/Discussion—4 hours. Problems and methods in data analysis. Design of research projects. Some consideration of procedures suited to digital computers. GE credit: QL. Effective: 2016 Fall Quarter.

EDU 115—Educating Children with Disabilities (2)
Lecture—2 hours. Educational issues and processes involved in teaching children with disabilities. The course will focus on the structure of special education, with an emphasis on meeting the educational needs of children who are mainstreamed in regular classes. GE credit: SS. Effective: 2016 Fall Quarter.

EDU 119—The Use and Misuse of Standardized Tests (4)
Discussion—1 hour; Lecture—3 hours. Principles underlying educational and psychological testing. Purposes of testing for individual achievement and evaluation of school programs. Interpretation and misinterpretations of outcomes. Analysis of SAT, GRE and other common tests. Experience in test administration and outcome interpretation. GE credit: QL, SS, WE. Effective: 2016 Fall Quarter.

EDU 120—Philosophical and Social Foundations of Education (4)
Discussion—1 hour; Lecture—3 hours. Philosophical, historical, and sociological study of education and the school in our society. GE credit: ACGH, SS, WE. Effective: 2016 Fall Quarter.

EDU 121—Introduction to Education Policy Analysis: Tools, Methods and Frameworks (4)
Discussion—1 hour; Lecture—3 hours. Introduces students to the field of education policy analysis with a specific emphasis on the quantitative frameworks and analytical tools—drawn primarily from economics and statistics—that are used to guide and inform educational policymaking. GE credit: QL, SS. Effective: 2014 Fall Quarter.

EDU 122—Children, Learning and Material Culture (4)
Extensive Writing/Discussion—1 hour; Fieldwork; Lecture/Discussion—3 hours. How material artifacts shape what and how children learn in school, at home, and in the community. Artifacts examined include books, computers, household appliances, toys and games, entertainment media, collectibles, sports equipment, clothing, folk arts and crafts, and neighborhood space. GE credit: SS, VL, WE. Effective: 2017 Summer Session 1.

EDU 130—Issues in Higher Education (4)
Discussion—3 hours; Fieldwork—3 hours. Analysis of current issues in higher education and of some practical implications of varying philosophical approaches to the role of the university. GE credit: SS, WE. Effective: 2017 Summer Session 1.

EDU 142—Introduction to Environmental Education (4)
Fieldwork; Lecture/Discussion—3 hours. Study of history, philosophy, principles and approaches to environmental education (EE) and outreach; learning theories, teaching strategies and techniques in EE and outreach; evaluation of EE curricula in non-formal and in-school contexts; observing, aiding and facilitating local environmental education programs. GE credit: OL, SS. Effective: 2009 Fall Quarter.

EDU 147—Anglos, Latinos and the Spanish Black Legend: The Origins and Educational Implications of Anti-Hispanic Prejudice (4)
Fieldwork; Lecture/Discussion—3 hours; Term Paper. Examination of anti-Hispanic prejudice in the United States focusing on the "Black Legend," a 16th Century anti-Spanish myth underpinning the doctrine of "Manifest Destiny." Exploration of the Legend's presence in contemporary American society through interviews and analysis of school textbooks. (SPA 147.) GE credit: ACGH, AH, DD, WE. Effective: 2016 Fall Quarter.

EDU 150—Cultural Diversity and Education in a Sociopolitical Context (4)
Extensive Writing; Lecture/Discussion—4 hours. Introduction to cultural diversity and education in a sociopolitical context. Interactive course. Small and large-group discussions explore, extend, and apply readings; range of writing genres for responses to assignments and course themes; lectures, slide shows, speakers, brief fieldwork, and presentations. GE credit: DD, SS, WE. Effective: 2011 Fall Quarter.

EDU 151—Language Development in the Chicano Child (3)
Lecture/Discussion—3 hours. Bilingualism, first and second language acquisition, bilingual education, language assessment, Chicano Spanish and the role of dialect varieties in the classroom. Not open for credit to students who have completed EDU 151T. Effective: 2016 Fall Quarter.

EDU 151T—Language Development in the Chicano Child (3)
Lecture/Discussion—3 hours. Prerequisite(s): Acceptance in Teaching Credential Program. Open to UC Davis Teacher Credential candidates only. Bilingualism, first and second language acquisition, bilingual education, language assessment, Chicano Spanish and the role of dialect varieties in the classroom. Not open for credit to students who have completed EDU 151. Effective: 2016 Fall Quarter.

EDU 152—Academic Spanish for Bilingual Teachers (3)
Fieldwork; Lecture/Discussion—3 hours; Recitation—3 hours. Prerequisite(s): Acceptance in Teaching Credential Program or consent of instructor. Communicative class taught in Spanish focused on the development of Spanish communication skills for current and/or future bilingual teachers. Main topics are related to school content areas in bilingual settings, with an emphasis on standard and Southwest Spanish dialects. GE credit: AH, OL, SS, WE. Effective: 2016 Fall Quarter.

EDU 153—Diversity in the K-12 Classroom (2)
Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teaching Credential Program. Analysis of research on learning styles among culturally diverse students with review and evaluation of responsive curricula and classroom teaching techniques. The ethnographic interview as a research tool. Effective: 2016 Fall Quarter.

EDU 160A—Introduction to Peer Counseling (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Introduction to peer counseling techniques and development of peer counseling skills. (P/NP grading only.) Effective: 2016 Fall Quarter.

EDU 160B—Issues in Peer Counseling (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. In-depth review and development of skills for specific counseling topics. May be repeated once for credit when topic differs. May be repeated up to 1 time(s) May be repeated once for credit when topic differs. (P/NP grading only.) Effective: 2016 Fall Quarter.

EDU 163—Guidance and Counseling (4)
Lecture—4 hours. Nature and scope of pupil personnel services; basic tools and techniques of guidance; theory and practice of counseling psychology, with emphasis on educational and vocational adjustment. Effective: 2016 Fall Quarter.

EDU 173—Language Development (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 001 or LIN 001Y; or Consent of Instructor. LIN 103A, LIN 103B recommended. Theory and research on children's acquisition of their native language, including the sound system, grammatical systems, and basic semantic categories. (LIN 173.) GE credit: SS. Effective: 2018 Spring Quarter.

EDU 180A—Computers in Education (1)
Laboratory—2 hours; Lecture/Discussion—1 hour; Project (Term Project)—3 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Restricted to Teaching Credential Majors. Applications of computers in education as instructional, intellectual, and communication tools. Effective: 2013 Fall Quarter.

EDU 180B—Computers in Education (1)
Laboratory—2 hours; Lecture/Discussion—1 hour; Project (Term Project)—3 hours. Prerequisite(s): EDU 180A; Acceptance in Teacher Credential Program. Restricted to Teaching Credential Majors. Applications of computers in education as instructional, intellectual, and communication tools. Effective: 2013 Fall Quarter.

EDU 180C—Computers in Education (1)
Laboratory—2 hours; Lecture/Discussion—1 hour; Project (Term Project)—3 hours. Prerequisite(s): EDU 180B; Acceptance in Teacher Credential Program. Restricted to Teaching Credential Majors. Applications of computers in education as instructional, intellectual, and communication tools. Effective: 2013 Fall Quarter.

EDU 181—Teaching in Science and Mathematics (2)
Fieldwork—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Major in mathematics, science, or engineering; or completion of a one-year sequence of science or calculus. Class size limited to 40 students per section. Exploration of effective teaching practices based on examination of how middle school students learn math and science. Selected readings, discussion and field experience in middle school classrooms. (GEL 181.) (P/NP grading only.) GE credit: SS, WE. Effective: 2011 Fall Quarter.

EDU 182—Computer Project for Curricular Integration (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Design and implementation of a curricular unit to integrate computer technology into a K-12 classroom setting. A project-based seminar intended for students with substantial prior experience with instructional use of computers and related technologies. Not open for credit to students who have completed EDU 180 or EDU 181. Effective: 2016 Fall Quarter.

EDU 183—Teaching High School Mathematics and Science (3) ***Review all entries***
Fieldwork; Lecture/Discussion—2 hours. Prerequisite(s): Major in mathematics, science, or engineering; or consent of instructor with completion of a one-year sequence of science or calculus. Limited to 40 students per section. Exploration and creation of effective teaching practices based on examination of how high school students learn mathematics and science. Field experience in high school classrooms. (Geology 183.) GE credit: OL, SS, WE. Effective: 2017 Fall Quarter.

EDU 183—Teaching High School Mathematics and Science (3) ***Review all entries***
Fieldwork; Lecture/Discussion—2 hours. Prerequisite(s): Major in mathematics, science, or engineering; or completion of a one-year sequence of science or calculus and consent of the instructor. Limited to 40 students per section. Exploration and creation of effective teaching practices based on examination of how high school students learn mathematics and science. Field experience in high school classrooms. (GEL 183.) GE credit: OL, SS, WE. Effective: 2018 Fall Quarter.

EDU 185—Learning in a Digital Age: Information, Schooling, and Society (4)
Lecture/Discussion—2 hours; Lecture/Lab—2 hours. Focus on the changing nature of learning in a digital age: social media, ubiquitous connectivity, online education, electronic communication, writing, gaming, and youth culture. Readings will be drawn from major recent works detailing fundamental shifts in information, schooling, and society. GE credit: OL, SS, VL. Effective: 2013 Fall Quarter.

EDU 192—Internship (1-3)
Discussion—1 hour; Internship—2-8 hours. Prerequisite(s): Consent of Instructor. Internship as a tutor, teacher's aide, or peer counselor in a school or educational counseling setting under the supervision of a faculty member. May be repeated for credit. (P/NP grading only.) Effective: 2016 Fall Quarter.

EDU 197T—Tutoring in Education (1-2)
Tutorial—1-2 hours. Prerequisite(s): Consent of Instructor. Leading of small voluntary discussion groups affiliated with the School's upper division courses under the supervision of, and at the option of, the course instructor, who will submit a written evaluation of the student's work. May be repeated up to 1 time(s) for a total of 4 units. (P/NP grading only.) Effective: 2016 Fall Quarter.

EDU 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

EDU 199—Special Study for Advanced Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2016 Fall Quarter.

EDU 200—Educational Research (4)
Discussion—2 hours; Lecture—2 hours. Prerequisite(s): Introductory statistics or consent of instructor. Defining educational research questions, reviewing relevant literature, developing research designs, developing research instruments, selecting appropriate data analysis procedures, and writing research projects. A case problem will provide practice in designing and reporting research. Effective: 2016 Fall Quarter.

EDU 201—Qualitative Research in Education (4)
Lecture—2 hours; Seminar—2 hours. Prerequisite(s): Graduate standing or consent of instructor. Examines the design and conduct of educational research using non-numerical data (e.g., text, discourse, imagery and artifacts). Focuses on issues (e.g., validity, reliability, generalizability, ethics) and reporting genres (e.g., narrative accounts, case studies, and arguments). Effective: 1997 Fall Quarter.

EDU 202N—Computer Analysis of Qualitative Data (4)
Laboratory—2 hours; Seminar—3 hours. Critical and practical understanding of how to use computer software programs to analyze qualitative data (text, images, and videotape) in conducting social research. Effective: 2016 Fall Quarter.

EDU 203—Educational Testing and Evaluation (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Introduces the theoretical assumptions underlying traditional test construction, as well as the basic statistical principles involved in the design, evaluation, and interpretation of standardized tests. Also introduces the debates surrounding the uses of different kinds of tests and evaluation tools. Effective: 1997 Winter Quarter.

EDU 204A—Quantitative Methods in Educational Research: Analysis of Correlational Designs (4)
Discussion—2 hours; Discussion/Laboratory—2 hours. Prerequisite(s): Introductory statistics or consent of instructor. Methods for analysis of correlational data in educational research. Topics include multiple correlation and regression, discriminant analysis, logistic regression, and canonical correlation. Emphasis on conceptual understanding of the techniques and use of statistical software. Effective: 2016 Fall Quarter.

EDU 204B—Quantitative Methods in Educational Research: Experimental Designs (4)
Discussion—2 hours; Discussion/Laboratory—2 hours. Prerequisite(s): Introductory statistics or consent of instructor. Methods for analysis of experimental data in educational research. Topics include ANOVA, fixed v. random effects models, repeated measures ANOVA, analysis of co-variance, MANOVA, chi square tests, small sample solutions to t and ANOVA. Effective: 2016 Fall Quarter.

EDU 205A—Ethnographic Research in Schools I: Current Theory and Practice (4)
Lecture—4 hours. Current literature from anthropology and society related to schools.Emphasis on the organizational structure of institutions,and the analysis of face-to-face interaction.Will explore the relationship between field-based research and theory development on the acquisition of knowledge in specific social and cultural contexts. Effective: 2016 Fall Quarter.

EDU 205B—Ethnographic Research in Schools II: Field-Based Research Projects (4)
Discussion—4 hours. Prerequisite(s): EDU 205A Student research projects in specific schools with cooperative critical analysis of the design, data collection, and inferencing by researchers. Students will continue to meet with instructor as a group throughout the quarter to discuss specific projects. Effective: 2016 Fall Quarter.

EDU 206A—Inquiry into Classroom Practice: Traditions and Approaches (2)
Fieldwork; Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Introduction to traditions and approaches of teachers conducting research in their own classrooms: purposes, focal areas, methods of data collection and analysis, and written genre conventions. Effective: 2016 Fall Quarter.

EDU 206B—Inquiry into Classroom Practice: Application of Teacher Research Approaches (4)
Fieldwork—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): EDU 206A; or Consent of Instructor. Open to Graduate Teaching Credential students. Analysis and application of teacher research through the development, implementation and evaluation of a short-term classroom research-based intervention. Particular attention to research that enhances learning of English language learners and under-performing students. Effective: 2007 Spring Quarter.

EDU 206C—Inquiry into Classroom Practice: Study Design (4)
Fieldwork—1 hour; Seminar—3 hours. Prerequisite(s): EDU 206B; or Consent of Instructor. Open to Graduate MA Credential students. Proposal development for classroom-based inquiry designed to address student learning needs. Mixed methods research design and preliminary data collection approaches. Design and application of baseline student assessment for proposal development. Literature review. Data collection in K-12 classrooms required. Effective: 2007 Spring Quarter.

EDU 206D—Inquiry into Classroom Practice: Data Analysis and Research Reporting (4)
Extensive Writing/Discussion—1 hour; Fieldwork—1 hour; Seminar—2 hours. Prerequisite(s): EDU 206C; or Consent of Instructor. Open to Graduate MA Credential students. Support of the inquiry begun in course 206C through continuous collaborative critique and feedback resulting in the writing and presentation of a research study. Effective: 2007 Winter Quarter.

EDU 207—Concepts of the Curriculum (4)
Discussion—2 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Development of the skills of philosophical analysis and argument for the establishment of a point of view, in the consideration of curriculum theory and practice. Classical and contemporary approaches to subject matter and activity emphases, hidden curriculum, and moral education. Effective: 2016 Fall Quarter.

EDU 208—Presenting Educational Research in Written Reports (4)
Extensive Writing; Seminar—3 hours. Prerequisite(s): Consent of Instructor. Rhetorical and substantive challenges of presenting educational research through written reports; research rhetoric and genres; competing discourse conventions of educational research, policy, and practice; the social organization of publishing educational research. May be repeated up to 1 time(s). Effective: 2016 Fall Quarter.

EDU 209—Image-based Field Research (4)
Fieldwork—2 hours; Lecture/Discussion—3 hours. Critical and practical understanding of video tape and still photography as resources for enhancing field research in schools and other social setting. Effective: 2016 Fall Quarter.

EDU 210—Psychological Perspectives on School Learning (4)
Extensive Writing; Lecture/Discussion—3 hours. Study of human learning theory and research related to learning of academic content. Review of contemporary issues of constructivism, problem solving, expertise, conceptual change, transfer, and metacognition. Effective: 2016 Fall Quarter.

EDU 211—Sociocultural and Situative Perspectives on Learning and Cognition (4)
Extensive Writing; Lecture/Discussion—3 hours. Sociocultural and situative theories of cognition and learning. Major ideas of L.S. Vygotsky, followed by modern perspectives: situated cognition, cognitive apprenticeship, situated learning, communities of practice, cultural-historical activity theory, and distributed cognition. Implications of each theoretical perspective for educational practice. Effective: 2016 Fall Quarter.

EDU 213—Individual Assessment (4)
Lecture—4 hours. Prerequisite(s): Introductory statistics or consent of instructor. Theories of intellectual functioning and the measurement of cognitive abilities in school-aged children. Supervised practice in administration and scoring of contemporary tests for children including the WISC-R, the WAIS-R, the Stanford Binet, the McCarthy Scales of Children's Ability. Effective: 2016 Fall Quarter.

EDU 215—Research on Achievement Motivation in Education (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Analysis and critique of recent research on cognitive processes related to achievement motivation in school settings. Topics include self-determination theory, attribution theory, goal theory, intrinsic and extrinsic motivation, learned helplessness. psychological reactance, gender and culture, and research design. Effective: 2016 Fall Quarter.

EDU 220—Concepts and Methods of Policy Analysis (4)
Fieldwork; Seminar—3 hours; Term Paper. Introduction to concepts and methods of policy analysis. Emphasis on the relationship between educational issues and problems; policy development; constructing persuasive policy analyses; issues related to policy process. Effective: 2016 Fall Quarter.

EDU 221—Culture and Social Organization of Schools (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Culture and social organization of schools. Examines perspectives of social researchers, educational policy-makers, and school members and their implications for educational research, policy and practice. Effective: 2016 Fall Quarter.

EDU 222—School Change and Educational Reform (4)
Lecture/Discussion—2 hours; Seminar—2 hours. Analysis of models, processes, and case studies of school change and
educational reform with respect to variable characteristics of schools and schooling, planned and unplanned change, the moral evaluation of school change, and the role of educational research. Effective: 2016 Fall Quarter.

EDU 223—Education and Social Policy (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Focuses on understanding the social and political context of education
in the U.S. and California and how education policy is formed in the broader public arena. Develops skills in educational policy analysis. (Former course 237.) Effective: 2016 Fall Quarter.

EDU 225—Education Policy and Law (4)
Lecture/Discussion—4 hours. Examination of law as an instrument of social policy. Specific focus on the legalization of education decision making, its causes, dimensions, and effects on administrative and teacher authority. Effective: 2016 Fall Quarter.

EDU 226—Culture and Social Organization of Higher Education (4)
Fieldwork—1 hour; Seminar—3 hours. Prerequisite(s): Consent of Instructor. Critical study of culture and social organization of higher education institutions policies and functions in the U.S., with some attention to other countries. Effective: 2016 Fall Quarter.

EDU 228—Politics and Governance of Education (4)
Seminar—3 hours; Term Paper. Examination of political power, representation, influence, decision-making and inter-governmental relations in the public schools. Effective: 2016 Fall Quarter.

EDU 229—Education Finance Policy (4)
Seminar—3 hours; Term Paper. Examination of (1) United States financing public education, (2) the relationship between school finance and education policy, and (3) the relationship between education finance and education practice. Effective: 2016 Fall Quarter.

EDU 230—Special Topics in Education Policy (4)
Seminar—3 hours; Term Paper. Selected topics in education policy. Designed to facilitate preparation for the qualifying examination or dissertation. Students will critically analyze scholarly work including their own works in progress. May be repeated for credit for credit when topic differs. Effective: 2016 Fall Quarter.

EDU 235—Critical Pedagogy (4)
Seminar—4 hours. A socio-cultural critique, from an interdisciplinary perspective, of educational reform and change. The critique will include an analysis of the influence of text content on the perpetuation of social power differences. Effective: 2016 Fall Quarter.

EDU 236—Application of Hierarchical Linear Models in Education Research (4)
Discussion/Laboratory—2 hours; Lecture—2 hours; Term Paper. Prerequisite(s): EDU 204A; Or similar course with permission of the instructor. Application of hierarchical linear models in education research across multiple areas, such as policy, curriculum, and assessment. Develop working knowledge of hierarchical linear modeling and an understanding of its use in existing research as well as student's work. Effective: 2009 Spring Quarter.

EDU 237—Survey Research Methods (4)
Fieldwork—1 hour; Lecture/Discussion—3 hours; Term Paper. Theories, principles and application of survey research methodology. Students develop, validate, and administer survey instruments; select representative samples; conduct focus groups; and collect, organize, and analyze survey data. Familiarity with introductory concepts in descriptive and inferential statistics is assumed. Effective: 2016 Fall Quarter.

EDU 238—Participatory Action Research (PAR) (4)
Fieldwork—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): Introductory research methods course recommended. Principles and strategies of PAR and related methodologies that emphasize collaborating with those affected by the issue being researched in order to educate, take action or effect social change. Conduct interviews with potential collaborators, case analyses and research proposals. Effective: 2016 Fall Quarter.

EDU 239—Interview Methods (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): EDU 201 or equivalent course recommended. Introduction to qualitative interviewing, focused in particular on narrative and self-story as both practical method and theoretical stance. Students complete a case-focused interview project during the course: designing an interview protocol, conducting the interview, transcribing, analyzing, and presenting their research. Effective: 2015 Winter Quarter.

EDU 242—Research on Text Comprehension (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Analysis of recent research related to cognitive processing of written texts. Topics include word decoding, schema theory, background knowledge, assimilation, accommodation, working memory, processing depth, vocabulary acquisition, sentence-level processes, text-level processes, text structure, implications for curriculum and instruction. Effective: 2016 Fall Quarter.

EDU 243—Research on the Teaching and Learning of Writing (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Study of issues in research on composition; history of composition studies; data analysis techniques; product and process approaches; cognitive and social perspectives. Effective: 2016 Fall Quarter.

EDU 244—Topical Seminar in Language, Literacy and Culture (4)
Project (Term Project)—1 hour; Seminar—3 hours. Critical study of selected issues of language, literacy, and culture as they relate to education. May be repeated up to 2 time(s) topics differ. Effective: 2016 Fall Quarter.

EDU 245—Theory and Research in Early Literacy (4)
Fieldwork—1 hour; Seminar—3 hours. Analysis of children's initial processes in learning to read extending from the preschool years into second grade. Topics include emergent literacy, phonological awareness, word recognition, decoding, spelling, vocabulary, comprehension, second language reading, assessment, intervention, and instruction. GE credit: SS. Effective: 2016 Fall Quarter.

EDU 246—Reading as a Social and Cultural Process (4)
Fieldwork—1 hour; Lecture—3 hours. Prerequisite(s): EDU 211 recommended. Recent theoretical and empirical work on reading in social contexts. Topics include reading as an individual interactive process; reading as a social and cultural process; critical perspectives on reading; implications of contrastive theoretical perspectives for curriculum and instruction in reading. Effective: 2016 Fall Quarter.

EDU 247—Research on Response to Culturally Diverse Literature, K-12 (4)
Fieldwork—1 hour; Seminar—3 hours. Research on response to culturally diverse literature in classrooms and other K-12 settings. Topics include reader response theories, values in expanding the literary canon, problems of cultural authenticity, resistance to multicultural literature, and instruction for diverse texts and learners. Effective: 2006 Fall Quarter.

EDU 248—Academic Language and Literacies (4)
Fieldwork; Project (Term Project); Seminar—3 hours. Exploration of theories and research on academic language and literacies for
the schooling of first and second language learners. Students use basic
qualitative methods to collect and analyze classroom language and literacy
data. Effective: 2011 Fall Quarter.

EDU 249—Discourse Analysis in Educational Settings (4)
Seminar—3 hours; Term Paper. Prerequisite(s): An introductory linguistics or sociolinguistics course or consent of instructor. Examines form and type in discourse (e.g., narration, conversation, routines), approaches to discourse analysis, and research on classroom discourse (lessons, teaching/learning interactional sequences). Final term paper is an analysis of discourse data tape-recorded by student in a field setting. Effective: 2016 Fall Quarter.

EDU 251—Research in Bilingual and Second Language Education (3)
Seminar—3 hours. Discussion and analysis of recent research in bilingual and second language education. Topics include:language acquisition in second language learners and bilinguals, second language teaching methods, language-use models in bilingual education, interaction analysis in bilingual/cross-cultural classrooms,use of the vernacular in classrooms. Effective: 2016 Fall Quarter.

EDU 253—Language and Literacy in Linguistic Minorities (3)
Fieldwork—3 hours; Seminar—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Analysis and application of research on oral language development and literacy in language minority students, through the development, implementation, and evaluation of research-based language arts curriculum. Effective: 2016 Fall Quarter.

EDU 255—Curriculum Development and Evaluation in Mathematics (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Analysis of curricular issues and goals in mathematics education, including long-term trends, current status and influences, proposed changes, and evaluation issues. Selected curriculum projects will be examined. Effective: 2016 Fall Quarter.

EDU 256A—Research in Mathematics Education (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Examination of research process in mathematics education; review of critical productive problems identified by researchers; evolution of trends, issues, theories and hypotheses in various areas of mathematics education research. Course emphasizes foundations. Effective: 2016 Fall Quarter.

EDU 256B—Research in Mathematics Education (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Current research issues and activities in mathematics education: status, trends, theories and hypotheses. Formulation of research questions and design of studies. Projection of future directions for research. Effective: 2016 Fall Quarter.

EDU 257—Computer Technology in Mathematics Education (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Roles of calculators, computers, and graphing calculators in mathematics education will be addressed, with emphasis on the impact of these technologies on curriculum reform. Selected efforts to integrate technology into mathematics instruction will be examined. Effective: 2016 Fall Quarter.

EDU 260—The Modern History of Science Education (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. History of curricular issues and goals in science education from the late 19th century forward, including long-term trends, current status and influences, proposed changes, and evaluation issues. National science standards and curriculum projects. Effective: 2016 Fall Quarter.

EDU 262A—Research Topics in Science Education I (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Research process and product in science education; review of critical science education issues; evolution of trends, theories and hypotheses in various areas of science education research. Survey of current major research in science education. Effective: 2016 Fall Quarter.

EDU 262B—Research Topics in Science Education II (4)
Seminar—4 hours. Current research issues and activities in science education: status, trends, theories and hypotheses. Formulation of research questions, design of studies and critical, in-depth review of literature related to the student's research interests. Effective: 2016 Fall Quarter.

EDU 264—Scientific Literacy and Science Education Reform (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Current trends in science education reform locally, regionally, and
nationally focusing on scientific literacy. Equity, access and "science for all." Effective: 2016 Fall Quarter.

EDU 270—Research on Teacher Education and Development (4)
Project (Term Project); Seminar—3 hours. Research on teacher preparation in university credential programs and on professional development of in-service teachers, with special attention to teacher preparation for work with culturally and linguistically diverse youth. Effective: 2016 Fall Quarter.

EDU 271—Supervision of Student Teachers: Research, Theory & Practice (4)
Fieldwork—1 hour; Lecture/Discussion—3 hours. Research, theory and practice in the preparation and supervision of teachers. Practice in the supervision of candidates in university teaching credential programs during the student teaching field placement and the mentoring of novice teachers by expert teachers. Effective: 2016 Fall Quarter.

EDU 275A—Effective Instruction: Curriculum and Assessment-Theory, Research, and Practice (2)
Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Restricted to Teaching Credential majors. Examination of contemporary theories of curriculum development, research about the relationship among instructional planning, classroom assessment, and student learning to guide teaching practice. Effective: 2013 Fall Quarter.

EDU 275B—Effective Instruction: English Language Development and Instructing English Language Learners (2)
Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in the Teaching Credential Program. Analysis and application of English language acquisition and development research to teaching practice. Particular attention to research that enhances learning of English language learners and under-performing students. Effective: 2016 Fall Quarter.

EDU 280A—Inquiry and Practice: Qualitative Research for Educational Leaders (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Prepares students to understand the nature/assumptions/logic of qualitative methodology as applied to educational settings, focusing on issues of design/conceptualization/ interpretation/application of qualitative research procedures. Students will use these methods in conducting studies in their educational settings. Effective: 2009 Fall Quarter.

EDU 280B—Inquiry and Practice: Quantitative Research for Educational Leaders (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Field-based and general quantitative research methods in education will focus this course. Students acquire skills and knowledge to collect, organize, analyze, and interpret univariate and multivariate quantitative data in educational research, dissertation projects, and field-based projects. Effective: 2010 Winter Quarter.

EDU 280C—Inquiry and Practice: Research Design and Application for Educational Leaders (4)
Fieldwork; Lecture—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Educational leaders are introduced to qualitative, quantitative, and mixed-methods educational research methods and learn to frame research questions, identify data/data sources, use descriptive statistics, critically examine research studies, make sense of educational research/policy, and conduct independent studies. Effective: 2010 Spring Quarter.

EDU 281A—Problem-Based Learning Courses: Part 1 (4)
Extensive Writing/Discussion; Fieldwork; Lecture/Discussion—4 hours. Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Students identify problems from their educational settings, engage in data collection/analysis, write-up the process/results, and present to class. Work may become a dissertation proposal, if the problem or its extension is of sufficient interest and value. Effective: 2009 Fall Quarter.

EDU 281B—Problem-Based Learning Courses: Part 2 (4)
Extensive Writing/Discussion; Fieldwork; Lecture/Discussion—4 hours. Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Continuation of part one. Effective: 2010 Winter Quarter.

EDU 281C—Problem-Based Learning Courses: Part 3 (4)
Extensive Writing/Discussion; Fieldwork; Lecture/Discussion—4 hours. Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Continuation of part two. Effective: 2010 Spring Quarter.

EDU 282A—Beginning Issues and Practices: Contemporary Educational Leadership (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Students explore the history and emergent relationships among leadership theories/practice and their application to current educational settings. Students will reflect on and refine their personal theory of leadership. Effective: 2009 Fall Quarter.

EDU 282B—Beginning Issues and Practices: Diversity Issues for Educational Leaders (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. The diversity of stakeholders and community issues in California schools and colleges will be explored. Emphasis will be placed on the interaction between underrepresented segments of society and educational institutions. Best Practices in leading diverse schools will be explored. Effective: 2010 Winter Quarter.

EDU 283A—Advanced Issues and Practices: Leadership Across Communities (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Students examine the theory/practice/process of leadership in community-building and collaboration in/across communities, while addressing the utilization of human and material resources and the creation of partnerships, community linkages, and collaborative efforts. Effective: 2010 Spring Quarter.

EDU 283B—Advanced Issues and Practices: Leadership and Student Services (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Practical and theoretical perspectives for building a sense of vision to lead the profession of student affairs and to meet the needs of the whole student. Effective: 2010 Spring Quarter.

EDU 284A—Policy: History and Theory of Educational Policy (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Students learn/analyze the history/theory of educational policy. They see how education leaders have/can positively influence the process and implement effective policies in their local institutions. Policy issues covered: educational opportunity, equity, access, regulation, testing, tenure, accountability. Effective: 2009 Fall Quarter.

EDU 284B—Policy: Formulating and Influencing Policy (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Students will conduct critical analyses of policy at the federal, judicial, state, regional and local levels. Specific California and federal policy environment structures, processes and people will be examined for intended consequences, ethical dilemmas, social justice and equity issues. Effective: 2010 Winter Quarter.

EDU 284C—Policy: Possibilities and Limitations of Educational Policy in a Democracy (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Students will critically examine the democratic purposes of education in light of existing National, State, and local policy reform efforts. Questions like, In what ways are these reforms and policies guided by democratic ideas and challenged by those ideals. Effective: 2010 Winter Quarter.

EDU 285A—Educational Finance, Human Resources, and Law: Integrated Seminar: Human and Financial Assets: Allocations, and Budgets (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Topics include: education finance theory, contemporary finance policy issues, intergovernmental relations, effective resource management, budget analysis and preparation. Effective: 2010 Spring Quarter.

EDU 285B—Educational Finance, Human Resources, and Law: Ethical and Legal Issues in Education (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Human resource and legal concepts and activities governing decisions of school leaders in public education. Attention to theory, application, and practice of personnel and risk management, curriculum, student services, teacher rights, torts, student rights. Effective: 2009 Fall Quarter.

EDU 285C—Educational Finance, Human Resources, and Law: Human Resources and Personnel (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Human resource management research and theory and for applying human resource techniques in the educational setting. Effective: 2010 Spring Quarter.

EDU 286A—Organizational Structures and Change: Data-Driven Decision-Making for Change (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Students use and examine multiple sources of information and data and trends found in making quality decisions to improve P-12/community college settings and addressing problems at sites. Students learn limitations of these data sources. Effective: 2009 Fall Quarter.

EDU 286B—Organizational Structures and Change: Curriculum & Instruction Issues in Education (4)
Fieldwork; Lecture/Discussion—4 hours; Project (Term Project). Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. This course addresses the historical development of various curriculum and instructional methodologies found in public and private schools and colleges, and their impact on current curriculum development and reform efforts at the national, state and local level. Effective: 2010 Winter Quarter.

EDU 287—CANDEL Dissertation Seminars (6-12)
Variable—18-36 hours. Prerequisite(s): Admission into the CANDEL EdD program or consent of instructor. Third year seminars encourage students to complete dissertations within the year. Cohort members meet together in every three-week meetings with faculty members and share their writing, data collection, analysis, discussion of results, development of conclusions/implications. May be repeated up to 9 time(s) until completion of dissertation. (S/U grading only.) Effective: 2009 Fall Quarter.

EDU 287D—CANDEL Dissertation (6-12)
Variable—18-36 hours. Prerequisite(s): Consent of Instructor. Passing of qualifying exams in CANDEL program and advancement to candidacy. Cohort members continue to meet with faculty and share their writing, data collection, analysis, development of conclusions/implications. May be repeated up to 9 time(s) until completion of dissertation. (S/U grading only.) Effective: 2016 Fall Quarter.

EDU 291—Proseminar in Education (4)
Fieldwork—3 hours; Seminar—3 hours. Prerequisite(s): Admission to the M.A. or Ph.D. graduate program in Education. Professional induction into educational research field and Graduate Group in Education at UC Davis. Introduction to landscape of educational research methodologies, purposes and theories. Analysis of debates within field. Investigation of K-12 educational outreach efforts at UC Davis. May be repeated up to 2 time(s) May take the course one time as an MA student and one time as a PhD student. Effective: 2016 Fall Quarter.

EDU 292—Special Topics in Education (2-4)
Variable—2-4 hours. Prerequisite(s): Consent of Instructor. Selected topics in education. Designed to facilitate preparation for the qualifying examination or dissertation. Students will critically analyze scholarly work including their own works in progress. May be repeated for credit. Effective: 2016 Fall Quarter.

EDU 294—Special Topics in Science, Agriculture and Mathematics Education (4)
Project (Term Project); Seminar—3 hours; Term Paper. Critical study of special topics of research relevant to science, agricultural and mathematics education. Students and faculty present work-in-progress on a major research project, and critically analyze and discuss one another's developing scholarly work. May be repeated for credit topic differs. Effective: 2016 Fall Quarter.

EDU 295—Special Topics in Learning and Mind Science (4)
Seminar—3 hours; Term Paper. Critical study of selected issues in the learning sciences, neurodevelopmental disorders, and psychometrics and measurement, as they relate to education. May be repeated for credit when topics differs. Effective: 2016 Fall Quarter.

EDU 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Group study. (S/U grading only.) Effective: 2016 Fall Quarter.

EDU 299—Individual Study (1-6)
Variable—3-18 hours. Prerequisite(s): Consent of Instructor. Individual study under the direction of a faculty member. (S/U grading only.) Effective: 2016 Fall Quarter.

EDU 299D—Research (1-12)
Independent Study—3-36 hours. Prerequisite(s): Consent of Instructor. Research for individual graduate students. (S/U grading only.) Effective: 2016 Fall Quarter.

EDU 300—Reading in the Elementary School (4)
Fieldwork—3 hours; Lecture—3 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Principles, procedures, and curriculum materials for teaching of reading. Includes decoding skills with a special emphasis on phonics, comprehension skills, study skills, and reading in the content areas. Effective: 2016 Fall Quarter.

EDU 301—Reading in the Secondary School (4)
Discussion—4 hours. Prerequisite(s): Graduate standing, enrollment in the secondary credential program or consent of instructor. Principles, procedures, and materials to help secondary school teachers improve the reading competence of students. Strategies for enhancing learning through reading and writing in all disciplines, with special attention to linguistically diverse populations. Effective: 1997 Winter Quarter.

EDU 301A—Teaching Literacy in High School Contexts (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Acceptance in Teacher Credential Program. Restricted to students enrolled in the secondary credential program. Focuses on secondary school literacy practices and strategies for engaging English-speaking and bilingual students with textual, image, and digital literacies across content areas. Covers reading and writing, the Common Core and Language Proficiency standards. Effective: 2016 Fall Quarter.

EDU 301B—Teaching Literacy in High School Contexts (2)
Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Restricted to students enrolled in the secondary credential program. Focuses on secondary school literacy practices and strategies for engaging English-speaking and bilingual students with textual, image, and digital literacies across content areas. Covers reading and writing, the Common Core and Language Proficiency standards. Effective: 2016 Fall Quarter.

EDU 302—Language Arts in the Elementary School (2)
Lecture—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Principles, procedures, and materials for the teaching of oral and written expression, listening skills, drama, and children's literature in elementary schools. Effective: 2016 Fall Quarter.

EDU 303—Art Education in the Elementary School (2)
Laboratory—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Understanding the principles of education in the arts through participation. Development of concepts, introduction to media, and techniques suitable for the elementary school with emphasis on cross-discipline exploration. Effective: 2016 Fall Quarter.

EDU 304A—Teaching in the Elementary Schools (2-18)
Fieldwork—9-48 hours; Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Supervised teaching in regular classrooms in elementary schools. Selection and organization of teaching materials. Introduction to techniques of diagnosing school achievement of children. Effective: 2016 Fall Quarter.

EDU 304B—Teaching in the Elementary Schools (2-18)
Fieldwork—9-48 hours; Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Supervised teaching in regular classrooms in elementary schools. Current conceptions of elementary school curriculum, emphasis on contributions
from the social, biological, and physical sciences. Emphasis on effective teaching methods. Effective: 2016 Fall Quarter.

EDU 304C—Teaching in the Elementary Schools (2-18)
Fieldwork—9-48 hours; Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Supervised teaching in regular classrooms in elementary schools. Evaluation of teaching materials including instructional technology. Current elementary school curriculum with emphasis on contributions from fine arts and humanities. Effective: 2016 Fall Quarter.

EDU 305A—Teaching in the Middle Grades (5-8)
Lecture—2 hours; Seminar—2 hours; Variable—15-30 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Supervised teaching in regular or special education classrooms in middle
grades. Current conceptions of the middle-grades curriculum with emphasis on social, biological, and physical sciences. Effective teaching methods. Effective: 2016 Fall Quarter.

EDU 306A—Teaching in the Secondary Schools (2-18)
Fieldwork—9-48 hours; Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Supervised teaching in regular secondary classrooms. Techniques for classroom communications; constructing goals and objectives; assessment of learning; special problems of adolescents; instructional technology. Effective: 2016 Fall Quarter.

EDU 306B—Teaching in the Secondary Schools (2-18)
Fieldwork—9-48 hours; Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Supervised teaching in regular secondary classrooms. Techniques for classroom communications; constructing goals and objectives; assessment of learning; special problems of adolescents; instructional technology. Effective: 2016 Fall Quarter.

EDU 306C—Teaching in the Secondary Schools (2-18)
Fieldwork—9-48 hours; Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Supervised teaching in regular secondary classrooms. Techniques for classroom communications; constructing goals and objectives; assessment of learning; special problems of adolescents; instructional technology. Effective: 2016 Fall Quarter.

EDU 307—Methods in Elementary Science (2)
Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Principles, procedures, and materials for teaching the biological and physical sciences in elementary schools. Effective: 2016 Fall Quarter.

EDU 308—Methods in Elementary Social Studies (2)
Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Principles, procedures, and materials for teaching history and the social sciences in elementary schools. Effective: 2016 Fall Quarter.

EDU 309—The Teaching of Mathematics, K-9 (3)
Lecture/Discussion—3 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Mathematics curriculum and teaching methods for K-9 reflecting the needs of California's diverse student populations. Effective: 2016 Fall Quarter.

EDU 310—Teaching as Reflective Practice (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Acceptance in Teacher Credential Program. Presentation of issues related to classroom instruction and professional practice, reflections on classroom instruction and other documentation related to student teaching experience. May be repeated up to 6 time(s). Effective: 2016 Fall Quarter.

EDU 320—Creating Classroom Communities (1)
Fieldwork—30 hours; Lecture/Discussion—2 hours. Acceptance in Teacher Credential Program. Observation of classrooms at beginning of academic year for first-hand experience with teachers' approaches to creating communities and setting routines. Candidates are placed with students they will teach during student teaching. Candidates may take on teaching tasks as appropriate. Effective: 2016 Summer Special Session.

EDU 322A—Pedagogical Preparation for Secondary Social Science I (3)
Discussion—1 hour; Lecture/Discussion—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Introduction to teaching methods and curriculum approaches for secondary social science teaching. State and national curriculum standards; application of learning theory to effective instruction; interdisciplinary teaching and active learning approaches; effective teaching strategies for English learners. Effective: 2016 Fall Quarter.

EDU 322B—Pedagogical Preparation for Secondary Social Science II (3)
Discussion—2 hours; Lecture/Discussion—1 hour. Prerequisite(s): Acceptance in Teacher Credential Program. Intermediate teaching methods and curriculum approaches for secondary social science teaching. Interdisciplinary approaches to teaching major themes across social science content areas; teaching potentially controversial social science topics; teaching democratic civic values, student assessment and evaluation. Effective: 2016 Fall Quarter.

EDU 323A—Physical Science in the Secondary School (3)
Discussion/Laboratory—1 hour; Discussion/Laboratory—2 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Activity-based overview of concepts and processes in secondary school physical sciences. Emphasis upon philosophy, appropriate teaching methods, materials, assessment and evaluation of learning. Effective: 2016 Fall Quarter.

EDU 323B—Life Sciences in the Secondary School (3)
Discussion/Laboratory—2 hours; Discussion/Laboratory—1 hour. Prerequisite(s): Acceptance in Teacher Credential Program. Activity-based overview of concepts and processes in secondary school biology and life sciences. Emphasis on philosophy, appropriate teaching methods, materials, assessment and evaluation of learning, and issues. Effective: 2016 Fall Quarter.

EDU 324A—Methods and Technology in Secondary Mathematics I (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Acceptance in Teacher Credential Program. Introduction to methods and curriculum for teaching mathematics at the secondary level. Introduction to applications of computer technology as instructional, intellectual, and communication tools for mathematics teachers. Effective: 2016 Fall Quarter.

EDU 324B—Methods in Secondary Mathematics II (3)
Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Acceptance in Teacher Credential Program. Expansion of methods and curriculum for teaching mathematics at the secondary level. Intermediate applications of computer technology as instructional, intellectual, and communication tools in mathematics teaching. Effective: 2016 Fall Quarter.

EDU 325—Research and Methods in Secondary English Language Arts (4)
Discussion—4 hours. Prerequisite(s): Consent of Instructor. Acceptance in Teacher Credential Program. Research on teaching and learning in the language arts. Principles, procedures and materials for improving the writing, reading and oral language of secondary students, with special attention to students from culturally and linguistically diverse populations. Effective: 2016 Fall Quarter.

EDU 326—Teaching Language Minority Students in Secondary Schools: Methods and Research (4)
Fieldwork—3 hours; Seminar—3 hours. Prerequisite(s): Consent of Instructor. Acceptance in Teacher Credential Program. Research on principles, procedures and curricula for teaching discipline-specific concepts to language-minority students in secondary schools. Second-language acquisition principles and instructional strategies. Effective: 2016 Fall Quarter.

EDU 327A—Teaching Methods for Secondary Foreign Language/Spanish, Part I (3)
Lecture—3 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Introduction to methods for teaching Spanish as a foreign and a heritage language in secondary schools. State and National Standards. Theories on second language acquisition. Lesson plans. Effective teaching strategies and class management. Effective: 2016 Fall Quarter.

EDU 327B—Teaching Methods for Secondary Foreign Language/Spanish, Part II (3)
Lecture—3 hours. Prerequisite(s): Acceptance in Teacher Credential Program. Continuation to methods for teaching Spanish as a foreign and a heritage language in secondary schools. Research and practice on foreign and heritage language teaching. Expansion of effective teaching strategies and class management. Effective: 2016 Fall Quarter.

EDU 398—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

EDU 399—Individual Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

EEC Engineering Electrical & Computer

Courses in EEC:

EEC 001—Introduction to Electrical and Computer Engineering (1)
Lecture—1 hour. Electrical and Computer Engineering as a professional activity. What Electrical and Computer Engineers know and how they use their knowledge. (P/NP grading only.) GE credit: SE. Effective: 2012 Fall Quarter.

EEC 010—Introduction to Digital and Analog Systems (4) ***Review all entries***
Laboratory—3 hours; Lecture—2 hours; Project (Term Project). Prerequisite(s): ECS 030; (PHY 009C (can be concurrent) or PHY 009HD (can be concurrent)); and Consent of Instructor. Open to Electrical and Computer Engineering sophomores. Interactive and practical introduction to fundamental concepts of electrical and computer engineering by implementing electronic systems, which can be digitally controlled and interrogated, with a programmable microcontroller with the ability to program the electrical connections between analog and digital components. GE credit: SE. Effective: 2017 Winter Quarter.

EEC 010—Introduction to Digital and Analog Systems (4) ***Review all entries***
Laboratory—3 hours; Lecture—2 hours; Project (Term Project). Prerequisite(s): (PHY 009C (can be concurrent) or PHY 009HD (can be concurrent)); (ECS 030 or ECS 036B or EEC 007); ENG 017; Consent of Instructor. Open to Electrical and Computer Engineering sophomores. Interactive and practical introduction to fundamental concepts of electrical and computer engineering by implementing electronic systems, which can be digitally controlled and interrogated, with a programmable microcontroller with the ability to program the electrical connections between analog and digital components. GE credit: SE. Effective: 2019 Winter Quarter.

EEC 089A—Special Topics in Electromagnetics (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Electromagnetics. May be repeated for credit if topic differs. GE credit: SE. Effective: 2011 Winter Quarter.

EEC 089B—Special Topics in Physical Electronics (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special topics in Physical Electronics. May be repeated for credit if topic differs. GE credit: SE. Effective: 2011 Winter Quarter.

EEC 089C—Special Topics in Active and Passive Circuits (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special topics in Active and Passive Circuits. May be repeated for credit if topic differs. GE credit: SE. Effective: 2011 Winter Quarter.

EEC 089D—Special Topics in Signals and Systems (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special topics in Signals and Systems. May be repeated for credit if topic differs. GE credit: SE. Effective: 2011 Winter Quarter.

EEC 089E—Special Topics in Computer Systems and Software (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special topics in Computer Systems and Software. May be repeated for credit if topic differs. GE credit: SE. Effective: 2011 Winter Quarter.

EEC 089F—Special Topics in Digital System Design (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special topics in Digital System Design. May be repeated for credit if topic differs. GE credit: SE. Effective: 2011 Winter Quarter.

EEC 090C—Research Group Conference in Electrical and Computer Engineering (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Lower division standing. Research group conferences. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

EEC 090X—Lower Division Seminar (1-4)
Seminar—1-4 hours. Prerequisite(s): Consent of Instructor. Examination of a special topic in a small group setting. May be repeated for credit. Effective: 1997 Winter Quarter.

EEC 092—Internship in Electrical and Computer Engineering (1-5)
Internship—3-15 hours. Prerequisite(s): Lower division standing; project approval prior to period of internship. Supervised work experience in Electrical and Computer Engineering. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

EEC 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

EEC 099—Special Study for Lower Division Students (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

EEC 100—Circuits II (5) ***Review all entries***
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 017 C- or better Restricted to the following majors: Electrical Engineering, Computer Engineering, Computer Science & Engineering, Electronic Materials Engineering, Electrical Engineering/Materials Science, Optical Science & Engineering, Biomedical Engineering, Applied Physics, Electrical & Computer Engineering graduate students. Theory, application, and design of analog circuits. Methods of analysis including frequency response, SPICE simulation, and Laplace transform. Operational amplifiers and design of active filters. Students who have completed Engineering 100 may receive 3.5 units of credit. GE credit: QL, SE, VL. Effective: 2014 Fall Quarter.

EEC 100—Circuits II (5) ***Review all entries***
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 017 C- or better; MAT 022B Restricted to the following majors: Electrical Engineering, Computer Engineering, Computer Science & Engineering, Electronic Materials Engineering, Electrical Engineering/Materials Science, Optical Science & Engineering, Biomedical Engineering, Applied Physics, Electrical & Computer Engineering graduate students. Theory, application, and design of analog circuits. Methods of analysis including frequency response, SPICE simulation, and Laplace transform. Operational amplifiers and design of active filters. Students who have completed ENG 100 may receive 3.5 units of credit. GE credit: QL, SE, VL. Effective: 2018 Fall Quarter.

EEC 110A—Electronic Circuits I (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 100; EEC 140A (can be concurrent) Use and modeling of nonlinear solid-state electronic devices in basic analog and digital circuits. Introduction to the design of transistor amplifiers and logic gates. GE credit: SE, VL. Effective: 2018 Winter Quarter.

EEC 110B—Electronic Circuits II (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 110A Analysis and design of integrated circuits. Single-stage amplifiers, cascaded amplifier stages, differential amplifiers, current sources, frequency response, and return-ratio analysis of feedback amplifiers. GE credit: SE, VL. Effective: 2009 Fall Quarter.

EEC 112—Communication Electronics (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 110A; EEC 150A; EEC 110B recommended. Electronic circuits for analog and digital communication, including oscillators, mixers, tuned amplifiers, modulators, demodulators, and phase-locked loops. Circuits for amplitude modulation (AM) and frequency modulation (FM) are emphasized. GE credit: SE. Effective: 2014 Spring Quarter.

EEC 116—VLSI Design (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 110A; EEC 180A recommended. CMOS devices, layout, circuits, and functional units; VLSI fabrication and design methodologies. GE credit: SE. Effective: 2014 Spring Quarter.

EEC 118—Digital Integrated Circuits (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 110A; EEC 180A Analysis and design of digital integrated circuits. Emphasis on MOS logic circuit families. Logic gate construction, voltage transfer characteristics, propagation delay, and power consumption. Regenerative circuits, sequential elements, interconnect, RAMs, ROMs, and PLAs. GE credit: SE. Effective: 2011 Spring Quarter.

EEC 119A—Integrated Circuit Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): EEC 116 or EEC 118 Design course involving architecture, circuit design, physical design, and validation through extensive simulation of a digital or mixed-signal integrated circuit of substantial complexity under given design constraints. Team project that includes a final report. GE credit: SE. Effective: 2014 Fall Quarter.

EEC 119B—Integrated Circuit Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): EEC 119A Design course involving architecture, circuit design, physical design, and validation through extensive simulation of a digital or mixed-signal integrated circuit of substantial complexity under given design constraints. Team project that includes a final report. GE credit: SE. Effective: 2014 Fall Quarter.

EEC 130A—Electromagnetics I (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021D; (PHY 009C or PHY 009HD); ENG 017 Basics of static electric and magnetic fields and fields in materials. Work and scalar potential. Maxwell's equations in integral and differential form. Plan waves in lossless media. Lossless transmission lines. GE credit: SE. Effective: 2016 Fall Quarter.

EEC 130B—Introductory Electromagnetics II (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 130A Plane wave propagation in lossy media, reflections, guided waves, simple modulated waves and dispersion, and basic antennas. GE credit: SE. Effective: 1997 Winter Quarter.

EEC 132A—RF and Microwaves in Wireless Communication (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 110A; EEC 130B Study of Radio Frequency and Microwave theory and practice for design of wireless electronic systems. Transmission lines, microwave integrated circuits, circuit analyis of electromagnetic energy transfer systems, the scattering parameters. GE credit: SE. Effective: 2015 Winter Quarter.

EEC 132B—RF and Microwaves in Wireless Communication (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 132A Passive RF and microwave device analysis, design, fabrication, and testing for wireless applications. RF and microwave filter and coupler design. Introductory analysis and design of RF and microwave transistor amplifiers. GE credit: SE. Effective: 2007 Winter Quarter.

EEC 132C—RF and Microwaves in Wireless Communications (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 132B RF and microwave amplifier theory and design, including transistor circuit models, stability considerations, noise models and low noise design. Theory and design of microwave transistor oscillators and mixers. Wireless system design and analysis. GE credit: SE. Effective: 2009 Spring Quarter.

EEC 133—Electromagnetic Radiation and Antenna Analysis (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 130B Properties of electromagnetic radiation; analysis and design of antennas: ideal cylindrical, small loop, aperture, and arrays; antenna field measurements. GE credit: SE. Effective: 1999 Fall Quarter.

EEC 133—Electromagnetic Radiation and Antenna Analysis (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 130B Properties of electromagnetic radiation; analysis and design of antennas: ideal cylindrical, small loop, aperture, and arrays; antenna field measurements. GE credit: SE. Effective: 2018 Fall Quarter.

EEC 134A—RF/Microwave Systems Design (3)
Laboratory—6 hours; Workshop—3 hours. Prerequisite(s): EEC 130B or EEC 110B or EEC 150A Class size limited to 24 students. Board-level RF design, fabrication, and characterization of an RF/microwave system, including the antenna, RF front-end, baseband, mix-signal circuits, and digital signal processing models. GE credit: SE. Effective: 2014 Fall Quarter.

EEC 134B—RF/Microwave Systems Design (3)
Laboratory—6 hours; Workshop—3 hours. Prerequisite(s): EEC 134A Class size limited to 24 students. Board-level RF design, fabrication, and characterization of an RF/microwave system, including the antenna, RF front-end, baseband, mix-signal circuits, and digital signal processing models. GE credit: SE. Effective: 2015 Winter Quarter.

EEC 135—Optical Communications I: Fibers (4)
Lecture—4 hours. Prerequisite(s): EEC 130B Principles of optical communication systems. Planar dielectric waveguides. Optical fibers: single-mode, multi-mode, step and graded index. Attenuation and dispersion in optical fibers. Optical sources (LEDs and lasers) and receivers. Design of digital optical transmission systems. GE credit: SE. Effective: 2012 Winter Quarter.

EEC 136A—Electronic Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): ECS 030; EEC 100; EEC 180A; (EEC 110B or EEC 157A (can be concurrent) or EEC 180B) Pass One restricted to major. Optical, electronic and communication-engineering design of an opto-electronic system operating under performance and economic constraints. Measurement techniques will be designed and implemented, and the system will be characterized. GE credit: SE. Effective: 2015 Fall Quarter.

EEC 136B—Electronic Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): EEC 136A Optical, electronic and communication-engineering design of an opto-electronic system operating under performance and economic constraints. Measurement techniques will be designed and implemented, and the system will be characterized. GE credit: SE. Effective: 2014 Fall Quarter.

EEC 140A—Principles of Device Physics I (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 017; (PHY 009D or PHY 009HE) Semiconductor device fundamentals, equilibrium and non-equilibrium statistical mechanics, conductivity, diffusion, electrons and holes, p-n and Schottky junctions, first-order metal-oxide-semiconductor (MOS) field effect transistors, bipolar junction transistor fundamentals. GE credit: SE, SL. Effective: 2016 Fall Quarter.

EEC 140A—Principles of Device Physics I (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 017 (can be concurrent); (PHY 009D or PHY 009HE) Semiconductor device fundamentals, equilibrium and non-equilibrium statistical mechanics, conductivity, diffusion, electrons and holes, p-n and Schottky junctions, first-order metal-oxide-semiconductor (MOS) field effect transistors, bipolar junction transistor fundamentals. GE credit: SE, SL. Effective: 2018 Fall Quarter.

EEC 140B—Principles of Device Physics II (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 140A Electrical properties, designs, models and advanced concepts for MOS, Bipolar, and Junction Field-Effect Transistors, including scaling, minority-carrier distributions, non-ideal effects, and device fabrication methods. MESFET and heterojunction bipolar transistors (HBTs). Fundamentals of solar cells, photodetectors, LEDs and semiconductor lasers. GE credit: SE. Effective: 2010 Spring Quarter.

EEC 145—Electronic Materials (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 140A Electronic and physical properties of materials used in electronics, ICs, optoelectronics and MEMS. Semiconductors, dielectrics, metals, optical materials, organic semiconductive, optical and nonlinear properties, as well as their synthesis and deposition methods. GE credit: SE. Effective: 2015 Fall Quarter.

EEC 146A—Integrated Circuits Fabrication (4)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): EEC 140A Theoretical and experimental study of basic fabrication processes for metal oxide semiconductor integrated circuits, including oxidation, photolithography, impurity diffusion, metallization, wet chemical etching, and characterization. GE credit: SE. Effective: 2018 Winter Quarter.

EEC 146B—Advanced Integrated Circuits Fabrication (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): EEC 146A Restricted to Electrical, Computer, and Electrical/Materials Science majors and Electrical Engineering graduate students; non-majors accommodated when space available. Fabrication processes for CMOS VLSI. Laboratory projects examine deposition of thin films, ion implantation, process simulation, anisotropic plasma etching, sputter metallization, and C-V analysis. Topics include isolation, projection alignment, epilayer growth, thin gate oxidation, and rapid thermal annealing. GE credit: SE. Effective: 1997 Winter Quarter.

EEC 150A—Introduction to Signals and Systems I (4)
Lecture—4 hours. Prerequisite(s): EEC 100; (ENG 006 (can be concurrent) or MAT 022AL (can be concurrent)) Characterization and analysis of continuous-time linear systems. Fourier series and transforms with applications. Introduction to communication systems. Transfer functions and block diagrams. Elements of feedback systems. Stability of linear systems. GE credit: QL, SE. Effective: 2013 Fall Quarter.

EEC 150B—Introduction to Signals and Systems II (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 150A Characterization and analysis of discrete time systems. Difference equation models. Ztransform analysis methods. Discrete and fast Fourier
transforms. Introduction to digital filter design. GE credit: QL, SE. Effective: 2012 Fall Quarter.

EEC 152—Digital Signal Processing (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): EEC 150B; (EEC 070 or ECS 050) Theory and practice of real-time digital signal processing. Fundamentals of real-time systems. Programmable architectures including I/O, memory, peripherals, interrupts, DMA. Interfacing issues with A/D and D/A converters to a programmable DSP. Specification driven design and implementation of simple DSP applications. GE credit: SE. Effective: 2014 Fall Quarter.

EEC 157A—Control Systems (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 100 Analysis and design of feedback control systems. Examples are drawn from electrical and mechanical systems as well as other engineering fields. Mathematical modeling of systems, stability criteria, root-locus and frequency domain design methods. GE credit: SE. Effective: 2013 Fall Quarter.

EEC 157B—Control Systems (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 157A Control system design; transfer-function and state-space methods; sampled-data implementation, digital control. Laboratory includes feedback system experiments and simulation studies. GE credit: SE. Effective: 1997 Winter Quarter.

EEC 160—Signal Analysis and Communications (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 150A Signal analysis based on Fourier methods. Fourier series and transforms; time-sampling, convolution, and filtering; spectral density; modulation: carrier-amplitude, carrier-frequency, and pulse-amplitude. GE credit: SE. Effective: 1997 Winter Quarter.

EEC 161—Probabilistic Analysis of Electrical & Computer Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 100; (ENG 006 or MAT 022AL) Probabilistic and statistical analysis of electrical and computer systems. Discrete and continuous random variables, expectation and moments. Transformation of random variables. Joint and conditional densities. Limit theorems and statistics. Noise models, system reliability and testing. GE credit: SE. Effective: 2016 Spring Quarter.

EEC 165—Statistical and Digital Communication (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 160; EEC 161 Introduction to random process models of modulated signals and noise, and analysis of receiver performance. Analog and digitally modulated signals. Signal-to-noise ratio, probability of error, matched filters. Intersymbol interference, pulse shaping and equalization. Carrier and clock synchronization. GE credit: SE. Effective: 2017 Winter Quarter.

EEC 170—Introduction to Computer Architecture (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 180A; ECS 030 Introduces basic aspects of computer architecture, including computer performance measurement, instruction set design, computer arithmetic, pipelined/non-pipelined implementation, and memory hierarchies (cache and virtual memory). Presents a simplified Reduced Instruction Set Computer using logic design methods from the prerequisite course. GE credit: SE. Effective: 2015 Winter Quarter.

EEC 171—Parallel Computer Architecture (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 170 or ECS 154B Organization and design of parallel processors including shared-memory multiprocessors, cache coherence, memory consistency, snooping protocols, synchronization, scalable multiprocessors, message passing protocols, distributed shared memory and interconnection networks. GE credit: SE. Effective: 2014 Fall Quarter.

EEC 172—Embedded Systems (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): (EEC 170 or ECS 154A); EEC 100 Introduction to embedded-system hardware and software. Topics include: embedded processor and memory architecture; input/output hardware and software, including interrupts and direct memory access; interfacing with sensors and actuators; wired and wireless embedded networking. GE credit: SE. Effective: 2016 Winter Quarter.

EEC 173A—Computer Networks (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECS 060; (ECS 132 or EEC 161 or MAT 135A or STA 131A or STA 120 or STA 032) Pass One open to Computer Science, Computer Science Engineering and Computer Engineering Majors only. Overview of computer networks, TCP/IP protocol suite, computer-networking applications and protocols, transport-layer protocols, network architectures, Internet Protocol (IP), routing, link-layer protocols, local area and wireless networks, medium access control, physical aspects of data transmission, and network-performance analysis. Only 2 units of credit for students who have taken ECS 157. (ECS 152A.) GE credit: SE. Effective: 2016 Fall Quarter.

EEC 173B—Design Projects in Communication Networks (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 173A or ECS 152A Advanced topics and design projects in communication networks. Example topics include wireless networks, multimedia networking, network design and management, traffic analysis and modeling, network simulations and performance analysis. Offered in alternate years. (ECS 152C.) GE credit: SE. Effective: 2005 Spring Quarter.

EEC 180A—Digital Systems I (5)
Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): PHY 009C or PHY 009HD Introduction to digital system design including combinational logic design, sequential and asynchronous circuits, computer arithmetic, memory systems and algorithmic state machine design; computer aided design (CAD) methodologies and tools. GE credit: SE. Effective: 2014 Spring Quarter.

EEC 180B—Digital Systems II (5)
Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): EEC 180A Computer-aided design of digital systems with emphasis on hardware description languages (VHDL), logic synthesis, and field-programmable gate arrays (FPGA). May cover advanced topics in digital system design such as static timing analysis, pipelining, memory system design, testing digital circuits. GE credit: SE. Effective: 2013 Fall Quarter.

EEC 181A—Digital Systems Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): EEC 180B; EEC 170 Digital-system and computer-engineering design course involving architecture, design, implementation and testing of a prototype application-specific processor under given design constraints. This is a team project that includes a final presentation and report. GE credit: SE. Effective: 2018 Winter Quarter.

EEC 181B—Digital Systems Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): EEC 181A Digital-system and computer-engineering design course involving architecture, design, implementation and testing of a prototype application-specific processor under given design constraints. This is a team project that includes a final presentation and report. GE credit: SE. Effective: 2015 Winter Quarter.

EEC 183—Testing and Verification of Digital Systems (5)
Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): EEC 170; EEC 180B Computer aided-testing and design verification techniques for digital systems; physical fault testing; simulation-based design verification; formal verification; timing analysis. GE credit: SE. Effective: 2012 Spring Quarter.

EEC 189A—Special Topics in Electrical Engineering and Computer Science; Computer Science (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Computer Science. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189B—Special Topics in Electrical Engineering and Computer Science; Programming Systems (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Programming Systems. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189C—Special Topics in Electrical Engineering and Computer Science; Digital Systems (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Digital Systems. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189D—Special Topics in Electrical Engineering and Computer Science; Communications (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Communications. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189E—Special Topics in Electrical Engineering and Computer Science; Signal Transmission (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Signal Transmission. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189F—Special Topics in Electrical Engineering and Computer Science; Digital Communication (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Digital Communication. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189G—Special Topics in Electrical Engineering and Computer Science; Control Systems (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Control Systems. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189H—Special Topics in Electrical Engineering and Computer Science; Robotics (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Robotics. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189I—Special Topics in Electrical Engineering and Computer Science; Signal Processing (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Signal Processing. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189J—Special Topics in Electrical Engineering and Computer Science; Image Processing (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Image Processing. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189K—Special Topics in Electrical Engineering and Computer Science; High-Frequency Phenomena and Devices (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in High-Frequency Phenomena and Devices. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189L—Special Topics in Electrical Engineering and Computer Science; Solid-State Devices and Physical Electronics (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Solid-State Devices and Physical Electronics. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189M—Special Topics in Electrical Engineering and Computer Science; Systems Theory (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Systems Theory. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189N—Special Topics in Electrical Engineering and Computer Science; Active and Passive Circuits (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Active and Passive Circuits. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189O—Special Topics in Electrical Engineering and Computer Science; Integrated Circuits (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Integrated Circuits. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189P—Special Topics in Electrical Engineering and Computer Science; Computer Software (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Computer Software. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189Q—Special Topics in Electrical Engineering and Computer Science; Computer Engineering (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Computer Engineering. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189R—Special Topics in Electrical Engineering and Computer Science; Microprocessing (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Microprocessing. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189S—Special Topics in Electrical Engineering and Computer Science; Electronics (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Electronics. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189T—Special Topics in Electrical Engineering and Computer Science; Electromagnetics (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Electromagnetics. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189U—Special Topics in Electrical Engineering and Computer Science; Opto-Electronics (1-5)
Laboratory; Lecture; Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Opto-Electronics. May be repeated for credit when topic differs. GE credit: SE. Effective: 2007 Fall Quarter.

EEC 189W—Special Topics in Electrical and Computer Engineering; Computer Networks (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special topics in Computer Networks. May be repeated for credit when topic differs. GE credit: SE. Effective: 2018 Winter Quarter.

EEC 190C—Research Group Conferences in Electrical and Computer Engineering (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing in Electrical and Computer Engineering. Research group conferences. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 2013 Spring Quarter.

EEC 192—Internship in Electrical and Computer Engineering (1-5) ***Review all entries***
Internship—3-15 hours. Prerequisite(s): Consent of Instructor. Completion of a minimum of 84 units; project approval before period of internship. Supervised work experience in electrical and computer engineering. May be repeated for credit project is different. (P/NP grading only.) GE credit: SE. Effective: 2012 Fall Quarter.

EEC 192—Internship in Electrical and Computer Engineering (1-6) ***Review all entries***
Internship—3-18 hours. Prerequisite(s): Consent of Instructor. Completion of a minimum of 84 units; project approval before period of internship. Supervised work experience in electrical and computer engineering. May be repeated for credit if project differs. (P/NP grading only.) GE credit: SE. Effective: 2018 Fall Quarter.

EEC 193A—Senior Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): EEC 196 (can be concurrent); and Consent of Instructor. Restricted to senior standing in Electrical or Computer Engineering. Team design project for seniors in Electrical or Computer Engineering. Project involves analysis, design, implementation and evaluation of an Electrical Engineering or Computer Engineering system. Project is supervised by a faculty member. GE credit: SE. Effective: 2014 Fall Quarter.

EEC 193B—Senior Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): EEC 193A Team design project for seniors in Electrical Engineering or Computer Engineering. Project involves analysis, design, implementation and evaluation of an Electrical Engineering or Computer Engineering system. Project supervised by a faculty member. GE credit: SE. Effective: 2015 Winter Quarter.

EEC 195A—Autonomous Vehicle Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): ECS 030; EEC 180A; (EEC 110B or EEC 157A (can be concurrent) or EEC 180B or ECS 060) Pass One restricted to major. Design and construct an autonomous race car. Work in groups to design, build and test speed control circuits, track sensing circuits, and a steering control loop. GE credit: SE. Effective: 2015 Fall Quarter.

EEC 195B—Autonomous Vehicle Design Project (3)
Laboratory—6 hours; Workshop—1 hour. Prerequisite(s): EEC 195A Design and construct an autonomous race car. Students work in groups to design, build and test speed control circuits, track sensing circuits, and a steering control loop. GE credit: SE. Effective: 2015 Winter Quarter.

EEC 196—Issues in Engineering Design (1)
Seminar—1 hour. Prerequisite(s): Senior standing in Electrical or Computer Engineering. The course covers various electrical and computer engineering standards and realistic design constraints including economic, manufacturability, sustainability, ethical, health and safety, environmental, social, and political. GE credit: SE. Effective: 2008 Fall Quarter.

EEC 197T—Tutoring in Electrical and Computer Engineering (1-3)
Discussion—1 hour; Discussion/Laboratory—2-8 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Tutoring in Electrical and Computer Engineering courses, especially introductory circuits. For upper-division undergraduate students who will provide tutorial assistance. (P/NP grading only.) Effective: 2007 Fall Quarter.

EEC 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. May be repeated up to 3 time(s). (P/NP grading only.) GE credit: SE. Effective: 2007 Fall Quarter.

EEC 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2007 Fall Quarter.

EEC 201—Digital Signal Processing (4)
Lecture—4 hours. Prerequisite(s): EEC 150B; STA 120 or MAT 131 or MAT 167 recommended. Theory and design of digital filters. Classification of digital filters, linear phase systems, all-pass functions, FIR and IIR filter design methods and optimality measures, numerically robust structures for digital filters. Effective: 2006 Winter Quarter.

EEC 202—Advanced Digital Signal Processing (4)
Lecture—4 hours. Prerequisite(s): EEC 201, EEC 260 and EEC 265, and MAT 167 are recommended. Multirate DSP theory and wavelets, optimal transform and subband coders in data compressions, advanced sampling theory and oversampled A/D converters, transmultiplexers and precoders in digital communication systems, genomic signal processing. Effective: 2006 Spring Quarter.

EEC 205—Computational Methods in Biomedical Imaging (4)
Lecture—4 hours. Prerequisite(s): (BIM 105 or STA 120); (BIM 108 or EEC 150A) Analytic tomographic reconstruction from projections in 2D and 3D; model-based image reconstruction methods; maximum likelihood and Bayesian methods; applications to CT, PET, and SPECT. (BIM 252.) Effective: 2011 Fall Quarter.

EEC 206—Digital Image Processing (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 150B Two-dimensional systems theory, image perception, sampling and quantization, transform theory and applications, enhancement, filtering
and restoration, image analysis, and image processing systems. Effective: 1997 Winter Quarter.

EEC 210—MOS Analog Circuit Design (3)
Lecture—3 hours. Prerequisite(s): EEC 110B; EEC 140A Analysis and design of MOS amplifiers, bias circuits, voltage references and other analog circuits. Stability and compensation of feedback amplifiers. Introduction to noise analysis in MOS circuits. Effective: 2016 Winter Quarter.

EEC 211—Advanced Analog Circuit Design (3)
Lecture—3 hours. Prerequisite(s): EEC 210; STA 131A and EEC 112 recommended. Noise and distortion in electronic circuits and systems. Application to communication circuits. Specific applications include mixers, low-noise amplifiers, power amplifiers, phase-locked loops, oscillators and receiver architectures. Effective: 2002 Winter Quarter.

EEC 212—Analog MOS IC Design for Signal Processing (3)
Lecture—3 hours. Prerequisite(s): EEC 210 Analysis and design of analog MOS integrated circuits. Passive components, single-ended and fully differential op amps, sampled-data and continuous-time filters. Effective: 1998 Spring Quarter.

EEC 213—Data-Conversion Techniques and Circuits (3)
Lecture—3 hours. Prerequisite(s): EEC 210 Digital-to-analog and analog-to-digital conversion; component characteristics and matching; sample-and-hold, comparator, amplifier, and reference circuits. Effective: 1997 Winter Quarter.

EEC 214—Computer-Aided Circuit Analysis and Design (3)
Lecture—3 hours. Prerequisite(s): EEC 110A; EEC 110B; And knowledge of FORTRAN or C. Network equation formulations. Nonlinear DC, linear AC, timedomain (both linear and nonlinear), steady-state (nonlinear) and harmonic analysis. DC, AC, and time-domain sensitivities of linear and nonlinear circuits. Gradient-based design optimization. Behavioral simulations. Extensive CAD project. Effective: 2000 Winter Quarter.

EEC 215—Circuits for Digital Communications (3)
Lecture—3 hours. Prerequisite(s): EEC 150B; EEC 210 (can be concurrent); EEC 165, EEC 166, or EEC 265 recommended. Analog, digital, and mixed-signal CMOS implementations of communication-circuit blocks: gain control, adaptive equalizers, sampling detectors, clock recovery. Effective: 2000 Fall Quarter.

EEC 216—Low Power Digital Integrated Circuit Design (3)
Lecture—3 hours. Prerequisite(s): EEC 118 IC design for low power and energy consumption. Low power architectures, logic styles and circuit design. Variable supply and threshold voltages. Leakage management. Power estimation. Energy sources, power electronics, and energy recovery. Applications in portable electronics and sensors. Thermodynamic limits. Effective: 2006 Winter Quarter.

EEC 217—Biomedical Electronics (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): EEC 210; or Consent of Instructor. Special consideration and accommodation will be made for biomedical or signal processing majors who have not taken EEC 210. Circuit design for medical applications including weak inversion amplifiers; integrated ULF filters; chopper stabilization; electrochemical interfaces; neurostimulation pulse generation; wireless powering of and communication with implantable devices. Electrophysiological signaling and aspects of signal processing for biomedical systems. Effective: 2013 Spring Quarter.

EEC 219—Advanced Digital Circuit Design (3)
Lecture—3 hours. Prerequisite(s): EEC 118 or EEC 218A Analysis and design of digital circuits. Both bipolar and MOS circuits are covered. Dynamic and static RAM cells and sense amplifiers. Advanced MOS families. Multi-valued logic. Effective: 1997 Winter Quarter.

EEC 221—Analog Filter Design (3)
Lecture—3 hours. Prerequisite(s): EEC 100; EEC 150A Design of active and passive filters including filter specification and approximation theory. Passive LC filter design will cover doubly-terminated reactance two-port synthesis. Active filter design will include sensitivity, op-amp building blocks, cascade, multi-loop, ladder and active-R filter design. Effective: 1997 Fall Quarter.

EEC 222—RF IC Design (3)
Lecture—3 hours. Prerequisite(s): EEC 132C; EEC 210 Radio frequency (RF) solid-state devices, RF device modeling and design rules; non-linear RF circuit design techniques; use of non-linear computer-aided (CAD) tools; RF power amplifier design. Effective: 2004 Winter Quarter.

EEC 224—Terahertz and mm-Wave Integrated Circuit Design (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): EEC 132A; EEC 112; or Consent of Instructor. Fundamental theory of RF transmitter and receiver, including noise analysis, transceiver architectures, and antenna arrays. Fundamental limitations, theory and design of amplifiers, oscillators and signal sources at THz and mm-wave frequencies Effective: 2018 Winter Quarter.

EEC 228—Advanced Microwave Circuit and Device Design Techniques (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 132B Theory, design, fabrication, analysis of advanced microwave circuits and devices. Wideband transformers, stripline/microstripline broadband couplers. Lumped and distributed filter synthesis. Broadband matching theory applied to microwave devices. Wideband and low noise FET/HEMT amplifiers. Advanced microwave oscillator theory. Phase noise analysis. Effective: 2007 Spring Quarter.

EEC 229—RF-MEMS and Adaptive Wireless Frontends (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 130A Focuses on the modeling, design, fabrication, and characterization of RF-MEMS while providing a thorough introduction to the technology with an emphasis on how it will benefit the design of adaptive RF/microwave wireless systems. Effective: 2015 Fall Quarter.

EEC 230—Electromagnetics (3)
Lecture—3 hours. Prerequisite(s): EEC 130B Maxwell's equations, plane waves, reflection and refraction, complex waves, waveguides, resonant cavities, and basic antennas. Effective: 2001 Fall Quarter.

EEC 231A—Plasma Physics and Controlled Fusion (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Equilibrium plasma properties; single particle motion; fluid equations; waves and instabilities in a fluid plasma; plasma kinetic theory and transport coefficients; linear and nonlinear Vlasov theory; fluctuations, correlations and radiation; inertial and magnetic confinement systems in controlled fusion. Effective: 2015 Spring Quarter.

EEC 231B—Plasma Physics and Controlled Fusion (3)
Lecture—3 hours. Prerequisite(s): EEC 231A; and Consent of Instructor. Equilibrium plasma properties; single particle motion; fluid equations; waves and instabilities in a fluid plasma; plasma kinetic theory and transport coefficients; linear and nonlinear Vlasov theory; fluctuations, correlations and radiation; inertial and magnetic confinement systems in controlled fusion. Effective: 2015 Spring Quarter.

EEC 231C—Plasma Physics and Controlled Fusion (3)
Lecture—3 hours. Prerequisite(s): EEC 231B; and Consent of Instructor. Equilibrium plasma properties; single particle motion; fluid equations; waves and instabilities in a fluid plasma; plasma kinetic theory and transport coefficients; linear and nonlinear Vlasov theory; fluctuations, correlations and radiation; inertial and magnetic confinement systems in controlled fusion. Effective: 2015 Spring Quarter.

EEC 232A—Advanced Applied Electromagnetics I (3)
Lecture—3 hours. Prerequisite(s): EEC 132B The exact formulation of applied electromagnetic problems using Green's functions. Applications of these techniques to transmission circuits. Effective: 2000 Fall Quarter.

EEC 232B—Advanced Applied Electromagnetics II (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EEC 132B An advanced treatment of electromagnetics with applications to passive microwave devices and antennas. Effective: 2000 Fall Quarter.

EEC 233—High Speed Signal Integrity (3)
Lecture—3 hours. Prerequisite(s): EEC 130B Design and analysis of interconnects in high-speed circuits and sub-systems; understanding of high-speed signal propagation and signal integrity concepts; electromagnetic modeling tools and experimental techniques. Effective: 2008 Fall Quarter.

EEC 234A—Physics and Technology of Microwave Vacuum Electron Beam Devices I (4)
Lecture—4 hours. Prerequisite(s): B.S. degree in physics or electrical engineering or the equivalent background. Physics and technology of electron beam emissions, flow and transport, electron gun design, space charge waves and klystrons. Effective: 2015 Fall Quarter.

EEC 234B—Physics and Technology of Microwave Vacuum Electron Beam Devices II (4)
Lecture—4 hours. Prerequisite(s): EEC 234A Theory and experimental design of traveling wave tubes, backward wave oscillators, and extended interaction oscillators. Effective: 2016 Spring Quarter.

EEC 234C—Physics and Technology of Microwave Vacuum Electron Beam Devices III (4)
Lecture—4 hours. Prerequisite(s): EEC 234B Physics and technology of gyrotrons, gyro-amplifiers, free electron lasers, magnetrons, crossfield amplifiers and relativistic devices. Effective: 2015 Fall Quarter.

EEC 235—Photonics (4)
Lecture—3 hours; Project (Term Project)—1 hour. Prerequisite(s): EEC 230 (can be concurrent) Optical propagation of electromagnetic waves and beams in photonic components and the design of such devices using numerical techniques. Effective: 2004 Fall Quarter.

EEC 236—Nonlinear Optical Applications (3)
Lecture—3 hours. Prerequisite(s): EEC 130B; EEC 230 (can be concurrent) Nonlinear optical interactions in optical communication, optical information processing and integrated optics. Basic concepts underlying optical nonlinear interactions in materials and guided media. Not open for credit to students who have completed EEC 233. Effective: 2000 Fall Quarter.

EEC 237A—Lasers (3)
Lecture—3 hours. Prerequisite(s): EEC 235; EEC 130B; Or the equivalent of EEC 130B. Not open for credit to students who have completed course 226A. Theoretical and practical description of lasers. Theory of population inversion, amplification and oscillation using semiclassical oscillator model and rate equations. Description and design of real laser system (Not open for credit to students who have completed course 226A.) Effective: 1998 Winter Quarter.

EEC 237B—Laser Physics II (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): EEC 237A or EAD 265A Oscillation threshold. Coupled cavity/atomic rate equations, Linear pulse propagation; dispersion, broadening, compression. Nonlinear pulse propagation. Energy extraction. Optical beams, resonators, eigenmodes, axial/transverse modes. Paraxial ray optics, resonator stability, ABCD matrices. Laser dynamics; transients, spiking, Q-switching, active and passive modelocking. Not open for credit to students who have completed EEC 226B. Effective: 2014 Fall Quarter.

EEC 238—Semiconductor Diode Lasers (3)
Lecture—3 hours. Prerequisite(s): EEC 245A Understanding of fundamental optical transitions in semiconductor and quantum-confined systems are applied to diode lasers and selected photonic devices. The importance of radiative and non-radiative
recombination, simulated emission, excitons in quantum wells, and strained quantum layers are considered. Effective: 1998 Spring Quarter.

EEC 239A—Optical Fiber Communications Technologies (4)
Lecture—4 hours. Prerequisite(s): EEC 130B Physical layer issues for component and system technologies in optical fiber networks. Sources of physical layer impairments and limitations in network scalability. Enabling technologies for wavelength-division-multiplexing and time-division-multiplexing networks. Optical amplifiers and their impact in optical networks (signal-to-noise ratio, gain-equalization, and cascadability). Effective: 2002 Fall Quarter.

EEC 239B—Optical Fiber Communications Systems and Networking (4)
Lecture—4 hours. Prerequisite(s): EEC 239A Physical layer optical communications systems in network architectures and protocols. Optical systems design and integration using optical component technologies. Comparison of wavelength routed WDM, TDM, and NGI systems and networks. Case studies of next generation technologies. Effective: 2003 Winter Quarter.

EEC 240—Semiconductor Device Physics (3)
Lecture—3 hours. Prerequisite(s): EEC 140B Physical principles, characteristics and models of fundamental semiconductor device types, including P-N and Schottky diodes, MOSFETs and MESFETs Bipolar Junction Transistors, and light emitters/detectors. Effective: 1998 Fall Quarter.

EEC 241—Introduction to Molecular Electronics (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Examines molecules for electronic devices and sensors. Course covers: electronic states of molecules, charge transport in nanoscale systems, and fabrication and measurement of molecular-scale devices. Specific Topics: Hartree-Fock and Density Functional Theory, Landauer formalism, coulomb blockade, tunneling and hopping transport. Effective: 2016 Spring Quarter.

EEC 242—Advanced Nanostructured Devices (3)
Lecture—3 hours. Prerequisite(s): EEC 130A; EEC 140A Physics of nano-structured materials and device operation. Overview of new devices enabled by nanotechnology; fabrication and characterization methods; applications of nano-structures and devices. Effective: 2005 Fall Quarter.

EEC 244A—Design of Microelectromechanical Systems (MEMS) (3)
Lecture—3 hours. Prerequisite(s): EEC 140A; EEC 140B; or Consent of Instructor. Theory and practice of MEMS design. Micromechanical fundamentals, CAD tools, and case studies. A MEMS design project is required. The designs will be fabricated in a commercial foundry and tested in course 244B. Effective: 1997 Fall Quarter.

EEC 244B—Microsciences (4)
Lecture/Discussion—4 hours. Introduction to the theory of physical and chemical principles at the microscale. Scale effects, surface tension, microfluidic mechanics, micromechanical properties, intermolecular interactions and micro tribology. (BIM 218.) Effective: 2011 Fall Quarter.

EEC 245—Micro- and Nano-Technology in Life Sciences (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Survey of biomedical device design from the engineering and biological perspectives; micro-/nano-fabrication and characterization techniques; surface chemistry and mass transfer; essential biological processes and models; proposal development skills to merge aforementioned themes in a multidisciplinary project. (ECH 245 and EMS 245.) Effective: 2016 Winter Quarter.

EEC 246—Advanced Projects in IC Fabrication (3)
Discussion—1 hour; Laboratory—6 hours. Prerequisite(s): EEC 146B Individualized projects in the fabrication of analog or digital integrated circuits. Effective: 1997 Winter Quarter.

EEC 247—Advanced Semiconductor Devices (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): Graduate standing in Engineering. Semiconductor devices, including MOSFETs, heterojunction transistors, light-emitting diodes, lasers, sensors, detectors, power and high-voltage transistors, MEMS resonators, organic semiconductors and photovoltaics. All material is from recent literature, encouraging students to utilize search methods and critically assess the latest research. Effective: 2011 Fall Quarter.

EEC 248—Photovoltaics and Solar Cells (3)
Lecture—3 hours. Prerequisite(s): EEC 140B; or Consent of Instructor. Or equivalent. Physics and application of photovoltaics and solar cells, including design, fabrication technology, and grid incorporation. Mono and microcrystalline silicon devices; thin-film technologies, heterojunction and organic-semiconductor technologies. Collectors, electrical inverters and infrastructure issues. Challenges and concerns. (EMS 246.) Effective: 2014 Fall Quarter.

EEC 249—Nanofabrication (3)
Lecture—3 hours. Prerequisite(s): Graduate standing in Engineering. Theory and practices of nanofabrication used for producing ICs, electronic devices, optoelectronics, sensors, and microstructures. Major topics include electron-, photon-, and ion-beams and their interactions with solids, chemical vapor depositions, plasma processing and micromachining. Effective: 2014 Winter Quarter.

EEC 250—Linear Systems and Signals (4)
Lecture—4 hours. Prerequisite(s): EEC 150A Mathematical description of systems. Selected topics in linear algebra. Solution of the state equations and an analysis of stability, controllability, observability, realizations, state feedback and state estimation. Discrete-time signals and systems, and the Z-transform. Effective: 2002 Fall Quarter.

EEC 251—Nonlinear Systems (3)
Lecture—3 hours. Prerequisite(s): EEC 250 Nonlinear differential equations, second-order systems, approximation methods, Lyapunov stability, absolute stability, Popov criterion, circle criterion, feedback linearization techniques. Effective: 1997 Winter Quarter.

EEC 252—Multivariable Control System Design (3)
Lecture—3 hours. Prerequisite(s): EEC 250 Modern control system design, theory, and techniques. Topics will include single-loop feedback design; stability, performance and robustness of multivariable control systems; LQG design; H-infinity design; frequency response methods; and optimization-based design. Effective: 2005 Fall Quarter.

EEC 254—Optimization (3)
Lecture—3 hours. Prerequisite(s): MAT 022A; Knowledge of FORTRAN or C. Modeling optimization problems in engineering design and other applications; optimality conditions; unconstrained optimization (gradient, Newton, conjugate gradient and quasi-Newton methods); duality and Lagrangian relaxation constrained optimization. (Primal method and an introduction to penalty and augmented Lagrangian methods.) Effective: 1997 Winter Quarter.

EEC 255—Robotic Systems (3)
Lecture—3 hours. Introduction to robotic systems. Mechanical manipulators, kinematics, manipulator positioning and path planning. Dynamics of manipulators. Robot motion programming and control algorithm design. Effective: 2006 Winter Quarter.

EEC 256—Stochastic Optimization in Dynamic Systems (4)
Lecture—4 hours. Prerequisite(s): EEC 260; Or the equivalent. Markov Decision Processes (MDP), dynamic programming, multi-armed bandit, Partially observable MDP, optimal stopping, stochastic scheduling, sequential detection and quickest change detection, competitive MDP and game theory, applications in dynamic systems such as queueing networks, communication systems, and multi-agent systems. Effective: 2012 Spring Quarter.

EEC 260—Random Signals and Noise (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 120; EEC 150A; EEC 250 recommended. Random processes as probabilistic models for signals and noise. Review of probability, random variables, and expectation. Study of correlation function and spectral density, ergodicity and duality between time averages and expected values, filters and dynamical systems. Applications. Effective: 1997 Winter Quarter.

EEC 261—Signal Processing for Communications (4)
Lecture—4 hours. Prerequisite(s): EEC 165; EEC 260; or Consent of Instructor. Signal processing in wireless and wireline communication systems. Characterization and distortion of wireless and wireline channels. Channel equalization and maximum likelihood sequence estimation. Channel precoding and pre-equalization. OFDM and transmit diversity. Array processing. Effective: 2003 Spring Quarter.

EEC 262—Multi-access Communications Theory (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): (EEC 173A or ECS 152A); STA 120; Or equivalent of STA 120. Maximum stable throughput of Poisson collision channels. Classic collision resolution algorithms. Carrier sensing multiple access and its performance analysis. System stability analysis. Joint design of the physical/medium access control layers. Capacity region of multi-access channels. Multi-access with correlated sources. Effective: 2006 Spring Quarter.

EEC 263—Optimal and Adaptive Filtering (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 260 Geometric formulation of least-squares estimation problems. Theory and applications of optimum Wiener and Kalman filtering. MAP and maximum likelihood estimation of hidden Markov models, Viterbi algorithm. Adaptive filtering algorithms, properties and applications. Effective: 2002 Spring Quarter.

EEC 264—Estimation and Detection of Signals in Noise (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EEC 260 Introduction to parameter estimation and detections of signals in noise. Bayes and Neyman-Pearson likelihood-ratio tests for signal detection. Maximum-likelihood parameter estimation. Detection of known and Gaussian signals in white or colored noise. Applications to communications, radar, signal processing. Effective: 2007 Fall Quarter.

EEC 265—Principles of Digital Communications (4)
Lecture—4 hours. Prerequisite(s): EEC 165; EEC 260; or Consent of Instructor. Introduction to digital communications. Coding for analog sources. Characterization of signals and systems. Modulation and demodulation for the additive Gaussian channel. Digital signaling over bandwidth-constrained linear filter channels and over fading multipath channels. Spread spectrum signals. Effective: 1997 Winter Quarter.

EEC 266—Information Theory and Coding (3)
Lecture—3 hours. Prerequisite(s): STA 120 Information theory and coding. Measure of information. Redundancy reduction encoding of an information source. Capacity of a communication channel, errorfree communications. Effective: 1997 Winter Quarter.

EEC 267—Mobile Communications (4)
Lecture/Lab—3 hours. Prerequisite(s): EEC 260; EEC 265 (can be concurrent) Time-varying multi-path fading channel models and receiver performance in fading channels; multiple access techniques and multiple access receivers design and performance; optimum design and the capacity of wireless channels. Effective: 2013 Spring Quarter.

EEC 269A—Error Correcting Codes I (3)
Lecture—3 hours. Prerequisite(s): MAT 022A; EEC 160 Introduction to the theory and practice of block codes,
linear block codes, cyclic codes, decoding algorithms, coding techniques. Effective: 2001 Fall Quarter.

EEC 269B—Error Correcting Codes II (3)
Lecture—3 hours. Prerequisite(s): EEC 165; EEC 269A Introduction to convolutional codes, turbo codes, trellis and block coded modulation codes,soft-decision decoding algorithms, the Viterbi algorithm,reliability-based decoding, trellis-based decoding, multistage decoding. Effective: 2002 Spring Quarter.

EEC 270—Computer Architecture (3)
Lecture—3 hours. Prerequisite(s): EEC 170 or ECS 154B Introduction to modern techniques for high-performance single and
multiple processor systems. Topics include advanced pipeline design, advanced memory hierarchy design, optimizing pipeline and memory use, and memory sharing among multiprocessors. Case studies of recent single and multiple processor systems. Effective: 1999 Winter Quarter.

EEC 272—High-Performance Computer Architecture (4)
Lecture—4 hours. Prerequisite(s): EEC 270 or ECS 201A Designing and analysis of high performance computer architecture with emphasis on vector processing, on-chip interconnect networks, chip-level multiprocessors, memory and storage subsystem design and impact of technological advances on computer architecture. Effective: 2015 Spring Quarter.

EEC 273—Networking Architecture and Resource Management (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): ECS 152A or EEC 173A Pass One and Pass Two open to Graduate Students in Computer Science and Electrical and Computer Engineering only. Concepts and design principles of computer networks. Network architectures, protocol mechanisms and implementation principles (transport/network/data-link layers), network algorithms, router mechanisms, design requirements of applications, network simulation, modeling and performance analysis. (ECS 258.) Effective: 2016 Fall Quarter.

EEC 274—Internet Measurements, Modeling and Analysis (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): ECS 252 or EEC 273 Advanced topics in the theoretical foundations of network measurements, modeling, and statistical inferencing. Applications to Internet engineering, routing optimization, load balancing, traffic engineering, fault tolerance, anomaly detection, and network security. Individual project requirement. Effective: 2007 Winter Quarter.

EEC 276—Fault-Tolerant Computer Systems: Design and Analysis (3)
Lecture—3 hours. Prerequisite(s): EEC 170; EEC 180A Introduces fault-tolerant digital system theory and practice. Covers recent and classic fault-tolerant techniques based on hardware redundancy, time redundancy, information redundancy, and software redundancy. Examines hardware and software reliability analysis, and example fault-tolerant designs. Not open for credit to students who have completed EEC 276A. Effective: 1997 Fall Quarter.

EEC 277—Graphics Architecture (3)
Lecture—3 hours. Prerequisite(s): (ECS 154B or EEC 170); ECS 175 Design and analysis of the architecture of computer graphics systems. Topics include the graphics pipeline with a concentration on hardware technqiues and algorithms, exploiting parallelism in graphics, and case studies of noteworthy and modern graphics arhitectures. Effective: 2004 Winter Quarter.

EEC 278—Computer Arithmetic for Digital Implementation (3)
Lecture—3 hours. Prerequisite(s): EEC 170; EEC 180A The design and implementation of computer arithmetic logic units are studied with particular emphasis on high-speed performance requirements. Addition (subtraction), multiplication and division operations are covered, and fixed and floating-point representations are examined. Effective: 1997 Winter Quarter.

EEC 281—VLSI Digital Signal Processing (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): EEC 150B; EEC 170; EEC 180B; or Consent of Instructor. Digital signal processors, building blocks, and algorithms. Design and implementation of processor algorithms, architectures, control, functional units, and circuit topologies for increased performance and reduced circuit size and power dissipation. Effective: 2011 Spring Quarter.

EEC 282—Hardware Software Codesign (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): EEC 170; EEC 180B Specification and design of embedded systems; modeling and performance estimation; hardware/software partitioning; co-simulation; design re-use; platform-based design; reconfigurable computing. Effective: 2003 Spring Quarter.

EEC 283—Advanced Design Verification of Digital Systems (4)
Lecture—3 hours; Project (Term Project)—1 hour. Prerequisite(s): EEC 170; EEC 180A Design verification techniques for digital systems; simulation-based design verification techniques; formal verification techniques, including equivalence checking, model checking, and theorem proving; timing analysis and verification; application of design cerification techniques to microprocessors. Effective: 2000 Winter Quarter.

EEC 284—Design and Optimization of Embedded Computing Systems (4)
Lecture—4 hours. Prerequisite(s): EEC 170; EEC 180B; or Consent of Instructor. ECS 122A recommended. Introduction to design and optimization of digital computing systems for embedded applications. Topics include combinatorial optimization techniques, performance and energy optimization in embedded systems, compilation and architecture-specific mapping, programmable and reconfigurable platforms; design automation and algorithmic improvements to design process. Effective: 2007 Winter Quarter.

EEC 286—Introduction to Digital System Testing (3)
Lecture—3 hours. Prerequisite(s): EEC 180A; (STA 120 or STA 131A) A review of several current techniques used to diagnose faults in both combinational and sequential circuits. Topics include path sensitization procedures, Boolean difference, D-algorithm random test generation, TC testing and an analysis of the effects of intermittent faults. Not open for credit to students who have completed EEC 276A. Effective: 1998 Winter Quarter.

EEC 289A—Special Topics in Electrical and Computer Engineering; Computer Science (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Computer Science. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289B—Special Topics in Electrical and Computer Engineering; Programming Systems (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Programming Systems. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289C—Special Topics in Electrical and Computer Engineering; Digital Systems (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Digital Systems. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289D—Special Topics in Electrical and Computer Engineering; Digital Systems (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Digital Systems. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289E—Special Topics in Electrical and Computer Engineering; Signal Transmission (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Signal Transmission. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289F—Special Topics in Electrical and Computer Engineering; Digital Communication (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Digital Communication. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289G—Special Topics in Electrical and Computer Engineering; Control Systems (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Control Systems. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289H—Special Topics in Electrical and Computer Engineering; Robotics (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Robotics. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289I—Special Topics in Electrical and Computer Engineering; Signal Processing (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Signal Processing. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289J—Special Topics in Electrical and Computer Engineering; Image Processing (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Image Processing. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289K—Special Topics in Electrical and Computer Engineering; High Frequency Phenomena and Devices (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in High Frequency Phenomena and Devices. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289L—Special Topics in Electrical and Computer Engineering; Solid-State Devices and Physical Electronics (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Solid-State Devices and Physical Electronics. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289M—Special Topics in Electrical and Computer Engineering; Systems Theory (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Systems Theory. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289N—Special Topics in Electrical and Computer Engineering; Active and Passive Circuits (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Active and Passive Circuits. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289O—Special Topics in Electrical and Computer Engineering; Integrated Circuits (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Integrated Circuits. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289P—Special Topics in Electrical and Computer Engineering; Computer Software (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Computer Software. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289Q—Special Topics in Electrical and Computer Engineering; Computer Engineering (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Computer Engineering. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289R—Special Topics in Electrical and Computer Engineering; Microprocessing (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Microprocessing. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289S—Special Topics in Electrical and Computer Engineering; Electronics (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Electronics. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289T—Special Topics in Electrical and Computer Engineering; Electromagnetics (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Electromagnetics. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289U—Special Topics in Electrical and Computer Engineering; Optoelectronics (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Optoelectronics. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

EEC 289W—Special Topics in Electrical and Computer Engineering; Computer Networks (1-5)
Lecture/Lab—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Computer Networks. May be repeated for credit when topic differs. Effective: 2018 Winter Quarter.

EEC 290—Seminar in Electrical and Computer Engineering (1)
Seminar—1 hour. Discussion and presentation of current research and development in Electrical and Computer Engineering. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

EEC 290C—Graduate Research Group Conference in Electrical and Computer Engineering (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Research problems, progress, and techniques in electrical and computer engineering. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

EEC 291—Solid-State Circuit Research Laboratory Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Lectures on solid-state circuit and system design by various visiting experts in the field. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

EEC 292—Seminar in Solid-State Technology (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Lectures on solid-state technology by various visiting experts in the field. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

EEC 293—Computer Engineering Research Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Lectures, tutorials and seminars on topics in computer engineering. May be repeated up to 4 time(s). (S/U grading only.) Effective: 2000 Winter Quarter.

EEC 294—Communications, Signal and Image Processing Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Communications, signal and image processing, video engineering and computer vision. May be repeated for credit. (S/U grading only.) Effective: 2003 Winter Quarter.

EEC 295—Systems, Control and Robotics Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Seminars on current research in systems and control by faculty and visiting experts. Technical presentations and lectures on current topics in robotics research and robotics technology. May be repeated for credit. (S/U grading only.) Effective: 1998 Winter Quarter.

EEC 296—Photonics Research Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Lectures on photonics and related areas by faculty and visiting experts. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1998 Winter Quarter.

EEC 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

EEC 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

EEC 390—The Teaching of Electrical Engineering (1)
Discussion—1 hour. Prerequisite(s): Meet qualifications for teaching assistant and/or associate-in in Electrical Engineering. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

EEC 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

EGG Energy Systems

Courses in EGG:

EGG 200—Energy Systems (4)
Lecture/Discussion—4 hours. Prerequisite(s): ENG 105; or equivalent. Theory and application of energy systems. Systems analysis, energy conversion technologies, environmental considerations, economics and system optimization. (EBS 216) Effective: 2018 Spring Quarter.

EGG 202—Energy and Climate Policy (4)
Extensive Writing/Discussion; Lecture—3 hours. Prerequisite(s): ECN 100A or ARE 100A; or Consent of Instructor. Pass One restricted to graduate students in the following programs: Economics, Energy Graduate Group, and Transportation Technology and Policy Graduate Group. Fundamentals of energy technology, economics, and policy. Survey and analysis of current and prospective climate policies at the local and global level, including but not limited to cap-and-trade, emissions offsets, intensity standards, technology standards, mandates and subsidies. (ECN 216.) Effective: 2018 Spring Quarter.

EGG 299—Research (1-12)
Variable—1-12 hours. Prerequisite(s): Consent of Instructor. Research May be repeated for credit. (S/U grading only.) Effective: 2017 Fall Quarter.

EME Engineering Mechanical

Courses in EME:

EME 001—Mechanical Engineering (1)
Lecture—1 hour. Description of the field of mechanical engineering with examples taken from industrial applications, discussions of the practice with respect to engineering principles, ethics, and responsibilities. (P/NP grading only.) Effective: 2001 Fall Quarter.

EME 005—Computer Programming for Engineering Applications (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016A (can be concurrent) or MAT 021A (can be concurrent) Structured programming in C for solving problems in engineering. Introduction to MATLAB and comparison study of C/C++ with MATLAB. GE credit: SE. Effective: 2017 Fall Quarter.

EME 050—Manufacturing Processes (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): ENG 004 C- or better; PHY 009A C- or better Restricted to Mechanical Engineering and Mechanical Engineering/Materials Science Engineering majors. Modern manufacturing methods, safety, manufacturing instructions, computer-aided manufacturing and their role in the engineering design and development process. GE credit: SE. Effective: 2017 Fall Quarter.

EME 092—Internship in Mechanical Engineering (1-5)
Internship. Prerequisite(s): Lower division standing; approval of project prior to period of internship. Supervised work-study experience in engineering. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

EME 097TC—Mentoring and Tutoring Engineering in the Community (1-4)
Variable—3-12 hours. Prerequisite(s): Consent of Instructor. Mentoring, coaching, tutoring and/or supervision of students in K-12 schools in Engineering-related topics. May be repeated for credit. (P/NP grading only.) Effective: 2012 Fall Quarter.

EME 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

EME 106—Thermo-Fluid Dynamics (4)
Lecture—4 hours. Prerequisite(s): ENG 103 C- or better; ENG 105 C- or better Restricted to Mechanical Engineering, Aerospace Science and Engineering, and Mechanical Engineering/Materials Science Engineering majors. Inviscid incompressible flow, compressible flow, ideal gas mixtures, psychrometrics, reacting mixtures and combustion. GE credit: SE. Effective: 2013 Winter Quarter.

EME 108—Measurement Systems (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): ENG 100 C- or better; ENG 102 C- or better; ENG 104 recommended. Restricted to Mechanical Engineering, Aerospace Science & Engineering and Mechanical/Materials Science & Engineering. Experiments to illustrate principles of mechanical systems. Signal analysis; Demonstration of basic sensors for mechanical systems; Experimental project design; Experiments involving voltage measurement; strain gauges, dynamic systems of 1st order. Three units of credit for students who have previously taken BIM 111; two units of credit for students who have previously taken EBS 165; one unit of credit allowed for students who have completed EME 107B (former version of EME 108). GE credit: SE, WE. Effective: 2017 Fall Quarter.

EME 109—Experimental Methods for Thermal Fluids (4)
Discussion—1 hour; Extensive Writing; Laboratory—1.5 hours; Lecture—2 hours. Prerequisite(s): EME 106 C- or better Restricted to Mechanical Engineering, Aerospace Science & Engineering and Mechanical/Materials Science Engineering Majors. Experiments illustrating principles of thermal-fluid systems and related measurement devices. Statistical design of experiments and uncertainty analysis of data; thermodynamic cycles, combustion, compressible and incompressible flows. Three units of credit for students who have previously taken ECH 155A; two units of credit for students who have previously taken ECH 155B; three units of credit for students who have previously taken ECI 141L; one unit of credit for students who have already completed EME 107A (former version of EME 109). GE credit: SE. Effective: 2017 Fall Quarter.

EME 115—Introduction to Numerical Analysis and Methods (4)
Lecture—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): (ENG 006 C- or better or EME 005 C- or better or ECS 030 C- or better or ECM 006 C- or better); (MAT 021A C- or better, MAT 021B C- or better, MAT 021C C- or better, MAT 021D C- or better, MAT 022A C- or better, MAT 022B C- or better); (PHY 009A C- or better, PHY 009B C- or better, PHY 009C C- or better) Number representation, Taylor expansions, error and stability analysis, roots of nonlinear equations, sets of linear equations, numerical integration, ordinary differential equations. Not open for credit to students who have taken EAD 115. GE credit: SE. Effective: 2013 Fall Quarter.

EME 121—Engineering Applications of Dynamics (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 102 C- or better; (ENG 006 C- or better or EME 005 C- or better or ECS 030 C- or better) Restricted to Mechanical Engineering, Aerospace Science and Engineering, and Mechanical Engineering/Materials Science Engineering majors. Technical elective that revisits dynamic principles with emphasis on engineering applications; Equations of motion are derived and put into a format for computer solution; There is a computer laboratory where real engineering systems are simulated. GE credit: SE. Effective: 2017 Fall Quarter.

EME 134—Vehicle Stability (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 102 C- or better Restricted to Mechanical Engineering, Aerospace Science and Engineering, and Mechanical Engineering/Materials Science Engineering majors. Analytical and experimental studies of the dynamics, stability and control of vehicles such as cars, trailers, airplanes, motorcycles, bicycles and rail cars. GE credit: SE. Effective: 2017 Fall Quarter.

EME 139—Stability of Flexible Dynamic Systems (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 102 C- or better; ENG 103 C- or better Stability of flexible systems. Introduction to fluid-structure interaction. Mechanical vibrations. Design of mechanical subsystems or systems under constraints. Dynamic instabilities. Flutter. Control effectiveness. Energy extraction from fluid-structure interactions. Design applications to aerospace, mechanical and biomedical systems. No credit for students who have completed EAE 139. GE credit: SE. Effective: 2016 Spring Quarter.

EME 150A—Mechanical Design (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ENG 045 C- or better or ENG 045Y C- or better); (ENG 104 C- or better, EME 050 C- or better (can be concurrent)) Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering majors. Principles of mechanics applied to design. Deformation and stress analysis. Structural integrity under static and fluctuating loads. Projects demonstrate progression from concept to engineering analysis, with emphasis on strength and durability. GE credit: SE, WE. Effective: 2017 Fall Quarter.

EME 150B—Mechanical Design (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EME 150A C- or better Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering. Principles of engineering mechanics applied to the design and selection of mechanical components. Design projects, which concentrate on conceptual design, engineering analysis, methods of manufacture, material selection, and cost. GE credit: SE. Effective: 2017 Fall Quarter.

EME 151—Statistical Methods in Design and Manufacturing (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EME 150A C- or better Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering. Methods of statistical analysis with emphasis on applications in mechanical design and manufacturing. Applications include product evaluation and decision making, probabilistic design, systems reliability, and fatigue under random loading. GE credit: SE. Effective: 2017 Fall Quarter.

EME 152—Computer-Aided Mechanism Design (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 102 C- or better; (EME 005 C- or better or ENG 006 C- or better or ECS 030 C- or better) Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering. Principles of computer-aided mechanism design. Computer-aided kinematic, static, and dynamic analysis and design of planar mechanisms such as multiple-loop linkages and geared linkages. Introduction to kinematic synthesis of mechanisms. GE credit: SE. Effective: 2017 Fall Quarter.

EME 154—Mechatronics (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 100 C- or better; ENG 102 C- or better; EME 050 C- or better Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering. Overview of mechatronics system and control system design concepts, control software architecture, control hardware architecture, microcontroller and interface technology for mechatronics control, sensor for mechatronics systems, actuator drives. GE credit: SE. Effective: 2017 Fall Quarter.

EME 161—Combustion and the Environment (4)
Lecture—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): EME 106 C- or better Introduction to combustion kinetics; premixed and diffusion flames; turbulent combustion; pollutant formation; examples of combustion devices such as internal combustion engines, gas turbines, furnaces and incinerators; alternative fuels. GE credit: SE. Effective: 2017 Fall Quarter.

EME 163—Internal Combustion Engines and Future Alternatives (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EME 106 C- or better; EME 050 C- or better Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering. Fundamentals of internal combustion engine design and performance. Future needs to adapt to environmental concerns, and the feasibility of better alternatives in the future. GE credit: SE. Effective: 2017 Fall Quarter.

EME 164—Introduction to Heating, Ventilation and Air Conditioning Systems (4)
Lecture—4 hours. Prerequisite(s): EME 106 C- or better; EME 165 C- or better Introduction to basic mechanisms and processes associated with heating, ventilation and air conditioning (HVAC), including equipment and systems used for HVAC in residential and commercial buildings. Only 2 units for students who have completed ECI 125. GE credit: SE. Effective: 2017 Winter Quarter.

EME 165—Heat Transfer (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ENG 006 C- or better or EME 005 C- or better or ECS 030 C- or better); ENG 103 C- or better; ENG 105 C- or better Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering. Conduction, convection, and radiation heat transfer. Computational modeling of heat transfer in engineering. Applications to engineering equipment with the use of digital computers. GE credit: SE. Effective: 2017 Winter Quarter.

EME 171—Analysis, Simulation and Design of Mechatronic Systems (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 100 C- or better; ENG 102 C- or better Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering. Modeling of dynamic engineering systems in various energy domains. Analysis and design of dynamic systems. Response of linear systems. Digital computer simulation and physical experiments. GE credit: SE. Effective: 2017 Fall Quarter.

EME 172—Automatic Control of Engineering Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 100 C- or better; ENG 102 C- or better Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering. Classical feedback control systems; block diagrams; performance specifications; steady state errors; rise and settling times; root locus; PID controllers; Bode and Nyquist plots; stability; phase and gain margins; advanced topics as time allows. GE credit: SE. Effective: 2017 Fall Quarter.

EME 185A—Mechanical Engineering Systems Design Project (4) ***Review all entries***
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): (EME 150A C- or better, EME 165 C- or better (can be concurrent)); CMN 001 or CMN 003 recommended; upper division composition recommended. Restricted to Senior standing in Mechanical Engineering (EMEC). Major mechanical engineering design experience; the mechanical engineering design process and its use in the design of engineering systems incorporating appropriate engineering standards and multiple realistic constraints. GE credit: OL, SE, VL. Effective: 2017 Fall Quarter.

EME 185A—Mechanical Engineering Systems Design Project (4) ***Review all entries***
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): EME 050 C- or better; EME 150A C- or better; EME 165 C- or better (can be concurrent); ENG 003, CMN 001 or CMN 003 recommended; upper division composition recommended. Restricted to Senior standing in Mechanical Engineering (EMEC). Major mechanical engineering design experience; the mechanical engineering design process and its use in the design of engineering systems incorporating appropriate engineering standards and multiple realistic constraints. GE credit: OL, SE, VL. Effective: 2019 Winter Quarter.

EME 185B—Mechanical Engineering Systems Design Project (4)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): EME 185A; senior standing in the Department of Mechanical and Aerospace Engineering. Major mechanical engineering design experience; the mechanical engineering design process and its use in the design of engineering systems incorporating appropriate engineering standards and multiple realistic constraints. GE credit: SE. Effective: 2017 Fall Quarter.

EME 189A—Selected Topics in Mechanical Engineering; Energy Systems and the Environment (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Energy Systems and the Environment. May be repeated for credit when the topic is different. Effective: 2008 Summer Session 1.

EME 189B—Selected Topics in Mechanical Engineering; Engineering Controls (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Engineering Controls. May be repeated for credit when the topic is different. GE credit: SE. Effective: 2008 Summer Session 1.

EME 189C—Selected Topics in Mechanical Engineering; Engineering Dynamics (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Engineering Dynamics. May be repeated for credit when the topic is different. Effective: 2008 Summer Session 1.

EME 189D—Selected Topics in Mechanical Engineering; Biomechanics (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Biomechanics. May be repeated for credit when the topic is different. Effective: 2008 Summer Session 1.

EME 189E—Selected Topics in Mechanical Engineering; Fluid Mechanics (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Fluid Mechanics. May be repeated for credit when the topic is different. Effective: 2008 Summer Session 1.

EME 189F—Selected Topics in Mechanical Engineering; Manufacturing Engineering (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Manufacturing Engineering. May be repeated for credit when the topic is different. Effective: 2008 Summer Session 1.

EME 189G—Selected Topics in Mechanical Engineering; Mechanical Engineering and Product Design (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Mechanical Engineering and Product Design. May be repeated for credit when the topic is different. Effective: 2008 Summer Session 1.

EME 189H—Selected Topics in Mechanical Engineering; Mechatronics Systems (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Mechatronics Systems. May be repeated for credit when the topic is different. Effective: 2008 Summer Session 1.

EME 189I—Selected Topics in Mechanical Engineering; MEMS/Nanotechnology (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in MEMS/Nanotechnology. May be repeated for credit when the topic is different. Effective: 2008 Summer Session 1.

EME 189J—Selected Topics in Mechanical Engineering; Solid and Structural Mechanics (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Solid and Structural Mechanics. May be repeated for credit when the topic is different. Effective: 2008 Summer Session 1.

EME 189K—Selected Topics in Mechanical Engineering; Thermodynamics (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Thermodynamics. May be repeated for credit when the topic is different. Effective: 2008 Summer Session 1.

EME 189L—Selected Topics in Mechanical Engineering; Vehicle and Transportation Systems (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study in Vehicle and Transportation Systems. May be repeated for credit when the topic is different. Effective: 2008 Summer Session 1.

EME 192—Intership in Engineering (1-5)
Variable. Prerequisite(s): Upper division standing; approval of project prior to period of internship. Supervised work experience in mechanical engineering. May be repeated for credit. (P/NP grading only.) Effective: 1997 Fall Quarter.

EME 197TC—Mentoring and Tutoring Engineering in the Community (1-4)
Variable—3-12 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Mentoring, coaching, tutoring and/or supervision of students in K-12 schools in Engineering-related topics. May be repeated for credit. (P/NP grading only.) Effective: 2012 Fall Quarter.

EME 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

EME 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

EMR Med - Intl: Emergency Medicine

Courses in EMR:

EMR 092—Emergency Medicine Clinical Research Internship (1-4)
Internship—6-12 hours. Prerequisite(s): Consent of Instructor. Undergraduate student in good academic standing at UC Davis. Intended to give the undergraduate student an opportunity to conduct "hands-on" clinical research in the Emergency Department. Through the lecture/discussion, students will learn the basics of conducting and developing clinical research studies, using examples from ongoing studies. May be repeated up to 4 unit(s). Units awarded will depend on hours worked. (P/NP grading only.) Effective: 2007 Summer Session 1.

EMR 092C—Joan Viteri Memorial Clinic Preceptorship (1.5)
Clinical Activity; Seminar—1 hour. Prerequisite(s): Consent of Instructor. Directed towards the undergraduate students at UC Davis that volunteer at the Joan Viteri Memorial Clinic (JVMC). May be repeated for credit. (P/NP grading only.) Effective: 2017 Spring Quarter.

EMR 192—Emergency Medicine Clinical Research Internship (1-4)
Internship—6-12 hours. Prerequisite(s): Consent of Instructor. Undergraduate student in good academic standing at UC Davis. Intended to give the upper division undergraduate student an opportunity to conduct "hands-on" clinical research in the Emergency Department. Through the lecture/discussion, students learn the basics of conducting and developing clinical research studies. May be repeated up to 2 time(s). (P/NP grading only.) Effective: 2007 Summer Quarter.

EMR 199A—Special Study for Advanced Undergraduates (4-12)
Variable—4-12 hours. Prerequisite(s): Consent of Instructor. Experienced RA's who have successfully performed in the EMRAP program for a minimum of 3 quarters; must have database skills. For students interested in working on specific EM projects in a more extensive way. Must commit at least four hours per week for two quarters. Will be awarded credit upon completion of course 199B. Credit awarded upon completion of EMR 199B. Effective: 2007 Fall Quarter.

EMR 299—Research (1-12)
Variable—1-12 hours. Prerequisite(s): Consent of Instructor. Directed research in the Department of Emergency Medicine. May be repeated for credit. (S/U grading only.) Effective: 2017 Spring Quarter.

EMR 401—Preceptorship in Emergency Medicine (1-6)
Clinical Activity—10 hours. Prerequisite(s): Consent of Instructor. Exposure to the specialty of Emergency Medicine and observation of a wide array of patients in the Emergency Department. May be repeated for credit. (P/F grading only.) Effective: 2012 Spring Quarter.

EMR 430—Introduction to Medical Toxicology (3-6)
Variable—40 hours. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good standing. In-depth review of clinical and medical toxicologic emergencies. Rotation includes contact with toxicology trained emergency faculty, didactic lectures, journal club, simulation training and exposure to a very busy poison control center. (H/P/F grading only.) Effective: 2012 Spring Quarter.

EMR 435—Wilderness Medicine (3-6)
Clinical Activity—12 hours; Independent Study—8 hours; Lecture/Discussion—20 hours. Prerequisite(s): Consent of Instructor. Designed as an introductory elective course for students to explore how physicians can interact with the environment in austere conditions through lectures, hands-on/field experience, and case-based learning. (P/F grading only.) Effective: 2018 Spring Quarter.

EMR 440—Emergency Medicine Clerkship (6)
Clinical Activity—46 hours; Lecture/Discussion—4 hours. Prerequisite(s): Satisfactory completion of Medicine, Surgery, and Pediatric Clerkship. Students complete clinical shifts in the Emergency Department, functioning as Acting Intern. Treat a wide variety of patients and problems under the supervision of the EM Attending. Students are expected to take focused histories and present in clear, concise fashion. May be repeated for credit. (H/P/F grading only.) Effective: 2011 Fall Quarter.

EMR 445—Emergency Medicine Ultrasound for Fourth-Year Medical Student (3-6)
Variable. Prerequisite(s): Fourth-year Medical Student in good standing; interest in Emergency Medicine or Critical Care is recommended; EMR 440 or equivalent is recommended prior to the rotation. Limited enrollment. Intended for students interested in learning both the technical and cognitive skills of bedside ultrasound. Emphasis will be on the use of ultrasound in emergency medicine as a diagnostic tool and in procedural guidance. (H/P/F grading only.) Effective: 2008 Fall Quarter.

EMR 450—Ambulatory Elective in Emergency Medicine (3-18)
Variable. Restricted to MS4 students in good standing; externships/away rotations only. Credit will be given for approved non-AI Emergency Medicine courses at other institutions to which there is not an equal learning experience at UC Davis. May be repeated up to 2 time(s). (H/P/F grading only.) Effective: 2016 Fall Quarter.

EMR 455A—Focus on POCUS A (6)
Clinical Activity—30 hours. Prerequisite(s): Consent of Instructor. Directed towards gaining a greater proficiency of point-of-care ultrasound. Particularly useful for those pursuing careers that use this modality heavily in clinical practice such as primary care, pediatrics, emergency medicine, critical care, physical medicine and rehabilitation, etc. (H/P/F grading only.) Effective: 2017 Summer Quarter.

EMR 455B—Focus on POCUS B (6)
Clinical Activity—30 hours. Prerequisite(s): Consent of Instructor. Directed towards gaining a greater proficiency of point-of-care ultrasound. Particularly useful for those pursuing careers that use this modality heavily in clinical practice such as primary care, pediatrics, emergency medicine, critical care, physical medicine and rehabilitation, etc. (H/P/F grading only.) Effective: 2017 Summer Quarter.

EMR 465—Externship in Emergency Medicine (3-9)
Clinical Activity—36 hours; Lecture/Discussion—4 hours. Prerequisite(s): Satisfactory completion of Medicine, Surgery and Pediatrics. Students complete clinical shifts in the Emergency Department, functioning as Acting Intern. Treat a wide variety of patients and problems under the supervision of the EM Attending. Students are expected to take focused histories and present in clear, concise fashion. May be repeated for credit No Limit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

EMR 470—Pediatric Emergency Medicine Clerkship (3-6)
Clinical Activity—36 hours; Lecture/Discussion—4 hours. Prerequisite(s): Satisfactory completion of Medicine, Surgery, and Pediatrics. Restricted to fourth-year medical student in good standing only. See patients in the Pediatric area of the Emergency Department under the supervision of an Emergency Medicine Attending. Emphasis on recognition and management of the acutely ill pediatric patient and treatment of common pediatric complaints. (H/P/F grading only.) Effective: 2017 Summer Quarter.

EMR 480—Understanding Health Policy: A Focus on Analysis and Translation (1-6)
Discussion—16 hours; Independent Study—10 hours; Lecture—4 hours. Prerequisite(s): Consent of Instructor. The paradigm of healthcare delivery in the US is changing rapidly. To prepare the next generation of physician leaders, this course will provide students with the skills, tools, and knowledge needed to impact decisions made at the policy level. (H/P/F grading only.) Effective: 2015 Fall Quarter.

EMR 490—Emergency Procedures Elective (3)
Discussion/Laboratory—24 hours; Independent Study—4 hours; Tutorial—4 hours; Web Virtual Lecture—8 hours. Prerequisite(s): Current basic life support (BLS) certification. Restricted to fourth-year medical student in good standing only. Simulator-based skills training for emergency procedures. Topics include airway management, central venous access, chest tube placement, and general critical care resuscitation skills. (P/F grading only.) Effective: 2010 Summer Quarter.

EMR 493A—Cardiac Arrest, Resuscitation and Repurfusion SSM (3)
Clinical Activity—4 hours; Laboratory—16 hours; Lecture—5 hours; Lecture/Lab—10 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. Special Studies Module, a four week course specific to the topics of Cardiac Arrest, Resusciatation and Repurfusion. (H/P/F grading only.) Effective: 2010 Summer Quarter.

EMR 493B—Cardiac Arrest, Resuscitation and Repurfusion SSM (3)
Clinical Activity—4 hours; Laboratory—16 hours; Lecture—5 hours; Lecture/Lab—10 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. Special Studies Module, a four week course specific to the topics of Cardiac Arrest, Resusciatation and Repurfusion. (H/P/F grading only.) Effective: 2010 Summer Quarter.

EMR 499—Research (2-18)
Laboratory. Prerequisite(s): Consent of Instructor. Elective where topics may be selected in either basic or clinical research areas of Emergency and/or Critical Care Medicine. The goals will be tailored to each individual student. Enrollment requires prior discussion and consent of instructor. (H/P/F grading only.) Effective: 1997 Winter Quarter.

EMS Engineering Material Science

Courses in EMS:

EMS 002—Materials Marvels: The Science of Superheroes (3)
Discussion—1 hour; Lecture—2 hours. Introduction to science and technology of materials as key engineering ingredients. Explores the relationship between art and materials, and how superheroes are both products and resources of ideas for new materials' technologies. GE credit: SE, SL, WE. Effective: 2018 Winter Quarter.

EMS 006H—Honors Materials Science Computer Applications (1)
Discussion—1 hour. Prerequisite(s): ENG 006 (can be concurrent); Enrollment in the Materials Science and Engineering Honors Program; ENG 006 required concurrently. Restricted to students in the Materials Science and Engineering Honors Program. Examination of materials science computer applications through additional readings, discussions, collaborative work, or special activities which may include projects or computer simulations. Effective: 2017 Winter Quarter.

EMS 009H—Honors Solid-State Materials Science (1)
Discussion—1 hour. Prerequisite(s): PHY 009D (can be concurrent); Enrollment in the Materials Science and Engineering Honors Program; PHY 009D required concurrently. Restricted to students in the Materials Science and Engineering Honors Program. Examination of solid-state materials science and modern physics topics through additional readings, discussions, collaborative work, or special activities which may include projects, laboratory experience or computer simulations. Effective: 2017 Winter Quarter.

EMS 147—Principles of Polymer Materials Science (3)
Lecture—3 hours. Prerequisite(s): CHE 002A; CHE 002B; ((CHE 008A, CHE 008B) or (ENG 045 or ENG 045Y)); introductory physics. Basic principles of polymer science presented including polymer structure and synthesis; polymerization mechanisms, polymer classes, properties, and reactions; polymer morphology, rheology, and characterization; polymer processing. (FPS 100.) GE credit: QL, SE. Effective: 2018 Spring Quarter.

EMS 160—Thermodynamics of Materials Processes and Phase Stability (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 045 C- or better; PHY 009B C- or better; MAT 022B C- or better; CHE 002C recommended. Review of thermodynamic principles of interest to materials scientists and engineers. Application of thermodynamics to material processing, phase stability, corrosion. GE credit: QL, SE, SL, VL. Effective: 2017 Winter Quarter.

EMS 160—Thermodynamics of Materials Processes and Phase Stability (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ENG 045 C- or better or ENG 045Y C- or better); PHY 009B C- or better; MAT 022B C- or better; CHE 002C recommended. Review of thermodynamic principles of interest to materials scientists and engineers. Application of thermodynamics to material processing, phase stability, corrosion. GE credit: QL, SE, SL, VL. Effective: 2018 Fall Quarter.

EMS 162—Structure and Characterization of Engineering Materials (4)
Lecture—4 hours. Prerequisite(s): (ENG 045 C- or better or ENG 045Y C- or better); MAT 022A C- or better; PHY 009B C- or better Description of the structure of engineering materials on the atomic scale by exploring the fundamentals of crystallography. The importance of this structure to materials' properties. Description of experimental determination using x-ray diffraction techniques. GE credit: QL, SE. Effective: 2018 Winter Quarter.

EMS 162L—Structure and Characterization of Materials Laboratory (2)
Discussion—1 hour; Laboratory—3 hours. Prerequisite(s): EMS 162 (can be concurrent); Concurrent enrollment recommended. Experimental investigations of structure of solid materials are combined with techniques for characterization of materials. Laboratory exercises emphasize methods used to study structure of solids at the atomic and microstructural levels. Methods focus on optical, x-ray and electron techniques. Not open for credit to those who have completed EMS 132; can be taken for 2 units of credit by those who have completed EMS 134L; not open for credit to those who have completed both EMS 132L and EMS 134L. GE credit: QL, SE, SL, VL, WE. Effective: 2017 Winter Quarter.

EMS 164—Rate Processes in Materials Science (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ENG 045 C- or better or ENG 045Y C- or better); EMS 160 Basic kinetic laws and the principles governing phase transformations. Applications in diffusion, oxidation, nucleation, growth and spinodal transformations. GE credit: QL, SE, SL, VL. Effective: 2018 Winter Quarter.

EMS 170—Sustainable Energy Technologies: Batteries, Fuel Cells, and Photovoltaic Cells (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 045 or ENG 045Y Open to students in Engineering or related fields. Basic principles of future energy devices such as lithium batteries, fuel cells, and photovoltaic cells. Examines the current status of these energy technologies and analyze challenges that still must be overcome. GE credit: SE. Effective: 2018 Winter Quarter.

EMS 172—Electronic, Optical and Magnetic Properties of Materials (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 110A or PHY 009D; ENG 006 or ECM 006 or equivalent recommended. Electronic, optical, and magnetic properties of materials as related to structure and processing of solid state materials. Physical principles for understanding the properties of metals, semiconductors, ceramics, and amorphous solids and the applications of these materials in engineering. GE credit: QL, SE, SL, VL. Effective: 2017 Winter Quarter.

EMS 172L—Electronic, Optical and Magnetic Properties Laboratory (2)
Laboratory—3 hours; Lecture/Lab—1 hour. Prerequisite(s): EMS 172 (can be concurrent); Concurrent enrollment recommended. Experimental investigation of electronic, optical and magnetic properties of engineering materials, emphasizing the fundamental relationship between microstructure and properties as well as the influence of rate processes on the evolution of the microstructure and properties. GE credit: QL, SE, SL, VL, WE. Effective: 2017 Winter Quarter.

EMS 174—Mechanical Behavior of Materials (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ENG 045 C- or better or ENG 045Y C- or better); EMS 162 recommended. Microscopic and macroscopic aspects of the mechanical behavior of engineering materials, with emphasis on recent development in materials characterization by nondestructive testing. Fundamental aspects of plasticity in engineering materials, strengthening mechanisms and mechanical failure modes of materials systems. GE credit: QL, SE, SL, VL. Effective: 2018 Spring Quarter.

EMS 174L—Mechanical Behavior Laboratory (2)
Laboratory—3 hours; Lecture/Lab—1 hour. Prerequisite(s): EMS 174 (can be concurrent); Concurrent enrollment recommended. Experimental investigation of mechanical behavior of engineering materials. Laboratory exercises emphasize the fundamental relationship between microstructure and mechanical properties, and the evolution of the microstructure as a consequence of rate process. Not open for credit to those who have taken EMS 138L; not open for credit to those who have taken both EMS 134L and EMS 138L. GE credit: QL, SE, SL, VL, WE. Effective: 2016 Winter Quarter.

EMS 180—Materials in Engineering Design (4)
Lecture—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): ENG 045 C- or better or ENG 045Y C- or better Restricted to students with upper division standing. Quantitative treatment of materials selection for engineering applications. Discussion of design and material selection strategy; process and process selection strategy; process economics; life-cycle thinking and eco-design. Use of materials selection software. GE credit: OL, SE, SL, VL, WE. Effective: 2018 Spring Quarter.

EMS 181—Materials Processing (4)
Lecture—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): (ENG 045 C- or better or ENG 045Y C- or better); (ENG 105 or ECH 152B or EEC 140A or EMS 164) Principles of phase equilibria, thermodynamics and reaction kinetics applied to materials processing. Effects of processing variables on the structure-property relationship. Fundamentals of the manufacturing processes for electronic, optical, functional and structural materials. GE credit: OL, SE, VL, WE. Effective: 2018 Spring Quarter.

EMS 182—Failure Analysis (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 045 C- or better or ENG 045Y C- or better; EMS 174 recommended. Analysis of the way materials fail. Effects of temperature, mechanical deformation and corrosion on the properties of materials. forensics and methodologies for investigating failures of materials including optical microscopy, x-ray analysis and scanning electron microscopy. Investigation of practical problems. GE credit: QL, SE, VL, WE. Effective: 2018 Spring Quarter.

EMS 188A—Materials Design Project (4)
Discussion—1 hour; Laboratory—4 hours. Prerequisite(s): EMS 160; EMS 162; EMS 164; EMS 172; EMS 174 Major materials design experience involving analysis of real materials synthesis/processing/fabrication and technological applications including critical assessments of economic, manufacturing, and ethical constraints. Various principles of materials science are integrated into a culminating team design project. GE credit: OL, SE, SL, VL, WE. Effective: 2017 Winter Quarter.

EMS 188AH—Honors Materials Design (1)
Discussion—1 hour. Prerequisite(s): Enrollment in the Materials Science and Engineering Honors Program. Open only to students in the Materials Science and Engineering Honors Program. Examination of special topics covered in the materials design course through additional readings, discussions, collaborative work, or special activities which may include projects, laboratory experience or computer simulations. Effective: 2017 Winter Quarter.

EMS 188B—Materials Design Project (4)
Discussion—1 hour; Laboratory—4 hours. Prerequisite(s): EMS 188A Major materials design experience involving analysis of real materials synthesis/processing/fabrication and technological applications including critical assessments of economic, manufacturing, and ethical constraints. Various principles of materials science are integrated into a culminating team design project. GE credit: OL, SE, SL, VL, WE. Effective: 2017 Winter Quarter.

EMS 188BH—Honors Materials Design (1)
Discussion—1 hour. Prerequisite(s): Enrollment in the Materials Science and Engineering Honors Program. Open only to students in the Materials Science and Engineering Honors Program. Examination of special topics covered in the materials design course through additional readings, discussions, collaborative work, or special activities which may include projects, laboratory experience or computer simulations. Effective: 2017 Winter Quarter.

EMS 190C—Research Group Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing. Individual and/or group conference on problems, progress and techniques in materials research. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 2017 Winter Quarter.

EMS 198—Directed Group Study (1-5)
Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Group study of selected topics. (P/NP grading only.) Effective: 2017 Winter Quarter.

EMS 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special study for advanced undergraduates. (P/NP grading only.) Effective: 2017 Winter Quarter.

EMS 230—Fundamentals of Electron Microscopy (3)
Lecture—2 hours; Lecture/Discussion—1 hour. Prerequisite(s): EMS 162 Principles and techniques of scanning and transmission of electron microscopy used in the study of materials will be described. Emphasis upon practical applications. Effective: 2017 Winter Quarter.

EMS 230L—Laboratory for Electron Microscopy (2)
Laboratory—6 hours. Prerequisite(s): EMS 230 (can be concurrent); EMS 230 required concurrently. Practical application of techniques of electron scanning and transmission microscopy including x-ray microanalysis. Effective: 2017 Winter Quarter.

EMS 232—Advanced Topics in Transmission Electron Microscopy (3)
Discussion—2 hours; Lecture—1 hour. Prerequisite(s): EMS 230 Advanced course in the techniques of electron microscopy including analytical techniques, probe diffraction methods, and high resolution imaging. Effective: 2017 Winter Quarter.

EMS 232L—Laboratory for Advanced Transmission Electron Microscopy (2)
Discussion—1 hour; Laboratory—3 hours. Prerequisite(s): EMS 230L Laboratory in advanced transmission electron microscopy techniques relevant to specific graduate research projects in materials science. Effective: 2017 Winter Quarter.

EMS 241—Principles and Applications of Dislocation Mechanics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing in Engineering. Concepts in dislocation theory are applied to explain plasticity of crystalline solids. Glide and climb of dislocations, strain hardening, recrystallization, theories of creep processes and interaction of dislocation with solute atoms, precipitates and impurity clouds are discussed. Effective: 2017 Winter Quarter.

EMS 243—Kinetics of Phase Transformation in Engineering Materials (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing in Engineering; EMS 160 recommended. Theory of alloying, kinetics of phase changes, homogenous and heterogeneous transformation, transformation by shear, order-disorder reactions. Effective: 2017 Winter Quarter.

EMS 244—Interaction of Materials and their Environment (3)
Lecture—3 hours. Prerequisite(s): (ENG 045 or ENG 045Y); ENG 105A recommended; or consent of instructor. Thermodynamic and kinetic foundations of the corrosion and oxidation processes. Practical aspects of corrosion control and prevention. Stress-corrosion and gas-embrittlement phenomena. Special topics in corrosion; microbiological and atmospheric corrosion. Effective: 2018 Spring Quarter.

EMS 245—Micro- and Nano-Technology in Life Sciences (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Survey of biomedical device design from the engineering and biological perspectives; micro-/nano-fabrication and characterization techniques; surface chemistry and mass transfer; essential biological processes and models; proposal development skills to merge aforementioned themes in a multidisciplinary project. (EEC 245 and ECH 245.) Effective: 2017 Winter Quarter.

EMS 246—Photovoltaics and Solar Cells (3)
Lecture—3 hours. Prerequisite(s): EEC 140B; or Consent of Instructor. Or equivalent. Physics and application of photovoltaics and solar cells, including design, fabrication technology, and grid incorporation. Mono and microcrystalline silicon devices; thin-film technologies, heterojunction and organic-semiconductor technologies. Collectors, electrical inverters and infrastructure issues. Challenges and concerns. (EEC 248.) Effective: 2017 Winter Quarter.

EMS 248—Fracture of Engineering Materials (3)
Lecture—3 hours. Prerequisite(s): EMS 174 Description of the failure of materials by crack propagation. Topics include the stress fields about elastic cracks, the Griffith-Irwin analysis, descriptions of plastic zones, fracture toughness testing, microstructural aspects of fracture and failure at elevated temperatures. Effective: 2017 Winter Quarter.

EMS 249—Mechanisms of Fatigue (3)
Lecture—3 hours. Prerequisite(s): EMS 174; or Consent of Instructor. EMS 248 recommended. Microstructural description of the mechanisms of fatigue in metals. Topics include a phenomenological treatment of cyclic deformation, dislocation processes in cyclic deformation, fatigue crack nucleation, Stage I growth, threshold effects and high temperature cyclic deformation. Effective: 2017 Winter Quarter.

EMS 250A—Special Topics in Polymer and Fiber Science (3)
Lecture—3 hours. Prerequisite(s): EMS 147; or Consent of Instructor. Selected topics of current interest in polymer and fiber sciences. Topics will vary each time the course is offered. (FPS 250A.) Effective: 2017 Winter Quarter.

EMS 250B—Special Topics in Polymer and Fiber Science (3)
Lecture—3 hours. Prerequisite(s): EMS 147; or Consent of Instructor. Selected topics of current interest in polymer and fiber sciences. Topics will vary each time the course is offered. (FPS 250B.) Effective: 2017 Winter Quarter.

EMS 250C—Special Topics in Polymer and Fiber Science (3)
Lecture—3 hours. Prerequisite(s): EMS 147; or Consent of Instructor. Selected topics of current interest in polymer and fiber sciences. Topics will vary each time the course is offered. (FPS 250C.) Effective: 2017 Winter Quarter.

EMS 250D—Special Topics in Polymer and Fiber Science (3)
Lecture—3 hours. Prerequisite(s): EMS 147; or Consent of Instructor. Selected topics of current interest in polymer and fiber sciences. Topics will vary each time the course is offered. (FPS 250D.) Effective: 2017 Winter Quarter.

EMS 250E—Special Topics in Polymer and Fiber Science (3)
Lecture—3 hours. Prerequisite(s): EMS 147; or Consent of Instructor. Selected topics of current interest in polymer and fiber sciences. Topics will vary each time the course is offered. (FPS 250E.) Effective: 2017 Winter Quarter.

EMS 250F—Special Topics in Polymer and Fiber Science (3)
Lecture—3 hours. Prerequisite(s): EMS 147; or Consent of Instructor. Selected topics of current interest in polymer and fiber sciences. Topics will vary each time the course is offered. (FPS 250F.) Effective: 2017 Winter Quarter.

EMS 251—Applications of Solid State Nuclear Magnetic Resonance Spectroscopy (3)
Lecture—3 hours. Prerequisite(s): Graduate standing in chemistry, physics or engineering, or consent of instructor. Fundamentals of solid state NMR spectroscopy and principles of advanced NMR techniques for analyzing structure of solid materials. Effective: 2017 Winter Quarter.

EMS 260—Advanced Thermodynamics of Solids (4)
Lecture/Discussion—4 hours. Prerequisite(s): EMS 160 Thermodynamic principles, formalism and their application to solid materials. Specific examples from ceramic and solid state systems. Use of thermodynamic approach in developing understanding of and constraints for processes in real systems. Effective: 2017 Winter Quarter.

EMS 262—Advanced Topics in Structure of Materials (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EMS 162; EMS 174 recommended; graduate standing in Engineering or consent of instructor. Nature of microstructure in engineering materials. Crystalline and non-crystalline structures, with special emphasis on grain boundary segregation in the development of polycrystalline microstructure and the radial distribution function of amorphous materials. Not open for credit to students who previously completed (cancelled) EMS 245. Effective: 2017 Winter Quarter.

EMS 264—Transport Phenomena in Materials Processes (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing in Engineering. Thermodynamic driving forces and atomic-scale mechanisms underlying diffusive mass transport and interface motion in materials. Nucleation, growth and coarsening dynamics of phase transformations. Not open for credit to students who previously completed EMS 240. Effective: 2017 Winter Quarter.

EMS 272—Advanced Functional Properties of Materials (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing in Physics, Chemistry, and Engineering. Fundamental physical properties of solid materials important to solid state devices, specifically electronic, magnetic, and optical properties. Topics include band structures, metals, superconductors, semiconductors, dielectrics, optical properties, and magnetic properties and implementation of these properties into devices. Effective: 2017 Winter Quarter.

EMS 274—Advanced Mechanical Properties of Materials (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EMS 174 Comprehensive study of mechanical properties of materials, with special attention to dislocations and deformation and fracture control mechanisms. Mechanical properties of conventional engineering materials as well as advanced materials such as nanocrystalline solids and thin films are considered. Effective: 2017 Winter Quarter.

EMS 282—Glass: Science and Technology (3)
Extensive Writing—1 hour; Lecture—2 hours. Prerequisite(s): Graduate standing in Chemistry, Physics or Engineering, or consent of instructor. Modern paradigms in glass science and their applications to technologies. Relation of macroscopic properties of glasses and glass-forming liquids to atomic-level structures, including principles of formation, relaxation, transport phenomena, nucleation, crystallization and phase separation in glasses. Effective: 2017 Winter Quarter.

EMS 288—Living Matter: Physical Biology of the Cell (3)
Lecture—3 hours. Open to any student possessing general background in any disciplines of physical or biological sciences and engineering. Introduction to the origin, maintenance, and regulation of the dynamic architecture of the cell, including cellular modes of organization, dynamics and energy dissipation, molecular transport, motility, regulation, and adaptability. (BIM 288 and BPH 288.) Effective: 2016 Fall Quarter.

EMS 289A—Special Topics in Materials Science; Electronic Materials (1-5)
Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Electronic Materials. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

EMS 289B—Special Topics in Materials Science; Ceramics and Minerals (1-5)
Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Ceramics and Minerals. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

EMS 289C—Special Topics in Materials Science; Physics and Chemistry of Materials (1-5)
Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Physics and Chemistry of Materials. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

EMS 289D—Special Topics in Materials Science; Materials Processing (1-5)
Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Materials Processing. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

EMS 289E—Special Topics in Materials Science; Materials Science and Forensics (1-5)
Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Materials Science and Forensics. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

EMS 289F—Special Topics in Materials Science; Biomaterials (1-5)
Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Biomaterials. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

EMS 289G—Special Topics in Materials Science; Surface Chemistry of Metal Oxides (1-5)
Lecture/Lab. Prerequisite(s): Consent of Instructor. Special topics in Surface Chemistry of Metal Oxides. May be repeated for credit when topic differs. Effective: 2017 Winter Quarter.

EMS 290—Materials Science and Engineering Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Selected topics of current interest in Materials Science and Engineering. The subjects covered will vary from year to year and will be announced at the beginning of each quarter. May be repeated for credit. (S/U grading only.) Effective: 2017 Fall Quarter.

EMS 290C—Graduate Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Individual and/or group conference on problems, progress, and techniques in materials science and engineering research. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 2017 Winter Quarter.

EMS 294—Materials Science Seminar (1)
Seminar—1 hour. Current literature and developments in materials science with presentations by individual students. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 2017 Winter Quarter.

EMS 298—Group Study (1-5)
Variable. Group study. Effective: 2017 Winter Quarter.

EMS 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Research. (S/U grading only.) Effective: 2017 Winter Quarter.

EMS 390—The Teaching of Materials Science (1)
Discussion—1 hour. Prerequisite(s): Meet qualifications for teaching assistant and/or associate-in in materials science and engineering. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit. (S/U grading only.) Effective: 2017 Winter Quarter.

ENG Engineering

Students are encouraged to carefully adhere to all prerequisite requirements. The instructor is authorized to drop students from a course for which stated prerequisites have not been completed.

Courses in ENG:

ENG 001—Introduction to Engineering (1)
Lecture—1 hour. Open to first year students only. Introduction to the role of engineers in the acquisition and development of engineering knowledge, the differences and similarities among engineering fields, and the work ethic and skills required for engineering. (P/NP grading only.) GE credit: SE. Effective: 2011 Fall Quarter.

ENG 002—Creativity and Entrepreneurship for Engineers (3)
Discussion—3 hours. Introduction to entrepreneurial thinking from an engineer's perspective. Focus on identifying entrepreneurial opportunities, developing prototypes, and generating business models. Emphasis on developing a creative and entrepreneurial mindset. GE credit: SE, SS. Effective: 2015 Fall Quarter.

ENG 003—Introduction to Engineering Design (4) ***Review all entries***
Lecture—2 hours; Project (Term Project)—4 hours; Studio—2 hours. Prerequisite(s): Must have satisfied the Entry Level Writing Requirement (ELWR). Pass One restricted to lower division College of Engineering students; Pass Two restricted to lower division students. Introduction to the engineering design process that incorporates the development of oral and written communication skills integral to the design process. Conducted in workshop format with hands-on engagement in the design process. GE credit: OL, SE, SS. Effective: 2017 Winter Quarter.

ENG 003—Introduction to Engineering Design (4) ***Review all entries***
Lecture—2 hours; Project (Term Project)—2 hours; Studio—2 hours. Prerequisite(s): Must have satisfied the Entry Level Writing Requirement (ELWR). Pass One restricted to lower division College of Engineering students; Pass Two restricted to lower division students. Introduction to the engineering design process that incorporates the development of oral and written communication skills integral to the design process. Conducted in workshop format with hands-on engagement in the design process. GE credit: OL, SE, SS. Effective: 2018 Fall Quarter.

ENG 004—Engineering Graphics in Design (3)
Laboratory—3 hours; Lecture—2 hours. Engineering design, descriptive geometry, pictorial sketching, computer-aided graphics, and their application in the solution of engineering problems. GE credit: SE, VL. Effective: 2003 Spring Quarter.

ENG 006—Engineering Problem Solving (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (MAT 016A C- or better or MAT 017A C- or better or MAT 021A C- or better); (MAT 016B C- or better (can be concurrent) or MAT 017B C- or better (can be concurrent) or MAT 021B C- or better (can be concurrent)) Methodology for solving engineering problems. Engineering computing and visualization based on MATLAB. Engineering examples and applications. GE credit: QL, SE. Effective: 2013 Spring Quarter.

ENG 007—Technology & Culture of the Internet (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Basic computer experience recommended. Technology and culture of networked computing and the Internet. Topics include the history and development of networked computing; Internet architecture and services; basics of Web page design and hypertext markup language; political, social, cultural, economic and ethical issues related to the Internet. GE credit: SE. Effective: 2001 Spring Quarter.

ENG 007—Technology & Culture of the Internet (4) ***Review all entries Discontinued***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Basic computer experience recommended. Technology and culture of networked computing and the Internet. Topics include the history and development of networked computing; Internet architecture and services; basics of Web page design and hypertext markup language; political, social, cultural, economic and ethical issues related to the Internet. GE credit: SE. Effective: 2018 Fall Quarter.

ENG 010—The Science Behind the Technology in Our Lives (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): High school algebra. Understanding of how the technology in our lives works using only basic concepts and rudimentry mathematics. GE credit: SE, SS. Effective: 2001 Fall Quarter.

ENG 011—Issues in Engineering (1)
Lecture—1 hour. Prerequisite(s): Participation in the MESA Engineering Program or consent of instructor. Designed to broaden the student's understanding of the engineering profession, its methods, principles, design and development process, career opportunities, and professional resources. Effective: 1999 Fall Quarter.

ENG 017—Circuits I (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (MAT 022A, MAT 022B (can be concurrent)); (PHY 009C or PHY 009HD); C- or better recommended for each course. Basic electric circuit analysis techniques, including electrical quantities and elements, resistive circuits, transient and steady-state responses of RLC circuits, sinusoidal excitation and phasors, and complex frequency and network functions. GE credit: SE, VL. Effective: 2014 Spring Quarter.

ENG 017—Circuits I (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021C; C- or better recommended. Basic electric circuit analysis techniques, including electrical quantities and elements, resistive circuits, transient and steady-state responses of RLC circuits, sinusoidal excitation and phasors, and complex frequency and network functions. GE credit: SE, VL. Effective: 2018 Fall Quarter.

ENG 020—Introduction to Space Exploration: Understanding the Technological and Environmental Challenges to Our Exploration of the Solar System (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): High school level Algebra, Geometry, General Science (Physics and Chemistry). Introductory overview of the space environment. Discussion of space exploration technology including propulsion, orbital mechanics, and spacecraft engineering. GE credit: QL, SE, SL. Effective: 2014 Winter Quarter.

ENG 035—Statics (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PHY 009A C- or better; MAT 021D C- or better (can be concurrent) Force systems and equilibrium conditions with emphasis on engineering problems. GE credit: SE. Effective: 2016 Fall Quarter.

ENG 035—Statics (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (PHY 009A C- or better or PHY 009HA C- or better); MAT 021D C- or better (can be concurrent) Force systems and equilibrium conditions with emphasis on engineering problems. GE credit: SE. Effective: 2018 Fall Quarter.

ENG 045—Properties of Materials (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (MAT 016C C- or better or MAT 021C C- or better); (CHE 002A C- or better, PHY 009A C- or better) Introductory course on the properties of engineering materials and their relation to the internal structure of materials. Not open for credit to students who have taken ENG 045Y. GE credit: QL, SE, SL, WE. Effective: 2013 Winter Quarter.

ENG 045H—Honors Properties of Materials (1)
Discussion—1 hour. Prerequisite(s): ENG 045 (can be concurrent) or ENG 045Y (can be concurrent); Enrollment in the Materials Science and Engineering Honors Program; ENG 045 or ENG 045Y required concurrently. Open only to students in the Materials Science and Engineering Honors Program. Examination of special materials science and engineering topics through additional readings, discussions, collaborative work, or special activities which may include projects, laboratory experience or computer simulations. Effective: 2018 Spring Quarter.

ENG 045Y—Properties of Materials (4)
Laboratory; Web Virtual Lecture. Prerequisite(s): (MAT 016C C- or better or MAT 021C C- or better); CHE 002A; PHY 009A Introductory course on the properties of engineering materials and their relation to the internal structure of materials. Not open for credit to students who have taken ENG 045. GE credit: QL, SE, SL. Effective: 2013 Summer Session 2.

ENG 098—Directed Group Study (1-4)
Variable. Restricted to College of Engineering students only. May be repeated up to 3 time(s) when content differs. (P/NP grading only.) Effective: 2001 Spring Quarter.

ENG 100—Electronic Circuits and Systems (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): ENG 017; C- or better recommended. Introduction to analog and digital circuit and system design through hands on laboratory design projects. Students who have completed EEC 100 may receive only 1.5 units of credit. GE credit: SE, VL. Effective: 2014 Spring Quarter.

ENG 102—Dynamics (4)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): ENG 035 C- or better; MAT 022B C- or better Open to College of Engineering students only. Kinematics and kinetics of particles, systems of particles, and of rigid bodies; application of these topics are applied to engineering problems. Only two units of credit allowed to students who have previously taken ENG 036. GE credit: SE, VL. Effective: 2017 Fall Quarter.

ENG 103—Fluid Mechanics (4) ***Review all entries***
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): ENG 035 C- or better; MAT 022B C- or better; PHY 009B C- or better Open to students in the College of Engineering and Hydrology majors. Fluid properties, fluid statics, continuity and linear momentum equations for control volumes, flow of incompressible fluids in pipes, dimensional analysis and boundary-layer flows. Not open for credit to students who have completed Chemical Engineering 150A. GE credit: SE. Effective: 2017 Winter Quarter.

ENG 103—Fluid Mechanics (4) ***Review all entries***
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): ENG 035 C- or better; MAT 022B C- or better; PHY 009B C- or better Open to students in the College of Engineering and Hydrology majors. Fluid properties, fluid statics, continuity and linear momentum equations for control volumes, flow of incompressible fluids in pipes, dimensional analysis and boundary-layer flows. Not open for credit to students who have completed ECH 150A. GE credit: SE. Effective: 2018 Fall Quarter.

ENG 104—Mechanics of Materials (4)
Lecture—4 hours. Prerequisite(s): ENG 035 C- or better; MAT 022B C- or better Open to Engineering majors only. Uniaxial loading and deformation. General concepts of stress-strain-temperature relations and yield criteria. Torsion of shafts. Bending of beams. Deflections due to bending. Introduction to stability and buckling. GE credit: QL, SE. Effective: 2010 Summer Session 1.

ENG 104L—Mechanics of Materials Laboratory (1)
Laboratory—3 hours. Prerequisite(s): ENG 104 Experiments which illustrate the basic principles and verify the analysis procedures used in the mechanics of materials are performed using the basic tools and techniques of experimental stress analysis. GE credit: SE. Effective: 1997 Winter Quarter.

ENG 105—Thermodynamics (4)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): MAT 022B C- or better; PHY 009B C- or better Open to College of Engineering students only. Fundamentals of thermodynamics: heat energy and work, properties of pure substances, First and Second Law for closed and open systems, reversibility, entropy, thermodynamic temperature scales. Applications of thermodynamics to engineering systems. GE credit: SE, VL. Effective: 2017 Fall Quarter.

ENG 106—Engineering Economics (3)
Lecture—3 hours. Prerequisite(s): Upper division standing in Engineering. The analysis of problems in engineering economy; the selection of alternatives; replacement decisions. Compounding, tax, origins and cost of capital, economic life, and risk and uncertainty are applied to methods of selecting most economic alternatives. GE credit: QL, SE, SL, SS, VL. Effective: 1997 Winter Quarter.

ENG 111—Electric Machinery Fundamentals (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 017 C- or better Principles of AC and DC electric motors and generators, their control systems and power sources. Selection of electric power equipment components based on their construction features and performance characteristics. GE credit: QL, SE, SL, VL. Effective: 2017 Winter Quarter.

ENG 121—Fluid Power Actuators and Systems (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 100 C- or better; ENG 102 C- or better Hydraulic and pneumatic systems with emphasis on analysis and control of actuators. Design of hydraulic and pneumatic systems, specification and sizing of components, and selection of electro-hydraulics/electro-pneumatics, servo valves, and closed loop systems to solve basic control problems. GE credit: QL, SE, SL, VL, WE. Effective: 2011 Fall Quarter.

ENG 122—Introduction to Mechanical Vibrations (4)
Lecture—4 hours. Prerequisite(s): ENG 102 C- or better; (ENG 006 C- or better or ENG 005 C- or better or ECS 030 C- or better); Ability to program in MATLAB. Free and forced vibrations in lumped-parameter systems with and without damping; vibrations in coupled systems; electromechanical analogs; use of energy conservation principles. GE credit: SE. Effective: 2017 Fall Quarter.

ENG 160—Environmental Physics and Society (3)
Lecture—3 hours. Prerequisite(s): (PHY 009D or PHY 010 or PHY 001B); MAT 016B; Or the equivalent of MAT 016B. Impact of humankind on the environment will be discussed from the point of view of the physical sciences. Calculations based on physical principles will be made, and the resulting policy implications will be considered. In the College of Engineering, students may receive only one unit of credit towards the Technical Electives requirement. (PHY 160.) GE credit: SE, SL. Effective: 1997 Winter Quarter.

ENG 180—Engineering Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ENG 006 C- or better or EME 005 C- or better or ECS 030 C- or better); (MAT 021D C- or better, MAT 022B C- or better) Solutions of systems of linear and nonlinear algebraic equations; approximation methods; solutions of ordinary differential equations; initial and boundary value problems; solutions of partial differential equations of Elliptic, parabolic, and hyperbolic types; Eigen value problems. GE credit: SE. Effective: 2013 Fall Quarter.

ENG 188—Science and Technology of Sustainable Power Generation (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PHY 007C or PHY 009C; Upper-division standing. Focus on scientific understanding and development of power generation that is the basis of modern society. Concentration on power generation methods that are sustainable, in particular, discussion of the most recent innovations. GE credit: SS. Effective: 2012 Fall Quarter.

ENG 190—Professional Responsibilities of Engineers (3)
Lecture—3 hours. Restricted to upper-division students in the College of Engineering. Organization of the engineering profession; introduction to contracts, specifications, business law, patents, and liability; discussion of professional, ethical, societal, and political issues related to engineering. GE credit: SS. Effective: 2013 Winter Quarter.

ENG 198—Directed Group Study (1-5)
May be repeated up to 3 time(s) content changes. (P/NP grading only.) GE credit: SE. Effective: 2001 Winter Quarter.

ENG 250—Technology Management (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Management of the engineering and technology activity. Functions of design, planning, production, marketing, sales, and maintenance. Technological product life cycle. Research and development activity. Project planning and organization. Manufacturing issues. Case studies. Effective: 1999 Spring Quarter.

ENH Environmental Horticulture

Questions pertaining to the following courses should be directed to the instructor or to the Plant Sciences Advising Office in 1224 Plant and Environmental Sciences Building; 530-752-7738.

Courses in ENH:

ENH 001—Introduction to Environmental Horticulture/Urban Forestry (3)
Lecture—3 hours. Introduction to the use of plants to enhance the physical, visual and social environment, the use of ecological principles in developing sustainable, low maintenance landscape systems, and the career opportunities in these areas. GE credit: SE, SL. Effective: 2016 Winter Quarter.

ENH 006—Introduction to Environmental Plants (4)
Discussion—2 hours; Laboratory—3 hours; Lecture—1 hour. Classification, nomenclature and variation of environmental plants. The use of floral and vegetative characteristics and terminology to key unknown plants. Characteristics of plant groups and basics of climate, soils and plant selection. Identification of 150 common landscape plants. GE credit: SE, VL. Effective: 1999 Fall Quarter.

ENH 100—Urban Forestry (4)
Laboratory—3 hours; Lecture—2 hours; Term Paper. Prerequisite(s): ENH 001 or PLS 002 or BIS 002B Principles and practices of planning and managing urban vegetation. Basics of tree appraisal, natural resource inventory, and development of long term urban forest management plans. GE credit: SE. Effective: 2017 Winter Quarter.

ENH 101—Trees of the Urban Forest (2)
Laboratory—2 hours; Lecture—1 hour. Prerequisite(s): ENH 006; or Consent of Instructor. Identification and evaluation of 200 tree species of the urban forest on campus, in the Arboretum, and in the city of Davis; appraised and aesthetic values, condition, and branch structure; contribution of trees to this ecosystem. Bicycle required. GE credit: SE, VL. Effective: 2004 Fall Quarter.

ENH 102—Physiological Principles in Environmental Horticulture (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 001C Physiological principles and processes essential to floriculture, nursery crop production, turfculture and landscape horticulture. Emphasis on the control of vegetative and reproductive development for a broad species range in greenhouse and extensive landscape environments. GE credit: SE. Effective: 1997 Winter Quarter.

ENH 105—Taxonomy and Ecology of Environmental Plant Families (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): ENH 006; or Consent of Instructor. Classification and identification of introduced and native species used
in urban forests, with emphasis on floral and vegetative characteristics of the prominent families of angiosperms and gymnosperms, adaptations to environmental variations in western landscapes, and horticultural
classification. GE credit: SE, VL. Effective: 1998 Spring Quarter.

ENH 120—Management of Container Media (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): SSC 010 or SSC 100 Principles of soil science and practices related to management of container media are taught, emphasizing appropriate use of soils and amendments, irrigation, and fertilizers.Physical and chemical properties are tested and effects of management on crops are evaluated in the laboratory. GE credit: QL, SE, WE. Effective: 2017 Winter Quarter.

ENH 125—Greenhouse and Nursery Crop Production (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): PLS 002 or BIS 002C Principles and techniques for the production of ornamental greenhouse and nursery crops. Hands-on experience producing greenhouse crops. Optional weekend field trip. GE credit: SE, WE. Effective: 2017 Winter Quarter.

ENH 133—Woody Plants in the Landscape: Growth, Ecology and Management (4)
Discussion—1 hour; Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): PLS 002 or BIS 002C Principles and practices of managing trees and shrubs in the urban landscape and other managed environments. Topics include woody plant form; growth response and adaptation; tree management in relation to soil, moisture, climate; plant problems. GE credit: SE. Effective: 2017 Winter Quarter.

ENH 150—Genetics and Plant Conservation: The Biodiversity Crisis (3)
Lecture/Discussion—3 hours. Prerequisite(s): BIS 001C; Or the equivalent. Conservation of genic diversity, measurement of diversity, threats to
diversity and reasons for protection, the process of extinction, distribution of diversity, determination of what to conserve and means of conservation. Examples drawn largely from forest tree species. GE credit: SE, SL. Effective: 1998 Winter Quarter.

ENH 160—Restoration Ecology (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): PLB 117 or EVE 117 or PLB 147; or equivalent course in ecology/plant ecology Conceptual bases of restoration ecology; tools used by restoration ecologists to solve practical problems; scope and success of actual restoration projects. GE credit: SE, SL, WE. Effective: 2017 Winter Quarter.

ENH 160—Restoration Ecology (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): PLB 117 or EVE 117 or PLS 147; or equivalent course in ecology/plant ecology. Application of ecological complexity to restoration design, implementation and monitoring across variable environments and under changing environmental conditions. Integration of physiology, population, community, ecosystem, and landscape ecology. GE credit: SE, SL. Effective: 2018 Fall Quarter.

ENH 160L—Restoration Ecology Laboratory (1)
Discussion/Laboratory—3 hours. Prerequisite(s): ENH 160 (can be concurrent); and Consent of Instructor. Companion field course to course 160. A series of part-day and all day visits to various field sites, involving site evaluations, guest field presentations by local restorationists, and actual restoration activities. Not open for credit to students who completed ENH 160 prior to spring 2004. GE credit: SE, SL. Effective: 2004 Spring Quarter.

ENL English

Courses in ENL:

ENL 003—Introduction to Literature (4)
Lecture/Discussion—4 hours. Prerequisite(s): Completion of Entry Level Writing requirement. Introductory study of several genres of English literature, emphasizing
both analysis of particular works and the range of forms and styles in English prose and poetry. Frequent writing assignments will be made. GE credit: AH, WE. Effective: 2012 Winter Quarter.

ENL 004—Critical Inquiry and Literature: Freshman Seminar (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Completion of Entry Level Writing requirement. Enrollment limited to freshmen. Critical inquiry into significant literary texts. Emphasis on close reading, classroom dialogue, and the writing of several papers or a longer seminar paper. GE credit: AH, WE. Effective: 2017 Winter Quarter.

ENL 005F—Introduction to Creative Writing: Fiction (4)
Lecture/Discussion—4 hours. Prerequisite(s): Completion of Entry Level Writing requirement. Elementary principles of writing fiction. Write both in prescribed forms and in experimental forms of their own choosing. No final examination. May be repeated up to 1 time(s). GE credit: AH, WE. Effective: 2014 Winter Quarter.

ENL 005NF—Introduction to Creative Writing: Non-Fiction (4)
Lecture/Discussion—4 hours. Prerequisite(s): Completion of Entry Level Writing requirement. Elementary principles of writing creative non-fiction. Work in prescribed literary forms (such as essay, meditation, biography, memoir, book review, documentary, or experimental non-fiction forms) and forms of students' choosing. No final examination. May be repeated up to 1 time(s) when instructor differs. GE credit: AH, WE. Effective: 2015 Fall Quarter.

ENL 005P—Introduction to Creative Writing: Poetry (4)
Lecture/Discussion—4 hours. Prerequisite(s): Completion of Entry Level Writing requirement. Elementary principles of writing poetry. Write both in prescribed forms and in experimental forms of their own choosing. No final examination. May be repeated up to 1 time(s). GE credit: AH. Effective: 2014 Winter Quarter.

ENL 010A—Literatures in English I: To 1700 (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or equivalent. Historical introduction to English language and literature from 800-1700. Linguistic borrowing, innovation, and change. Emergence of key literary genres. Colonial America as a new site of English literary production and consumption. GE credit: AH, WE. Effective: 2018 Winter Quarter.

ENL 010B—Literatures in English II: 1700-1900 (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or equivalent. Historical introduction to English language and literature from 1700-1900. Linguistic borrowing, innovation, colonization, and change. Emergence and development of key literary genres. America, Britain, Ireland, Scotland, and India as important sites of English literary production and consumption. GE credit: AH, WE. Effective: 2018 Winter Quarter.

ENL 010C—Literatures in English III: 1900 to Present (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or equivalent. Historical introduction to English language and literature from 1900-present. Linguistic borrowing, innovation, and change. Emergence and development of key literary genres. Formal experimentation. Modernism as transnational phenomenon. GE credit: AH, WE. Effective: 2018 Winter Quarter.

ENL 040—Introductory Topics in Literature (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or equivalent. Study of a special topic. Literature written in English in any period or place or genre. Thematic, formal, or temporal focus. May be repeated up to 2 time(s) content differs. GE credit: AH, WE. Effective: 2018 Winter Quarter.

ENL 041—Introductory Topics in Literature and Media (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): ENL 003 or (UWP 001 or UWP 001V or UWP 001Y); Or equivalent. Study of a topic centered on the relationships between literature and moving-image media. May be repeated up to 2 time(s) when content differs. GE credit: AH, VL, WE. Effective: 2018 Spring Quarter.

ENL 042—Approaches to Reading (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or (UWP 001 or UWP 001V or UWP 001Y); Or equivalent. Close reading and interpretation of literature from a variety of traditional and contemporary approaches. Topics include traditional textual and historical approaches; new criticism; formalism; psychological criticism; feminism and gender; reader-response; materialist approaches. Frequent written assignments. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 043—Introductory Topics in Drama (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or equivalent. Close reading of, and topics relating to selected works of British and American drama from a range of historical periods. May be repeated up to 2 time(s) when content differs. GE credit: AH, WE. Effective: 2018 Winter Quarter.

ENL 044—Introductory Topics in Fiction (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): ENL 003 or (UWP 001 or UWP 001V or UWP 001Y); Or equivalent. Close reading of, and topics relating to, British and American Fiction: short stories, novellas, novels. May be repeated up to 2 time(s) when content differs. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 045—Introductory Topics in Poetry (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): ENL 003 or (UWP 001 or UWP 001V or UWP 001Y); Or equivalent. Topical study and close reading of selections from English and American poetry. May be repeated up to 2 time(s) when content differs. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 051—Hot Bars, Supreme Lyrics, and Rhymes for Days: Hip Hop as Poetry (3)
Lecture/Discussion—3 hours. Literary approaches to hip hop as poetry. Formal examination of rap lyrics in relation to technology, visual expression, dance, and knowledge production. Historical and cultural consideration of race, ethnicity, gender, urban culture, and politics. GE credit: ACGH, AH, DD. Effective: 2018 Winter Quarter.

ENL 052—Pop Culture Shakespeare (3)
Lecture/Discussion—3 hours. Critical approaches to the study of Shakespeare's afterlife in contemporary American media. Focus on visual, audio, and kinesthetic modes of analysis and presentation. Relation of Shakespeare to contemporary society, politics, media, and economics. GE credit: AH, DD, VL. Effective: 2018 Winter Quarter.

ENL 072—Introduction to Games (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Introduction to the history, theory, and practice of play. Survey of both analog and digital games. Overview of gaming cultures, aesthetics, industries, and technologies. (CDM 072.) GE credit: AH, VL. Effective: 2017 Fall Quarter.

ENL 092—Internship in English (1-12)
Internship—3-36 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; and Consent of Instructor. Internships in fields where students can practice their skills. May be repeated for credit for a total of 12 units. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2018 Winter Quarter.

ENL 098—Directed Group Study (1-5)
Variable. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; and Consent of Instructor. (P/NP grading only.) Effective: 2018 Winter Quarter.

ENL 098F—Student Facilitated Course (1-4)
Variable—1-4 hours. Prerequisite(s): ENL 003 or (UWP 001 or UWP 001V or UWP 001Y); Consent of Instructor. Student facilitated course intended primarily for lower division students. (P/NP grading only.) Effective: 2018 Spring Quarter.

ENL 099—Special Study for Undergraduates (1-5)
(P/NP grading only.) Effective: 1997 Winter Quarter.

ENL 100F—Creative Writing: Fiction (4)
Discussion—4 hours. Prerequisite(s): ENL 005F or ENL 005P; ENL 005NF; and Consent of Instructor. Priority given to English (Creative Writing) majors. Writing of fiction. May be repeated for credit with consent of instructor. No final examination. Effective: 2017 Winter Quarter.

ENL 100FA—Creative Writing Advanced Fiction (4)
Discussion—4 hours. Prerequisite(s): ENL 100F Priority given to English majors; admission by application only. Development and evaluation of students' work in prose, primarily in the workshop format. Some reading and discussion of published novels and short stories. Conferences with individual students once per quarter. May be repeated up to 1 time(s) with consent of instructor. Effective: 2011 Fall Quarter.

ENL 100NF—Creative Writing: Non-Fiction (4)
Discussion—4 hours. Prerequisite(s): ENL 005F or ENL 005P or ENL 005NF; and Consent of Instructor. Priority given to English (Creative Writing) majors. Writing of non-fiction. May be repeated for credit with consent of instructor. No final examination. Effective: 2017 Winter Quarter.

ENL 100P—Creative Writing: Poetry (4)
Discussion—4 hours. Prerequisite(s): ENL 005F or ENL 005P or ENL 005NF; and Consent of Instructor. Priority given to English (Creative Writing) majors. Writing of poetry. May be repeated for credit with consent of instructor. Effective: 2007 Winter Quarter.

ENL 100PA—Creative Writing Advanced Poetry (4)
Discussion—4 hours. Prerequisite(s): ENL 100P Priority to English majors; admission by application only. Development and evaluation of students' work in poetry, primarily in the workshop format. Some reading and discussion of published works of poetry. Conferences with individual students once per quarter. May be repeated up to 1 time(s) with consent of instructor. Effective: 2011 Fall Quarter.

ENL 105—History of the English Language (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or (UWP 001 or UWP 001V or UWP 001Y); Or the equivalent. History of the English language. Examination of the language as recorded from Old English to present-day English. Relationship of English to other languages; development of vocabulary, phonology, and grammatical patterns. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 106—English Grammar (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or LIN 001 or UWP 001 or UWP 001V or UWP 001Y; or Consent of Instructor. Survey of present-day English grammar as informed by contemporary linguistic theories. The major syntactic structures of English; their variation across dialects, styles, and registers; their development; and their usefulness in describing the conventions of English. (LIN 106 and UWP 106.) GE credit: AH. Effective: 2018 Winter Quarter.

ENL 106P—English Grammar Practicum (2)
Discussion—2 hours. Prerequisite(s): ENL 106; LIN 106 (can be concurrent) Practice in teaching the principles of grammar to the kinds of audiences teachers encounter in California. Discussions with teachers who teach in these areas. Examination of pedagogical research on teaching grammar. (P/NP grading only.) Effective: 2000 Fall Quarter.

ENL 107—Freedom of Expression (4)
Lecture—3 hours; Term Paper. Prerequisite(s): ENL 003 or (UWP 001 or UWP 001V or UWP 001Y); Or the equivalent. Historical development of fundamental issues and contemporary controversies about freedom of expression, with emphasis on literary and artistic censorship. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 110A—Introduction to Literary Theory (4)
Extensive Writing/Discussion—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Key theoretical terms, concepts, and thinkers from the Greeks to the modern era. GE credit: AH, WE. Effective: 2018 Winter Quarter.

ENL 110B—Introduction to Modern Literary and Critical Theory (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y History of literary criticism in the modern era, with emphasis on the ties with the past and the special problems presented by modern literary theory. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 111—Topics in Medieval Literature (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically or thematically focused intensive examination of selected topics in Medieval British literature. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 113A—Chaucer: Troilus and the "Minor" Poems (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Development of the poet's artistry and ideas from his first work to his masterpiece, "Troilus and Criseyde." GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 113B—Chaucer: The Canterbury Tales (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Literary analysis of the complete "Canterbury Tales." Courtly love, literary forms, medieval science and astrology, theology and dogma as they inform the reading of Chaucer's work. GE credit: AH, WC, WE. Effective: 2018 Winter Quarter.

ENL 115—Topics in Sixteenth and Seventeenth Century Literature (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Historically or thematically focused study of works of the Renaissance. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 117—Shakespeare (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or equivalent. Historically, generically, or thematically focused study of Shakespeare's works. May be repeated up to 2 time(s) content differs. GE credit: AH, WC, WE. Effective: 2018 Winter Quarter.

ENL 120—Law and Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically, thematically, or generically focused study of the relationship between law and literature. GE credit: ACGH, AH, DD, OL, WE. Effective: 2018 Spring Quarter.

ENL 122—Milton (4)
Extensive Writing/Discussion—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Selected major works, including Paradise Lost. GE credit: AH, WC, WE. Effective: 2018 Winter Quarter.

ENL 123—18th-Century British Literature (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Historically or thematically focused study of 18th century English literature. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 125—Topics in Irish Literature (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or equivalent. Intensive study or treatment of special topics relating to the emergence, invention, and re-invention of Irish literature. May be repeated up to 2 time(s) when content differs. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 130—British Romantic Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically or thematically focused study of works of Romantic English literature. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 133—19th-Century British Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001V; Or the equivalent. Historically or thematically focused study of works of 19th-century English literature. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 137—British Literature, 1900-1945 (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically or thematically focused study of works of British literature (drama, poetry, prose fiction) from the period between 1900 and the end of World War II. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 138—British Literature, 1945 to Present (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically or thematically focused study of works of British literature (drama, poetry, prose fiction) from the period between 1945 and the present. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 139—Topics in Global Literatures and Cultures (4)
Extensive Writing/Discussion; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Historically or regionally focused study of world literatures in English (other than the national literatures of British Isles and the United States), particularly from post-colonial regions in Africa, the Caribbean , and Asia, and immigrant cultures in the English-speaking world. May be repeated up to 2 time(s) content differs. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 140—Topics in Postcolonial Literatures and Cultures (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Study of postcolonial literature of Anglophone colonies. Specific emphases may include literature from and about Anglophone India, the Caribbean, the Middle East, South Asia, Africa, and/or South America. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 141—Topics in Diasporic Literatures and Migration (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Study of literatures, histories, and cultures of one or more diasporic groups. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 142—Early American Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically or thematically focused study of American literature of the 17th and 18th centuries. GE credit: ACGH, AH, WE. Effective: 2018 Spring Quarter.

ENL 143—19th-Century American Literature to the Civil War (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically or thematically focused study of works of 19th-century American literature. GE credit: ACGH, AH, DD, WE. Effective: 2018 Spring Quarter.

ENL 144—Post-Civil War American Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically or thematically focused study of works of post-Civil War American literature. GE credit: ACGH, AH, WE. Effective: 2018 Spring Quarter.

ENL 146—American Literature 1900-1945 (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically or thematically focused study of American literature (drama, poetry, prose fiction) from the period between 1900 and the end of World War II. GE credit: ACGH, AH, DD, WE. Effective: 2018 Spring Quarter.

ENL 147—American Literature, 1945 to the Present (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or equivalent. Historically or thematically focused study of American literature (drama, poetry, prose fiction) from the period between 1945 and the present. GE credit: ACGH, AH, DD, WE. Effective: 2018 Spring Quarter.

ENL 149—Topics in Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Intensive examination of literature considered in topical terms, not necessarily historically. May be repeated for credit content differs. GE credit: AH, WE. Effective: 2018 Winter Quarter.

ENL 150A—British Drama to 1800 (4)
Extensive Writing/Discussion—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically or thematically focused study of works of English drama prior to 1800. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 150B—Drama from 1800 to the Present (4)
Extensive Writing/Discussion; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically or thematically focused study of works of British drama from 1800 to the present. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 153—Topics in Drama (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Historical or thematic study of drama. May be repeated for credit when topic differs. May be repeated for credit. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 154—The Graphic Novel (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or equivalent courses. Thematically, historically, and formally focused study of the graphic novel genre. Contents may include any regional, national, or transnational group of graphic novels. GE credit: AH, VL, WE. Effective: 2018 Spring Quarter.

ENL 155A—18th-Century British Novel (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically or thematically organized examination of the 18th-century British novel, with particular emphasis on its evolution, including the epistolary novel, the picaresque novel, and the Gothic novel: Richardson, Fielding, Sterne, Austen. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 155B—19th-Century British Novel (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically or thematically organized examination of 19th-century British novelists, with emphasis on the historical novel, the social novel, and novels by women: Scott, Dickens, the Brontes, Eliot, Hardy. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 155C—20th-Century British Novel (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically or thematically organized examination of the 20th-century British novel, with emphasis on impressionism; the revolt against naturalism; the experimental novel; the anti-modernist reaction: Conrad, Joyce, Woolf, Lawrence, Drabble, Rhys. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 156—The Short Story (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y The short story as a genre; its historical development, techniques, and formal character as a literary form. European as well as American writers. GE credit: AH, WE. Effective: 2018 Winter Quarter.

ENL 157—Detective Fiction (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Historically, formally, and thematically focused study of novels and short stories in the detective fiction genre. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 158A—The American Novel to 1900 (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically or thematically organized examination of the rise and development of the American novel from its beginnings; Hawthorne, Melville, Twain, James, and others. GE credit: ACGH, AH, WE. Effective: 2018 Spring Quarter.

ENL 158B—The American Novel from 1900 to the Present (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically or thematically organized examination of important American novelists from 1900 to the present: authors may include Willa Cather, Nathanael West, William Faulkner, Ralph Ellison, Zora Neale Hurston, Thomas Pynchon, Ishmael Reed, Maria Helena Viramontes, Rachel Kushner, and others. GE credit: AH, DD, WE. Effective: 2018 Spring Quarter.

ENL 159—Topics in the Novel (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Examination of major novels arranged thematically. Topics might include Bildungsroman, stream-of-consciousness novel, Gothic novel, historical novel. May be repeated for credit topic differs. GE credit: AH, WE. Effective: 2018 Winter Quarter.

ENL 160—Film as Narrative (4)
Film Viewing—3 hours; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Study of modern film (1930 to present) as a storytelling medium. GE credit: AH, VL, WE. Effective: 2018 Spring Quarter.

ENL 161A—Film History I: Origins to 1945 (4)
Film Viewing—3 hours; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Cultural and aesthetic history of filmmaking from its origins in the 1890's through 1945. (Courses 161A and 161B need not be taken in sequence.) GE credit: AH, VL, WE. Effective: 2018 Spring Quarter.

ENL 161B—Film History II: 1945 to present (4)
Film Viewing—3 hours; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Cultural and aesthetic history of filmmaking from 1945 through the present. (Courses 161A and 161B need not be taken in sequence.) GE credit: AH, VL, WE. Effective: 2018 Spring Quarter.

ENL 162—Film Theory and Criticism (4)
Film Viewing—3 hours; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Film theory and criticism, with a study of ten major works of international film art. GE credit: AH, VL, WE. Effective: 2018 Spring Quarter.

ENL 163—Literary Study in the British Isles (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Enrollment by application only through the Education Abroad Center. Literary Study in the British Isles: On-site study of the literature, film, and/or performance of the British Isles. May be repeated up to 2 time(s) if subject matter differs. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 164—Writing Science (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): ENL 003; STS 001; Or equivalent. Texts and writing practices in the production of scientific knowledge. Surveys the literary structure of scientific arguments; history of scientific genres; rhetoric and semiotics in scientific culture; graphical systems in the experimental laboratory; narratives of science, including science fiction. (STS 164.) GE credit: AH, SL, WE. Effective: 2006 Fall Quarter.

ENL 165—Topics in Poetry (4)
Lecture/Discussion—3 hours; Term Paper—1 hour. Prerequisite(s): (ENL 003 or UWP 001 or UWP 001V or UWP 001Y); ENL 045 Intensive examination of various topics expressed in poetry from all periods of English and American literature. May be repeated for credit
when topic covers different poets and poems. May be repeated for credit. GE credit: AH, WE. Effective: 2018 Winter Quarter.

ENL 166—Love and Desire in Contemporary American Poetry (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Close reading of contemporary American poems on the theme of love and desire by poets of diverse ethnicities and of gay, lesbian, and heterosexual orientations. GE credit: ACGH, AH, WE. Effective: 2018 Winter Quarter.

ENL 167—Twentieth-Century African American Poetry (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V; UWP 001Y; Or the equivalent. Twentieth-century African American poetry, including oral and literary traditions. Authors covered may include Gwendolyn Brooks, Countee Cullen, Robert Hayden, and Langston Hughes. GE credit: ACGH, AH, WE. Effective: 2018 Spring Quarter.

ENL 168—20th Century American Poetry (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historical Study of American poetry since 1900, with thematic and formal focus at the instructor's discretion. GE credit: ACGH, AH, WE. Effective: 2018 Spring Quarter.

ENL 171A—The Bible as Literature: The Old Testament (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y May be taken independently of course 171B. Selected readings from the Old Testament illustrating various literary forms. Emphasis on the Pentateuch, the Historical Books, and the Wisdom Books. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 171B—The Bible as Literature: Prophets and New Testament (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y May be taken independently of course 171A. Selected readings from the Old Testament prophets and the New Testament. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

ENL 172—Video Games and Culture (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): TCS 001 or STS 001 or ENL 003; Or equivalent of any. Critical approaches to the study of video games, focusing on formal, historical, and cultural modes of analysis. History of software and hardware in North American and global contexts. Relations of games to society, politics, economics, literature, media, and the arts. (CTS 172 and STS 172.) GE credit: ACGH, AH, SS, VL. Effective: 2014 Fall Quarter.

ENL 173—Science Fiction (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): ENL 003 or STS 001; Or equivalent. Literary modes and methods of science fiction. Representative texts, authors, and themes of the genre—e.g., time travel, alternative universes, and utopias. Relations of science fiction to science, philosophy, and culture. (STS 173.) GE credit: AH, WE. Effective: 2008 Winter Quarter.

ENL 175—American Literary Humor (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or standing above freshman level. American humorous vision of man, nature, and the supernatural. Includes one or more of the following: colonial humor; southwestern and New England humor; pre- and post-Civil War masters; local colorists; journalistic gadflies; anti-provincialists; modernist poets and prose writers; black humor. GE credit: ACGH, AH, WE. Effective: 2018 Spring Quarter.

ENL 177—Study of an Individual Author (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 110A or ENL 110B In-depth study of an author's works; historical context; relation to predecessors and contemporaries; critical reception; influence. May be repeated up to 1 time(s) if author differs. GE credit: AH, WE. Effective: 2010 Fall Quarter.

ENL 178—Topics in Nations, Regions, and Other Cultural Geographies (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or equivalent. Literary productions of a local, regional, national, transnational, or other geographical formation; e.g., the global South; literature of Hawaii; literature of Australia. May be repeated up to 2 time(s) when topic differs. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 179—Multi-Ethnic Literature of the United States (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or standing above freshman level. Writings by American authors of diverse races and ethinicities (African American, Asian, Jewish, Latin American, Native American, and mixed ancestry) clarifying the roles of story-telling and cultural heritage in constructing identity, experiencing displacement, recovering history, and cultivating an inclusive society. May be repeated up to 2 time(s). GE credit: ACGH, AH, DD, WE. Effective: 2018 Winter Quarter.

ENL 180—Children's Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Historical backgrounds and development of types of children's literature, folklore and oral tradition, levels of interest, criticism and evaluation, illustration and bibliography. GE credit: AH, WE. Effective: 2018 Winter Quarter.

ENL 181A—African American Literature to 1900 (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y African American literature from the colonial period to 1900. Particular attention to the rapid development of the African American literary culture from a primarily oral tradition to various literary genres, including the slave narrative. GE credit: ACGH, AH, DD, WE. Effective: 2018 Winter Quarter.

ENL 181B—African American Literature 1900-Present (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Major African American writers in the context of cultural history from 1900 to the present. Writers may include Richard Wright, Ann Petry, James Baldwin, Ralph Ellison, Paule Marshall, Toni Morrison, Alice Walker, Clarence Major. GE credit: ACGH, AH, DD, WE. Effective: 2018 Spring Quarter.

ENL 182—Literature of California (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Focus is on the diverse contributions to the rise of California literature. Reading of poetry, fiction, and essays. Emphasis on 19th and 20th century naturalists, turn of the century novelists, the Beats, and writers of the last two decades. GE credit: ACGH, AH, DD, WE. Effective: 2018 Spring Quarter.

ENL 183—Young Adult Literature (4)
Lecture—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or equivalent. Theoretical, critical, and literary issues informing the study and teaching of American young adult literature. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 184—Literature and the Environment (4)
Discussion/Laboratory—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Historical and/or thematic survey of topics in writing about the environment. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 185A—Women's Writing I (4)
Extensive Writing/Discussion—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Women's Writing in English before 1800; organized by period, place, genre, or theme. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 185B—Women's Writing II (4)
Extensive Writing/Discussion—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Women's Writing in English from 1800 to 1900; organized by period, place, genre, or theme. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 185C—Women's Writing III (4)
Extensive Writing/Discussion—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Women's Writing in English after 1900; organized by period, place, genre, or theme. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 186—Literature, Sexuality, and Gender (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Historically or thematically focused intensive examinations of gender and sexuality in British and American literature. GE credit: AH, WE. Effective: 2018 Spring Quarter.

ENL 187A—Topics in Literature and Media (4)
Film Viewing—3 hours; Seminar—3 hours. Prerequisite(s): ENL 110A or ENL 110B; and Consent of Instructor. Group study of a topic centered on the relationships between literature and film or other moving-image media. Effective: 2009 Fall Quarter.

ENL 188A—Topics in Literary and Critical Theory (4)
Seminar—3 hours; Term Paper. Prerequisite(s): ENL 110A or ENL 110B; and Consent of Instructor. Intensive examination of theories addressing a particular problem, topic, or question. Effective: 2009 Fall Quarter.

ENL 189—Seminar in Literary Studies (4)
Seminar—3 hours; Term Paper. Prerequisite(s): ENL 110A or ENL 110B Intensive, focused study of literature at an advanced level. May be organized by topic, author, period, movement, or genre. High participation. GE credit: AH, WE. Effective: 2013 Fall Quarter.

ENL 192—Internship in English (1-12)
Internship—3-36 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y Internships in fields where students can practice their skills. A maximum of four units is allowed toward the major in English. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2018 Winter Quarter.

ENL 194H—Seminar for Honors Students (4)
Seminar—3 hours; Term Paper. Prerequisite(s): ENL 110A or ENL 110B; One advanced study course; admission to English Department Senior Honors Program in Literature, Criticism, and Theory. Preparation for writing an honors thesis in course 195H. Limited enrollment; high level of participation expected. GE credit: AH, WE. Effective: 2010 Fall Quarter.

ENL 195H—Honors Thesis (4)
Independent Study—12 hours. Prerequisite(s): ENL 194H Preparation of a thesis, under the supervision of an instructor. Students satisfying requirements for the general major or the teaching emphasis write on a scholarly or critical subject; creative writing students submit a volume of poems or fiction. GE credit: AH, WE. Effective: 1997 Winter Quarter.

ENL 197T—Community Tutoring in English (1-5)
Tutorial—1-5 hours. Prerequisite(s): Upper division standing and consent of Chairperson. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. Does not fulfill requirement for major. May be repeated up to 8 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

ENL 197TC—Community Tutoring in English (1-4)
Tutorial—1-4 hours. Prerequisite(s): Upper division standing and a major in English; consent of Chairperson. Field experience, with individuals or in classroom in instruction of English language, literature, and composition. Does not fulfill requirement for major. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

ENL 198—Directed Group Study (1-5)
Variable. Prerequisite(s): ENL 003 or ENL 005F or ENL 005P or UWP 001 or UWP 001V or UWP 001Y (P/NP grading only.) Effective: 2018 Winter Quarter.

ENL 198F—Student Facilitated Course (1-4)
Variable—1-4 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Consent of Instructor. Student facilitated course intended primarily for upper division students. (P/NP grading only.) Effective: 2018 Spring Quarter.

ENL 198S—Directed Group Study (4)
Lecture/Discussion—4 hours. Prerequisite(s): ENL 163S (can be concurrent); and Consent of Instructor. ENL 163S required concurrently. Group study will be closely tied to the texts and periods studied in course 163S. Investigations of historical sites, museums, galleries, and performances. To be taught in London. (P/NP grading only.) Effective: 2002 Winter Quarter.

ENL 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

ENL 199FA—Student Facilitated Course Development (1-4)
Variable—1-4 hours. Prerequisite(s): ENL 003 or UWP 001 or UWP 001V or UWP 001Y; Consent of Instructor. Under the supervision of a faculty member, an undergraduate student plans and develops the course they will offer under 98F/198F. (P/NP grading only.) Effective: 2018 Winter Quarter.

ENL 200—Introduction to Graduate Studies in English (4)
Seminar—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing. Introduction to literary scholarship with special attention to the elements of professionalism and to different modes of literary investigation. (S/U grading only.) Effective: 2000 Fall Quarter.

ENL 205—Anglo-Saxon Language and Culture (4)
Lecture—3 hours; Term Paper/Discussion. The language and culture of Anglo-Saxon England; readings in Old English prose and poetry. (S/U grading only.) Effective: 1997 Winter Quarter.

ENL 206—Beowulf (4)
Conference; Discussion—3 hours; Term Paper/Discussion. Prerequisite(s): ENL 205; Or the equivalent. A study of the poem and the Heroic Age of Germanic literature. Effective: 1997 Winter Quarter.

ENL 207—Middle English (4)
Discussion—3 hours; Term Paper. Study of the phonology, morphology, syntax, and lexicon between 1100 and 1500 with investigation of the regional dialects; pertinent facts on both the internal and external linguistic history; intensive reading of texts. Effective: 1997 Winter Quarter.

ENL 210—Readings in English and American Literature (4)
Conference—1 hour; Seminar—3 hours. Prerequisite(s): Upper division course in area studied. Content varies according to specialty of instructor. May be repeated for credit topic differs. Effective: 2005 Winter Quarter.

ENL 225—Topics in Irish Literature (4)
Conference—1 hour; Seminar—3 hours. Prerequisite(s): Graduate standing. Varied topics, including the nineteenth-century novel, contemporary Irish poetry, rise of the drama, or a study of a major author. May be repeated for credit topic differs. Effective: 2004 Fall Quarter.

ENL 230—Study of a Major Writer (4)
Conference—1 hour; Seminar—3 hours. Artistic development of one major writer and his intellectual and
literary milieu. May be repeated for credit different writer is studied. Effective: 1997 Winter Quarter.

ENL 232—Problems in English Literature (4)
Conference—1 hour; Seminar—3 hours. Selected issues in the current study and critical assessment of a limited period or topic in English literature. May be repeated for credit different period or topic is studied. Effective: 1997 Winter Quarter.

ENL 233—Problems in American Literature (4)
Conference—1 hour; Seminar—3 hours. Selected topics for intensive investigation. May be repeated for credit different topic or period is studied. Effective: 1997 Winter Quarter.

ENL 234—Dramatic Literature (4)
Conference—1 hour; Lecture—3 hours. Historical introduction to dramatic theory; the genres of tragedy, comedy, and tragicomedy. May be repeated for credit topic differs. Effective: 2004 Fall Quarter.

ENL 235—Theory of Fiction (4)
Conference—1 hour; Seminar—3 hours. Prerequisite(s): Graduate standing. Theories of fiction as they relate to the professional writer's practice of the craft. For students in the Creative Writing Program. May be repeated for credit focus differs. Effective: 1998 Spring Quarter.

ENL 236—Poetics (4)
Conference—1 hour; Seminar—3 hours. Prerequisite(s): Graduate standing. Theories of poetry as revealed in structure, prosody, and idiom of British and American poems, variably approached-through intensive
study of a single poet, historically, or theoretically-at the instructor's discretion. For students in the Creative Writing Program. May be repeated for credit focus differs. Effective: 1998 Spring Quarter.

ENL 237—Seminar for Writers (4)
Extensive Writing; Seminar—3 hours. Prerequisite(s): Graduate standing. Varied topics in the study of literature and literary culture craft and poetics from the perspective of the writer/practitioner. May be repeated up to 2 time(s) If focus differs. Effective: 2015 Fall Quarter.

ENL 238—Special Topics in Literary Theory (4)
Seminar—3 hours; Term Paper. Prerequisite(s): ENL 237; Or the equivalent. Advanced topics in literary theory and criticism. Preparation and evaluation of research paper. May be repeated for credit when topic and/or reading list differs. Effective: 1997 Winter Quarter.

ENL 240—Medieval Literature (4)
Conference—1 hour; Seminar—3 hours. Studies of Medieval literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit different topic is studied. Effective: 1998 Fall Quarter.

ENL 242—Sixteenth-Century Literature (4)
Conference—1 hour; Seminar—3 hours. Studies in sixteenth-century literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit different topic is studied. Effective: 1997 Winter Quarter.

ENL 244—Shakespeare (4)
Conference—1 hour; Seminar—3 hours. Studies in Shakespeare. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit different topic is studied. Effective: 1998 Fall Quarter.

ENL 246—Seventeenth-Century Literature (4)
Conference—1 hour; Seminar—3 hours. Studies in seventeenth-century literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit different topic is studied. Effective: 1997 Winter Quarter.

ENL 248—Eighteenth-Century Literature (4)
Conference—1 hour; Seminar—3 hours. Studies in eighteenth-century literature. Course materials to be
selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit different topic is studied. Effective: 1997 Winter Quarter.

ENL 250—Romantic Literature (4)
Conference—1 hour; Seminar—3 hours. Studies in Romantic literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit different topic is studied. Effective: 1997 Winter Quarter.

ENL 252—Victorian Literature (4)
Conference—1 hour; Seminar—3 hours. Studies in Victorian literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit different topic is studied. Effective: 1997 Winter Quarter.

ENL 254—Twentieth-Century British Literature (4)
Conference—1 hour; Seminar—3 hours. Studies in twentieth-century British literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit different topic is studied. Effective: 1997 Winter Quarter.

ENL 256—Early American Literature (4)
Conference—1 hour; Seminar—3 hours. Studies in Early American literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit different topic is studied. Effective: 1997 Winter Quarter.

ENL 258—American Literature: 1800 to the Civil War (4)
Conference—1 hour; Seminar—3 hours. Studies in American literature from 1800 to Civil War. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit different topic is studied. Effective: 1997 Winter Quarter.

ENL 260—American Literature: Civil War to 1914 (4)
Conference—1 hour; Seminar—3 hours. Studies in American literature from the Civil War to 1914. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit different topic is studied. Effective: 1997 Winter Quarter.

ENL 262—American Literature after 1914 (4)
Conference—1 hour; Seminar—3 hours. Studies in American literature after 1914. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit different topic is studied. Effective: 1998 Fall Quarter.

ENL 264—Studies in Modern British and American Literature (4)
Conference—1 hour; Seminar—3 hours. Studies in modern British and American literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit different topic is studied. Effective: 1998 Fall Quarter.

ENL 270—Studies in Contemporary World Literature (4)
Conference—1 hour; Seminar—3 hours. Prerequisite(s): Graduate standing, consent of instructor, with preference given to those enrolled in the masters program in Creative Writing. Emerging global, international or transnational techniques, theories, and individual works of contemporary world prose or poetry. Discussion,
seminar reports, research papers. May be repeated for credit topic differs. Effective: 1998 Spring Quarter.

ENL 275—Proseminar in Research Practices (2)
Lecture/Discussion—2 hours. Must have passed Departmental Preliminary Exam. Study of various practical and technical skills needed to perform research in literary studies. Materials to be selected by the instructor. Evaluation based on student projects that involve hands-on application of skills taught in the proseminar. May be repeated for credit when content differs. Effective: 2016 Fall Quarter.

ENL 280—Seminar in Research Practices (4)
Lecture/Discussion—3 hours; Project (Term Project). Must have passed Departmental Preliminary Exam. Study of various practical and technical skills needed to perform research in literary studies. Course materials to be selected by the instructor. Evaluation based on student projects that involve hands-on application of skills taught in the seminar. May be repeated for credit when content differs. Effective: 2016 Fall Quarter.

ENL 285—Literature by Women (4)
Conference—1 hour; Seminar—3 hours. Studies in literature by women and the theoretical approaches to literature by women. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit topic and/or reading list differs. Effective: 1997 Winter Quarter.

ENL 287—Topics in Literature and Media (4)
Film Viewing—3 hours; Seminar—3 hours. Prerequisite(s): Graduate standing. Study of a topic centered on film or other moving-image media. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when content differs. Effective: 2009 Fall Quarter.

ENL 288—Prospectus Workshop (2)
Conference—2 hours. Must have passed Departmental Preliminary Exam. Training in writing the dissertation prospectus. Participation in group discussions of preparatory assignments and final proposal. (S/U grading only.) Effective: 2011 Fall Quarter.

ENL 289—Article Writing Workshop (2)
Conference—2 hours. Prerequisite(s): Consent of Instructor. Class size limited to 12 students; nomination for admission by Dissertation Director. Training in preparing an article for publication. Participation in group discussions of article drafts. May be repeated up to 1 time(s). (S/U grading only.) Effective: 2011 Fall Quarter.

ENL 290—Creative Writing: Special Topic (4)
Conference—1 hour; Seminar—3 hours. Prerequisite(s): Consent of Instructor. Writing that falls outside the generic confines of traditional genres (fiction, poetry, and nonfiction) or traditional workshop formats. Evaluation of written materials and individual student conferences. May be repeated for credit. Effective: 2015 Fall Quarter.

ENL 290F—Creative Writing: Fiction (4)
Conference—1 hour; Seminar—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing, with preference given to those enrolled in master's program in Creative Writing. Writing of prose fiction. Evaluation of written materials and individual student
conferences. May be repeated for credit. Effective: 2016 Winter Quarter.

ENL 290NF—Creative Writing: Non-Fiction (4)
Conference—1 hour; Seminar—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing; with preference given to those enrolled in the master's program in Creative Writing. Writing of literary non-fiction, with emphasis on autobiography, biography, memoir, the occasional or nature essay, or other non-fiction prose narratives. May be repeated for credit. Effective: 2016 Winter Quarter.

ENL 290P—Creative Writing: Poetry (4)
Conference—1 hour; Seminar—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing, with preference given to those enrolled in master's program in Creative Writing. Writing of poetry. Evaluation of written materials and individual student conferences. May be repeated for credit. Effective: 2016 Winter Quarter.

ENL 298—Directed Group Study (1-5)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

ENL 299—Individual Study (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

ENL 299D—Special Study for the Doctoral Dissertation (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

ENL 391—Teaching Creative Writing (2)
Discussion—2 hours. Prerequisite(s): Graduate standing; appointment as Teaching Assistant in the English Department. Designed for new instructors of English 5F or 5P; discussion of ways to facilitate creative writing workshops and to respond to student manuscripts. (S/U grading only.) Effective: 2007 Winter Quarter.

ENL 393—Teaching Literature and Composition (2)
Discussion—2 hours. Prerequisite(s): Graduate standing; appointment as Teaching Assistant in the English Department. Designed for new instructors of English 3 or the equivalent courses; discussion of problems related to teaching literature and composition to lower division students. (S/U grading only.) Effective: 2007 Winter Quarter.

ENL 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

ENM Med - Intl: Endocrinology & Metabolism

Courses in ENM:

ENM 192—Internship in Endocrinology (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project by preceptor prior to internship. Supervised work experience in endocrinology. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

ENM 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Endocrinology research. (S/U grading only.) Effective: 1997 Winter Quarter.

ENM 460—Endocrinology Clinical Clerkship (3-18)
Clinical Activity. Prerequisite(s): IMD 430; And/or consent of instructor. Limited enrollment. Participation with members of subspecialty service in the initial
evaluation, work-up, management and follow-up of patients with endocrinologic disorders. Limited enrollment. (H/P/F grading only.) Effective: 1997 Winter Quarter.

ENM 465—Clinical Nutrition Clerkship (3-18)
Clinical Activity—30 hours. Prerequisite(s): IMD 430; Consent of IOR. In-depth experience in assessment and monitoring of nutritional support of patients whose illnesses are complicated by malnutrition and of patients with problems in under-nutrition due to various illnesses. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

ENM 480—Insights in Endocrinology (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. Student in good academic standing. First- or second-year students observe in morning Endocrine and Diabetes clinics and attend bi-weekly noon and afternoon endocrine conferences. They also give brief endocrine physiology oral presentation to the endocrine group. (H/P/F grading only.) Effective: 1997 Winter Quarter.

ENM 499—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (H/P/F grading only.) Effective: 1997 Winter Quarter.

ENT Entomology

Courses in ENT:

ENT 001—Art, Science and the World of Insects (3)
Laboratory—3 hours; Lecture—3 hours. Fusion of entomology and art to create an appreciation of insect biology, ecology, interactions with humans and importance in human culture. Multidisciplinary approaches in education and career paths in entomology and art will be highlighted. GE credit: AH, OL, SE, SS, VL, WE. Effective: 2013 Fall Quarter.

ENT 002—Biodiversity (3)
Lecture—2 hours; Lecture/Discussion—1 hour. Introduction to nature, scope and geographical distribution of biodiversity (diversity of life, with emphasis on plants and animals, especially insects).Humans and biodiversity - domestication, aesthetics, ethics and valuation.Species richness and "success".Biodiversity through time; monitoring, evaluation and conservation.Biomes-global, continental and Californian. (EVE 002.) GE credit: SE, SL, WE. Effective: 2013 Fall Quarter.

ENT 010—Natural History of Insects (3)
Lecture—3 hours. Introduction to the insects detailing their great variety, structures and functions, habits, and their significance in relation to plants and animals including man. Designed for students not specializing in entomology. Not open for credit to students who have had ENT 100, but students who have taken this course may take ENT 100 for credit. GE credit: SE, SL. Effective: 2013 Fall Quarter.

ENT 090X—Special Topics in Entomology (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. Freshman seminar course for indepth examination of a special topic within the subject area. May be repeated up to 2 time(s). (P/NP grading only.) Effective: 2013 Fall Quarter.

ENT 092—Internship (1-12)
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. Work-learn experience on and off campus in all subject areas offered by the department, supervised by a member of the faculty. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2013 Fall Quarter.

ENT 099—Special Study for Undergraduates (1-5)
Effective: 2013 Fall Quarter.

ENT 100—General Entomology (4)
Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): BIS 001B Biology, anatomy, physiology, development, classification, ecology and relation of insects to human welfare. GE credit: WE. Effective: 2013 Fall Quarter.

ENT 100L—General Entomology Laboratory (2)
Laboratory—6 hours. Prerequisite(s): ENT 100 (can be concurrent) Anatomy, development, population ecology, methods of collecting, classification and identification of insects of all orders and of major families. GE credit: VL. Effective: 2013 Fall Quarter.

ENT 101—Functional Insect Morphology (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): ENT 100 Study of the basic external and internal structures, organs and tissues of insects, with emphasis on functional systems. Functional anatomy, histology and fine structures of important organs and tissues will be discussed. Effective: 2013 Fall Quarter.

ENT 102—Insect Physiology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENT 100; Or course in physiology or invertebrate zoology. Processes by which insects maintain themselves, reproduce, and adapt to environment. Insects as models for basic/applied research through detailed analysis of metabolic, physiological, and behavioral processes. Emphasis on analysis of methodology, fact, and theory. GE credit: SE, WE. Effective: 2013 Fall Quarter.

ENT 103—Insects Systematics (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): Introductory course in zoology or entomology. Principles and methods of systematics, with particular reference to insects. Emphasis on different theories of classification, and analysis of phylogenetic relationships. Effective: 2013 Fall Quarter.

ENT 104—Behavioral Ecology of Insects (3)
Lecture—3 hours. Prerequisite(s): Introductory biology or zoology. Basic principles and mechanisms of insect behavior and ecology. An evolutionary approach to understanding behavioral ecology of insects. Effective: 2013 Fall Quarter.

ENT 105—Insect Ecology (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): BIS 002B (can be concurrent); Consent of Instructor. Introduction to insect ecology combining fundamental concepts and questions in ecology with ideas, hypotheses and insights from insects. Integrates aspects of individual, population, community and ecosystem ecology. GE credit: OL, SE, SL, WE. Effective: 2017 Fall Quarter.

ENT 107—California Insect Diversity (5)
Fieldwork—6 hours; Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): An introductory course in entomology. Survey of the diversity of insects from selected ecological zones in California with emphasis on collection, identification, and natural history. GE credit: SE. Effective: 2013 Fall Quarter.

ENT 109—Field Taxonomy and Ecology (7)
Laboratory—36 hours; Lecture—2 hours. Prerequisite(s): An introductory course in entomology or consent of instructor. GE credit: SE. Effective: 2013 Fall Quarter.

ENT 110—Arthropod Pest Management (5)
Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): BIS 001B Development of the ecological basis for the integrated pest management paradigm with emphasis on agriculture. Ecological and practical aspects of control tactics. Laboratory emphasizes identification of pests and beneficials of agriculture and urban situations. GE credit: SE, WE. Effective: 2013 Fall Quarter.

ENT 116—Freshwater Macroinvertebrates (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): BIS 002B; Or equivalent. Limited enrollment. Biology, ecology and taxonomy of freshwater macroinvertebrates, including insects, crustaceans, molluscs, worms, leeches, flatworms and others. Adaptations to life in freshwater. Aquatic food webs. Uses of macroinvertebrates in water quality monitoring. Field trips during regular lab hours. GE credit: SE, SL. Effective: 2013 Fall Quarter.

ENT 116L—Aquatic Insect Collection (2)
Fieldwork—2 hours; Laboratory—4 hours. Prerequisite(s): ENT 100L or ENT 116 (can be concurrent); Or prior experience with insect/arthropod identification to Family level. Restricted to 25 students. Collection of aquatic insects and identification to the Family level. Collections will require two, one-day weekend field trips (by arrangement). Collection requirement is 40 Families. Effective: 2016 Fall Quarter.

ENT 117—Longevity (4)
Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): Upper division standing or consent of instructor. Nature, origin, determinants, and limits of longevity with particular reference to humans; emphasis on implications of findings from non-human model systems including natural history, ecology and evolution of life span; description of basic demographic techniques including life table methods. (HDE 117.) GE credit: SE, SL, WE. Effective: 2013 Fall Quarter.

ENT 119—Apiculture (3)
Lecture—3 hours. Biology and behavior of honeybees; communication, orientation, social organization, foraging activities, honey production, pollination activities. GE credit: OL, SE, VL, WE. Effective: 2016 Fall Quarter.

ENT 123—Plant-Virus-Vector Interaction (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 101; PLB 105, PLP 120, and ENT 100 recommended. Analysis of interactions necessary for viruses to infect plants.Interactions among insect vectors and host plants involved in the plant-virus life cycle. Evolutionary aspects of the molecular components in viral infection and modern approaches to the interdiction of viral movement. (PBI 123 and PLP 123.) GE credit: SE, SL, WE. Effective: 2014 Winter Quarter.

ENT 135—Introduction to Biological Control (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENT 100 or ENT 110 Effective: 2013 Fall Quarter.

ENT 153—Medical Entomology (3)
Lecture—3 hours. Prerequisite(s): BIS 001A; BIS 001B; Upper division standing in one of the biological sciences, or consent of instructor. Basic biology and classification of medically important arthropods with special emphasis on the ecology of arthropodborne diseases and principles of their control. Relationships of arthropods to human health. GE credit: SE, SL, WE. Effective: 2013 Fall Quarter.

ENT 156—Biology of Parasitism (3)
Lecture/Discussion—3 hours. Prerequisite(s): BIS 001A; or Consent of Instructor. Lectures on the biological and ecological aspects affecting host-parasite relationships using selected examples from protozoan and metazoan fauna. GE credit: SE. Effective: 2013 Fall Quarter.

ENT 156L—Biology of Parasitism Laboratory (1)
Laboratory—3 hours. Prerequisite(s): ENT 156 (can be concurrent); ENT 156 required concurrently or consent of instructor. Laboratory demonstrations using selected examples of protozoan and metazoan organisms along with various techniques used in parasitology to exemplify concepts presented in the lecture course. GE credit: SE. Effective: 2013 Fall Quarter.

ENT 158—Forensic Entomology (3)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): BIS 001B or ENT 100; Upper division standing. Arthropods, their general biology, succession, developmental cycles and population biology in matters of criminal prosecution and civil litigation. Emphasis on basic arthropod biology, ecological and developmental concepts and methods, development of reasoning abilities, implication, development of opinions and evidence. GE credit: WE. Effective: 2013 Fall Quarter.

ENT 180A—Experimental Ecology and Evolution in the Field (4)
Fieldwork—3 hours; Lecture/Lab—3 hours. Prerequisite(s): (ENT 105 or ESP 100); EVE 100; EVE 101 Experimental design in field ecology. Examination of primary literature, experimental design, independent and collaborative research, analysis of data, development of original research paper based on field experiments. (EVE 180A.) GE credit: QL, SE, VL. Effective: 2014 Winter Quarter.

ENT 180B—Experimental Ecology and Evolution in the Field (4)
Fieldwork—3 hours; Lecture/Lab—3 hours. Prerequisite(s): (EVE 180A or ENT 180A); (EVE 100 or EVE 101 or ESP 100); ENT 105 Experimental design in field ecology. Examination of primary literature, experimental design, independent and collaborative research, analysis of data, development of original research paper based on field experiments. (EVE 180B.) GE credit: QL, SE, VL, WE. Effective: 2014 Winter Quarter.

ENT 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Laboratory experience or fieldwork off and on campus in all subject areas offered in the Department of Entomology. Internships supervised by a member of the faculty. (P/NP grading only.) Effective: 2013 Fall Quarter.

ENT 197T—Tutoring in Entomology (1-3)
Discussion—1-3 hours. Leading small discussion groups. Preview assignments and prepare guidelines for discussion. (P/NP grading only.) Effective: 2013 Fall Quarter.

ENT 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2013 Fall Quarter.

ENT 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 2013 Fall Quarter.

ENT 212—Molecular Biology of Insects and Insect Viruses (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. A molecular biological analysis of insect systematics, physiology, and defense mechanisms. Molecular biology of insect viruses. Baculovirus expresion vectors and post-translation modification of expressed polypeptides. Biological control of using neuropeptides and toxin genes in insect viruses. Effective: 2013 Fall Quarter.

ENT 214—Vector-borne Infectious Diseases: Changing Patterns (2)
Lecture/Discussion—2 hours. Prerequisite(s): Open to graduate students, MPVM and MPH students, DVM and medical students with second- or third-year standing. Open to upper division undergraduate students with consent of instructor(s). Vector-borne infectious diseases especially as they relate to changing patterns associated with climatic changes, trade and population movement. (PMI 214.) Effective: 2013 Fall Quarter.

ENT 225—Terrestrial Field Ecology (4)
Fieldwork—12 hours; Seminar—1 hour. Prerequisite(s): Introductory ecology and introductory statistics or consent of instructor. A field course conducted over spring break and four weekends at Bodega Bay, emphasizing student projects. Ecological hypothesis testing, data gathering, analysis and written and oral presentation of results. (ECK 225 and PBG 225.) Effective: 2013 Fall Quarter.

ENT 230—Advanced Biological Control (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): Graduate or upper division standing in biological science or consent of instructor. Principles and current issues in biological control of arthropod pests and weeds; laboratory devoted to identification and life history of the major groups of parasitic and predaceous arthropods. Effective: 2013 Fall Quarter.

ENT 253—Advanced Medical Entolomogy (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): One upper division course in Entomology (other than ENT 153) and one course in Microbiology: ENT 153 strongly recommended. An analysis of several anthropod-borne human diseases with emphasis on the relationships of the biology of the vector to the ecology of the disease. Discussion includes demonstration of vectors and techniques. Effective: 2013 Fall Quarter.

ENT 290—Exploratory Topics in Entomology (2)
Seminar—2 hours. Interdisciplinary topics in entomology, including innovative applications of entomological concepts to other fields of research and human endeavor (e.g. medicine, technology, art, criminology). May be repeated up to 8 unit(s) when topic differs. Effective: 2013 Fall Quarter.

ENT 291—Current topics in Medical and Veterinary Entomology (2)
Seminar—2 hours. Prerequisite(s): ENT 153 Discussions of parasitology, ecology and epidemiology related to vectors of pathogens causing disease in humans and animals. May be repeated up to 1 time(s). Effective: 2013 Fall Quarter.

ENT 292—Current Topics in Insect Physiology and Behavior (2)
Seminar—2 hours. Prerequisite(s): ENT 102 if topic is physiology, a course in behavior if topic is behavior, or either if topic bridges both. Analysis of contemporary advances in insect physiology, biochemistry and/or behavior. Interpretation and description of physiological and behavioral mechanisms and functions. Application of general principles to solution of problems in the laboratory and field. May be repeated up to 8 unit(s) topic differs. Effective: 2013 Fall Quarter.

ENT 293N—Current Topics in Insect Biotechnology and Genomics (2)
Seminar—2 hours. Prerequisite(s): ENT 212 Discussion of advances in insect biotechnology, including genetic engineering and genomics. May be repeated up to 6 unit(s) topic differs. Effective: 2013 Fall Quarter.

ENT 294—Current topics in Insect Ecology, Evolution, and Systematics (2)
Seminar—2 hours. Prerequisite(s): ENT 103; General course in ecology or evolution. Discussions of advanced topics in ecology, evolution and systematics with emphasis on analysis of factors influencing the distribution, abundance, adaptations and evolutionary relationships of insects. Includes consideration of applications of basic theory (e.g. biological control). May be repeated up to 8 unit(s) topic differs. Effective: 2013 Fall Quarter.

ENT 295—Current Topics in Agricultural Entomology and Bee Biology (2)
Seminar—2 hours. Prerequisite(s): ENT 110 if topic relates to pests and beneficial predators; ENT 119 if topic is bee biology; either if topic bridges both. Discussion of advanced topics about the biology, ecology, behavior, and management of pest and beneficial insects. May be repeated up to 8 unit(s) if topic differs. Effective: 2013 Fall Quarter.

ENT 297N—Seminar in Entomology (1)
Seminar—1 hour. Weekly Entomology seminar. May be repeated up to 9 unit(s) topic differs. (S/U grading only.) Effective: 2013 Summer Quarter.

ENT 298—Group Study (1-5)
Variable. (S/U grading only.) Effective: 2013 Fall Quarter.

ENT 299—Research (1-12)
Variable. (S/U grading only.) Effective: 2013 Fall Quarter.

ENV Environmental Policy and Management

Courses in ENV:

ENV 200A—Analysis of Environmental Management and Policy (4)
Lecture—4 hours. Prerequisite(s): Graduate standing. Introduction to rational decision making for public policy problems. Modeling natural/human system interactions, data gathering and hypothesis testing. Predicting outcomes of policy options. Effective: 2017 Fall Quarter.

ENV 200B—Environmental Policy Evaluation (4)
Discussion—1 hour; Lecture—2 hours; Seminar—2 hours. Prerequisite(s): (STA 108 or ARE 106); ARE 176; Intermediate microeconomics (e.g., ECN 100); policy analysis (e.g., ESP 168A or the equivalent). Method and practice, philosophical basis, and political role of policy analysis. Reviews basic concepts from economic theory; how and why environmental problems emerge in a market economy; and tools necessary for solving environmental problems. (ECL 212B and ESP 212B.) Effective: 2018 Winter Quarter.

ENV 200C—Environmental Policy Process (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Course in public policy (e.g., ESP 160); environmental law (e.g., ESP 161); course in statistics (e.g., SOC 106 or ARE 106). Introduction to selected theories of the policy process and applications to the field of environmental policy. Develops critical reading skills, understanding of policy theory, and an ability to apply multiple theories to the same phenomena. (ECL 212A and ESP 212A.) Effective: 2017 Fall Quarter.

ENV 201—Environmental Law (3)
Lecture—3 hours. Prerequisite(s): Graduate standing. Roles of legislatures, agencies, and courts in creating and interpreting law; legal strategies for addressing environmental problems; major environmental statutes; and the relationship between federal and state/local legal authority. Effective: 2018 Spring Quarter.

ENV 202—Strategies of Environmental Administration and Management (4)
Lecture—4 hours. Bureaucracy and public management, organizational theory, analysis of environmental management by US agencies, NGOs, and business. Overview of natural resource management, analyzes the strengths and limitations of different administrative approaches. Effective: 2017 Fall Quarter.

ENV 203—Environmental Policy Clinic (4)
Laboratory—4 hours. Prerequisite(s): Graduate standing. Teams of students analyze an environmental policy problem from scientific, legal, and economic perspectives. Hands-on learning partnering with rotating clients. May be repeated up to 1 time(s) - once in winter and once in spring. Effective: 2018 Winter Quarter.

ENV 296—Environmental Policy and Management Practicum (2-6)
Internship—0.5 hours. Prerequisite(s): Consent of Instructor. Practicum experience integrating coursework into an applied professional setting. May be repeated for credit. (S/U grading only.) Effective: 2017 Fall Quarter.

ENV 297—Professional Development Seminar (1)
Seminar—2 hours. Prerequisite(s): Graduate standing. Weekly seminar inviting policy and management professionals to come and discuss their challenges and achievements. May be repeated up to 6 unit(s). (S/U grading only.) Effective: 2018 Spring Quarter.

EPI Epidemiology

Courses in EPI:

EPI 202—Quantitative Epidemiology I: Probability (5)
Laboratory—2 hours; Lecture—4 hours. Prerequisite(s): ((MAT 016A, MAT 016B) or (MAT 017A, MAT 017B) or (MAT 021A, MAT 021B)); STA 102; STA 108; or Population Health and Reproduction 402 and 403 or equivalent of any listed course; concurrent or previous enrollment in a basic epidemiology course (e.g., course 205). Foundations in probability for epidemiologists. Emphasis on properties of and relationships between distributions and application of probability concepts to epidemiology. Includes a mathematical skills laboratory to assist in solution of epidemiologic problems. Effective: 2013 Fall Quarter.

EPI 203—Quantitative Epidemiology II: Statistical Inference (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): (EPI 202 or STA 130A or STA 131A or STA 133); EPI 205; A basic course in Epidemiology (EPI 205 or equivalent). Provides the mathematical statistics foundation for statistical models, methods, and data analysis. Effective: 2014 Winter Quarter.

EPI 204—Quantitative Epidemiology III: Statistical Models (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): (EPI 203 or STA 130B or STA 131B or STA 133); EPI 205; STA 108 recommended; a basic course in Epidemiology (EPI 205 or equivalent); consent of instructor. Introduces statistical models, methods, and data analysis in the areas of generalized linear model and survival analysis methodology. Effective: 2014 Spring Quarter.

EPI 204A—Foundation of Statistical Models, Methods, and Data Analysis for Scientists (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 130A or STA 131A or STA 133; EPI 228 recommended. Provides the mathematical statistics foundation for statistical models, methods, and data analysis. Effective: 2006 Winter Quarter.

EPI 204B—Statistical Models, Methods, and Data Analysis for Scientists (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): EPI 204A; STA 108 recommended. Introduces statistical models, methods, and data analysis in the areas of generalized linear, survival, and correlated data methodology. Effective: 2006 Winter Quarter.

EPI 205—Principles of Epidemiology (4)
Lecture—4 hours. Prerequisite(s): MPM 202; or Consent of Instructor. An introductory statistics course. Basic epidemiologic concepts and approaches to epidemiologic research, with examples from veterinary and human medicine, including outbreak investigation, infectious disease epidemiology, properties of tests, and an introduction to epidemiologic study design and surveillance. (MPM 205.) Effective: 2017 Winter Quarter.

EPI 205B—Integration of Epidemiologic Concepts (2)
Discussion—2 hours. In-depth analysis and integration of basic epidemiologic concepts and approaches to epidemiologic research presented in Preventive Veterinary Medicine 405/course 205A, with more mathematical and theoretical basis and examples from veterinary and human medicine, including outbreak investigation, infectious disease epidemiology, properties of diagnostic tests, study design, and surveillance. Effective: 1999 Fall Quarter.

EPI 206—Epidemiologic Study Design (4)
Discussion—9 hours; Laboratory—2 hours; Lecture—30 hours. Prerequisite(s): EPI 205; or Consent of Instructor. Builds on concepts presented in course 205. Concepts of epidemiologic study design—clinical trials, observational cohort studies, case control studies—introduced in course 205A are covered in more depth, using a problem-based format. Discussion of published epidemiologic studies. (MPM 206.) Effective: 2014 Spring Quarter.

EPI 207—Advanced Epidemiologic Methodology (4)
Lecture/Discussion—4 hours. Prerequisite(s): EPI 206 In-depth integration of advanced epidemiological concepts. Theory, methods, and applications for observational studies including random and systematic error, confounding, counterfactuals, causal inference, effect modification, internal and external validity, estimability, and interpretation of effect measures, and advanced study designs. (SPH 207.) Effective: 2016 Winter Quarter.

EPI 208—Analysis and Interpretation of Epidemiologic Data (3)
Laboratory—21 hours; Lecture—16 hours; Project (Term Project). Prerequisite(s): EPI 204 (can be concurrent); EPI 207; (STA 144 or PHR 202); And entry level skill in standard statistical software (eg. SPSS, BMDP, SAS, Stata, MinTab, S-Plus). Application of theory and concepts of statistics and epidemiology to analysis and interpretation of data typically found in veterinary and human epidemiologic research. Effective: 2001 Spring Quarter.

EPI 209—History of Epidemiology in Public Health (2)
Discussion—1.5 hours; Lecture—0.5 hours. Introduction to the history of epidemiology in solving major public health problems. Original historical articles will be read/discussed. Topics may include: infectious disease, accidents/adverse events, nutritional deficiencies, community vaccination trials, occupational exposures, cancer, birth defects, cardiovascular disease, and smoking. (SPH 209.) Effective: 2014 Fall Quarter.

EPI 220—Problems in Epidemiologic Study Design (4)
Lecture—3 hours; Term Paper. Prerequisite(s): MPM 405; STA 102; STA 106; or the equivalent; MPM 406 or the equivalent; PHR 207 required concurrently. Design and development of research protocols and funding applications for peer review. Application of research methods data collection and management and statistical analysis in research proposals. Methods of evaluating research proposals, mechanisms of funding, specifying human subjects considerations. Effective: 1997 Winter Quarter.

EPI 222—Epidemiological Modeling (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): MPM 405 Techniques of model building and simulation of infectious diseases will be explored. Epidemiologic modeling philosophy, construction and validation will be emphasized. Effective: 1997 Winter Quarter.

EPI 223—Spatial Epidemiology (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): EPI 205A or MPM 205 Geographic Information Systems (GIS) and spatial statistics. Students are expected to complete a term project based on their graduate research. Effective: 1997 Winter Quarter.

EPI 224—Health and Ecological Risk Analysis (4)
Laboratory—4 hours; Lecture—2 hours. Methodological approach to risk analysis for human and animal-related health and ecological issues. Basic principles of risk analysis, including perception, communication, assessment and management. Emphasis on the assessment of risk. Effective: 2017 Winter Quarter.

EPI 225—Advanced Topics in Epidemiology Methods (2)
Discussion—2 hours. Prerequisite(s): EPI 205B; EPI 206; EPI 207; Or equivalents, with consent of instructor. An in-depth study of topics in epidemiology theory and methods, selected from: causal inference, confounding, study design, or other related areas, with year to year variation. Readings are assigned and students are expected to lead discussions on them. May be repeated for credit when topic differs. Effective: 2006 Winter Quarter.

EPI 226—Methods for Longitudinal and Repeated Measurement Data (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): EPI 204; or Consent of Instructor. Mixed models for longitudinal data (LD)/repeated measurements; Mean and covariance models; General linear LD models; Random coefficients models; Linear mixed effects models for continuous outcome; Generalized linear mixed effects model for discrete outcome including binary, ordinal and count data. Effective: 2009 Fall Quarter.

EPI 229—Geographic Information Systems for Health Professionals (4)
Laboratory—6 hours; Lecture—2 hours. Emphasis on basic geographic and data management principles. Focus on software proficiency in application to analyzing/solving health-related problems. For graduate and professional students in epidemiology, public health, preventive veterinary medicine, health informatics with interest in spatial techniques in research. Effective: 2010 Spring Quarter.

EPI 230—Introduction to Molecular Epidemiology (3)
Lecture/Discussion—3 hours. Prerequisite(s): EPI 205 Overview of the modern field of molecular epidemiology. Integrates molecular biology into traditional epidemiologic research by identifying pathways, molecules and genes that influence the risk of developing disease. Effective: 2014 Fall Quarter.

EPI 231—Infectious Disease Epidemiology (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): Introductory epidemiology course (e.g., EPI 205). Infectious disease epidemiology and prevention, with emphasis on human and veterinary diseases of global health importance. Major global health epidemics and challenges of infectious diseases, by mode of transmission. Effective: 2017 Spring Quarter.

EPI 232—Advanced Data Analysis with SAS (3)
Lecture—3 hours. Prerequisite(s): EPI 202; EPI 203; EPI 204; or the equivalent, or Consent of Instructor. Provide an overview of common advanced statistical methods as well as a treatment of how to use SAS to implement them. Learn the ideas of reproducible research and reporting of statistical analyses. Effective: 2017 Winter Quarter.

EPI 240—Principles of Injury Epidemiology (3)
Lecture/Discussion—3 hours. Overview of the epidemiology of human injury, including general principles, surveillance methods, behavioral factors, environmental factors, treatment issues and engineering and legal interventions related to vehicular injuries, drownings, falls, fires and burns, poisonings, firearm injuries, and other intentional injuries. Effective: 1997 Winter Quarter.

EPI 251—Environmental Epidemiology (3)
Lecture—3 hours. Prerequisite(s): MPM 405 (can be concurrent); Upper division undergraduates who have completed EST 126; or the equivalent. Examination of the human health effects and the risk of disease from community, occupational, and personal exposure to toxic substances. Effective: 1997 Winter Quarter.

EPI 252—Social Epidemiology (2)
Lecture/Discussion—2 hours. Prerequisite(s): EPI 205A; and Consent of Instructor. Social determinants of health; psychosocial and physiological pathways; health and social inequality; gender and racial/ethnic disparities in health; social support, social cohesion and health; social gradient in behavioral risk factors; social ecological approaches to health intervention; interventions addressing social determinants. (SPH 252.) Effective: 2009 Spring Quarter.

EPI 260—Epidemiology of Chronic Diseases and Aging (3)
Lecture/Discussion—3 hours. Overview of the epidemiology of chronic disease in old age. Topics include biology of aging, epidemiology of cardiovascular disease, neoplasms, osteoporosis and fractures, psychosocial factors and health in old age, dementias, functional status and prevention of disease. Effective: 1997 Winter Quarter.

EPI 270—Research Methods in Occupational Epidemiology (3)
Lecture/Discussion—3 hours. Prerequisite(s): (EPI 205A or MPM 205); (MPM 202 or STA 102) Methods used in epidemiologic research on occupational hazards. Topics include design and analysis of cohort and case-control studies, sample size, measuring dose, choosing a control group, validation of employment and health data, interpreting negative studies, and analysis software. Effective: 1997 Winter Quarter.

EPI 272—Cancer Epidemiology (2)
Discussion—1 hour; Recitation—1 hour. Prerequisite(s): EPI 205A; EPI 205B; EPI 206 (can be concurrent); STA 102; Must have basic understanding of epidemiologic and statistical concepts covered in the above courses. We will cover the underlying concepts essential to understanding cancer epidemiology, such as trends in incidence and survival, epidemiologic methods used to assess cancer etiology, prevention and control, and an introduction to the cancer initiation and progression multi-stage model. Effective: 2005 Winter Quarter.

EPI 277—Mathematical Models in Epidemiology (3)
Laboratory—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): MPM 403; MPM 405; and Consent of Instructor. Although not required, students encouraged to refresh their knowledge of high school calculus and differential equations. Class size limited to 30 students. Theory of epidemics and mathematical modeling concepts for infectious diseases to include discrete and continuous time models, their use to explore disease dynamics and investigate prevention and control strategies for human and veterinary infectious diseases. (PHR 277.) Effective: 2013 Fall Quarter.

EPI 280—Introduction to SAS Programming (3)
Discussion/Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): Introductory statistics course (e.g., MPM 402, STA 102). Introduction to SAS, an integrated software system for data retrieval and management, data manipulation and programming. (SPH 280.) Effective: 2016 Fall Quarter.

EPI 290—Seminars in Epidemiology (0.5)
Seminar—0.5 hours. Faculty and students will present and lead discussion of ongoing or published epidemiologic research. (S/U grading only.) Effective: 2015 Winter Quarter.

EPI 291—Seminars in Human Health Services Research and Clinical Epidemiology (1)
Seminar—1 hour. Critical review, evaluation, and discussion of research in health services and clinical epidemiology. Presentation of statistical, epidemiologic, and econometric methods. Students present their own research and critique the work of others. May be repeated for credit. May be repeated for credit. (GMD 291.) (S/U grading only.) Effective: 1998 Fall Quarter.

EPI 298—Group Study (1-5)
Seminar—1-5 hours. Group study in selected areas of epidemiology. Effective: 1997 Winter Quarter.

EPI 299—Research (1-12)
Variable. Research in selected areas of epidemiology. (S/U grading only.) Effective: 1997 Winter Quarter.

ESM Environmental Science & Management

Courses in ESM:

ESM 008—Water Quality at Risk (3)
Discussion—1 hour; Lecture—2 hours. Not open to students who have successfully completed Environmental and Resource Sciences 8. (Formerly Environmental and Resource Sciences 8.) Natural and human threats to water quality. Balance of science and policy in all aspects of attaining, maintaining, and managing water quality, water contamination. Decoding popular media coverage of water quality and water contamination. (SAS 008.) GE credit: SE, SL, SS, WE. Effective: 2011 Fall Quarter.

ESM 030—World Ecosystems & Geography (3)
Lecture—3 hours. Not open to students who have successfully completed Environmental and Resource Sciences 30. (Formerly Environmental and Resource Sciences 30.) Introduction to the earth's major geographic regions and associated ecosystems, such as deserts, temperate forests, and oceans with an examination of how climate, vegetation regimes, ecological processes, agriculture and other human activities interact in different regions of the world. (ESP 030.) GE credit: SE, SL, WC. Effective: 2011 Fall Quarter.

ESM 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Work experience off and on campus in resource sciences. Internship supervised by a member of the faculty. May be repeated for credit. (P/NP grading only.) Effective: 2011 Fall Quarter.

ESM 098—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Primarily for lower division students. (P/NP grading only.) Effective: 2011 Fall Quarter.

ESM 098F—Student Facilitated Course Development (1-3)
Variable—1-3 hours. Prerequisite(s): Consent of Instructor. Student-facilitated (taught) course intended for lower division students. (P/NP grading only.) Effective: 2016 Winter Quarter.

ESM 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2011 Fall Quarter.

ESM 100—Principles of Hydrologic Science (4)
Lecture—4 hours. Prerequisite(s): CHE 002B; MAT 016B; (PHY 007A or PHY 009A) Not open to students who have successfully completed Environmental and Resource Sciences 100. (Formerly Environmental and Resource Sciences 100.) Topics include hydrology (surface and ground water), hydraulic
flow through porous media, water in the soil-plant-atmosphere continuum, water quality, flow through open channels, and representative water-resource problems. GE credit: QL, SE, SL. Effective: 2011 Fall Quarter.

ESM 108—Environmental Monitoring (3)
Fieldwork; Laboratory—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): EVE 101; ESP 100; ETX 101; WFC 100; ERS 100; SSC 100; ENH 100; LDA 050; Or the equivalent for any of theses courses. Not open to students who have successfully completed Environmental and Resource Sciences 108. (Formerly Environmental and Resource Sciences 108.) Instrumentation and methods for environmental and ecological monitoring; GPS, sensors, datalogging, and GIS. Wide range of measurement techniques for environmental parameters. GE credit: SE, SL. Effective: 2011 Fall Quarter.

ESM 120—Global Environmental Interactions (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): One college level chemistry course; one college level biology course. Limited to 25 students per discussion section. Not open to students who have successfully completed Environmental Resources Sciences 60 or 120. (Formerly Environmental Resources Sciences 60 and 120.) Relationships among climate, hydrology, biogeochemical cycles, soils and vegetation distribution in diverse landscapes and biomes. Emphasis on physical, chemical, and biological processes affecting ecosystems from the poles to the equator, and human impacts on the environment. Effective: 2010 Fall Quarter.

ESM 121—Water Science and Management (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): PHY 010 or GEL 001 Not open to students who have successfully completed Environmental and Resource Sciences 121. (Formerly Environmental and Resource Sciences 121.) Role of water as an essential natural resource in contemporary society. Aspects of the scientific method, including descriptions of natural phenomena and underlying physical causes. Water for cities, agriculture, industry, wildlife and recreation; case studies of water management. GE credit: QL, SE, SL. Effective: 2011 Fall Quarter.

ESM 131—Air as a Resource (3) ***Review all entries***
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): CHE 010 Not open to students who have successfully completed Environmental and Resource Sciences 131. (Formerly Environmental and Resource Sciences 131.) Degradation of the atmospheric resource, historical aspects and effects of air pollution examined. Evaluation of primary gaseous and particulate pollutants and discussion of their impact. GE credit: QL, SE, SL. Effective: 2011 Fall Quarter.

ESM 131—Air as a Resource (3) ***Review all entries***
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): (CHE 010 or CHE 002A); CHE 002B Not open to students who have successfully completed Environmental and Resource Sciences 131. (Formerly Environmental and Resource Sciences 131.) Degradation of the atmospheric resource, historical aspects and effects of air pollution examined. Evaluation of primary gaseous and particulate pollutants and discussion of their impact. GE credit: QL, SE, SL. Effective: 2019 Winter Quarter.

ESM 141—Role of Fire in Natural Ecosystems (4)
Lecture—3 hours; Term Paper. Prerequisite(s): (BIS 002A or PLS 002); (BIS 002B or BIS 002C); Basic biological, ecology/evolution concepts. Not open to students who have successfully completed Environmental and Resource Sciences 141. (Formerly Environmental and Resource Sciences 141.) Fire regimes and roles in major North American vegetation types, especially in the west. Physics of fire, fire effects on organisms and ecosystem functioning, reconstructing fire histories, fire in resource management, and fire use by indigenous people. GE credit: SE, SL, WE. Effective: 2011 Fall Quarter.

ESM 144—Trees and Forests (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PLS 002 or BIS 001C or BIS 002C Biological structure and function of trees as organisms; understanding of forests as communities and as ecosystems; use of forests by humans; tree phenology, photosynthesis, respiration, soil processes, life histories, dormancy, forest biodiversity, and agroforestry. Not open for credit to students who have completed PLB 144 or ENH 144 or ERS 144. (Former course PLB/ENH/ERS 144.). (PLS 144.) GE credit: SE, VL. Effective: 2011 Fall Quarter.

ESM 185—Aerial Photo Interpretation and Remote Sensing (4)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): Upper division standing. Not open to students who have successfully completed Environmental Resource Science 185. (Formerly Environmental Resource Science 185.) Basics of remote sensing and photogrammetry, grids and map projections, aerial photo interpretation, sensors and platforms for aerial and space photography and non-photographic imaging systems, aerial thermography, microwave sensing, and introduction to remote sensing applications. Effective: 2011 Fall Quarter.

ESM 186—Environmental Remote Sensing (5)
Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): MAT 016B; (PHY 007C or PHY 009B); Upper division standing; LDA 150 recommended. Not open to students who have successfully completed Hydrologic Science 186 or Environmental and Resource Sciences 186. (Formerly Hydrologic Science 186 and formerly Environmental and Resource Sciences 186.) Overview of satellite, airborne, and ground-based remote sensing, building on properties of electromagnetic radiation. Applications include hydrologic processes, weather and climate, ecology and land use, soils, geology, forestry, and agriculture. Computer based analysis and visualization of images and processing techniques. GE credit: QL, SE, VL. Effective: 2014 Winter Quarter.

ESM 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Work experience off and on campus in resource sciences. Internship supervised by a member of the faculty. (P/NP grading only.) Effective: 2011 Fall Quarter.

ESM 194H—Senior Honor Thesis (2-6)
Independent Study—2-6 hours. Prerequisite(s): Senior standing, overall GPA of 3.50 or higher and consent of master advisor. Independent study, guided research on an environmentally related subject of special interest to the student. May be repeated for credit. GE credit: SE, WE. Effective: 2011 Fall Quarter.

ESM 195—Integrating Environmental Science and Management (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Senior status in Environmental Science and Management major or other environmental science major (e.g. Environmental Resource Science; Environmental Biology and Management; Environmental Toxicology; Environmental Policy Analysis and Planning, Wildlife, Fish, and Conservation Biology; Hydrologic Science). Practical aspects of environmental improvement through integrated analyses of contemporary issues or problems associated with advocacy, regulation, science and resource management from the perspectives of the physical and ecological sciences and current policy/management. May be repeated up to 2 time(s). GE credit: SE, SS. Effective: 2011 Fall Quarter.

ESM 198—Directed Group Study (1-5)
Variable. May be repeated for credit. (P/NP grading only.) Effective: 2011 Fall Quarter.

ESM 198F—Student Facilitated Course (1-3)
Variable—1-3 hours. Prerequisite(s): Consent of Instructor. Restricted to upper division standing or consent of instructor. Student-facilitated (taught) course intended for upper division students. (P/NP grading only.) Effective: 2016 Spring Quarter.

ESM 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2011 Fall Quarter.

ESM 199FA—Student Teaching Course Development (1-3)
Variable—1-3 hours. Prerequisite(s): Consent of Instructor. Restricted to upper division standing. Under the supervision of a faculty member, an undergraduate student plans and develops the course they will teach under 98F/198F. (P/NP grading only.) Effective: 2016 Winter Quarter.

ESM 199FB—Student Teaching Course Development (1-3)
Variable—1-3 hours. Prerequisite(s): Consent of Instructor. Student facilitated. Under the supervision of a faculty member, an undergraduate student teaches a course under 98F/198F. (P/NP grading only.) Effective: 2016 Winter Quarter.

ESP Environmental Science and Policy

Courses in ESP:

ESP 001—Environmental Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): UWP 001 (can be concurrent) or UWP 001Y (can be concurrent) or UWP 001V (can be concurrent) or ENL 003 (can be concurrent); Or equivalent; sophomore standing; ECN 001A and BIS 002B recommended. Analysis of the physical, biological, and social interactions which constitute environmental problems. Emphasis on analysis of environmental problems, the consequences of proposed solutions, and the interaction of environmental science and public policy in creating solutions. GE credit: SE, SL, SS. Effective: 2018 Spring Quarter.

ESP 010—Current Issues in the Environment (3)
Lecture—3 hours. Prerequisite(s): Elementary biology recommended. The science behind environmental issues, and policies affecting our ability to solve domestic and international environmental problems. Resources, environmental quality, regulation, environmental perception and conservation. Integrative case studies. Not open for credit to students who have completed ESP 1. GE credit: SE, SL, SS, WE. Effective: 2004 Fall Quarter.

ESP 030—World Ecosystems & Geography (3)
Lecture—3 hours. Not open to students who have successfully completed Environmental and Resource Sciences 30. (Formerly Environmental and Resource Sciences 30.) Introduction to the earth's major geographic regions and associated ecosystems, such as deserts, temperate forests, and oceans with an examination of how climate, vegetation regimes, ecological processes, agriculture and other human activities interact in different regions of the world. (ESM 030.) GE credit: SE, SL, WC. Effective: 2011 Fall Quarter.

ESP 092—Internship (1-12)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. Work experience off and on campus in all subject areas offered in the
College of Agricultural and Environmental Sciences. Internship supervised by member of the faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

ESP 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Primarily for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

ESP 100—General Ecology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (BIS 002A, BIS 002B, BIS 002C); ((MAT 016A, MAT 016B) or (MAT 017A, MAT 017B) or (MAT 021A, MAT 021B)); STA 013 recommended. Theoretical and experimental analysis of the distribution, growth and
regulation of species populations; predator-prey and competitive interactions; and the organization of natural communities. Application of evolutionary and ecological principles to selected environmental problems. GE credit: SE, SL. Effective: 2016 Fall Quarter.

ESP 101—Ecology, Nature, and Society (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 001 or ANT 002 or ESP 030 or EVE 100 or BIS 101 recommended. Interdisciplinary study of diversity and change in human societies, using frameworks from anthropology, evolutionary ecology, history, archaeology, psychology, and other fields. Topics include population dynamics, subsistence transitions, family organization, disease, economics, warfare, politics, and resource conservation. (ANT 101.) GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

ESP 105—Evolution of Societies and Cultures (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ANT 001 or ANT 002 or ESP 030 or EVE 100 or BIS 101 recommended. Interdisciplinary study of social and cultural evolution in humans. Culture as a system of inheritance,psychology of cultural learning, culture as an adaptive system,evolution of maladaptations, evolution of technology and institutions,evolutionary transitions in human history, coevolution of genetic and cultural variation. Only two units of credit for students who took ESP 101 or ANT 101 prior to fall 2004. (ANT 105.) GE credit: QL, SS, WC, WE. Effective: 2016 Fall Quarter.

ESP 110—Principles of Environmental Science (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (PHY 001A or PHY 007A); (MAT 016B or MAT 017B or MAT 021B); BIS 002A or BIS 010 recommended; upper division standing. Application of physical and chemical principles, ecological concepts, and systems approach to policy analysis of atmospheric environments, freshwater and marine environments, land use, energy supplies and technology, and other resources. GE credit: QL, SE, SL. Effective: 2018 Winter Quarter.

ESP 111—Marine Environmental Issues (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Examination of critical environmental issues occurring in coastal waters including the effects of climate change, overfishing, and other human impacts. Through readings and group discussions, students will develop an integrative understanding of the oceanographic and ecological processes. May be repeated up to 2 time(s) when topics differ. (EVE 111.) GE credit: SE, SL. Effective: 2015 Summer Session 1.

ESP 116N—Oceanography (3)
Fieldwork; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): GEL 001 or GEL 002 or GEL 016 or GEL 050 Advanced oceanographic topics: Chemical, physical, geological, and biological processes; research methods and data analysis; marine resources, anthropogenic impacts, and climate change; integrated earth/ocean/atmosphere systems; weekly lab and one weekend field trip. (GEL 116N.) GE credit: SE, SL. Effective: 2017 Winter Quarter.

ESP 121—Population Ecology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B; BIS 002C; (MAT 016B or MAT 017B or MAT 021B or MAT 021BH) Development of exponential and logistic growth models for plant and animal populations, analysis of age structure and genetic structure, analysis of competition and predator-prey systems. Emphasis is on developing models and using them to make predictions and solve problems. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

ESP 123—Introduction to Field and Laboratory Methods in Ecology (4)
Fieldwork—4 hours; Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): (ESP 100 or EVE 101); STA 100; Or equivalent of EVE 101 and STA 100. Introduces students to methods used for collecting ecological data in field and laboratory situations. Methods used by population ecologists and community ecologists; emphasis on experimental design, scientific writing and data analysis. GE credit: SE, SL. Effective: 2015 Spring Quarter.

ESP 124—Marine and Coastal Field Ecology (3)
Discussion—1 hour; Fieldwork—3 hours; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Upper division standing or consent of instructor. Introductory animal biology (BIS 001B) recommended; residence at or near Bodega Marine Lab required. Enrollment restricted to application at http://www.bml.ucdavis.edu. Ecology of marine populations and communities living in diverse habitats along the California coast. Hands-on learning using scientific process and tools of the biological trade to address ecological questions arising during field trips. Critical thinking through discussing scientific literature. GE credit: SE, SL. Effective: 2006 Summer Session 1.

ESP 127—Plant Conservation Biology (4)
Discussion—1 hour; Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ESP 100 or EVE 101; Or equivalent upper division general ecology. Principles governing the conservation of plant species and plant communities, including the roles of fire, exotic species, grazing, pollination, soils, and population genetics; analytic and practical techniques for plant conservation; and introduction to relevant legal, ethical, and policy issues. GE credit: SE, SL. Effective: 2016 Fall Quarter.

ESP 150A—Physical and Chemical Oceanography (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ESP 116N or GEL 116N); PHY 009B; MAT 021D; CHE 002C; and Consent of Instructor. Physical and chemical properties of seawater, fluid dynamics, air-sea interaction, currents, waves, tides, mixing, major oceanic geochemical cycles. (GEL 150A.) GE credit: QL, SE. Effective: 2017 Winter Quarter.

ESP 150B—Geological Oceanography (3)
Lecture—3 hours. Prerequisite(s): GEL 050 or (GEL 116N or ESP 116N) Introduction to the origin and geologic evolution of ocean basins. Composition and structure of oceanic crust; marine volcanism; and deposition of marine sediments. Interpretation of geologic history of the ocean floor in terms of sea-floor spreading theory. (GEL 150B.) GE credit: SE. Effective: 2017 Winter Quarter.

ESP 150C—Biological Oceanography (4)
Discussion—1 hour; Fieldwork; Lecture—3 hours. Prerequisite(s): BIS 002A; Consent of Instructor. A course in general ecology. Ecology of major marine habitats, including intertidal, shelf benthic, deep-sea and plankton communities. Existing knowledge and contemporary issues in research. Segment devoted to human use. One weekend field trip required. (GEL 150C.) GE credit: SE, SL. Effective: 2017 Winter Quarter.

ESP 151—Limnology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B; (BIS 002C and ESP 100 or EVE 101 recommended.) Biology and productivity of inland waters with emphasis on the physical and chemical environment. GE credit: SE. Effective: 2017 Spring Quarter.

ESP 151L—Limnology Laboratory (3)
Laboratory—6 hours. Prerequisite(s): ESP 151 (can be concurrent); Junior, senior, or graduate standing. Limnological studies of lakes, streams, and reservoirs with interpretation of aquatic ecology. GE credit: SE. Effective: 1997 Winter Quarter.

ESP 152—Coastal Oceanography (3)
Discussion—1 hour; Fieldwork—3 hours; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Upper division standing or consent of the instructor; physics (PHY 009B), calculus (MAT 021B) and exposure to physical and chemical oceanography (GEL 150A and ESP 150A) are recommended; residence at or near Bodega Marine Laboratory required. Enrollment restricted to application at http://www.bml.ucdavis.edu. Oceanography of coastal waters, including bays, river plumes, nearshore and estuaries; focus on transport patterns, how they are forced and implications for ecological and environmental problems. Pertinent for students in oceanography, ecology, environmental engineering, geology and hydrology. GE credit: SE, SL. Effective: 2006 Summer Special Session.

ESP 155—Wetland Ecology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 002A; Or equivalent of BIS 002A; ESP 100 or EVE 101 recommended. Introduction to wetland ecology. The structure and function of major wetland types and principles that are common to wetlands and that distinguish them from terrestrial and aquatic ecosystems. GE credit: SE. Effective: 2016 Fall Quarter.

ESP 155L—Wetland Ecology Laboratory (3)
Fieldwork; Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): ESP 155 (can be concurrent) Modern and classic techniques in wetland field ecology. Emphasis on sampling procedures, vegetation analysis, laboratory analytical procedures, and examples of successful wetland restoration techniques. GE credit: SE, SL. Effective: 1997 Winter Quarter.

ESP 160—The Policy Process (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): POL 001; ECN 001A and STA 013 recommended. Alternative models of public policymaking and application to case studies in the U.S. and California. GE credit: SS. Effective: 2016 Fall Quarter.

ESP 161—Environmental Law (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Upper division standing and one course in environmental science or political science recommended. Introduction for non-Law School students to some of the principal issues in environmental law and the judicial interpretation of some important environmental statutes, e.g., NEPA. GE credit: SS. Effective: 1997 Winter Quarter.

ESP 162—Environmental Policy (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 001A or ECN 001AV Compares economic with socio-cultural approaches to understanding the causes of environmental problems and strategies for addressing them. Includes different approaches to the policy process, policy instruments, and environmental behavior. Applies these principles to several problems. GE credit: SS. Effective: 2018 Winter Quarter.

ESP 163—Energy and Environmental Aspects of Transportation (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): ECN 001A or ECN 001AV or ENG 106 Engineering, economic, and systems planning concepts. Analysis and evaluation of energy, air quality and selected environmental attributes of transportation technologies. Strategies for reducing pollution and petroleum consumption in light of institutional and political constraints. Evaluation of vehicle emission models. (ECI 163.) GE credit: SE, SL, SS, WE. Effective: 2018 Spring Quarter.

ESP 164—Ethical Issues in Environmental Policy (3)
Lecture—3 hours. Prerequisite(s): ESP 160; ESP 168A; Seniors only in Environmental Policy Analysis and Planning or by consent of instructor. Basic modes of ethical reasoning and criteria of distributive justice
applied to selected topics in environmental policymaking. GE credit: SS. Effective: 1997 Winter Quarter.

ESP 165—Climate Policy (3)
Lecture—3 hours. Prerequisite(s): ESP 001 or ECN 001A or ECN 001AV; or Consent of Instructor. Models, data and assumptions behind competing arguments regarding societal response to the prospect of climate change at the state, national and international level from economic, ethical and policy science perspectives. Effective: 2018 Spring Quarter.

ESP 166—Ocean and Coastal Policy (3)
Lecture—3 hours. Prerequisite(s): ESP 001; or Consent of Instructor. Limited enrollment. Overview of U.S. and International ocean and coastal policy, including energy, coastal land-use and water quality, protected areas and species. GE credit: SS. Effective: 2017 Spring Quarter.

ESP 167—Energy Policy (4)
Lecture—4 hours; Term Paper. Prerequisite(s): (ECN 001A or ECN 001AV); (MAT 016B or MAT 017B or MAT 021B); or Consent of Instructor. Survey of primary energy resources (fossil, renewable, nuclear), energy conversion methods, future energy demand scenarios, and environmental impacts of energy. Overview of energy policy in the U.S. Analysis of policy alternatives for addressing energy-related environmental and national security issues. GE credit: SS. Effective: 2018 Spring Quarter.

ESP 168A—Methods of Environmental Policy Evaluation (5) ***Review all entries***
Discussion—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): (ESP 001 or ESP 010); (STA 013 or STA 100); ECN 001A; ECN 100 recommended. Evaluation of alternatives for solution of complex environmental problems; impact analysis, benefitcost analysis, distributional analysis, decision making under uncertainty, and multi-objective evaluation. GE credit: SS. Effective: 2018 Spring Quarter.

ESP 168A—Methods of Environmental Policy Evaluation (5) ***Review all entries***
Discussion—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): (ESP 001 or ESP 010); (STA 013 or STA 013Y or STA 100); (ECN 001A or ECN 001AV); ECN 100 recommended. Evaluation of alternatives for solution of complex environmental problems; impact analysis, benefitcost analysis, distributional analysis, decision making under uncertainty, and multi-objective evaluation. GE credit: SS. Effective: 2018 Summer Quarter.

ESP 168B—Methods of Environmental Policy Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ESP 168A Continuation of course 168A, with emphasis on examination of the literature for applications of research and evaluation techniques to problems of transportation, air and water pollution, land use, and energy policy. GE credit: SS. Effective: 1997 Winter Quarter.

ESP 169—Water Policy and Politics (3)
Lecture—3 hours. Prerequisite(s): ECN 001A or POL 001 recommended. Governance of water, including issues of water pollution/quality and water supply. The politics of water decision-making and effectiveness of water policy. Broad focus on federal water policy, with case examples from nationally significant U.S. watersheds. GE credit: SS. Effective: 2016 Fall Quarter.

ESP 170—Conservation Biology Policy (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): One course in environmental science (e.g., ESP 1), conservation (e.g., WFC 11 or WFC 154), or government (e.g., POL 1) recommended. Analysis of policies designed to conserve species and their habitats. Emphasis on how individual incentives affect the success of conservation policies. Valuation of endangered species and biodiversity. Criteria for deciding conservation priorities. GE credit: SE, SS. Effective: 2016 Fall Quarter.

ESP 171—Urban and Regional Planning (4)
Discussion—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): ESP 001 recommended. How cities plan for growth in ways that minimize environmental harm. Standard city planning tools (general plan, zoning ordinance) and innovative new approaches. Focus on planning requirements and practices in California. Relationships between local, regional, state, and federal policy. GE credit: SS, WE. Effective: 2016 Fall Quarter.

ESP 172—Public Lands Management (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ECN 001A recommended. Investigation of alternative approaches to public lands management by Federal and state agencies. The role each agency's legislation plays in determining the range of resource allocations. GE credit: ACGH, SS. Effective: 2016 Fall Quarter.

ESP 173—Land Use and Growth Controls (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Upper division standing; one course in environmental policy. Exposes students to the economic, political, and legal factors affecting land use and growth controls, and helps students critically evaluate written materials in terms of their arguments and supporting data. GE credit: SS. Effective: 2016 Fall Quarter.

ESP 175—Natural Resource Economics (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100B or ECN 100; Or the equivalent. Pass One open to Managerial Economics (AMGE) and Environmental Policy Analysis and Planning (AEPP) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Economic concepts and policy issues associated with natural resources,
renewable resources (ground water, forests, fisheries, and wildlife populations) and non-renewable resources (minerals and energy resources, soil). (Agricultural and Resource Economics 175.) GE credit: SS. Effective: 2017 Winter Quarter.

ESP 175—Natural Resource Economics (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A C- or better or ECN 100A C- or better or ECN 100 C- or better Pass One open to Managerial Economics (AMGE) and Environmental Policy Analysis and Planning (AEPP) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Economic concepts and policy issues associated with natural resources, renewable resources (ground water, forests, fisheries, and wildlife populations) and non-renewable resources (minerals and energy resources, soil). (ARE 175.) GE credit: SS. Effective: 2018 Fall Quarter.

ESP 178—Applied Research Methods (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 103 or STA 100 or STA 108 or SOC 106 or ARE 106; Or the equivalent. Research methods for analysis of urban and regional land use, transportation, and environmental problems. Survey research and other data collection techniques; demographic analysis; basic forecasting, air quality, and transportation models. Collection, interpretation, and critical evaluation of data. GE credit: QL, SS. Effective: 2016 Fall Quarter.

ESP 179—Environmental Impact Assessment (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ESP 001; Or the equivalent. Introduction to the information resources and methods typically used in environmental impact analysis. Emphasis on how environmental information is applied to planning, environmental regulation, and public policymaking, with case studies from California land use and natural resource policy. GE credit: SS. Effective: 2016 Fall Quarter.

ESP 179L—Environmental Impact Reporting Using Geographic Information (2)
Discussion/Laboratory—2 hours; Laboratory—4 hours. Prerequisite(s): ESP 179 (can be concurrent); ESP 179 required concurrently. Introduction to Geographic Information Systems (GIS) by using ArcView for assessment and environmental planning. Not open for credit to students who have completed ABT 180, ABT 181, or ASE 132. GE credit: SE. Effective: 2002 Fall Quarter.

ESP 190—Workshops on Environmental Problems (1-8)
Laboratory—2-16 hours. Prerequisite(s): Consent of Instructor. Open to all upper division and graduate students on application. Workshops featuring empirical analyses of contemporary environmental problems by multidisciplinary student teams. Guided by faculty and lay professionals, the teams seek to develop an integrated view of a problem and outline a series of alternative solutions. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ESP 191A—Workshop on Food System Sustainability (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): PLS 015; CRD 020; ARE 121; PLS 150; or Consent of Instructor. Upper division standing. Priority enrollment for seniors in the sustainable agriculture and food systems major; limited to 25 students per section. First in a two-quarter senior capstone course sequence. Identify projects addressing specific problems and opportunities of sustainable agriculture and food systems, form multidisciplinary teams, and identify and consult with key stakeholders to understand their needs and concerns. GE credit: SE. Effective: 2009 Fall Quarter.

ESP 191B—Workshop on Food System Sustainability (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): ESP 191A Priority enrollment for seniors in the sustainable agriculture and food systems major; limited to 25 students per section. Continuation of course 191A. Student teams conduct analyses of a specific issue in sustainable agriculture or food systems, prepare a critical assessment of technological, economic, environmental, and social dimensions of options for action and present their results to stakeholders. GE credit: SE. Effective: 2010 Winter Quarter.

ESP 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Work experience off and on campus in all subject areas offered in the
College of Agricultural and Environmental Sciences. Internships supervised by a member of the faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

ESP 197T—Tutoring in Environmental Science and Policy (1-5)
Tutorial—2-6 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Experience in teaching under guidance of faculty member. (P/NP grading only.) Effective: 2014 Winter Quarter.

ESP 198—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

ESP 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

ESP 212A—Environmental Policy Process (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Course in public policy (e.g., ESP 160); environmental law (e.g., ESP 161); course in statistics (e.g., SOC 106 or ARE 106). Introduction to selected theories of the policy process and applications to the field of environmental policy. Develops critical reading skills, understanding of policy theory, and an ability to apply multiple theories to the same phenomena. (ECL 212A and ENV 200C.) Effective: 2017 Fall Quarter.

ESP 212B—Environmental Policy Evaluation (4)
Discussion—1 hour; Lecture—2 hours; Seminar—2 hours. Prerequisite(s): (STA 108 or ARE 106); ARE 176; Intermediate microeconomics (e.g., ECN 100); policy analysis (e.g., ESP 168A or the equivalent). Method and practice, philosophical basis, and political role of policy analysis. Reviews basic concepts from economic theory; how and why environmental problems emerge in a market economy; and tools necessary for solving environmental problems. (ECL 212B and ENV 200B.) Effective: 2018 Winter Quarter.

ESP 220—Tropical Ecology (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): ESP 100; EVE 101; EVE 117; EVE 138 recommended. Open to graduate and undergraduate students who meet requirement subject to consent of instructor. An overview of present status of knowledge on structure and processes of major tropical ecosystems. Differences and similaritiees among tropical and temperate systems
stressed. Effective: 1997 Winter Quarter.

ESP 228—Advanced Simulation Modeling (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): (STA 108 or ARE 106); (ESP 128 and ESP 128L) Advanced techniques in simulation modeling; optimization and simulation, dynamic parameter estimation, linear models, error propagation, and sensitivity testing. Latter half of course will introduce model evaluation in ecological and social system models. Effective: 1997 Winter Quarter.

ESP 252—Sustainable Transportation Technology and Policy (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): ESP 160; Or the equivalent. Role of technical fixes and demand management in creating a sustainable transportation system. Emphasis on technology options, including alternative fuels, electric propulsion, and IVHS. Analysis of market demand and travel behavior, environmental impacts, economics and politics. (ECI 252.) Effective: 1997 Winter Quarter.

ESP 275—Economic Analysis of Resource and Environmental Policies (4)
Lecture/Discussion—4 hours. Prerequisite(s): ARE 204 or ECN 204 Development of externality theory, market failure concepts, welfare economics, theory of renewable and non-renewable resource use, and political economic models. Applications to policy issues regarding the agricultural/environment interface and managing resources in the public domain. (ARE 275.) Effective: 1999 Spring Quarter.

ESP 278—Research Methods in Environmental Policy (3)
Lecture/Discussion—3 hours. Prerequisite(s): ARE 106; Or the equivalent. Introduction to scientific research in environmental policy.Major issues in the philosophy of the social sciences.How to design research that acknowledges theoretical assumptions and that is likely to produce evidence in an intersubjectively reliable fashion with explicit recognition of its uncertainties. Effective: 1998 Winter Quarter.

ESP 298—Directed Group Study (1-5)
Variable. Effective: 1997 Winter Quarter.

ESP 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

ESP 396—Teaching Assistant Training Practicum (1-4)
Variable—3-12 hours. Prerequisite(s): Consent of Instructor. Open to graduate students only. Teaching assistant training practicum. May be repeated for credit. (S/U grading only.) Effective: 2017 Spring Quarter.

ETX Environmental Toxicology

Courses in ETX:

ETX 010—Introduction to Environmental Toxicology (3)
Lecture—3 hours. Hazardous substances, their effects on humans and their actions and movement in the environment. Emphasis on substances of current concern. GE credit: SE, SL. Effective: 2000 Fall Quarter.

ETX 020—Introduction to Forensic Science (3)
Lecture—3 hours. Basic principles of forensic science, types of information on which investigations focus, how information is obtained and used in criminal investigations, types of scientific skills required to practice forensic science, guidance on training. Real cases discussed; demonstrations of methods provided. GE credit: SE, SL, VL. Effective: 2012 Spring Quarter.

ETX 030—Chemical and Drug Use and Abuse (3)
Lecture—3 hours. An overview of chemical use and abuse in our society. The effects of chemicals (therapeutic drugs, pesticides, food additives, herbal remedies, environmental contaminants, and recreational drugs) on humans and other living systems. GE credit: SE. Effective: 2006 Winter Quarter.

ETX 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Work experience off and on campus in all subject areas offered in the
College of Agricultural and Environmental Sciences. Internships supervised by a member of the faculty. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ETX 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ETX 101—Principles of Environmental Toxicology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (CHE 008B or CHE 118B or CHE 128B); BIS 001A Principles of toxicology with a focus on environmental, industrial, and natural chemicals. Topics include fate and effects of chemicals in organisms and the environment, air pollutants, insecticides, aquatic toxicology, endocrine disruptors, biomarkers and bioassays, and risk assessment. GE credit: SE, SL. Effective: 2003 Fall Quarter.

ETX 102A—Environmental Fate of Toxicants (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 008B; CHE 118B; CHE 128B; or Consent of Instructor. Properties of toxic chemicals influencing their distribution and transformations; action of environmental forces affecting toxicant breakdown, movement, and accumulation; sources and occurrence of major classes of environmental toxicants. Not open for credit to students who have completed ETX 112A. GE credit: QL, SE, SL, VL, WE. Effective: 2004 Winter Quarter.

ETX 102B—Quantitative Analysis of Environmental Toxicants (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ETX 102A Sample preparation methods for trace analysis of environmental toxicants. Concept and techniques of advanced analytical instrumentation. Interpretation and use of analytical data. Not open for credit to students who have completed course ETX 112B. GE credit: SE, VL. Effective: 2004 Spring Quarter.

ETX 103A—Biological Effects of Toxicants (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 102; ETX 101 and NPB 101 recommended. Biological effects of toxic substances in living organisms. Metabolism, cellular and tissue targets, mechanisms of action, and pathological effects. Not open for credit to students who have taken ETX 114A. GE credit: SE. Effective: 2004 Winter Quarter.

ETX 103B—Biological Effects of Toxicants: Experimental Approaches (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ETX 103A Experimental approaches for assessing the biological effects of toxicants. Not open for credit to students who have taken ETX 114B. GE credit: SE, VL, WE. Effective: 2004 Spring Quarter.

ETX 104—Environmental and Nutritional Factors in Cellular Regulation and Nutritional Toxicants (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 101; (BIS 103 or ABI 103) Cellular regulation from nutritional/toxicological perspective. Emphasis: role of biofactors on modulation of signal transduction pathways, role of specific organelles in organization/regulation of metabolic transformations, major cofactor functions, principles of pharmacology/toxicology important to understanding nutrient/toxicant metabolism. (NUT 104.) GE credit: OL, SE, SL. Effective: 2005 Spring Quarter.

ETX 110—Toxic Tragedies and Their Impact on Society (2)
Lecture—2 hours. Prerequisite(s): BIS 010; or Consent of Instructor. Or equivalent; CHE 118A recommended. Examination of toxic tragedies, their origins, consequences, and effects on toxic regulation. GE credit: OL, SE, SL, WE. Effective: 2004 Winter Quarter.

ETX 111—Introduction to Mass Spectrometry (3)
Lecture—3 hours. Prerequisite(s): CHE 118C Introduction to mass spectrometry, including ionization techniques, mass analyzers, interpretation of mass spectra, and applications of mass spectrometry. Emphasis on fundamental concepts of mass spectrometry necessary to identify and quantify organic molecules. GE credit: SE. Effective: 2004 Winter Quarter.

ETX 120—Perspectives in Aquatic Toxicology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 008B; (CHE 118B or CHE 128B); BIS 001A; or Consent of Instructor. Toxic substances, their fate in marine and freshwater systems, and their effects on aquatic organisms, populations, and ecosystems. Emphasis will be on substances and issues of current concern. GE credit: OL, SE, SL, VL, WE. Effective: 2004 Winter Quarter.

ETX 127—Environmental Stress and Development in Marine Organisms (10)
Discussion—2 hours; Laboratory—12 hours; Lecture—4 hours. Prerequisite(s): ETX 101 or BIS 102 or BIS 104; and Consent of Instructor. Or the equivalent; ETX 114A or NUT 114 recommended. Course taught at Bodega Marine Laboratory. Effects of environmental and nutritional stress, including pollutants, on development and function in embryos and larvae of marine organisms. Emphasis on advanced experimental methods. (NUT 127.) GE credit: OL, QL, SE, SL, VL, WE. Effective: 2002 Summer Session 1.

ETX 128—Food Toxicology (3)
Lecture—3 hours. Prerequisite(s): BIS 102; BIS 103 Chemistry and biochemistry of toxins occurring in foods, including plant and animal toxins, intentional and unintentional food additives. The assessment of food safety and toxic hazards. (FST 128.) GE credit: SE. Effective: 1997 Winter Quarter.

ETX 130—The Role and Applications of Toxicology in Modern Industry (3)
Lecture—3 hours. Prerequisite(s): ETX 101; ETX 103A recommended. Role of toxicology in industry research and development, human health and environmental protection, hazard and risk evaluations, risk management and communications, product stewardship, and regulatory compliance. Scientific principles and methods of toxicology in chemical, energy, pharmaceutical, pesticide, biotechnology industries. GE credit: OL, SE, SL, VL, WE. Effective: 2008 Spring Quarter.

ETX 131—Environmental Toxicology of Air Pollutants (3)
Lecture—3 hours. Prerequisite(s): CHE 008B (can be concurrent); Or the equivalent; BIS 102 recommended. Field trip required. Toxicology of air pollutants in the ambient, indoor, and occupational environments. Health effects, sources, environmental fates, pulmonary responses, sampling and analyses, and air-quality criteria and standards. Field trip required. GE credit: SE, VL. Effective: 2003 Fall Quarter.

ETX 135—Health Risk Assessment of Toxicants (3)
Lecture—3 hours. Prerequisite(s): ETX 101; ETX 114A recommended. Current practices of health risk assessment of environmental chemicals using toxicological principles and their application to regulatory control of these chemicals. GE credit: QL, SE, SL, VL. Effective: 1997 Winter Quarter.

ETX 138—Legal Aspects of Environmental Toxicology (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. ETX 010 or ETX 101 recommended. Federal and California legislation concerning air and water pollution, pesticide use, food and feed additives, consumer protection, and occupational exposure to toxic substances; roles of federal regulatory agencies; alternatives to government control. GE credit: SE, VL, WE. Effective: 2001 Fall Quarter.

ETX 140—Genes and the Environment (3)
Lecture/Discussion—3 hours. Prerequisite(s): BIS 101; Biological Science 101 required or permission of instructor; coursework in genetics and molecular biology and/or environmental toxicology recommended. Evaluation of evidence that human health and disease susceptibility result from complex interactions between genes and the environment. Emphasis on cancer, metabolic, cardiovascular, and neurological health outcomes assessed by genotoxicity and toxicogenomic methods. Effective: 2015 Fall Quarter.

ETX 146—Exposure and Dose Assessment (3)
Lecture—3 hours. Prerequisite(s): ETX 112A; ETX 135 recommended. The exposure component of risk assessment; specifically, the presence and/or formation of toxic substances in environmental media, their movement within and between contaminated media, and the contacts of human populations with those media. GE credit: QL, SE, SL, VL. Effective: 1997 Winter Quarter.

ETX 190—Seminar (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Selected topics presented by students, faculty, or outside speakers covering current research and instructional activities within environmental toxicology. Reports and discussion concerning oral and written presentations, literature sources, and career opportunities. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ETX 190C—Research Group Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Weekly conference of advanced research methods and the interpretation of research results. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ETX 190S—Environmental Toxicology Career Seminar (1)
Seminar—1 hour. Careers in environmental toxicology; discussions with graduates from the Department of Environmental Toxicology and other experts in the field. (P/NP grading only.) GE credit: SE. Effective: 2003 Fall Quarter.

ETX 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Work experience off and on campus in all subject areas offered in the
College of Agricultural and Environmental Sciences. Internships supervised by a member of the faculty. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ETX 194HA—Honors Research (3)
Discussion—1 hour; Laboratory—6 hours. Prerequisite(s): Consent of Instructor. Senior standing; minimum GPA of 3.250. Specific research project conducted under the supervision of a faculty sponsor. Experience to include experimental design, learning new techniques, data analysis and interpretation of findings. GE credit: SE. Effective: 1997 Winter Quarter.

ETX 194HB—Honors Research (3)
Discussion—1 hour; Laboratory—6 hours. Prerequisite(s): Consent of Instructor. Senior standing; minimum GPA of 3.250. Specific research project conducted under the supervision of a faculty sponsor. Experience to include experimental design, learning new techniques, data analysis and interpretation of findings. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ETX 194HC—Honors Research (3)
Discussion—1 hour; Laboratory—9 hours. Prerequisite(s): Consent of Instructor. Senior standing, minimum GPA of 3.250. Continuation of course 194HA-194HB. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ETX 197T—Tutoring in Environmental Toxicology (1-5)
Variable. Prerequisite(s): Consent of Instructor. Advanced standing in Environmental Toxicology, a related major, or the equivalent experience. Teaching toxicology including conducting discussion groups for regular departmental courses under direct guidance of staff. May be repeated up to 5 unit(s). (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ETX 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ETX 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

ETX 203—Environmental Toxicants (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 008B or CHE 128C; and Consent of Instructor. Or the equivalent of CHE 128C. Toxic chemicals: selected topics illustrating their occurrence, structure, and the reactions underlying detection, toxicity, fate, and ecological importance. Effective: 1997 Winter Quarter.

ETX 214—Mechanisms of Toxic Action (3)
Lecture—3 hours. Prerequisite(s): BIS 102; BIS 103; and Consent of Instructor. Chemical, biochemical, and molecular mechanisms underlying the adverse effects of toxic chemicals. Students are required to write a grant proposal and participate in a grant review panel. Effective: 1999 Spring Quarter.

ETX 220—Analysis of Toxicants (3)
Lecture—3 hours. Prerequisite(s): Coursework in organic chemistry. Principles of microanalysis of toxicants. Theoretical considerations regarding separation, detection and quantitative determination of toxicants using chemical and instrumental techniques. (FOR 220.) Effective: 2006 Winter Quarter.

ETX 220L—Analysis of Toxicants Laboratory (2)
Laboratory—6 hours. Prerequisite(s): ETX 220 (can be concurrent); and Consent of Instructor. Laboratory techniques for microanalysis of toxicants. Separation, detection, and quantitative determination of toxicants using chemical and instrumental methods. Effective: 1997 Winter Quarter.

ETX 228—Gas Chromatography/Mass Spectrometry of Toxic Chemicals (3)
Discussion—1 hour; Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): ETX 220; CHE 129C; and Consent of Instructor. Application of GC/MS techniques to investigate toxic chemicals. Mass spectral fragmentations and their application to the structural elucidation. Practical application of GC/MS in current research. Preference given to environmental toxicology graduate students. Effective: 1997 Winter Quarter.

ETX 234—Current Topics in Neurotoxicology (3)
Lecture—3 hours. Prerequisite(s): Core courses in one of the following graduate programs: Pharmacology and Toxicology, Agricultural and Environmental Chemistry, Biochemistry and Molecular Biology, Cell and Developmental Biology, Immunology, Molecular Cellular and Integrative Physiology or Neuroscience. Restricted to upper level undergraduate students must obtain permission from the course coordinator. General principles of neurotoxicology, the cell and molecular mechanisms and health impacts of specific neurotoxicants and the contribution of neurotoxic compounds to complex eurodevelopmental disorders and neurodegenerative diseases. (VMB 234 and MCP 234.) Effective: 2010 Fall Quarter.

ETX 240—Ecotoxicology (3)
Lecture—3 hours. Prerequisite(s): or Consent of Instructor. Elementary course in toxicology and ecology or the equivalent. Principles of toxicology as applied to chemical action on natural populations, communities, and ecosystems. Physical, chemical, and biological characteristics which influence ecotoxic effects, modeling, and field research. Selected case histories are analyzed and presented in class. Effective: 1997 Winter Quarter.

ETX 250—Reproductive Toxicology (3)
Lecture—1.5 hours; Lecture/Discussion—1.5 hours. Prerequisite(s): PTX 203 Application of toxicological principles in reproductive studies. Effects of toxicants on the male, female, and developing embryo/fetus. Critical
evaluation of reproductive toxicity studies and development of mechanistic approaches to understanding how chemical exposure can adversely affect reproduction. Effective: 2000 Winter Quarter.

ETX 260—Immunotoxicology (3)
Lecture—3 hours. Prerequisite(s): Undergraduate or graduate introduction to immunology coursework recommended but not required; graduate standing or consent of instructor. Provides students with skills and knowledge for evaluating and applying research on the impact of environmental toxicants on immunological function in human and wildlife populations. Effective: 2005 Fall Quarter.

ETX 270—Toxicology of Pesticides (3)
Lecture—3 hours. Prerequisite(s): ETX 101; One course each in (a) Organic Chemistry, (b) Biochemistry, (c) Toxicology (ETX 101 or equivalent), or with consent of instructor; graduate standing. Classification and chemical properties of pesticides, their mode of action, metabolism and disposition, pesticide resistance, effects on human health and ecological health and methods of risk benefit analyses. Effective: 2007 Winter Quarter.

ETX 278—Molecular Techniques (3)
Lecture—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Recombinant DNA technology and its applications. (FOR 278.) Effective: 2002 Spring Quarter.

ETX 280—Forensic DNA Analysis (3)
Lecture—3 hours. Prerequisite(s): Coursework in genetics and molecular biology. Graduate standing; consent of instructor required for all students not enrolled in the MS Forensics program. Foundation in theory and practice of forensic DNA analysis; past, present, and emerging technologies; legal and quality assurance issues. DNA extraction, DNA quantitation, multiplex amplification of STR loci, capillary electrophoresis of amplified products, and analysis of STR typing data. (FOR 280.) Effective: 2003 Spring Quarter.

ETX 281—Principles and Practice of Forensic Serology and DNA Analysis (3)
Discussion/Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): (FOR 278 or ETX 278) or (FOR 280 or ETX 280); Or equivalent; consent of instructor. Restricted to students enrolled in the M.S. in Forensic Science Program or by consent of Forensic Science Program Director. Comprehensive overview of forensic serology and DNA typing techniques and technologies. Strong emphasis on real-world applications, including preservation and tracking of biological evidence, detection and identification of bodily fluids, and methods to extract, quantify, and type human DNA. (FOR 281.) Effective: 2011 Spring Quarter.

ETX 284—Non-Human Forensic DNA--Theory and Casework Application (2)
Lecture—2 hours. Prerequisite(s): Consent of instructor required for all students not enrolled in the MS Forensics program; upper division Molecular Biology and Genetics or its equivalent. Restricted to graduate standing. Provides a comprehensive understanding of plant and animal forensic biology in terms of sample collection, preservation, analytical methods, and of the invaluable lines of inquiry these forensic evidence may permit. (FOR 284.) Effective: 2010 Fall Quarter.

ETX 290—Seminar (1)
Seminar—1 hour. Current topics in environmental toxicology. (S/U grading only.) Effective: 1997 Winter Quarter.

ETX 290C—Advanced Research Conference (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Presentation and critical discussion of advanced research methods and interpretation of research results. Designed primarily for graduate students. (S/U grading only.) Effective: 1997 Winter Quarter.

ETX 297T—Tutoring in Environmental Toxicology (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing in Environmental Toxicology, a related major, or the equivalent experience. Teaching toxicology including conducting discussion groups for regular departmental courses under direct guidance of staff. May be repeated up to 5 unit(s). (S/U grading only.) Effective: 1997 Winter Quarter.

ETX 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Effective: 1997 Winter Quarter.

ETX 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

ETX 396—Teaching Assistant Training Practicum (1-4)
Variable. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

EVE Evolution and Ecology

Courses in EVE:

EVE 002—Biodiversity (3)
Lecture—2 hours; Lecture/Discussion—1 hour. Introduction to nature, scope and geographical distribution of biodiversity (the diversity of life, with emphasis on plants and animals, especially insects). Humans and biodiversity - domestication, aesthetics, ethics and valuation. Species richness and "success." Biodiversity through time; monitoring, evaluation and conservation. Biomes - global, continental and Californian. (ENT 002.) GE credit: SE, SL, WE. Effective: 2001 Fall Quarter.

EVE 010—Evolution for Non-Biologists (3)
Lecture—3 hours. Introduction to evolutionary biology for the general population. GE credit: QL, SE, SL. Effective: 2013 Fall Quarter.

EVE 011—Principles of Ecology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Elementary biology recommended. Ecological principles with emphasis on humans and their interactions with the environment; how humans affect and depend on natural ecosystems; the future of the Earth's biosphere. GE credit: OL, SE, SL, WE. Effective: 2004 Spring Quarter.

EVE 012—Life in the Sea (3)
Lecture—3 hours. Diversity of life in the sea; adaptations to physical/chemical ocean environment; marine science research methods; utilization of living marine resources by humans; factors and processes that influence diversity of sea life, including humans. GE credit: SE, SL. Effective: 2015 Spring Quarter.

EVE 013—Sex in the Natural World (3)
Lecture/Discussion—3 hours. Explores the diversity, mechanisms and evolution of sexual behaviors across the kingdoms of life. GE credit: SE, SL, VL. Effective: 2014 Fall Quarter.

EVE 017—Dining with Darwin: Evolutionary Insights Into Your Diet (3)
Lecture—3 hours. Crave salty, fatty, sugary foods? Want to know why? Evolution of cravings, metabolism and dentition, and of cooking our food. Relate Paleo, South Beach, and vegan diets to ancestral and global diets and current metabolism. For majors and nonmajors. GE credit: SE, SS, WC. Effective: 2016 Fall Quarter.

EVE 020—Darwinian Medicine (3)
Lecture—3 hours. Introduction for non-biologists to the evolved traits of humans and pathogens that influence human biological variation, health, and disease. GE credit: QL, SE, SL. Effective: 2017 Fall Quarter.

EVE 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Work experience off and on campus in all subject areas offered in the
Department of Evolution and Ecology. Internships supervised by a member of the faculty. May be repeated for credit. (P/NP grading only.) Effective: 2010 Spring Quarter.

EVE 098—Directed Group Study (1-5)
Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 2004 Winter Quarter.

EVE 099—Special Study for Lower Division Students (1-5)
Variable. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

EVE 100—Introduction to Evolution (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (BIS 002A, BIS 002B, BIS 002C); (MAT 016A or MAT 017A or MAT 021A); (MAT 016B or MAT 017B or MAT 021B); STA 100 recommended. General survey of the origins of biological diversity and evolutionary mechanisms. GE credit: QL, SE, SL. Effective: 2018 Winter Quarter.

EVE 101—Introduction to Ecology (4)
Lecture—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): (BIS 002A, BIS 002B, BIS 002C); (MAT 016A or MAT 017A or MAT 021A); (MAT 016B or MAT 017B or MAT 021B); Or the equivalent. General survey of the principles of ecology. GE credit: QL, SE, SL, VL. Effective: 2018 Winter Quarter.

EVE 101Q—Introduction to Computer Models in Ecology (1)
Auto Tutorial—1.5 hours; Extensive Problem Solving—1.5 hours. Prerequisite(s): EVE 101 (can be concurrent); EVE 101 required concurrently. Computational methods and mathematical models used to study ecological phenomena. Effective: 2006 Fall Quarter.

EVE 102—Population and Quantitative Genetics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 101; (STA 100 or STA 102); EVE 100 Evolution as caused by random mating, genetic drift, natural selection, inbreeding, migration,and mutation in theory and actuality. The
resemblance between relatives and consequences of selection for quantitative traits. Application of these ideas to topics such as the evolution of sex. GE credit: SE. Effective: 1997 Winter Quarter.

EVE 103—Phylogeny, Speciation and Macroevolution (4)
Discussion/Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EVE 100 Statistical inference of evolutionary patterns and processes above the species level. Topics include estimation of phylogenies and divergence times, character evolution, biogeographic history, and rates and patterns of lineage diversification, with an emphasis on the origin of species. GE credit: QL, SE, SL. Effective: 2012 Winter Quarter.

EVE 104—Community Ecology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EVE 101 or ESP 100 Population growth and density dependence; predation; exploitative, interference and apparent competition; coexistence mechanisms; niches, spatial and temporal variation; stability, diversity, and productivity of food webs; applications to conservation and biological control. Emphasis on quantitative understanding through models, concepts,and empirical evidence. GE credit: SE, SL, VL. Effective: 1999 Spring Quarter.

EVE 105—Phylogenetic Analysis of Vertebrate Structure (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): (BIS 001A, BIS 001B) or (BIS 002B, BIS 002C) The structure of the classes and subclasses of vertebrates is described
and interpreted in terms of phylogeny. GE credit: SE. Effective: 2008 Fall Quarter.

EVE 106—Mechanical Design in Organisms (3)
Discussion—1 hour; Fieldwork—3 hours; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Upper division standing or consent of instructor; introductory animal biology (BIS 001B or BIS 002B), invertebrate zoology (EVE 112), and/or ecology (EVE 101) are recommended; residence at or near Bodega Marine Lab required. Enrollment restricted to application at http://www.bml.ucdavis.edu. Explores fundamental principles in the form and function of organisms, examining how basic properties of size, shape, structure, and habitat constrain ways in which plants and animals interact and cope with their physical surroundings. GE credit: QL, SE, VL, WE. Effective: 2008 Summer Session 1.

EVE 107—Animal Communication (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 002B How animals use songs, dances, colors, chemicals, electricity and vibrations to communicate. Mechanisms of signal production and detection (sensory systems), theory of information transfer and signal design, and the role of natural selection in shaping communication. GE credit: QL, SE, VL. Effective: 2013 Fall Quarter.

EVE 108—Systematics and Evolution of Angiosperms (5)
Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): (BIS 001A, BIS 001B, BIS 001C) or (BIS 002A, BIS 002B, BIS 002C) Diversity and classification of angiosperms (flowering plants) on a world scale, and current understanding of the origin of angiosperms and evolutionary relationships and trends within them based on morphological and molecular evidence. (PLB 108.) Effective: 2008 Spring Quarter.

EVE 110—Running, Swimming and Flying (3)
Discussion—1 hour; Fieldwork—3 hours; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Upper division standing or consent of instructor; introductory animal biology (BIS 001B or BIS 002B), invertebrate zoology (EVE 112), and/or ecology (EVE 101) are recommended; residence at or near Bodega Marine Lab required. Enrollment restricted to application at http://www.bml.ucdavis.edu. Examines the bases of organism movement in terrestrial, aquatic, and aerial environments, emphasizing both the unifying principles underlying locomotion, as well as a range of strategies employed across diverse groups of organisms. GE credit: QL, SE, VL, WE. Effective: 2008 Summer Session 1.

EVE 111—Marine Environmental Issues (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Examination of critical environmental issues occurring in coastal waters including the effects of climate change, overfishing, and other human impacts. Through readings and group discussions, students will develop an integrative understanding of the oceanographic and ecological processes. May be repeated up to 2 time(s) when topics differ. (ESP 111.) GE credit: SE, SL. Effective: 2015 Summer Session 1.

EVE 112—Biology of Invertebrates (3)
Lecture—3 hours. Prerequisite(s): BIS 001B or (BIS 002B, BIS 002C); Courses in systematics, ecology, and evolution recommended. Limited enrollment. Survey of the invertebrate phyla, emphasizing aquatic forms, and focusing on morphology, development, natural history, ecology, and phylogenetic relationships. Effective: 2008 Fall Quarter.

EVE 112L—Biology of Invertebrates Laboratory (2)
Laboratory—6 hours. Prerequisite(s): (BIS 001B or (BIS 002B, BIS 002C)), EVE 112 (can be concurrent); EVE 112 required concurrently. Enrollment limited to 50 students. Field and laboratory experience with representative members of the major invertebrate phyla discussed in course 112. Emphasis on comparative morphology, natural history, ecology, and behavior of living invertebrates. Two field trips required. Effective: 2008 Fall Quarter.

EVE 114—Experimental Invertebrate Biology (3)
Discussion—1 hour; Fieldwork—3 hours; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Upper division standing or consent of instructor; introductory cell, animal and plant biology (BIS 001A and BIS 001B and BIS 001C, or BIS 002B), invertebrate zoology (EVE 112), ecology (EVE 101), and/or evolution (EVE 100) are recommended; residence at or near Bodega Marine Lab required. Enrollment restricted to application at http://www.bml.ucdavis.edu. Biology, ecology, and evolution of local marine invertebrates with a focus on adaptations to environmental and biological factors encountered on the California coast. Hands-on field and laboratory learning with an emphasis on generating and testing hypotheses. GE credit: QL, SE, VL, WE. Effective: 2008 Summer Session 1.

EVE 115—Marine Ecology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EVE 101 or ESP 100 or BIS 002B; or Consent of Instructor. Processes affecting the distribution, abundance, and diversity of plant and animal life in the sea. Introduction to marine habitat diversity and human impacts on marine ecosystems. GE credit: SE, SL, VL, WE. Effective: 2008 Fall Quarter.

EVE 117—Plant Ecology (4)
Fieldwork—3 hours; Lecture—3 hours. Prerequisite(s): (BIS 001A, BIS 001B, BIS 001C) or (BIS 002A, BIS 002B, BIS 002C); PLB 111 recommended. The study of the interactions between plants, plant populations or vegetation types and their physical and biological environment. Special emphasis on California. Four full-day field trips and brief write-up of class project required. (PLB 117.) Effective: 2008 Fall Quarter.

EVE 119—Population Biology of Invasive Plants and Weeds (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): (BIS 001A, BIS 001B, BIS 001C) or (BIS 002A, BIS 002B, BIS 002C); Introductory statistics recommended. Origin and evolution of invasive plant species and weeds, reproduction and dispersal, seed ecology, modeling of population dynamics, interactions between invasive species, native species, and crops, biological control. Laboratories emphasize design of competition experiments and identification of weedy species. (PLB 119.) GE credit: SE. Effective: 2011 Spring Quarter.

EVE 120—Global Change Ecology (3)
Lecture/Discussion—3 hours. Prerequisite(s): EVE 100; EVE 101; Or equivalents. Treatment of historical evolution of the biosphere resulting from physical, chemical, and biological influences. Special focus upon changes caused by humans. Topics pertain to biodiversity, resources, conservation, and ecosystem services. Effective: 2010 Spring Quarter.

EVE 131—Human Genetic Variation and Evolution (3)
Lecture—3 hours. Prerequisite(s): BIS 001B or BIS 002B Introduction to genome-wide nucleotide sequence variation in human populations and computational methods for its analysis. Topics to include forensics, disease gene mapping, and studies of human evolutionary history. Misuses, such as eugenics, and ethical/legal issues will be discussed. Effective: 2010 Spring Quarter.

EVE 138—Ecology of Tropical Latitudes (5)
Discussion—1 hour; Extensive Writing; Lecture—3 hours. Prerequisite(s): and Consent of Instructor. One course in Biological Sciences, Entomology, Wildlife, Fish, and Conservation Biology, Geography, or tropical experience. Biological, physical, and human-related aspects of the ecology of low latitudes. Distribution, numbers, and relationships of tropical organisms. Problems of development and conservation in the context of ecological and evolutionary theory. GE credit: SE, SL, WE. Effective: 1999 Spring Quarter.

EVE 140—Paleobotany (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (BIS 001A, BIS 001B, BIS 001C) or (BIS 002A, BIS 002B, BIS 002C) Introduction to plant fossil record, beginning with invasion of land in the Silurian, emphasizing origin and evolution of major groups and adaptations and changing composition and distribution of floras in relation to plate tectonics and climatic change. Effective: 2008 Fall Quarter.

EVE 141—Principles of Systematics (3)
Independent Study; Lecture—2 hours. Prerequisite(s): BIS 001B or BIS 001C or BIS 002B; EVE 100 recommended. Historical background, philosophical rationale, contemporary approaches, and working rules of biosystematics, including International Code of Zoological Nomenclature. GE credit: OL, QL, SE, SL, VL, WE. Effective: 2008 Fall Quarter.

EVE 147—Biogeography (4)
Lecture—3 hours; Term Paper. Prerequisite(s): BIS 002B or (BIS 001A, BIS 001B) Movements of terrestrial organisms. The role of geologic, climatic, and biologic changes in the geographic distribution of organisms. GE credit: QL, SE, SL, VL, WE. Effective: 2008 Fall Quarter.

EVE 149—Evolution of Ecological Systems (4)
Lecture—3 hours; Term Paper. Prerequisite(s): (EVE 101 or ESP 100); EVE 100; Or equivalent courses. Evolution as an organizing force in natural communities. Coadaptation in trophic and competitive relationships. Ecology of polymorphisms, clines, and speciation. GE credit: SE, SL, WE. Effective: 1997 Winter Quarter.

EVE 150—Evolution of Animal Development (3)
Lecture—3 hours. Prerequisite(s): BIS 101; EVE 100; EVE 100 (may be waived for graduate students with consent of instructor). Comparative analysis of animal development and the genetic basis of morphological diversification. GE credit: SE, WE. Effective: 2013 Winter Quarter.

EVE 161—Microbial Phylogenomics - Genomic Perspectives on the Diversity and Diversification of Microbes (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B; BIS 002C; Or equivalent. Use of DNA and genomic sequencing in studies of the diversity of microorganisms. Diversity of microbes, phylogenetics, genome sequencing, comparative genomics, phylogenomics, lateral gene transfer, molecular ecology, metagenomics, and studies of the human microbiome. GE credit: SE. Effective: 2013 Spring Quarter.

EVE 175—Computational Genetics (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): BIS 101; (STA 100 or STA 102) The use of computers to solve problems in genetics and evolution.
Introduction to a general purpose computer language (Python),
computational statistical methods, and applications such as QTL mapping, linkage detection, estimation of rates of evolution, and gene finding. Effective: 2004 Winter Quarter.

EVE 180A—Experimental Ecology and Evolution in the Field (4)
Fieldwork—3 hours; Lecture/Lab—3 hours. Prerequisite(s): EVE 100; (EVE 101 or ESP 100); ENT 105 Experimental design in field ecology. Examination of primary literature, experimental design, independent and collaborative research, analysis of data, development of original research paper based on field experiments. (ENT 180A.) GE credit: QL, SE, VL. Effective: 2014 Winter Quarter.

EVE 180B—Experimental Ecology and Evolution in the Field (4)
Fieldwork—3 hours; Lecture/Lab—3 hours. Prerequisite(s): (EVE 180A or ENT 180A); EVE 100; (EVE 101 or ESP 100); ENT 105 Experimental design in field ecology. Examination of primary literature, experimental design, independent and collaborative research, analysis of data, development of original research paper based on field experiments. (ENT 180B.) GE credit: QL, SE, VL, WE. Effective: 2014 Winter Quarter.

EVE 181—Ecology and Evolution of Animal-Plant Interactions (4)
Extensive Writing/Discussion; Lecture—1.5 hours; Lecture/Discussion—1.5 hours; Term Paper. Prerequisite(s): BIS 002B; BIS 002C (can be concurrent) Animal adaptations for eating plants, pollinating flowers, dispersing seeds. Plant adaptations to herbivore defense, attraction of mutualists; role of coevolutionary arms race, mutualists and cheaters in plant/animal speciation. Exploration through lectures, original scientific literature, discussions and term paper. GE credit: OL, QL, SE, SL, WE. Effective: 2010 Fall Quarter.

EVE 189—Introduction to Biological Research (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing in Evolution and Ecology or related biological science. Introduction to research methods in biology. Presentation and discussion
of research by faculty, graduate, and undergraduate students. May be repeated up to 6 unit(s). (P/NP grading only.) GE credit: SE. Effective: 2010 Winter Quarter.

EVE 190—Undergraduate Seminar (2)
Seminar—2 hours. Prerequisite(s): Upper division standing in the biological sciences or a related discipline. Student reports on current topics with emphasis on integration of concepts, synthesis, and state-of-the-art research approaches. Reviews of literature and reports of undergraduate research may be included. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

EVE 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Work experience off and on campus in all subject areas offered in the
Department of Evolution and Ecology. Internships supervised by a member of the faculty. May be repeated for credit. (P/NP grading only.) Effective: 2008 Fall Quarter.

EVE 194HA—Research Honors (2)
Laboratory—6 hours. Prerequisite(s): Students who have completed 135 units and qualify for the Honors Program (as defined by the current catalog). Students pursue intensive research under the guidance of a faculty advisor. Students are expected to complete the full three-quarter sequence culminating in the writing of an honors thesis. GE credit: SE, WE. Effective: 1997 Winter Quarter.

EVE 194HB—Research Honors (2)
Laboratory—6 hours. Prerequisite(s): Students who have completed 135 units and qualify for the Honors Program (as defined by the current catalog). Students pursue intensive research under the guidance of a faculty advisor. Students are expected to complete the full three-quarter sequence culminating in the writing of an honors thesis. GE credit: SE, WE. Effective: 1997 Winter Quarter.

EVE 194HC—Research Honors (2)
Laboratory—6 hours. Prerequisite(s): Students who have completed 135 units and qualify for the Honors Program (as defined by the current catalog). Students pursue intensive research under the guidance of a faculty advisor. Students are expected to complete the full three-quarter sequence culminating in the writing of an honors thesis. GE credit: SE, WE. Effective: 1997 Winter Quarter.

EVE 197T—Tutoring in Biological Sciences 2B (1-2)
Tutorial—3 hours. Prerequisite(s): BIS 001B B or better Assisting the instructor by tutoring students in a Biological Sciences 2B laboratory. Tutoring is voluntary and is supervised by a Laboratory Teaching Assistant and the Laboratory Coordinator. May be repeated up to 3 time(s). (P/NP grading only.) GE credit: SE. Effective: 2008 Fall Quarter.

EVE 198—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

EVE 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

EVE 210—Molecular Phylogenetic Analysis (3)
Laboratory—3 hours; Lecture—2 hours. Theory and practice of inferring phylogenetic trees using molecular sequence data. Practical techniques for obtaining sequence data, advantages and disadvantages of common approaches for inferring trees, statistical methods for comparing alternative hypotheses. (NEM 210.) Effective: 2001 Spring Quarter.

EVE 211—Applied Phylogenetics (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): EVE 103 or EVE 210 or PBG 200C; Or equivalent, graduate standing. Applications of phylogenetic methods to fields outside of systematics. Core lectures/labs in remedial phylogenetics, phylogeography, conservation and comparative morphology. Special topics vary yearly. May be repeated up to 1 time(s). Effective: 2002 Spring Quarter.

EVE 220—Species and Speciation (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): EVE 100 or PHI 108; Or the equivalent; HPS 130B recommended. Current status of species concepts, models of speciation, current research on speciation, and relevance of species to conservation biology. Effective: 2005 Winter Quarter.

EVE 231—Principles of Biological Data Analysis (3)
Laboratory—3 hours; Lecture—2 hours. Introduction to the principles of data analysis, experimental design, statistical modeling, inference, and hypothesis tests. Statistical methods of particular importance in biological applications will be emphasized. Examples will be presented from the fields of ecology and evolutionary genetics. (S/U grading only.) Effective: 2006 Winter Quarter.

EVE 240—Paleobotany and Angiosperm Evolution (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): PLB 108 or PLB 116 or EVE 140 Critical analysis of the plant fossil record as a source of evidence
on origin, evolution, and phylogeny of the angio-sperms, Cretaceous and Tertiary climates, geographic history of modern taxa, and origin of
modern vegetation types. Effective: 1997 Winter Quarter.

EVE 290C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Presentation and discussion of faculty and graduate student research in biology. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

EVE 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

EVE 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

EVE 390—Methods of Teaching (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Practical experience in the methods and problems of teaching. Includes analyses of texts and supporting material, discussion of teaching techniques and preparing and conducting of laboratory and discussion sections. May be repeated up to 8 unit(s). (S/U grading only.) Effective: 1997 Winter Quarter.

EXB Exercise Biology

Courses in EXB:

EXB 010—Exercise and Fitness: Principles and Practice (3)
Lecture—3 hours. Human movement from physiological, psychological, sociological, and historical perspectives. Biology and psychology of exercise across the human lifespan. Not open for credit to students who have taken an upper division EXB course. GE credit: SE, SL. Effective: 2004 Winter Quarter.

EXB 090C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): EXB 099 (can be concurrent); Lower division standing in Exercise Biology or related biological science and consent of instructor; EXB 099 required concurrently. Research findings and methods in exercise biology. Presentation and discussion of research by faculty and students. May be repeated for credit. (P/NP grading only.) Effective: 2006 Fall Quarter.

EXB 090X—Lower Division Seminar (1-2)
Lecture—1-2 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Gives freshman or sophomore level students the opportunity to study a special topic in the general area of Exercise Biology in a small class setting. GE credit: SE. Effective: 1997 Winter Quarter.

EXB 092—Exercise Biology Internship (1-5)
Internship—3-15 hours. Prerequisite(s): Consent of Instructor. Enrollment dependent on availability of intern positions. Work experience in the application of physical activity programs to teaching, recreational, clinical or research situations under department faculty supervision. May be repeated up to 1 time(s). No internship units will be counted towards the Exercise Biology major. (P/NP grading only.) Effective: 2003 Spring Quarter.

EXB 097T—Tutoring in Exercise Biology (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Assisting the professor by tutoring students in exercise biology course-related projects. May be repeated up to 10 unit(s) including courses EXB 097TC, EXB 197T and EXB 197TC. No tutorial units will be counted towards the Exercise Biology major. (P/NP grading only.) Effective: 2004 Fall Quarter.

EXB 097TC—Tutoring Exercise Biology in the Community (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of instructor and chairperson. Tutoring in the community in exercise biology related projects under the guidance of the faculty. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 2003 Spring Quarter.

EXB 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of instructor and chairperson. (P/NP grading only.) Effective: 1997 Winter Quarter.

EXB 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

EXB 101—Exercise Physiology (4)
Lecture—4 hours. Prerequisite(s): NPB 101 or NPB 110C Physiologic responses to acute exercise, and physiologic adaptations to both chronic exercise (training) and selected environmental stresses. Emphasis is placed on the muscular, metabolic, cardiovascular, respiratory and renal responses and adaptations to exercise. Only 1 unit of credit allowed to students who have completed EXS 101; only 3 units of credit allowed to students who have completed EXS 102; not open for credit to students who have completed EXS 101 and EXS 102. GE credit: SE, SL. Effective: 2018 Winter Quarter.

EXB 102—Introduction to Motor Learning and the Psychology of Sport and Exercise (4)
Lecture—4 hours. Prerequisite(s): PSC 001 recommended. Theoretical and practical issues in motor learning, sport psychology, and exercise psychology are examined. Emphasis is placed on how motor skills are acquired and retained, and on the application of social psychology and human motivation studies to human performance. Only 2 units of credit allowed for students who have completed EXB 104; only 2 units of credit allowed for students who have completed EXB 105; not open for credit to students who have completed EXS 104 and EXS 105. GE credit: SS. Effective: 2002 Winter Quarter.

EXB 104L—Exercise Biology Laboratory (3)
Discussion—1 hour; Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): EXB 101 (can be concurrent); EXB 102 (can be concurrent); EXB 103 (can be concurrent); The last taken of the three courses may be taken concurrently. Principles and analytical procedures for assessing fundamental physiological, biomechanical, motor learning and motor control factors which underlie human movement and performance. Only 1 unit of credit allowed to students who have completed EXS 101L; only 1 unit of credit allowed to students who have completed EXS 103; not open for credit to students who have completed EXS 101L and EXS 103. (Former EXS 101L and EXS 103.). GE credit: SE, WE. Effective: 2004 Winter Quarter.

EXB 106—Human Gross Anatomy (4)
Lecture—4 hours. Prerequisite(s): BIS 002A; Concurrent enrollment in EXB 106L or CHA 101L strongly recommended. Upper division students only; Pass One open to upper division Exercise Biology or Anthropology majors only; Pass Two open to Seniors in any major; open enrollment at the start of the quarter for upper division students in any major. Detailed study of the gross anatomical structure of the human body, with emphasis on function and clinical relevance to students entering health care professions. (CHA 101.) GE credit: SE. Effective: 2010 Fall Quarter.

EXB 106L—Human Gross Anatomy Laboratory (3)
Laboratory—9 hours. Prerequisite(s): BIS 002A; EXB 106 (can be concurrent) or CHA 101 (can be concurrent); Must have completed EXB 106 or CHA 101 or required concurrently. Upper division students only; Pass One open to upper division Exercise Biology or Anthropology majors only; Pass Two open to Seniors in any major; open enrollment at the start of the quarter for upper division students in any major; mandatory attendance on first day of lab. Detailed study of prosected human cadavers in small group format with extensive hands-on experience. (CHA 101L.) GE credit: SE. Effective: 2010 Fall Quarter.

EXB 110—Exercise Metabolism (3)
Lecture—3 hours. Prerequisite(s): EXB 101 or NPB 101 or NPB 110C Exercise metabolism, with emphasis on skeletal muscle and cardiac muscle metabolism during activity and inactivity. Basics of bioenergetics, substrate utilization, and cell signaling; mechanisms that regulate these properties, and differences between skeletal muscle and cardiac muscle metabolism. GE credit: SE. Effective: 2018 Winter Quarter.

EXB 111—Environmental Effects on Physical Performance (3)
Discussion/Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): EXB 101; or Consent of Instructor. The effects of thermal, barometric and gravitational conditions on physiological function and physical performance of humans. Acute and chronic effects, emphasizing physiological adaptations and limitations, will be studied. GE credit: QL, SE. Effective: 2007 Winter Quarter.

EXB 112—Clinical Exercise Physiology (4)
Discussion/Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EXB 101; or Consent of Instructor. Physical activity as a therapeutic modality in normal and diseased populations (cardiovascular, pulmonary, diabetic). Effects of exercise and inactivity in terms of normal physiology, pathophysiology, and therapeutic benefit. Exercise fitness and disease assessment methods. GE credit: SE, SL. Effective: 2009 Spring Quarter.

EXB 115—Biomechanical Bases of Movement (3)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): EXB 103; or Consent of Instructor. Biomechanical bases of human movement investigated; topics include musculo-skeletal mechanics, tissue mechanics, electromyography,
and measurement and analysis techniques. Application made to sport, clinical, and work environments, including extensive analysis of
locomotion. GE credit: QL, SE, VL, WE. Effective: 1997 Winter Quarter.

EXB 116—Nutrition for Physically Active Persons (3)
Lecture—3 hours. Prerequisite(s): EXB 101; NPB 101 The role of nutrition and exercise in modifying metabolism, body composition, performance and health of humans. GE credit: SE. Effective: 1997 Winter Quarter.

EXB 117—Exercise and Aging in Health and Disease (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): EXB 101 or EXB 113 (can be concurrent) Etiology of and standard therapy for various diseases associated with aging (e.g., cardiovascular, pulmonary, and renal diseases, diabetes, obesity, lipemias, etc.). Exercise will then be considered as a protective and/or therapeutic modality. GE credit: SE. Effective: 2007 Spring Quarter.

EXB 120—Sport in American Society (3)
Lecture—3 hours. Sociological approaches to the study of sport and contemporary American culture, including sport interaction with politics, economics, religion, gender, race, media and ethics. Socialization factors involving youth, scholastic, collegiate, and Olympic sport. (PHE 120.) GE credit: SS. Effective: 2009 Summer Session 1.

EXB 121—Advanced Sport Psychology (3)
Lecture—3 hours. Prerequisite(s): EXB 102; PSC 001 recommended. Advanced study and consideration of major theoretical and practical issues in sport psychology. Emphasis on practical application to sport and human performance. Effective: 2010 Winter Quarter.

EXB 122—Psychological Effects of Physical Activity (3)
Lecture—3 hours. Prerequisite(s): PSC 001 or PSC 001Y Upper division standing. Physical activity is evaluated in terms of its ability to enhance the quality of life. Topics studied include: individual factors (self concept, type A); special populations (elderly, cardiovascular); and mental health changes (depression, anxiety). Effective: 2018 Spring Quarter.

EXB 124—Physiology of Maximal Human Performance (4)
Lecture—3 hours; Practice—4 hours. Prerequisite(s): EXB 101; or Consent of Instructor. BIS 101, BIS 102, and BIS 103 recommended. Molecular mechanisms underlying adaptation to training. Learn how to exercise to maximize their own performance as well as learning how the frequency, intensity and timing of exercise and nutrition affect the molecular signals that underlie performance. GE credit: SE. Effective: 2011 Winter Quarter.

EXB 125—Neuromuscular and Behavioral Aspects of Motor Control (3)
Discussion/Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): EXB 101 Factors which affect control of movement from neuropsychological, physiological, behavioral, and mechanical viewpoints. Topics include central vs. peripheral control mechanisms, open and closed loop theories, motor programming, cognitive learning strategies, and the effects of biochemical and biomechanical influences. GE credit: SE. Effective: 2006 Fall Quarter.

EXB 148—Theory and Practice of Exercise Testing (1)
Lecture/Discussion—1 hour. Prerequisite(s): EXB 112 (can be concurrent) Theory and practice of exercise testing applied to older adult populations. Physiological responses to and limitations of exercise testing. Application of exercise testing and training to healthy and diseased populations. (P/NP grading only.) GE credit: SE. Effective: 2006 Fall Quarter.

EXB 148L—Adult Fitness Testing Laboratory (1)
Laboratory—3 hours. Prerequisite(s): EXB 148 (can be concurrent); EXB 148 required concurrently. Testing symptomatic and asymptomatic older adults for functional aerobic capacity, body composition, blood lipids, pulmonary function, and cardiovascular disease risk. Counseling adults in appropriate exercise programs and lifestyle modifications. Two quarters minimum; third quarter permitted. (Former course Physical Education 148L). May be repeated up to 2 time(s). (P/NP grading only.) GE credit: QL, SE. Effective: 2006 Fall Quarter.

EXB 179—Frontiers in Exercise Biology (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): EXB 101; EXB 102; EXB 103 (can be concurrent); EXB 104L recommended. Lectures by leading authorities and discussion of the latest research in newly emerging areas in exercise biology. Offered every fourth year. GE credit: SE. Effective: 2007 Spring Quarter.

EXB 189—International Perspectives in Exercise Biology (4)
Lecture—4 hours. Prerequisite(s): EXB 010; Or upper division standing in Exercise Biology; consent of instructor: students will be accepted based upon academic merit, personal experience, and academic discipline in order to provide multidisciplinary perspectives. Restricted to 22 students. Compare and contrast exercise science issues between the US and an international location. Identify political, economic, cultural, technological and environmental issues that impact human exercise, physical activity, wellness, and sport from a global perspective. Effective: 2009 Summer Session 1.

EXB 190C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): EXB 099 (can be concurrent); Upper division standing in Exercise Biology or related biological science and consent of instructor; EXB 199 required concurrently. Restricted to upper division students. Research findings and methods in exercise biology. Presentation and discussion of research by faculty and students. May be repeated for credit. (P/NP grading only.) Effective: 2006 Fall Quarter.

EXB 192—Exercise Biology Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Enrollment dependent on availability of intern positions. Work experience in the application of physical activity programs to teaching, recreational, clinical or research situations under program faculty supervision. Written report required. May be repeated up to 15 unit(s) including course 92. (P/NP grading only.) Effective: 2003 Spring Quarter.

EXB 194H—Research Honors (2)
Independent Study—6 hours. Prerequisite(s): Senior standing, minimum of 6 units of EXB 199, 3.50 GPA or greater in major courses, consent of honors thesis advisor. Completion of individual honors research project in Exercise Biology, under the guidance of an Exercise Biology faculty advisor, culminating in written honors thesis. (P/NP grading only.) GE credit: SE. Effective: 2004 Fall Quarter.

EXB 197T—Tutoring in Exercise Biology (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Assisting the instructor by tutoring students in exercise biology course-related projects. May be repeated up to 10 unit(s) including courses EXB 097T, EXB 097TC and EXB 197TC. No tutorial units will be counted towards the Exercise Biology major. (P/NP grading only.) Effective: 2004 Fall Quarter.

EXB 197TC—Tutoring Exercise Biology in the Community (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of instructor and chairperson. Tutoring in the community in exercise biology related projects under the guidance of the faculty. May be repeated up to 10 unit(s) including courses 97T, 97TC and 197T. (P/NP grading only.) Effective: 2003 Spring Quarter.

EXB 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of instructor and chairperson. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

EXB 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of chairperson. (P/NP grading only.) Effective: 1997 Winter Quarter.

EXS Exercise Science

Courses in EXS:

EXS 201—Exercise Cardiorespiratory Physiology (3)
Lecture/Discussion—3 hours. Prerequisite(s): Undergraduate course in systemic physiology, exercise physiology, and biochemistry (intermediary metabolism). Advanced course on integrated responses of the cardiovascular and respiratory systems to exercise. Includes hemodynamic, neurohormonal, and autonomic aspects of cardiac and vascular function, principles of myocardial metabolism, and mechanisms underlying changes in pulmonary function and gas transport. Effective: 2001 Fall Quarter.

FAH Fine Arts & Humanities

Courses in FAH:

FAH 098—Directed Group Study (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Directed group study. May be repeated for credit. (P/NP grading only.) Effective: 2017 Winter Quarter.

FAH 198—Directed Group Study (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Directed group study. May be repeated for credit. (P/NP grading only.) Effective: 2017 Winter Quarter.

FAP Med - Family & Community Medicine

Courses in FAP:

FAP 092C—Primary Care Clinic (2)
Clinical Activity—8 hours; Lecture—2 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Enrollment at the UC Davis campus, for freshman and sophomore students. Students must apply and interview with the Board of Clinica Tepati or Imani Clinic. Field experience exposes lower division students to health care delivery, patient histories, physical examinations,health promotion, disease prevention, diagnosis; treatment of episodic,acute,chronic illness; appropriate referral and follow-up. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

FAP 192C—Primary Care Clinics (1-2)
Clinical Activity—6-8 hours; Lecture—1-2 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Enrollment at the UC Davis campus, upper-division standing. Students must apply and interview with the Board of Clinica Tepati or Imani Clinic. Field experience introduces students to health care delivery, patient histories and physical examinations, health promotions and disease prevention, diagnosis and treatment of episodic, acute and chronic illness, basic laboratory testing and appropriate referral and follow-up. May be repeated for credit. (P/NP grading only.) Effective: 2004 Fall Quarter.

FAP 195—Health Care to Underserved Populations (1)
Lecture—1 hour. Prerequisite(s): Sociology, political science, or applied behavioral science background recommended, or registration in medical school. Discusses sociocultural perspectives of underserved populations in California impacting their health; roles of family/interpersonal relationships in making health care decisions; and clinician's perspectives in treating people of cultures which are unfamiliar and/or uncomfortable with Western medicine. May be repeated for credit. (P/NP grading only.) Effective: 2011 Spring Quarter.

FAP 401—Introductory Preceptorship in Family Practice (3-9)
Clinical Activity—20-40 hours. Prerequisite(s): Completion of first-year of medical training. Preceptorship in family practice offered as an introduction to clinical medicine. 20 hours or 40 hours per week in a family physician's office, doing patient interviews, historytaking, and performing physical exams. (H/P/F grading only.) Effective: 1999 Summer Quarter.

FAP 405—The Healer's Art (1)
Lecture—0.6 hours; Workshop—3 hours. Prerequisite(s): Consent of Instructor. Limited to first-year medical students. Learning to strengthen your humanity and remain open-hearted can make the difference between burnout and a fulfilling life. Learn tools for selfcare, healing, finding meaning, strengthening commitment and becoming a true physician. May be repeated for credit. (P/F grading only.) Effective: 2016 Fall Quarter.

FAP 411—Selected Studies of Systems for Chronic Illness Care (3)
Clinical Activity—4 hours; Discussion—4 hours. Prerequisite(s): FAP 400A; FAP 400B; FAP 400C; Medical students with consent of instructor. Understanding of chronic illness, particularly diabetes, participate in patient care, alternative techniques. May be repeated up to 1 time(s). (H/P/F grading only.) Effective: 2004 Spring Quarter.

FAP 430—Family Medicine Clerkship (6-12)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Approval by School of Medicine Committee on Student Progress. Family medicine clerkship for third year medical students. (H/P/F grading only.) Effective: 2015 Spring Quarter.

FAP 430FA—SJVP Longitudinal Family Medicine Clerkship (1.5-6)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Family Medicine Clerkship runs concurrently with Internal Medicine, Pediatrics and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 430FB—SJVP Longitudinal Family Medicine Clerkship (1.5-6)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Family Medicine Clerkship runs concurrently with Internal Medicine, Pediatrics and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 430FC—SJVP Longitudinal Family Medicine Clerkship (1.5-6)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Family Medicine Clerkship runs concurrently with Internal Medicine, Pediatrics and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 430FD—SJVP Longitudinal Family Medicine Clerkship (1.5-6)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Family Medicine Clerkship runs concurrently with Internal Medicine, Pediatrics and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 430R—Rural PRIME Family Medicine Longitudinal Clerkship (2)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Approval by School of Medicine Committee on Student Progress. Family Medicine Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 430RA—Rural PRIME Family Medicine Longitudinal Clerkship (3)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Consent of Instructor. Family Medicine Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 430RB—Rural PRIME Family Medicine Longitudinal Clerkship (3)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Consent of Instructor. Family Medicine Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 430RC—Rural PRIME Family Medicine Longitudinal Clerkship (3)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Consent of Instructor. Family Medicine Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 430RD—Rural PRIME Family Medicine Longitudinal Clerkship (1)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Consent of Instructor. Family Medicine Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 430TA—TeachMS Longitudinal Primary Care Clerkship (A) (4)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Internal Medicine and Psychiatry for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. (H/P/F grading only.) Effective: 2013 Fall Quarter.

FAP 430TB—TeachMS Longitudinal Primary Care Clerkship (B) (6)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Internal Medicine and Psychiatry for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. (H/P/F grading only.) Effective: 2013 Fall Quarter.

FAP 430TC—TeachMS Longitudinal Primary Care Clerkship (C) (2)
Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Internal Medicine and Psychiatry for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. (H/P/F grading only.) Effective: 2013 Fall Quarter.

FAP 431—Introduction to Primary Care Continuity Clinic (1)
Clinical Activity—4 hours; Project (Term Project)—1 hour. Prerequisite(s): Consent of Instructor. Completion of the Pre-Clinical Curriculum. Longitudinal component of the third-year primary care curriculum. Student attends their clinic roughly 18 half-days over the course of the year, working one-on-one with a primary care preceptor. (H/P/F grading only.) Effective: 2016 Fall Quarter.

FAP 431A—Primary Care Continuity Clinic (1)
Clinical Activity—4 hours; Project (Term Project)—1 hour. Prerequisite(s): Consent of Instructor. Completion of the Pre-Clinical Curriculum. Longitudinal component of the third-year primary care curriculum. Student attends their clinic roughly 18 half-days over the course of the year, working one-on-one with a primary care preceptor. (H/P/F grading only.) Effective: 2015 Spring Quarter.

FAP 431B—Primary Care Continuity Clinic (1)
Clinical Activity—4 hours; Project (Term Project)—1 hour. Prerequisite(s): Consent of Instructor. Completion of the Pre-Clinical Curriculum. Longitudinal component of the third-year primary care curriculum. Student attends their clinic roughly 18 half-days over the course of the year, working one-on-one with a primary care preceptor. (H/P/F grading only.) Effective: 2015 Spring Quarter.

FAP 431C—Primary Care Continuity Clinic (1)
Clinical Activity—4 hours; Project (Term Project)—1 hour. Prerequisite(s): Consent of Instructor. Completion of the Pre-Clinical Curriculum. Longitudinal component of the third-year primary care curriculum. Student attends their clinic roughly 18 half-days over the course of the year, working one-on-one with a primary care preceptor. (H/P/F grading only.) Effective: 2015 Spring Quarter.

FAP 431D—Primary Care Continuity Clinic (1)
Clinical Activity—4 hours; Project (Term Project)—1 hour. Prerequisite(s): Consent of Instructor. Completion of the Pre-Clinical Curriculum. Longitudinal component of the third-year primary care curriculum. Student attends their clinic roughly 18 half-days over the course of the year, working one-on-one with a primary care preceptor. (H/P/F grading only.) Effective: 2015 Spring Quarter.

FAP 431KA—ACE-PC Continuity Clinic (6)
Clinical Activity—40 hours. Prerequisite(s): Consent of Instructor. Longitudinal clinic component of the 2nd year of the ACE-PC Program. Students start off with a 4 week immersion experience and then 12 additional half-days over the course of the year, working one-on-one with a primary care preceptor. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 431KB—ACE-PC Continuity Clinic (0.5)
Clinical Activity—2 hours. Prerequisite(s): Consent of Instructor. Longitudinal clinic component of the 2nd year of the ACE-PC Program. Students start off with a 4 week immersion experience and then 12 additional half-days over the course of the year, working one-on-one with a primary care preceptor. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 431KC—ACE-PC Continuity Clinic (0.5)
Clinical Activity—2 hours. Prerequisite(s): Consent of Instructor. Longitudinal clinic component of the 2nd year of the ACE-PC Program. Students start off with a 4 week immersion experience and then 12 additional half-days over the course of the year, working one-on-one with a primary care preceptor. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 431KD—ACE-PC Continuity Clinic (0.5)
Clinical Activity—2 hours. Prerequisite(s): Consent of Instructor. Longitudinal clinic component of the 2nd year of the ACE-PC Program. Students start off with a 4 week immersion experience and then 12 additional half-days over the course of the year, working one-on-one with a primary care preceptor. (H/P/F grading only.) Effective: 2017 Spring Quarter.

FAP 434—Primary Care Clinics-Clínica Tepati (3-12)
Clinical Activity—32-36 hours; Lecture—1-2 hours; Seminar—0-2 hours. Open to medical students in all four years of medical school. Medical students will learn counseling, diagnosis and treatment of patients with chronic and acute disease under supervision of physician. Provides exposure to special health care needs of various ethnic and poverty-level populations. May be repeated for credit. (P/F grading only.) Effective: 2010 Winter Quarter.

FAP 435—Primary Care Clinics-Imani Clinic (3-12)
Clinical Activity—32-36 hours; Lecture—1-2 hours; Seminar—0-2 hours. Open to medical students in all four years of medical school. Learn counseling, diagnosis and treatment of patients with chronic and acute disease under supervision of physician. Provides exposure to special health care needs of various ethnic and poverty-level populations. May be repeated for credit. (P/F grading only.) Effective: 2010 Winter Quarter.

FAP 436—Continuity Clinic in Primary Care--Shifa Clinic (3-12)
Clinical Activity—32-36 hours; Lecture—1-2 hours; Seminar—0-2 hours; Variable. Open to medical students in all four years of medical school. Learn counseling, diagnosis and treatment of patients with chronic and acute disease under supervision of physician. Provides exposure to special health care needs of various ethnic and poverty-level populations. May be repeated for credit. (P/F grading only.) Effective: 2010 Winter Quarter.

FAP 437—Primary Care Clinics-Knights Landing (3)
Clinical Activity—3 hours; Lecture—1 hour. Must complete an application and interview prior to registering. Learn counseling, diagnosis and treatment of patients with chronic and acute disease under supervision of physician. Provides exposure to special health care needs of various ethnic and poverty-level populations in the community of Knights Landing. May be repeated for credit. (P/F grading only.) Effective: 2012 Winter Quarter.

FAP 439D—Directed Clinical Studies in Family Medicine (1-12)
Clinical Activity—40 hours. Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for modified curriculum or to complete a clinical rotation following a leave of absence. May be repeated for credit. (P/F grading only.) Effective: 2011 Spring Quarter.

FAP 439R—Directed Studies in Family Medicine (1-12)
Clinical Activity—30 hours; Independent Study—10 hours. Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for remediation of all or part of clinical rotation. Clinical studies to accommodate and satisfy remedial work as directed by the Committee on Student Progress and approved by the course IOR. May be repeated for credit. (P/F grading only.) Effective: 2011 Summer Quarter.

FAP 444—Advanced Preceptorship in Family Medicine (3-18)
Clinical Activity—40 hours. Prerequisite(s): Completion of third-year primary care plus clerkship or consent of instructor. Open to medical students only. Preceptorships with primary care physicians in a variety of settings. Acquisition skills to evaluate and devleop a treatment plan for patients with common medical problems seen by primary care physicians in an out patient setting. May be repeated up to 18 unit(s). (H/P/F grading only.) Effective: 2002 Fall Quarter.

FAP 450—CAM in Family & Community Health (3-18)
Variable—20-40 hours. Complementary and alternative medicine courses at away institutions that cover various aspects of integrative medicine, including but not limited to: botanicals, homeopathy, mind/body, naturopathy, nutrition, traditional Chinese medicine, osteopathy, and energy medicine. Intended to grant units for away rotations; not offered at the UC Davis Medical Center. (H/P/F grading only.) Effective: 2011 Winter Quarter.

FAP 460—Geriatrics in Community Health (3-6)
Clinical Activity—12 hours; Fieldwork—24 hours; Lecture—4 hours. Prerequisite(s): FAP 430 Visits to community agencies including mental health teams, adult day health centers, a diagnostic and research center, and case management specialists. Observation and participation in MMSE's, patient-family conferences, interdisciplinary team meetings, neuropsychiatric testing and home visit evaluations. (H/P/F grading only.) Effective: 2001 Spring Quarter.

FAP 468—International Preceptorship (3-12)
Clinical Activity—40 hours. Prerequisite(s): Medical students with consent of instructor. Preceptorship with a family practitioner in a foreign country (Arranged by student contact or with assistance of the Family and Community Medicine Department.) Participate in clinical activities, analyze and report characteristics of the practice. May be repeated up to 12 unit(s). (H/P/F grading only.) Effective: 2002 Fall Quarter.

FAP 469—Inpatient Acting Internship in Family Medicine (3-12)
Clinical Activity—40 hours. Prerequisite(s): Completion of third-year of medical school or consent of instructor. Open to medical students only. Comprehensive primary medical care of inpatients on a family medicine hospital service. Available sites are university-based family medicine residency programs and programs within the UC Davis Network of Affiliated Family Medicine Residency Programs. May be repeated up to 12 unit(s). (H/P/F grading only.) Effective: 2011 Spring Quarter.

FAP 470—Inpatient Clinical Elective in Family Medicine (3-12)
Clinical Activity—40 hours. Prerequisite(s): Completion of third-year of medical school or consent of instructor. Open to medical students only. Comprehensive primary medical care of patients on a family medicine hospital service. Usually includes inpatient and outpatient experience. May be repeated up to 12 unit(s). (H/P/F grading only.) Effective: 2011 Spring Quarter.

FAP 475—Combined Inpatient/Outpatient Clinical Elective in Family Medicine (3-12)
Clinical Activity—40 hours. Prerequisite(s): Completion of third-year of medical school or consent of instructor. Open to Medical students only. Combined inpatient and outpatient elective. Consists of comprehensive primary medical care of patients on a family medicine hospital service and in a family medicine outpatient clinic. May be repeated up to 12 unit(s). (H/P/F grading only.) Effective: 2011 Fall Quarter.

FAP 488—Selected Studies in Family Practice (1-9)
Variable—3-27 hours. Prerequisite(s): Medical students with consent of instructor. Assigned readings in family practice to increase understanding on selected topics relating to family medicine and primary health care delivery; visits to and written analysis of selected health care programs; and/or exposure to family practice with a community physician preceptor. May be repeated up to 9 unit(s). (H/P/F grading only.) Effective: 2002 Fall Quarter.

FAP 490—Health Care to Underserved Populations (1)
Lecture—1 hour. Prerequisite(s): Sociology, Political Science, or Applied Behavioral Science background recommended, or registration in medical school. Discusses sociocultural perspectives of underserved populations impacting health; roles of family/interpersonal relationships in making health care decisions; the nature of ethnic/racial/socioeconomic health care disparities; and clinicians' perspectives in treating people of cultures which are unfamiliar and/or uncomfortable with Western medicine. May be repeated for credit. (P/F grading only.) Effective: 2012 Winter Quarter.

FAP 493—Aging and Health (6)
Seminar—12 hours. Prerequisite(s): Consent of Instructor. Is disease and infirmity the inevitable consequence of aging? We will spend four weeks exploring this question by reviewing the biology of aging, physiologic changes seen in aged individuals and disease processes commonly found in elderly persons. (H/P/F grading only.) Effective: 2010 Summer Quarter.

FAP 495—LGBTIQQA Healthcare Lecture Series (1)
Lecture—6 hours. Increase the awareness of medical issues surrounding the LGBTIQQA community and arm students with knowledge of the health disparities the community faces. Provide better quality care to the LGBTIQQA patients cared for as physicians. May be repeated for credit. (P/F grading only.) Effective: 2012 Winter Quarter.

FAP 498—Directed Group Study (1-5)
Variable—3-15 hours. Explore in-depth various topics in primary care. Extensive contact with and oversight by instructor. May be repeated for credit. (H/P/F grading only.) Effective: 2008 Spring Quarter.

FAP 499—Research (1-12)
Prerequisite(s): Medical students with consent of instructor. Research in various aspects of the health care delivery system. (H/P/F grading only.) Effective: 1997 Winter Quarter.

FMS Film Studies

Courses in FMS:

FMS 001—Introduction to Film Studies (4)
Discussion—1 hour; Film Viewing—3 hours; Lecture—2 hours. Analysis of film form and narrative, including cinematography, editing, and sound. Issues in film studies, including authorship, stardom, race, gender, class, and cultural identity. Includes introduction to selected cinematic movements and national film traditions. Not open for credit to students who have taken HUM 010. GE credit: AH, OL, VL, WC, WE. Effective: 2012 Fall Quarter.

FMS 045—Vampires and Other Horrors in Film and Media (4)
Discussion—1 hour; Film Viewing—3 hours; Lecture—2 hours. History of representations of vampires and horror generally from the 19th through 21st centuries. Emphasis on transnational history of the horror genre; psychologies of horror effects; issues of race, gender, and class; intersections with prejudice, medicine, modernity. (GER 045.) GE credit: ACGH, AH, DD, OL, VL, WC, WE. Effective: 2012 Fall Quarter.

FMS 090X—Lower Division Seminar (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Study of a special topic in Film Studies in a small class setting. May be repeated for credit if topics differs. (P/NP grading only.) Effective: 2012 Fall Quarter.

FMS 092—Internship (1-12) ***Review all entries***
Internship—3-36 hours. Supervised internship off and on campus in areas of Film Studies. May be repeated for credit. (P/NP grading only.) Effective: 2012 Fall Quarter.

FMS 092—Internship (1-12) ***Review all entries Discontinued***
Internship—3-36 hours. Supervised internship off and on campus in areas of Film Studies. May be repeated for credit. (P/NP grading only.) Effective: 2018 Fall Quarter.

FMS 098—Directed Group Study (1-5) ***Review all entries***
Variable—3-15 hours. Directed Group Study (P/NP grading only.) Effective: 2012 Fall Quarter.

FMS 098—Directed Group Study (1-5) ***Review all entries Discontinued***
Variable—3-15 hours. Directed Group Study (P/NP grading only.) Effective: 2018 Summer Session 1.

FMS 099—Special Study for Undergraduates (1-5) ***Review all entries***
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Special Study for Undergraduates (P/NP grading only.) Effective: 2012 Fall Quarter.

FMS 099—Special Study for Undergraduates (1-5) ***Review all entries Discontinued***
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Special Study for Undergraduates (P/NP grading only.) Effective: 2018 Summer Session 1.

FMS 120—Italian-American Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): FMS 001 Exploration of representations of Italian-American identity in American (U.S.) cinema. Analysis of both Hollywood and independently produced films, especially as they represent ethnicity, gender, and social class of Italian Americans. Not open for credit to students who have taken HUM 120. GE credit: ACGH, AH, DD, OL, VL, WC, WE. Effective: 2012 Fall Quarter.

FMS 121—New Italian Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): FMS 001; And upper-division standing, or consent of instructor. Italian cinema of the 21st century in the context of profound cultural and social changes in Italy since World War II. Productions by representative directors such as Amelio, Giordana, Moretti, Muccino are included. Knowledge of Italian not required. (ITA 121.) GE credit: AH, OL, VL, WC, WE. Effective: 2012 Fall Quarter.

FMS 121S—New Italian Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): FMS 001; And upper-division standing or consent of instructor. Italian cinema of the 21st century in the context of profound cultural and social changes in Italy since World War II. Productions by representative directors such as Amelio, Giordana, Moretti, Muccino are included. Knowledge of Italian not required. (ITA 121S.) GE credit: AH, OL, VL, WC, WE. Effective: 2012 Fall Quarter.

FMS 124—Topics in U.S. Film History (4)
Film Viewing—3 hours; Lecture—3 hours. Prerequisite(s): FMS 001 Study of an aspect of American film history (such as the silent era; the studio system; U.S. avant-garde cinema), including the influences of technological, economic, regulatory, cultural, and artistic forces. May be repeated up to 2 time(s) when topic differs. Not open for credit to students who have completed HUM 124, unless topic differs. GE credit: ACGH, AH, DD, OL, VL, WE. Effective: 2012 Fall Quarter.

FMS 125—Topics in Film Genres (4)
Film Viewing—3 hours; Lecture—3 hours. Prerequisite(s): FMS 001 A study of one or more of the film genres (such as the documentary, the musical, film noir, screwball comedy, or the western), including genre theory and the relationship of the genre(s) to culture, history, and film industry practices. May be repeated up to 2 time(s) when topic differs. Not open for credit to students who have completed HUM 125, unless topic differs. GE credit: AH, OL, VL, WE. Effective: 2012 Fall Quarter.

FMS 127—Film Theory (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): FMS 001; or Consent of Instructor. Survey of the conceptual frameworks used to study film (including semiotics, psychoanalysis, spectatorship, auteur, genre and narrative theories). Historical survey of major film theorists. GE credit: AH, OL, VL, WC, WE. Effective: 2012 Fall Quarter.

FMS 129—Russian Film (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): Completion of Subject A requirement. History of Russian film; film and social revolution, the cult of Stalin, dissident visions; film and the collapse of the Soviet empire; gender and the nation in Russian film. Course taught in English; films are in Russian with English subtitles. (RUS 129.) GE credit: AH, VL, WC, WE. Effective: 2012 Fall Quarter.

FMS 142—New German Cinema (4)
Extensive Writing; Lecture/Discussion—3 hours. German filmmakers of the 1960s-1980s such as Fassbinder, Herzog, Syberberg, Brückner, Schlöndorf, Kluge, Wenders. Knowledge of German is not required. May be repeated for credit with consent of instructor. (GER 142.) GE credit: AH, OL, VL, WC, WE. Effective: 2012 Fall Quarter.

FMS 176A—Classic Weimar Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): HUM 001 German Weimar (1919-1933) cinema. Fritz Lang, F.W. Murnau, and G.W. Pabst among others. Influence on world-wide (esp. Hollywood) film genres such as film noir, horror, science fiction, and melodrama. Not open for credit to students who have taken HUM 176. (GER 176A.) GE credit: AH, OL, VL, WC, WE. Effective: 2012 Fall Quarter.

FMS 176B—Postwar German Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): FMS 001 Exploration of German cinema from 1945 to 1980, when the Nazi past was a central theme. Includes study of postwar "rubble films," escapist "homeland films," and New German Cinema of the 1970s (including films by Fassbinder, Kluge, Syberberg, and Herzog). Not open for credit to students who have taken HUM 177. GE credit: AH, OL, VL, WC, WE. Effective: 2012 Fall Quarter.

FMS 189—Special Topics in Film Studies (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): FMS 001; or Consent of Instructor. Upper division standing. Group study of a special topic in film, focusing on a national tradition, a major filmmaker, or a specific era. May be repeated up to 3 time(s). GE credit: AH, OL, VL, WE. Effective: 2012 Fall Quarter.

FMS 190X—Upper Division Seminar (4)
Seminar—4 hours. Prerequisite(s): Upper division standing or consent of instructor. Study of a special topic in film studies in a small class setting. May be repeated for credit if topic differs. (P/NP grading only.) Effective: 2012 Fall Quarter.

FMS 192—Internship (1-12) ***Review all entries***
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. Supervised internship off and on campus in areas of film studies. May be repeated for credit. (P/NP grading only.) Effective: 2012 Fall Quarter.

FMS 192—Internship (1-12) ***Review all entries Discontinued***
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. Supervised internship off and on campus in areas of film studies. May be repeated for credit. (P/NP grading only.) Effective: 2018 Fall Quarter.

FMS 194H—Special Study for Honors Students (1-5)
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. Senior standing; GPA of at least 3.500. Guided research on a topic in Film Studies in preparation for the writing of an honors thesis in course 195H or the creation of an honors project in course 196H. May be repeated up to 2 time(s). (P/NP grading only.) Effective: 2012 Fall Quarter.

FMS 195H—Honors Thesis (1-5)
Independent Study—3-15 hours. Prerequisite(s): FMS 194H; and Consent of Instructor. GPA of at least 3.500; senior standing. Writing of an honors thesis on a topic in Film Studies under the direction of a faculty member. May be repeated up to 2 time(s). (P/NP grading only.) GE credit: AH, VL, WE. Effective: 2012 Fall Quarter.

FMS 196H—Honors Project (1-5)
Project (Term Project)—3-15 hours. Prerequisite(s): FMS 194H; and Consent of Instructor. Senior standing, GPA of at least 3.500. Creation of an honors film, video, or mixed-media project under the direction of a faculty member. May be repeated up to 2 time(s). (P/NP grading only.) GE credit: AH, VL, WE. Effective: 2012 Fall Quarter.

FMS 197T—Tutoring in Film Studies (1-5) ***Review all entries***
Tutorial—3-15 hours. Prerequisite(s): Consent of program director. Leading of small voluntary discussion groups affiliated with one of the program's regular courses. May be repeated for credit. (P/NP grading only.) Effective: 2012 Fall Quarter.

FMS 197T—Tutoring in Film Studies (1-5) ***Review all entries Discontinued***
Tutorial—3-15 hours. Prerequisite(s): Consent of program director. Leading of small voluntary discussion groups affiliated with one of the program's regular courses. May be repeated for credit. (P/NP grading only.) Effective: 2018 Summer Session 1.

FMS 198—Directed Group Study (1-5) ***Review all entries***
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Directed Group Study (P/NP grading only.) Effective: 2012 Fall Quarter.

FMS 198—Directed Group Study (1-5) ***Review all entries Discontinued***
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Directed Group Study (P/NP grading only.) Effective: 2018 Fall Quarter.

FMS 199—Special Study for Advanced Undergraduates (1-5) ***Review all entries***
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Special Study for Advanced Undergraduates (P/NP grading only.) Effective: 2012 Fall Quarter.

FMS 199—Special Study for Advanced Undergraduates (1-5) ***Review all entries Discontinued***
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Special Study for Advanced Undergraduates (P/NP grading only.) Effective: 2018 Fall Quarter.

FMS 396—Teaching Assistant Training Practicum (1-4) ***Review all entries***
Variable—3-12 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Teaching Assistant Training Practicum May be repeated for credit. (S/U grading only.) Effective: 2012 Fall Quarter.

FMS 396—Teaching Assistant Training Practicum (1-4) ***Review all entries Discontinued***
Variable—3-12 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Teaching Assistant Training Practicum May be repeated for credit. (S/U grading only.) Effective: 2018 Summer Session 1.

FOR Forensic Science

Courses in FOR:

FOR 200—Fundamental Concepts in Forensic Science (3)
Fieldwork—0.25 hours; Lecture—2 hours; Lecture/Lab—0.25 hours; Seminar—0.5 hours. Restricted to students enrolled in the M.S. in Forensic Science Program. Overview of Forensic Science. Problem definition, strategies for problem solving, analytical tools, and professional and ethical considerations. Effective: 2003 Winter Quarter.

FOR 201A—Forensic Science Fundamentals-A (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Enrolled in the Forensic Science Graduate Program. Open to Forensic Science Graduate Program students only. Professional responsibilities and ethics, physical evidence concepts, drug chemistry and toxicology, controlled substances and analytical chemistry and instrumentation as practiced in the forensic sciences. First of three courses that, in part, covers the curriculum
requirements of the Forensic Education Program Accreditation Committee (FEPAC). Effective: 2018 Spring Quarter.

FOR 201B—Forensic Science Fundamentals-B (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Enrolled in the Forensic Science Graduate Program. Open to Forensic Science Graduate Program students only. Forensic biology and DNA, microscopy and materials analysis and pattern evidence as practiced in the forensic sciences. Second in a series of three courses which covers the curriculum requirements of the Forensic Education Program Accreditation Committee
(FEPAC). Effective: 2018 Spring Quarter.

FOR 201C—Forensic Science Fundamentals-C (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Enrolled in the Forensic Science Graduate Program. Arson and explosives, quality assurance and accreditation, the law and science interface and court testimony as practiced in the forensic sciences. This course is the third in a series of three courses that covers the curriculum requirements of the Forensic Education Program Accreditation Committee (FEPAC). Effective: 2018 Spring Quarter.

FOR 205—Microscopy and Microanalytical Methods in Forensic Science (3)
Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Restricted to students enrolled in the M.S. in Forensic Science Program; a minimum, year each of the following chemistry, organic chemistry, calculus, & physics. Introduction to optical and electron microscopy. Transmission, diffraction, reflection and absorption; polarized light and polarizing crystals; phase contrast. Radiography; image recording, SEM analysis of gunshot residues, paints, glass. EDS, XRF analysis, signal-to-noise ratios, minimum detectable levels and homogeneity. Effective: 2006 Spring Quarter.

FOR 207—Advanced Spectroscopy Methods in Forensic Science (3)
Lecture—3 hours. Restricted to Forensic Science Graduate program or consent of instructor. Discuss, evaluate and interpret advanced molecular spectra/structure, Infrared Spectroscopy, such as chemical applications of spectroscopic methods, vibrational, rotational spectra; electronic spectra, photoelectron spectroscopy generated by various analytical instruments used in forensic science community. Effective: 2014 Fall Quarter.

FOR 208—Forensic Toxicology (3)
Lecture—3 hours. Forensic toxicology as related to driving under the influence of drugs (DUID) investigations, detection, and evaluation through the use of standardized field sobriety tests and drug recognition protocols. Effective: 2018 Spring Semester.

FOR 210—Personal Identification Methods In Forensic Science (3)
Lecture—3 hours. Restricted to students enrolled in the M.S. in Forensic Science Program or by consent of instructor. Methods for identifying individuals from evidence collected at crime scenes, suspects or victims, crime scene examination and analytical methods used to support such investigations. Topics include forensic anthropology and odontology; latent prints; shoe prints; facial reconstruction/recognition; eyewitness identifications; biometric systems. Effective: 2003 Spring Quarter.

FOR 212—Scientific Evidence and Courtroom Testimony (3)
Discussion—1 hour; Lecture—2 hours. Restricted to graduate students enrolled in the MS Forensic Science program or by the consent of the instructor. Explores the relationship between science and the criminal justice system. Admissibility of scientific testimony and documentary proof during the trial, concepts of relevancy, hearsay and opinion rule, examination of expert witnesses, impact of Kelley-Fry and Daubert decisions & court testimony. Effective: 2007 Fall Quarter.

FOR 215—Forensic Fire and Arson Investigation (3)
Lecture—3 hours. Restricted to students enrolled in the M.S. Forensic Science program or by consent of the Forensic Science Program Director Principles and techniques of scientific investigation of fires and related crimes; offer peer-reviewed protocols for processing fire and explosion scenes; discuss recognition, collection, analysis of physical evidence, and describe the scientific method for decision-making in fire/arson investigation. Effective: 2007 Fall Quarter.

FOR 218—Technical Writing in Forensic Science (3)
Extensive Writing/Discussion—1 hour; Lecture—2 hours. Prerequisite(s): Consent of the instructor required for all students not enrolled in the Forensic Science program. Restricted to graduate standing in the Forensic Science program. How to write clear, credible forensic science reports and scientific articles, that (a) serve the ends of the justice system, (b) meet their readers' varying needs and (c) reflect well on the author. Effective: 2011 Fall Quarter.

FOR 220—Analysis of Toxicants (3)
Lecture—3 hours. Prerequisite(s): Coursework in organic chemistry. Principles of microanalysis of toxicants. Theoretical considerations regarding separation, detection and quantitative determination of toxicants using chemical and instrumental techniques. (ETX 220.) Effective: 2006 Winter Quarter.

FOR 221L—Forensic Science Analytical Instrumentation (2)
Discussion/Laboratory—1 hour; Laboratory—3 hours. Enrollment limited to students accepted in the Forensic Science Graduate program or subject to the approval of the instructor if the student has the appropriate chemistry, calculus and physics courses required of students in the graduate forensic science program. Methodology and instruments used for the analysis of substances of interest in the discipline of Forensic Science. Practical experience with modern instrumental techniques & methodologies used in the advanced forensic science laboratory. Effective: 2007 Fall Quarter.

FOR 240—Homicide Crime Scene Investigation (3)
Laboratory—3 hours; Lecture—2 hours. Restricted to Forensic Science Masters Program Students; enrollment is limited to 15 students per class. Processing and evaluating complex homicide scenes. Functions and activities of police agencies. Recognition, documentation, identification, and collection of evidence. Event sequence reconstruction. Evidence collection, preservation, report writing. Courtroom presentation. Effective: 2004 Winter Quarter.

FOR 263—Forensic Computer Science Investigations (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Graduate student. Restricted to students in the Forensic Science Graduate program unless approved by instructor. Discuss the threats to the security of any kind of evidence that is captured, transmitted, or stored digitally and develop critical thinking and basic knowledge of computer forensic science issues in the evaluation of digital evidence. Effective: 2013 Fall Quarter.

FOR 268—Statistics in Forensic Science (3)
Lecture—3 hours. Restricted to students enrolled in the M.S. in Forensic Science Program or by consent of forensic program director. Statistics that are used by the forensic scientist, their limitations/applications in presenting evidential results in such areas as DNA-STR results, trace evidence correlation, fingerprint statistics, population sampling and the Bayes method. Effective: 2006 Spring Quarter.

FOR 277—Forensic Genetics; Next Generation Techniques and Applications (3)
Lecture—3 hours. Prerequisite(s): Undergraduate courses in fundamental and applied principles of: genetics, biochemistry, and molecular biology, or consent of instructor. Restricted to Forensic Science Graduate students (GFOR) or consent of instructor. Review organization/function of the human genome, recent developments, next generation sequencing techniques including the preparation of DNA samples, principles of the new generation sequencing assay formats and biochemical reactions. Will include quality control parameter, and bioinformatic approaches. Effective: 2013 Fall Quarter.

FOR 278—Molecular Techniques (3)
Lecture—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Recombinant DNA technology and its applications. (ETX 278.) Effective: 2002 Spring Quarter.

FOR 280—Forensic DNA Analysis (3)
Lecture—3 hours. Prerequisite(s): Coursework in genetics and molecular biology. Graduate standing; consent of instructor required for all students not enrolled in the MS Forensics program. Foundation in theory and practice of forensic DNA analysis; past, present, and emerging technologies; legal and quality assurance issues. DNA extraction, DNA quantitation, multiplex amplification of STR loci, capillary electrophoresis of amplified products, and analysis of STR typing data. (ETX 280.) Effective: 2003 Spring Quarter.

FOR 281—Principles and Practice of Forensic Serology and DNA Analysis (3)
Discussion/Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): (FOR 278 or ETX 278) or (FOR 280 or ETX 280); and Consent of Instructor. Or equivalent of FOR 280/ETX 280. Restricted to students enrolled in the M.S. in Forensic Science Program or by consent of Forensic Science Program Director. Comprehensive overview of forensic serology and DNA typing techniques and technologies. Strong emphasis on real-world applications, including preservation and tracking of biological evidence, detection and identification of bodily fluids, and methods to extract, quantify, and type human DNA. (ETX 281.) Effective: 2011 Spring Quarter.

FOR 283—Forensic Biology (3)
Discussion—1 hour; Lecture—2 hours. Restricted to students enrolled in the M.S. in Forensic Science program or by consent of the Forensic Science Program Director. Overview to the foundational concepts in forensic biology: chemistry and molecular biology of biological evidence, genetic basis of biological uniqueness, evolutionary basis of species differences, patterns and dynamics of evidence deterioration, and the legal/ professional considerations associated with biological evidence. Effective: 2009 Fall Quarter.

FOR 284—Non-Human Forensic DNA--Theory and Casework Application (2)
Lecture—2 hours. Prerequisite(s): Consent of instructor required for all students not enrolled in the MS Forensics program; upper division Molecular Biology and Genetics or its equivalent. Restricted to graduate standing. Provides a comprehensive understanding of plant and animal forensic biology in terms of sample collection, preservation, analytical methods, and of the invaluable lines of inquiry these forensic evidence may permit. (ETX 284.) Effective: 2010 Fall Quarter.

FOR 289—Survey in Forensic Science (3)
Lecture—3 hours. Restricted to students enrolled in the M.S. in Forensic Science Program. Analytical methods in contemporary forensic science. Clandestine laboratories in California, crime scene management, examination and analysis of human hair, forensic ballistics/trajectory reconstruction, shoe/tire print impressions, serial number restoration, forensic aspects of alcohol impairment, bloodstain pattern interpretation, microscopy of building materials, biological aspect of forensic science. May be repeated for credit when topics differ. Effective: 2002 Fall Quarter.

FOR 290—Seminar in Forensic Science (1)
Seminar—3 hours. Restricted to students enrolled in the M.S. in Forensic Science Program. Students will be exposed to topical areas in Forensic Science by presentations conducted by expert guest speakers. The seminar will also serve as a medium whereby the exiting students will present the research conducted as part of their thesis requirement. May be repeated for credit when topic differs. (S/U grading only.) Effective: 2006 Spring Quarter.

FOR 290C—Graduate Research Conference in Forensic Science (1)
Independent Study—1 hour. Restricted to students enrolled in the M.S. in Forensic Science Program. Individual and/or group conference on problems, progress and techniques in forensic science and research. May be repeated for credit when topic differs. (S/U grading only.) Effective: 2003 Winter Quarter.

FOR 293—Forensic Science Research Methodology (2)
Extensive Writing/Discussion—0.5 hours; Lecture—1.5 hours. Restricted to students enrolled in the Graduate Forensic Science program or by consent of the instructor. Introduction to identification, formulation, and solution of meaningful scientific problems encountered in the Forensic Science area including experimental design and/or theoretical analysis of new and prevailing techniques, theories and hypotheses. Students will present and defend their thesis research/journal article proposals. (S/U grading only.) Effective: 2007 Fall Quarter.

FOR 298—Group Study in Forensic Science (1-5)
Independent Study—1-5 hours. Restricted to students enrolled in the M.S. in Forensic Science Program. May be repeated for credit when topic differs. (P/NP grading only.) Effective: 2002 Fall Quarter.

FOR 299—Research in Forensic Science (1-12)
Independent Study—1-12 hours. Prerequisite(s): Consent of Instructor. Restricted to students enrolled in the M.S. in Forensic Science Program. May be repeated for credit. (P/NP grading only.) Effective: 2002 Fall Quarter.

FPS Fiber and Polymer Science

Courses in FPS:

FPS 100—Principles of Polymer Materials Science (3)
Lecture—3 hours. Prerequisite(s): CHE 002A; CHE 002B; ((CHE 008A, CHE 008B) or (ENG 045 or ENG 045Y)); Introductory physics. Basic principles of polymer science are presented including polymer structure and synthesis; polymerization mechanisms, polymer classes, properties, and reactions; polymer morphology, rheology, and characterization; polymer processing. (EMS 147.) GE credit: QL, SE. Effective: 2018 Winter Quarter.

FPS 110—Plastics in Society and the Environment (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 010; Or introductory course in physical sciences. Basic concepts and methodologies in the study of plastics. Formation, classification, structure, properties, processing, and formulation. Their application to societal needs, and their impact on society and the environment. GE credit: SE, SL, SS, WE. Effective: 1997 Winter Quarter.

FPS 150—Polymer Syntheses and Reactions (3)
Lecture—3 hours. Prerequisite(s): (CHE 128B or CHE 008B); CHE 107A Organic and physical chemistry aspects of polymer syntheses and reactions including polymerization mechanisms, kinetics and thermodynamics for major types of organic high polymers. GE credit: OL, QL, SE, SL, VL, WE. Effective: 1997 Winter Quarter.

FPS 161—Structure and Properties of Fibers (3)
Lecture—3 hours. Prerequisite(s): TXC 006; CHE 008B The structure, properties and reactions of natural- and man-made fibers; the relations between molecular structure of fibers and their physical properties; interactions of fibers and detergents. GE credit: OL, QL, SE, SL, VL, WE. Effective: 1997 Winter Quarter.

FPS 161L—Textile Chemical Analysis Laboratory (1)
Laboratory—3 hours. Prerequisite(s): FPS 161 (can be concurrent) Laboratory methods and procedures employed in qualitative and quantitative analysis of textile fibers and auxiliaries. GE credit: OL, QL, SE, SL, VL, WE. Effective: 1997 Winter Quarter.

FPS 180A—Introduction to Research in Fiber and Polymer Science (2)
Lecture/Discussion—6 hours. Prerequisite(s): Consent of Instructor. Senior standing in major related to Fiber and Polymer Science. Senior thesis on independent problems. Research begun in course 180A will be continued and completed in course 180B. GE credit: QL, SE, VL, WE. Effective: 1998 Fall Quarter.

FPS 180B—Introduction to Research in Fiber and Polymer Science (2)
Lecture/Discussion—6 hours. Prerequisite(s): Consent of Instructor. Senior standing in major related to Fiber and Polymer Science. Senior thesis on independent problems. Research begun in course 180A will be continued and completed in course 180B. GE credit: QL, SE, VL, WE. Effective: 1998 Fall Quarter.

FPS 192—Internship in Fiber and Polymer Science (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Work experience off campus in a fiber and polymer science related area. Supervision by a member of the Textiles and Clothing faculty. (P/NP grading only.) Effective: 1998 Fall Quarter.

FPS 197T—Tutoring in Fiber and Polymer Science (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division fiber and polymer science related major. Tutoring of students in Fiber and Polymer Science courses. Assistance with discussion groups and laboratory sections under supervision of instructor. May be repeated for credit tutoring in another Fier and Polymer Science course. (P/NP grading only.) Effective: 1998 Fall Quarter.

FPS 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1998 Fall Quarter.

FPS 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1998 Fall Quarter.

FPS 250A—Special Topics in Polymer and Fiber Science (3)
Lecture—3 hours. Prerequisite(s): FPS 100; or Consent of Instructor. Selected topics of current interest in polymer and fiber science. Topics will vary each time the course is offered. (EMS 250A.) Effective: 1997 Winter Quarter.

FPS 250B—Special Topics in Polymer and Fiber Science (3)
Lecture—3 hours. Prerequisite(s): FPS 100; or Consent of Instructor. Selected topics of current interest in polymer and fiber science. Topics will vary each time the course is offered. (EMS 250B.) Effective: 1997 Winter Quarter.

FPS 250C—Special Topics in Polymer and Fiber Science (3)
Lecture—3 hours. Prerequisite(s): FPS 100; or Consent of Instructor. Selected topics of current interest in polymer and fiber science. Topics will vary each time the course is offered. (EMS 250C.) Effective: 1997 Winter Quarter.

FPS 250D—Special Topics in Polymer and Fiber Science (3)
Lecture—3 hours. Prerequisite(s): FPS 100; or Consent of Instructor. Selected topics of current interest in polymer and fiber science. Topics will vary each time the course is offered. (EMS 250D.) Effective: 1997 Winter Quarter.

FPS 250E—Special Topics in Polymer and Fiber Science (3)
Lecture—3 hours. Prerequisite(s): FPS 100; or Consent of Instructor. Selected topics of current interest in polymer and fiber science. Topics will vary each time the course is offered. (EMS 250E.) Effective: 1997 Winter Quarter.

FPS 250F—Special Topics in Polymer and Fiber Science (3)
Lecture—3 hours. Prerequisite(s): FPS 100; or Consent of Instructor. Selected topics of current interest in polymer and fiber science. Topics will vary each time the course is offered. (EMS 250F.) Effective: 1997 Winter Quarter.

FPS 299—Research (1-12)
Independent Study—3-36 hours. (S/U grading only.) Effective: 1998 Fall Quarter.

FPS 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

FRE French

Courses in FRE:

FRE 001—Elementary French (5)
Discussion—5 hours; Laboratory—1 hour. Introduction to French grammar and development of all language skills in a cultural context with special emphasis on communication. Not open for credit to students who have taken FRE 001A; students who have successfully completed FRE 002 or FRE 003 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only, although a passing grade will be charged to the student's P/NP option, no petition is required; all other students will receive a letter grade unless a P/NP petition is filed. GE credit: AH, WC. Effective: 2014 Winter Quarter.

FRE 001A—Accelerated Intensive Elementary French (15)
Lecture/Discussion—15 hours. Prerequisite(s): Placement exam required. Introduction to French grammar and development of all language skills in a cultural context with special emphasis on communication. Special 12-week, accelerated, intensive summer session course that combines the work of courses 1, 2, and 3. Not open for credit to students who have completed FRE 001, FRE 001S, FRE 002, FRE 002S, FRE 003, or FRE 003S. GE credit: AH, WC. Effective: 2014 Winter Quarter.

FRE 001S—Elementary French (5)
Discussion—5 hours; Laboratory—1 hour. Introduction to French grammar and development of all language skills in a cultural context with special emphasis on communication. Course is taught abroad. Students who have successfully completed FRE 002 or 003 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only, although a passing grade will be charged to the student's P/NP option, no petition is required; all other students will receive a letter grade unless a P/NP petition is filed; not open for credit to students who have completed FRE 001 or FRE 001A. GE credit: AH, WC. Effective: 2013 Fall Quarter.

FRE 002—Elementary French (5)
Discussion—5 hours; Laboratory—1 hour. Prerequisite(s): FRE 001 Continuation of course 1. Not open for credit to students who have taken FRE 001A. GE credit: AH, WC. Effective: 2014 Winter Quarter.

FRE 002S—Elementary French (5)
Discussion—5 hours; Laboratory—1 hour. Prerequisite(s): FRE 001 or FRE 001S Continuation of course 1. Course is taught abroad. Not open for credit to students who have completed FRE 001A or FRE 002. GE credit: AH, WC. Effective: 2013 Fall Quarter.

FRE 003—Elementary French (5)
Discussion—5 hours; Laboratory—1 hour. Prerequisite(s): FRE 002 Continuation of course 2. Not open for credit to students who have taken FRE 001A. GE credit: AH, WC. Effective: 2014 Winter Quarter.

FRE 003S—Elementary French (5)
Discussion—5 hours; Laboratory—1 hour. Prerequisite(s): FRE 002 or FRE 002S Continuation of course 2. Course is taught abroad. Not open for credit to students who have completed FRE 001A or FRE 003. GE credit: AH, WC. Effective: 2013 Fall Quarter.

FRE 021—Intermediate French (5)
Laboratory—1 hour; Lecture/Discussion—4 hours. Prerequisite(s): FRE 001A or FRE 003 or FRE 003S Review of grammar and vocabulary acquired in the elementary sequence, as well as the study of new grammatical structures and a continuing enrichment of vocabulary through oral work in class, written exercises, readings and compositions. Not open for credit to students who have completed FRE 021S. GE credit: AH, OL, WC, WE. Effective: 2014 Winter Quarter.

FRE 021S—Intermediate French (5)
Laboratory—1 hour; Lecture/Discussion—4 hours. Prerequisite(s): FRE 001A or FRE 003 or FRE 003S Review of grammar and vocabulary acquired in the elementary sequence, as well as the study of new grammatical structures and a continuing enrichment of vocabulary through oral work in class, written exercises, readings and compositions. Not open for credit to students who have completed FRE 021. GE credit: AH, OL, WC, WE. Effective: 2013 Fall Quarter.

FRE 022—Intermediate French (5)
Laboratory—1 hour; Lecture/Discussion—4 hours. Prerequisite(s): FRE 021 or FRE 021S Continuation of course 21 or 21S. Review of grammar and vocabulary, as well as the study of new grammatical structures and a continuing enrichment of vocabulary. Not open for credit to students who have completed FRE 022S. GE credit: AH, OL, WC, WE. Effective: 2014 Winter Quarter.

FRE 022S—Intermediate French (5)
Laboratory—1 hour; Lecture/Discussion—4 hours. Prerequisite(s): FRE 021 or FRE 021S Continuation of 21 or 21S. Review of grammar and vocabulary, as well as, the study of new grammatical structures and a continuing enrichment of vocabulary. Not open for credit to students who have completed FRE 022. GE credit: AH, OL, WC, WE. Effective: 2013 Fall Quarter.

FRE 023—Intermediate French (5)
Laboratory—1 hour; Lecture/Discussion—4 hours. Prerequisite(s): FRE 022 or FRE 022S Continuation of course 22 or 22S. Review of grammar and vocabulary, as well as the study of new grammatical structures and a continuing enrichment of vocabulary. Not open for credit to students who have completed FRE 023S. GE credit: AH, OL, WC, WE. Effective: 2014 Winter Quarter.

FRE 023S—Intermediate French (5)
Laboratory—1 hour; Lecture/Discussion—4 hours. Prerequisite(s): FRE 022 or FRE 022S Continuation of course 22 or 22S. Review of grammar and vocabulary, as well as, the study of new grammatical structures and a continuing enrichment of vocabulary. Not open for credit to students who have completed FRE 023. GE credit: AH, OL, WC, WE. Effective: 2013 Fall Quarter.

FRE 050—French Film (4)
Discussion—2 hours; Lecture—1 hour; Term Paper. Introduction to the tradition of French cinema from its invention by Méliès and the Lumière brothers through New Wave (especially the works of Truffaut and Godard) and more recent developments in French and Francophone film. Taught in English. GE credit: AH, VL, WC, WE. Effective: 1997 Winter Quarter.

FRE 051—Major Works of French Literature in Translation (4)
Discussion—1 hour; Lecture—2 hours; Term Paper—1 hour. Readings in English translation of key works of French and Francophone literature from the Middle Ages to the Present. Particular attention is given to the long-standing interest of French writers in issues of social, regional, gender, sexual, and ethnic identity. GE credit: AH, WC, WE. Effective: 2002 Fall Quarter.

FRE 052—France and the French-Speaking World (4)
Discussion—1 hour; Lecture—2 hours; Term Paper—1 hour. This course is taught in English. A survey of the history and culture of France and the French-speaking world, especially Canada, the Caribbean and Africa. Study of social, historical and cultural issues that occupy the French-speaking world, with particular attention to mass media. GE credit: AH, WC, WE. Effective: 2002 Spring Quarter.

FRE 053—French as a World Language (4)
Lecture/Discussion—3 hours; Term Paper. The linguistic status of French and its function in multilingual societies and international arenas. Linguistico-political landscape of communities in Euroasia, Africa, and the Americas. Sociolinguistic concepts and emergence of French as a world language. GE credit: AH, OL, WC, WE. Effective: 2007 Fall Quarter.

FRE 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

FRE 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

FRE 100—Composition in French (4)
Lecture—3 hours; Term Paper. Prerequisite(s): FRE 023 Instruction and practice in expository writing in French, with emphasis on organization, correct syntax, and vocabulary building. GE credit: AH, WC, WE. Effective: 2004 Spring Quarter.

FRE 101—Introduction to French Poetry (4)
Lecture—3 hours. Prerequisite(s): FRE 100; or Consent of Instructor. Analysis and evaluation of works representing the main types of French
poetry. Study of French poetic conventions and versification. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

FRE 102—Introduction to French Drama (4)
Lecture—3 hours. Prerequisite(s): FRE 100; or Consent of Instructor. Analysis and evaluation of plays representing the main types of French
drama, with emphasis on dramatic structure and techniques. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

FRE 103—Introduction to French Prose (4)
Lecture—3 hours. Prerequisite(s): FRE 100; or Consent of Instructor. Analysis and evaluation of works representing main types of French prose, with emphasis on narrative structure and techniques. GE credit: WE. Effective: 1997 Winter Quarter.

FRE 104—Translation (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): FRE 100; Or the equivalent. Practice in English-to-French and French-to-English translation using a variety of non-literary materials, illustrating different problems and styles. Effective: 2004 Fall Quarter.

FRE 105—Advanced French Grammar (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): FRE 023; Or equivalent. Understanding of, and extensive practice with, various grammatical structures in French. Lexical-semantic, morphological, and syntactic analysis. GE credit: WE. Effective: 2005 Winter Quarter.

FRE 105S—Advanced French Grammar (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): FRE 023 or FRE 023S Understanding of, and extensive practice with, various grammatical structures in French. Lexical-semantic, morphological, and syntactic analysis. Taught abroad. Not open for credit to students who have taken FRE 105. GE credit: WE. Effective: 2013 Fall Quarter.

FRE 106—French in Business and the Professions (4)
Discussion—2 hours; Lecture—1 hour. Prerequisite(s): FRE 100; or Consent of Instructor. French language as used in the commercial sphere. Emphasis on proper style and form in letter-writing, and in non-literary composition. Technical terminology in such diverse fields as government and world business. GE credit: WE. Effective: 1997 Winter Quarter.

FRE 107—The Making of Modern France (4)
Lecture—3 hours; Term Paper. Prerequisite(s): FRE 023; Consent of Instructor. Introduction to French culture through a historical approach to topics such as the citizen and the state (politics, justice, social security), the nation and centralization, the rise of public education, colonization, class and social relationships. GE credit: AH, WE. Effective: 2016 Fall Quarter.

FRE 107A—Pre and Early Modern France (4)
Lecture—3 hours; Term Paper. Prerequisite(s): FRE 023; Consent of Instructor. Introduction to pre- and early modern French culture through a historical approach to topics such as the feudal system, the rise of the monarchy, the Reformation and religious wars. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

FRE 107B—The Making of Modern France (4)
Lecture—3 hours; Term Paper. Prerequisite(s): FRE 023; Consent of Instructor. Introduction to French culture through a historical approach to topics such as the absolute monarchy, the role of the parlements, the French revolution, and the political regimes of the nineteenth century. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

FRE 107S—The Making of Modern France (4)
Lecture—3 hours; Term Paper. Prerequisite(s): FRE 023 or FRE 023S Introduction to French culture through a historical approach to topics such as the nation-state, centralization of the monarchy, and the rise of public education, colonization, class and social relationships. Taught abroad. Not open for credit to students who have completed FRE 107. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

FRE 108—Modern French Culture (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): FRE 023 Survey of modern French culture from the Dreyfus affair to the present day. Topics may include women and French culture, decolonialization and modernization, education, social welfare and immigration. GE credit: WC, WE. Effective: 2016 Spring Quarter.

FRE 109—French Phonetics (4)
Laboratory—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): FRE 023; Or equivalent. Introduction to the sound-inventory of French and practice in phonetic transcription, with a focus on ways in which phonetic contrasts signal grammatical contrasts; spoken forms and spelling; formal differences between the "Standard" and other varieties across the French-speaking world. GE credit: SS. Effective: 2005 Spring Quarter.

FRE 110—Stylistics and Creative Composition (4)
Lecture—3 hours. Prerequisite(s): FRE 100; or Consent of Instructor. Intensive course in creative composition using a variety of techniques
and literary styles, patterned on Queneau's Exercices de style. Practice in such stylistic modifications as inversion, antithesis, changes in tense, mood, tonality, etc. The writing of poetry. GE credit: WE. Effective: 1999 Fall Quarter.

FRE 115—Medieval French Literature and Society (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Social and cultural life of medieval France as studied through its
representation in such literary works as La Chanson de Roland, courtly love lyric, the Arthurian romances of Chrétien de Troyes, Aucassin et Nicolette, selected fabliaux and farces. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

FRE 116—The French Renaissance (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Overview of major works and writers with particular attention to the historical context of the turbulent 16th century. Writers to be read may include Rabelais, Marot, Ronsard, Du Bellay, Labé, Marguerite de Navarre, Montaigne, and D'Aubigné. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

FRE 117A—Baroque and Preclassicism (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Literature and intellectual culture of the period between the Renaissance and French classicism. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

FRE 117B—The Classical Moment (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Literature, culture, and politics in the Age of Louis XIV. May be repeated up to 1 time(s) when topic differs. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

FRE 118A—The Age of Reason and Revolution (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100 Literature and philosophy of the French Enlightenment. Readings from such authors as Bayle, Fontenelle, Montesquieu, Voltaire, Rousseau and Diderot. GE credit: AH, OL, WC, WE. Effective: 2011 Fall Quarter.

FRE 118B—Private Lives and Public Secrets: The Early French Novel (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. History of the French roman from the Middle Ages to the Revolution with particular emphasis on the novels of the 18th century. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

FRE 119A—The Romantic Imaginary (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Major concepts and themes of French Romanticism, such as dream and the supernatural, impossible love, exoticism, revolution, individualism, nature, the mal du siècle, Romantic irony, the creative imagination, the cult of ruin. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

FRE 119B—Realism, History and the Novel (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Narrative and historical codes of French realist fiction, with emphasis on the representation of history in the realist novel, its depiction of social "realities" such as class and gender, and its relation to the historical situation of post-revolutionary society. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

FRE 119C—From Baudelaire to Surrealism (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Study of the main poets and poetic movements from the mid-19th to the early 20th century, including Baudelaire, the Symbolists, and the Surrealists. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

FRE 120—Modern French Thought (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Overview of post-Second World War French intellectual currents from existentialism to structuralism and deconstructionism. Readings will include Sartre and de Beauvoir, Camus, Lévi-Strauss, Lacan, Barthes, Foucault, Derrida, Kristeva, Sollers, Cixous, and Irigaray. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

FRE 121—Twentieth Century French Novel (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Novels and theories of the novel, from Proust to the Nouveau Roman and beyond. Readings from among Gide, Sartre, de Beauvoir, Camus, Breton, Beckett, Robbe-Grillet, Sarraute, Simon, Barthes, Duras, Tournier, Perec, Modiano, Guibert, Toussaint. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

FRE 122—French and Francophone Film (4)
Extensive Writing; Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): FRE 100; or Consent of Instructor. French and Francophone film from the Lumière Brothers to the present. Topics may include analysis of film form and narrative, major filmmakers and filmic traditions, and film theory. May be repeated up to 1 time(s) when topic differs. GE credit: AH, VL, WC, WE. Effective: 2007 Fall Quarter.

FRE 124—Post-Colonial and Francophone Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Post-Independence Black African and/or Caribbean and/or North African literatures written in French. Selected topics include: identity and subjectivity, the role of the intellectual, women's voices, languages and oral literatures, cultural syncretism, theories of post-colonialism. May be repeated up to 1 time(s) with approval of major advisor and instructor; when content differs; for example, students may take the course for repeat credit when the geographical focus (West Africa, North, African or Caribbean) or theme is substantially different from previous iterations. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

FRE 125—French Literature and Other Arts (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Relationship between French literature and other arts-painting, music, cinema, architecture, opera-from different periods. May be repeated up to 1 time(s) when topic differs. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

FRE 125S—French Literature and Other Arts (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Relationship between French literature and other arts, such as painting, music, cinema, architecture, or opera, from different periods. Taught abroad. May be repeated up to 1 time(s) when topic differs. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

FRE 127—Paris: Modernity and Metropolitan Culture (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Representation of Paris in 19th and 20th century texts and its importance in defining the experience and art of modernity. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

FRE 128—Topics in French Culture (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): FRE 100; or Consent of Instructor. In-depth study of a particular topic in French culture. Topics may include the Court of Louis XIV, the French Revolution and Immigration. May be repeated up to 1 time(s) when topic differs. GE credit: WE. Effective: 2007 Fall Quarter.

FRE 128S—Topics in French Culture (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): FRE 100; or Consent of Instructor. In-depth study of a particular topic in French culture. Topics may include the Court of Louis XIV, the French Revolution, and Immigration. Taught abroad. May be repeated up to 1 time(s) when topic differs. GE credit: AH, WC, WE. Effective: 2013 Fall Quarter.

FRE 130—From Page to Stage: Theatre and Theatricality (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. French theater as literature and performance. May be repeated up to 1 time(s) when topic differs. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

FRE 133—Gender and Politics in French Literature and Culture (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Thematic, theoretical and political tendencies in contemporary French fiction. Barthes, Foucault, Duras, Guibert, considered in terms of their writing on identity and gender. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

FRE 140—Study of a Major Writer (4)
Lecture—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Concentrated study of works of a single author. May be repeated up to 1 time(s) if author-subject changes. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

FRE 141—Selected Topics in French Literature (4)
Lecture—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Subjects and themes such as satiric and didactic poetry of the Middle Ages, poetry of the Pléiade, theater in the eighteenth century, pre-romantic poetry, autobiography, literature and film, etc. May be repeated up to 2 time(s) when topic differs. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

FRE 141S—Selected Topics in French Literature (4)
Lecture—3 hours; Term Paper. Prerequisite(s): FRE 100; or Consent of Instructor. Subjects and themes such as satiric and didactic poetry of the Middle Ages, poetry of the Pléiade, theater in the eighteenth century, pre-romantic poetry, autobiography, literature and film, etc. Taught abroad. May be repeated up to 2 time(s) when topic differs. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

FRE 160—Linguistic Study of French-Sound and Form (4)
Seminar—3 hours; Term Paper. Prerequisite(s): FRE 100 or LIN 001 or LIN 001Y Introduction to the linguistic study of modern French, with focus on sound structure and form, inflection and derivation. GE credit: AH, SS, WE. Effective: 2018 Spring Quarter.

FRE 161—Linguistic Study of French-Form and Meaning (4)
Seminar—3 hours; Term Paper. Prerequisite(s): FRE 100 or LIN 001 or LIN 001Y Introduction to the linguistic study of modern French, with focus on sentence construction and constituency, meaning and discourse functions. GE credit: AH, SS. Effective: 2018 Spring Quarter.

FRE 162—History of the French Language (4)
Lecture—3 hours; Term Paper. Prerequisite(s): FRE 100 or LIN 001 or LIN 001Y Main periods in development of the French language, from Latin to contemporary popular aspects, with emphasis on relationship between socio-cultural patterns and evolution of the language. GE credit: AH, SS, WC, WE. Effective: 2018 Spring Quarter.

FRE 192—Internship (1-12)
Internship—3-36 hours; Term Paper. Prerequisite(s): Consent of Instructor. Upper division standing. Practical application of the French language through work experience in government and/or business, culminating in an analytical term paper on a topic approved by the sponsoring instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

FRE 194H—Special Study for Honors Students (4)
Independent Study—4 hours. Prerequisite(s): Open only to French majors of senior standing who qualify for Honors Program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in French literature, civilization, or
language studies. (P/NP grading only.) GE credit: AH, WC, WE. Effective: 1998 Fall Quarter.

FRE 195H—Honors Thesis (4)
Independent Study—4 hours. Prerequisite(s): FRE 194H Writing of an honors thesis on a topic in French literature, civilization, or language studies under the direction of a faculty member. (P/NP grading only.) GE credit: AH, WC, WE. Effective: 1998 Fall Quarter.

FRE 197T—Tutoring in French (1-4)
Laboratory—1-2 hours; Seminar—1-2 hours. Prerequisite(s): Upper division standing and consent of Chairperson. Tutoring in undergraduate courses including leadership in small voluntary discussion groups affiliated with departmental courses. May be repeated for credit for a total of 6 units. May be repeated up to 6 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

FRE 197TC—Tutoring in the Community (2-4)
Laboratory—1-2 hours; Seminar—1-2 hours. Prerequisite(s): Upper division standing and consent of Chairperson. Tutoring in public schools under the guidance of a regular teacher and supervision by a departmental faculty member. May be repeated for credit for a total of 6 units. May be repeated up to 6 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

FRE 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

FRE 198S—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Group study on focused topics in French literature and culture. Taught abroad. May be repeated for credit. (P/NP grading only.) Effective: 2013 Fall Quarter.

FRE 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

FRE 200—Introduction to Graduate Study in French (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Introduction to a range of methodologies and critical practices in the field of French Studies, including literature, culture, and linguistics. Covers basic principles of bibliographic research in the humanities. (S/U grading only.) Effective: 2016 Spring Quarter.

FRE 201—History of French (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Graduate standing. Presentation of the main changes in the grammatical structures of French, from Latin to contemporary usage, involving textual analysis and sociolinguistic description. Effective: 2016 Spring Quarter.

FRE 202—Topics in French Civilization (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Graduate standing. Interdisciplinary approach to the study of French and Francophone civilization from the Middle Ages to the present. Course content will vary by instructor. May be repeated for credit when content differs. Effective: 2016 Spring Quarter.

FRE 204—Topics in Medieval Literature (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Graduate standing. Study of Medieval French literature, focusing on a particular period,
milieu, literary movement, genre, or theoretical approach. May be repeated for credit when topic differs. May be repeated for credit. Effective: 2016 Spring Quarter.

FRE 205A—Sixteenth-Century Literature: The Humanists (4)
Seminar—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing. French humanism in its most varied forms. Although at different times Rabelais and Montaigne will be primarily studied, other leading intellectuals and religious writers will also receive attention. May be repeated for credit when different topic is studied. May be repeated for credit. Effective: 2016 Spring Quarter.

FRE 206A—Seventeenth-Century Literature: Theater (4)
Seminar—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Works of Corneille, Racine, Molière, and minor dramatists. One or more authors may be covered. May be repeated for credit with consent of instructor when different topics are studied. May be repeated for credit. Effective: 2016 Spring Quarter.

FRE 206B—Seventeenth-Century Literature: Prose (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Graduate standing. Works of authors such as Pascal, Descartes, Mme de Lafayette. One or more authors may be covered. May be repeated for credit with consent of instructor as different topics are studied from quarter to quarter. May be repeated for credit. Effective: 2016 Spring Quarter.

FRE 206C—Seventeenth-Century Literature: Poetry (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Graduate standing. Studies of the works of one or more poets of the period. May be repeated for credit with consent of instructor. May be repeated for credit. Effective: 2016 Spring Quarter.

FRE 207A—Eighteenth-Century Literature: Philosophies (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Graduate standing. Not a course in philosophy, but an examination of the role of philosophy in the design and context of literary works. Study of one or more authors. May be repeated for credit. Effective: 2016 Spring Quarter.

FRE 207B—Eighteenth-Century Literature: Novel (4)
Seminar—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Rise of the novel. Study of narrative experiments in the context of the philosophical climate and new literary values. Course may treat one or more novelists of the period. May be repeated for credit when different topics are studied. May be repeated for credit. Effective: 2016 Spring Quarter.

FRE 208A—Nineteenth-Century Literature: Fiction (4)
Seminar—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Study of the works of one or several novelists and/or short-story writers of the period. May be repeated for credit with consent of instructor when different topics are studied. May be repeated for credit. Effective: 2016 Spring Quarter.

FRE 208B—Nineteenth-Century Literature: Poetry (4)
Seminar—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Study of the works of one or several poets of the period. May be repeated for credit with consent of instructor when different topics are
studied. May be repeated for credit. Effective: 2016 Spring Quarter.

FRE 209A—Twentieth-Century: Prose (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Graduate standing. Study of the works of one or several writers of the period. Effective: 2016 Spring Quarter.

FRE 209B—Twentieth-Century: Theater (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Graduate standing. Study of the works of one or several dramatists of the period. Effective: 2016 Spring Quarter.

FRE 209C—Twentieth-Century: Poetry (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Graduate standing. Study of the works of one or several poets of the period. May be repeated for credit with consent of instructor. Effective: 2016 Spring Quarter.

FRE 210—Studies in Narrative Fiction (4)
Seminar—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit with consent of instructor when different topic is studied. May be repeated for credit. Effective: 2016 Spring Quarter.

FRE 211—Studies in Criticism (4)
Seminar—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit with consent of instructor when different topic is studied. May be repeated for credit. Effective: 2016 Spring Quarter.

FRE 212—Studies in Theater (4)
Seminar—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit with consent of instructor when different topic is studied. May be repeated for credit. Effective: 2016 Spring Quarter.

FRE 213—Studies in Poetry (4)
Seminar—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit with consent of instructor when different topic is studied. May be repeated for credit. Effective: 2016 Spring Quarter.

FRE 214—Study of a Literary Movement (4)
Seminar—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit with consent of instructor when different topic is studied. May be repeated for credit. Effective: 2016 Spring Quarter.

FRE 215—Topics in French and Francophone Film (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Graduate standing. Aspects of French and Francophone film from the Lumière Brothers through the present. Topics may include a specific historical period of filmmaking, film theories and the analysis of film form and narrative, and major filmmakers and filmic traditions. May be repeated up to 2 time(s). Effective: 2016 Winter Quarter.

FRE 224—Francophone Literatures (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Graduate standing. Study of cultural productions (literature, film, visual arts) by Francophone peoples such as found in North Africa, West Africa, the Caribbean, South-East Asia, the Americas, and Metropolitan France. May be repeated for credit when topic differs and with consent of instructor. Effective: 2016 Spring Quarter.

FRE 250A—French Linguistics I (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Graduate standing. Theoretical approach to the forms and functions of French, with emphasis on phonology and morphology. Overview of current linguistic theories and their application to French. Offered in alternate years. Effective: 2016 Spring Quarter.

FRE 250B—French Linguistics II (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Graduate standing. Theoretical approach to the forms and functions of French, with emphasis on syntax and semantics. Overview of current linguistic theories and their application to French. Offered in alternate years. Effective: 2016 Spring Quarter.

FRE 251—Topics in the Linguistic Study of French (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Graduate standing. Questions relevant to the linguistic study of French, such as language acquisition, sociolinguistics, or theoretical examination of structure. Intended for students in French Linguistics and those applying linguistic models to literature or teaching. Repeatable for credit when topic differs. May be repeated for credit topic differs. Effective: 2016 Spring Quarter.

FRE 291—Foreign Language Learning in the Classroom (4)
Project (Term Project); Seminar—3 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Overview of approaches to university-level foreign language instruction and the theoretical notions underlying current trends in classroom practices across commonly taught foreign languages. (GER 291 and SPA 291.) Effective: 2016 Spring Quarter.

FRE 297—Individual Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 2016 Spring Quarter.

FRE 298—Group Study (1-5)
Seminar—1-5 hours. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit with consent of instructor. May be repeated for credit. Effective: 2016 Spring Quarter.

FRE 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 2016 Spring Quarter.

FRE 299D—Dissertation Research (1-12)
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 2016 Spring Quarter.

FRE 300—Teaching of a Modern Foreign Language (3)
Lecture/Discussion—3 hours. Prerequisite(s): Senior or graduate standing; a major or minor in a modern foreign language. Effective: 1997 Winter Quarter.

FRE 390A—The Teaching of French in College (2)
Lecture/Discussion—2 hours. Prerequisite(s): Graduate standing or consent of instructor. Course designed for graduate teaching assistants with emphasis on problems and procedures encountered by teachers of lower division classes at the university. May be repeated for credit with consent of instructor. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

FRE 390B—The Teaching of French in College (2)
Lecture/Discussion—2 hours. Prerequisite(s): Graduate standing or consent of instructor. Course designed for graduate teaching assistants with emphasis on problems and procedures encountered by teachers of lower division classes at the university. (S/U grading only.) Effective: 1997 Winter Quarter.

FRE 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

FRS Freshman Seminar

Questions pertaining to the following courses should be directed to the instructor or to the First-Year Seminar Office in Undergraduate Education.

Courses in FRS:

FRS 001—First-Year Seminar (1)
Seminar—1 hour. Open only to: students who have completed fewer than 45 quarter units; transfer students in their first academic year at UC Davis. Investigation of a special topic through shared readings, discussions, written assignments, term papers, and special activities (such as fieldwork, site visits, laboratory work, etc.). Emphasis placed upon student participation in learning. Students may take more than one First-Year Seminar, but may not take more than one in any given quarter. May be repeated for credit if topics differ. Effective: 2009 Fall Quarter.

FRS 002—First-Year Seminar (2)
Seminar—2 hours. Open only to: students who have completed fewer than 45 quarter units; transfer students in their first academic year at UC Davis. Investigation of a special topic through shared readings, discussions, written assignments, term papers, and special activities (such as fieldwork, site visits, laboratory work, etc.). Emphasis placed upon student participation in learning. Students may take more than one First-Year Seminar, but may not take more than one in any given quarter. May be repeated for credit if topics differ. Effective: 2009 Fall Quarter.

FRS 003—First-Year Seminar (1)
Seminar—1 hour. Open only to: students who have completed fewer than 45 quarter units; transfer students in their first academic year at UC Davis. Investigation of a special topic through shared readings, discussions, written assignments, term papers, and special activities (such as fieldwork, site visits, laboratory work, etc.). Emphasis placed upon student participation in learning. Students may take more than one First-Year Seminar, but may not take more than one in any given quarter. May be repeated for credit if topics differ. (P/NP grading only.) Effective: 2009 Fall Quarter.

FRS 004—First-Year Seminar (2)
Seminar—2 hours. Open only to: students who have completed fewer than 45 quarter units; transfer students in their first academic year at UC Davis. Investigation of a special topic through shared readings, discussions, written assignments, term papers, and special activities (such as fieldwork, site visits, laboratory work, etc.). Emphasis placed upon student participation in learning. Students may take more than one First-Year Seminar, but may not take more than one in any given quarter. May be repeated for credit if topics differ. (P/NP grading only.) Effective: 2009 Fall Quarter.

FSM Food Service Management

Questions pertaining to the following courses should be directed to the instructor or to the Nutrition Department Advising office in 3202 Meyer Hall; 530-752-2512.

Courses in FSM:

FSM 120—Principles of Quantity Food Production (4)
Independent Study—1 hour; Lecture—3 hours. Prerequisite(s): FST 100B; FST 101B Restricted to upper division Clinical Nutrition students only. Fundamental principles of food service management, including quantity food preparation, institutional equipment, receiving and storage, service, menu planning, merchandising, and safety. Students will earn food safety certification. Effective: 2008 Spring Quarter.

FSM 120L—Quantity Food Production Laboratory (2)
Laboratory—6 hours. Prerequisite(s): FSM 120 Laboratory experience in quantity food production and service. Effective: 1997 Winter Quarter.

FSM 122—Food Service Systems Management (3)
Lecture—3 hours. Prerequisite(s): ARE 112; FSM 120 Principles of quantity food production management: production schedules, portion control, financial management, layout and equipment planning, evaluation of alternative systems, and computer applications. Effective: 2017 Winter Quarter.

FSM 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. One upper division course in Food Service Management. Work experience on or off campus in practical aspects of food service management, supervised by a faculty member. (P/NP grading only.) Effective: 1997 Winter Quarter.

FSM 197T—Tutoring in Food Service Management (1-2)
Discussion/Laboratory—3-6 hours. Prerequisite(s): Dietetics or related major; completion of the Food Service Management course in which tutoring is done. Tutoring of students in food service management, assistance with discussion groups or laboratory sections; weekly conference with instructor in charge of course; written evaluations. May be repeated if tutoring a different course. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

FSM 198—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

FSM 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

FST Food Science & Technology

Courses in FST:

FST 001—Principles of Food Science (3)
Discussion—1 hour; Lecture—2 hours. Not open for credit to students who have completed any Food Science and Technology course except course 10. Food science fundamentals. Fresh and processed food technologies;
world food problems; food composition; food microbiological and toxicological safety; food laws; evaluation of acceptability and nutritional value. GE credit: SE, VL. Effective: 2001 Winter Quarter.

FST 003—Introduction to Brewing and Beer (3)
Lecture—3 hours. Basic description of brewing and associated processes, from raw materials to final product; history of brewing and brewing science; types of beer worldwide; world beer markets; basics of beer quality, including wholesomeness; role of scientist in brewing. Not open for credit to students who have taken FST 003V. GE credit: SE, SL. Effective: 2017 Fall Quarter.

FST 003V—Introduction to Brewing and Beer (3)
Project (Term Project); Web Electronic Discussion—1.5 hours; Web Virtual Lecture—1 hour. Basic description of brewing and associated processes, from raw materials to final product; history of brewing and brewing science; types of beer worldwide; world beer markets; basics of beer quality, including wholesomeness; role of scientist in brewing. Not open for credit to students who have taken FST 003. GE credit: SE, SL. Effective: 2017 Spring Quarter.

FST 010—Food Science, Folklore and Health (3)
Lecture—3 hours. Not open for credit to students who have completed course 2. Ancient and modern food folklore in relation to health and well-being. Food safety, organic food, herbalism, food preservation, and nutritional enhancement. GE credit: SE, SL, SS, VL, WC. Effective: 2000 Fall Quarter.

FST 050—Introduction to Food Preservation (3) ***Review all entries***
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): CHE 002A; STA 013 (can be concurrent); BIS 002A (can be concurrent) Restricted to Food Science Majors. Introduction to modes of fresh food preservation including use of chemicals and microbes, heat and energy, control of water and atmosphere, and by indirect approaches such as packaging, hygienic design and sanitation. GE credit: QL, SE. Effective: 2018 Winter Quarter.

FST 050—Introduction to Food Preservation (3) ***Review all entries***
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): CHE 002A; BIS 002A (can be concurrent); (STA 013 (can be concurrent) or STA 013Y (can be concurrent) or STA 100 (can be concurrent)) Pass One restricted to Food Science majors; Pass Two open to all students. Introduction to modes of fresh food preservation including use of chemicals and microbes, heat and energy, control of water and atmosphere, and by indirect approaches such as packaging, hygienic design and sanitation. GE credit: QL, SE. Effective: 2018 Fall Quarter.

FST 055—Food in American Culture (4)
Discussion—1 hour; Lecture—3 hours. Relationship between food and culture; relationship between food and the social order; influences on eating habits and the tensions between them including identity, convenience, and responsibility; multiple disciplines and genres. (AMS 055.) GE credit: ACGH, AH, DD, SS, WE. Effective: 2018 Winter Quarter.

FST 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

FST 100A—Food Chemistry (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 008B; BIS 002A recommended. Chemical aspects of food composition. Emphasis on the functional properties and chemical reactions of the major components of foods: carbohydrates, lipids, proteins, and water. GE credit: SE, VL. Effective: 2017 Winter Quarter.

FST 100A—Food Chemistry (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (CHE 008B or CHE 118B or CHE 128B); BIS 002A recommended. Open to Food Science, Clinical Nutrition, and Nutrition Science majors only. Chemical aspects of food composition. Emphasis on the functional properties and chemical reactions of the major components of foods: carbohydrates, lipids, proteins, and water. GE credit: SE, VL. Effective: 2018 Fall Quarter.

FST 100B—Food Properties (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): FST 100A; CHE 008B; and Consent of Instructor. Sensory quality, chemical and microbial safety, and nutritional properties of foods. Effects of food processing and preparation on these properties. Selected properties of food commodities. GE credit: QL, SE, VL. Effective: 2017 Winter Quarter.

FST 101A—Food Chemistry Laboratory (3) ***Review all entries***
Discussion—1 hour; Laboratory—3 hours; Lecture—1 hour. Concurrent enrollment in FST 100A required. Study of basic chemical and physical properties that influence the reactivity and functional properties of components in food systems. GE credit: QL, SE, VL, WE. Effective: 2017 Spring Quarter.

FST 101A—Food Chemistry Laboratory (3) ***Review all entries***
Discussion—1 hour; Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): FST 100A (can be concurrent) Open to Food Science and Clinical Nutrition majors only. Study of basic chemical and physical properties that influence the reactivity and functional properties of components in food systems. GE credit: QL, SE, VL, WE. Effective: 2018 Fall Quarter.

FST 101B—Food Properties Laboratory (2)
Lecture/Lab—3 hours. Prerequisite(s): FST 100B (can be concurrent); Must be taken concurrently. Study of properties of food described in course 100B. GE credit: QL, SE, VL, WE. Effective: 2017 Winter Quarter.

FST 102A—Malting and Brewing Science (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): BIS 102; BIS 103; Senior standing recommended. The technology of the malting, brewing and fermentation processes is integrated with the chemistry, biochemistry and microbiology that determine industrial practices and product quality. Not open for credit to students who have taken course 102. GE credit: SE. Effective: 1997 Winter Quarter.

FST 102A—Malting and Brewing Science (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): (BIS 102, BIS 103) or BIS 105; Senior standing recommended. The technology of the malting, brewing and fermentation processes is integrated with the chemistry, biochemistry and microbiology that determine industrial practices and product quality. Not open for credit to students who have taken FST 102. GE credit: SE. Effective: 2018 Fall Quarter.

FST 102B—Practical Malting and Brewing (4)
Laboratory—6 hours; Lecture/Discussion—2 hours. Prerequisite(s): FST 102A; CHE 002C Open to seniors only in Fermentation Science or Food Science and Technology. Provides practical working knowledge of analytical methods used in malting and brewing and experience with brewing materials and processes, by analysis of samples that illustrate the range of values experienced in practice and pilot scale brewing. GE credit: QL, SE. Effective: 2017 Winter Quarter.

FST 103—Physical and Chemical Methods for Food Analysis (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): CHE 002C; CHE 008B; BIS 103; FST 100B Theory and application of physical and chemical methods for determining the constituents of foods. Modern separation and instrumental analysis
techniques are stressed. GE credit: QL, SE, WE. Effective: 2017 Winter Quarter.

FST 104—Food Microbiology (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 103; MIC 102; MIC 103L Microorganisms in food safety, spoilage, and production. Food-borne disease agents and their control. Growth parameters of food spoilage agents. Destruction of microbes in food. Food fermentations. The development of microbes as a resource for the food industry. GE credit: QL, SE, VL. Effective: 2017 Winter Quarter.

FST 104—Food Microbiology (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 103; MIC 102 Microorganisms in food safety, spoilage, and production. Food-borne disease agents and their control. Growth parameters of food spoilage agents. Destruction of microbes in food. Food fermentations. The development of microbes as a resource for the food industry. GE credit: QL, SE, VL. Effective: 2019 Winter Quarter.

FST 104L—Food Microbiology Laboratory (4)
Discussion—1 hour; Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): BIS 002A; BIS 103; FST 104 Cultural and morphological characteristics of microorganisms involved in food spoilage, in foodborne disease, and food fermentation. Analysis of microbiological quality of foods. GE credit: QL, SE, VL, WE. Effective: 2017 Spring Quarter.

FST 107—Food Sensory Science (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): FST 117 (can be concurrent); (STA 013 or STA 013Y) Critical examination of techniques and theories of sensory measurement of food; measures of consumer perception and acceptance. An introduction to the sensory and cognitive systems associated with the perception of food. Not open for credit to students who have completed FST 107A. GE credit: QL, SE, WE. Effective: 2018 Spring Quarter.

FST 109—Principles of Quality Assurance in Food Processing (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): STA 013 or STA 013Y Quality assurance measurement techniques applied to selected food processed products emphasized. Rationale for establishing valid quality assurance programs including selection of samples at critical points. Statistical problems in quality assurance programs used by the food industry. GE credit: QL, SE, SL, VL. Effective: 2018 Spring Quarter.

FST 110—Food Processing (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PHY 007A; PHY 007B; PHY 007C; MAT 016A; MAT 016B; MAT 016C; Or equivalent to PHY 007 series or MAT 016 series. Application of the conservation of mass and energy to food processing. Elements of engineering thermodynamics, fluid mechanics, heat and mass transfer. Quantitative analysis through problem solving and simulation. Not open for credit to students enrolled in College of Engineering. GE credit: QL, SE, VL. Effective: 2017 Spring Quarter.

FST 110—Food Processing (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PHY 007A; PHY 007B; PHY 007C (can be concurrent); (MAT 016C or MAT 017C or MAT 021C) Application of the conservation of mass and energy to food processing. Elements of engineering thermodynamics, fluid mechanics, heat and mass transfer. Quantitative analysis through problem solving and simulation. Not open for credit to students enrolled in College of Engineering. GE credit: QL, SE, VL. Effective: 2018 Fall Quarter.

FST 110L—Food Processing Laboratory (2) ***Review all entries***
Discussion—1 hour; Laboratory—3 hours. Prerequisite(s): FST 110 (can be concurrent); FST 050 Open to Food Science majors only. Laboratory exercises to gain experience with common food processing operations at the bench and pilot plant scales. GE credit: QL, SE, SL, VL. Effective: 2017 Spring Quarter.

FST 110L—Food Processing Laboratory (2) ***Review all entries***
Discussion—1 hour; Laboratory—3 hours. Prerequisite(s): FST 110 (can be concurrent) Open to Food Science majors only. Laboratory exercises to gain experience with common food processing operations at the bench and pilot plant scales. GE credit: QL, SE, SL, VL. Effective: 2018 Fall Quarter.

FST 115—Fermented Foods (4)
Lecture—3 hours; Term Paper/Discussion. Prerequisite(s): BIS 103; MIC 102; or Consent of Instructor. Pass One restricted to upper division or graduate level Food Science and Viticulture and Enology majors. Physiology, biochemistry, and genetics of microorganisms important in food fermentations. How microorganisms are used in fermentations and how raw materials are converted into finished fermented foods and beverages. Effective: 2017 Spring Quarter.

FST 117—Design and Analysis for Sensory Food Science (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 013 Methods of design and analysis for sensory food science. Experimental design strategies. Use of taste panels and consumer testing. Data analysis and computation including the relative merits and limitations of parametric and nonparametic approaches. Modifications for quality assurance. GE credit: QL, SE. Effective: 2017 Spring Quarter.

FST 119—Chemistry and Technology of Milk and Dairy Products (4)
Lecture—4 hours. Prerequisite(s): BIS 002A; BIS 102; Consent of Instructor. Composition, structure and properties of milk and products derived from milk. Relates chemical, microbiological, and technological principles to commercial practices in processing of milk and its products. GE credit: QL, SE, VL. Effective: 2017 Spring Quarter.

FST 123—Introduction to Enzymology (3)
Lecture—3 hours. Prerequisite(s): FST 123L (can be concurrent); BIS 102; BIS 103 Principles of physical, chemical and catalytic properties of enzymes and their importance. Purification, characterization, and quantitative evaluation of reaction conditions on activity are stressed. Specificity and mechanism of action illustrated by use of selected enzymes. (Former course Biochemistry and Biophysics 123.) GE credit: QL, SE, VL. Effective: 2017 Spring Quarter.

FST 123L—Enzymology Laboratory (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): BIS 103; FST 123 (can be concurrent); FST 123 required concurrently. Laboratory procedures involved in detection, purification and characterization of enzymes. (Former course Biochemistry and Biophysics 123L.) GE credit: QL, SE, VL, WE. Effective: 1997 Winter Quarter.

FST 127—Sensory Evaluation of Foods (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): FST 117 Critical examination of methods of sensory measurement applied to food and beverage systems; descriptive analysis and consumer tests and their application to quality assurance, product development and optimization. GE credit: QL, SE, WE. Effective: 2017 Winter Quarter.

FST 128—Food Toxicology (3)
Lecture—3 hours. Prerequisite(s): BIS 102; BIS 103 Chemistry and biochemistry of toxins occurring in foods, including plant and animal toxins, intentional and unintentional food additives. The
assessment of food safety and toxic hazards. (ETX 128.) GE credit: SE. Effective: 1997 Winter Quarter.

FST 131—Food Packaging (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 008B; BIS 001B; PHY 007C Class size limited to 50 students. Principles of food packaging. Functions of packaging. Properties of metal, glass, paper and plastic materials and packages. Design, fabrication, and applications of food packaging. Packaging of fresh and processed foods, including fruits and vegetables, dairy foods, beer and wine. GE credit: SE. Effective: 2016 Summer Session 1.

FST 151Y—Food Freezing (1)
Discussion—1 hour; Web Virtual Lecture. Prerequisite(s): FST 110A; Or the equivalent. Mechanisms of ice crystallization, interpretation of freezing diagrams, and modes of heat transfer. Food properties at sub-freezing temperatures, refrigeration requirements, and estimation of freezing times. Industrial systems used in freezing foods. GE credit: QL, SE. Effective: 2013 Fall Quarter.

FST 159—New Food Product Ideas (3)
Lecture—3 hours. Prerequisite(s): FST 050; BIS 002A; PHY 007A; PHY 007B; PHY 007C; CHE 002A; CHE 002B; CHE 002C Create, refine, test and present viable ideas for new food products. Activities include trend monitoring, consumer research, idea generation, concept screening, and new product concept presentations. GE credit: AH, OL, SS, WE. Effective: 2017 Spring Quarter.

FST 160—Food Product Development (4)
Discussion—1 hour; Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): FST 050; FST 103; FST 104; FST 110 Product implementation stage of food product development including preliminary product description, prototype development, product testing, and formal presentation of a new product development. GE credit: OL, SE, VL. Effective: 2017 Winter Quarter.

FST 190—Senior Seminar (1)
Seminar—1 hour. Prerequisite(s): Senior standing or consent of instructor. Selected topics presented by students on recent advances in food science and technology. Reports and discussions concerning oral and written presentations, literature sources and career opportunities. GE credit: OL, SE. Effective: 1997 Winter Quarter.

FST 192—Internship for Advanced Undergraduates (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Work experience on or off campus in the practical application of food science. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

FST 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

FST 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

FST 201—Food Chemistry and Biochemistry (4)
Lecture—4 hours. Prerequisite(s): Undergraduate courses in organic chemistry and biochemistry; undergraduate course in food chemistry is recommended. Restricted to Food Science graduate level standing or consent of instructor. Advanced topics in food chemistry and biochemistry, emphasizing the application of the basic principles of chemistry and biochemistry to food composition, properties, preservation and processing. Chemical structures, interactions, reaction mechanisms and experimental methods are stressed. Effective: 2017 Fall Quarter.

FST 202—Physical Chemistry of Foods (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): CHE 107A; CHE 107B; BIS 102 recommended. Fundamental principles of chemistry and physics are applied to a study of changes in water binding properties and activity, changes in proteins, nutrients, toxic constituents, and other compounds during storage, heating, freezing, dehydrating, and concentrating of food materials. Effective: 2017 Winter Quarter.

FST 203—Food Processing (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): FST 110A; PHY 007C); CHE 107B; or Consent of Instructor. Principles of food engineering applied to food processing. Relationship of Newtonian and non-Newtonian fluid properties to heat and momentum transfer. Application of mass transfer in controlling kinetics and quality changes of foods. Effective: 2013 Spring Quarter.

FST 204—Advanced Food Microbiology (3)
Lecture—3 hours. Prerequisite(s): BIS 001C; BIS 103; FST 104; Or a course in microbiology. Principles of and recent developments in food microbiology, including food pathogen virulence and detection, parameters of microbial growth in food, and the microbiology of food and beverage fermentations. Effective: 1997 Winter Quarter.

FST 205—Industrial Microbiology (3)
Lecture—3 hours. Prerequisite(s): BIS 001A; BIS 102; BIS 103; MIC 130A and MIC 130B or BIS 101 recommended. Use of microorganisms for producing substances such as amino acids, peptides, enzymes, antibiotics and organic acids. Emphasis on metabolic regulation of pathways leading to fermentation products, on yeast fermentations, and on genetic manipulations (including recombinant DNA techniques) of industrial microorganisms. Effective: 1997 Winter Quarter.

FST 207—Advanced Sensory-Instrumental Analyses (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): FST 107; and Consent of Instructor. Basic principles of measurement of color, texture, and flavor of foods by sensory and instrumental methods. Advanced statistical analysis of relation of colorimetry, texturometry, and chemistry of volatile compounds to perception of appearance, texture, flavor. Effective: 1997 Winter Quarter.

FST 210—Proteins: Functional Activities and Interactions (3)
Lecture—3 hours. Prerequisite(s): BIS 103 The relationships of structure of proteins to their biological functions. Structural proteins, complexing proteins, and catalytic proteins in plant and animal materials and products. Effective: 1997 Winter Quarter.

FST 211—Lipids: Chemistry and Nutrition (3)
Lecture—3 hours. Prerequisite(s): BIS 103; CHE 107B; CHE 128B Chemistry of lipids as it pertains to research in food and nutrition. Relations between lipid structure and their physical properties in tissues and foods. Regulation of absorption, transport, and metabolism of lipids. Implications of dietary fats and health. Effective: 1997 Winter Quarter.

FST 213—Flavor Chemistry of Foods and Beverages (3)
Lecture/Discussion—3 hours. Prerequisite(s): CHE 008B; VEN 123; (VEN 123L or FST 103); or Consent of Instructor. Students will become familiar with basic principles of flavor chemistry, analysis, and formation in fresh and processed foods. Students will be required to read and critically evaluate flavor chemistry literature. (VEN 213.) Effective: 2009 Spring Quarter.

FST 217—Advanced Food Sensory Science (3)
Lecture—3 hours. Prerequisite(s): FST 107 (can be concurrent); or Consent of Instructor. Advanced study of the techniques and theory of the sensory measurement of food as an analytical tool and as a measure of consumer perception and acceptance. Advanced examination of the sensory and cognitive systems associated with the perception of food. Effective: 2010 Fall Quarter.

FST 219—Biochemistry, Microbiology and Technology of Cheeses of the World (4)
Lecture—4 hours. Prerequisite(s): FST 119; (BIS 103 or FST 100A); FST 123; BIS 103; CHE 107B; CHE 128B; or Consent of Instructor. Restricted to graduate level students or senior undergraduate students with appropriate background in biochemistry and microbiology. Compositional and physico-chemical aspects of milk and their implications on cheesemaking; enzymatic, microbiological and physical aspects of cheesemaking; cheese as a biological composite; designing cheese quality attributes; cheese aging. Cheese from all over the world will be tasted and discussed. Effective: 2008 Fall Quarter.

FST 227—Food Perception and the Chemical Senses (2)
Lecture—2 hours. Prerequisite(s): FST 107B (can be concurrent); and Consent of Instructor. Examination of the anatomy and physiology of the chemical senses (taste, smell, and the trigeminal senses) and how they are involved in the perception of food and food intake. Effective: 1997 Winter Quarter.

FST 230—Food & Gut Microbiota (4)
Discussion—1.5 hours; Lecture—1.5 hours; Term Paper. Prerequisite(s): Microbiology and molecular biology undergraduate coursework or Consent of Instructor. Upper division or graduate standing. Impact of specific food structures on the structure and function of the animal gut microbiota. How food is transformed by, and modulates, the gut microbiota to provide the host with nutrients and protection. Effective: 2017 Spring Quarter.

FST 290—Seminar (1)
Seminar—1 hour. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

FST 290C—Advanced Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Critical presentation and evaluation of original research by graduate students. Planning of research programs and proposals. Discussion led by individual major instructors for their research group. (S/U grading only.) Effective: 1997 Winter Quarter.

FST 291—Advanced Food Science Seminar (1)
Seminar—1 hour. Prerequisite(s): FST 290; Completion of at least one quarter of FST 290. Oral presentation of student's original research, discussion, and critical evaluation. (S/U grading only.) Effective: 1997 Winter Quarter.

FST 298—Group Study (1-5)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

FST 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

FST 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

GAS Med - Intl: Gastroenterology

Courses in GAS:

GAS 192—Internship in Gastroenterology (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project by preceptor prior to internship. Supervised work experience in gastroenterology. May be repeated for credit up to 12 units. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

GAS 299—Research (1-12)
Variable. Research in gastroenterology. (S/U grading only.) Effective: 1997 Winter Quarter.

GAS 460—Gastroenterology Clinical Clerkship (3-18)
Clinical Activity—30 hours. Prerequisite(s): Consent of Instructor. Completion of third-year of medical school. Work-up, manage, and follow-up new patients on active inpatient consulting service. Gastroenterology/Hepatology patients. Daily rounds with attending physician. May be repeated for credit. (H/P/F grading only.) Effective: 2013 Summer Quarter.

GAS 480—Insights in Gastroenterology (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. Student in good academic standing. To gain insight in clinical activities of Gastroenterology Division through attendance at any of the following: endoscopic procedures, ward rounds, outpatient clinic, and G.I. grand rounds. (H/P/F grading only.) Effective: 1997 Winter Quarter.

GAS 499—Research (1-12)
Clinical Activity. Prerequisite(s): Consent of Instructor. Medical student status. Part-time participation in active clinical and basic research projects.
Some will involve both patient care and relevant laboratory procedures. Basic research includes liver metabolism, cancer markers, porphyrias diet and cancer, folate metabolism. May be repeated for credit. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

GDB Global Disease Biology

Courses in GDB:

GDB 090—Introduction to Global Disease Biology (1)
Seminar—1 hour. Open to Global Disease Biology majors only. Introduction to the Global Disease Biology major, research and internship opportunities, and potential career paths in human, animal, and plant health. Communication, ethics and the nature of science. (P/NP grading only.) Effective: 2017 Fall Quarter.

GDB 101—Epidemiology (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): SAS 013; BIS 002A; BIS 002B; BIS 002C; (STA 013 or STA 013Y); (STA 100 or PLS 120) Principles and practice of epidemiology as applied to human, animal, and plant populations and the environment in which these populations co-exist. Quantitative analysis of both infectious and non-infectious disease. Inter-dependence between epidemiological analysis, decision-making and policy formulation will be highlighted. GE credit: QL, SE. Effective: 2018 Winter Quarter.

GDB 102—Disease Intervention and Policy (4)
Discussion—1 hour; Lecture—3 hours; Project (Term Project). Prerequisite(s): GDB 101; SAS 013; BIS 002A; BIS 002B; BIS 002C; PMI 129Y; VME 158 Examination of the prevention and treatment of diseases affecting humans, animals, and plants. Case studies will illustrate the merits of a unified approach to promoting health at local, regional, and global scales. GE credit: OL, SE, SL. Effective: 2014 Fall Quarter.

GDB 103—The Microbiome of People, Animals, and Plants (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B; BIS 002C Examination of the structure and function of microbial communities that live inside and on host organisms. Introduction to general concepts of the microbiome and microbiota, and their relationship to host health and disease. GE credit: SE, SL. Effective: 2015 Fall Quarter.

GDB 187—Global Disease Biology Seminar (3)
Discussion—1 hour; Seminar—1 hour; Term Paper. Prerequisite(s): GDB 090; SAS 013 Open to junior standing; Global Disease Biology majors. Seminar leading to development of the research proposal and academic plan for the Global Disease Biology major. Effective: 2015 Fall Quarter.

GDB 189—Global Disease Biology Senior Research (3)
Independent Study—3 hours. Prerequisite(s): GDB 090; GDB 189D (can be concurrent); SAS 013; GBD 189D required concurrently the first time GBD 189 is taken. Restricted to senior standing; Global Disease Biology majors only. Capstone research experience for the Global Disease Biology major. Project may be experimental, library research, or some other creative activity. May be repeated up to 1 time(s) for student research conducted over two quarters; second quarter used to finish writing the research paper. (P/NP grading only.) Effective: 2015 Fall Quarter.

GDB 189D—Global Disease Biology Research Discussion (1)
Discussion—1 hour. Prerequisite(s): GDB 090; GDB 187; SAS 013; GDB 189 (can be concurrent); GBD 189 required concurrently. Restricted to junior standing; Global Disease Biology majors only. Course helps prevent or solve problems during the students' research activity. Independent advising and assistance on research proposal. (P/NP grading only.) Effective: 2015 Fall Quarter.

GEL Geology

Courses in GEL:

GEL 001—The Earth (4)
Discussion—1 hour; Lecture—3 hours. Intoduction to the study of the Earth. Earth's physical and chemical structure;
internal and surface processes that mold the Earth; geological hazards and resources. Not open for credit to students who have taken GEL 050; only 2 credits for students who have taken GEL 002. GE credit: SE, SL, WE. Effective: 2013 Fall Quarter.

GEL 002—Earth System Science (3)
Lecture—3 hours. Solid and fluid earth and its place in the solar system. How the solid earth interacts with the atmosphere, hydrosphere, biosphere, and extraterrestrial environment. Only 2 units credit for students who have taken GEL 050; only 2 units credit for students who have taken GEL 001. GE credit: SE, SL. Effective: 2017 Winter Quarter.

GEL 002G—The Blue Planet: Introduction to Earth Science - Discussion (1) ***Review all entries***
Discussion—1 hour. Prerequisite(s): GEL 002 (can be concurrent); GEL 002 required concurrently. Small group discussion and preparation of short papers for course 2. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 002G—Earth System Science Discussion (1) ***Review all entries***
Discussion—1 hour. Prerequisite(s): GEL 002 (can be concurrent); GEL 002 required concurrently. Small group discussion and preparation of short papers for GEL 002. GE credit: SE. Effective: 2018 Fall Quarter.

GEL 003—History of Life (3)
Lecture—3 hours. Prerequisite(s): GEL 001 recommended. The history of life during the three and onehalf billion years from its origin to the present day. Origin of life and processes of evolution; how to visualize and understand living organisms from their fossil remains. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 003G—History of Life: Discussion (1)
Discussion—1 hour. Prerequisite(s): GEL 003 (can be concurrent); GEL 003 required concurrently. Small group discussion and preparation of short papers for course 3. GE credit with concurrent enrollment in course 3: Wrt. GE credit: SE, WE. Effective: 2013 Fall Quarter.

GEL 003L—History of Life Laboratory (1)
Laboratory—3 hours. Prerequisite(s): GEL 003 (can be concurrent); GEL 003 required concurrently. Exercises in understanding fossils as the clues to interpreting ancient life, including their functional morphology, paleoecology, and evolution. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 004—Evolution: Science and World View (3)
Discussion—1 hour; Lecture—2 hours. Introduction to biological evolution. Emphasis on historical development, major lines of evidence and causes of evolution; relationships between evolution and Earth history; the impact of evolutionary thought on other disciplines. GE credit: SE, SL, WE. Effective: 2013 Fall Quarter.

GEL 009—Geology Field Experience (1)
Fieldwork—1 session. Prerequisite(s): Consent of Instructor. At least one previous GEL class, or concurrent enrollment. Pass One open to non-Geology Majors only. Exposure to geologic features and earth processes in the field. Experiential instruction in earth-science concepts, spatial visualization, landscape evolution, deep time, critical thinking skills, and integrative scientific themes. One 4-5 day field trip. May be repeated up to 1 time(s) when field trip destination differs. (P/NP grading only.) GE credit: SE. Effective: 2018 Fall Quarter.

GEL 010—Modern and Ancient Global Environmental Change (3)
Lecture—3 hours. Fundamental scientific concepts underlying issues such as global warming, pollution, and the future of nonsustainable resources presented
in the context of anthropogenic processes as well as natural forcing of paleoenvironmental change throughout Earth's history. GE credit: SE, SL, VL. Effective: 2013 Fall Quarter.

GEL 012—Evolution and Paleobiology of Dinosaurs (2)
Lecture—2 hours. Introduction to evolutionary biology, paleobiology, ecology and paleoecology, using dinosaurs as case studies. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 016—The Oceans (3)
Lecture—3 hours. Introductory survey of the marine environment. Oceanic physical phenomena, chemical constituents and chemistry of water, geological history, the seas biota and human utilization of marine resources Not open for credit to students who have taken GEL 116. GE credit: SE, SL. Effective: 2013 Fall Quarter.

GEL 016G—The Oceans: Discussion (2)
Discussion/Laboratory—2 hours; Term Paper/Discussion—4 hours. Prerequisite(s): GEL 016 (can be concurrent) Scientific method applied to discovery of the processes, biota and history of the oceans. Group discussion and preparation of term paper. Not open for credit to students who have taken GEL 116G. GE credit: SE, WE. Effective: 2016 Fall Quarter.

GEL 017—Earthquakes and Other Earth Hazards (2)
Lecture—2 hours. Impact of earthquakes, tsunami, volcanoes, landslides, and floods on humans, structures, and the environment. Discussion of the causes and effects of disasters and catastrophes, and on prediction, preparation, and mitigation of natural hazards. GE credit: SE, SL. Effective: 2013 Fall Quarter.

GEL 018—Energy and the Environment (3)
Lecture—3 hours. Conventional and alternative energy resources and their environmental impacts. Basic principles, historical development, current advantages and disadvantages, future prospects. Oil, natural gas, coal, nuclear, wind, geothermal, water, tidal, solar, hydrogen, and other sources of energy for the 21st century. GE credit: SE, SL, WE. Effective: 2013 Fall Quarter.

GEL 018V—Energy and the Environment (3)
Web Electronic Discussion—1.5 hours; Web Virtual Lecture—1.5 hours. Conventional and alternative energy resources and their environmental impacts. Basic principles, historical development, current advantages and disadvantages, future prospects. Oil, natural gas, coal, nuclear, wind, geothermal, water, tidal, solar, hydrogen, and other sources of energy for the 21st century. GE credit: SE, SL, WE. Effective: 2015 Winter Quarter.

GEL 020—Geology of California (2)
Lecture—2 hours. The geologic history of California, the origin of rocks and the environments in which they were formed, the structure of the rocks and the interpretation of their structural history, mineral resources, and appreciation of the California landscape. Offered in alternate years. GE credit: SE, SL, VL. Effective: 2013 Fall Quarter.

GEL 025—Geology of National Parks (3)
Lecture—3 hours. Appreciation of the geologic framework underlying the inherent beauty of U.S. National Parks. Relationship of individual parks to geologic processes such as mountain building, volcanism, stream erosion, glacial action and landscape evolution. GE credit: SE, SL, VL. Effective: 2014 Winter Quarter.

GEL 025V—Geology of National Parks (3)
Web Electronic Discussion—2 hours; Web Virtual Lecture—1 hour. Appreciation of the geologic framework underlying the inherent beauty of U.S. National Parks. Relationship of individual parks to geologic processes such as mountain building, volcanism, stream erosion, glacial action and landscape evolution. No credit for students who have completed GEL 025. GE credit: SE. Effective: 2015 Spring Quarter.

GEL 028—Astrobiology (3)
Lecture—3 hours. Origin, evolution and distribution of life in our solar system and the Universe. Detecting habitable worlds, Drake equations, necessities and raw materials for life, philosophical implications of the search for life elsewhere. GE credit: SE, SL. Effective: 2013 Fall Quarter.

GEL 030—Fractals, Chaos and Complexity (3)
Lecture/Discussion—3 hours. Prerequisite(s): MAT 016A or MAT 021A Modern ideas about the unifying ideas of fractal geometry, chaos and complexity. Basic theory and applications with examples from physics, earth sciences, mathematics, population dynamics, ecology, history, economics, biology, computer science, art and architecture. Offered in alternate years. (PHY 030.) GE credit: QL, SE. Effective: 2013 Fall Quarter.

GEL 032—Volcanoes (3)
Lecture—3 hours. Role of eruptions, and eruptive products of volcanoes in shaping the planet's surface, influencing its environment, and providing essential human resources. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 035—Rivers (3)
Lecture—3 hours. Introduction to geomorphology, climate and geology of rivers and watersheds, with case examples from California. Assessment of impacts of logging, agriculture, mining, urbanization and water supply on river processes. Optional river field trips. GE credit: SE, SL. Effective: 2013 Fall Quarter.

GEL 036—The Solar System (4)
Discussion—1 hour; Lecture—3 hours. Nature of the sun, moon, and planets as determined by recent manned and unmanned exploration of the solar system.Comparison of terrestrial, lunar, and planetary geological processes. Search for life on other planets. Origin and evolution of the solar system. (Former course 113-113G.) GE credit: SE, VL, WE. Effective: 2013 Fall Quarter.

GEL 050—Physical Geology (3)
Lecture—3 hours. Prerequisite(s): High school physics and chemistry. The Earth, its materials, its internal and external processes, its development through time by sea-floor spreading and global plate tectonics. Students with credit for GEL 001 or the equivalent may receive only 2 units for GEL 050. GE credit: SE, SL. Effective: 2013 Fall Quarter.

GEL 050L—Physical Geology Laboratory (2)
Laboratory—6 hours. Prerequisite(s): GEL 050 (can be concurrent) Introduction to classification and recognition of minerals and rocks and to interpretation of topographic and geologic maps and aerial photographs. Students with credit for GEL 001L or the equivalent may receive only 1 unit for GEL 050L. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 060—Earth Materials: Introduction (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 002A; (MAT 016A or MAT 017A or MAT 021A); (GEL 001 or GEL 050, GEL 050L) Physical and chemical properties of rocks, minerals and other earth materials; structure and composition of rock-forming minerals; formation of minerals by precipitation from silicate liquids and aqueous fluids and by solid state transformations. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 062—Optical Mineralogy (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): GEL 060 (can be concurrent) Optical properties of inorganic crystals; techniques of mineral identification using the polarizing microscope; strategies for studying rocks in thin section. GE credit: SE, VL. Effective: 2016 Fall Quarter.

GEL 081—Learning in Science and Mathematics (2)
Fieldwork—2 hours; Lecture/Discussion—2 hours. Limited to 26 students per section. Exploration of how students learn and develop understanding in science and mathematics classrooms. Introduction to case studies and interview techniques and their use in K-6 classrooms to illuminate factors that affect student learning. (EDU 081.) (P/NP grading only.) GE credit: SS, VL, WE. Effective: 2013 Fall Quarter.

GEL 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Work-learn experience on and off campus in all subject areas offered by the department. Internships supervised by a member of the faculty. May be repeated up to 12 unit(s). (P/NP grading only.) GE credit: SE. Effective: 2013 Fall Quarter.

GEL 098—Directed Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Directed group study. May be repeated up to 3 time(s) content changes. (P/NP grading only.) GE credit: SE. Effective: 2013 Fall Quarter.

GEL 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. Special study for undergraduates. (P/NP grading only.) GE credit: SE. Effective: 2013 Fall Quarter.

GEL 101—Structural Geology (3)
Lecture—3 hours. Prerequisite(s): GEL 050; GEL 050L; (PHY 007A or PHY 009A); (MAT 016A or MAT 017A or MAT 021A); Consent of Instructor. Class size limited to 35 students. Study of processes and products of rock deformation. Introduction to structural geology through a survey of the features and geometries of faults and folds, techniques of strain analysis, and continuum mechanics of rock deformation. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 101L—Structural Geology Lab (2)
Fieldwork—2 hours; Laboratory—6 hours. Prerequisite(s): GEL 050; GEL 050L; (PHY 007A or PHY 009A); GEL 101 (can be concurrent); Consent of Instructor. Class size limited to 15 students per session. Laboratory study of the processes and products of rock deformation. Introduction to the practice of structural geology through observations and analysis of rock deformation, including field measurement techniques and geologic mapping. GE credit: SE, VL. Effective: 2016 Fall Quarter.

GEL 103—Field Geology (3)
Fieldwork; Laboratory. Prerequisite(s): GEL 101L; GEL 101; Consent of Instructor. Field mapping projects and writing geological reports. Weekly classroom meetings devoted to preparation of maps, cross sections, stratigraphic sections, rock descriptions, and reports. Seven-eight days on weekends during quarter. GE credit: SE, VL, WE. Effective: 2016 Fall Quarter.

GEL 105—Earth Materials: Igneous Rocks (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): GEL 060; GEL 062; (MAT 016A or MAT 017A or MAT 021A); CHE 002B (can be concurrent) Origin and occurrence of igneous rocks. Laboratory exercises emphasize the study of these rocks in hand specimen and thin section. GE credit: SE, WE. Effective: 2016 Fall Quarter.

GEL 106—Earth Materials: Metamorphic Rocks (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): GEL 105 Physical and chemical properties of metamorphic rocks; interpretation of metamorphic environments. Laboratory exercises emphasize the study of these rocks in hand specimen and thin section. GE credit: SE, WE. Effective: 2016 Fall Quarter.

GEL 107—Earth History: Paleobiology (3)
Lecture—3 hours. Prerequisite(s): GEL 003 or BIS 002A or BIS 010 Evolution and ecological structure of the biosphere from the origin of life to the present. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 107L—Earth History: Paleobiology Laboratory (2)
Laboratory—6 hours. Prerequisite(s): (GEL 003, GEL 003L) or BIS 002B; GEL 107 (can be concurrent) Exercises in determining the ecological functions and evolution of individuals, populations, and communities of fossil organisms in field and laboratory. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 108—Earth History: Paleoclimates (3)
Lecture—3 hours. Prerequisite(s): (GEL 001 or GEL 050 or GEL 116N or ESP 116N); CHE 002A; Consent of Instructor. Geological and environmental factors controlling climate change, the greenhouse effect with a detailed analysis of the history of Earth's climate fluctuations over the last 600 million years. Past and present climate records are used to examine potential future climatic scenarios. GE credit: SE, SL, WE. Effective: 2016 Fall Quarter.

GEL 109—Earth History: Sediments and Strata (2)
Lecture—2 hours. Prerequisite(s): GEL 050; GEL 050L Principles of stratigraphic and sedimentologic analysis. Evaluation of historical and modern global changes in sedimentation within terrestrial and marine environments. Examination of the plate tectonic, climatic and oceanographic factors controlling the distribution and exploitation of economic fluids within sedimentary rocks. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 109L—Earth History: Sediments and Strata Laboratory (2)
Laboratory—6 hours. Prerequisite(s): GEL 109 (can be concurrent) Methods of stratigraphic and sedimentologic analysis of modern and ancient sediments. Identification of major sediment and sedimentary rock types. Outcrop and subsurface analysis of sedimentary basins. GE credit with concurrent enrollment in course 109. Includes four one-day field trips. GE credit: SE, WE. Effective: 2016 Fall Quarter.

GEL 110—Summer Field Geology (8)
Fieldwork. Prerequisite(s): GEL 060; GEL 103; GEL 109; GEL 105 recommended. Advanced application of geologic and geophysical field methods to the study of rocks. Includes development and interpretation of geologic maps and cross sections; gravity, magnetic, electrical resistivity and seismic surveys; and field analysis of plutonic and volcanic rock suites. Eight hours/day, six days/week for six weeks. GE credit: SE, VL, WE. Effective: 2017 Spring Quarter.

GEL 115—Earth Science, History, and People (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): GEL 001 or GEL 050 Study of interplay between the Earth and its human inhabitants through history, including consideration of acute events such as earthquakes and eruptions as well as the geology of resources, topography, and water. GE credit: OL, SE, WE. Effective: 2017 Winter Quarter.

GEL 116N—Oceanography (3)
Fieldwork; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): GEL 001 or GEL 002 or GEL 016 or GEL 050 Advanced oceanographic topics: Chemical, physical, geological, and biological processes; research methods and data analysis; marine resources, anthropogenic impacts, and climate change; integrated earth/ocean/atmosphere systems; weekly lab and one weekend field trip. (ESP 116N.) GE credit: SE, SL. Effective: 2017 Winter Quarter.

GEL 120—Origins: From the Big Bang to Today (3)
Lecture—3 hours. Limited enrollment. Long-term and large-scale perspectives on the origins of the universe, stars and planets, life, human evolution, the rise of civilization and the modern world. Multi-disciplinary approach to 'Big History' involving cosmology, astronomy, geology, climatology, biology, anthropology, archeology and traditional history. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 130—Non-Renewable Natural Resources (3)
Lecture—3 hours. Prerequisite(s): GEL 001 or GEL 050 Origin, occurrence, and distribution of non-renewable resources, including metallic, nonmetallic, and energy-producing materials. Problems of discovery, production, and management. Estimations and limitations of reserves, and their sociological, political, and economic effects. GE credit: SE, SL. Effective: 2016 Fall Quarter.

GEL 131—Risk: Natural Hazards and Related Phenomena (3)
Lecture—3 hours. Risk, prediction, prevention and response for earthquakes, volcanic eruptions, landslides, floods, storms, fires, impacts, global warming. GE credit: SE, SL. Effective: 2016 Fall Quarter.

GEL 132—Introductory Inorganic Geochemistry (3)
Lecture—3 hours. Prerequisite(s): GEL 060 (can be concurrent); CHE 002B Nucleosynthesis of chemical elements, physical and chemical properties of elements, ionic substitution, elemental partition, distribution and transport among planetary materials, basic thermodynamics and phase diagrams, isotopic geochronometers, stable isotope fractionation, mixing and dilution, advection and diffusion, geochemical cycles. Effective: 2016 Fall Quarter.

GEL 134—Environmental Geology and Land Use Planning (3)
Lecture—3 hours. Prerequisite(s): GEL 001 or GEL 050; Consent of Instructor. One course in Geology. Geologic aspects of land use and development planning. Geologic problems concerning volcanic and earthquake hazards, land stability, floods, erosion, coastal hazards, non-renewable resource extraction, waste disposal, water resources. GE credit: SE, WE. Effective: 2016 Fall Quarter.

GEL 136—Ecogeomorphology of Rivers and Streams (5)
Discussion/Laboratory—2 hours; Fieldwork; Lecture—1 hour; Term Paper. Prerequisite(s): Consent of Instructor. Upper division or graduate standing in any physical science, biological science, or engineering. Restricted to advanced students in the physical sciences, biological sciences, or engineering. Integrative multidisciplinary field analysis of streams. Class project examines hydrology, geomorphology, water quality and aquatic and riparian ecology of degraded and pristine stream systems. Includes cooperative two-week field survey in remote wilderness settings with students from diverse scientific backgrounds. GE credit: SE, WE. Effective: 2013 Fall Quarter.

GEL 138—Introductory Volcanology (4)
Fieldwork—6 hours; Lecture—2 hours. Prerequisite(s): GEL 060; GEL 109; Consent of Instructor. Principles of physical and chemical volcanology. Taught in a volcanically active setting (e.g., Hawaii) with a strong field component. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 139—Rivers: Form, Function and Management (4)
Fieldwork—3 hours; Lecture—3 hours. Prerequisite(s): GEL 050 or GEL 050L; MAT 016B or 021B recommended. Analysis of river form and processes, emphasis on fluvial geomorphology, and river and stream restoration; case studies to illustrate concepts and applications. Two weekend field trips required. Offered irregularly. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 140—Introduction to Process Geomorphology (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (GEL 001 or GEL 050); (MAT 016B or MAT 021B) Quantitative description and interpretation of landscapes with emphasis on the relationships between physical processes, mass conservation, and landform evolution. Topics covered include physical and chemical weathering, hillslopes, debris flows, fluvial systems, alluvial fans, pedogenesis, eolian transport, glaciation and Quaternary geochronology. Effective: 2016 Fall Quarter.

GEL 141—Evolutionary History of Vertebrates (3)
Lecture—3 hours. Prerequisite(s): GEL 003 or BIS 002A Evolutionary history of vertebrates; fossil record and phylogeny; timing of major evolutionary events; appearance of major vertebrate groups; physical constraints in vertebrate evolution; paleobiogeography of vertebrates; effect of continental movement on vertebrate evolution; dinosaurs and other strange vertebrates. Offered in alternate years. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 141L—Evolutionary History of Vertebrates Laboratory (1)
Laboratory—3 hours. Prerequisite(s): GEL 141 (can be concurrent) Augments lecture course 141 through handling of specimens enabling in-person examination of three dimensional features observed in vertebrate skeletons, both fossil and living. Offered in alternate years. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 142—Basin Analysis (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): GEL 050; GEL 050L; GEL 109 Analysis of sedimentary basins from initiation to maturity, including controls on sedimentary fill, subsidence analysis, sequence stratigraphy, core logs, and applications to petroleum exploration and hydrology. One two-day field trip. Offered irregularly. GE credit: SE, VL. Effective: 2013 Fall Quarter.

GEL 143—Advanced Igneous Petrology (5)
Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): GEL 105; (MAT 016C or MAT 021C); CHE 002C Physical and chemical properties of magmatic environments and processes of igneous rock formation. Laboratory study of representative igneous rocks. Offered irregularly. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 144—Historical Ecology (3)
Lecture—3 hours. Prerequisite(s): Upper division course in environmental science or ecology, or an introductory course in paleobiology. Ancient ecosystems and the factors that caused them to change. Species, expansion, evolution of new modes of life, geologically induced variations in resource supply, and extinction provide historical perspective on the biosphere of future. GE credit: SE, WE. Effective: 2013 Fall Quarter.

GEL 145—Advanced Metamorphic Petrology (5)
Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): GEL 106; (HYD 134 or CHE 002C); (MAT 016C or MAT 021C) Metamorphic processes and the origin of metamorphic rocks. Laboratory study of representative rock suites. Offered irregularly. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 146—Radiogenic Isotope Geochemistry and Cosmochemistry (3)
Lecture—3 hours. Prerequisite(s): CHE 002C; PHY 007C; MAT 016C Basic principles of nuclear chemistry and physics applied to geology to determine the ages of terrestrial rocks, meteorites, archeological objects, age of the Earth, to trace geological/environmental processes, and explain formation of the chemical elements in the Universe. Offered irregularly. GE credit: QL, SE. Effective: 2013 Fall Quarter.

GEL 147—Geology of Ore Deposits (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (CHE 002C or HYD 134); GEL 060; GEL 062; GEL 105 Tectonic, lithologic and geochemical setting of major metallic ore deposit types emphasizing ore deposit genesis, water/rock interaction and the environmental effects of mining. Offered irregularly. GE credit: QL, SE. Effective: 2013 Fall Quarter.

GEL 148—Stable Isotopes and Geochemical Tracers (3)
Lecture—3 hours. Prerequisite(s): (CHE 002C or HYD 134); GEL 050; GEL 050L; GEL 060 Use of oxygen and hydrogen isotopes in defining hydrologic processes; carbon, nitrogen, and sulfur isotopes as indicators of exchange between the lithosphere, hydrosphere, atmosphere and biosphere. Radiogenic, cosmogenic, and noble gas isotope tracers. Offered irregularly. GE credit: QL, SE. Effective: 2013 Fall Quarter.

GEL 149—Geothermal Systems (3)
Fieldwork; Lecture—3 hours. Prerequisite(s): GEL 050; GEL 050L; CHE 002B Geology, geochemistry, and geophysics of geothermal systems, including electrical power generation and direct use applications. Includes one day field trip on a weekend during the quarter. Offered irregularly. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 150A—Physical and Chemical Oceanography (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (ESP 116N or GEL 116N); PHY 009B; MAT 021D; CHE 002C; and Consent of Instructor. Physical and chemical properties of seawater, fluid dynamics, air-sea interaction, currents, waves, tides, mixing, major oceanic geochemical cycles. (ESO 150A.) GE credit: QL, SE. Effective: 2017 Winter Quarter.

GEL 150B—Geological Oceanography (3)
Lecture—3 hours. Prerequisite(s): GEL 050 or (GEL 116N or ESP 116N) Introduction to the origin and geologic evolution of ocean basins. Composition and structure of oceanic crust; marine volcanism; and deposition of marine sediments. Interpretation of geologic history of the ocean floor in terms of sea-floor spreading theory. (ESP 150B.) GE credit: SE. Effective: 2017 Winter Quarter.

GEL 150C—Biological Oceanography (4)
Discussion—1 hour; Fieldwork; Lecture—3 hours. Prerequisite(s): BIS 002A; Consent of Instructor. A course in general ecology. Ecology of major marine habitats, including intertidal, shelf benthic, deep-sea and plankton communities. Existing knowledge and contemporary issues in research. Segment devoted to human use. One weekend field trip required. (ESP 150C.) GE credit: SE, SL. Effective: 2017 Winter Quarter.

GEL 152—Paleobiology of Protista (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): GEL 107 or BIS 002A; Consent of Instructor. Morphology, systematics, evolution, and ecology of single-celled organisms that are preserved in the fossil record. Offered irregularly. GE credit: SE. Effective: 2016 Fall Quarter.

GEL 156—Hydrogeology and Contaminant Transport (5)
Laboratory—3 hours; Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): HYD 145; ECI 144; Or equivalent of ECI 144. Physical and chemical processes affecting groundwater flow and contaminant transport, with emphasis on realistic hydrogeologic systems. Groundwater geology and chemistry. Fundamentals of groundwater flow and transport analysis. Laboratory includes field pumping test and work with physical and computer models. (HYD 146.) GE credit: SE. Effective: 2013 Fall Quarter.

GEL 160—Geological Data Analysis (3)
Lecture/Discussion—3 hours. Prerequisite(s): MAT 021A Introduction to quantitative methods in analyzing geological data including basic principles of statistics and probability, error analysis, hypothesis testing, inverse theory, time series analysis and directional data analyses. Use of computer in lectures and homework. GE credit: QL, SE. Effective: 2016 Fall Quarter.

GEL 161—Geophysical Field Methods (3)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): MAT 021C; (GEL 001 or GEL 050); (PHY 007C or PHY 009C) Geophysical methods applied to determining subsurface structure in tectonics, hydrogeology, geotechnical engineering, hydrocarbon and mineral exploration. Theory, survey design and interpretation of gravity, electrical resistivity, electromagnetic, reflection and refraction seismology, and ground-penetrating radar measurements. GE credit: QL, SE. Effective: 2016 Fall Quarter.

GEL 162—Geophysics of the Solid Earth (3)
Lecture—3 hours. Prerequisite(s): MAT 021C; (PHY 007C or PHY 009C); Consent of Instructor. Theory and use of physics in the study of the solid earth. Gravity, magnetism, paleomagnetism, and heat flow. Application to the interpretation of the regional and large-scale structure of the earth and to plate tectonics. Offered irregularly. GE credit: QL, SE. Effective: 2016 Fall Quarter.

GEL 163—Planetary Geology and Geophysics (3)
Lecture—3 hours. Prerequisite(s): MAT 021C; (PHY 007C or PHY 009C); (GEL 050 or GEL 036 or AST 010G or AST 010L or AST 010S); Consent of Instructor. Principles of planetary science. Planetary dynamics, including orbital mechanics, tidal interactions and ring dynamics. Theory of planetary interiors, gravitational fields, rotational dynamics. Physics of planetary atmospheres. Geological processes, landforms and theirmodification. Methods of analysis from Earth-based observations and spacecraft. GE credit: QL, SE. Effective: 2016 Fall Quarter.

GEL 175— Advanced Field Geology (3)
Discussion—3 hours; Fieldwork—6 hours. Prerequisite(s): Consent of Instructor. Advanced field studies of selected geologic terrains, interpretation and discussion of field observations. Offered irregularly. May be repeated up to 2 time(s) when instructors varies. (P/NP grading only.) GE credit: SE. Effective: 2013 Fall Quarter.

GEL 181—Teaching in Science and Mathematics (2)
Fieldwork—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Major in mathematics, science, or engineering; or completion of a one-year sequence of science or calculus. Class size limited to 40 students per section. Exploration of effective teaching practices based on examination of how middle school students learn math and science. Selected readings, discussion and field experience in middle school classrooms. (EDU 181.) (P/NP grading only.) GE credit: SS, WE. Effective: 2013 Fall Quarter.

GEL 182—Field Studies in Marine Geochemistry (2-8)
Fieldwork—6-40 hours; Laboratory—1-3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Marine geochemistry with the opportunity of going to sea or into the field on land. Techniques of sea-floor mapping using bottom photography, marine geochemical sampling, and method of data reduction and sample analysis. Analysis of data/samples collected. Offered irregularly. GE credit: SE. Effective: 2013 Fall Quarter.

GEL 183—Teaching High School Mathematics and Science (3) ***Review all entries***
Fieldwork; Lecture/Discussion—2 hours. Prerequisite(s): Major in mathematics, science, or engineering; or consent of instructor with completion of a one-year sequence of science or calculus. Limited to 40 students per section. Exploration and creation of effective teaching practices based on examination of how high school students learn mathematics and science. Field experience in high school classrooms. (Education 183.) GE credit: OL, SS, WE. Effective: 2017 Fall Quarter.

GEL 183—Teaching High School Mathematics and Science (3) ***Review all entries***
Fieldwork; Lecture/Discussion—2 hours. Prerequisite(s): Major in mathematics, science, or engineering; or completion of a one-year sequence of science or calculus and consent of the instructor. Limited to 40 students per section. Exploration and creation of effective teaching practices based on examination of how high school students learn mathematics and science. Field experience in high school classrooms. (EDU 183.) GE credit: OL, SS, WE. Effective: 2018 Fall Quarter.

GEL 185A—Conceptual Integrated Science for Non-Science Majors: The Physical World (2)
Discussion/Laboratory—3 hours; Lecture—1 hour. Conceptual, inquiry-based integrated science course. Topics in the Next Generation Science Standards. Elementary school level teaching practice. Physics, chemistry, and science inquiry. GE credit: SE, SL. Effective: 2017 Winter Quarter.

GEL 185B—Conceptual Integrated Science for Non-Science Majors: Earth System Science (2)
Discussion/Laboratory—3 hours; Lecture—1 hour. Conceptual, inquiry-based integrated science course. Topics in the Next Generation Science Standards. Elementary school level teaching practice. Earth, space and environmental science, and science inquiry. GE credit: SE, SL. Effective: 2016 Fall Quarter.

GEL 186—Facilitating Learning in STEM Classrooms (1)
Lecture/Discussion—1 hour. STEM Learning Assistant Seminar. Theoretical and practical issues of effective teaching in discussion/labs: student-centered, active, cooperative learning environments, responsive teaching, and differentiated classroom instruction. GE credit: SS. Effective: 2016 Fall Quarter.

GEL 190—Seminar in Geology (1)
Discussion—1 hour; Seminar—1 hour. Presentation and discussion of current topics in geology by visiting lecturers, staff, and students. Written abstracts. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 2016 Fall Quarter.

GEL 192—Internship in Geology (1-12)
Internship. Prerequisite(s): Upper division standing; project approval prior to internship. Supervised work experience in geology. May be repeated for credit for a total of 10 units. May be repeated up to 10 unit(s). (P/NP grading only.) GE credit: SE. Effective: 2013 Fall Quarter.

GEL 194A—Senior Thesis (3)
Variable. Prerequisite(s): Open to Geology majors who have completed 135 units and who do not qualify for the Honors Program. Guided independent study of a selected topic, leading to the writing of a senior thesis. GE credit: SE, WE. Effective: 2013 Fall Quarter.

GEL 194B—Senior Thesis (3)
Variable. Prerequisite(s): Open to Geology majors who have completed 135 units and who do not qualify for the Honors Program. Guided independent study of a selected topic, leading to the writing of a senior thesis. GE credit: SE, WE. Effective: 2013 Fall Quarter.

GEL 194HA—Senior Honors Project (3)
Independent Study—9 hours. Prerequisite(s): Open to Geology majors who have completed 135 units and who qualify for the Honors Program. Guided independent study of a selected topic, leading to the writing of an honors thesis. GE credit: SE, WE. Effective: 2013 Fall Quarter.

GEL 194HB—Senior Honors Project (3)
Independent Study—9 hours. Prerequisite(s): Open to Geology majors who have completed 135 units and who qualify for the Honors Program. Guided independent study of a selected topic, leading to the writing of an honors thesis. GE credit: SE, WE. Effective: 2013 Fall Quarter.

GEL 198—Directed Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Senior standing in Geology or consent of instructor. Group study focused on topics in Geology. (P/NP grading only.) GE credit: SE. Effective: 2016 Spring Quarter.

GEL 199—Special Study for Advanced Undergraduates (1-5)
Variable. Special study for advanced undergraduates. (P/NP grading only.) GE credit: SE. Effective: 2013 Fall Quarter.

GEL 205—Advanced Field Stratigraphy (3)
Fieldwork—2 hours; Lecture—1 hour. Prerequisite(s): GEL 109; GEL 110; or Consent of Instructor. GEL 206 recommended. Fieldwork over spring break. Application of stratigraphic techniques to research problems. Collection, compilation, and interpretation of field data. Integration of data with models for deposition and interpretations of Earth history. Topics will vary. Offered irregularly. May be repeated for credit. Effective: 2013 Fall Quarter.

GEL 206—Stratigraphic Analysis (3)
Lecture—3 hours. Prerequisite(s): GEL 109; GEL 109L; or Consent of Instructor. GEL 144 recommended. Topics in advanced methods of stratigraphic analysis, regional stratigraphy and sedimentation, and sedimentary basin analysis. Emphasis on techniques used to interpret stratigraphic record and on current issues in stratigraphy and sedimentation. Offered irregularly. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

GEL 214—Active Tectonics (3)
Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Active deformation associated with faults, landslides, and volcanoes. Geodetic measurement techniques such as triangulation, trilateration, leveling, Global Positioning System (GPS), and radar interferometry. GPS data acquisition and analysis. Inversion of geodetic data and mechanical models of crustal deformation. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 216—Tectonics (3)
Lecture/Discussion—3 hours. Prerequisite(s): GEL 101; or Consent of Instructor. Nature and evolution of tectonic features of the Earth. Causes, consequences, and evolution of plate motion, with selected examples from the Earth's deformed belts. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 217—Topics in Geophysics (3)
Lecture—1 hour; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Discussion and evaluation of current research in a given area of geophysics. Topic will change from year to year. Offered in alternate years. May be repeated for credit. Effective: 2013 Fall Quarter.

GEL 218—Analysis of Structures in Deformed Rocks (3)
Seminar—3 hours. Prerequisite(s): GEL 100; GEL 100L; GEL 101; GEL 101L; GEL 170; or Consent of Instructor. Recent advances in the understanding and analysis of structures in brittlely and ductilely deformed rocks. Detailed investigation of the characteristics of the structures, models for their formation, and applications to inferring the kinematics of larger scale tectonics. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 219—Fracture and Flow of Rocks (3)
Lecture—3 hours. Prerequisite(s): GEL 100; GEL 101; or Consent of Instructor. Origins of those structures in rocks associated with brittle and ductile deformation. Theoretical analysis, using continuum mechanics, and experimental evidence for the origin of the structures with emphasis on deformational processes in the earth. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 220—Mechanics of Geologic Structures (3)
Lecture—3 hours. Prerequisite(s): MAT 021C; (PHY 009A; or PHY 005A); GEL 170; or Consent of Instructor; MAT 021D and MAT 022A recommended. Development in tensor notation of the balance laws of continuum mechanics, and constitutive theories of elasticity, viscosity, and plasticity and their application to understanding development of geologic structures such as fractures, faults, dikes, folds, foliations,
and boudinage. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 226—Advanced Sedimentary Petrology (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): GEL 144; or Consent of Instructor. Advanced petrography and geochemistry of sediments and sedimentary rocks. Geochemical, textural and mineralogical evolution of sedimentary rocks reflecting depositional or burial processes. Laboratory work emphasizes thin section study of rocks. Offered irregularly. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

GEL 227—Stable Isotopes Biogeochemistry (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Discussion and application of stable isotope techniques for scientific research problems. Course emphasizes carbon, oxygen, nitrogen, hydrogen and sulfur isotopes. Laboratory will develop basic skills of cryogenic gas extraction and specific techniques for individual research using stable isotopes. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 228—Topics in Paleoceanography (3)
Lecture—3 hours. Prerequisite(s): GEL 108; GEL 150A; or Consent of Instructor. Critical discussion and review of selected topics in paleoceanography and paleoclimatology relating to the history of the processes controlling and affecting climate change and ocean circulation throughout the geologic record. Topics vary. Offered irregularly. May be repeated for credit. Effective: 2013 Fall Quarter.

GEL 230—Geomorphology and River Management (3)
Seminar—3 hours. Prerequisite(s): GEL 139; Or equivalent; graduate standing. Impacts of management and land use activities on the geomorphology of rivers and streams. Evaluation and use of analytical tools for river assessment. Assessment of river and stream restoration strategies and emerging issues in river management. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

GEL 232—The Oceans and Climate Change (3)
Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Modern climate change and linkages between the ocean-atmosphere-cryosphere-terrestrial climate system. Importance of the ocean in forcing climate change, and the impacts of anthropogenic processes on the ocean. Topics vary. Offered irregularly. May be repeated up to 3 time(s). Effective: 2013 Fall Quarter.

GEL 235—Surface Processes (3)
Seminar—3 hours. Prerequisite(s): GEL 050; GEL 050L; GEL 139; MAT 021B or MAT 016B recommended. Recent advances in the analysis of landforms and their evolution. Detailed investigation of the tools used to document surface processes. Evaluation of concepts and processes that govern landscape evolution. Offered irregularly. May be repeated for credit. Effective: 2013 Fall Quarter.

GEL 236—Inverse Theory in Geology and Geophysics (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Inversion of data for model parameters. Evaluation of parameter uncertainties. Linear and nonlinear problems for discrete and continuous models. Bakus-Gilbert inversion. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 238—Theoretical Seismology (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Elastodynamic wave equation. Greens functions and source representations. Ray theory. Plane and spherical waves and boundary conditions. Elastic wave propagation in stratified media. (P/F grading only.) Effective: 2013 Fall Quarter.

GEL 240—Geophysics of the Earth (3)
Lecture—3 hours. Prerequisite(s): PHY 009B; MAT 022B Physics of the earth's crust, mantle, and core. Laplace's equation and spherical harmonic expression of gravity and magnetic fields. Elastic wave equation in geologic media. Body and surface seismic waves. Equations of state, thermal structure of the earth. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 241—Geomagnetism (3)
Lecture—3 hours. Prerequisite(s): Graduate standing. Nature and origin of the Earth's magnetic field. Present field and recent secular variation. Spherical harmonic analysis. Paleosecular variation. Polarity transitions and geomagnetic excursions. Statistics of polarity intervals. Dynamo theory. Planetary magnetism. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 242—Paleomagnetism (3)
Lecture—3 hours. Prerequisite(s): Graduate standing. Principles and applications of paleomagnetism. Physical basis of rock and mineral magnetism. Field and laboratory techniques. Instrumentation. Analysis of paleomagnetic data. Statistical methods. Rock magnetic properties. Geological and geophysical applications. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 246—Physical Chemistry of Metamorphic Processes (3)
Lecture—3 hours. Prerequisite(s): GEL 145; CHE 110A; or Consent of Instructor. Physiochemical principles of metamorphic mineral assemblages and methods of interpreting the paragenesis of metamorphic rocks. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 247—Metamorphic Petrology Seminar (3)
Seminar—3 hours. Prerequisite(s): GEL 145; or Consent of Instructor. GEL 246 recommended. Selected topics in metamorphic petrology (e.g., mass transport processes, tectonic settings, geothermometry, thermal structure of metamorphic belts, regional studies). Offered irregularly. May be repeated for credit. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 250—Advanced Geochemistry Seminar (3)
Seminar—3 hours. Prerequisite(s): GEL 146; or Consent of Instructor. Critical review of selected topics in geochemistry including: ore genesis, hydrothermal and geothermal fluids, recent and ancient sediments, isotope geology, origin and chemistry of the oceans. Subject varies yearly depending on student interest. May be repeated for credit. May be repeated for credit. Effective: 2013 Fall Quarter.

GEL 251—Advanced Topics in Isotope Geochemistry and Cosmochemistry (3)
Lecture/Discussion—2 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Astrophysical context on origin of Solar System, synthesis of chemical elements, condensation sequence, star and planet formation, cosmochronology, building blocks of planets, development on planets' layered structure, atmosphere and hydrosphere and the role of comets/asteroids for volatile delivery. Offered irregularly. May be repeated up to 3 time(s) when topics differs. Effective: 2013 Fall Quarter.

GEL 253—Current Topics in Igneous Petrology (3)
Seminar—3 hours. Prerequisite(s): GEL 143; or Consent of Instructor. Graduate standing in Geology. Topical seminar designed to help graduate students develop and maintain familiarity with current and past literature related to igneous rock petrogenesis. May be repeated for credit when topic differs. May be repeated for credit when topic differs. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 254—Physical Chemistry of Igneous Processes (3)
Lecture—3 hours. Prerequisite(s): CHE 110A; GEL 143; and Consent of Instructor. GEL 143 or consent of instructor; CHE 110B and CHE 110C recommended. Introduction of modern concepts in chemical thermodynamics and kinetics, and fluid dynamics of magmatic systems for graduate students in petrology. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 255—Experimental Petrology (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): GEL 143; or Consent of Instructor. Introduction to techniques and methods of design and executing experiments on Earth-forming minerals and rocks. Problems and examples from igneous and metamorphic petrology will be utilized. Offered irregularly. Effective: 2013 Fall Quarter.

GEL 260—Paleontology (3)
Seminar—3 hours. Prerequisite(s): Graduate standing in geology or a biological science. Selected problems in paleontology. Subject to be studied will be decided at an organizational meeting. Offered irregularly. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

GEL 261—Paleobiology Graduate Seminar 1: Evolutionary aspects (3)
Lecture—1 hour; Seminar—2 hours. Prerequisite(s): Graduate standing in Geology or a biological science; qualified undergraduates will be accepted on an exception-only basis. This course will treat one or more of several topics in paleobiology from a phylogenetic perspective, including major patterns in evolution, building the tree of life, extinction and phylogeny, phylogeny of major phyla, and the relation between taxonomy and phylogeny. May be repeated for credit when topic varies. Effective: 2013 Fall Quarter.

GEL 262—Paleobiology Graduate Seminar: Methodological aspects (3)
Lecture—1 hour; Seminar—2 hours. One or more major methods used in the study of fossils: Morphometrics and three-dimensional reconstruction of fossils, phylogenetic methodology, the application of geochemical techniques, and electron microscopy. May be repeated up to 4 time(s) topic varies. Effective: 2013 Fall Quarter.

GEL 281N—Instrumental Techniques for Earth Scientists (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): MAT 021A; MAT 021B; MAT 021C; ((PHY 007A, PHY 007B, PHY 007C) or (PHY 009A, PHY 009B, PHY 009C)); or Consent of Instructor. Laboratory research techniques for new graduate students in Geology. Demonstration of and exposure to appropriate techniques in research. Effective: 2013 Fall Quarter.

GEL 285—Field Studies in Marine Geochemistry (2-8)
Fieldwork—6-40 hours; Laboratory—1-3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Marine geochemistry with the opportunity of going to sea or into the field on land. Techniques of seafloor mapping using bottom photography, marine geochemical sampling, and method of data reduction and sample analysis. Analysis of data/samples collected. Effective: 2013 Fall Quarter.

GEL 290—Seminar in Geology (1)
Discussion—1 hour; Seminar—1 hour. Presentation and discussion of current topics in geology by visiting lecturers, staff, and students. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 291—Geology of the Sierra Nevada (1)
Seminar. Prerequisite(s): Consent of Instructor. Short oral presentations by students and faculty concerning results of their past work and plans for future work in the Sierra. A written abstract is required following the format required at professional meetings. Offered irregularly. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 292—River Forum (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Review and discussion of latest research and fundamental issues surrounding riverine systems, with emphasis on physical processes. Topics vary. Offered irregularly. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 293—Geologic Event of the Week (1)
Discussion—0.5 hours; Seminar—0.5 hours. Prerequisite(s): Graduate standing. Seminar/discussion group to review and discuss recent earthquakes, volcanic eruptions, and other significant geologic events. The focus is on understanding the available observations, the physical processes behind each event, the geological setting, and societal consequences. Offered irregularly. May be repeated up to 3 time(s) for up to 3 units. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 294—Structure/Tectonics Forum (1)
Seminar—1 hour. Prerequisite(s): Graduate student in geology or consent of instructor. Seminar/discussion group to review and discuss latest research in structural geology and tectonics, and on-going research of participants. Topics will vary each quarter depending on the interests of the group. Occasional field trips to areas of current interest. May be repeated for credit when topic differs. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 295—Geophysics Forum (1)
Discussion—0.5 hours; Seminar—0.5 hours. Prerequisite(s): GEL 100; GEL 101; or Consent of Instructor. Seminar/discussion group to review and discuss latest research in geophysics, and on-going research of participants. Topics will change each quarter depending on the interests of the group. Offered irregularly. May be repeated for credit when topic differs. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 296—Advanced Problems in Tectonics (3)
Seminar—3 hours. Prerequisite(s): GEL 101; and Consent of Instructor. Seminar dealing with current problems in tectonics of selected regions. Topics will change from year to year. Emphasis on study of recent literature. Offered irregularly. May be repeated for credit. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 297—Geophysics Forum (1)
Discussion—0.5 hours; Seminar—0.5 hours. Prerequisite(s): Graduate student status in the Geology Department, or consent of instructor. Seminar/discussion group to review and discuss latest research in geophysics, and on-going research of participants. Topics will change each quarter depending on the interests of the group. Offered irregularly. May be repeated up to 3 time(s). (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 298—Group Study (1-5)
Variable. Group study. Effective: 2013 Fall Quarter.

GEL 299—Research (1-12)
Variable. Research. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 390—Methods of Teaching Geology (2)
Extensive Writing/Discussion—2 hours. Prerequisite(s): Graduate student standing in Geology. Introduction to graduate-level writing and undergraduate-level teaching skills in geology. Persuasive (proposal) writing workshop; discussions on campus teaching resources, presenting information, managing classroom dynamics, evaluating student performance. Participation in teaching program required for Ph.D. in Geology. (S/U grading only.) Effective: 2014 Spring Quarter.

GEL 391—Ethical Issues in Earth Science (1)
Seminar—1 hour. Prerequisite(s): Graduate standing in Geology or consent of instructor. Reading and discussion of ethical issues arising in the earth sciences. Topics include scientific misconduct, gender equity in science, authorship of scientific papers, establishing priorities in research, and related issues. Offered irregularly. (S/U grading only.) Effective: 2013 Fall Quarter.

GEL 396—Teaching Assistant Training Practicum (1-4)
Variable. Teaching assistant training. May be repeated for credit. (P/NP grading only.) Effective: 2013 Fall Quarter.

GEO Geography

Courses in GEO:

GEO 200A—Research Trends in Geography (1)
Seminar—1 hour. Major current research themes and trends in geography. (S/U grading only.) Effective: 1999 Fall Quarter.

GEO 200AN—Geographical Concepts (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing in Geography or consent of instructor. Concepts and thematic content of the discipline, including contemporary research questions. A brief review of the history of geographic thought and practice is done at the beginning of the course. Effective: 2011 Fall Quarter.

GEO 200BN—Theory & Practice of Geography (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing. Class size limited to 20. Development, application, and philosophical background of theory in discipline of geography and geographical knowledge production. Similarities and differences in theories employed in physical and human geography and cartography. Geographic contributions to interdisciplinary theory bridging biophysical sciences, social sciences, and humanities. Effective: 2011 Fall Quarter.

GEO 200CN—Quantitative Geography (4)
Laboratory—6 hours; Lecture—2 hours. Class size limited to 25 students. Provides an overview of quantitative approaches in spatial data analysis. Overview of different approaches used for inference, modeling, and prediction. Also learn how to write computer programs to implement these methods. Effective: 2012 Spring Quarter.

GEO 200DN—Socio-Spatial Analysis in Geography (4)
Lecture/Discussion—4 hours. Class size limited to 25. Introduction to methodologies of socio-spatial analysis in interviews, and ethnographic fieldwork. Students develop a critical understanding of different methodological and theoretical approaches, and their appropriate applications in overall research design. Effective: 2011 Fall Quarter.

GEO 200E—Advanced Research Design in Geography (2)
Lecture/Discussion—2 hours. Prerequisite(s): GEO 200AN; GEO 200BN; GEO 200CN; GEO 200DN; Graduate standing. Class size limited to 15. Helps Ph.D. students develop their research question, design their research plan and complete a full dissertation research proposal. Effective: 2011 Fall Quarter.

GEO 201—Sources and General Literature of Geography (4)
Discussion—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing in geography. Designed for students preparing for higher degrees in geography.
May be repeated for credit in one or more of the following subfields: physical, cultural, economic, urban, historical, political, conservation, and regional geography. May be repeated for credit. Effective: 1997 Winter Quarter.

GEO 210—Topics in Biogeography (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): EVE 147 or WFC 156 (can be concurrent); Or equivalent. Consent of instructor required for undergraduates. Current topics in historical and ecological biogeography, including macroecology and areography, GIS and remote sensing, phylogeography, vegetation, plant and animal community and species geography. Systematics, climate change, and conservation will be addressed. Effective: 2004 Fall Quarter.

GEO 211—Physical Geography Traditions and Methods (3)
Discussion/Laboratory—2 hours; Term Paper. Prerequisite(s): Introductory course in physical geography. Graduate-level standing in geography or related discipline. Discussion of the physical science tradition in geography, including key concepts and current research in climatology, geomorphology, soils geography, biogeography, climate change, watershed science, and coastal studies. Research paradigms, programs, and methods as used by physical geographers will be discussed. May be repeated up to 3 time(s). Effective: 2008 Fall Quarter.

GEO 212—Water Resource Management (3)
Lecture—3 hours. Prerequisite(s): GEO 114; GEO 141; GEO; 142; GEO 153 recommended. Engineering, institutional, economic, and social basis for managing local and regional water resources. Examples in the context of California's water development and management. Uses of computer modeling to improve water management. (ECI 267.) Effective: 2013 Fall Quarter.

GEO 214—Seminar in Geographical Ecology (2)
Seminar—2 hours. Prerequisite(s): EVE 100 or EVE 101; or Consent of Instructor. Recent developments in theoretical and experimental biogeography, historical biogeography and related themes in systematics, the biology of colonizing species, and related topics. May be repeated for credit. (PBG 296.) (S/U grading only.) Effective: 2013 Spring Quarter.

GEO 215—Ecologies of Infrastructure (4)
Seminar—4 hours. Open to graduate standing or consent of instructor. Focus on design practices and theory associated with ecological conceptions of infrastructure, including networked infrastructure, region, bioregion, regionalization, ecological engineering, reconciliation ecology, novel ecosystems, and theory/articulation of landscape change. (LDA 215.) Effective: 2016 Winter Quarter.

GEO 220—Topics in Human Geography (4)
Seminar—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Class size limited to 20 students. Examination of philosophy and theory in human geography with an emphasis on contemporary debates and concepts in social, cultural, humanistic, political, and economic geographies. Specific discussion of space, place, scale and landscape; material and imagined geographies. Effective: 2016 Winter Quarter.

GEO 230—Citizenship, Democracy, & Public Space (4)
Seminar—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Introduction to seminal works in political theory, philosophy, and the social sciences that focus on citizenship and the public sphere; development of critical perspective regarding restructuring of public space in a pluralistic and global culture; discussion of contemporary case studies. (LDA 200.) Effective: 2012 Fall Quarter.

GEO 233—Urban Planning and Design (4)
Discussion—2 hours; Lecture—2 hours. Limited to graduate students. Regulation, design, and development of the built landscape, planning and land development processes, zoning and subdivision regulation, site planning, urban design goals and methods, public participation strategies, creatively designing landscapes to meet community and ecological goals. (LDA 205.) Effective: 2016 Winter Quarter.

GEO 236—Transportation Planning and Policy (4)
Lecture/Discussion—4 hours. Limited enrollment. Transportation planning process at the regional level, including the role of federal policy in shaping regional transportation planning, tools and techniques used in regional transportation planning, issues facing regional transportation planning agencies, pros and cons of potential solutions and strategies. Students taking this course previously as TTP 289 cannot repeat it for credit; taking other TTP 289 offerings does not preclude taking TTP 220 for credit. (TTP 220.) Effective: 2013 Winter Quarter.

GEO 240—Community Development Theory (4)
Lecture/Discussion—4 hours. Introduction to theories of community development and different concepts of community, poverty, and development. Emphasis on building theory, linking applied development techniques to theory, evaluating development policy, and examining case studies of community development organizations and projects. (Community & Regional Development 240.) Effective: 2014 Winter Quarter.

GEO 241—The Economics of Community Development (4)
Seminar—4 hours. Prerequisite(s): Graduate standing. Economic theories and methods of planning for communities. Human resources, community services and infrastructure, industrialization and technological change, and regional growth. The community's role in the greater economy. (Community and Regional Development 241.) Effective: 2015 Spring Quarter.

GEO 245—The Political Economy of Urban and Regional Development (4)
Lecture—4 hours. Prerequisite(s): CRD 157; CRD 244; Or the equivalent. How global, political and economic restructuring and national and state policies are mediated by community politics; social production of urban form; role of the state in uneven development; dynamics of urban growth and decline; regional development in California. (Community & Regional Development 245.) Effective: 2014 Spring Quarter.

GEO 246—The Political Economy of Transnational Migration (4)
Lecture—4 hours. Prerequisite(s): Graduate standing. Theoretical perspectives and empirical research on social, cultural, political, and economic processes of transnational migration to the U.S. Discussion of conventional theories will precede contemporary comparative perspectives on class, race, ethnicity, citizenship, and the ethnic economy. (Community & Regional Development 246.) Effective: 2014 Winter Quarter.

GEO 248—Social Policy, Welfare Theories and Communities (4)
Seminar—4 hours. Prerequisite(s): Graduate standing. Theories and comparative histories of modern welfare states and social policy in relation to legal/normative, organizational, and administrative aspects. Analysis of specific social issues within the U.S./California context. Not open for credit to students having completed CRD 248A and CRD 248B. (Community & Regional Development 248.) Effective: 2011 Fall Quarter.

GEO 254—Political Ecology of Community Development (4)
Lecture—4 hours. Prerequisite(s): Graduate standing. Community development from the perspective of geographical political ecology. Social and environmental outcomes of the dynamic relationship between communities and land-based resources, and between social groups. Cases of community conservation and development in developing and industrialized countries. (Community and Regional Development 244.) Effective: 2014 Winter Quarter.

GEO 260—Global Political Ecology (4)
Seminar—3 hours; Term Paper/Discussion—1 hour. Open to graduate students only or consent of instructor. Background, genesis, current debates in political ecology. Examination of political-economic and social-cultural causes of environmental change. Introduction to development theory, globalization, history of science and power/knowledge. Cases of social movements, justice, resistance, gender, race and class. Focus outside North America. Effective: 2014 Fall Quarter.

GEO 279—Exploring Data from Built Environment Using R (4)
Laboratory—3 hours; Lecture—3 hours. Introduction to modern data science, specifically data acquisition, exploratory data, visualization, and beginning data analysis using R. Emphasizes computational reasoning and working with tabular and non-standard data. Focus will be on data generated in the built environment. (Civil and Environmental Engineering 254.) Effective: 2017 Fall Quarter.

GEO 280—Field Studies in Geography (3)
Fieldwork—6 hours; Lecture—1 hour. Prerequisite(s): Consent of Instructor. Undergraduate or graduate coursework in geography. Limited to 20 students. A topic or subdiscipline of geography will form the theme for the course in any given offering, with a focus on current research on this topic, field methodologies, and data analysis in human and physical geography May be repeated up to 2 time(s). Effective: 2005 Spring Quarter.

GEO 281—Transportation Survey Methods (4)
Lecture—4 hours. Prerequisite(s): (STA 013 or STA 013Y); ECI 251 recommended. Description of types of surveys commonly used in transportation demand modeling, including travel and activity diaries, attitudinal, panel, computer, and stated-response surveys. Discussion of sampling, experimental design, and survey design issues. Analysis methods, including factor, discriminant and cluster analysis. Not open for credit to students who have taken ECI 255. (Transportation Technology and Policy 200.) Effective: 2018 Spring Quarter.

GEO 286—Selected Topics in Environmental Remote Sensing (3)
Discussion—2 hours; Lecture—1 hour; Project (Term Project). Prerequisite(s): ERS 186; and Consent of Instructor. Or equivalent required; ERS 186L recommended. In depth investigation of advanced topics in remote sensing applications, measurements, and theory. May be repeated for credit. (Hydrologic Science 286.) Effective: 2014 Fall Quarter.

GEO 290—Seminar in Geography (1-3)
Seminar—1-3 hours. Prerequisite(s): Graduate standing or consent of instructor. Seminar focuses on specified topical areas within geography, which will vary quarter to quarter. Students expected to present an oral seminar on an aspect of the general topic under discussion. May be repeated up to 6 time(s). (S/U grading only.) Effective: 2008 Fall Quarter.

GEO 291—Seminar in Cultural Geography (4)
Seminar—3 hours. Effective: 1997 Winter Quarter.

GEO 293—Graduate Internship (1-12)
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. Individually designed, supervised internship, off campus, in community or institutional setting. Developed with advice of faculty mentor. May be repeated for credit. (S/U grading only.) Effective: 2004 Spring Quarter.

GEO 295—Seminar in Urban Geography (4)
Seminar—3 hours. Effective: 1997 Winter Quarter.

GEO 297—Graduate Group in Geography (2)
Lecture/Discussion—1 hour; Term Paper. Prerequisite(s): Graduate standing. Seminars by UC Davis faculty and prominent national and international scholars; research presentations by Graduate Group in Geography Ph.D. candidates. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

GEO 298—Group Study (1-5)
Seminar—1 hour. Prerequisite(s): Graduate standing or consent of instructor. May be repeated up to 10 unit(s). (S/U grading only.) Effective: 2000 Spring Quarter.

GEO 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

GEO 299D—Individual Study (1-12)
Variable. Prerequisite(s): and Consent of Instructor. Graduate student status in Geography. (S/U grading only.) Effective: 1997 Winter Quarter.

GEO 396—Teaching Assistant Training Practicum (1-4) ***Review all entries***
Variable. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

GEO 396—Teaching Assistant Training Practicum (1-4) ***Review all entries Discontinued***
Variable. May be repeated for credit. (P/NP grading only.) Effective: 2019 Winter Quarter.

GER German

Courses in GER:

GER 001—Elementary German (5)
Discussion—5 hours; Laboratory—1 hour. Not open to students who have taken course 1A. Introduction to German grammar and development of all language skills in a cultural context with special emphasis on communication. Students who have successfully completed GER 002 or GER 003 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only; although a passing grade will be charged to the student's P/NP option, no petition is required; all other students will receive a letter grade unless a P/NP petition is filed. GE credit: AH, WC. Effective: 2007 Spring Quarter.

GER 001A—Accelerated Intensive Elementary German (15) ***Review all entries***
Lecture/Discussion—15 hours. Special 12 week accelerated, intensive summer session course that combines the work of courses 1, 2, and 3. Introduction to German grammar and development of all language skills in a cultural context with emphasis on communication. Not open to students who have completed German 1, 2, or 3. Effective: 2006 Summer Special Session.

GER 001A—Accelerated Intensive Elementary German (15) ***Review all entries***
Lecture/Discussion—12.5 hours. Special 12 week accelerated, intensive summer session course that combines the work of courses 1, 2, and 3. Introduction to German grammar and development of all language skills in a cultural context with emphasis on communication. Not open to students who have completed GER 001, GER 002, or GER 003. GE credit: AH, WC. Effective: 2018 Summer Session 1.

GER 002—Elementary German (5)
Discussion—5 hours; Laboratory—1 hour. Prerequisite(s): GER 001 Not open for credit to students who have taken course 1A. Continuation of course 1 in areas of grammar and basic language skills. GE credit: AH, WC. Effective: 2007 Spring Quarter.

GER 003—Elementary German (5)
Discussion—5 hours; Laboratory—1 hour. Prerequisite(s): GER 002 Not open to students who have taken course 1A. Completion of grammar sequence and continuing practice of all language skills through cultural texts. GE credit: AH, OL, WC. Effective: 2015 Winter Quarter.

GER 010—German Fairy Tales from the Grimms to Disney (4)
Lecture/Discussion—3 hours; Term Paper. Introduction to the genre of fairy tale with a focus on the Brothers Grimm and Hans Christian Andersen in their respective political/cultural contexts. Discusses filmic adaptations by Disney, the East German DEFA and Hollywood. GE credit: AH, VL, WC, WE. Effective: 2012 Fall Quarter.

GER 011—Travel and the Modern World (4)
Extensive Writing; Lecture/Discussion—3 hours. Examination of travel as an essential human activity and experience of global modernity and cross-cultural encounters from the 18th to the 21st century with an emphasis on German-speaking culture. Travelogues, literature, art, memoirs, and films in English translation. (Comparative Literature 011.) GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

GER 020—Intermediate German (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): GER 003; can be concurrent with GER 006. Review of grammatical principles by means of written exercises; expanding of vocabulary through readings of modern texts. GE credit: AH, OL, WC, WE. Effective: 2015 Winter Quarter.

GER 021—Intermediate German (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): GER 020 Review of grammatical principles by means of written exercises; expanding of vocabulary through readings of modern texts; addresses social relations and cultural practices in Germany; discusses history of Germany. GE credit: AH, OL, WC, WE. Effective: 2016 Winter Quarter.

GER 022—Intermediate German (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): GER 021 Review of grammatical principles by means of written exercises; expanding of vocabulary through readings of modern texts. GE credit: AH, OL, WC, WE. Effective: 2015 Winter Quarter.

GER 040—Great German Short Stories (in English) (4)
Extensive Writing; Lecture/Discussion—3 hours. Major German short stories from Goethe at the end of the eighteenth century to Thomas Mann at the beginning of the twentieth century. GE credit: AH, OL, WC, WE. Effective: 2005 Fall Quarter.

GER 045—Vampires and Other Horrors in Film and Media (4)
Discussion—1 hour; Film Viewing—3 hours; Lecture—2 hours. History of representations of vampires and horror generally from the 19th through 21st centuries. Emphasis on transnational history of the horror genre; psychologies of horror effects; issues of race, gender, and class; intersections with prejudice, medicine, modernity. (Film Studies 45.) GE credit: ACGH, AH, DD, OL, VL, WC, WE. Effective: 2012 Fall Quarter.

GER 048—Myth and Saga in the Germanic Cultures (4)
Lecture—3 hours; Term Paper. Knowledge of German not required. English translation from the Norse Eddas, the Volsung and Sigurd-Siegfried cycles, and the Gudrun lays; literary mythology in German Romanticism culminating in Wagner's "total art-work" concept and The Ring of the Nibelung cycle. May not be counted toward major in German. GE credit: AH, VL, WC, WE. Effective: 2015 Winter Quarter.

GER 049—Freshman Colloquium (2)
Seminar—2 hours. Prerequisite(s): Open only to students who have completed 40 or fewer quarter units of transferable college level work. Readings, discussion and written projects treating topics such as communist-capitalist tension in German literary culture; masculine "versus" feminine authorial consciousness; disintegration and reconstitution of language reflecting cultural transformation; exorcising post-Holocaust national guilt and individual frustration-Germany's new European "mission." Effective: 1997 Winter Quarter.

GER 092—Field Work in German (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Restricted to lower-division standing. Total immersion program in Germany or a German speaking setting in the U.S. to further develop students' proficiency in the German language. (P/NP grading only.) Effective: 2001 Fall Quarter.

GER 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Primarily for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

GER 099—Special Study for Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

GER 101A—Survey of German Literature, 800-1800 (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): GER 022; or Consent of Instructor. German literature from the Middle Ages to Classicism (800-1800) with an overview of major movements and authors. GE credit: AH, OL, VL, WC, WE. Effective: 2016 Spring Quarter.

GER 101B—Survey of German Literature, 1800-Present (4)
Lecture/Discussion—3 hours. Prerequisite(s): GER 022 German literature from the Age of Romanticism (1800) to the present with an overview of major movements and authors. GE credit: AH. Effective: 2005 Winter Quarter.

GER 103—Writing Skills in German (4)
Extensive Writing—1 hour; Lecture—3 hours. Prerequisite(s): GER 022; or Consent of Instructor. Practice in different kinds of writing, such as abstracts, correspondence, lecture summaries, analysis of or response to short literary texts. GE credit: AH, OL, WC, WE. Effective: 2016 Fall Quarter.

GER 104—Translation (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): GER 022; or Consent of Instructor. Exercises in German-to-English, English-to-German translation using texts from the areas of culture and commerce. Not open for credit to students who have completed GER 104A. GE credit: AH, OL, VL, WC, WE. Effective: 2016 Spring Quarter.

GER 105—The Modern German Language (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): GER 022; or Consent of Instructor. Introduction to the linguistic analysis of contemporary German, including its phonology, morphology, syntax and semantics, as well as sociolinguistic considerations. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

GER 109A—Business German (4)
Laboratory—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): GER 022; or Consent of Instructor. Specialized language course using business-oriented information and publications as the basis for discussions, roleplay, reports, compositions and translations. Effective: 2005 Spring Quarter.

GER 109B—Advanced Business German (4)
Discussion/Laboratory—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): GER 022; or Consent of Instructor. Specialized advanced language course providing in-depth study of major business topics with the help of authentic texts and videos. Effective: 2005 Spring Quarter.

GER 112—Topics in German Literature (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Upper-division standing or consent of instructor. Knowledge of German not required. Investigation of significant themes and issues within their European context. May be repeated up to 1 time(s). GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

GER 113—Goethe's Faust (4)
Discussion—3 hours; Term Paper—1 hour. Knowledge of German not required. Intensive study of Goethe's Faust in its entirety. Discussions and readings in English; reading the text in the original is encouraged. GE credit: AH, WC, WE. Effective: 2010 Fall Quarter.

GER 114— From Marlene Dietrich to Run, Lola Run: German Women and Film (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): ANT 001 (can be concurrent) Knowledge of German not required. Women in German film from the Weimar Republic to present, with special emphasis on conceptualizations of gender, historical and political context, aesthetic and filmic innovations. GE credit: AH, OL, VL, WC, WE. Effective: 2018 Spring Quarter.

GER 115—German Literature Since 1945 (4)
Extensive Writing; Lecture—3 hours. Knowledge of German not required. Major writers of the post-war
generation of Austria, Switzerland and Germany: novelists, such as Böll, Grass, Johnson, Walser, Handke; playwrights such as Frisch, Dürrentmatt and Hochhuth; and poets, such as Celan, Enzensberger, and Aichinger. May be repeated for credit if topic differs. GE credit: AH, WC, WE. Effective: 1998 Fall Quarter.

GER 116—Readings in Jewish Writing and Thought in German Culture (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): RST 023; or Consent of Instructor. Historical tradition of Jewish thought in the German cultural context; unique contributions of Jewish writers to culture of the German-speaking world; what it means to be "other" in the mainstream culture. May be repeated up to 2 time(s) when topic differs. No credit will be given to those students who have completed HUM 121. (Jewish Studies 116.) GE credit: AH, OL, WC, WE. Effective: 2007 Spring Quarter.

GER 117—After the Catastrophe: Jews and Jewish Life in Post-1945 Germany (4)
Discussion/Laboratory—3 hours; Term Paper. Jews and Jewish culture in post-1945 Germany, with special attention given to literature, historical debates, photography, film, as well as websites and other new media. GE credit: ACGH, AH, DD, OL, VL, WC, WE. Effective: 2011 Fall Quarter.

GER 118A—Vienna at the Turn of the Twentieth Century (The End of the Habsburg Empire) (4)
Discussion—2 hours; Extensive Writing—1 hour; Lecture—1 hour. Knowledge of German not required. Cultural ferment in Vienna, capital of the multinational Habsburg empire, at the turn of the century, with consideration of innovations in literature, music, graphic arts, architecture philosophy and psychology, heralding European modernism. GE credit: AH, WC. Effective: 2001 Fall Quarter.

GER 118B—Weimar Culture: Defeat, the Roaring Twenties, the Rise of Nazism (4)
Discussion—2 hours; Extensive Writing—1 hour; Lecture—1 hour. Knowledge of German not required. Expressionism in graphic arts, literature, film, New Objectivity, Brecht, and Bauhaus considered in the context of the failure of the German experiment in democracy, the Weimar Republic of 1919-33. GE credit: AH, WC, WE. Effective: 2000 Fall Quarter.

GER 118C—Germany Under the Third Reich (4)
Lecture/Discussion—3 hours; Term Paper—1 hour. Prerequisite(s): Background in Modern European History; GER 118B recommended. No knowledge of German required. Interdisciplinary study of German society and culture during the Third Reich (1933-45); readings in aesthetics, history, and philosophy; study of Fascist culture in literature, film, architecture, and the graphic arts; focus on everyday life in Hitler's Germany. GE credit: WC, WE. Effective: 2001 Fall Quarter.

GER 118E—Contemporary German Culture (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): GER 022; or Consent of Instructor. Political, economic, social and cultural scene of Germany today. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

GER 119—From German Fiction to German Film (4)
Discussion—1 hour; Lecture—3 hours; Term Paper. Examines a number of film adaptations of major German prose works and plays to ascertain the types of changes involved in the shift in medium and the positive and negative effects achieved by such transferences. GE credit: AH, OL, VL, WC. Effective: 1997 Winter Quarter.

GER 120—Survey of German Culture (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): GER 022; or Consent of Instructor. Major developments in German arts, philosophical thought, social institutions, and political history. GE credit: AH, OL, VL, WC, WE. Effective: 2016 Spring Quarter.

GER 121—The Medieval Period in German Literature (4)
Discussion—3 hours; Extensive Writing. Prerequisite(s): GER 022; or Consent of Instructor. Literary-philosophical profile of the Mittelhochdeutsche Blütezeit in terms of the significant epics, romances, and lyric poetry. Readings in German. GE credit: AH. Effective: 2016 Spring Quarter.

GER 122—Reformation and Baroque (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): GER 022; or Consent of Instructor. Exemplary literary works of the 16th and 17th centuries tracing the principal lines of development and showing the reflection in literature of the social, as well as religious, scenes. GE credit: AH, OL, VL, WC, WE. Effective: 2016 Fall Quarter.

GER 123—Literature of the Classical Age (4)
Discussion—3 hours; Term Paper. Prerequisite(s): GER 022; or Consent of Instructor. Critical assessment of principal works of Goethe and Schiller within the historical and philosophical context of their times. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

GER 124—Major Movements in German Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): GER 022; or Consent of Instructor. Significant movements and schools in German literary history (e.g., the medieval troubadours, Storm and Stress, the romanticists, the George Circle, the expressionists), with emphasis on the broader cultural dynamics and ideologies as these apply to individual literary works. May be repeated up to 1 time(s) if topic differs. GE credit: AH, WC. Effective: 2016 Fall Quarter.

GER 125—Short Fiction: 1880-1914 (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GER 022; or Consent of Instructor. Reading of short German fiction from the fin-de-siècle period and representative of various prose styles and cultural currents. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

GER 126—Modern German Literature (4)
Discussion—3 hours; Extensive Writing. Prerequisite(s): GER 022; or Consent of Instructor. Selections from significant works of major contemporary writers, such as Hesse, Mann, Kafka, Rilke, Brecht, Grass. May be repeated up to 1 time(s) with consent of an advisor. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

GER 127— Major Writers in German (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): GER 022; or Consent of Instructor. Examination of representative works by a major writer, set in the broader cultural context of the relevant period or movement. May be repeated up to 1 time(s) when topic differs. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

GER 129—Postwar Women Writers (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): GER 022; or Consent of Instructor. Major writers in both Germanies, Austria, and Switzerland since 1945. Topics include the concept of a feminist aesthetics, East vs. West German writers, and the status of minority women writers in Germany (Jewish, Turkish-German, Afro-German). GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

GER 131—German Lyric Poetry (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GER 022; or Consent of Instructor. Study of the genre of lyric poety from the late Middle Ages through Renaissance, Baroque, Classical, Romantic, and Modern periods in correlation with other literary forms and the social climate of each period. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

GER 132—The German Novelle (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GER 022; or Consent of Instructor. Inquiry into the art of the "Novelle" through analysis of the materials and formal devices of representative authors from Goethe to Kafka. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

GER 133—The German Drama (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GER 022; or Consent of Instructor. Readings in the works of Germany's leading dramatists from the eighteenth century to the present day, such as Lessing, Goethe, Schiller, Kleist, Büchner, Hauptmann, Brecht. GE credit: AH, OL, VL, WC, WE. Effective: 2016 Spring Quarter.

GER 134—Topics in German Intellectual History (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): GER 022; or Consent of Instructor. Topics in German intellectual history with materials from a number of periods, genres, and disciplines. May be repeated up to 2 time(s) topic differs. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

GER 141—The Holocaust and its Literary Representation (4)
Discussion—1 hour; Lecture—2 hours; Term Paper. Knowledge of German not required. Aesthetic representation and metaphorical transformation of the Holocaust in its human and historical perspectives. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

GER 142—New German Cinema (4)
Extensive Writing; Lecture/Discussion—3 hours. Knowledge of German not required. German filmmakers of the 1960s-1980s such as Fassbinder, Herzog, Syberberg, Brückner, Schlöndorf, Kluge, Wenders. May be repeated for credit content changes and with consent of instructor. (Film Studies 142.) GE credit: AH, OL, VL, WC, WE. Effective: 2006 Winter Quarter.

GER 143—Language Through Media (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): GER 022; or Consent of Instructor. Study of contemporary German-language news media (press, video, film, CD-ROM, Internet) for insight into political and cultural developments in the German-speaking countries. GE credit: AH, OL, VL, WC, WE. Effective: 2016 Spring Quarter.

GER 144—Marx, Nietzsche, Freud (4)
Lecture/Discussion—3 hours; Term Paper. Study of major texts of Marx, Nietzsche, and Freud, selected with an eye to their impact on 20th-century economics, ethics, and attitudes toward eros. Particular focus on conceptions of the self and the individual's relation to society. (Humanities 144.) GE credit: AH, WC. Effective: 2011 Spring Quarter.

GER 160—Love in the Middle Ages (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): GER 022; or Consent of Instructor. Analysis of the phenomenon of love in selected medieval lyrical poems and romances of the twelfth and thirteenth century Blütezeit. Origins of courtly love, love and individualism, love and the Church, love and adultery. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

GER 168—Multiculturalism in German Literature (4)
Lecture/Discussion—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): GER 022; or Consent of Instructor. Examples of German literature from the High Middle Ages to the present that explore the "encounter with the other" (people of color, different beliefs and cultures, and inner-German minorities). GE credit: AH, OL, VL, WC, WE. Effective: 2016 Spring Quarter.

GER 176A—Classic Weimar Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): HUM 001 "German Weimar (1919-1933) cinema. Fritz Lang, F.W. Murnau, and G.W. Pabst among others. Influence on world-wide (esp. Hollywood) film genres such as film noir, horror, science fiction, and melodrama." Not open for credit to students who have completed HUM 176. (Film Studies 176A.) GE credit: AH, OL, VL, WC, WE. Effective: 2006 Fall Quarter.

GER 185—The Age of Bismarck (4)
Discussion—3 hours; Term Paper. Prerequisite(s): GER 022; or Consent of Instructor. Notable literary repercussions of the zenith of Germany's international status at the time of Bismarck's Chancellorship. The poetry of Storm, the prose of Fontane, the drama of Hauptmann. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

GER 192—Field Work in German (1-12)
Internship—3-36 hours. Prerequisite(s): GER 109A; or Consent of Instructor. Total immersion program in Germany or a German speaking setting in the U.S. to further develop student proficiency in the German language. May be repeated up to 2 time(s) or up to 12 units of credit with consent of instructor. (P/NP grading only.) Effective: 2002 Winter Quarter.

GER 194HA—Honors Program (3)
Independent Study—2 hours; Term Paper. Prerequisite(s): Open only to majors with a 3.500 minimum GPA in at least 135 graduation units. Research of an integrative nature (in either "General" or "Area Studies Emphasis" fields of major), guided by thesis advisor chosen by student. (P/NP grading only.) Effective: 1997 Winter Quarter.

GER 194HB—Honors Program (3)
Independent Study—2 hours; Term Paper. Prerequisite(s): Open only to majors with a 3.500 minimum GPA in at least 135 graduation units. Writing of Honors Thesis on topic selected by student in consultation with thesis advisor. (P/NP grading only.) Effective: 1997 Winter Quarter.

GER 197T—Tutoring in German (1-4)
Tutorial—3-12 hours. Prerequisite(s): Consent of German Program Director. Tutoring in undergraduate courses including leadership in small voluntary discussion groups affiliated with department courses. May be repeated up to 8 unit(s). (P/NP grading only.) Effective: 2004 Fall Quarter.

GER 198—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

GER 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

GER 202—Middle High German (4)
Discussion—3 hours; Lecture—1 hour. Graduate standing. Outline of grammar; selections from Middle High German epic, romance, and lyric poetry. Effective: 2016 Spring Quarter.

GER 206—Cognitive Grammar for Applied Linguists (4)
Lecture/Discussion—3 hours; Term Paper—1 hour. Prerequisite(s): Graduate standing. Analysis of grammar and application of cognitive grammar to language instruction. Syntactical problems and analyses relevant to the language which the student will teach. Effective: 2002 Spring Quarter.

GER 210—Techniques of Literary Scholarship (4)
Seminar—3 hours; Term Paper. Graduate standing. Bibliographical, organizational, and methodological tools and resources for advanced, independent research. Effective: 2016 Spring Quarter.

GER 211—Concepts in Literary Theory (4)
Seminar—3 hours. Graduate standing. Advanced course in concepts of literary theory and criticism. Discussion of the emergence of theoretical concepts and their impact on the understanding and appreciation of literary works. Discussion in German and English, readings in German. Effective: 2016 Spring Quarter.

GER 212—Contemporary Approaches to Literary Theory (4)
Seminar—3 hours; Term Paper. Graduate standing. Study of contemporary theoretical approaches such as structuralism,
deconstruction, feminism, Marxism/Frankfurt School, and reception theory in conjunction with the works of major authors. Effective: 2016 Spring Quarter.

GER 239—Narrative and Narrative Theory (4)
Seminar—3 hours; Term Paper. Graduate standing. Studies, in a theoretical and literary historical context, major elements of 19th- and 20th-century narrative, such as techniques of framing, refraction, and montage; narrative perspective; mimesis; and self-consciousness. Focuses on paradigmatic prose texts alongside a spectrum of critical approaches. Effective: 2016 Spring Quarter.

GER 240—Forms of German Verse (4)
Seminar—3 hours; Term Paper. Graduate standing. Development of German verse from the Middle Ages to the present, with special emphasis on different techniques of text analysis and interpretation. May be repeated for credit with consent of instructor. May be repeated for credit. Effective: 2016 Spring Quarter.

GER 241—The German Drama (4)
Seminar—3 hours; Term Paper. Graduate standing. Major forms of German drama from its origins to the middle of the
twentieth century. May be repeated for credit with consent of instructor. May be repeated for credit with consent of instructor. Effective: 2016 Spring Quarter.

GER 242—The German Novelle (4)
Seminar—3 hours; Term Paper. Graduate standing. The major German Novellisten, with particular emphasis on the flowering
of this genre in the nineteenth century. May be repeated for credit with consent of instructor. May be repeated for credit with consent of instructor. Effective: 2016 Spring Quarter.

GER 243—Fontane and the Rise of the Modern German Novel (4)
Seminar—3 hours; Term Paper. Graduate standing. Fontane, the father of the modern German novel and the chief German
representative of the European novel at its greatest, in the context of the nineteenth-century European political and social scene. Effective: 2016 Spring Quarter.

GER 244—Gender and Comedy (4)
Seminar—3 hours; Term Paper. Graduate standing. Studies of genre and gender in German-language comedy by male and
female writers from the 18th century to the present. Authors treated include Lessing, Kleist, Büchner, Ebner-Eschenbach, Hauptmann, Hofmannsthal, Frisch, Langner, and Jelinek. Effective: 2016 Spring Quarter.

GER 252—The Writing of Lessing (4)
Seminar—3 hours; Term Paper. Graduate standing. Study of Lessing's theory of literature with particular emphasis upon his critical attacks on French drama. Effective: 2016 Spring Quarter.

GER 253—Goethe (4)
Seminar—3 hours; Term Paper. Graduate standing. Study of the origins of Goethe's thought in German Pietism, and his principal artistic, autobiographical, scientific, and philosophical works. Effective: 2016 Spring Quarter.

GER 254—Schiller (4)
Seminar—3 hours; Term Paper. Graduate standing. Critical analysis of Schiller's major works and his impact on the intellectual climate in Germany during the late eighteenth and early nineteenth centuries. Effective: 2016 Spring Quarter.

GER 255—Aesthetics in the Age of Goethe (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Emergence of aesthetic autonomy from eighteenth century normative poetics during the Age of Goethe. The shift from a model based on the imitation of nature (and the Ancients) to a new concept grounded in the individuality of aesthetic experience. Effective: 2003 Spring Quarter.

GER 257—Heinrich von Kleist (4)
Seminar—3 hours; Term Paper. Graduate standing. Kleist's important dramatic and prose works; special attention will be
given to the peculiar hermeneutic problems in modern German, French, and Anglo-American Kleist criticism. Effective: 2016 Spring Quarter.

GER 258—The Novels of Thomas Mann (4)
Seminar—3 hours; Term Paper. Graduate standing. Reading of selected novels with emphasis on aesthetic techniques, originality, ethical and political views, and influence on the contemporary literary scene in Germany. Effective: 2016 Spring Quarter.

GER 259—Studies in Kafka (4)
Seminar—3 hours; Term Paper. Graduate standing. Study of Kafkas narrative techniques with special emphasis in the shorter works on the existential development from its roots in Expressionism. Effective: 2016 Spring Quarter.

GER 260—The Poetry of Rilke (4)
Seminar—3 hours; Term Paper. Graduate standing. Study of the principal motifs, myths, images, and problems in the poetry of Rainer Maria Rilke. Effective: 2016 Spring Quarter.

GER 261—Brecht and the Epic Theater (4)
Seminar—3 hours; Term Paper. Graduate standing. Reading of Brechts works with emphasis on the ideas which impelled the development of new literary forms and concepts. Effective: 2016 Spring Quarter.

GER 262—Studies in Turn-of-the-Century Culture (4)
Seminar—3 hours; Term Paper. Graduate standing. Investigates literary currents in turn-of-the-century Germany and Austria against the background of contemporaneous developments in psychology, the visual arts, philosophy, and music. Authors treated include Hauptmann, Holz and Schlaf, Schnitzler, T. Mann, Wedekind, Musil, Hofmannsthal. Effective: 2016 Spring Quarter.

GER 285—Middle High German Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Graduate standing. Extensive reading of Middle High German texts in the original language.
Examines linguistic and literary problems. May be repeated for credit when topic differs. May be repeated for credit. Effective: 2016 Spring Quarter.

GER 288—The Renaissance and Reformation in German Literature (4)
Seminar—3 hours; Term Paper. Restricted to graduate standing. Parabolic and didactic style in Germany's literature during the sixteenth century. May be repeated for credit with consent of instructor. Effective: 2016 Fall Quarter.

GER 289—German Literature of the Baroque (4)
Seminar—3 hours; Term Paper. Graduate standing. The "Elegantiaideal" and the varying methods used to portray it in seventeenth-century German literature. May be repeated for credit with consent of instructor. May be repeated for credit. Effective: 2016 Spring Quarter.

GER 290—The Enlightenment in German Literature (4)
Seminar—3 hours; Term Paper. Revolt against the concept of the Elegantiaideal, and evolution of a

new literature based on reason and wit. May be repeated for credit with consent of instructor. May be repeated for credit. Effective: 1997 Winter Quarter.

GER 291—Foreign Language Learning in the Classroom (4)
Project (Term Project); Seminar—3 hours. Overview of approaches to university-level foreign language instruction and the theoretical notions underlying current trends in classroom practices across commonly taught foreign languages. (French 291 and Spanish 291.) Effective: 2006 Fall Quarter.

GER 292—Sentimentality and Sturm und Drang in German Literature (4)
Seminar—3 hours. Reaction to overemphasis on Reason: theories of Hamann and Herder and works of poets such as Lenz, Leisewitz, the early Goethe and Schiller. May be repeated for credit consent of instructor. Effective: 1997 Winter Quarter.

GER 293—The Classical Age of German Literature (4)
Seminar—3 hours; Term Paper. Inquiry into the aesthetic and humanistic qualities of Germany's greatest literary epoch. May be repeated for credit with consent of instructor. May be repeated for credit. Effective: 1997 Winter Quarter.

GER 294—The Romantic Period in German Literature (4)
Seminar—3 hours; Term Paper. Survey of the works of early nineteenth-century authors in reaction
against the age of classicism. May be repeated for credit with consent of instructor. May be repeated for credit. Effective: 1997 Winter Quarter.

GER 295—Poetic Realism in German Literature (4)
Seminar—3 hours; Term Paper. Outstanding figures in German literature between 1840 and 1890. Important phases in their developments will be treated. May be repeated for credit with consent of instructor. May be repeated for credit. Effective: 1997 Winter Quarter.

GER 296—Twentieth-Century German Literature (4)
Seminar—3 hours; Term Paper. Considers the revolt of the Hauptmann generation, Symbolism, Expressionism, and the chief currents of the contemporary scene. May be repeated for credit with consent of instructor. May be repeated for credit. Effective: 1997 Winter Quarter.

GER 297—Special Topics in German Literature (4)
Seminar—3 hours; Term Paper. Various special topics in German literature, which may cut across the
more usual period and genre rubrics. May be repeated for credit when topic differs. May be repeated for credit. Effective: 1997 Winter Quarter.

GER 298—Group Study (1-5)
Variable. Effective: 1997 Winter Quarter.

GER 299—Individual Study (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

GER 299D—Special Study for the Doctoral Dissertation (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

GER 390A—The Teaching of German (2)
Lecture—2 hours. Prerequisite(s): Graduate standing or consent of instructor. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required of new teaching assistants. (S/U grading only.) Effective: 1997 Winter Quarter.

GER 390B—The Teaching of German (2)
Lecture—2 hours. Prerequisite(s): Graduate standing or consent of instructor. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required of new teaching assistants. (S/U grading only.) Effective: 1997 Winter Quarter.

GER 390C—The Teaching of German (2)
Lecture—2 hours. Prerequisite(s): Graduate standing or consent of instructor. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required of new teaching assistants. (S/U grading only.) Effective: 1997 Winter Quarter.

GER 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

GER 400—Tutorial and Instructional Internship (1-3)
Discussion—1-3 hours. Prerequisite(s): Graduate standing. Apprentice training in ongoing undergraduate literature courses taught by regular staff, with supplementary weekly critique sessions; intern leadership of discussion sections under staff supervision. May be repeated for credit. May be repeated for credit. Effective: 1997 Winter Quarter.

GGG Genetics

Courses in GGG:

GGG 201A—Advanced Genetic Analysis (5)
Lecture/Discussion—5 hours. Prerequisite(s): BIS 101; STA 100; Or the equivalent, graduate standing. Fundamentals of genetic analysis and chromosome structure using model organisms including mutation, transmission, complementation, suppression, and enhancement as well as epigenetic phenomena at the whole organism and molecular levels. Effective: 2002 Fall Quarter.

GGG 201B—Genomics (5)
Discussion—2 hours; Lecture—3 hours. Prerequisite(s): GGG 201A; GGG 201C; Or equivalents that provide a basic understanding of genetics and molecular biology. Class limited to 40 students; priority to Genetics Graduate Group students. Prokaryotic and eukaryotic genomes. Experimental strategies and analytical challenges of modern genomics research and the theory and mechanics of data analysis. Structural, functional, and comparative genomics. Related issues in bioinformatics. Effective: 2004 Spring Quarter.

GGG 201C—Molecular Genetic Mechanisms in Disease (4)
Lecture/Discussion—4 hours. Prerequisite(s): BIS 101; Or the equivalent. Pass One restricted to graduate students in genetics, microbiology or biochemistry and molecular biology graduate groups. Exploration of how basic mechanisms of molecular biology contribute to health and disease. Diseases related to animals, plants, and microbes will highlight fundamental concepts in the assembly, function and regulation of DNA, RNA, and protein. Effective: 2012 Fall Quarter.

GGG 201D—Quantitative and Population Genetics (5)
Lecture—5 hours. Prerequisite(s): GGG 201A; or Consent of Instructor. Basic concepts of quantitative and population genetics including gene and genotypic frequencies, multiple factor hypothesis, phenotypic and genotypic values, heritability, selection, genetic variation, the detection of quantitative trait loci and evolution in populations. Experimental and analytical methods. Effective: 2002 Fall Quarter.

GGG 205—Molecular Genetics Laboratory (5)
Laboratory—15 hours. Prerequisite(s): BIS 101 (can be concurrent); Or the equivalent, enrolled in Genetics Graduate Group. Students will conduct experiments in molecular genetics laboratories. Individual research problems will emphasize experimental design, experience with methodologies, and data interpretation. May be repeated up to three times for credit. May be repeated up to 3 time(s). (S/U grading only.) Effective: 1997 Winter Quarter.

GGG 210—Horizontal Gene Transfer (3)
Lecture/Discussion—3 hours. Prerequisite(s): Background in basic microbiology and genetics required; introductory course in molecular biology, biotechnology and microbial and animal/plant genetics recommended. Transfer of genes between unrelated organisms in nature. Dissemination of foreign DNA from genetically engineered organisms, including plants and animals. Mechanisms by which genes are transferred horizontally, and between kingdoms. Effective: 1999 Fall Quarter.

GGG 211—Concepts in Human Genetics and Genomics (3)
Lecture/Discussion—3 hours. Prerequisite(s): GGG 201A; Or equivalent; GGG 201B and GGG 201C or equivalent are recommended. Pass One restricted to graduate students enrolled in the Human Genetics Focus Group; Pass Two restricted to graduate students enrolled in Genetics Graduate Group; after that, open enrollment for graduate students up to 12 students, then undergraduates. Human genomic organization; genetic structure of populations; positional cloning, application of linkage, association, and haplotypes; quantitative trait loci analyses; integrative genetic studies of gene expression; DNA repair mechanisms in genetic disease; mutation analyses; epigenetics; mitochondrial disease; gene manipulation and therapy. Effective: 2004 Winter Quarter.

GGG 220—Genomics and Biotechnology of Plant Improvement (3)
Lecture—3 hours. Prerequisite(s): BIS 101; Or equivalent. Integration of modern biotechnology and classical plant breeding including the impact of structural, comparative and functional genomics on gene discovery, characterization and exploitation. Also covers molecular markers, plant transformation, hybrid production, disease resistance, and novel output traits. (Pland Sciences 220.) Effective: 2002 Winter Quarter.

GGG 225—Gene and Cellular Therapies (3)
Lecture/Discussion—3 hours. Gene therapy from basic concepts to clinical applications. Topics include the human genome and genetic variation, genetic diseases, methods to manipulate gene expression, viral and non-viral delivery vectors, history and progress of gene therapy, case studies, and ethical issues. (Pharmacology & Toxicology 225.) Effective: 2017 Winter Quarter.

GGG 250—Functional Genomics: From Bench to Bedside (3)
Lecture/Discussion—3 hours. Prerequisite(s): GGG 201C; MCB 214; Or equivalent. Functional genomics (how genetic variation and epigenomics affect gene expression), with an emphasis on clinical relevance and applications. Topics include genetic variation and human disease, cancer therapeutics, and biomarker discovery. (Pharmacology & Toxicology 250.) Effective: 2015 Spring Quarter.

GGG 290—Seminar in Evolutionary, Developmental and Population Genetics (1)
Seminar—1 hour. Topics of current interest in evolutionary, population, and developmental genetics. May be repeated for credit. (S/U grading only.) Effective: 2014 Fall Quarter.

GGG 290A—Graduate Student Conference in Genetics (1)
Conference—1 hour. Restricted to Genetics Graduate Group students. Student-given seminars on topics in genetics, with critiques by instructor and peers. May be repeated for credit. (S/U grading only.) Effective: 2012 Fall Quarter.

GGG 291—Seminar in History of Genetics (2)
Seminar—2 hours. Prerequisite(s): BIS 101 The development of modern genetic theories beginning with Mendel. Effective: 1997 Winter Quarter.

GGG 292—Seminar in Genomics and Epigenomics (1)
Seminar—1 hour. Topics of current interest in genomics and epigenomics. May be repeated for credit. (S/U grading only.) Effective: 2014 Winter Quarter.

GGG 293—Seminar in Animal Genetics (1-3)
Seminar—1-3 hours. Prerequisite(s): GGG 201A; or Consent of Instructor. Emphasis on recent advances in the field of animal genetics, ranging from quantitative genetics to molecular biology as it relates to animals. Effective: 1997 Winter Quarter.

GGG 294—Seminar in Human Genetics (2)
Seminar—2 hours. Prerequisite(s): GGG 201A; and Consent of Instructor. Topics of current interest in human genetics and genomics. May be repeated up to 5 time(s) topic differs. Effective: 2004 Fall Quarter.

GGG 295—Seminar in Molecular Genetics (1-3)
Seminar—1-3 hours. Prerequisite(s): GGG 201A; or Consent of Instructor. Topics of current interest related to the structure, modification and expression of genes. Effective: 1997 Winter Quarter.

GGG 296—Scientific Professionalism and Integrity (2)
Lecture—1 hour; Seminar—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Review of basic skills required of contemporary scientists. Topics include scientific conduct, manuscript preparation, grant writing, seminar presentations, and time management. Emphasis on responsibilities of scientists to factually and thoughtfully communicate results. (P/NP grading only.) Effective: 2017 Spring Quarter.

GGG 297—Seminar in Plant Genetics (1-3)
Seminar—1-3 hours. Prerequisite(s): GGG 201A; or Consent of Instructor. Current topics in plant genetics will be examined in student-conducted seminars and discussion format. The integration of molecular, organismal and population genetics to address questions in plant biology will be emphasized. Effective: 1997 Winter Quarter.

GGG 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Group study of selected topics in genetics. (S/U grading only.) Effective: 1997 Winter Quarter.

GGG 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

GGG 300—Methods in Teaching Genetics (1-3)
Lecture/Discussion; Variable. Prerequisite(s): Consent of Instructor. Graduate standing. Practical experience in the methods and problems of teaching genetics. Includes analysis of texts and supporting material, discussion of teaching techniques, preparing for and conducting discussion or laboratory sections, formulating examinations under supervision of instructor. May be repeated up to 3 time(s) or 9 units if teaching in different genetics related course. (S/U grading only.) Effective: 2001 Fall Quarter.

GMD Med - Intl: General Medicine

Courses in GMD:

GMD 192—Internship in General Medicine (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project by preceptor prior to internship. Supervised work experience in general medicine. May be repeated for credit up to 12 units. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

GMD 291—Seminars in Human Health Services Research and Clinical Epidemiology (1)
Seminar—1 hour. Critical review, evaluation, and discussion of research in health services and clinical epidemiology. Presentation of statistical, epidemiologic, and econometric methods. Students present their own research and critique the work of others. May be repeated for credit. May be repeated for credit. (Epidemiology 291) (S/U grading only.) Effective: 1998 Fall Quarter.

GMD 460—General Medicine Consults (1-18)
Clinical Activity—1-18 hours; Variable—1-18 hours. Prerequisite(s): Fourth-year medical students with consent of instructor; a general medicine clerkship. Limited enrollment. Supervised opportunity to see entire spectrum of medical problems encountered by a general internist. Student spends time in General Medicine Clinic and on the General Medicine Consult Service. Consultation Service is particularly concerned with medical evaluation of surgical patients. (H/P/F grading only.) Effective: 1997 Winter Quarter.

GMD 470—Health Care Ethics (3-9)
Discussion/Laboratory—1 hour; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Guided independent study of issues in biomedical ethics, with discussion of readings that are based on student interests and needs. Participation in ethics rounds. (Nursing 470.) (H/P/F grading only.) Effective: 2012 Spring Quarter.

GMD 485—Introduction to Health Care Ethics (1)
Lecture. Prerequisite(s): Medical student in good standing. Introduction to concepts and methods of healthcare ethics. Emphasis on problems and methods. (H/P/F grading only.) Effective: 1997 Fall Quarter.

GMD 499—General Medicine Research (1-18)
Clinical Activity—8-40 hours; Discussion—3 hours. Prerequisite(s): Consent of Instructor. Student will be involved in a clinical research problem within the
areas, interest and expertise of members of Division of General Internal Medicine. Alternatively,the research effort will be directed toward investigation of a clinical problem of general medical interest. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

GRK Greek

Courses in GRK:

GRK 001—Elementary Greek (5)
Lecture—5 hours. Introduction to the basic grammar and vocabulary of Classical and New Testament Greek. Development of translation skills with emphasis on Greek-English. GE credit: AH. Effective: 1997 Winter Quarter.

GRK 002—Elementary Greek (5)
Lecture—5 hours. Prerequisite(s): GRK 001; Or the equivalent. Continuation of course 1. GE credit: AH. Effective: 2016 Spring Quarter.

GRK 002NT—Elementary New Testament Greek (1)
Lecture—1 hour. Prerequisite(s): GRK 002 (can be concurrent); Concurrent attendance required. Supplementary study of New Testament Greek. GE credit: AH. Effective: 2016 Spring Quarter.

GRK 003—Intermediate Greek (5)
Lecture—5 hours. Prerequisite(s): GRK 002; Or the equivalent. Continuation of course 2. Selected readings from Greek authors. GE credit: AH. Effective: 2016 Spring Quarter.

GRK 003NT—Elementary New Testament Greek (1)
Lecture—1 hour. Prerequisite(s): GRK 003 (can be concurrent); or Consent of Instructor. Concurrent attendance required. Supplementary study of New Testament Greek. GE credit: AH. Effective: 2016 Spring Quarter.

GRK 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

GRK 100—Readings in Greek Prose (4)
Lecture/Discussion—4 hours. Prerequisite(s): GRK 003; Or equivalent. Review of Greek morphology, syntax, and vocabulary. Readings in Greek prose authors, including Xenophon. GE credit: AH. Effective: 2015 Fall Quarter.

GRK 101—Plato (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. GE credit: AH, WE. Effective: 2016 Fall Quarter.

GRK 102—Euripides (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. GE credit: AH, WE. Effective: 2016 Spring Quarter.

GRK 103A—Homer: Iliad (4)
Recitation—3 hours; Term Paper. Prerequisite(s): GRK 003 GE credit: AH, WE. Effective: 1997 Winter Quarter.

GRK 103B—Homer: Odyssey (4)
Recitation—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. GE credit: AH, WE. Effective: 2016 Fall Quarter.

GRK 104—Menander (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. GE credit: AH, WE. Effective: 2016 Spring Quarter.

GRK 105—Attic Orators (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. Selected readings from the orators of 4th and 5th century Athens. May be repeated up to 1 time(s) if topic differs and with consent of instructor. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

GRK 106—Greek Hexameter Poetry (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): GRK 100; or Consent of Instructor. Selected readings from ancient Greek hexameter poetry. Wisdom poetry, hymns, epyllia, idylls, epic, natural history and other texts from the hexameter tradition. May be repeated for credit May be repeated for credit when topic differs. GE credit: AH, WC, WE. Effective: 2017 Fall Quarter.

GRK 110—Readings in the Greek Novel (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. Selected readings from Greek prose fiction of the late classical, Hellenistic and imperial periods. May be repeated up to 2 time(s) with consent of instructor. GE credit: AH, WE. Effective: 2016 Fall Quarter.

GRK 111—Sophocles (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. GE credit: AH, WE. Effective: 2016 Fall Quarter.

GRK 112—Aristophanes (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. GE credit: AH, WE. Effective: 2016 Fall Quarter.

GRK 113—Thucydides (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. GE credit: AH, WE. Effective: 2016 Fall Quarter.

GRK 114—Lyric Poetry (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. GE credit: AH, WE. Effective: 2016 Spring Quarter.

GRK 115—Aeschylus (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. GE credit: AH, WE. Effective: 2016 Spring Quarter.

GRK 116—Herodotus (4)
Lecture—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. GE credit: AH, WE. Effective: 2016 Spring Quarter.

GRK 121—Greek Prose Composition (4)
Lecture/Discussion—4 hours. Prerequisite(s): GRK 100; or Consent of Instructor. Intensive grammar and vocabulary review through exercises in Greek prose composition. GE credit: AH. Effective: 2016 Fall Quarter.

GRK 130—Readings in Later Greek (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): GRK 100; or Consent of Instructor. Translation and discussion of selected readings from Hellenistic to Byzantine Greek literature. GE credit: AH, WE. Effective: 2016 Fall Quarter.

GRK 131—Readings in Ancient Greek Philosophy and Science (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): GRK 100 (can be concurrent); or Consent of Instructor. Selected readings from ancient Greek philosophical and scientific writers. Texts on logical truth and empirical sense data, material and social contexts of ancient Greek philosophy and science. May be repeated for credit May be repeated for credit if topics differ. GE credit: AH, WC, WE. Effective: 2017 Fall Quarter.

GRK 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

GRK 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

HDE Human Development

Courses in HDE:

HDE 012—Human Sexuality (3)
Lecture—3 hours. Vocabulary, structure/function of reproductive system; sexual response; pre-natal development; pregnancy and childbirth; development of sexuality; rape and sexual assault; birth control; sexually transmitted diseases; homosexuality; establishing/maintaining intimacy; sexual dysfunctions; communication; enhancing sexual interaction, cultural differences in attitudes towards sexuality. GE credit: ACGH, DD, SS. Effective: 2012 Fall Quarter.

HDE 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Field work experience or at least one course (e.g. HDE 100A, HDE 100B, HDE 140 or HDE 140L) related to fieldwork assignment. Supervised internship, off campus and on campus, in community and institutional setting. May be repeated up to 12 unit(s) involves progressively greater (supervised) participation in program delivery or assessment. (P/NP grading only.) Effective: 2012 Fall Quarter.

HDE 098—Directed Group Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2012 Fall Quarter.

HDE 099—Special Study for Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 2012 Fall Quarter.

HDE 100A—Infancy and Early Childhood (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); (BIS 002A or BIS 010 or BIS 001A or BIS 010V) or MCB 010 or NPB 010 or NPB 012 or MIC 010 Pass One restricted to Human Development majors. Biological, social, and cultural influences in the psychological growth and development of children, prenatal through age six. Two observations of preschool children required. Effective: 2018 Winter Quarter.

HDE 100B—Middle Childhood and Adolescence (4)
Lecture—4 hours. Prerequisite(s): (HDE 100A or PSC 140); (PSC 001 or PSC 001Y) Interplay of biological and social-cultural factors in the emotional, cognitive and social development from middle childhood through adolescence. Effective: 2018 Winter Quarter.

HDE 100C—Adulthood and Aging (4)
Lecture—4 hours. Prerequisite(s): PSC 001 or PSC 001Y Development during early, middle, and late adulthood; biological, cognitive, and psycho-social aspects of adult development. Emphasis on normative patterns of development which characterize "successful aging." Effective: 2018 Spring Quarter.

HDE 101—Cognitive Development (4)
Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): HDE 100A or HDE 100B or PSC 140 Pass One restricted to Human Development and Psychology majors. Theories, methods, evidence, and debates in the field of cognitive development, such as nature/nurture, constraints on learning, and the role of plasticity. Topics include attention, memory, concepts about the physical and social world, and language. (Psychology 141.) GE credit: WE. Effective: 2012 Fall Quarter.

HDE 102—Social and Personality Development (4)
Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): HDE 100A or HDE 100B or PSC 140 Pass One open to Human Development or Psychology majors. Social and personality development of children, infancy through adolescence. Topics include the development of personality, achievement motivation, self-understanding, sex-role identity, and antisocial behavior. Emphasis on the interface between biological and social factors. (Psychology 142.) GE credit: SS, WE. Effective: 2012 Fall Quarter.

HDE 103—Cross-Cultural Study of Children (4)
Lecture—4 hours. Prerequisite(s): HDE 100A or PSC 140; Consent of Instructor. Cross-cultural studies of children in developing countries and among minority groups in the U.S. GE credit: ACGH, DD, SS, WC. Effective: 2016 Fall Quarter.

HDE 110—Contemporary American Family (4)
Lecture—4 hours. Prerequisite(s): PSC 001 or PSC 001Y or SOC 001 or SOC 002 Factors currently influencing American families including changing economic conditions, changing sex roles, divorce, and parenthood; theories and research on family interaction. Effective: 2018 Winter Quarter.

HDE 117—Longevity (4)
Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): Upper division standing or consent of instructor. Nature, origin, determinants, and limits of longevity with particular reference to humans; emphasis on implications of findings from non-human model systems including natural history, ecology and evolution of life span; description of basic demographic techniques including life table methods. (Entomology 117.) GE credit: SE, SL, WE. Effective: 2012 Fall Quarter.

HDE 120—Research Methods in Human Development (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): STA 013 or STA 013V or STA 013Y or EDU 114 or PSC 041 or (SOC 046A, SOC 046B) Scientific process, research designs, and experimental controls; APA manuscript style and scientific writing; statistical analysis and interpretation of results. Laboratory exercises to collect data, analyze and interpret results, and write scientific papers. GE credit: SS, WE. Effective: 2018 Winter Quarter.

HDE 121—Psychological Assessment (4)
Lecture—4 hours. Prerequisite(s): (HDE 100A or HDE 100B); (STA 013 or STA 013Y or PSC 041 or (SOC 046A, SOC 046B)) Current issues and methodology related to the process of psychological assessment with children. Effective: 2018 Spring Quarter.

HDE 130—Developmental Psychopathology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (HDE 100A, HDE 100B) or PSC 140; Consent of Instructor. Foundational principles and current issues in developmental psychopathology, the study of mental health problems and disorders that originate in childhood and adolescence (e.g., disruptive behavior, mood and anxiety disorders). Effective: 2018 Winter Quarter.

HDE 132—Individual Differences in Cognition (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); (HDE 100A or HDE 100B) Individual differences in cognition, including learning disabilities and giftedness. Education implications and neurodevelopmental substrates of individual differences in cognition. Effective: 2018 Spring Quarter.

HDE 140—Communication and Interaction with Young Children (2)
Lecture—2 hours. Prerequisite(s): HDE 100A; HDE 140L (can be concurrent); and Consent of Instructor. HDE 140L required concurrently. Enrollment requires sign up for laboratory time at the Child and Family Studies Center located at 244 First Street, Davis, CA. Integration of research, theory and practice in child development, emphasizing the role of relationships in creating a growth-promoting environment for young children. Includes: peer relationships, emotional understanding and self regulation, attachment, communication and school readiness. Effective: 2012 Fall Quarter.

HDE 140L—Laboratory in Early Childhood (3-5)
Discussion/Laboratory—3 hours; Laboratory—6-15 hours. Prerequisite(s): HDE 140 (can be concurrent); and Consent of Instructor. HDE 140 must be taken concurrently for first 3 units of credit; students must contact the Center for Child and Family Studies to enroll. Limited enrollment. Application of theories of learning and development to interaction with infants, toddlers, and preschoolers at Early Childhood Laboratory. Applied skills in communication, guidance and curriculum. May be repeated up to 2 time(s). (P/NP grading only.) Effective: 2012 Fall Quarter.

HDE 141—Field Study With Children and Adolescents (4-6)
Fieldwork—6-12 hours; Lecture—2 hours. Prerequisite(s): HDE 100A or HDE 100B; and Consent of Instructor. Study of children's affective, cognitive and social development within the context of family/school environments, hospitals and foster group homes. May be repeated up to 12 unit(s). Effective: 2012 Fall Quarter.

HDE 142—Field Study with Emotionally Distressed Children and Adolescents (4-6)
Discussion—1.5 hours; Fieldwork—6-12 hours. Prerequisite(s): HDE 130 (can be concurrent); and Consent of Instructor. Field study with children who are identified as emotionally distressed, including those with internalizing and externalizing behavioral problems. May be repeated up to 12 unit(s). Effective: 2012 Fall Quarter.

HDE 143—Field Studies of the Elderly (4-6)
Discussion—2 hours; Fieldwork—6-12 hours; Variable. Prerequisite(s): HDE 100C or HDE 160 (can be concurrent); and Consent of Instructor. Apply theory and research on adult development and aging, work with older adults in a variety of settings, and develop skills relevant to that application. Develop a small research project. Effective: 2016 Fall Quarter.

HDE 160—Social Aspects of Aging (4)
Lecture—4 hours. Prerequisite(s): HDE 100C How the social context affects adult development and aging. Emphasis on demography, social policy, culture, and adaptation. Oral histories as class projects. Effective: 2016 Fall Quarter.

HDE 161—Applied Cognition and Aging (4)
Lecture/Discussion—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); HDE 100C Principles from cognition and aging and applies these to real-world concerns in areas including education, technology, job performance, and health. Considers physical and social changes in later life that impact functioning. GE credit: SS, WE. Effective: 2018 Spring Quarter.

HDE 163—Cognitive Neuropsychology in Adulthood and Aging (4)
Lecture/Discussion—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); HDE 100C recommended. Theories, methods, and findings concerning the relationship between cognitive processes and brain functioning. Readings, lectures, and in-class discussions cover research on normal younger and older adults, neuropsychological case studies, and selected patient groups (e.g., amnesia, schizophrenia, Alzheimer's disease). Effective: 2018 Spring Quarter.

HDE 190C—Introductory Research Conference (1)
Discussion—1 hour. Prerequisite(s): Involvement in ongoing research; consent of instructor. Instructors lead discussions with undergraduate students who involve themselves in a research project. Research papers are reviewed and
aspects of project proposals developed out of class are presented and evaluated. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 2016 Fall Quarter.

HDE 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Supervised internship off and on campus, in community, and institutional
settings. (P/NP grading only.) Effective: 2012 Fall Quarter.

HDE 198—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 2012 Fall Quarter.

HDE 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 2012 Fall Quarter.

HDE 200A—Early Development (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Graduate standing; basic biology or physiology; one upper division course in psychology or a related field; one upper division or graduate course in developmental psychology (can be concurrent). Theory and research on the biological, social, cognitive, and cultural aspects of development from conception to the age of five years. Effective: 2012 Fall Quarter.

HDE 200B—Middle Childhood and Adolescence (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Graduate standing; basic biology or physiology, and at least two upper division or graduate level courses in psychology or related fields. Theory and research on biological, cognitive, social, and cultural influences on behavioral development from age five years until late adolescence. Effective: 2012 Fall Quarter.

HDE 200C—Development in Adulthood (4)
Lecture/Discussion—4 hours. Theory and research focusing on social, personality, cognitive, and biological development from early to late adulthood. Emphasis is on theory development and continuity and change. Effective: 2016 Fall Quarter.

HDE 203—Adolescent Behavioral and Emotional Development (4)
Lecture/Discussion—4 hours. Prerequisite(s): HDE 200B Analysis of recent theories, research methods, and major findings on adolescent behavioral and emotional development, including contextual and genetic influences on adolescence, pubertal transitions, and social/family contexts and processes. Emphasis on multi-level mechanisms underlying adolescent behavioral and emotional development. Effective: 2012 Fall Quarter.

HDE 204—Developmental Neuroscience and Adolescent Psychopathology (4)
Lecture—4 hours. Prerequisite(s): Graduate standing in Human Development, Psychology, Education, Neuroscience or consent of instructor. Introduction to human developmental neuroscience. Understanding of adolescence and its characterization as a time of risky and unhealthy behavior and vulnerability to onset of mental disorder as well as issues around plasticity of the adolescent brain and prevention/intervention. Effective: 2012 Fall Quarter.

HDE 205—Path Analysis, Factor Analysis, and Structural Equation Modeling (4)
Lecture—4 hours. Prerequisite(s): PSC 204B; Or equivalent graduate courses in statistics or consent of instructor; familiarity with multiple regression and the basics of matrix algebra. Graduate standing in Human Development Graduate Group, Psychology, Sociology, Education, or a related social science. Introduction of basic concepts, principles, and applications of structural equation modeling including path analysis, confirmatory factor analysis, multiple-group modeling, and latent growth curve modeling. Effective: 2012 Fall Quarter.

HDE 207—Topics in Applied Cognitive Aging (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing in Human Development Graduate Group, Psychology, Education, or a related social science, or consent of instructor. Apply principles from cognitive aging to real-world concerns in areas such as education, technology, job performance, and health. Examine how physical and social changes occurring in later life impact functioning. Effective: 2012 Fall Quarter.

HDE 210—Theories of Behavioral Development (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): Graduate standing in behavioral sciences. Consideration of enduring issues in theories of behavioral development; analysis of adequacy of major theoretical schools (e.g., social learning, Piagetian) as scientific theories. Effective: 2012 Fall Quarter.

HDE 211—Physiological Correlates of Behavioral Development (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. An overview of mechanisms of organismic development and the implications of developmental biology for the analysis of behavioral ontogeny; consideration of parallels between processes of organismic development and behavioral development in children and infra-human mammals. Effective: 2012 Fall Quarter.

HDE 220—Research Methods in Human Growth and Development (4)
Lecture—4 hours. Prerequisite(s): STA 013 or STA 013Y; Or the equivalent and at least two upper division courses in Human Biology or Developmental Psychology. Overview of qualitative and quantitative approaches to empirical inquiry in the social sciences, with a focus on theory and research methods in biological growth and cognitive and social/emotional development from prenatal period to death. Effective: 2018 Winter Quarter.

HDE 232—Cognition and Aging (3)
Lecture/Discussion—3 hours. Prerequisite(s): HDE 200C The manner in which cognitive processes are affected by aging as well as an understanding of the changes in the central nervous system occurring with aging. Effective: 2012 Fall Quarter.

HDE 234—Children's Learning and Thinking (3)
Seminar—3 hours. Prerequisite(s): HDE 200A or PSC 212 recommended. Analysis of theories, research methods, and major findings of children's higher-order cognition, including origins of knowledge, development of problem-solving skills, reasoning strategies, and scientific concepts, with an emphasis on the underlying mechanism involved in children's thinking and learning processes. Effective: 2012 Fall Quarter.

HDE 238—The Context of Individual Development (3)
Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing in Human Development, Child Development, Education, Psychology, Anthropology, Sociology, or consent of instructor. Analysis of human development within the context of daily life. Contextualizing theories and methods of developmental psychology will be distinguished from contextual theories and methods. Developmental psychology models will be distinguished from child psychology models. Effective: 2012 Fall Quarter.

HDE 239—Developmental Trajectories in Typical and Atypical Children; Birth to Five (4)
Discussion/Laboratory—3 hours; Term Paper. Prerequisite(s): Graduate standing in Human Development, Psychology, Sociology, a related social science, or permission of the instructor. Discuss theories of development in typical and atypical children from birth to five from a socio-cultural perspective including parent-child interaction, peer interactions, cultural contexts of learning, as well as theoretical and empirical issues for understanding continuities and discontinuities in development. Effective: 2012 Fall Quarter.

HDE 240—Peer Relationships during Adolescence (4)
Lecture/Discussion—4 hours. Graduate standing in Human Development, Psychology, Education, or consent of instructor. Course examines the role of peer relationships in adolescent development including forms and functions at the individual, dyadic and group levels. Ethnicity and cross cultural research will be discussed. Emphasis on methodology, including surveys, peer nominations/sociometrics, experimental, and observational designs. Effective: 2012 Fall Quarter.

HDE 250—Current Research on Family Relationships (4)
Discussion/Laboratory—3 hours; Term Paper. Graduate standing in Human Development Graduate Group, Psychology, Sociology, a related social science, or consent of instructor. Discussion of theories, methods, and current research on the nature and development of sibling, romantic, and parent-child relationships across the lifespan. Emphasis on interpersonal and family processes examined in ethnic/cultural contexts. Implications for individual development will be addressed. Effective: 2012 Fall Quarter.

HDE 252—Family Research, Programs and Policy (4)
Seminar—3 hours; Term Paper. Graduate standing in Human Development, Psychology, Sociology, related social sciences, or consent of instructor. Course examines the competing interests of research, policy, and service on current issues of family functioning and individual well being. The course considers communication barriers between researchers, practitioners, and policy makers. Effective: 2012 Fall Quarter.

HDE 290—Seminar (3)
Seminar—3 hours. Discussion and evaluation of theories, research, and issues in human development. Different topics each quarter. Effective: 2012 Fall Quarter.

HDE 290C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Supervising instructors lead research discussions with their graduate students. Research papers are reviewed and project proposals are presented and evaluated. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 2012 Fall Quarter.

HDE 291—Research Issues in Human Development (4)
Seminar—4 hours. Prerequisite(s): Graduate Standing in the behavioral sciences. In-depth presentations of research issues in particular areas of behavioral development. May be repeated for credit. Effective: 2012 Fall Quarter.

HDE 292—Graduate Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of faculty (internship sponsor) and satisfactory completion of placement relevant course work, for example: EDU 213, EDU 216; HDE 222, HDE 242; LAW 272, LAW 273. Individually designed supervised internship, off campus, in community or institutional setting. Developed with advice of faculty mentor. May be repeated up to 12 unit(s) justifed skill acqusition and promise of informing evaluation research. (S/U grading only.) Effective: 2012 Fall Quarter.

HDE 298—Group Study (1-5)
Variable. Effective: 2012 Fall Quarter.

HDE 299—Human Development (1-12)
Variable. (S/U grading only.) Effective: 2012 Fall Quarter.

HDE 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 2012 Fall Quarter.

HEB Hebrew

Courses in HEB:

HEB 001—Elementary Hebrew (5)
Laboratory—1 hour; Lecture/Discussion—4 hours. Speaking, listening, comprehension, reading and writing fundamentals of modern Hebrew. GE credit: AH. Effective: 1998 Fall Quarter.

HEB 001A—Accelerated Intensive Elementary Hebrew (15)
Lecture/Discussion—15 hours. Special 12 week accelerated, intensive summer session course that combines the work of courses 1, 2, and 3. Introduction to Hebrew grammar and development of language skills in a cultural context with emphasis on communication. Not open to students who have completed course HEB 001, HEB 002, or HEB 003. GE credit: AH, WC. Effective: 2008 Spring Quarter.

HEB 002—Elementary Hebrew (5)
Laboratory—1 hour; Lecture/Discussion—4 hours. Prerequisite(s): HEB 001; Or the equivalent. Speaking, listening, comprehension, reading and writing fundamentals of modern Hebrew. GE credit: AH, OL, WC. Effective: 2017 Fall Quarter.

HEB 003—Elementary Hebrew (5)
Laboratory—1 hour; Lecture/Discussion—4 hours. Prerequisite(s): HEB 002; Or the equivalent. Speaking, listening comprehension, reading and writing fundamentals of modern Hebrew. GE credit: AH, OL, WC. Effective: 2017 Fall Quarter.

HEB 010—Introduction to Biblical Hebrew (3)
Lecture/Discussion—3 hours. Introduction to the Hebrew Alphabet and basic grammar rules of the biblical language. Students will learn to read most any biblical text and learn how to find the meaning of words by their roots and morphological structure. GE credit: AH, WC. Effective: 2015 Winter Quarter.

HEB 011—Introduction to Biblical Hebrew (3)
Lecture/Discussion—3 hours. Prerequisite(s): HEB 010 Continuation of course 10. Biblical text reading, simple/literal translation, verb and noun patterns, compounding of prepositions and nouns. GE credit: AH, WC. Effective: 2018 Winter Quarter.

HEB 012—Introduction to Biblical Hebrew (3)
Lecture/Discussion—3 hours. Prerequisite(s): HEB 011 Continuation of course 011. Biblical text reading, simple/literal translation, verb and noun patterns, compounding of prepositions and nouns. GE credit: AH, WC. Effective: 2018 Winter Quarter.

HEB 021—Intermediate Modern Hebrew I (4)
Lecture/Discussion—4 hours. Prerequisite(s): HEB 003; Consent of Instructor. Development and refinement of grammar, composition, and language skills required for reading literary texts and conversing about contemporary topics at an advanced level. History of the Hebrew language. Not open to students who have taken course HEB 100 or HEB 100A. GE credit: AH, OL, WC. Effective: 2017 Fall Quarter.

HEB 022—Intermediate Modern Hebrew II (4)
Lecture/Discussion—4 hours. Prerequisite(s): HEB 021; Consent of Instructor. Continued development and refinement of grammar, composition, and language skills required for reading literary texts and conversing about contemporary topics at an advanced level. History of the Hebrew language. Not open to students who have taken HEB 101 or HEB 100B. GE credit: AH, OL, WC. Effective: 2017 Fall Quarter.

HEB 023—Intermediate Modern Hebrew III (4)
Lecture/Discussion—4 hours. Prerequisite(s): HEB 022; Consent of Instructor. Continued development of grammar, composition, language skills required for reading literary texts and conversing about contemporary topics at an advanced level. History of the Hebrew language. Further development of writing and translating skills. Not open to students who have taken HEB 100C or HEB 102. GE credit: AH, OL, WC. Effective: 2018 Spring Quarter.

HEB 098—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Directed group study. May be repeated for credit. (P/NP grading only.) Effective: 2017 Winter Quarter.

HEB 099—Special Study for Undergraduates (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special study. May be repeated for credit. (P/NP grading only.) Effective: 2017 Winter Quarter.

HEB 100AN—Advanced Modern Hebrew I (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): HEB 023; or Consent of Instructor. Those who took course 100A as second-year Hebrew may take course 100AN. Third year Hebrew. Advanced grammar and composition. Focus on reading of literary texts, oral skills and accuracy in writing. GE credit: AH. Effective: 2006 Fall Quarter.

HEB 100BN—Advanced Modern Hebrew II (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): HEB 100AN; or Consent of Instructor. Those who took course 100B as second-year Hebrew may take course 100BN. Third year Hebrew. Advanced grammar and composition. Focus on reading of literary texts, oral skills and accuracy in writing. GE credit: AH. Effective: 2006 Winter Quarter.

HEB 100CN—Advanced Modern Hebrew III (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): HEB 100BN Third year Hebrew. Advanced grammar and composition. Focus on reading of literary texts, oral skills and accuracy in writing. Students who have taken course 100C as 2nd year Hebrew may take course 100CN. GE credit: AH. Effective: 2006 Spring Quarter.

HIN Hindi/Urdu

Courses in HIN:

HIN 001—Elementary Hindi/Urdu I (5)
Lecture/Discussion—5 hours. Introduction to Devanagari Script through development of all language skills in a cultural context with emphasis on communicative proficiency. GE credit: AH, WC. Effective: 2014 Fall Quarter.

HIN 001A—Accelerated Intensive Elementary Hindi (15)
Lecture/Discussion—15 hours. Special 12-week accelerated, intensive summer session course that combines the work of courses 1, 2, and 3. Introduction to Devnagari Script through development of all language skills in cultural context with emphasis on communicative proficiency. Not open for credit to students who have completed course HIN 001, HIN 002 or HIN 003. GE credit: AH, WC. Effective: 2014 Summer Special Session.

HIN 002—Elementary Hindi/Urdu II (5)
Lecture/Discussion—5 hours. Prerequisite(s): HIN 001 Continuation of course 1. Devanagari Script through development of all language skills in a cultural context with emphasis on communicative proficiency. GE credit: AH, WC. Effective: 2015 Winter Quarter.

HIN 003—Elementary Hindi/Urdu III (5)
Lecture/Discussion—5 hours. Prerequisite(s): HIN 002 Introduction to Devanagari Script through development of all language skills in a cultural context with emphasis on communicative proficiency. GE credit: AH, WC. Effective: 2015 Spring Quarter.

HIN 021—Intermediate Hindi/Urdu I (4)
Lecture/Discussion—4 hours. Prerequisite(s): HIN 003 Intermediate level course for students who have completed Elementary Hindi/Urdu or the equivalent. Students will continue to practice their skills in listening, speaking, reading and writing in Hindi and Urdu. GE credit: AH, OL, WC. Effective: 2017 Fall Quarter.

HIN 022—Intermediate Hindi/Urdu II (4)
Lecture/Discussion—4 hours. Prerequisite(s): HIN 021 Intermediate level course where students will continue to practice their skills in listening, speaking, reading and writing in Hindi and Urdu. GE credit: AH, OL, WC. Effective: 2017 Fall Quarter.

HIN 023—Intermediate Hindi/Urdu III (4)
Lecture/Discussion—4 hours. Prerequisite(s): HIN 022 Intermediate level course where students will continue to practice their skills in listening, speaking, reading and writing in Hindi and Urdu. GE credit: AH, OL, WC. Effective: 2017 Fall Quarter.

HIN 098—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Directed group study. May be repeated for credit. (P/NP grading only.) Effective: 2017 Winter Quarter.

HIN 099—Special Study for Undergraduates (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special study. May be repeated for credit. (P/NP grading only.) Effective: 2017 Winter Quarter.

HIN 396—Teaching Assistant Training Practicum (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Restricted to graduate students. Teaching practicum. May be repeated up to 18 time(s). (S/U grading only.) Effective: 2017 Winter Quarter.

HIS History

Courses in HIS:

HIS 001—Introduction to History (2)
Discussion—1 hour; Lecture—1 hour. Introduction to history, its key methodologies, writing tasks, and research practices. Examination of the development of history as an academic discipline; ethics in historical research. Topical focus changes regularly. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

HIS 002—Introduction to the History of Science and Technology (4)
Discussion—1 hour; Lecture—3 hours. Introduction to topics and methods of the history of science and technology. Emphasis on understanding the role of science and technology in the modern world through a long-term historical perspective. (Science and Technology Studies 002.) GE credit: AH, SL, SS, WC, WE. Effective: 2017 Fall Quarter.

HIS 003—Cities: A Survey of World Cultures (4)
Lecture—3 hours; Lecture/Discussion—1 hour. Survey of urban world cultures, focusing on up to ten cities selected by the instructor. GE credit: AH, SS, WC. Effective: 2017 Winter Quarter.

HIS 004A—History of Western Civilization (4)
Discussion—1 hour; Lecture—3 hours. Growth of western civilization from late antiquity to the Renaissance. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 004B—History of Western Civilization (4)
Discussion—1 hour; Lecture—3 hours. History of western civilization from the Renaissance to the Eighteenth Century. GE credit: AH, SS, VL, WC, WE. Effective: 2015 Winter Quarter.

HIS 004C—History of Western Civilization (4)
Discussion—1 hour; Lecture—3 hours. Development of Western Civilization from the Eighteenth Century to the present. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 005—Modernist Culture (2)
Lecture/Discussion—2 hours. Modernist culture in global perspective. Introduction to early 20th century- innovations in visual arts, music, literature, film, and architecture in Europe, the Americas, Asia, and Africa. GE credit: AH, VL, WC. Effective: 2018 Fall Quarter.

HIS 006—Introduction to the Middle East (4)
Discussion—1 hour; Lecture—3 hours. Survey of the major social, economic, political and cultural transformations in the Middle East from the rise of Islam (c.600A.D.) to the present, emphasizing themes in religion and culture, politics and society. GE credit: AH, SS, WC, WE. Effective: 2003 Fall Quarter.

HIS 007A—History of Latin America to 1700 (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the history of Spanish and Portuguese America from the late pre-Columbian period through the initial phase and consolidation of a colonial regime (circa 1700). Topics include conquest, colonialism, racial mixture, gender, and labor systems. GE credit: AH, SS, WC, WE. Effective: 2004 Fall Quarter.

HIS 007B—History of Latin America, 1700-1900 (4)
Discussion—1 hour; Lecture—3 hours. Latin America from colony to republic. The nature of Iberian colonialism, the causes for independence, the creation of nation states, the difficulties in consolidating these nations, and the rise of Liberalism and export economies in the nineteenth century. GE credit: AH, SS, WC, WE. Effective: 2004 Fall Quarter.

HIS 007C—History of Latin America 1900-present (4)
Discussion—1 hour; Lecture—3 hours. Latin America since the beginning of the 20th century. Themes include export economies, oligarchic rule, crises of depression and war, corporatism, populism, revolution and reform movements, cultural and ethnic issues, U.S.-Latin American relations, neo-liberal restructuring. GE credit: AH, SS, WC, WE. Effective: 2004 Fall Quarter.

HIS 008—History of Indian Civilization (4)
Discussion—1 hour; Lecture—3 hours. Survey of Indian civilization from the rise of cities (ca. 2000 B.C.) to the present, emphasizing themes in religion, social and political organization, and art and literature that reflect cultural interaction
and change. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 009A—History of East Asian Civilization (4)
Discussion—1 hour; Lecture—3 hours. Surveys traditional Chinese civilization and its modern transformation.
Emphasis is on thought and religion, political and social life, art and literature. Perspectives on contemporary China are provided. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 009B—History of East Asian Civilization (4)
Discussion—1 hour; Lecture—3 hours. Surveys traditional Japanese civilization and its modern transformation.
Emphasis is on thought and religion, political and social life, art and literature. Perspectives on contemporary Japan are provided. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 010A—World History to 1350 (4)
Discussion—1 hour; Lecture—3 hours. Historical examination of the changing relationship of human societies to one another and to their natural settings through the year 1350, with particular attention to long-term trends and to periodic crises that reshaped the links of culture and nature on a global scale. GE credit: AH, SS, WC, WE. Effective: 2003 Fall Quarter.

HIS 010B—World History, c. 1350-1850 (4)
Discussion—1 hour; Lecture—3 hours. Major topics in world history from the 14th century to the beginning of the 19th century. Topics will vary but may include: oceans as systems of human communication and conflict; the global consequences of "industrious revolutions" in Europe and Asia, etc. GE credit: AH, SS, WC, WE. Effective: 2001 Winter Quarter.

HIS 010C—World History III (4)
Discussion—1 hour; Lecture—3 hours. Major topics from world history of the 19th and 20th centuries,
emphasizing the rise and fall of Western colonial empires; Cold War and the superpowers; the spread of the nation-states; and process of globalization. GE credit: AH, SS, WC, WE. Effective: 1998 Fall Quarter.

HIS 011—History of the Jewish People in the Modern World (4)
Discussion—1 hour; Lecture—3 hours. Histories and cultures of the Jews since 1492. Topics include: the making of Jewish diasporas, roots of antisemitism, the Holocaust in images and texts, changing ideas of the self, Jews in America, contemporary visions of the Jewish past. GE credit: AH, DD, VL, WC, WE. Effective: 2014 Winter Quarter.

HIS 012—Food and History (4)
Discussion—1 hour; Lecture—3 hours. Survey of the ways humans have fed themselves from the dawn of humanity to the present. Transformation of plants and animals into food, cooking into cuisine, and ceremony into etiquette. GE credit: AH, OL, SS, VL, WC, WE. Effective: 2014 Fall Quarter.

HIS 013—Global Sexualities (4)
Discussion—1 hour; Lecture—3 hours. Global history of sexualities, including comparative study of gender, marriage, and fertility before 1800, followed by the modern history of sexualities worldwide as it intersects with imperialism, race, population control, law, and globalization. GE credit: AH, DD, SS, VL, WC. Effective: 2017 Fall Quarter.

HIS 014—History of Global Capitalism (4)
Discussion—1 hour; Lecture—3 hours. History of institutions, workers, commodity chains, and the social and cultural context of capitalism around the world from 1500-present. Emphasis on transnational and comparative histories of political economies and individual human lives. GE credit: DD, SS, WC. Effective: 2018 Spring Quarter.

HIS 015A—Africa to 1900 (4)
Discussion—1 hour; Lecture—3 hours. Introduction to African history to 1900. Origins and impact of early human history, precolonial states and societies, slavery and the slave trade, religious and cultural movements, and the foundations of European colonialism. GE credit: AH, SS, WC. Effective: 2018 Spring Quarter.

HIS 015B—Africa Today (4)
Discussion—1 hour; Lecture—3 hours. Survey of major themes in colonial and postcolonial sub-Saharan African history, including colonialism, decolonization, nationalism and politics, economic history and labor, urbanization, popular culture, gender, marriage, and family life. GE credit: AH, SS, WC. Effective: 2017 Fall Quarter.

HIS 017A—History of the United States (4)
Discussion—1 hour; Lecture—3 hours. The experience of the American people from the Colonial Era to the Civil War. GE credit: ACGH, AH, DD, SS, WE. Effective: 1997 Winter Quarter.

HIS 017B—History of the United States (4)
Discussion—1 hour; Lecture—3 hours. The experience of the American people from the Civil War to the end of the Cold War. Not open for credit to students who have completed course HIS 017C. GE credit: ACGH, AH, DD, SS, WE. Effective: 1997 Winter Quarter.

HIS 018A—Race in America to 1865 (4)
Discussion—1 hour; Lecture—3 hours. Introduction to history of race and racial formation in the United States to the Civil War through a comparative approach. Examines the experiences of African Americans, Asian Americans, Native American, Mexican Americans and other Latino/a groups. One unit of credit to students who have previously completed HIS 178A. GE credit: ACGH, AH, DD, SS. Effective: 2017 Fall Quarter.

HIS 018B—Race in the United States Since 1865 (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the history of race and racial formation in America since 1865 though a comparative approach that examines the experiences of African Americans, Asian Americans, Native American and Mexican Americans and other Latino/a groups. GE credit: ACGH, AH, DD, SS. Effective: 2018 Spring Quarter.

HIS 020—The Vietnam War (4)
Extensive Writing; Lecture—3 hours. A history of the Vietnam War, including its origins, fighting, and repercussions. GE credit: ACGH, AH, DD, SS, VL, WC, WE. Effective: 2017 Fall Quarter.

HIS 072A—Women and Gender in America, to 1865 (4)
Discussion—1 hour; Lecture—3 hours. History of women and gender in America through 1865, emphasizing intersections of gender, race, class, and sexuality. Topics include interracial marriage, slavery, witchcraft, meanings of motherhood, war, domestic labor, moral reform, women's rights, migrations, the effects of commercialization and industrialization. GE credit: ACGH, AH, DD, SS, WE. Effective: 2014 Fall Quarter.

HIS 072B—Women and Gender in America, 1865-Present (4)
Discussion—1 hour; Lecture—3 hours. History of women and gender in America since 1865, emphasizing intersections of gender, race, class, and sexuality. Covers emancipation, migration, immigration, war, media, same-sex and opposite-sex relationships, and the birth control, suffrage, labor, civil rights, feminist, and anti-feminist movements. GE credit: ACGH, AH, DD, SS, WE. Effective: 2014 Fall Quarter.

HIS 080—The History of the United States in the Middle East (2)
Lecture—2 hours. History of the United States in the Middle East from 1900 to the present. Examination of U.S. foreign relations toward the Middle East, their regional ramifications and domestic repercussions. GE credit: ACGH, AH, SS, WC. Effective: 2018 Spring Quarter.

HIS 080W—The History of the United States in the Middle East (2)
Extensive Writing; Lecture/Discussion—1 hour. Must enroll in HIS 080 concurrently. History of the United States in the Middle East from 1900 to the present. Examination of U.S. foreign relations toward the Middle East, their regional ramifications and domestic repercussions with extensive writing. GE credit: AH, SS, WE. Effective: 2018 Spring Quarter.

HIS 085—Nature, Man, and the Machine in America (4)
Seminar—4 hours; Term Paper. Limited enrollment. History of the attitudes and behavior of Americans toward their natural environment and their technology, from colonial times to the present. No final examination. GE credit: AH, SS, WE. Effective: 2016 Spring Quarter.

HIS 092—Internship in History (1-12)
Internship—1-12 hours. Prerequisite(s): Consent of Instructor. Supervised internship and study as a historian, archivist, curator, or an in another history-related capacity, in an approved organization or institution. May be repeated for credit. (P/NP grading only.) Effective: 2017 Fall Quarter.

HIS 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Primarily for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

HIS 099—Special Study for Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

HIS 101—Introduction to Historical Thought and Writing (5)
Lecture/Discussion—4 hours; Term Paper. Study of the history of historical thought and writing, analysis of critical and speculative philosophies of history and evaluation of modes of organization, interpretation, and style in historical writing. GE credit: WE. Effective: 2016 Fall Quarter.

HIS 102A—Undergraduate Proseminar in History; Ancient (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Ancient. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102B—Undergraduate Proseminar in History; Medieval (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Medieval. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102D—Undergraduate Proseminar in History; Modern Europe to 1815 (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Modern Europe to 1815. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102E—Undergraduate Proseminar in History; Europe Since 1815 (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Europe since 1815. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102F—Undergraduate Proseminar in History; Russia (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Russia. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102G—Undergraduate Proseminar in History; China to 1800 (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. China to 1800. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102H—Undergraduate Proseminar in History; China Since 1800 (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. China since 1800. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102I—Undergraduate Proseminar in History; Britain (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Britain. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102J—Undergraduate Proseminar in History; Latin America Since 1810 (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Latin America since 1810. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102K—Undergraduate Proseminar in History; American History to 1787 (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. American History to 1787. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102L—Undergraduate Proseminar in History; United States, 1787-1896 (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. United States, 1787-1896. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102M—Undergraduate Proseminar in History; United States Since 1896 (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. United States since 1896. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102N—Undergraduate Proseminar in History; Japan (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Japan. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102O—Undergraduate Proseminar in History; Africa (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Africa. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102P—Undergraduate Proseminar in History; Christianity and Culture in Europe, 50-1850 (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Christianity and Culture in Europe, 50-1850. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102Q—Undergraduate Proseminar in History; India (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. India. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102R—Undergraduate Proseminar in History; Muslim Societies (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Muslim Societies. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 102S—Undergraduate Proseminar in History; Education Abroad Program (5)
Seminar—3 hours; Term Paper. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Education Abroad Program. May be repeated for credit. GE credit: AH, SS, WE. Effective: 2006 Spring Quarter.

HIS 102X—Undergraduate Proseminar in History; Comparative History (5)
Seminar—3 hours; Term Paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Comparative History, selected topics in cultural, political, economic, and social history that deal comparatively with more than one geographic field. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 103—Topics in Historical Research (4)
Discussion—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Individual research resulting in a research paper on a specific topic in one of various fields of history. May be repeated for credit. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 104A—Introduction to Historical Research and Interpretation (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Acceptance into History Department Honors Program. Directed reading and research aimed at preparing students to select appropriate topics and methodologies for a senior honors essay and to situate their topics within a meaningful, broad context of historical
interpretations. GE credit: WE. Effective: 1997 Winter Quarter.

HIS 104B—Honors Thesis (4)
Tutorial—4 hours. Prerequisite(s): HIS 104A Research in preparation of a senior honors thesis under the direction of a faculty advisor. GE credit: WE. Effective: 2002 Winter Quarter.

HIS 104C—Honors Thesis (4)
Tutorial—4 hours. Prerequisite(s): HIS 104A; HIS 104B Completion of a senior honors thesis under the direction of a faculty advisor. GE credit: WE. Effective: 2002 Spring Quarter.

HIS 105—Teaching History (4)
Lecture—3 hours; Term Paper. Teaching of American and world history at the K-12 level. Emphasis on introducing college students to the multiple ways in which history is taught, and on understanding how history education is determined. GE credit: ACGH, AH, SS, WE. Effective: 2014 Fall Quarter.

HIS 107—Medicine's Histories: Human and Veterinary Medicine from the Ancient World to One Health (4)
Lecture/Discussion—3 hours; Project (Term Project). Global, comparative study of the related histories of human and veterinary medicine from the ancient world to today's interdisciplinary One Health. Emphasis on reintegration of human and veterinary medicine to meet the biggest health challenges today GE credit: AH, SS. Effective: 2017 Spring Quarter.

HIS 108—Global Environmental History (4)
Lecture/Discussion—3 hours; Project (Term Project). Global, comparative study of how environmental change, human perceptions of nature, and manipulations of nature have changed over time. Primary focus post-1500, emphasis on critically analyzing many common ideas of environmental change. Not open for credit to students who have taken HIS 109A. GE credit: AH, SS. Effective: 2014 Fall Quarter.

HIS 109—Environmental Change, Disease and Public Health (4)
Lecture/Discussion—3 hours; Project (Term Project). Analysis of environmental changes from pre-history to the present and their influence on disease distribution, virulence and public health. Focus on critical study of many human-driven environmental changes and the accelerated transformation/spread of pathogens under globalization. Not open for credit to students who have taken HIS 109B. (Science and Society 109.) GE credit: SE, SL, SS, WC. Effective: 2016 Fall Quarter.

HIS 110—Themes in World History (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Upper division standing recommended. Topics will emphasize the interaction of diverse regions of the world as well as common patterns of historical change. May be repeated for credit topic and/or instructor differs. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 110A—Colonialism and the Making of the Modern World (4)
Lecture—3 hours; Term Paper. History of the modern world, focusing on struggles between Europeans and colonized peoples; the global formation of capitalism; the creation of nation-states; and the constitution of bourgeois bodies and racial selves in modern societies. GE credit: AH, SS, VL, WC, WE. Effective: 2014 Fall Quarter.

HIS 111A—Ancient History (4)
Lecture—3 hours. History of ancient empires of the Near East and of their historical legacy to the Western world. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 111B—Ancient History (4)
Lecture—3 hours. Political, cultural and intellectual study of the Greek world from Minoan-Mycenaean period to end of Hellenistic Age. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 111C—Ancient History (4)
Lecture—3 hours. Development of Rome from earliest times. Rise and fall of the Roman Republic; the Empire to 476 A.D. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 112A—Topics in Pre-Modern Jewish History (4)
Lecture—3 hours; Term Paper. Topics in the history of Jews from the Biblical era to the eras of Jewish emancipation. Topics can be framed chronologically (eg.,
medieval Jewry) or thematically (eg., trade and Jewish communities). May be repeated once for credit. May be repeated up to 1 time(s). GE credit: AH, SS, WC, WE. Effective: 1997 Fall Quarter.

HIS 112B—Topics in Modern Jewish History (4)
Lecture—3 hours; Term Paper. Topics in the history of Jews from the era of Jewish emancipation to the
present. Topics can be framed chronologically or thematically (eg. Zionism, assimilation, the post Holocaust Diaspora). May be repeated once for credit. May be repeated up to 1 time(s). GE credit: AH, SS, WC, WE. Effective: 1997 Fall Quarter.

HIS 112C—History of Jews in the Muslim World (4)
Lecture—3 hours; Term Paper. History of Jewish communities in the lands of Islam from the time of the Prophet Muhammad to the present day. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 113—History of Modern Israel (4)
Lecture—3 hours; Term Paper. Topics include the rise and fall of utopian Zionism, the century-long struggle between Jews and Arabs, the development of modern Hebrew culture, the conflict between religious and secular Jews, and the nature of Israel's multicultural society. GE credit: AH, SS, WC, WE. Effective: 2004 Spring Quarter.

HIS 115A—History of West Africa (4)
Lecture—3 hours; Term Paper. Prerequisite(s): HIS 015 recommended. West and Central Africa from 1500 to the present. Origins and impact of precolonial states and societies, the trans-Atlantic slave trade, colonialism, decolonization, nationalism, and changes in religions, politics, economics, gender, and culture. GE credit: AH, WC, WE. Effective: 2018 Winter Quarter.

HIS 115B—History of East Africa and the Indian Ocean (4)
Lecture—3 hours; Term Paper. Prerequisite(s): HIS 015 recommended. Eastern Africa and the Indian Ocean world from 1500 to the present. Origins and impact of precolonial states and societies, slavery, trade, colonialism, decolonization, nationalism, and changes in religions, politics, economics, gender, and culture GE credit: AH, WC, WE. Effective: 2018 Winter Quarter.

HIS 115C—History of Southern Africa from Exploration to the Rainbow Nation (4)
Lecture—3 hours; Term Paper. Prerequisite(s): HIS 015 recommended. Southern Africa from 1500 to the present. Origins and impact of precolonial states and societies, European colonization, industrialization, urbanization, nationalism, apartheid, and changes in religions, politics, economics, gender, and culture. GE credit: AH, WC, WE. Effective: 2018 Winter Quarter.

HIS 115D—Postcolonial Africa (4)
Lecture—3 hours; Term Paper. Prerequisite(s): HIS 015 recommended. Survey of social, political, cultural and economic change in African societies since the ending of European colonial rule in the twentieth century. Themes include development, health and medicine, war and conflict, urbanization, global and inter-continental migration, and family and gender. GE credit: AH, SS, WC, WE. Effective: 2017 Spring Quarter.

HIS 115E—Slavery, Africa, and the Atlantic World (4)
Lecture—3 hours; Term Paper. History of the African Slave trades, from the early Egyptian and Saharan trades in the pre-modern period to the trans-Atlantic trade (15th-19th century) and the contemporary trafficking of humans. GE credit: AH, SS, WC, WE. Effective: 2017 Fall Quarter.

HIS 115F—History of Modern North Africa, 1800 to the Present (4)
Lecture—3 hours; Term Paper. History of Morocco, Algeria, Tunisia and Libya (the Maghrib), 1800 to the present. Topics include conquest and pacification, reform movements, the rise of nationalism, decolonization, state capitalism, economic liberalization, Islamism, democratization and human rights, the interplay of history and memory. GE credit: AH, SS, WC, WE. Effective: 2011 Fall Quarter.

HIS 116—African History: Special Themes (4)
Lecture—3 hours; Term Paper. Prerequisite(s): HIS 015 recommended. Themes of African history, such as African states and empires, slave trade, relationship of Egypt to rest of Africa, Bantu origins and migrations, and French policy of Assimilation and Association. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 119—World War I (4)
Extensive Writing; Lecture—3 hours. The First World War and the settlement that followed from 1914-1919. Causes, conduct, and consequences of the war including military, political, economic, social, and cultural factors, with special emphasis on connections between the home front and the battlefield. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

HIS 120—World War II (4)
Extensive Writing; Lecture—3 hours. The Second World War from 1931 to 1945 in all of its theaters. Causes, conduct, and consequences of the war including military, political, economic, social, and cultural factors, with special emphasis on battlefield strategy and mobilization of the home front. GE credit: SS, WC, WE. Effective: 2011 Fall Quarter.

HIS 121A—Medieval History (4)
Lecture/Discussion—3 hours. European history from "the fall of the Roman Empire" to the eighth century. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 121B—Medieval History (4)
Lecture/Discussion—3 hours. European history from Charlemagne to the twelfth century. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 121C—Medieval History (4)
Lecture/Discussion—3 hours. European history from the Crusades to the Renaissance. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 122—Selected Themes in Medieval History (4)
Lecture—3 hours; Term Paper. Each offering will focus on single major theme, such as medieval agrarian history, feudalism, the family, medieval Italy, or the Crusades. Readings include original sources in English translation and modern works. May be repeated for credit. May be repeated for credit. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 125—Topics in Early Modern European History (4)
Discussion/Laboratory—3 hours; Term Paper. Social and cultural history, 1300-1800. Topics such as medieval and
Renaissance Italy, early modern Italy, Ancient Regime France, family and sexuality, and material culture and daily life. May be repeated for credit. May be repeated for credit. GE credit: AH, SS, WC, WE. Effective: 2016 Spring Quarter.

HIS 126Y—The History of Human Rights in Europe (4)
Lecture—3 hours; Web Electronic Discussion—1 hour. History of the origins, development, and state of international humanitarian law (IHL) and international human rights law (IHRL) in Europe. Emphasis on Enlightenment-era and modern theories of the source, utility, and limits of human rights. (HMR 162Y) GE credit: SS, WC. Effective: 2017 Fall Quarter.

HIS 130A—Christianity and Culture in Europe: 50-1450 (4)
Lecture—3 hours. A history of the ideas and institutions of Christianity and their impact on the late Roman Empire and medieval Europe in terms of outlook on life, art, politics and economics. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 130B—Christianity and Culture in Europe: 1450-1600 (4)
Lecture—3 hours. A history of the Lutheran, Zwinglian-Calvinist, Radical, Anglican, and Catholic Reformations as foundation stones of a new culture in Europe, with special attention to the interconnections between the revival of antiquity and the different reform movements. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 130C—Christianity and Culture in Europe: 1600-1850 (4)
Lecture—3 hours. A survey of the intellectual, cultural and political reorientation of European society in the aftermath of the Wars of Religion. "Secularization" will be discussed in the context of the Enlightenment and Romanticism. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 131A—Early Modern European History (4)
Lecture—3 hours. Western European history from about 1350 to about 1500. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 131B—European History During the Renaissance and Reformation (4)
Lecture—3 hours; Term Paper. Survey of European society, politics, and culture from the late 15th through the early 17th centuries, with particular focus on the Italian and Northern Renaissance, on the Protestant Reformation, and the Catholic Counter Reformation. GE credit: AH, SS, WC, WE. Effective: 1997 Fall Quarter.

HIS 131C—The Old Regime: Absolution, Enlightenment and Revolution in Europe (4)
Lecture—3 hours; Term Paper. Survey of European society, politics, and culture in the 17th and 18th
centuries, focusing on religious warfare, absolutism, Scientific Revolution, Enlightenment and the growth of religious tolerance, the French Revolution and the collapse of the old regime. GE credit: AH, SS, WC, WE. Effective: 1997 Fall Quarter.

HIS 132—Crime and Punishment in Early Modern Europe (4)
Lecture—3 hours; Term Paper. Deviance and crime in early modern Europe, contrasting imaginary crimes,
e.g. witchcraft, with "real" crimes such as highway robbery and infanticide. Examines impact of gender, sexual orientation, ethnicity, and class in processes of criminalization. GE credit: AH, SS, WC, WE. Effective: 1997 Fall Quarter.

HIS 133—European Thought and Culture from the Renaissance to the Enlightenment (4)
Lecture—3 hours; Term Paper. History of European thought on politics, society, science, and religion from 1400 to 1800. Cultural impact of printing press, Protestant Reformation, wars, exploration, and empire. GE credit: AH. Effective: 2018 Spring Quarter.

HIS 134A—The Age of Revolution (4)
Lecture—3 hours. Ideas and institutions during the French Revolution and the Napoleonic era. GE credit: AH, SS, WE. Effective: 1997 Winter Quarter.

HIS 135A—History of Science to the 18th Century (4)
Lecture/Discussion—3 hours; Term Paper. Survey of the historical development of science, technology, and medicine from the ancient world to the eighteenth century, with special emphasis on Isaac Newton as the culmination of the seventeenth century scientific revolution. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 135B—History of Science, 18th to 20th Centuries (4)
Lecture/Discussion—3 hours; Term Paper. Survey of the historical development of scientific thought in geology, biology, chemistry, physics, and cosmology from the eighteenth to the twentieth century, with special emphasis on emergence of broad explanatory principles that serve more than one science. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 136—Scientific Revolution (4)
Lecture/Discussion—3 hours; Term Paper. History of science in Western Europe (1400-1750). Investigates the changing definitions of science in the age of Copernicus, Versalius, Harvey, Galileo and Newton. Considers the evolution of new ideas about nature, experiment, observation, and scientific theory. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 138A—The Rise of the Russian Empire, 1304-1825 (4)
Lecture—3 hours; Term Paper. Expansion of the Russian state in Muscovite and imperial era. Emphasis on autocratic rule, the incorporation of non-Russian peoples, and emergence of Russia as a Great Power. Only two units of credit will be allowed to students who have completed former HIS 137B. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 138B—Reform and Revolution in Tsarist Russia, 1825-1917 (4)
Lecture—3 hours; Term Paper. Processes of state reform and social change in the 19th century; failure of reform and collapse of the Russian Empire; the revolutions of 1917. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 138C—Russian History: The Rise and Fall of the Soviet Union, 1917 to the Present (4)
Lecture—3 hours; Term Paper. Emergence of the Soviet Union as a socialist system and a Great Power; the decline and collapse of the Soviet Union and the formation of independent nation states in its place. Not open for credit to students who have completed former HIS 137C. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 139A—Medieval and Renaissance Medicine (4)
Discussion/Laboratory—3 hours; Term Paper. The history of medicine, circa 1000-1700. Revival of ancient medicine; role of the universities; development of anatomy, chemistry and natural history; ideas about the body; cultural understanding of disease; hospital and the public health system. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 139B—Medicine, Society, and Culture in Modern Europe (4)
Discussion—1 hour; Lecture—2 hours; Term Paper. History of European medicine, 18th to 20th centuries, by examining the development of medical knowledge in epidemiology and anatomy; function of this knowledge,how it changed with technological breakthroughs and professionalization;and role of medicine in attitudes toward poverty, women, race, disease. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 140—The Rise of Capitalism in Europe (4)
Lecture—3 hours; Term Paper. Comparative analysis of major interpretations of the rise of merchant capitalism during the Middle Ages and Renaissance; European expansion overseas, 1450-1815; the transition to modern capitalism via industrial revolution. Interplay of social, political, cultural, and economic history. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 141—France Since 1815 (4)
Lecture—3 hours; Term Paper. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 142A—History of the Holocaust (4)
Lecture—3 hours; Term Paper. Topics include comparative genocide, medieval and modern antisemitism, modern German history, the rise of Nazism, Jewish life in Europe before the Nazi period, and the fate of the Jewish communities and other persecuted groups in Europe from 1933-1945. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 142B—The Memory of the Holocaust (4)
Lecture—3 hours; Term Paper. Examination of the literary, philosophical, theological and artistic responses to the Holocaust of the European Jews. Exploration of how memory is constructed, by whom and for what purposes. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 143—History of Eastern Europe and the Balkans (4)
Lecture—3 hours. History of the Baltic, Danubian, and Balkan lands since the Middle Ages. National cultures and conflicts in the Polish Commonwealth and the Habsburg and Ottoman Empires; nationalist movements, 1789-1914; the
twentieth century, including an analysis of the contemporary scene. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 144A—History of Germany, 1450 to 1789 (4)
Extensive Writing; Lecture—3 hours. Survey of early modern Germany, 1450 to 1789, covering the theology
and social history of the Reformation, the Peasants War of 1525, religious warfare, state building and absolutism, the rise of Prussia, Austro-Prussian dualism, and the German Enlightenment. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 144B—History of Germany since 1789 (4)
Extensive Writing; Lecture/Discussion—3 hours. History of the German lands in the age of the French Revolution; 19th-century liberalism, nationalism, and industrialization; the World Wars, National Socialism, and the Holocaust; east and west Germany in the Cold War; the post-reunification scene. Not open for credit to students who have completed former HIS 144. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 145—War and Revolution in Europe 1789-1918 (4)
Lecture—3 hours; Term Paper. Survey of revolutionary movements, international crises, and wars in Europe from the French Revolution to World War I. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 146A—Europe in the Twentieth Century (4)
Lecture—3 hours; Term Paper. Survey of the history of Europe from 1919 to 1939. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 146B—Europe in the Twentieth Century (4)
Lecture—3 hours; Term Paper. Survey of the history of Europe since 1939. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 147A—European Intellectual History, 1800-1870 (4)
Lecture—3 hours; Term Paper. European thought in the early industrial era. Shifting cultural frameworks, from romanticism to scientism; liberal and socialist reactions to social change. Focus on the work of Goethe, Hegel, J.S. Mill, Marx, Darwin and Flaubert. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 147B—European Intellectual History, 1870-1920 (4)
Lecture—3 hours; Term Paper. Cultural and intellectual watershed of the late nineteenth and early twentieth centuries. Emergence of modern art and literature; psychoanalysis and the new social sciences. Focus on the work of Baudelaire, Wagner, Nietzsche, Freud, Weber and Kafka. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 147C—European Intellectual History, 1920-1970 (4)
Lecture—3 hours; Term Paper. European thought and culture since World War I. Coverage includes: literature and politics; Communism and Western Marxism; Fascism; Existentialism; Structuralism; Feminism. Particular attention to Lenin, Brecht, Hitler, Sartre, Camus, Beckett, Marcuse, Foucault, Woolf and de
Beauvoir. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 148A—Women and Society in Europe: 1500-1789 (4)
Lecture—3 hours; Term Paper. Roles and perceptions of women from the Renaissance to the French Revolution. Emphasis on social and economic factors as well as on discussions of women in the writings of political theorists and social commentators. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 148B—Women and Society in Europe: 1789-1920 (4)
Lecture—3 hours; Term Paper. Roles and perceptions of women from the French Revolution to World War I, primarily in France and England. Emphasis on social and economic developments within a loosely chronological and comparative framework. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 148C—Women in Society in Europe: 1914-Present (4)
Lecture—3 hours; Term Paper. History of 20th-century Europe from the perspective of women and the family,and of sexual and gender relations.Emphasis on the impact on women of major events and movements,such as World War I, fascism,Soviet communism,World War II,the welfare state,feminism,and mass culture. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 149—Comparative Cultural History of Modern Britain and France, 1880-1914 (4)
Lecture—3 hours; Term Paper. Cultural comparison of the histories of Britain and France during the fin de siecle. Addresses cultural debates of the period (including gender, race, class) and the practices of cultural history. GE credit: AH, SS, WC, WE. Effective: 1999 Winter Quarter.

HIS 151A—England: The Middle Ages (4)
Lecture—3 hours; Term Paper. Origins of England to the accession of the Lancastrians. Survey includes: impact of Norman Conquest on Anglo-Saxon institutions; rise of the Church, common law, parliament, and the economy; thought, arts, and literature to the age of Chaucer and Wyclif. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 151B—England: The Early Modern Centuries (4)
Lecture—3 hours; Term Paper. From Lancaster and York to the Glorious Revolution. Includes growth of the Church of England; beginnings of modern worldwide economy; rise of the gentry and parliament; thought, arts, and literature in the times
of More, Shakespeare, Hobbes, Wren, and Newton. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 151C—Eighteenth-Century England (4)
Lecture—3 hours; Term Paper. English history from the Glorious Revolution to the French Revolution.
Examination of the transformation of one of Europe's most politically unstable kingdoms into the firmly established constitutional monarchy which provided an environment fit to engender the industrial revolution. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 151D—Industrial England (4)
Lecture—3 hours; Term Paper. English history from Waterloo to the Battle of Britain; the rise and continuance of the first industrial nation, examining the transformation of landed to class society, oligarchy to democracy and bureaucracy, Bentham to Bloomsbury, empire to commonwealth. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 158—Special Topics in Latin American History (4)
Lecture—3 hours; Term Paper. Topics in the history of Latin America. Topics may be framed geographically (e.g., Central America), chronologically (e.g., The Cold War) or thematically (e.g., environmental history). May be repeated up to 3 time(s) when topic differs. GE credit: AH, WC, WE. Effective: 2017 Fall Quarter.

HIS 159—Women and Gender in Latin American History (4)
Extensive Writing; Lecture—3 hours. Roles of women and men in the history of Latin America, with an emphasis on the intersection of gender with racial and class categories. Introduction to the theoretical premises of women’s and gender history. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 160—Spain and America in the 16th century (4)
Lecture—3 hours; Term Paper. Atlantic world in the 16th century, particularly the transcultural and reciprocal social and economic relations between Spain and America in the course of colonization. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 161—Human Rights in Latin America (4)
Lecture—3 hours; Term Paper. History of the origins, denial and protection of Human Rights in Latin America. Emphasis on dictatorships, political violence, social resistance, democracy, justice, accountability, truth commissions, memory. (Human Rights 161.) GE credit: AH, SS, VL, WC, WE. Effective: 2015 Spring Quarter.

HIS 162—History of the Andean Region (4)
Lecture/Discussion—3 hours. History of the Andean region, the area that now comprises modern Peru, Bolivia, and Chile, from the beginning of human settlement to the present. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 163A—History of Brazil (4)
Lecture—3 hours. The history of colonial and imperial Brazil from 1500 to 1889. Written reports. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 163B—History of Brazil (4)
Lecture—3 hours. The history of the Brazilian republic from 1889 to the present. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 164—History of Chile (4)
Lecture—3 hours; Term Paper. Emphasis on the history of Chilean political economy from 1930 to the present. Various strategies of development (modernization, Marxism, Neo-Liberalism); the rise of mass politics; the course of foreign relations; and the richness of Chilean literature. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 165—Latin American Social Revolutions (4)
Lecture—3 hours. Major social upheavals since 1900 in selected Latin American nations; similarities and differences in cause, course, and consequence. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 166A—History of Mexico to 1848 (4)
Lecture/Discussion—3 hours. Political, economic, and social development of pre-Columbian, colonial and national Mexico to 1848. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 166B—History of Mexico since 1848 (4)
Lecture/Discussion—3 hours. History of Mexico from 1848 to the present. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 167—Modern Latin American Cultural and Intellectual History (4)
Lecture—3 hours; Term Paper. Introduce to the cultural and intellectual history of modern Latin America including architecture, cinema, painting, music and literature. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 168—History of Inter-American Relations (4)
Lecture—3 hours. Diplomatic history of Latin America since independence, intra-Latin American relations, relations with the United States, participation in international organizations, and communism in Latin America. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 169A—Mexican-American History (4)
Lecture/Discussion—3 hours. Economic, social, religious, cultural and political development of the Spanish-speaking population of the Southwestern United States from about 1800 to 1910. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 169B—Mexican-American History (4)
Lecture/Discussion—3 hours. Role of the Mexican and Mexican-American or Chicano in the economy, politics, religion, culture and society of the Southwestern United States since 1910. GE credit: ACGH, AH, DD, SS, WE. Effective: 1997 Winter Quarter.

HIS 170A—Colonial America (4)
Lecture—3 hours; Term Paper. Colonial society from 1607 to the American Revolution, with emphasis on
European expansion, political, social and economic foundations, colonial thought and culture, and imperial rivalry. GE credit: ACGH, AH, SS, WE. Effective: 1997 Winter Quarter.

HIS 170B—The American Revolution (4)
Lecture—3 hours; Term Paper. Analysis of the Revolutionary epoch with emphasis on the structure of British colonial policy, the rise of revolutionary movements, the War for Independence and its consequences, and the Confederation period. GE credit: ACGH, AH, SS, WE. Effective: 1997 Winter Quarter.

HIS 170C—The Early National Period, 1789-1815 (4)
Lecture—3 hours. Political and social history of the American republic from the adoption of the Constitution through the War of 1812 and its consequences. GE credit: ACGH, AH, DD, SS, WE. Effective: 1997 Winter Quarter.

HIS 171A—Jacksonian America (4)
Lecture—3 hours; Term Paper. Political and social history of the United States from the end of the War of 1812 to the Compromise of 1850. How the market revolution transformed American life, and led the nation towards war. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

HIS 171B—Civil War Era (4)
Lecture—3 hours; Term Paper. Examination of the political and social history of the United States from the Compromise of 1850 to the end of the Civil War in 1865. Causes of the war the war itself and the problems of reconstruction after the war. GE credit: ACGH, AH, DD, SS, WE. Effective: 2017 Spring Quarter.

HIS 171BF—The Civil War in American Film (1)
Discussion—1 hour; Film Viewing. Prerequisite(s): HIS 171B (can be concurrent); HIS 171B required concurrently. Viewing and discussion of films with short writing assignments. (P/NP grading only.) GE credit: AH, SS. Effective: 1998 Winter Quarter.

HIS 171C—Reconstruction, America's Second Founding (4)
Lecture—3 hours; Term Paper. After the U.S. Civil War, from 1865 to 1876. Emphasis on end of slavery; expansion of civil rights, voting rights, and birthright citizenship; overthrow of biracial Southern governments; segregation and disfranchisement; culture of reconciliation. GE credit: ACGH, AH. Effective: 2017 Spring Quarter.

HIS 171D—Selected Themes in 19th Century American History (4)
Lecture—3 hours; Term Paper. Interpretative overview of a single topic in the history of the United States in the 19th century. Sample topics include social history, the 1850s, and southern history. May be repeated up to 1 time(s) when the topic differs. GE credit: ACGH, AH, SS, WE. Effective: 2016 Fall Quarter.

HIS 172—American Environmental History (4) ***Review all entries***
Lecture—3 hours; Term Paper—1 hour. Examination of changing relations between people and nature in the area of the current United States from pre-Columbian times to the present. Topics include ecological change; perceptions of nature; social conflicts over "proper" uses of nature; environmental movement. GE credit: ACGH, AH, SS, WE. Effective: 2018 Winter Quarter.

HIS 172—American Environmental History (4) ***Review all entries***
Lecture—3 hours; Term Paper. American history through connections between people and nature, pre-Columbus to climate change. Native America; conquest; epidemics; extinctions; industrialization; pollution; environmentalism; climate change and global warming; ideas of nature. GE credit: ACGH, AH, SS, WE. Effective: 2018 Fall Quarter.

HIS 173—Becoming an American: Immigration and American Culture (4)
Lecture—3 hours; Term Paper. Introduction to the wide range of immigrant experiences and cycles of
nativism that have shaped American culture in the twentieth century. From novels, memoirs and films, students will explore how external and internal immigration has created a multicultural society. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

HIS 174A—The Gilded Age and Progressive Era: United States, 1876-1917 (4)
Lecture—3 hours; Term Paper. US history and the construction of modern America from the end of Reconstruction to US entry into World War I. Includes Southern redemption, Western incorporation, electoral corruption, labor movements, Populism, Progressivism, women's suffrage, US imperial expansion, and immigration restriction. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

HIS 174AD—Emergence of Modern America: Discussion (1)
Discussion—1 hour. Prerequisite(s): HIS 174A (can be concurrent); HIS 174A required concurrently. Intensive discussion of topics and readings for course 174A. (P/NP grading only.) Effective: 1997 Fall Quarter.

HIS 174B—War, Prosperity, and Depression: United States, 1917-1945 (4)
Lecture—3 hours; Term Paper. America's emergence as a world power, the business culture of the 1920s, the New Deal and World War II. Emphasis on such issues as government regulation of the economy, welfare capitalism, and class, racial, ethnic, and gender conflicts. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

HIS 174BD—America in War, Prosperity and Depression: Discussion (1)
Discussion—1 hour. Prerequisite(s): HIS 174B (can be concurrent); HIS 174B required concurrently. Intensive discussion of topics and readings for course 174B. (P/NP grading only.) Effective: 1997 Fall Quarter.

HIS 174C—The United States Since World War II, 1945 to the Present (4)
Lecture—3 hours; Term Paper. America's struggle to respond to new complexities in foreign relations, social tensions, family changes and media. Emphasis on such topics as: Cold War; anticommunist crusade; civil rights, feminist and environmentalist movement; New Left; counterculture; Vietnam; Watergate; and the moral majority. GE credit: ACGH, AH, DD, SS, WE. Effective: 1997 Winter Quarter.

HIS 174CD—The United States Since World War II: Discussion (1)
Discussion—1 hour. Prerequisite(s): HIS 174C (can be concurrent); HIS 174C required concurrently. Intensive discussion of topics and readings for course 174C. (P/NP grading only.) Effective: 1997 Fall Quarter.

HIS 174D—Selected Themes in 20th Century American History (4)
Lecture—3 hours; Term Paper. Interpretive overview of a single topic in the history of the United States in the 20th century with attention to the phases and processes of historical change. May be repeated once for credit when topic differs. May be repeated up to 1 time(s) when topic differs. GE credit: ACGH, AH, SS, WE. Effective: 2016 Fall Quarter.

HIS 174DD—Selected Themes in 20th Century American History: Discussion (1)
Discussion—1 hour. Prerequisite(s): HIS 174D (can be concurrent); HIS 174D required concurrently. Intensive discussion of topics and readings for course 174D. May be repeated for credit. (P/NP grading only.) Effective: 1997 Fall Quarter.

HIS 175—American Intellectual History (4)
Lecture—3 hours; Term Paper. Exploration of the ideas that have shaped politics and society in the United States from colonial times to the present. Topics include American liberalism, republicanism, democracy, constitutionalism, communitarianism, utopianism, pragmatism, feminism, Darwinism, nationalism, conservatism, and economics. GE credit: ACGH, AH, SS, WE. Effective: 2016 Fall Quarter.

HIS 176A—Cultural and Social History of United States (4)
Lecture—3 hours; Term Paper. Study of social and cultural forces in American society in the nineteenth century with emphasis on social structure, work and leisure, socialization and the family, social reform movements and changes in cultural values. GE credit: ACGH, AH, SS, WE. Effective: 1997 Winter Quarter.

HIS 176B—Cultural and Social History of United States (4)
Lecture—3 hours; Term Paper. Study of social and cultural forces in American society in the twentieth century with emphasis on social structure, work and leisure, socialization and the family, social reform movements and changes in cultural values. GE credit: ACGH, AH, DD, SS, WE. Effective: 1997 Winter Quarter.

HIS 177A—History of Black People and American Race Relations, 1450-1860 (4)
Lecture—3 hours; Term Paper. History of black people in the United States from the African background to Reconstruction. GE credit: ACGH, AH, DD, SS, WE. Effective: 2010 Winter Quarter.

HIS 177B—History of Black People and American Race Relations, 1860-Present (4)
Lecture—3 hours; Term Paper. History of black people and race relations from 1860-present. Emphasis on Civil War, Reconstruction, Segregation, Age of Accommodation, black nationalism, urbanization, civil rights, and changing ideology of race relations. GE credit: ACGH, AH, DD, SS, WE. Effective: 2010 Winter Quarter.

HIS 179—Asian American History, 1850-Present (4)
Lecture—3 hours; Term Paper. Historical experience of people of Asian ancestry in the United States from the mid-nineteenth century to the present. Migration, labor, community formation, race relations, women and gender, popular culture. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

HIS 180AN—American Political History, 1789-1896 (4)
Lecture—3 hours; Term Paper. Growth of American politics from the birth of the republic to the end of the nineteenth century. Development of political parties, the expanding electorate, and how social issues such as slavery shaped the political process. Not open for credit to students who have completed HIS 180A. GE credit: ACGH, AH, SS, WE. Effective: 2016 Fall Quarter.

HIS 180BN—American Political History, 1896-present (4)
Lecture—3 hours; Term Paper. Politics in the United States from 1896 to the present. Topics include race and partisan politics; communism and anti-communism; the New Deal and the centralization of government; and the rise of the imperial presidency. Not open for credit to students who have taken HIS 180A or HIS 180C. GE credit: ACGH, AH, SS, WE. Effective: 2016 Fall Quarter.

HIS 180C—The Fight for the Right to Vote (4)
Lecture—3 hours; Term Paper. History of the struggle for voting rights from the colonial period to the present. Emphasis on the struggle for inclusion by African Americans, women, Latinos, and other groups. GE credit: ACGH, AH, SS. Effective: 2017 Fall Quarter.

HIS 181—Religion in American History to 1890 (4)
Lecture—3 hours; Term Paper. American religious history from colonization through the Gilded Age. Topics include religious diversity in America; native American religion; Protestant evangelism; gender and religion; religion and bigotry; African American religion; religion in the Civil War; and religion's response to modernization. GE credit: ACGH, AH, SS, WE. Effective: 2016 Fall Quarter.

HIS 182—Gender and Justice in American History (4)
Lecture/Discussion—3 hours; Term Paper. Intersection of gender and law in North America from the colonial period
through the 20th century. Topics include witchcraft, suffrage, child
custody, protective labor laws, regulation of sexuality. Analysis of legal change, trials, and cultural influences. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

HIS 183A—The Frontier Experience: Trans-Mississippi West (4)
Lecture—3 hours. The fur trade, western exploration and transportation, the Oregon Country, the Greater Southwest and the Mexican War, the Mormons, mining discovery, and the West during the Civil War. GE credit: ACGH, AH, SS, WE. Effective: 1997 Winter Quarter.

HIS 183B—The Frontier Experience: Trans-Mississippi West (4)
Lecture—3 hours. Spread of the mining kingdom, the range cattle industry, Indian-military affairs, settlement of the Great Plains and Rocky Mountain Regions and political organization of the West. GE credit: ACGH, AH, SS, WE. Effective: 1997 Winter Quarter.

HIS 184—History of Sexuality in America (4)
Extensive Writing; Lecture—3 hours. History of sexuality in America from pre-European through the late twentieth century. Topics include birth control, marriage, sexual violence, prostitution, inter-racial relationships, heterosexuality and homosexuality, the feminist, gay, and lesbian liberation movements, AIDS, commercialization of sexuality. GE credit: ACGH, AH, DD, SS, WE. Effective: 2003 Fall Quarter.

HIS 185A—History of Science in America (4)
Lecture—3 hours. Survey of the European background. Study of American scientific institutions, ideas, personalities, creative processes in science, and of relationships between society and science from colonial times to present. GE credit: AH, SS, WE. Effective: 1997 Winter Quarter.

HIS 185B—History of Technology in America (4)
Lecture—3 hours. Study of American technology, emphasizing biographical approach to historical understanding of technological change, creative processes, institutions, ideas, and relationships between technology and society
from colonial times to present. GE credit: AH, SS, WE. Effective: 1997 Winter Quarter.

HIS 187—History of US Foreign Relations in the Twentieth Century (4)
Extensive Writing; Lecture—3 hours. Rise of the US to superpower standing during the twentieth century, from colonialism to the war on terror, including political, diplomatic, cultural, and economic activities of both US government and private American agencies beyond US borders. GE credit: SS, WE. Effective: 2017 Fall Quarter.

HIS 188—America in the 1960s (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Tumult and upheaval in American politics, culture, and society 1961-1969. Civil rights; Vietnam, the draft and the anti-war movement; rock and roll and the counterculture; modern feminism; modern conservatism; student movements; urban unrest and insurrection. GE credit: ACGH, DD, SS, WE. Effective: 2011 Fall Quarter.

HIS 189—California History (4)
Lecture—3 hours; Term Paper. California history from the pre-colonial period to the present including dispossession of California's Indians, political economy of the Spanish and Mexican periods, Gold Rush effects, industrialization, Hollywood, water politics, World War II, Proposition 13, and the emergence of Silicon Valley. Not open for credit to students who have completed two courses of HIS 189A, HIS 189B, HIS 189C. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

HIS 190A—Middle Eastern History I: The Rise of Islam, 600-1000 (4)
Extensive Writing; Lecture—3 hours. Middle Eastern history from the rise of Islam to the disintegration of the Abbasid Caliphate; the formative centuries of a civilization. Politics and religion, conquest and conversion, arts and sciences, Christians, Jews and Muslims, gender and sexuality, orthodoxy and heterodoxy. GE credit: AH, SS, WC, WE. Effective: 2009 Fall Quarter.

HIS 190B—Middle Eastern History II: The Age of the Crusades, 1001-1400 (4)
Extensive Writing; Lecture—3 hours. Middle Eastern history during the age of the Crusades and Mongol invasions. The idea of holy war, the Crusades, the Mongols as the bearers of Chinese arts, nomads and sedentary life, feudalism, mysticism, slavery, women in the medieval Middle East. GE credit: AH, SS, WC, WE. Effective: 2009 Fall Quarter.

HIS 190C—Middle Eastern History III: The Ottomans, 1401-1730 (4)
Extensive Writing; Lecture—3 hours. Middle Eastern history from the foundation of the Ottoman Empire on the borderlands of Byzantine Anatolia through its expansion into Europe, Asia, and Africa, creating a new cultural synthesis including the Arab, Greek, Islamic, Mongol, Persian, Slavic, and Turkish traditions. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 190D—Middle Eastern History IV: Safavids Iran, 1300-1720 (4)
Lecture—3 hours; Term Paper. Middle Eastern history focusing on Safavid Empire (present-day Iran, Iraq, Afghanistan, up to Georgia), beginning with the origins of the dynasty as a powerful religious family, to the establishment of the Empire, focusing on Social, Religious, Economic, and Political History. GE credit: AH, SS, WC, WE. Effective: 2012 Fall Quarter.

HIS 191A—Classical China (4)
Lecture—3 hours; Term Paper. History of Chinese civilization from its origins through the establishment of city states and the flowering of classical philosophy,
to the rise and fall of the First Empire. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 191B—High Imperial China (4)
Lecture—3 hours; Term Paper. Political disunion and the influx of Buddhism; reunification under the great dynasties of T'ang, Sung, and Ming with analysis of society, culture and thought. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 191C—Late Imperial China (4)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): HIS 009A or upper division standing recommended. Patterns and problems of Chinese life traced through the Ming and Ching dynasties (c.15001800), prior to the confrontation with the West in the Opium War. Readings include primary sources and novels portraying elite ethos as well as popular culture. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 191D—Nineteenth Century China: The Empire Confronts the West (4)
Discussion—1 hour; Lecture—2 hours; Term Paper. Prerequisite(s): HIS 009A or upper division standing recommended. Decline and fall of the Chinese Empire, with particular attention to the social and political crises of the 19th century, and the response of government officials, intellectuals, and ordinary people to the increasing pressures of Western imperialism. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 191E—The Chinese Revolution (4)
Discussion—1 hour; Extensive Writing; Lecture—2 hours. Prerequisite(s): Upper division standing recommended. Analysis of China's cultural and political transformation from Confucian empire into Communist state. Emphasis on emergence and triumph of peasant revolutionary strategy (to 1949), with some attention to its implications for post-revolutionary culture and politics. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 191F—History of the People's Republic of China (4)
Discussion—1 hour; Extensive Writing; Lecture—2 hours. Prerequisite(s): Upper division standing recommended. Comprehensive analysis of recent Chinese history, including land reform, the Cultural Revolution, the post-Mao era, and the consequences of the new economic policies of the 1980s. Not open for credit to students who have completed course 190C. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 191G—Special Topics in Chinese History to 1800 (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): HIS 009A recommended. Topics in the history of China from the beginning of the imperial period through the high Qing dynasty. Topics may be framed chronologically (e.g.,the Ming Dynasty) or thematically (e.g., Trade in early Chinese history). May be repeated up to 1 time(s) when topics differs. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

HIS 191H—Special Topics in Chinese History after 1800 (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): HIS 009A recommended. Topics in the history of China since 1800. Topics may be framed chronologically (e.g., The Republican Period (1911-1948)) or thematically (e.g., The Modern Evolution of Chinese Law). May be repeated up to 1 time(s) when topics differs. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

HIS 191J—Sex and Society in Modern Chinese History (4)
Lecture—3 hours; Term Paper. Role of sex, gender, and family relations in the development of Chinese politics, society, and personal life in the modern period, 1900-present. GE credit: AH, WC, WE. Effective: 2015 Winter Quarter.

HIS 192—Internship in History (1-12)
Variable. Prerequisite(s): Consent of Instructor. Enrollment dependant on availability of intern positions, with priority to History majors. Supervised internship and study as historian, archivist, curator, or in another history-related capacity, in an approved organization or institution. (P/NP grading only.) Effective: 1997 Winter Quarter.

HIS 193A—History of the Modern Middle East, 1750-1914 (4)
Lecture—3 hours; Term Paper. Prerequisite(s): HIS 006 recommended. State and society within the Middle East from 1750 to 1914 under pressure of the changing world economy and European imperialism. Themes: colonialism, Orientalism, intellectual renaissance, Islamic reform, state-formation, role of subaltern groups. GE credit: AH, SS, VL, WC, WE. Effective: 2017 Fall Quarter.

HIS 193B—History of the Modern Middle East, From 1914 (4)
Lecture—3 hours; Term Paper. Middle East from the turn of the 20th century to the present. Themes include the legacy of imperialism, cultural renaissance, the World Wars, nationalism, Palestine/Israel, Islamic revival, gender, revolutionary movements, politics of oil and war, cultural modernism,exile and diaspora. GE credit: AH, SS, VL, WC, WE. Effective: 2017 Winter Quarter.

HIS 193C—The Middle East Environment: Historical Change and Current Challenges (4)
Lecture/Discussion—3 hours; Project (Term Project). Examines Middle East environment and human use of nature over last 10,000 years. Introduction to desert ecology, environmental history and current environmental problems. Case Studies of Egypt, Maghreb countries, Arabian peninsula/Gulf countries, desertification, water, indigenous knowledge, and national parks. GE credit: AH, SS. Effective: 2016 Fall Quarter.

HIS 193D—History of Modern Iran, From 1850 to Present (4)
Lecture—3 hours; Term Paper. Prerequisite(s): HIS 006 recommended. Modern Iran from the mid 19th century to the present. Themes include the legacy of imperialism, cultural renaissance, the World Wars, nationalism, modernization, Islamic revival, gender, revolutionary movements, politics of oil and war. GE credit: AH, SS, VL, WC, WE. Effective: 2011 Fall Quarter.

HIS 194A—Aristocratic and Feudal Japan (4)
Discussion; Lecture—3 hours; Term Paper. Broad survey of the cultural, social, religious, and political aspects of Japanese history from mythological times through the sixteenth century emphasizing comparison of the organizations, values, and beliefs associated with the aristocratic and feudal periods. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 194B—Early Modern Japan (4)
Lecture—3 hours; Term Paper/Discussion. Survey of the cultural, social, economic,and political aspects of Japanese history from the seventeenth through the nineteenth centuries emphasizing the development of those patterns of thought and political organization with which Japan met the challenge of the nineteenth-century Western expansionism. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 194C—Modern Japan (4)
Lecture—3 hours; Term Paper/Discussion. Survey of the cultural, social, economic, and political aspects of Japanese history in the twentieth century emphasizing labor and social movements, militarism and the Pacific war, and the emergence of Japan as a major economic power. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 194D—Business and Labor in Modern Japan (4)
Lecture—3 hours; Term Paper. Survey of labor and management relations in Japan from the mid-eighteenth century to the present. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 194E—Education and Technology in Modern Japan (4)
Lecture—3 hours; Term Paper. Survey of education and technology in Japan from the mid-eighteenth
century to the present. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 195B—History of Modern Korea (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): Upper division standing recommended. History of Modern Korea, from Yi dynasty period to 1990s. Covers the political and socioeconomic changes in 19th century, modernization under Japanese colonialism, postwar economic growth and effects of the Cold War. GE credit: AH, SS, WC, WE. Effective: 2016 Fall Quarter.

HIS 195C—A History of Vietnam (4)
Lecture/Discussion—4 hours. Overview of Vietnamese history: early state formation in Southeast Asia; expansion/contention in the 17th and 18th centuries; colonial period; war with the US; and post-war developments (with an emphasis on relations with China and the US). GE credit: AH, SS, WC, WE. Effective: 2017 Fall Quarter.

HIS 196A—Medieval India (4)
Discussion—1 hour; Lecture—3 hours. Survey of history of India in the millennium preceding arrival of British in the eighteenth century, focusing on interaction of the civilizations of Hinduism and Islam and on the changing nature of the
state. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 196B—Modern India (4)
Discussion—1 hour; Lecture—3 hours. Survey of cultural, social, economic, and political aspects of South Asian history from arrival of the British in the eighteenth century to formation of new independent states-India, Bangladesh, and Pakistan-in the twentieth century. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

HIS 197T—Tutoring in History (2)
Discussion—1 hour; Laboratory—3 hours. Prerequisite(s): Enrolled as a History major with senior standing and consent of department chairperson. Tutoring of students in lower division courses. Weekly meeting with instructors in charge of courses. Written reports on methods and materials required. May be repeated once for credit. No final examination. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

HIS 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

HIS 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

HIS 201A—Sources and General Literature of History; Ancient (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. Ancient. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 201B—Sources and General Literature of History; Medieval (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. Medieval. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 201C—Sources and General Literature of History; Renaissance and Reformation (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. Renaissance and Reformation. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 201D—Sources and General Literature of History; Early Modern Europe (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. Early Modern Europe. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 201E—Sources and General Literature of History (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history.(E)Europe since 1815. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 201F—Sources and General Literature of History; China to 1880 (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. China to 1880. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 201G—Sources and General Literature of History; China Since 1880 (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. China since 1880. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 201H—Sources and General Literature of History; Britain (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. Britain. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 201I—Sources and General Literature of History; Latin America Since 1810 (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. Latin America since 1810. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 201J—Sources and General Literature of History; American History to 1787 (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. American History to 1787. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 201K—Sources and General Literature of History; United States, 1787-1896 (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. United States, 1787-1896. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 201L—Sources and General Literature of History; United States Since 1896 (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. United States since 1896. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 201M—Sources and General Literature of History; Middle East (4)
Seminar—3 hours; Term Paper. Addresses various theoretical and methodological approaches to the study of the Modern Middle East. Survey Modern Middle East historiography in light of theoretical innovations such as post-Orientalism, World Systems theory, and postcolonial theory. May be repeated for credit when subject differs. Effective: 2011 Winter Quarter.

HIS 201N—Sources and General Literature of History; Modern Japan (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. Modern Japan. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 201P—Sources and General Literature of History; African Historiography (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. African Historiography. May be repeated for credit when different subject area is studied. Effective: 2005 Winter Quarter.

HIS 201Q—Sources and General Literature of History; Cross-Cultural Women's History (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. Cross-Cultural Women's History. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 201S—Sources and General Literature of History; History of Science and Medicine (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. History of Science and Medicine. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 201T—Sources and General Literature of History; Jewish History (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. Jewish History. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 201W—Sources and General Literature of History; Advanced Topics in World History (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history. Advanced Topics in World History. May be repeated for credit when different subject area is studied. Effective: 2007 Spring Quarter.

HIS 201X—Sources and General Literature of History (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Designed primarily for students preparing for higher degrees in history.(X)World History. May be repeated for credit when different subject area is studied. Effective: 1997 Winter Quarter.

HIS 202A—Major Issues in Historical Interpretation; Ancient (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Fundamental issues and debates in the study of history. Ancient. Readings, papers, and class reports. May be repeated for credit when a different subject area is studied. Effective: 1997 Winter Quarter.

HIS 202B—Major Issues in Historical Interpretation; Medieval Europe (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Fundamental issues and debates in the study of history. Medieval Europe. Readings, papers, and class reports. May be repeated for credit when a different subject area is studied. Effective: 1997 Winter Quarter.

HIS 202C—Major Issues in Historical Interpretation; Modern Europe (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Fundamental issues and debates in the study of history. Modern Europe. Readings, papers, and class reports. May be repeated for credit when a different subject area is studied. Effective: 1997 Winter Quarter.

HIS 202D—Major Issues in Historical Interpretation; India (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Fundamental issues and debates in the study of history. India. Readings, papers, and class reports. May be repeated for credit when a different subject area is studied. Effective: 1997 Winter Quarter.

HIS 202E—Major Issues in Historical Interpretation; India (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Fundamental issues and debates in the study of history. Africa. Readings, papers, and class reports. May be repeated for credit when a different subject area is studied. Effective: 1997 Winter Quarter.

HIS 202F—Major Issues in Historical Interpretation; China (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Fundamental issues and debates in the study of history. China. Readings, papers, and class reports. May be repeated for credit when a different subject area is studied. Effective: 1997 Winter Quarter.

HIS 202G—Major Issues in Historical Interpretation; Japan (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Fundamental issues and debates in the study of history. Japan. Readings, papers, and class reports. May be repeated for credit when a different subject area is studied. Effective: 1997 Winter Quarter.

HIS 202H—Major Issues in Historical Interpretation; United States (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Fundamental issues and debates in the study of history. United States. Readings, papers, and class reports. May be repeated for credit when a different subject area is studied. Effective: 1997 Winter Quarter.

HIS 202I—Major Issues in Historical Interpretation; Latin America (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Fundamental issues and debates in the study of history. Latin America. Readings, papers, and class reports. May be repeated for credit when a different subject area is studied. Effective: 1997 Winter Quarter.

HIS 203A—Research Seminar (4)
Seminar—3 hours; Tutorial—1 hour. Designed for students preparing for higher degrees in history.Individual research and analysis resulting in a substantial research paper of publishable quality.Completion required of all Ph.D. candidates.The three courses must be taken in a continuous sequence, ordinarily during the second year. Effective: 2003 Fall Quarter.

HIS 203B—Research Seminar (4)
Seminar—3 hours; Tutorial—1 hour. Prerequisite(s): HIS 203A Designed for students preparing for higher degrees in history. Individual research and analysis resulting in substantial research paper of publishable quality. Completion required of all Ph.D. candidates. The three courses must be taken in continuous sequence, ordinarily during second year. Effective: 2004 Winter Quarter.

HIS 203C—Research Seminar (4)
Seminar—3 hours; Tutorial—1 hour. Prerequisite(s): HIS 203A Designed for students preparing for higher degrees in History. Individual research and analysis resulting in substantial research paper of publishable quality. Completion required of all Ph.D. candidates. The three courses must be taken in continuous sequence, ordinarily during second year. Effective: 2004 Spring Quarter.

HIS 204—Historiography (4)
Seminar—3 hours; Term Paper. Major issues in the philosophy and methodology of history. Effective: 1997 Winter Quarter.

HIS 221—Medieval History (4)
Seminar—3 hours. Prerequisite(s): HIS 121A, HIS 121B, HIS 121C recommended. Topics in the history of medieval and early Renaissance Europe. Effective: 1997 Winter Quarter.

HIS 245—Modern European History (4)
Seminar—3 hours. Prerequisite(s): HIS 201E Primary sources and research methodologies in the history of modern France and Germany. May be repeated once for credit. May be repeated up to 1 time(s). Effective: 1997 Winter Quarter.

HIS 261—Latin American History (4)
Seminar—3 hours. Prerequisite(s): Two courses in Latin American history; reading knowledge of Spanish or Portuguese. Effective: 1997 Winter Quarter.

HIS 271A—United States History (4)
Seminar—3 hours; Term Paper. Prerequisite(s): (HIS 201J, HIS 201K, HIS 201L) or HIS 202H Research in literature, methods, and sources on aspects of United States history, culminating in each student completing a research paper in the field by the end of the second quarter. May be repeated for credit. Effective: 1998 Winter Quarter.

HIS 271B—United States History (4)
Seminar—3 hours; Term Paper. Prerequisite(s): (HIS 201J, HIS 201K, HIS 201L) or HIS 202H Research in literature, methods, and sources on aspects of United States history, culminating in each student completing a research paper in the field by the end of the second quarter. May be repeated for credit. Effective: 1998 Winter Quarter.

HIS 291A—Chinese History (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Research on topics to be chosen by the students for the purpose of writing article-length papers. May be repeated for credit. May be repeated for credit. Effective: 1997 Winter Quarter.

HIS 291B—Chinese History (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Completion of article-length papers on topics chosen by students. May be repeated for credit. May be repeated for credit. Effective: 1997 Winter Quarter.

HIS 291C—Methods and Issues in Chinese History (4)
Seminar—2 hours; Tutorial—1 hour. Prerequisite(s): Consent of Instructor. Reading knowledge of Chinese. Readings in Chinese historical materials. Training in the use of Chinese reference works (including on-line resources). May be repeated for credit. Effective: 2007 Fall Quarter.

HIS 292—College Teaching Internship (4)
Internship—4 hours. Prerequisite(s): HIS 300 (may be taken concurrently). Student prepares and teaches one lower division history course in a
nearby community college under the supervision of a UC Davis instructor and a community college instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

HIS 298—Group Study (1-5)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

HIS 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

HIS 299D—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

HIS 389—Introductory Seminar for Teaching Assistants (1)
Seminar—1 hour. Prerequisite(s): HIS 390 (can be concurrent); HIS 390 required concurrently. An introduction to the broad comparative and theoretical issues of teaching methods and techniques in history. (S/U grading only.) Effective: 1997 Winter Quarter.

HIS 390—Teaching History in College (2)
Discussion—2 hours. Designed for teaching assistants with emphasis on problems and procedures encountered by teachers of lower division classes at the university. (S/U grading only.) Effective: 1997 Winter Quarter.

HMR Human Rights

Courses in HMR:

HMR 001—Human Wrongs/Human Rights (4)
Discussion—1 hour; Lecture—3 hours. Introduction to Human Rights and the problems they seek to address. Using key episodes of inhumanity like slavery, genocide, and racism. Examines how international movements for social justice led to the emergence of the international Human Rights system. GE credit: AH, SS, WC, WE. Effective: 2015 Fall Quarter.

HMR 120A—Art, Architecture, and Human Rights (4)
Lecture/Discussion—4 hours. Study of human rights as they relate to art, architecture, and cultural heritage. Examines museums, art collections, and cultural-heritage management, their relation to the cultural prerogatives of communities and indigenous groups, and protection of cultural heritage during war and conflict. (Art History 120A.) GE credit: AH, DD, SS, VL, WC, WE. Effective: 2014 Fall Quarter.

HMR 130—Special Topics in Human Rights (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): HMR 134 or RST 134 recommended. Thematic study of human rights. Topics may include contemporary or historical issues in the promotion, protection, and violation of human rights; human rights and the arts, religion, literature are possible topical areas. May be repeated for credit when topic differs. GE credit: AH, SS, WC, WE. Effective: 2014 Spring Quarter.

HMR 134—Human Rights (4)
Lecture/Discussion—3 hours; Term Paper/Discussion—1 hour. Introduction to the interdisciplinary study of the origins, evolution, denial and protection of Human Rights. No credit for students who have completed RST 090. (Religious Studies 134.) GE credit: AH, SS, WC, WE. Effective: 2014 Spring Quarter.

HMR 136—Human Rights in the Middle East (4)
Lecture/Discussion—3 hours; Term Paper. Study of the experience of Human Rights in the modern Middle East, with special attention to the Human Rights issues raised by events of Arab Spring; Palestine-Israel conflict; history of genocide, mass killing and totalitarianism in the region. GE credit: AH, SS, WC, WE. Effective: 2015 Fall Quarter.

HMR 138—Human Rights, Gender, and Sexuality (4) ***Review all entries***
Lecture/Discussion—3 hours; Term Paper. Gender and sexuality in the context of human rights. Topics include women's participation in the public sphere, the right to change gender, the right for family privacy, and the right to marriage. (Religious Studies 138.) GE credit: AH, WC, WE. Effective: 2015 Fall Quarter.

HMR 138—Human Rights, Gender, and Sexuality (4) ***Review all entries***
Lecture/Discussion—3 hours; Term Paper. Gender and sexuality in the context of human rights. Topics include women's participation in the public sphere, the right to change gender, the right for family privacy, and the right to marriage. GE credit: AH, WC, WE. Effective: 2018 Fall Quarter.

HMR 161—Human Rights in Latin America (4)
Lecture—3 hours; Term Paper. History of the origins, denial and protection of Human Rights in Latin America. Emphasis on dictatorships, political violence, social resistance, democracy, justice, accountability, truth commissions, memory. (History 161.) GE credit: AH, SS, VL, WC, WE. Effective: 2015 Spring Quarter.

HMR 162Y—The History of Human Rights in Europe (4)
Lecture—3 hours; Web Electronic Discussion—1 hour. History of the origins, development, and state of international humanitarian law (IHL) and international human rights law (IHRL) in Europe. Emphasis on Enlightenment-era and modern theories of the source, utility, and limits of human rights. (HIS 126Y) GE credit: SS, WC. Effective: 2017 Fall Quarter.

HMR 190—Seminar (4)
Seminar—3 hours; Term Paper. Emphasis on current scholarly debate about the methods for analyzing and comparing diverse human rights issues with the intention of integrating disciplined study of the field. Effective: 2016 Fall Quarter.

HMR 198—Directed Group Study (1-4)
Variable. Prerequisite(s): Consent of Instructor. Group study on focused topics in human rights. May be repeated for credit. (P/NP grading only.) Effective: 2014 Winter Quarter.

HMR 199—Special Study for Advanced Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Opportunity for advanced undergraduate students to work with a faculty member in a focused manner on a topic or topics of human rights. May be repeated for credit. (P/NP grading only.) Effective: 2014 Winter Quarter.

HMR 200A—History, Theory and Criticism of Human Rights (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Restricted to graduate students. Introduces the advanced study of Human Rights and the theoretical and practical elaboration of the international Human Rights system. Seminar will engage with criticism of Human Rights and develop research and teaching within disciplinary and interdisciplinary frameworks. (Study of Religion 231E.) Effective: 2013 Fall Quarter.

HMR 200B—Memory, Culture, and Human Rights (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Restricted to graduate students. Explores the multiple convergences among memory, culture, and human rights. Discusses diverse approaches to how societal actors in different historical, cultural, and national settings, construct meanings of past political violence, inter-group conflicts, and human rights struggles. (Cultural Studies 210.) Effective: 2013 Fall Quarter.

HMR 298—Group Study (1-4)
Variable—1 hour. Prerequisite(s): Consent of Instructor. Restricted to graduate students. Group study on focused topics in human rights. Four-unit courses may serve as electives for the Designated Emphasis in Human Rights. May be repeated up to 16 unit(s) when topic differs. Effective: 2016 Spring Quarter.

HMR 299—Individual Study (1-12)
Variable—1-12 hours. Prerequisite(s): Consent of Instructor. Restricted to graduate students. Individual study for the designated emphasis in human rights. May be repeated for credit. (S/U grading only.) Effective: 2014 Fall Quarter.

HMR 396—Teaching Assistant Training Practicum (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Restricted to graduate students. Teaching Assistant Training Practicum. May be repeated for credit. (S/U grading only.) Effective: 2017 Fall Quarter.

HNR Honors Challenge

Courses in HNR:

HNR 090X—Honors Discussion Section (1)
Discussion—1 hour. Prerequisite(s): Open only to students in the Davis Honors Challenge. Examination of special topics in selected lower division courses
through additional readings, discussions, term papers, collaborative work, or special activities, including projects, field and laboratory experiences, computer simulations, creative works. May be repeated for credit. May be repeated for credit. Effective: 1997 Spring Quarter.

HNR 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Open only to students in the Davis Honors Challenge. Supervised work experience under the auspices of the Davis Honors Challenge. May be repeated for credit for a total of 12 units. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Fall Quarter.

HNR 094—Honors Seminar (4)
Seminar—4 hours. Open to students in the Davis Honors Challenge. Collaborative, multidisciplinary exploration of complex contemporary problem. Focus on critical thinking and analytical interpretation, on oral and written communication, and on the use of electronic media in gathering information. May be repeated for credit. GE credit: WE. Effective: 2013 Winter Quarter.

HNR 098—Directed Group Study (1-5)
Discussion—1-5 hours. Prerequisite(s): Consent of Instructor. Open to students in the Davis Honors Challenge. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 1997 Summer Quarter.

HNR 099—Special Study for Undergraduates (1-5)
Independent Study—1-5 hours. Prerequisite(s): Consent of Instructor. Student in the Davis Honors Challenge. (P/NP grading only.) Effective: 1997 Winter Quarter.

HNR 190X—Honors Contract (1)
Discussion; Independent Study. Prerequisite(s): Open only to students in the Davis Honors Challenge. In-depth examination of material in an upper division course as defined in an Honors Contract Proposal submitted by the student. Contract must be approved by the instructor and the Honors Council of the Academic Senate. May be repeated for credit. May be repeated for credit. Effective: 1997 Fall Quarter.

HNR 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Open only to students in the Davis Honors Challenge. Supervised work experience under the auspices of the Davis Honors Challenge. May be repeated for credit for a total of 12 units. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Fall Quarter.

HNR 194—Honors Seminar (3)
Seminar—3 hours. Prerequisite(s): Consent of Instructor. Open only to students in the Davis Honors Challenge. Team-based work on actual problems drawn from the public or private sector. Focus on critical thinking and analytic interpretation, oral and written communication skills, and developement of practical solutions to real-world problems. Effective: 2000 Fall Quarter.

HNR 195—Honors Thesis/Honors Project (1-3)
Independent Study—3-9 hours. Prerequisite(s): Open only to students in the Davis Honors Challenge. Guided independent study of a selected topic leading to the presentation of an honors thesis/honors project. May be repeated for credit up to 9 units. May be repeated up to 9 unit(s). Effective: 1999 Fall Quarter.

HNR 198—Directed Group Study (1-5)
Discussion—1-5 hours. Prerequisite(s): Consent of Instructor. Open only to students in the Davis Honors Challenge. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 1997 Fall Quarter.

HNR 199—Special Study for Advanced Undergraduates (1-5)
Independent Study—1-5 hours. Prerequisite(s): Open only to students in the Davis Honors Challenge. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 1997 Fall Quarter.

HON Med - Intl: Hematology-Oncology

Courses in HON:

HON 199—Research in Hematology-Oncology (1-5)
Laboratory. Prerequisite(s): Consent of Instructor. Upper division standing. Experience in laboratory research. (P/NP grading only.) Effective: 1997 Winter Quarter.

HON 298—Topics in Hematology (1-4)
Variable. Prerequisite(s): One year of graduate work and/or consent of instructor. Basic concepts of the physiology of the hematopoietic organ, the pathophysiology of hematopoietic disease, and concepts of therapeutics
will be offered for study. The specific topics to be dictated by the interest and background of the students. Effective: 1997 Winter Quarter.

HON 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Laboratory investigation contributing to the dissertation for a graduate
degree. (S/U grading only.) Effective: 1997 Winter Quarter.

HON 420—Oncology (4)
Lecture/Discussion—2 hours. Prerequisite(s): Approval by the SOM Committee on Student Promotions. Restricted to Medical student only; students must pass all Year 1 SOM courses. Covers the principles of oncology and the pathophysiology of specific, common cancers correlated with organ systems pathophysiology and systemic pathology courses. (P/F grading only.) Effective: 2015 Fall Quarter.

HON 460—Hematology-Oncology Consult Clerkship (6-12)
Clinical Activity. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing. Limited enrollment. Acting intern on inpatient hematology/oncology ward service. May be repeated for credit. Limited enrollment. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

HON 461—Hematology-Oncology Consult Clerkship (6-12)
Clinical Activity. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing. Limited enrollment. Student is an integral member of the inpatient hematology and oncology consult service, the bone marrow service, and will attend all conferences sponsored by the Division. May be repeated for credit. Limited enrollment. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

HON 462—Hematology-Oncology Ambulatory Clerkship (3-18)
Clinical Activity—30 hours. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing. Limited enrollment. Outpatient rotations in related clinics. Participation with members of the subspecialty service in the initial clinical evaluation, work-up, management and follow-up of the patient with hematologic or oncologic disorders. May be repeated for credit. (H/P/F grading only.) Effective: 2011 Winter Quarter.

HON 493—Cancer as a Process (1-6)
Auto Tutorial—6 hours; Clinical Activity—14 hours; Independent Study—10 hours; Seminar—10 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. Covers cancer as a process, beginning with risks and prevention, preneoplasia, microinvasion, treatment options, metastases and systemic therapy, pain medicine and palliative care, and cancer communication. Format includes traditional lectures, student-led case discussions, and problem-based learning. (H/P/F grading only.) Effective: 2012 Summer Quarter.

HON 499—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (H/P/F grading only.) Effective: 1997 Winter Quarter.

HPH Human Physiology - Medicine

Courses in HPH:

HPH 099—Special Study for Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2004 Fall Quarter.

HPH 115—Cannabis and Cannabinoids in Physiology and Medicine (3)
Lecture—3 hours. Prerequisite(s): NPB 100 or NPB 101 or NPB 110B; or Consent of Instructor. In-depth scientific analysis of cannabis and cannabinoids, topics include biochemical, physiological, behavioral, pharmacological, social and therapeutic aspects of cannabinoids, with emphasis on the physiological impacts on major organ systems in humans and animals, and the potential medicinal uses. GE credit: SE, SL. Effective: 2017 Spring Quarter.

HPH 157—Advanced Physiology of Animal/Human Disease (3)
Lecture—1 hour; Lecture/Discussion—2 hours. Prerequisite(s): NPB 101 B+ or better or NPB 110C B+ or better; Consent of Instructor. Limited to 35 students initially. Centers on fundamental mechanisms and pathophysiological basis for animal and human diseases. Course is case-based and uses animal and human diseases to help exemplify the physiological consequences of organ dysfunction. (NPB 157.) Effective: 2017 Spring Quarter.

HPH 192—Internship in Human Physiology (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in physiology and related fields. (P/NP grading only.) Effective: 1997 Winter Quarter.

HPH 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed reading, discussion and/or laboratory experience on selected topics. (P/NP grading only.) Effective: 1997 Winter Quarter.

HPH 199—Special Study for Advanced Undergraduates (1-5)
Laboratory—3-15 hours. Prerequisite(s): Consent of Instructor. Senior standing in biology, chemistry, physics, psychology, or engineering. (P/NP grading only.) Effective: 1997 Winter Quarter.

HPH 210A—Advanced Physiology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Physiology Ph.D. program or consent of instructor. Advanced course in general principles of physiology, surveying homeostasis, cellular and selected topics, and neurophysiology. (Physiology 210A) Effective: 1999 Fall Quarter.

HPH 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. For graduate students desiring to explore particular topics in depth.
Lectures and conferences may be involved. Effective: 1997 Winter Quarter.

HPH 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

HPH 400—Human Physiology (6)
Laboratory—2 hours; Lecture—3 hours. Medical student only. General and cellular physiology of neurons, muscle, and epithelial cells and systemic physiology of cardiovascular, respiratory, gastrointestinal, and renal systems. (P/F grading only.) Effective: 2011 Summer Quarter.

HPH 403—Medical Neuroanatomy (5)
Discussion/Laboratory—1 hour; Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): HPH 400; Block 1. Restricted to medical students only. Anatomy of the normal human nervous system, to include gross external and internal morphology of brain and spinal cord, and function neuroanatomy of motor, sensory and cognitive systems. Incorporates application of neuroanatomy to clinical problem solving. (Cell Biology and Human Anatomy 403.) (P/F grading only.) Effective: 2007 Summer Quarter.

HPH 440—Cannabis and Cannabinoids in Physiology and Medicine (3)
Lecture. Prerequisite(s): Consent of Instructor. Provides an in-depth scientific analysis of current knowledge on cannabis and cannabinoids pertaining to human physiology and potential medicinal uses. May be repeated for credit. (H/P/F grading only.) Effective: 2018 Winter Quarter.

HPH 493—Physiological Principles in SICU SSM (6)
Clinical Activity—4 hours; Laboratory—16 hours; Lecture—5 hours; Lecture/Lab—10 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. Special Study Module, a four week course on the topic: Care of the Critically Ill Surgical Patient: Use of Physiological Principles to Guide Treatment of Patients with Common Surgical Problems (Surgery 493C.) (H/P/F grading only.) Effective: 2008 Winter Quarter.

HPH 497T—Tutoring in Human Physiology (1-5)
Tutorial—3-15 hours. Prerequisite(s): Advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum of the School of Medicine. (S/U grading only.) Effective: 1997 Winter Quarter.

HPH 498—Directed Reading and Group Study (1-4)
Discussion—2-8 hours. Prerequisite(s): Consent of Instructor. Medical student. Directed reading and discussion on selected topics in human physiology. (S/U grading only.) Effective: 1997 Winter Quarter.

HPH 499—Research (1-6)
Variable. Prerequisite(s): Medical students with consent of instructor. Laboratory investigation on selected topics. (S/U grading only.) Effective: 1997 Winter Quarter.

HRT Horticulture

Courses in HRT:

HRT 200A—Horticulture & Agronomy: Principles (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing. Core course to introduce students to the principles that are of general importance in horticultural and agronomic research, including agroecology, plant developmental physiology, crop improvement, and biotechnology. Generally taken in the first year of the graduate program. Effective: 2016 Winter Quarter.

HRT 200B—Horticulture & Agronomy: Practices (4)
Fieldwork—3 hours; Lecture/Discussion—2 hours; Seminar—3 hours. Prerequisite(s): HRT 200A recommended; graduate standing. Introduction to horticultural and agronomic cropping systems. Covers current applied research within agroecology, crop improvement, crop production, postharvest biology. Effective: 2016 Spring Quarter.

HRT 203—Research Perspectives in Horticulture (3)
Lecture—1 hour; Lecture/Discussion—2 hours. Prerequisite(s): Graduate standing. Following lectures/discussions of scientific methodology, students develop research proposals aided by classroom discussions and individual interactions with instructors. Lectures and critiques of classical papers provide a sense of the evolution of the current concepts in perennial plant biology. Effective: 2017 Winter Quarter.

HRT 251—Modeling Horticultural Systems (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): PLS 142; or Consent of Instructor. Calculus. Development and application of models. Emphasis on physiological and ecological models, with examples from areas of interest to class participants. Applications to horticultural systems. Effective: 2008 Fall Quarter.

HRT 290—Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing at UCD. Seminars presented by invited speakers, students, or faculty on selected topics in horticulture. (S/U grading only.) Effective: 1997 Winter Quarter.

HRT 298—Group Study (1-5)
Variable. May be repeated for credit. Effective: 2007 Fall Quarter.

HRT 299—Research (1-12)
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. Research. May be repeated for credit. (S/U grading only.) Effective: 2016 Winter Quarter.

HUM Humanities

Courses in HUM:

HUM 001—Humanities Forum (2)
Lecture—2 hours. Reading and discussion of a single work representative of a particular culture, historical period, or genre and significant for its ongoing cultural impact in the humanities, sciences, social sciences, technology, and popular arenas. Attention to provocative implications for contemporary society. May be repeated up to 1 time(s) if topic differs. GE credit: AH. Effective: 2001 Fall Quarter.

HUM 001D—Issues and Concepts in the Humanities (2)
Discussion—2 hours. Prerequisite(s): HUM 001 (can be concurrent); HUM 001 required concurrently. Small group discussions and preparation of short papers for course 1. May be repeated up to 1 time(s) if topic differs. GE credit: AH, WE. Effective: 2001 Fall Quarter.

HUM 002A—Global Humanities Forum (4)
Extensive Writing; Lecture—3 hours. Introduction to humanities topics and methodologies; analysis of major figures, works, and genres in world arts and literatures, with emphasis on relationships between history, society, and culture. May be repeated up to 1 time(s) topic differs. GE credit: AH, WC, WE. Effective: 2010 Fall Quarter.

HUM 002B—American Humanities Forum (4)
Extensive Writing; Lecture—3 hours. Introduction to humanities topics and methodologies; analysis of major figures, works, and genres in American arts and literatures, with emphasis on relationships between history, society, and culture. May be repeated up to 1 time(s) topic differs. GE credit: ACGH, AH, WE. Effective: 2010 Fall Quarter.

HUM 003—Medicine and Humanities (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Completion of Subject A requirement. Evolution of the "medical arts" into the "science of medicine." The culture of medicine in the context of society, medical ethics. GE credit: AH, SS, WE. Effective: 1999 Winter Quarter.

HUM 004—Animals and Human Culture (2)
Lecture—2 hours. The meaning of human relations with animals studied across a variety of historical periods and cultures and from a variety of humanistic perspectives. GE credit: AH. Effective: 2001 Spring Quarter.

HUM 004D—Animals and Human Culture: Discussion (2)
Discussion—2 hours. Prerequisite(s): HUM 004 (can be concurrent); HUM 004 required concurrently. Small group discussions and preparation of short papers for course 4. GE credit: AH, WE. Effective: 2001 Spring Quarter.

HUM 007—Travel and Travel Literature (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Subject A requirement. History of travel from the age of exploration to the modern era. Contemporary trends in travel, including mas tourism, adventure travel, and ecotravel. Social, economic, and cultural issues related to modern trends in travel. Analysis of literary representations of travel. GE credit: AH, WC, WE. Effective: 2000 Spring Quarter.

HUM 008—Introduction to Perspectives on Narrative (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Satisfaction of Subject A requirement. Interdisciplinary approach to the use of story across time, culture, and discipline. How the telling and retelling of particular stories reflect the values, concerns, and assumptions of their original audiences and genres. GE credit: AH, WE. Effective: 1999 Spring Quarter.

HUM 009—Don Quixote and the Modern World (2)
Lecture—2 hours. Reading Don Quixote as emblem of modernity in the West. Issues of reality versus illusion, heroism, freedom and self-fulfillment, racial tolerance and love. Don Quixote in other cultural and popular media:film,dance,art,musical drama,and television.GE credit with concurrent enrollment in course 9D:ArtHum,Wrt. GE credit: AH, WC. Effective: 1999 Winter Quarter.

HUM 009D—Don Quixote and the Modern World Discussion (2)
Discussion—2 hours. Prerequisite(s): HUM 009 (can be concurrent); HUM 009 required concurrently. Small group discussions and preparation of short papers for course 9. GE credit: AH, WC, WE. Effective: 1999 Winter Quarter.

HUM 010—How to be a Critic: Understanding Cultural Products and Practices (2)
Lecture—2 hours. Introduction to key topics and methodologies of interest to humanists. Series uses a variety of critical approaches to examine the cultural significance of subjects such as: fashion, film, architecture, music, food, dance. May be repeated up to 1 time(s) if topic differs. GE credit: AH. Effective: 2017 Fall Quarter.

HUM 010D—How to be a Critic: Discussion (2)
Discussion—2 hours. Concurrent enrollment in HUM 010 required. Optional discussion section can be taken concurrently with HUM 10. Small group discussions and preparation of short papers. GE credit: WE. Effective: 2017 Fall Quarter.

HUM 013—Witches: Myth and Historical Reality (4)
Extensive Writing; Lecture—3 hours. This course examines the historical construction of the witch. The four areas covered are: European pagan religions and the spread of Christianity; the "Burning' Times" in early modern Europe; 17th-century New England and the Salem witch trials; and fairytales. GE credit: AH, WC, WE. Effective: 2006 Spring Quarter.

HUM 015—Language and Identity (4)
Extensive Writing—1 hour; Lecture/Discussion—3 hours. Introduction to topics related to the construction of identity through language use, including geographical and social factors affecting language groups. Language ideology affecting linguistic groups, including bilinguals and non-native speakers of English. GE credit: AH, SS, WE. Effective: 2002 Spring Quarter.

HUM 060—Narrative and Argumentative Approaches to Major Current Issues in the Media, Culture, and Society (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): English A or the equivalent. Interdisciplinary approach to contemporary issues (abortion, AIDS,
civil rights, war and peace, welfare state) around which individuals, communities and institutions define themselves in American society, by applying principles of narrative theory to the narratives where those issues are embedded. GE credit: AH, WE. Effective: 1998 Winter Quarter.

HUM 092—Internship (1-12)
Internship—3-36 hours. Internships in fields where students can practice their skills. May be repeated for credit. (P/NP grading only.) Effective: 2004 Fall Quarter.

HUM 144—Marx, Nietzsche, Freud (4)
Lecture/Discussion—3 hours; Term Paper. Study of major texts of Marx, Nietzsche, and Freud, selected with an eye to their impact on 20th-century economics, ethics, and attitudes toward eros. Particular focus on conceptions of the self and the individual's relation to society. (German 144.) GE credit: AH, WC. Effective: 2011 Spring Quarter.

HUM 180—Topics in the Humanities (4)
Lecture/Discussion—3 hours; Term Paper. Analysis of interdisciplinary issues in the Humanities. Topics will vary. May be repeated up to 1 time(s). GE credit: AH, WE. Effective: 2005 Winter Quarter.

HUM 192—Internship (1-12)
Internship—3-36 hours. Internships in fields where students can practice their skills. May be repeated for credit. (P/NP grading only.) Effective: 2004 Fall Quarter.

HUM 198—Directed Group Study (1-4)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

HUM 199—Special Study for Advanced Undergraduates (1-4)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

HUM 250—Topics in the Humanities (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Topics in the humanities, selected by the instructor. May be repeated once for credit. May be repeated up to 1 time(s). Effective: 1997 Winter Quarter.

HUM 292—Graduate Internship (1-15)
Lecture—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Individually designed supervised internship, off campus, in community or institutional setting. Developed with advice of faculty mentor. May be repeated up to 15 unit(s). (S/U grading only.) Effective: 2005 Spring Quarter.

HUM 298—Directed Group Study (1-5)
Variable. (S/U grading only.) Effective: 2005 Spring Quarter.

HUM 299—Individual Research (1-4)
Variable. Individual research in the humanities resulting in a formal written research report. (S/U grading only.) Effective: 1997 Winter Quarter.

HUM 396—Teaching Assistant Training Practicum (1-4)
Variable—3-12 hours. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit. (S/U grading only.) Effective: 2005 Winter Quarter.

HYD Hydrologic Science

Courses in HYD:

HYD 010—Water, Power, Society (3)
Discussion—1 hour; Lecture—2 hours. Water resources issues. How water has been used to gain and wield socio-political power. Water resources development in California as related to current and future sustainability of water quantity and quality. Roles of science and policy in solving water problems. (Science and Society 10.) GE credit: SE, SL, SS. Effective: 2005 Spring Quarter.

HYD 092—Hydrologic Science Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division student. Work experience off and on campus in Hydrologic Science. Internship supervised by a member of the faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

HYD 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2002 Spring Quarter.

HYD 103N—Fluid Mechanics Fundamentals (4)
Lecture—4 hours. Prerequisite(s): PHY 009B Fluid mechanics axioms, fluid statics, kinematics, velocity fields for one-dimensional incompressible flow and boundary layers, turbulent flow time averaging, potential flow, dimensional analysis, and macroscopic balances to solve a range of practical problems. (Biological Systems Engineering 103.) GE credit: QL, SE, VL. Effective: 2005 Spring Quarter.

HYD 110—Irrigation Principles and Practices (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): PHY 007A; SSC 100 recommended. General course for agricultural and engineering students dealing with soil and plant aspects of irrigation and drainage. Soil-water principles including water movement, plant responses to irrigation regimes, water use by crops; also irrigation systems and water quality. Not open for credit to students who have completed WSC 110. GE credit: SE, SL. Effective: 2009 Fall Quarter.

HYD 124—Plant-Water-Soil Relationships (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): One upper division course in soil science, such as SSC 100; and one upper division course in plant science or plant biology, such as PLB 111; or consent of instructor. Principles of plant interactions with soil and atmospheric water environments and practical applications to crop management (e.g., irrigation) and plant eco-physiology (e.g., drought). Not open for credit to students who have completed Water Science 104. GE credit: QL, SE, SL. Effective: 2008 Spring Quarter.

HYD 124—Plant-Water-Soil Relationships (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (SSC 100 (can be concurrent) or SSC 107 (can be concurrent)); (PLS 100A (can be concurrent) or PLB 111 (can be concurrent)); or Consent of Instructor. Principles of plant interactions with soil and atmospheric water environments and practical applications to crop management (e.g., irrigation) and plant eco-physiology (e.g., drought). Not open for credit to students who have completed WSC 104. GE credit: QL, SE, SL. Effective: 2018 Fall Quarter.

HYD 134—Aqueous Geochemistry (6)
Laboratory—3 hours; Lecture—4 hours. Prerequisite(s): CHE 002B Chemistry of natural waters; dielectric properties of water; thermodynamic and mass-action relations; metal hydrolysis; acid-base equilibria; metal-coordination chemistry; solubility calculations; electron-exchange reactions; sorptive partitioning; ion exchange; and dissolved organic matter. GE credit: QL, SE. Effective: 2009 Fall Quarter.

HYD 141—Physical Hydrology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PHY 009B; MAT 021B; HYD 100 recommended. Introduction to the processes that constitute the hydrologic cycle. Special emphasis on a quantitative description of the following processes: precipitation, infiltration, evaporation, transpiration, surface runoff, and groundwater runoff. GE credit: QL, SE, SL, VL. Effective: 1997 Fall Quarter.

HYD 142—Systems Hydrology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): HYD 141 or ECI 142 General course considering hydrologic processes from a systems or statistical model perspective. General probability concepts are applied to frequency, time series and spatial data analysis. Linear systems are also considered in conjunction with Kalman filter techniques. GE credit: OL, QL, SE. Effective: 1998 Winter Quarter.

HYD 143—Ecohydrology (4)
Extensive Problem Solving; Lecture/Discussion—3 hours. Prerequisite(s): HYD 010 or HYD 141 or ESP 001 or ESM 100 or ESM 108 or ESM 120 or GEL 001 or GEL 050 or SSC 100; or Consent of Instructor. Movement and storage of water in individual ecosystems and the integrated functioning of water and biota at the watershed scale. GE credit: OL, QL, SE, SL. Effective: 2017 Winter Quarter.

HYD 144—Groundwater Hydrology (4)
Lecture—4 hours. Prerequisite(s): MAT 016B or MAT 021A; HYD 103 or ENG 103 recommended. Fundamentals of groundwater flow and contaminant hydrology. Occurrence, distribution, and movement of groundwater. Well-flow systems. Aquifer tests. Well construction operation and maintenance. Groundwater exploration and quality assessment. Agricultural threats to groundwater quality: fertilizers, pesticides, and salts. (Biological Systems Engineering 144.) GE credit: QL, SE, SL, VL. Effective: 2006 Fall Quarter.

HYD 145—Water Science and Design (4) ***Review all entries***
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): HYD 141 or MAT 016C or MAT 017C or MAT 021C; or Consent of Instructor. Introduction to watershed engineering, storm water management, design of hydraulic systems. Topics include hydrological risk analysis, flood routing, design storms, open channel flow, pipes, culverts, spillways, and detention basins. Class project and field trips will apply theory to real-life problems. GE credit: QL, SE, SL, WE. Effective: 2016 Fall Quarter.

HYD 145—Water Science and Design (4) ***Review all entries***
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (HYD 141 or ESM 100); (MAT 016B or MAT 021B); or Consent of Instructor. Introduction to watershed engineering, storm water management, design of hydraulic systems. Topics include hydrological risk analysis, flood routing, design storms, open channel flow, pipes, culverts, spillways, and detention basins. Class project and field trips will apply theory to real-life problems. GE credit: QL, SE, SL, WE. Effective: 2018 Fall Quarter.

HYD 146—Hydrogeology and Contaminant Transport (5)
Laboratory—2 hours; Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): HYD 144 or ECI 144; Or the equivalent. Physical and chemical processes affecting groundwater flow and contaminant transport, with emphasis on realistic hydrogeologic examples. Groundwater geology and chemistry. Fundamentals of groundwater flow and transport analysis. Laboratory includes field pumping test and work with physical and computer models. (Geology 156.) GE credit: SE. Effective: 2002 Winter Quarter.

HYD 147—Runoff, Erosion and Water Quality Management (3)
Fieldwork; Lecture/Lab—3 hours. Prerequisite(s): (PHY 007B or PHY 009B); (MAT 016C or MAT 017C or MAT 021C); (ECI 142 or HYD 141 or ESM 100); or equivalent. Practical hydrology and runoff water quality management from disturbed watersheds. Development of hillslope and soils restoration concepts and practice, modeling and application. (Biological Systems Engineering 147.) GE credit: SE. Effective: 2018 Spring Quarter.

HYD 150—Water Law (3)
Lecture—3 hours. Prerequisite(s): Consent of instructor or upper division standing. Principles and issues of California Water Law.Types of water rights, groundwater rights and management, and protection of instream uses.Water projects, role of federal government and federal/state relations. Basic water quality acts, endangered species act, water transfers and current water issues. GE credit: ACGH, SS. Effective: 2016 Fall Quarter.

HYD 151—Field Methods in Hydrology (4)
Fieldwork—3 hours; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): ERS 100 or HYD 141 Measurement methods and data analysis for evaluation of water storage, movement and contamination in the field. Equipment such as data loggers, water and sediment samplers, pressure transducers, weather stations, surveying equipment, and flow meters will be used. GE credit: QL, SE, SL. Effective: 2003 Winter Quarter.

HYD 182—Environmental Analysis using GIS (4)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): ABT 150 or LDA 150; Or equivalent GIS experience and skills; general biology and/or ecology courses are recommended. Ecosystem and landscape modeling with emphasis on hydrology and solute transport. Spatial analysis of environmental risk analysis including ecological risk assessment, natural resource management. Spatial database structures, scripting, data models, and error analysis in GIS. (Applied Biological Systems Technology 182.) GE credit: QL, SE, SL, VL. Effective: 2018 Winter Quarter.

HYD 192—Hydrologic Science Internship (1-12)
Internship—3-40 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Work experience off and on campus in water science. Internship supervised by a member of the faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

HYD 198—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

HYD 199—Special Study for Advanced Undergraduate (1-5)
Variable. Prerequisite(s): Senior standing. (P/NP grading only.) Effective: 1997 Fall Quarter.

HYD 200—Survey of Hydrologic Sciences (1)
Seminar—1 hour; Term Paper. Prerequisite(s): Open to students in the Hydrologic Sciences program. Seminar course exposes students to the diversity of sciences involved in the program. Students prepare a paper and presentation in their area of research interest. May be repeated twice for credit. May be repeated up to 2 time(s). (S/U grading only.) Effective: 1997 Winter Quarter.

HYD 201A—Hydrologic Sciences Core Survey (3)
Lecture/Discussion—2 hours; Project (Term Project). Considers the primary sub-disciplines while reviewing the fundamental scientific concepts/processes of the hydrologic sciences research community, and includes a basic writing component. Effective: 2017 Fall Quarter.

HYD 201B—Hydrologic Sciences Core Seminar (1)
Seminar—2 hours. Exposes students to the research underway in the Hydrologic Sciences Graduate Group as well as provide them the opportunity to present and refine their research through interaction with other students in the Graduate Group. (P/NP grading only.) Effective: 2018 Winter Quarter.

HYD 205—Continuum Mechanics of Natural Systems (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021D; MAT 022B; PHY 009B Continuum mechanics of static and dynamic air, water, earth and biological systems using hydraulic, heat and electrical conductivity; diffusivity; dispersion; strain; stress; deformation gradient; velocity gradient; stretch and spin tensors. (Biological Systems Engineering 205.) Effective: 2002 Fall Quarter.

HYD 210—Vadose Modeling and Characterization (3)
Discussion—0.5 hours; Laboratory—3 hours; Lecture—1.5 hours. Prerequisite(s): SSC 107; or Consent of Instructor. Principles and modeling of water flow and chemical transport in the vadose zone, with specific applications to soils. Topics include hydraulic properties, finite difference application to unsaturated water flow, parameter optimization, diffusive and convective transport in gaseous and liquid phases. Effective: 2015 Spring Quarter.

HYD 243—Water Resource Planning and Management (3)
Lecture—3 hours. Prerequisite(s): HYD 141 or ECI 142 Applications of deterministic and stochastic mathematical programming
techniques to water resource planning, analysis, design and management. Water allocation, capacity expansion, and reservoir operation. Conjunctive use of surface water and groundwater. Water quality management. Irrigation planning and operation models. (Biological Systems Engineering 243.) Effective: 1997 Fall Quarter.

HYD 245—Climate Change, Water and Society (4)
Lecture—4 hours. Class size limited to 25 students. Integration of climate science and hydrology with policy to understand hydroclimatology and its impact upon natural and human systems. Assignments: readings, take-home examination on climate and hydrologic science, paper that integrates course concepts into a research prospectus or review article. (Atmospheric Science 245 and Ecology 245.) Effective: 2015 Spring Quarter.

HYD 252—Hillslope Geomorphology and Sediment Budgets (4)
Fieldwork—3 hours; Lecture—3 hours. Prerequisite(s): HYD 141 or GEL 035 or ECI 142; or Consent of Instructor. Exploration of theoretical and empirical foundations of sediment production on hillslopes using computer models and field experiments to promote an understanding of how watersheds evolve naturally and with human impacts. Effective: 2001 Spring Quarter.

HYD 254Y—Ecohydraulics (3)
Discussion—1 hour; Extensive Problem Solving; Web Virtual Lecture—1 hour. Use of 2D hydrodynamic modeling to perform instream flow assessment by exploring flow-dependent hydraulic patterns at multiple spatial scales and extrapolating results with empirical and analytical functions to evaluate geomorphic resilience and ecological functions. Effective: 2014 Fall Quarter.

HYD 256—Geomorphology of Estuaries and Deltas (4)
Fieldwork—3 hours; Lecture—3 hours. Prerequisite(s): HYD 141 or GEL 035; or ECI 042 or Consent of Instructor. Survey of the processes and landforms associated with sediment deposition in the coastal zone. Application of geomorphic principles to coastal management issues. Effective: 2002 Spring Quarter.

HYD 264—Modeling of Hydrologic Processes (3)
Lecture—3 hours. Prerequisite(s): HYD 141; STA 102; Or the equivalents. Techniques used to model the spatio-temporal structure of rainfall and runoff are introduced. Procedures studied include those based on stochastic point processes, chaos theory, fractal geometry, and fractional noises. Effective: 1997 Winter Quarter.

HYD 269—Numerical Modeling of Groundwater Systems (3)
Lecture—3 hours. Prerequisite(s): MAT 022B; (ECI 144; or HYD 145A); HYD 145B; Finite difference and finite element techniques in modeling groundwater flow and transport. Fundamentals of constructing and calibrating models with hands-on applications. Methods and limitations of numerical solution of transport equations. Model interpretation and ethics. Effective: 1997 Winter Quarter.

HYD 273—Introduction to Geostatistics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 130A; STA 130B; Or the equivalent. Statistical treatment of spatial data with hydrologic emphasis. Topics: theory of random functions, variogram analysis, Kriging/co-Kriging, indicator geostatistics, and stochastic simulation of spatial variability. Geostatistical software use. Effective: 2018 Winter Quarter.

HYD 274—Practice of Groundwater Flow and Transport Modeling (3)
Lecture—2 hours; Lecture/Discussion—0.5 hours; Lecture/Lab—0.5 hours. Prerequisite(s): HYD 269; (ECI 272B or ECI 272C) Selecting and building groundwater flow and transport models. Planning, preparation, execution, presentation, and review of modeling projects. Review of methods, assumptions, and limitations of groundwater models; practicing with MODFLOW, MT3D, associated GUI, and with other groundwater modeling software of choice. Effective: 2012 Fall Quarter.

HYD 275—Analysis of Spatial Processes (3)
Lecture—3 hours. Prerequisite(s): STA 102; Or the equivalent; HYD 273 or STA 273A recommended. Characterization of homogeneous random fields; extremes and spectral parameters; geometry of excursions, local averaging; scale of fluctuation; non-Gaussian and irregular random fields; geostatistical
applications. Effective: 1997 Winter Quarter.

HYD 286—Selected Topics in Environmental Remote Sensing (3)
Discussion—2 hours; Lecture—1 hour; Project (Term Project). Prerequisite(s): ERS 186; Consent of Instructor. Or equivalent; ERS 186L recommended. In depth investigation of advanced topics in remote sensing applications, measurements, and theory. May be repeated for credit. (Geography 286.) Effective: 2014 Fall Quarter.

HYD 290—Seminar in Hydrologic Science (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing and background in Hydrologic Science. Seminars and critical review of problems, issues, and research in hydrologic sciences. Oral presentations of research. Topics will vary. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

HYD 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

HYD 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

HYD 396—Teaching Assistant Training Practicum (1-4)
Variable. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

HYD 410—OSHA HAZWOPER Refresher Course (1)
Lecture—1 hour. Updates hazardous materials handling information for purposes of keeping certification current. Certification lapses until the refresher course is complete. (P/NP grading only.) Effective: 1998 Winter Quarter.

HYD 440—Hazardous Waste Operations Training (3)
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): Upper division standing in College of Agricultural and Environmental Sciences. Forty-hour course designed to meet the requirements of Federal OSHA
regulation CFR 1910.120. Covers the health, regulatory, processing and safe handling issues/problems associated with working with hazardous
materials. (P/NP grading only.) Effective: 1997 Spring Quarter.

IAD International Agricultural Development

Courses in IAD:

IAD 010—Introduction to International Agricultural Development (4)
Discussion—1 hour; Lecture—3 hours. Theories, practices and institutions relating to agricultural development; the interaction of changing social, cultural and economic organization through successive stages of economic development; impact of new agricultural technology on underdeveloped regions. GE credit: SS, WC, WE. Effective: 2011 Spring Quarter.

IAD 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Supervised internship, off and on campus, in community and institutional settings. (P/NP grading only.) Effective: 2011 Spring Quarter.

IAD 103—Social Change and Agricultural Development (4)
Lecture/Discussion—4 hours. Prerequisite(s): Introductory social science course (Anthropology, Sociology, Economics, International Agricultural Development). How social and cultural factors influence technological change in agriculture; theories of diffusion of innovations; social impact analysis and technology assessment. GE credit: SS, WE. Effective: 2011 Spring Quarter.

IAD 142—Equipment and Technology for Small Farms (2)
Laboratory—3 hours; Lecture—1 hour. Types and characteristics of agricultural equipment and technologies
appropriate for small commercial farming. Adjustment and calibration of equipment. Selection of and budgeting for equipment. (Applied Biological Systems Technology 142.) GE credit: QL, SE, VL. Effective: 2011 Spring Quarter.

IAD 160—Agroforestry: Global and Local Perspectives (3)
Lecture/Discussion—3 hours. Prerequisite(s): PLS 002 or BIS 001C or BIS 002C; (PLS 142 or PLS 150 or BIS 002B); Or general ecology course in lieu of PLS 142 or PLS 150 or BIS 002B. Traditional and evolving use of trees in agricultural ecosystems; their multiple roles in environmental stabilization and production of food, fuel, and fiber; and socioeconomic barriers to the adoption and implementation of agroforestry practices. Not open for credit to students who have taken previously taken AMR 160. (Former course AMR 160.). (Plant Sciences 160.) GE credit: SE. Effective: 2011 Spring Quarter.

IAD 170—Program Development for International Agriculture (4)
Lecture/Discussion—4 hours. Prerequisite(s): IAD 010 Principles of leadership and management for international agricultural development. Organizations and organizational behavior, and the implications for planning and administering organizations involved in the global development effort. Effective: 2011 Spring Quarter.

IAD 190—Proseminar in International Agricultural Development (1)
Seminar—1 hour. Presentation and discussion of current topics in international agricultural development by visiting lecturers, staff and students. May be repeated for credit. (P/NP grading only.) Effective: 2011 Spring Quarter.

IAD 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Supervised internship, off and on campus, in community and institutional settings. May be repeated for credit. (P/NP grading only.) Effective: 2011 Spring Quarter.

IAD 198—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Directed group study. May be repeated for credit. (P/NP grading only.) Effective: 2011 Spring Quarter.

IAD 199—Special Study for Advanced Undergraduates (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special study for advanced undergraduates. May be repeated for credit. (P/NP grading only.) Effective: 2011 Spring Quarter.

IAD 200N—Philosophy and Practice of Agricultural Development (5)
Lecture/Discussion—5 hours; Term Paper. Introduces key elements of philosophy and practice of agricultural development in less developed countries; major paradigms of development; historical context within which these paradigms operate; various development techniques and initiatives emerging from agricultural production to institutional capacity building and management. Not open for credit to students who have completed former IAD 202. Effective: 2011 Spring Quarter.

IAD 201—The Economics of Small Farms and Farming Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ARE 100A or ECN 100; or the equivalent. Economic perspective on small farm development. Establishes a basis for predicting farmers' responses to changes in the economic environment, and for proposing government policies to increase small farm production and improve farmer and national welfare. Effective: 2017 Winter Quarter.

IAD 202N—Analysis and Determinants of Farming Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PLS 110C or PLS 111; or the equivalent. Unifying concepts of cropping systems in temperate and tropical climatic zones; agroecosystems stability, diversity and sustainability; management strategies, resource use efficiency and their interactions; role of animals, their impact on energy use efficiency, nutrient cycling, and providing food and power.. Not open for credit to students who have completed former IAD 200. Effective: 2017 Winter Quarter.

IAD 203N—Project Planning and Evaluation (4)
Discussion—1 hour; Workshop—3 hours. Prerequisite(s): IAD 200N; or Consent of Instructor. Interdisciplinary setting for application of student skills and specialization to a "real world" development project. Focus on team-building and effective interdisciplinary problem-solving methods, with the objective of producing a project document and presentation within a specified deadline. Not open for credit to students who have completed former IAD 203. Effective: 2017 Winter Quarter.

IAD 290—Seminar in International Agricultural Development (1-2)
Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. Discussion and critical evaluation of advanced topics and issues in international agricultural development. May be repeated for credit. (S/U grading only.) Effective: 2011 Spring Quarter.

IAD 291—Topics in International Agricultural Development (1-3)
Lecture/Discussion—1-3 hours. Prerequisite(s): Consent of Instructor. Selected topics dealing with current issues in agricultural development in lesser developed nations. Variable content. May be repeated up to 1 time(s). Effective: 2011 Spring Quarter.

IAD 292—Graduate Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Participation in H. Humphrey Fellow Program or consent of instructor. Individually designed supervised internship, off or on campus, in community, business or institutional setting. Developed with advice of faculty mentor and Humphrey Coordinator. (S/U grading only.) Effective: 2011 Spring Quarter.

IAD 298—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Directed group study. May be repeated for credit. (S/U grading only.) Effective: 2011 Spring Quarter.

IAD 299—Research (1-12)
Variable—1-12 hours. Prerequisite(s): Consent of Instructor. Research. May be repeated for credit. (S/U grading only.) Effective: 2011 Spring Quarter.

IAD 396—Teaching Assistant Training Practicum (1-4)
Variable—3-12 hours. Prerequisite(s): Graduate standing. Teaching assistant training practicum. May be repeated for credit. (S/U grading only.) Effective: 2011 Spring Quarter.

ICL International Commercial Law

Courses in ICL:

ICL 201—Orientation in United States Law (7)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Investigation of the Common Law System of the United States. Includes structure of the U.S. government, Constitutional law, contracts, torts, real property, consumer law, securities law, intellectual property, antitrust, taxation, labor law, environmental law, ethics, remedies, legal research and trial practice. Effective: 2002 Summer Special Session.

ICL 201A—Fundamentals in United States Law (4)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Investigation of the Common Law System of the U.S. Includes the American constitutional system, the American judiciary, the American civil trial, and foundational substantive and procedural law such as real property, torts, criminal law and procedure, civil procedure, and contracts. Effective: 2013 Summer Session 1.

ICL 201B—Advanced Topics in United States Law (3)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Orientation to advanced topics in U.S. law: Intellectual Property (including copyright and trademarks), Commercial and Consumer Law, Advanced Contracts, Antitrust, Taxation, Remedies, Labor Law, Environmental Law, Dispute Resolution, Remedies and introduction to trial techniques and legal research/writing. Effective: 2013 Summer Special Session.

ICL 202—Introduction to Contracts (4)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Examines sorts of promises that are enforced and the nature of protection given promissory obligations in both commercial and noncommercial transactions. Inquiry is made into the means by which traditional doctrine adjusts to changing social demands. Effective: 2009 Fall Semester.

ICL 202A—Introduction to Contracts Formation (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Examines formation of the sorts of promises that are enforced and the nature of protection given promissory obligations in both commercial and noncommercial transactions. Inquiry is made into the means by which traditional doctrine adjusts to changing social demands. Effective: 2013 Summer Session 1.

ICL 202AS—Introduction to Contracts Formation (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Examines formation of the sorts of promises that are enforced and the nature of protection given promissory obligations in both commercial and noncommercial transactions. Inquiry is made into the means by which traditional doctrine adjusts to changing social demands. Effective: 2014 Winter Quarter.

ICL 202B—Contracts Performance (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Examines issues of performing promises that are enforceable and possible breach of promissory obligations in both commercial and noncommercial transactions. Inquiry is made into the means by which traditional doctrine adjusts to changing social demands. Effective: 2013 Fall Quarter.

ICL 202BS—Contract Performance (2)
Lecture/Discussion—20 hours. Prerequisite(s): ICL 202A; Or equivalent; Law school education or equivalent. Examines issues of performing promises that are enforceable and possible breach of promissory obligations in both commercial and noncommercial transactions. Inquiry is made into the means by which traditional doctrine adjusts to changing social demands. Effective: 2014 Winter Quarter.

ICL 203—Civil Procedure (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Study of the fundamental and recurrent problems in civil actions including the methods used by federal and state courts to resolve civil disputes. Effective: 2009 Fall Semester.

ICL 204—International Joint Ventures (3)
Lecture/Discussion—20 hours. Prerequisite(s): ICL 201; Law school education or equivalent. International and U.S. business and legal transactions. Legal planning, problem solving, decision making and negotiations related to the break-up and dissolution of a major international joint venture. U.S. laws including finance, tax, bankruptcy, labor, antitrust, environmental, corporate structures and intellectual property. Offered every three years. Effective: 2002 Summer Special Session.

ICL 205—Introduction to Constitutional Law (4)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Principles, doctrines and controversies regarding the structure and division of powers in American government. Includes judicial review, jurisdiction, standing to sue, federalism, federal and state powers and immunities, and the separation of powers among branches of the federal government. Effective: 2009 Fall Semester.

ICL 205A—Overview of US Constitutional Law (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Principles, doctrines and controversies regarding the structure and division of powers in American government. Includes judicial review, jurisdiction, standing to sue, federalism, federal and state powers and immunities, and the separation of powers among branches of the federal government. Effective: 2013 Summer Special Session.

ICL 205AS—Overview of US Constitutional Law (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Principles, doctrines and controversies regarding the structure and division of powers in American government. Includes judicial review, jurisdiction, standing to sue, federalism, federal and state powers and immunities, and the separation of powers among branches of the federal government. Effective: 2013 Fall Quarter.

ICL 205B—Constitutional Law - Protection of Individual Rights (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Principles, doctrines and controversies regarding the U.S. Constitution Bill of Rights, including due process of law, equal protection, freedom of expression, freedom of religion, state action, and congressional legislation in aid of civil rights and liberties. Effective: 2013 Summer Special Session.

ICL 211—Negotiations and Alternative Dispute Resolution (1)
Lecture/Discussion—10 hours. Prerequisite(s): ICL 201; Law school education or the equivalent. Mechanisms for resolving disputes including the alternatives to litigation such as negotiation, mediation, and arbitration. Advantages and disadvantages of each approach. Offered every three years. Effective: 2002 Summer Special Session.

ICL 212—Introduction to Negotiation (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Introduction to theoretical and empirical approaches to negotiation for the purposes of making deals and resolving legal disputes. Effective: 2009 Fall Semester.

ICL 212S—Introduction to Negotiation (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Introduction to theoretical and empirical approaches to negotiation for the purposes of making deals and resolving legal disputes. Effective: 2013 Fall Quarter.

ICL 214—Advanced Negotiation (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Principles and empirical approaches to advanced negotiations including negotiation framework, models, styles, multiple party/issue negotiations and settlements. Effective: 2009 Fall Semester.

ICL 214S—Advanced Negotiation (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Principles and empirical approaches to advanced negotiations including negotiation framework, models, styles, multiple party/issue negotiations and settlements. Effective: 2012 Spring Quarter.

ICL 215—Business Associations (4)
Lecture/Discussion—20 hours. Prerequisite(s): ICL 201; Law school education or the equivalent. Legal rules and concepts applicable to business associations including general partnerships, joint ventures, limited partnerships, limited liability entities, and sole proprietorships. Effective: 2002 Summer Special Session.

ICL 215S—Business Associations (4)
Lecture/Discussion—20 hours. Prerequisite(s): ICL 201; Law school education or the equivalent. Legal rules and concepts applicable to business associations including general partnerships, joint ventures, limited partnerships, limited liability entities, and sole proprietorships. Effective: 2012 Spring Quarter.

ICL 216—International Business Transactions (2)
Lecture/Discussion—20 hours. Prerequisite(s): ICL 201; Law school education or the equivalent. Legal problems arising from international business transactions. Focus on international sales contracts, choice of law, forum selection clauses, letters of credit, transfers of technology, regulation of bribery, development of joint ventures, repatriation of profits, foreign exchange problems, and national efforts to control imports. Effective: 2002 Summer Special Session.

ICL 217—Alternative Dispute Resolution (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Introduces students to a wide variety of alternative dispute resolution procedures, with an in-depth emphasis on negotiation, mediation and arbitration. Effective: 2009 Fall Semester.

ICL 219—Advanced Writing Project (4)
Project (Term Project). Prerequisite(s): ICL 201; Law school education or the equivalent. The completion of a written research project under the active supervision of a faculty member in satisfaction of the research-writing requirement. (S/U grading only.) Effective: 2002 Summer Special Session.

ICL 220—United States Taxation of Multinational Investments (2)
Lecture/Discussion—20 hours. Prerequisite(s): ICL 201; Law school education or the equivalent. An analysis of the United States taxation of multinational investments including jurisdiction of tax, the U.S. tax system, foreign tax credits, treaties, and transfer pricing. Effective: 2002 Summer Special Session.

ICL 227—Criminal Procedure (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Federal constitutional limits on government authority to gather evidence and investigate crime. Includes Fourth Amendment limits on search, seizure, and arrest; Fifth Amendment privilege against self-incrimination; Sixth Amendment right to counsel. Effective: 2009 Summer Quarter.

ICL 228A—Mergers and Acquisitions Law (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Practical approach to mergers and acquisitions with an in-depth look at the planning, negotiation and completion of mergers and acquisitions. Effective: 2013 Fall Quarter.

ICL 228AS—Mergers and Acquisitions Law (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Practical approach to mergers and acquisitions with an in-depth look at the planning, negotiation and completion of mergers and acquisitions. Effective: 2013 Fall Quarter.

ICL 236—United States Securities Law & Regulation (2)
Lecture/Discussion—20 hours. Prerequisite(s): ICL 201; Law school education or the equivalent. Structural and jurisdictional issues associated with securities practice. Topics include the regulation of public offerings, transactions by corporate insiders, regulation of corporate disclosure and conduct, and the liabilities of corporations and individuals under anti-fraud provisions. Effective: 2002 Summer Special Session.

ICL 239—Mediation (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Introduction to the mediation process. Development of communication skills, the ability to analyze disputes, to understand why mediations succeed or fail, and understand the advantages and limitations of mediation as a method of resolving disputes. Effective: 2009 Fall Semester.

ICL 242—Private International Law (2)
Lecture/Discussion—20 hours. Prerequisite(s): ICL 201; Law school education or the equivalent. Operating law across national borders; emphasis on methods of resolving international disputes. International aspects of jurisdiction, choice of law, judgment enforcement, forum choice, process service, taking of evidence, foreign sovereign immunity, extraterritorial regulation of antitrust, securities; other national laws. Effective: 2004 Summer Special Session.

ICL 242S—Private International Law (2)
Lecture/Discussion—20 hours. Prerequisite(s): ICL 201; Law school education or the equivalent. Operating law across national borders; emphasis on methods of resolving international disputes. International aspects of jurisdiction, choice of law, judgment enforcement, forum choice, process service, taking of evidence, foreign sovereign immunity, extraterritorial regulation of antitrust, securities; other national laws. Effective: 2011 Fall Quarter.

ICL 247—Banking Law (1)
Lecture/Discussion—10 hours. Prerequisite(s): ICL 201; Law school education or the equivalent. Institutional features of international banking transactions, the structure of a large financial deal, and the mechanics of overseeing large loans. Emphasis on negotiable instruments such as bills of lading, letters of credit, standby letters of credit, and interbank transactions. Offered every three years. Effective: 2002 Summer Special Session.

ICL 249—Comparative Law (1)
Lecture/Discussion—10 hours. Prerequisite(s): ICL 201; Law school education or the equivalent. A comparative study of the development of schools of legal thought, chiefly Common law systems and Civil law traditions. Attention to the historical reasons for their divergence, contemporary aproaches to universal problems such as succession, torts, and contracts, the cross-fertilization of laws and difficulties commonly associated with importing foreign law into new territory. Effective: 2002 Summer Special Session.

ICL 250—International Trade Law (3)
Lecture/Discussion—20 hours. Prerequisite(s): ICL 201; Law school education or the equivalent. An investigation of global trading systems including international trade in goods and services, e-commerce, international intellectual property, international tax planning and investment. Includes substantive and procedural provisions of the World Trade Organization (WTO) and the North American Free Trade Agreement (NAFTA). Offered every three years. Effective: 2002 Summer Special Session.

ICL 251—United States Litigation Issues (1)
Lecture/Discussion—10 hours. Prerequisite(s): ICL 201; Law school education or the equivalent. Prevention and resolution of disputes in international commerce. Emphasis on preparing for a trial in the United States. Includes the study of pre-trial motions, jury selection, opening statements, rules of evidence, closing arguments, and the selection of appropriate strategies. Offered every three years. Effective: 2002 Summer Special Session.

ICL 262—Antitrust (1)
Lecture/Discussion—10 hours. Prerequisite(s): ICL 201; Law school education or the equivalent. Historical and institutional background of Antitrust law in the United States. The statutory framework including price fixing, limits on distribution, monopolization and mergers, and reporting requirements. Effective: 2002 Summer Special Session.

ICL 270—Financing International Transactions (3)
Lecture/Discussion—20 hours. Prerequisite(s): ICL 201; Law school education or the equivalent. How capital is raised in international markets. Investment strategies for U.S. markets. Taxation of financial investments, international currency regulation, and assessing rates of return on international investments. Offered every three years. Effective: 2002 Summer Special Session.

ICL 274—Intellectual Property (2)
Lecture/Discussion—20 hours. Prerequisite(s): ICL 201; Law school education or the equivalent. Intensive study of intellectual property law. Including copyright, trademark and patent law and unfair competition. Effective: 2002 Summer Special Session.

ICL 274S—Intellectual Property (2)
Lecture/Discussion—20 hours. Prerequisite(s): ICL 201; Law school education or the equivalent. Intensive study of intellectual property law. Including copyright, trademark and patent law and unfair competition. Effective: 2011 Fall Quarter.

ICL 283—Contract Remedies (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Covers a range of remedies for contract breach: remedies under common law and equity, liquidated damages clauses, remedies for mistake and unconscionability as well as breach of contract for the Sale of Goods under UCC Article II. Effective: 2014 Winter Quarter.

ICL 283S—Contract Remedies (2)
Discussion/Laboratory—20 hours. Prerequisite(s): ICL 202A; ICL 202B; Or equivalent; Law School education or equivalent. Covers a range of remedies for contract breach: remedies under common law and equity, liquidated damages clauses, remedies for mistake and unconscionability as well as breach of contract for the Sale of Goods under UCC Article II. Effective: 2014 Winter Quarter.

ICL 285—Environmental Law (2)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Introduction to federal and state environmental law. Historical development of environmental law; the role of courts, the legislature and the executive branch in the development and implementation of environmental policy. Review of major statutes. Effective: 2009 Fall Semester.

ICL 289—Licensing Academy in Intellectual Property & Technology Commercialization (4)
Lecture/Discussion—20 hours. Prerequisite(s): ICL 201; Law School education or equivalent. Intellectual property as it relates to current forms of legal protection and how new innovations fit into these models, including public-private technology transfer, patents, institutional objectives, technology transfer offices, startups, and licenses. Effective: 2013 Summer Special Session.

ICL 290—American Legal System Research Seminar (1)
Seminar—5 hours. Prerequisite(s): ICL 201; Law School education or equivalent. American legal system and its structure. Legal research methodologies and presentation with attention to analysis, synthesis, organization, and editing techniques common to legal writing. (S/U grading only.) Effective: 2004 Summer Special Session.

ICL 291C—International Commercial Law Seminar (4)
Seminar—20 hours. Prerequisite(s): ICL 201; Law School education or equivalent. Advanced seminar on a current topic in International Commercial Law. Offered at the University of Cologne in Cologne, Germany for two weeks each summer. May be repeated up to 3 time(s) when topic differs. Effective: 2013 Summer Special Session.

ICL 292—International Commercial Law Seminar (1-4)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Advanced seminar in a current topic in International Commercial Law. Topic will change each year the course is offered. May be repeated up to 2 time(s) when topic differs. Effective: 2013 Summer Session 1.

ICL 292S—International Commercial Law Seminar (1-4)
Lecture/Discussion—20 hours. Prerequisite(s): Law school education or equivalent. Advanced seminar in a current topic in International Commercial Law. Topic will change each year the course is offered. May be repeated up to 2 time(s) when topic differs. Effective: 2013 Spring Semester.

ICL 299—Advanced Research in Legal Problems (1-4)
Variable—3-40 hours. Prerequisite(s): ICL 201; Law School education or equivalent. Permission of supervising instructor. Student individualized research projects under faculty supervision. (S/U grading only.) Effective: 2002 Summer Special Session.

IDI Med - Intl: Infectious Diseases

Courses in IDI:

IDI 141—Infectious Diseases of Humans (1)
Lecture—1 hour. Prerequisite(s): Introductory knowledge in biology and chemistry recommended. Course integrates information on biological and molecular nature of the causative organism, modern diagnostics, treatment and prevention strategies, and the role of infectious diseases in contemporary society and throughout human history. (P/NP grading only.) Effective: 1997 Winter Quarter.

IDI 192—Research Internship in Internal Medicine (1-12)
Internship—3-36 hours. Supervised work experience in the division of Infectious Diseases. Undergraduates will have an opportunity to acquire research experience in clinical settings. May be repeated for credit up to 12 units. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

IDI 199—Infectious Diseases Research (1-5)
Variable. Prerequisite(s): Consent of Instructor. Chemistry through organic chemistry (in addition, physical and biochemistry preferred), biology through basic bacteriology (in addition, microbiology and immunology preferred). Discrete problem requiring reading and actual manual effort in solution will be assigned to each student. Progress and results will be reviewed at intervals with instructor and via seminar presentation. (P/NP grading only.) Effective: 1997 Winter Quarter.

IDI 211—Epidemiology and Prevention of Infectious Diseases (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): EPI 205B; (EPI 207; or IMD 421). Infectious disease epidemiology and prevention, with equal emphasis on human and veterinary diseases. Major categories of infectious diseases by mode of transmission. Effective: 2002 Spring Quarter.

IDI 299—Research in Infectious Diseases (1-12)
Variable. Prerequisite(s): Consent of Instructor. Laboratory investigation contributing to the dissertation for a graduate
degree. (S/U grading only.) Effective: 1997 Winter Quarter.

IDI 440—Introduction to AIDS and Related Disorders (1.5-6)
Clinical Activity—30 hours; Discussion—10 hours. Prerequisite(s): First- and second-year medical students must be in good academic standing and have consent from the instructor. Familiarizes students with the diagnosis and treatment of individuals infected with the human immunodeficiency virus. Students will interview patients, observe patient care and participate in ongoing clinic research as well as examine alternative lifestyles. May be repeated for credit. May be repeated for credit. (H/P/F grading only.) Effective: 2005 Spring Quarter.

IDI 450—Clinical and Social Care of the Injection Drug User (1-4)
Clinical Activity—3 hours; Lecture—1 hour. Prerequisite(s): Consent of Instructor. First- and second-year medical students in good academic standing. Lecture and guided clinical practice in a supervised clinical setting, focusing on the social and medical aspects of health care for injection drug users. May be repeated for credit up to 24 units. May be repeated up to 24 unit(s). (H/P/F grading only.) Effective: 1999 Fall Quarter.

IDI 460—Infectious Diseases Clinical Clerkship (3-6)
Clinical Activity. Prerequisite(s): Successful completion of two years of study in an accredited medical school. Limited enrollment with priority to fourth-year medical students. Patients ill with infectious diseases, including AIDS, will be evaluated and presented at rounds and case conferences. Patients are also seen in the Infectious Diseases Clinic. Instruction in clinical microbiology and the proper use of the laboratory will be provided. (H/P/F grading only.) Effective: 1997 Winter Quarter.

IDI 493—Correctional Medicine SSM - Evaluation of HIV and Hepatitis C Patients (6)
Clinical Activity—30 hours; Discussion—5 hours. Primary agenda focuses on the evaluation of treatment of HIV and Hepatitis C patients in the correctional environment. (H/P/F grading only.) Effective: 2016 Fall Quarter.

IDI 499—Research Topics in Infectious Disease (2-12)
Variable. Prerequisite(s): Successful completion of the first-year of study in School of Medicine, graduate students (approved for graduate credit), and/or consent of instructor. Discrete problem requiring reading and actual manual effort in solution will be assigned to each student. Progress and results to be reviewed at
intervals with instructor and via seminar presentation. (H/P/F grading only.) Effective: 1997 Winter Quarter.

IMD Med - Intl: Internal Medicine

Courses in IMD:

IMD 090—Seminar in Medical Ethics (1)
Lecture—1 hour. Seminar Series covering the current topics in Medical Ethics. (P/NP grading only.) Effective: 2017 Winter Quarter.

IMD 092—Internship (1-4)
Internship—3-12 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Supervised internship in internal medicine and related fields. (P/NP grading only.) Effective: 1997 Winter Quarter.

IMD 098—Directed Group Study (1-2)
Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Directed group study in medicine and related fields. (P/F grading only.) Effective: 1997 Winter Quarter.

IMD 099—Undergraduate Research in Medicine: Molecular and Cell Biology (1-3)
Variable. Prerequisite(s): Consent of Instructor. (P/F grading only.) Effective: 1997 Winter Quarter.

IMD 164—Practicum in Community Health Clinic: Bayanihan Clinic (1-2)
Clinical Activity—5 hours. Through active participation in the medical aspects of community health clinics, the undergraduate student gains knowledge of the organization, administration, and problem-solving capabilities. May be repeated for credit. (P/NP grading only.) Effective: 2014 Winter Quarter.

IMD 192—Internship in Internal Medicine (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Supervised work experience in internal medicine and related fields. (P/F grading only.) Effective: 1997 Winter Quarter.

IMD 194—Practicum in Community Health Clinics (1-3)
Clinical Activity—5-15 hours. Prerequisite(s): Consent of Instructor. The undergraduate student, through active participation in the medical aspects of community health clinics, gains knowledge of the organization, administration, and problem-solving capabilities of these primary care facilities. May be repeated for credit. (P/F grading only.) Effective: 1997 Winter Quarter.

IMD 198—Directed Group Study (1-3)
Extensive Problem Solving—2 hours; Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. Directed group study in medicine and related fields. (P/NP grading only.) Effective: 2014 Winter Quarter.

IMD 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/F grading only.) Effective: 1997 Winter Quarter.

IMD 214—Topics in Medical Ethics (1)
Seminar—1 hour. The complex moral, legal and ethical dilemmas that patients, families, and health care providers face in today's clinics. May be repeated up to 1 time(s). (S/U grading only.) Effective: 2001 Fall Quarter.

IMD 220D—Cardiovascular System (2.5)
Lecture/Discussion—5.5 hours. Prerequisite(s): HPH 200; and Consent of Instructor. Graduate student status. Principles of etiology, mechanisms, diagnosis and management of the major diseases of the cardiovascular system. Included are ischemic, valvular, hypertensive, cardiomyopathic, pericardial, and electrical disorders. Effective: 2002 Fall Quarter.

IMD 250—Medicine and the Law (3)
Lecture/Discussion—2 hours; Project (Term Project)—2 hours. Legal and bioethical principles and concepts in medicine. Topics include standard of care, informed consent, reproductive medicine, and end-of-life issues. (S/U grading only.) Effective: 2002 Winter Quarter.

IMD 414—One Health: A Course on Global Health (1)
Conference—8 hours. Global health problems are complex and require culturally-sensitive, socially-acceptable, and action-oriented approaches to create practical and cost-effective solutions. Will examine major health problems created by the convergence of human, animal, and environmental influences. May be repeated for credit. (P/F grading only.) Effective: 2011 Summer Quarter.

IMD 416—Summer Institute on Race and Health (6)
Independent Study—30 hours. Prerequisite(s): Consent of Instructor. Limited enrollment. Using field trips, media, readings, and clinical experiences, 8-10 first year medical students will explore issues of race, health disparities and related issues in a 4 week institute during the summer break. (P/F grading only.) Effective: 2011 Spring Quarter.

IMD 420A—Hematology (2)
Discussion—1 hour; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Restricted to Medical students only. Malignant disorders of blood cells and transfusion therapy. Covers acute leukemia, myelodysplasia, myeloproliferative disorders, lymphoma, and myeloma. (P/F grading only.) Effective: 2010 Summer Quarter.

IMD 420B—Gastrointestinal System (2.5)
Discussion—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): Approval of Committee on Student Progress. Restricted to Medical students only. Basic pathophysiologic principles of digestive diseases on which clinical concepts and judgments can be developed. Emphasis on pathophysiologic basis of gastroenterological and hepatic disorders with discussion of major disorders and their diagnosis and management. (P/F grading only.) Effective: 2008 Winter Quarter.

IMD 420C—Pulmonary & Critical Care Medicine (2.5)
Lecture/Discussion—5.5 hours. Prerequisite(s): Approval of SOM's Committee on Student Promotions. Restricted to Medical students only; student must pass all SOM Year 1 courses. Clinical aspects of respiratory anatomy, physiology, and pathology. Diagnostic procedures and a description of the major pulmonary diseases & disorders, and critical care medicine. (P/F grading only.) Effective: 2013 Fall Quarter.

IMD 420D—Cardiovascular System (2.5)
Lecture/Discussion—5.5 hours. Prerequisite(s): Approval of the School of Medicine Committee on Student Promotions. Restricted to Medical students only; student must pass all SOM Year 1 courses. Principles of etiology, mechanisms, diagnosis and management of the major diseases of the cardiovascular system. Included are ischemic, valvular, hypertensive, cardiomyopathic, pericardial, and electrical disorders. (P/F grading only.) Effective: 2013 Fall Quarter.

IMD 420E—Nephrology (2)
Discussion—2 hours; Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): Approval of Student Progress Committee. Fundamental aspects of disorders of body water, electrolytes and acid/base balance; major categories and mechanisms of parenchymal renal diseases; urinary tract infections. (P/F grading only.) Effective: 2002 Winter Quarter.

IMD 430—Medicine Clerkship (12)
Clinical Activity—45 hours. Prerequisite(s): Approval by School of Medicine Committee on Student Progress. Clerkship is divided into two, four-week blocks, one each at UCDMC and at Kaiser Hospitals. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. (H/P/F grading only.) Effective: 2001 Summer Quarter.

IMD 430FA—SJVP Longitudinal Medicine Clerkship (1.5-6)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Family Medicine, Pediatrics and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Spring Quarter.

IMD 430FB—SJVP Longitudinal Medicine Clerkship (1.5-6)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Family Medicine, Pediatrics and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Spring Quarter.

IMD 430FC—SJVP Longitudinal Medicine Clerkship (1.5-6)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Family Medicine, Pediatrics and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Spring Quarter.

IMD 430FD—SJVP Longitudinal Medicine Clerkship (1.5-6)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Family Medicine, Pediatrics and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Spring Quarter.

IMD 430R—Rural PRIME Internal Medicine Longitudinal Clerkship (2)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Internal Medicine Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

IMD 430RA—Rural PRIME Internal Medicine Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Internal Medicine Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

IMD 430RB—Rural PRIME Internal Medicine Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Internal Medicine Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

IMD 430RC—Rural PRIME Internal Medicine Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Internal Medicine Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

IMD 430RD—Rural PRIME Internal Medicine Longitudinal Clerkship (1)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Internal Medicine Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

IMD 430TA—TeachMS Longitudinal Medicine Clerkship (A) (4)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only.) Effective: 2013 Fall Quarter.

IMD 430TB—TeachMS Longitudinal Medicine Clerkship (B) (6)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only.) Effective: 2013 Fall Quarter.

IMD 430TC—TeachMS Longitudinal Medicine Clerkship (C) (2)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only.) Effective: 2013 Fall Quarter.

IMD 439D—Directed Clinical Studies in Internal Medicine (1-12)
Clinical Activity—40 hours. Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for modified curriculum or to complete a clinical rotation following a leave of absence. May be repeated for credit. (P/F grading only.) Effective: 2011 Spring Quarter.

IMD 439R—Directed Studies in Internal Medicine (1-12)
Clinical Activity—30 hours; Independent Study—10 hours. Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for remediation of all or part of clinical rotation. Clinical studies to accommodate and satisfy remedial work as directed by the Committee on Student Progress and approved by the course IOR. May be repeated for credit. (P/F grading only.) Effective: 2011 Summer Quarter.

IMD 450A—Medicine and the Law (1.5)
Discussion—2 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Restricted to Medical students only. Legal and bioethical principles and concepts in medicine. Topics include standard of care, informed consent, reproductive medicine, and end-of-life issues. (H/P/F grading only.) Effective: 2010 Summer Quarter.

IMD 450B—Medicine and the Law (1.5)
Discussion—2 hours; Seminar—2 hours. Prerequisite(s): Consent of Instructor. Restricted to Medical students only. Legal and bioethical principles and concepts in medicine. Topics include standard of care, informed consent, reproductive medicine, and end-of-life issues. (H/P/F grading only.) Effective: 2010 Summer Quarter.

IMD 459—Oncology: Research and Treatment of Cancer (2)
Lecture/Discussion—2 hours. Prerequisite(s): Second-, third-, or fourth-year medical student and/or consent of instructor. Comprehensive review of current treatment practices of cancer and state-of-the-art research impacting treatment and prevention of cancer.
Emphasis on epidemiology, molecular biology, and pharmacology. (H/P/F grading only.) Effective: 1997 Winter Quarter.

IMD 460—Correctional Health Care Clerkship (1-4)
Clinical Activity. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing. Covers Correctional Health delivery and the effects of detention and incarceration on health status. Special emphasis on problems unique to health care delivery in a prison setting. Student will spend time in clinical settings at three prison facilities. (H/P/F grading only.) Effective: 1997 Winter Quarter.

IMD 461—Mather VA Internal Medicine AI (6)
Clinical Activity—50 hours; Independent Study—5 hours; Lecture/Discussion—5 hours. Prerequisite(s): Consent of Instructor. Limited enrollment. Acting Internship in Internal Medicine for qualified 4th year Medical Students from the UC Davis School of Medicine at the Sacramento VA Hospital. Experiences will somewhat mirror those of AIs at UCDMC. May be repeated for credit. (H/P/F grading only.) Effective: 2014 Summer Quarter.

IMD 462—Medicine Wards AI (6)
Clinical Activity—40 hours. Prerequisite(s): Consent of Instructor. MDS 431; demonstrated ability to accept responsibility. Limited enrollment. Assume role of acting intern and be primary physician on medical ward under direction of medical resident and staff. Teams I-V take call every fifth night. Emphasis on evidence-based inpatient care. May be repeated for credit. (H/P/F grading only.) Effective: 2012 Fall Quarter.

IMD 463—Acting Internship in Medicine Intensive Care Unit (MICU) (3-6)
Clinical Activity—40 hours. Prerequisite(s): Completion of third-year in medical school; consent of Director of MICU. Limited enrollment. At UCDMC, student functions as acting intern on MICU service under direction of medical resident and staff. Responsibility for patients admitted to MICU. On call in hospital every fourth night. May be repeated for credit. (H/P/F grading only.) Effective: 2016 Spring Quarter.

IMD 464—Bayanihan Primary Care Clinic (3)
Clinical Activity—0.6 hours. Restricted to medical students in all four years of medical school. Under the guidance and supervision of a physician, medical students will learn patient history taking, medical documentation, counseling, diagnosis and treatment of patients with chronic and acute disease. Provides exposure to the special needs of various ethnic and socioeconomic groups. May be repeated for credit. (P/F grading only.) Effective: 2009 Spring Quarter.

IMD 465—Medicos-Global Health Sciences (9)
Clinical Activity—25 hours; Fieldwork—5 hours; Lecture—5 hours; Project (Term Project)—5 hours. Prerequisite(s): Consent of Instructor. Medical students only. Travel to foreign country for four weeks to collaborate with faculty from local universities and work in urban and rural environments, including hands-on experience with clinic patients. Cultural exchange and awareness of global health care. (P/F grading only.) Effective: 2007 Summer Quarter.

IMD 468—Ambulatory Internal Medicine Externship (3-18)
Clinical Activity—40 hours; Variable—12-40 hours. Prerequisite(s): IMD 430; and Consent of Instructor. Demonstrated ability to accept responsibility. Limited enrollment. Hands-on primary care clinical experience in the ambulatory setting supervised by a general internist. Emphasis on evidence-based outpatient care. (H/P/F grading only.) Effective: 2010 Summer Quarter.

IMD 470—Critical Evaluation of Landmark Studies in Evidence-Based Medicine (3)
Seminar. Prerequisite(s): Fourth-year medical student. Primary objective is to prepare future physicians to effectively integrate evidence-based medicine into their clinical practice. While this course will have an Internal Medicine emphasis, the skills the course aims to impart (formulating focused clinical questions, searching the medical literature, evaluating the quality of research, and integrating evidence into clinical practice, giving effective article presentations) will apply to all future clinicians, regardless of their specialty. (P/F grading only.) Effective: 2017 Fall Quarter.

IMD 480—Person Centered Assessment (1)
Lecture—1 hour. Prerequisite(s): Open to all medical students. Person-centered assessment modalities and diagnostic approaches with regards to Internal Medicine and its different subspecialties. (P/F grading only.) Effective: 2002 Fall Quarter.

IMD 493—Introduction Interprofessionalism, Pain Management, and Palliative Care (6)
Clinical Activity—24 hours; Discussion—4 hours; Independent Study—2 hours. Prerequisite(s): Consent of Instructor. Learners will spend one week with the inpatient palliative care service, one week with the inpatient pain pharmacy service and two weeks with Snowline Hospice. (P/F grading only.) Effective: 2018 Winter Quarter.

IMD 494—Practicum in Community Health Clinics (1-3)
Clinical Activity—15-40 hours. Prerequisite(s): Medical student with consent of instructor. Students are assigned to clinical settings that demonstrate ethnic,
urban/rural, or other related aspects of clinical community health. Through active participation in health care delivery, students are able to relate conceptual with practical aspects of primary health care. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

IMD 497—Medicine, Bioethics and the Holocaust (3)
Lecture/Discussion—10 hours. Prerequisite(s): Consent of Instructor. Medical students only. The concept of "evil" and the role of collaborators, bystanders and participants exemplified by the holocaust and compared to problems physicians face in practice today. Demonstration that evil emerges incrementally until taken for granted. (P/F grading only.) Effective: 2004 Winter Quarter.

IMD 498—Group Study in Internal Medicine (1-18)
Variable. Prerequisite(s): Consent of Instructor. Special study for medical students which may involve laboratory or library research, ambulatory or inpatient care responsibility on campus, at UCDMC or off campus by specific arrangement. (H/P/F grading only.) Effective: 1997 Winter Quarter.

IMD 499—General Medicine Reseach (1-18)
Independent Study—20 hours. (H/P/F grading only.) Effective: 2006 Winter Quarter.

IMM Immunology

Courses in IMM:

IMM 201—Introductory Immunology (4)
Lecture—4 hours. Prerequisite(s): Graduate standing. Enrollment limited to 30 students. Comprehensive introduction to the principles of immunology. Effective: 2006 Fall Quarter.

IMM 201L—Advanced Immunology Laboratory Rotations (4)
Discussion/Laboratory—12 hours. Laboratory assignment in two research laboratories. Individual research problems with emphasis on methodological/procedural experience and experimental design. Student writes a project outline and gives oral presentation. May be repeated up to 2 time(s). Effective: 2011 Fall Quarter.

IMM 202L—Advanced Immunology Laboratory Rotations (5)
Discussion/Laboratory—15 hours. One four-week and one six week assignment in immunology research laboratories. Individual research problems with an emphasis on methodological/procedural experience and experimental design. May be repeated up to 2 time(s). Effective: 2011 Fall Quarter.

IMM 203—Cancer Immunology (2)
Lecture—1 hour; Term Paper—1 hour. Covers concepts in cancer biology, progression and immune evasion. It will also cover topics such as: immune surveillance, immune effector mechanisms and current concepts in immune therapy. Effective: 2011 Fall Quarter.

IMM 204—Topics in Innate Immunity (2)
Extensive Writing/Discussion—1 hour; Performance Instruction—1 hour. Prerequisite(s): IMM 201; Or equivalent; IMM 293 preferred. Restricted to first- or second-year GGI and MGG students; others with permission of instructor; enrollment limited to 18 students. Covers current topics in the field of innate immunity through student seminar presentations and critical evaluation of the literature. Concepts include: pathogen recognition, intercellular communication, specialized cellular function and effector/signaling molecules. Effective: 2010 Spring Quarter.

IMM 210—Topics on Neuroimmunology and Neuroinflammation (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Topics will include a broad range of frontiers in neuroimmunology and neuroinflammation. Research articles in current literature will serve to guide in-depth discussions of experimental approaches, technical aspects of experimental techniques, data interpretation, and other relevant aspects of each topic. May be repeated for credit. (S/U grading only.) Effective: 2016 Winter Quarter.

IMM 292—Immunotoxicology Seminar (2)
Seminar—2 hours. Prerequisite(s): Graduate standing in Pharmacology/Toxicology, Immunology, Physiology, or Biochemistry. Seminar presentations dealing with principles of xenobiotic effects on immune system functions and specific examples of drugs and environmental chemicals exerting toxic effects on the immune system. (S/U grading only.) Effective: 1997 Winter Quarter.

IMM 293—Current Concepts in Immunology (4)
Lecture/Discussion—4 hours. Prerequisite(s): PMI 126; or Consent of Instructor. Innate and acquired immunity as defense mechanisms against disease. Mechanisms regulating the distinct cell types driving these responses and current concepts in the literature. Effective: 2002 Winter Quarter.

IMM 294—Comparative Clinical Immunology (4)
Lecture/Discussion—4 hours. Prerequisite(s): PMI 126; or Consent of Instructor. Clinical immunology in animals and man. Pathogenesis of representative infectious diseases, hypersensitive reactions, and autoimmunity. Emphasis on specific and nonspecific immune effector mechanisms to combat infections or mediate pathology. Not open for credit to students who have completed IMM 294A. Effective: 2003 Winter Quarter.

IMM 295—Cytokines (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): IMM 293; or Consent of Instructor. Cytokines and their involvement in human and animal physiology/disease, molecular mechanisms and receptor signaling. Immune and non-immune actions. Overlapping/redundant functions (referred to as the "cytokine network"). Effective: 2003 Spring Quarter.

IMM 296—Advanced Topics in Immunology (2)
Seminar—2 hours. Prerequisite(s): Graduate standing or consent of instructor. Presentation, discussion, and analysis of faculty research topics in immunology. Required for Immunology Graduate Students every year until they have passed their qualifying exam. May be repeated for credit. (S/U grading only.) Effective: 2002 Winter Quarter.

IMM 297—Mucosal Immunology (2)
Discussion—1 hour; Lecture—1 hour; Term Paper. Prerequisite(s): IMM 201; Or equivalent. Basic concepts and current research topics in the field of mucosal immunology, with an emphasis on human immunology. Major emphases include innate and adaptive mucosal immunity, the gastrointestinal tract, the lung, lymphocyte trafficking, and mucosal vaccination. Effective: 2006 Summer Session 1.

IRE International Relations

Courses in IRE:

IRE 001—Global Interdependence (4)
Discussion—1 hour; Lecture—3 hours. Development of the concept of global interdependence along its
political, economic, demographic, cultural, technological, and environmental dimensions. Focus on the ways societies and states interact. Course provides the foundation for upper division multidisciplinary work in international relations. GE credit: SS, WE. Effective: 1997 Winter Quarter.

IRE 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

IRE 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

IRE 104—The Political Economy of International Migration (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, SOC 003, or SOC 004 recommended. Analysis of worldwide migration patterns, and social scientific theories of international and transnational migration. Focus in economical, political, and social impact of immigration and potential for international and regional cooperation. (Sociology 104.) GE credit: SS, WC. Effective: 2016 Fall Quarter.

IRE 190—Topics in International Relations (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Selected topics in international relations. Variable content. May be repeated for credit when topic differs. May be repeated for credit. GE credit: WE. Effective: 1997 Winter Quarter.

IRE 192—International Relations Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Work experience in international relations, with term paper summarizing the practical experience of the student. (P/NP grading only.) GE credit: SS, WE. Effective: 1997 Winter Quarter.

IRE 194HA—Special Study for Honors Students (4)
Seminar—2 hours; Term Paper. Prerequisite(s): Open only to majors of senior standing who qualify for Honors Program. Directed reading, research, and writing on topics selected by students and instructor culminating in preparation of a senior honors thesis under direction of a faculty advisor. GE credit: OL, SS, WE. Effective: 1997 Winter Quarter.

IRE 194HB—Special Study for Honors Students (4)
Seminar—2 hours; Term Paper. Prerequisite(s): Open only to majors of senior standing who qualify for Honors Program. Directed reading, research, and writing on topics selected by students and instructor culminating in preparation of a senior honors thesis under direction of a faculty advisor. GE credit: OL, SS, WE. Effective: 1997 Winter Quarter.

IRE 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

IRE 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

IST Integrated Studies

Courses in IST:

IST 008—Colloquium (1)
Discussion—1 hour. Lectures, films, and readings on the interrelation between the arts and sciences. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

IST 008A—Special Topics in Natural Science and Mathematics (4)
Discussion—1 hour; Lecture—3 hours. Limited enrollment. Group study of a special topic in natural sciences and mathematics. Course varies with topic offered. Limited enrollment. May be repeated for credit. May be repeated for credit. GE credit: SE, SL. Effective: 1997 Winter Quarter.

IST 008B—Special Topics in Humanities (4)
Discussion—1 hour; Lecture—3 hours. Limited enrollment. Group study of a special topic in humanities. Course varies with
topic offered. Limited enrollment. May be repeated for credit. May be repeated for credit. GE credit: AH. Effective: 1997 Winter Quarter.

IST 008C—Special Topics in the Social Sciences (4)
Discussion—1 hour; Lecture—3 hours. Limited enrollment. Group study of a special topic in social sciences. Course varies
with topic offered. Limited enrollment. May be repeated for credit. May be repeated for credit. GE credit: SS. Effective: 1997 Winter Quarter.

IST 009—Seminar (1)
Seminar—1 hour. Preparation of a research report. Normally taken with course 8. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 2017 Fall Quarter.

IST 090—Seminar (1)
Seminar—1 hour. Prerequisite(s): IST 009; and Consent of Instructor. And completion of 45 units with a minimum GPA of 3.250. Enrollment limited to sophomores who participated in the Integrated Studies Honors Program during their freshman year and transfer students by consent of instructor. Interrelation between the arts and sciences, focusing on a special topic. (P/NP grading only.) Effective: 2007 Fall Quarter.

IST 094—Introduction to Undergraduate Research (1)
Seminar—1 hour. Prerequisite(s): IST 009; and Consent of Instructor. And completion of 45 units with a minimum GPA of 3.500. Restricted to sophomores who participated in the Integrated Studies Honors Program during their freshman year and other students by consent of instructor. The nature of research at the undergraduate level. (P/NP grading only.) Effective: 2008 Winter Quarter.

IST 190—Topics in Integrated Studies (1)
Seminar—1 hour. Prerequisite(s): IST 009; and Consent of Instructor. Discussion of the integration of the arts and sciences, focusing on a special topic. May be repeated up to 3 time(s) when topic differs. (P/NP grading only.) Effective: 2003 Spring Quarter.

IST 194HA—Special Study for Honors Students (4)
Independent Study—3 hours; Seminar—1 hour. Prerequisite(s): IST 009; and Consent of Instructor. And completion of 90 units with a minimum GPA of 3.500. A program of research culminating in the writing of a junior honors thesis under the direction of a faculty advisor. May be repeated up to 1 time(s). Effective: 2004 Fall Quarter.

IST 194HB—Special Study for Honors Students (4)
Independent Study—3 hours; Seminar—1 hour. Prerequisite(s): IST 009; and Consent of Instructor. And completion of 90 units with a minimum GPA of 3.500. A program of research culminating in the writing of a junior honors thesis under the direction of a faculty advisor. May be repeated up to 1 time(s). Effective: 2005 Winter Quarter.

IST 197T—Tutoring in Integrated Studies (1-4)
Tutorial—1 hour. Prerequisite(s): Consent of Director of Integrated Studies. Open to students in the Integrated Studies Program only. Tutoring in Integrated Studies courses, usually in small discussion groups. Weekly discussions with the instructor on the subject matter of the course being tutored and on the art and craft of teaching. May be repeated up to 8 time(s). (P/NP grading only.) Effective: 2004 Spring Quarter.

ITA Italian

Courses in ITA:

ITA 001—Elementary Italian (5)
Discussion—5 hours; Laboratory—1 hour. Introduction to Italian grammar and development of all language skills in a cultural context with special emphasis on communication. Students who have successfully completed ITA 002 or ITA 003 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only; although a passing grade will be charged to the student's P/NP option, no petition is required; all other students will receive a letter grade unless a P/NP petition is filed.; not open for credit to students who have taken ITA 001A or ITA 001S. GE credit: AH, WC. Effective: 2014 Winter Quarter.

ITA 001A—Accelerated Intensive Elementary Italian (15)
Lecture/Discussion—15 hours. Special 12-week accelerated, intensive summer session course that combines the work of courses 1, 2, and 3. Introduction to Italian grammar and development of all language skills in a cultural context with emphasis on communicative ability. Not open for credit to students who have completed ITA 001, ITA 002, or ITA 003. Effective: 2006 Summer Special Session.

ITA 001S—Elementary Italian (5)
Discussion—5 hours; Laboratory—1 hour. Introduction to Italian grammar and development of all language skills in a cultural context with special emphasis on communication. Course is taught abroad. Students who have successfully completed ITA 002 or ITA 003 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only; although a passing grade will be charged to the student's P/NP option, no petition is required; all other students will receive a letter grade unless a P/NP petition is filed; not open for credit to students who have taken ITA 001 or ITA 001A. GE credit: AH, WC. Effective: 2014 Winter Quarter.

ITA 002—Elementary Italian (5)
Discussion—5 hours; Laboratory—1 hour. Prerequisite(s): ITA 001 or ITA 001S Continuation of course 1 or 1S. Review of grammar and vocabulary, and practice of all language skills through cultural texts. Not open for credit to students who have taken ITA 001A or ITA 002S. GE credit: AH, WC. Effective: 2014 Winter Quarter.

ITA 002S—Elementary Italian (5)
Discussion—5 hours; Laboratory—1 hour. Prerequisite(s): ITA 001 or ITA 001S Continuation of course 1 or 1S. Review of grammar and vocabulary, and practice of all language skills through cultural texts. Course is taught abroad. Not open for credit to students who have completed ITA 001A or ITA 002. GE credit: AH, WC. Effective: 2014 Winter Quarter.

ITA 003—Elementary Italian (5)
Laboratory—1 hour; Lecture/Discussion—5 hours. Prerequisite(s): ITA 002 or ITA 002S Continuation of course 2 or 2S. Review of grammar and vocabulary, and practice of all language skills through cultural texts. Not open for credit to students who have taken ITA 001A or ITA 003S. GE credit: AH, WC. Effective: 2014 Winter Quarter.

ITA 003S—Elementary Italian (5)
Discussion—5 hours; Laboratory—1 hour. Prerequisite(s): ITA 002 or ITA 002S Continuation of course 2 or 2S. Review of grammar and vocabulary, and practice of all language skills through cultural texts. Course is taught abroad. Not open for credit to students who have taken ITA 001A or ITA 003. GE credit: AH, WC. Effective: 2014 Winter Quarter.

ITA 004—Intermediate Italian (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): ITA 003 or ITA 003S Review of grammar and syntax through written exercises and short prose works. Intended to develop the linguistic foundations of students who have completed the first year language classes. GE credit: WC. Effective: 2016 Spring Quarter.

ITA 004S—Intermediate Italian (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): ITA 003 or ITA 003S; Or the equivalent. Review of grammar and syntax through written exercises and readings of short prose works. Intended to develop the linguistic foundations of students who have completed the first year language classes. This course is taught abroad. Not open for credit to students who have completed ITA 004. GE credit: WC. Effective: 2012 Spring Quarter.

ITA 005—Intermediate Italian (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): ITA 004 or ITA 004S Review and study of grammar and syntax, readings of short prose works, and written exercises. Intended to prepare students to read, understand, and discuss modern Italian. GE credit: WC. Effective: 2016 Spring Quarter.

ITA 005S—Intermediate Italian (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): ITA 004 or ITA 004S Review and study of grammar and syntax, readings of short prose works, and written exercises. Intended to prepare students to read, understand, and discuss modern Italian. Course is taught abroad. Not open for credit to students who have completed ITA 005. GE credit: WC. Effective: 2013 Spring Quarter.

ITA 008A—Italian Conversation (3)
Discussion—3 hours. Prerequisite(s): ITA 003; Or the equivalent. Italian conversation with peers in classroom setting. GE credit: OL, WC. Effective: 2017 Winter Quarter.

ITA 008AS—Italian Conversation (3)
Discussion—3 hours. Prerequisite(s): ITA 003; Or the equivalent. Italian conversation in local context outside United States. GE credit: OL, WC. Effective: 2017 Winter Quarter.

ITA 008B—Italian Conversation (3)
Discussion—3 hours. Prerequisite(s): ITA 008A Italian conversation with peers in a classroom setting. GE credit: WC. Effective: 2017 Winter Quarter.

ITA 008BS—Italian Conversation (3)
Discussion—3 hours. Prerequisite(s): ITA 008A Italian conversation in local context outside United States. GE credit: OL, WC. Effective: 2017 Winter Quarter.

ITA 009—Reading Italian (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 005 or ITA 005S Reading and discussion of modern Italian prose, including selections from creative, scientific and journalistic writings. Introduction to contemporary Italian literature and culture. Strengthening the student's command of the Italian language. GE credit: AH, WC. Effective: 2014 Fall Quarter.

ITA 009S—Reading Italian (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 005 or ITA 005S Reading and discussion of modern Italian prose, including selections from creative, scientific and journalistic writings. Introduction to contemporary Italian literature and culture as well as strengthening the student's command of the Italian language. This course is taught abroad. Not open for credit to students who have completed ITA 009. GE credit: AH, WC. Effective: 2015 Winter Quarter.

ITA 031—Beginning Italian for Spanish Speakers (5)
Lecture/Discussion—5 hours. Prerequisite(s): SPA 003 or SPA 003V or SPA 003Y; Or two years of high school Spanish or native or heritage speaker of Spanish. Intensive introductory course on Italian language with emphasis on structural similarities between Italian and Spanish. Not open for credit to students who have completed ITA 001, ITA 001A, ITA 001S, ITA 002, ITA 002S. GE credit: AH, OL, WC. Effective: 2018 Winter Quarter.

ITA 031Y—Beginning Italian for Spanish Speakers (5)
Lecture/Discussion—3 hours; Web Electronic Discussion—2 hours. Prerequisite(s): SPA 003 or SPA 003V or SPA 003Y; Consent of Instructor. SPA 003 or two years of high school Spanish or native or heritage speaker of Spanish. Intensive Introductory course on Italian language with emphasis on structural similarities between Italian and Spanish. Not open for credit to students who have completed ITA 001, ITA 001A, ITA 001S, ITA 002, ITA 002S. GE credit: AH, OL, WC. Effective: 2018 Spring Quarter.

ITA 032—Beginning Italian for Spanish Speakers (5)
Lecture/Discussion—5 hours. Prerequisite(s): ITA 031 or ITA 031Y; or Consent of Instructor. Continuation of course 31. Intensive introductory course to Italian language and grammar with emphasis on oral and written communication. Highlights the structural similarities between Italian and Spanish. Not open for credit to students who have completed ITA 001A, ITA 001S, ITA 002, ITA 002S, ITA 003, ITA 003S. GE credit: AH, OL, WC. Effective: 2017 Fall Quarter.

ITA 032Y—Beginning Italian for Spanish Speakers (5)
Lecture/Discussion—3 hours; Web Electronic Discussion—2 hours. Prerequisite(s): ITA 031 or ITA 031Y; or Consent of Instructor. Continuation of course 31. Intensive introductory course to Italian language and grammar with emphasis on oral and written communication. Highlights the structural similarities between Italian and Spanish. Not open for credit to students who have taken ITA 001A, ITA 003, ITA 003S. GE credit: AH, OL, WC. Effective: 2018 Spring Quarter.

ITA 050—Studies in Italian Cinema (4)
Discussion—1 hour; Lecture—2 hours; Term Paper. Lower division standing. Introduction to Italian cinema through its genres. Focus is on cinema as a reflection of and a comment on modern Italian history. Film will be studied as an artistic medium and as a form of mass communication. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

ITA 090X—Lower Division Seminar (1-2)
Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Examination of a special topic in Italian language or culture (such as
Italian culture seen through film, Italian feminism, literature, or politics) through shared readings, discussions, written assignments, or special activities such as film screening or laboratory work. Effective: 1997 Winter Quarter.

ITA 098—Directed Group Study (1-5)
Variable. Prerequisite(s): and Consent of Instructor. Lower division standing. Primarily intended for lower division students. (P/NP grading only.) Effective: 2016 Spring Quarter.

ITA 101—Advanced Conversation, Composition, and Grammar (4)
Lecture—3 hours. Prerequisite(s): ITA 009 or ITA 009S; or Consent of Instructor. Or the equivalent. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

ITA 101S—Advanced Composition, Conversation and Grammar (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): ITA 009 or ITA 009S; Or the equivalent. Instruction and practice in expository writing in Italian, with emphasis on advanced grammar, organization, and vocabulary building. Course will be taught in Italy. Not open for credit to students who have completed ITA 101. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

ITA 104—Italian Translation and Style (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 009 or ITA 009S; Consent of Instructor. Practice in translation from Italian to English and English to Italian, using literary and nonliterary texts of different styles. Analysis of linguistic problems and elements of style contained in the translation material. Not open for credit to students who have completed ITA 104S. GE credit: AH, WC. Effective: 2016 Spring Quarter.

ITA 104S—Translation and Style (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 009 or ITA 009S Practice in translation from Italian to English and English to Italian, using literary and non-literary texts of different styles. Analysis of linguistic problems and elements of style contained in the translation material. Course will be taught abroad. No credit allowed to those who have completed ITA 104. GE credit: AH, WC. Effective: 2016 Spring Quarter.

ITA 105—Introduction to Italian Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 009 or ITA 009S; Consent of Instructor. Introduction to the study of the principal authors, works, and movements of the Medieval, Renaissance, and Early Modern periods in Italy. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

ITA 107—Survey of Italian Culture and Institutions (4)
Lecture—3 hours; Term Paper. Assessment of the impact of regional autonomy on Italian cultural life
from the Middle Ages to the present. Special emphasis will be placed upon achievements in literature, the arts, philosophy, and socio-political institutions. To be taught in English. GE credit: AH, OL, SS, VL, WC, WE. Effective: 1997 Winter Quarter.

ITA 107S—Survey of Italian Culture and Institutions (4)
Lecture/Discussion—3 hours; Term Paper. An assessment of the impact of regional autonomy on Italian cultural life from the Middle Ages to the present. Special emphasis will be placed upon achievements in literature, the arts, philosophy, and socio-political institutions. To be taught in English. Not open for credit to students who have completed ITA 107. GE credit: AH, OL, SS, VL, WC, WE. Effective: 2004 Winter Quarter.

ITA 108—Contemporary Issues in Italian Culture and Society (4)
Lecture/Discussion—3 hours; Term Paper. Analysis of cultural issues in contemporary Italy: Myth and reality of imagined Italies, Italian identities; immigration and race relations; the media and popular culture. Taught in Englsih. GE credit: AH, OL, SS, VL, WC, WE. Effective: 1998 Fall Quarter.

ITA 108S—Contemporary Issues in Italian Culture and Society (4)
Lecture/Discussion—3 hours; Term Paper. Analysis of cultural issues in contemporary Italy; myth and reality of imagined Italies; Italian identities; immigration and race relations; the media and popular culture. Taught in English. This course will be taught abroad. Not open for credit to students who have completed ITA 108. GE credit: AH, OL, SS, VL, WC, WE. Effective: 2004 Winter Quarter.

ITA 112—Medieval and Renaissance Poetry: St. Francis to Petrarch (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 009 or ITA 009S; Consent of Instructor. Or the equivalent. Study of the origins of Italian religious and secular poetry of the13th and 14th centuries. A diversified poetry is illustrated in works of St. Francis, Dante, Cavalcanti, Petrarch, the Sicilian School, the Sweet New Style Poets, and other authors. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

ITA 113—Dante Alighieri, Divina Commedia (Inferno, Purgatorio, Paradiso) (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 009 or ITA 009S; Consent of Instructor. Or equivalent. Study of Dante Alighieri's Divina Commedia, and its role in the development of Italian language and literature. Emphasis will be placed on reading the whole poem within the historical context of the Middle Ages. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

ITA 114—Boccaccio, Decameron, and the Renaissance Novella (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 009 or ITA 009S; Consent of Instructor. Or the equivalent course. Study of the development of the short story in Italy, as exemplified in Giovanni Boccaccio's Decameron, in his predecessors and Renaissance followers. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

ITA 115A—Studies in the Cinquecento (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 009 or ITA 009S; or Consent of Instructor. Or the equivalent. Analysis of key texts from the high moment of the Italian Renaissance. The political and aesthetic legacy of humanism will be foregrounded in relation to authors such as Ficino, Ariosto, Machiavelli, Aretino, Castiglione, and Tasso. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

ITA 115B—Italian Literature of the Renaissance and the Baroque: From Cellini to Marino (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 115A Continued examination into the loss of an ideal. Emphasis on the conflicts in Michelangelo and Tasso leading to Marino, with an excursus
on Galileos role in the formation of a modern literary standard. GE credit: OL. Effective: 1997 Winter Quarter.

ITA 115C—Italian Drama from Machiavelli to the Enlightenment (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 009; or Consent of Instructor. Development of comic and tragic forms as critical representations of their societal and historical contexts, i.e. Machiavelli and the logic of power, Baroque dramatists in the service of counter-reformation Italy, Goldoni's comedies and bourgeois social consciousness. GE credit: AH, OL, WC. Effective: 2016 Fall Quarter.

ITA 115D—Early Modern Italian Lyric (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 009 or ITA 009S; or Consent of Instructor. Examination of the poetic tradition influenced by Petrarch. Consideration of the relation between gender and genre in such poets as Petrarch, Bembo, della Casa, Tasso, Marino, Gaspara Stampa, Veronica Franco, Isabella di Morra. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

ITA 118—Italian Literature of the Eighteenth Century (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 009 or ITA 009S; or Consent of Instructor. Development of modern Italian literature. Emphasis on the work of Goldoni, Bettinelli, Baretti, Parini, Alfieri, and Vico. GE credit: AH, OL. Effective: 2016 Fall Quarter.

ITA 119—Italian Literature of the Nineteenth Century (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 009 or ITA 009S; or Consent of Instructor. Romanticism in Italy, including Manzoni, Verga, and Verismo. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

ITA 120A—Italian Literature of the Twentieth Century: The Novel (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 009; Consent of Instructor. Development of the novel from Svevo to the present. Emphasis on the work of Svevo, Levi, Moravia, Pavese, and Vittorini. GE credit: AH, OL, WC, WE. Effective: 2017 Spring Quarter.

ITA 120B—Italian Literature of the Twentieth Century: Poetry and Drama (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 009; or Consent of Instructor. Italian poetry with emphasis on Hermeticism; the theater of Luigi
Pirandello and its role in the development of contemporary Italian drama. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

ITA 121—New Italian Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): FMS 001; or Consent of Instructor. And upper division standing. Italian cinema of the 21st century in the context of profound cultural and social changes in Italy since World War II. Productions by representative directors such as Amelio, Giordana, Moretti, Muccino are included. Knowledge of Italian not required. (Film Studies 121) GE credit: AH, OL, VL, WC, WE. Effective: 2008 Fall Quarter.

ITA 121S—New Italian Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): FMS 001; and Consent of Instructor. And upper division standing. Italian cinema of the 21st century in the context of profound cultural and social changes in Italy since World War II. Productions by representative directors such as Amelio, Giordana, Moretti, Muccino are included. Knowledge of Italian not required. (Film Studies 121S.) GE credit: AH, OL, VL, WC, WE. Effective: 2011 Fall Quarter.

ITA 128—Topics in Italian Culture (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): ITA 009 or ITA 009S; or Consent of Instructor. In-depth study of a particular topic in Italian Culture. Topics include: Italian Cities; Church and State; the "Southern Question"; Fascism and Resistance; 1968: Counter Culture, Feminism and Terrorism; Multicultural Italy. May be repeated up to 1 time(s) when topic differs. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

ITA 131—Autobiography in Italy (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ITA 009 or ITA 009S; or Consent of Instructor. Development of representations of selfhood with particular attention to generic conditions, the confessional tradition and the problem of women's self-representation. Authors studied may included Petrarch, Tasso, Casanova, Alfieri, Zvevok, Sibilla Aleramo and Primo Levi. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

ITA 139B—Italian Literature in English: Boccaccio, Petrarch and the Renaissance (4)
Lecture/Discussion—3 hours; Term Paper. Petrarch and Boccaccio and their relations to the Middle Ages and the Renaissance; the Renaissance, with particular attention to the works of Lorenzo de' Medici, Leonardo da Vinci, Machiavelli, Ariosto, Michelangelo, and Tasso. GE credit: AH, OL, WC, WE. Effective: 1997 Winter Quarter.

ITA 140—Italian Literature in English Translation: Dante, Divine Comedy (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Any course from the GE Literature Preparation List. Reading of Dante Alighieri's Divine Comedy, through the otherworld realms of Inferno, Purgatory, and Paradise. GE credit: AH, OL, WC, WE. Effective: 1997 Winter Quarter.

ITA 141—Gender and Interpretation in the Renaissance (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Completion of entry level writing requirement. Critical analysis of Renaissance texts with primary focus on issues such as human dignity, education and gender politics; "high" and "low" culture and its relation to literary practices. (Comparative Literature 138.) GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

ITA 142—Masterpieces of Modern Italian Narrative (4)
Discussion—1.5 hours; Lecture—1.5 hours; Term Paper. Prerequisite(s): ENG 003 or COM 002 or HIS 004C Analysis of major works of Italian narrative fiction from unification of Italy to present. Students will learn to use representative methods and concepts which guide literary scholarship. Consideration of works within European social and cultural context. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

ITA 145—Special Topics in Italian Literature (4)
Lecture/Discussion—4 hours. Prerequisite(s): ITA 009 or ITA 009S; or Consent of Instructor. Study of special topics and themes in Italian literature, such as comic literature, epic poetry, pre-twentieth century theater, fascism, futurism, women and literature, and the image of America, etc. May be repeated for credit May be repeated for credit when topic differs. GE credit: AH, OL, VL, WC, WE. Effective: 2016 Spring Quarter.

ITA 145S—Special Topics in Italian Literature (4)
Lecture/Discussion—4 hours. Prerequisite(s): ITA 009 or ITA 009S; or Consent of Instructor. Study of special topics and themes in Italian literature, such as comic literature, epic poetry, pre-twentieth-century theater, fascism, futurism, women and literature, the image of America, etc. Course is taught abroad. May be repeated for credit. Not open for credit to students who have completed ITA 145. GE credit: AH, OL, VL, WC, WE. Effective: 2016 Fall Quarter.

ITA 150—Studies in Italian Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Introduction to Italian cinema through its genres. Focus on cinema as a reflection or a comment on modern Italian history. Film as an artistic medium and as a form of mass communication. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

ITA 190X—Upper Division Seminar (1-2)
Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Limited enrollment. Examination of a special topic in Italian language or culture through shared readings, discussions, written assignments or special activities such as film screening or laboratory work. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

ITA 192—Italian Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing and consent of chairperson of Italian Department. Participation in government and business activities to gain work experience and to develop a better knowledge of Italian language and culture. (P/NP grading only.) Effective: 1997 Winter Quarter.

ITA 192S—Italian Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing, consent of instructor and UC Davis program director or chairperson of Italian Department. Participation in community service, teaching, government, and business activities to gain work experience and to develop a better knowledge of Italian language and culture. This course is offered abroad. (P/NP grading only.) Effective: 2011 Fall Quarter.

ITA 194H—Special Study for Honors Students (3)
Independent Study—3 hours. Prerequisite(s): Open only to majors of senior standing who qualify for Honors Program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in Italian literature, civilization, or language studies. (P/NP grading only.) GE credit: AH, WC. Effective: 1997 Winter Quarter.

ITA 195H—Honors Thesis (3)
Independent Study—3 hours. Prerequisite(s): ITA 194H Writing of an honors thesis on a topic in Italian literature, civilization, or language studies under the direction of a faculty member. (P/NP grading only.) GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

ITA 197T—Tutoring in Italian (1-4)
Laboratory—1-2 hours; Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Tutoring in undergraduate courses, including leadership in small voluntary discussion groups affiliated with departmental courses. May be repeated up to 6 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

ITA 197TC—Community Tutoring in Italian (1-5)
Discussion—1-2 hours; Laboratory—2-4 hours. Prerequisite(s): Consent of Instructor. Field experience as Italian tutors or teacher's aides. May be repeated up to 10 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

ITA 198—Directed Group Study (1-4)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

ITA 198S—Directed Group Study (1-4)
Variable. Prerequisite(s): Consent of Instructor. Group study on focused topics in Italian literature and culture. Varies according to instructor. This course is offered abroad. May be repeated for credit when topic differs. (P/NP grading only.) Effective: 2011 Fall Quarter.

ITA 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

ITA 199S—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Opportunity for a faculty member to work with an advanced undergraduate student in a focused manner on a topic or topics of mutual research/creative interest. This course is offered abroad. May be repeated for credit when topic differs. (P/NP grading only.) Effective: 2011 Fall Quarter.

ITA 297—Individual Study (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Effective: 1997 Winter Quarter.

ITA 298—Group Study (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Effective: 1997 Winter Quarter.

ITA 299—Research (1-12)
Variable. Prerequisite(s): Graduate standing or consent of instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

ITA 299D—Dissertation Research (1-12)
Variable. Prerequisite(s): Graduate standing or consent of instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

ITA 396—Teaching Assistant Training Practicum (1-4)
Variable—3-12 hours. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit. (S/U grading only.) Effective: 2008 Fall Quarter.

JPN Japanese

Courses in JPN:

JPN 001—Elementary Japanese (5)
Lecture/Discussion—5 hours. Introduction to spoken and written Japanese in cultural contexts, with emphasis on communication. GE credit: AH, OL, WC. Effective: 2014 Fall Quarter.

JPN 001A—Accelerated Intensive Elementary Japanese (15)
Lecture/Discussion—15 hours. Special 12 week accelerated, intensive summer session course that combines the work of courses 1, 2 and 3. Introduction to Japanese grammar and development of all language skills in a cultural context with emphasis on communication. not open for credit to students who have completed JPN 001, JPN 002, or JPN 003. GE credit: AH, OL, WC. Effective: 2014 Summer Special Session.

JPN 001AS—Intensive Elementary Japanese (15)
Lecture/Discussion—15 hours. Intensive course taught combining the work of courses 1, 2 and 3. Introduction to Japanese grammar and development of all language skills in a cultural context with emphasis on communication. Offered in Japan. not open for credit to students who have taken JPN 001, JPN 002, or JPN 003. GE credit: AH, OL, WC. Effective: 2014 Fall Quarter.

JPN 002—Elementary Japanese (5)
Lecture/Discussion—5 hours. Prerequisite(s): JPN 001 C- or better; Or the equivalent language proficiency. Continuation of training in basic Japanese spoken and written skills. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

JPN 003—Elementary Japanese (5)
Lecture/Discussion—5 hours. Prerequisite(s): JPN 002 C- or better; Or the equivalent language proficiency. Continuation of training in basic spoken and written skills in Japanese language. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

JPN 004—Intermediate Japanese (5)
Lecture/Discussion—5 hours. Prerequisite(s): JPN 003 C- or better; Or the equivalent language proficiency. Intermediate-level training in spoken and written Japanese in cultural context, based on language skills developed in course 3. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

JPN 005—Intermediate Japanese (5)
Lecture/Discussion—5 hours. Prerequisite(s): JPN 004 C- or better; Or the equivalent language proficiency. Intermediate-level training in spoken and written Japanese in cultural context, based on language skills developed in course 4. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

JPN 006—Intermediate Japanese (5)
Lecture/Discussion—5 hours. Prerequisite(s): JPN 005 C- or better; Or the equivalent language proficiency. Intermediate-level training in spoken and written Japanese in cultural context, based on language skills developed in course 5. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

JPN 007S—Intensive Intermediate Japanese (20)
Lecture/Discussion—20 hours. Prerequisite(s): JPN 002 C- or better; or the equivalent language proficiency. Consent of Instructor. Special intensive course that combines the work of courses 3, 4, 5, and 6. Introduction to Japanese grammar and development of all language skills in a cultural context with emphasis on communication. Taught in Japan. GE credit: AH, OL, WC. Effective: 2017 Winter Quarter.

JPN 010—Masterworks of Japanese Literature (in English) (4)
Discussion—1 hour; Lecture—3 hours. Introduction to Japanese literature: readings and discussion in English of important works from earliest times to the present. GE credit: AH, WC, WE. Effective: 2011 Fall Quarter.

JPN 015S—Introduction to Japanese Culture (2)
Fieldwork; Lecture/Discussion—2 hours. Restricted to students enrolled in units for the Kyoto Quarter Abroad program. Aspects of Japanese culture: literature, history, religion, art, language, and society. Conducted in English; taught in Japan. (P/NP grading only.) GE credit: AH, WC. Effective: 2014 Fall Quarter.

JPN 025—Japanese Language and Culture (in English) (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 001 or LIN 001 or ANT 004 recommended. Classification and communication of experience in Japanese culture; principles of language use in Japanese society. Speech levels and honorific language, language and gender, minority languages, literacy. Role of Japanese in artificial intelligence and computer science. GE credit: AH, SS, WC, WE. Effective: 2014 Fall Quarter.

JPN 031—Basic Kanji (4)
Lecture—3 hours; Practice—1 hour. Prerequisite(s): JPN 001 C- or better; or Consent of Instructor. Or equivalent proficiency of basic writing system (Hiragana and Katakana). Restricted to students who have never been exposed to any form of Kanji or Chinese characters before; students who have completed schooling up to the 6th grade in the Japanese education system or equivalent or whose native languages have Chinese character orthography are not allowed to register this course. Introduction and mastery of 300 basic Kanji or Chinese characters to establish a solid foundation in the novel and complex Kanji encountered while learning Japanese. GE credit: AH, WC. Effective: 2016 Spring Quarter.

JPN 050—Introduction to the Literature of China and Japan (4)
Lecture/Discussion—4 hours. Methods of literary analysis and their application to major works from the various genres of Chinese and Japanese literature (in translation),
including film. East Asian cultural traditions will also be introduced. (Chinese 50.) GE credit: AH, WC. Effective: 2012 Fall Quarter.

JPN 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study. (P/NP grading only.) GE credit: AH. Effective: 2016 Fall Quarter.

JPN 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

JPN 101—Japanese Literature in Translation: The Early Period (4)
Discussion—1 hour; Lecture—3 hours. Study of early Japanese literature from the Nara to the end of the Heian period through a broad survey of the major literary genres such as lyric poetry, court diaries, prose narratives, poem-tales, and classical Chinese writings. GE credit: AH, WC, WE. Effective: 2012 Winter Quarter.

JPN 102—Japanese Literature in Translation: The Middle Period (4)
Discussion—1 hour; Lecture—3 hours. Study of the major literary genres from the twelfth century to the second half of the nineteenth century including poetry, linked-verse, military chronicles, no drama, Buddhist literature, haiku, haibun, kabuki, bunraku, plays and Edo prose narratives. GE credit: AH, WC, WE. Effective: 2012 Winter Quarter.

JPN 103—Japanese Literature in Translation: The Modern Period (4)
Discussion—1 hour; Lecture—3 hours. Modern Japanese literature from the 1870s to the 1970s. Surveys representative literary works and ideas against the social and intellectual background of the Meiji, Taisho, and Showa periods. GE credit: AH, WC. Effective: 1997 Winter Quarter.

JPN 104—Modern Japanese Literature: War and Revolution (3)
Lecture/Discussion—3 hours. Perspectives and sensibilities with which major modern Japanese writers have interpreted the traumatic and often poignant experiences of war and socio-political upheavals from the late nineteenth century to the 1970s. Lectures, discussions, and readings in English. GE credit: AH, WC. Effective: 1997 Winter Quarter.

JPN 105—Modern Japanese Literature: Hero and Anti-hero (4)
Lecture/Discussion—4 hours. The ways in which representative hero and anti-hero protagonists in modern Japanese literature perceive, confront, challenge, and resolve a wide array of social, political, and moral problems of their times. Course taught in English. GE credit: AH, WC. Effective: 2002 Spring Quarter.

JPN 106—Japanese Culture Through Film (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Aspects of Japanese culture such as love, sexuality, war, the military, the family, the position of women, growing up and death as portrayed in Japanese cinema. Lectures, discussion, and readings in English. Films with English subtitles. GE credit: AH, VL, WC. Effective: 2017 Spring Quarter.

JPN 107—Modern Japanese Autobiographies (in English) (4)
Discussion—1 hour; Lecture—3 hours; Term Paper. Exploring the modern and contemporary Japanese social and cultural
landscape through critical analysis of modern Japanese autobiographies by prominent and other authors in the 19th and 20th centuries. GE credit: AH, WC. Effective: 2016 Spring Quarter.

JPN 108—Poetry of China and Japan (in English) (4)
Discussion—1 hour; Lecture—3 hours. A comparative approach to Chinese and Japanese poetry, examining poetic practice in the two cultures; includes a general outline of the two traditions, plus study of poetic forms, techniques, and distinct treatments of universal themes: love, nature, war, etc. (Chinese 108.) GE credit: AH, WC. Effective: 1997 Winter Quarter.

JPN 109—Japanese Popular Culture (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Japanese popular culture, from its medieval/early modern precedents to contemporary incarnations. Emphasis on major forms of popular culture that emerged in the 20th century, including comics, animation, science fiction, and fantasy. GE credit: AH, VL, WC. Effective: 2017 Fall Quarter.

JPN 111—Modern Japanese: Reading and Discussion (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 006 C- or better; Or the equivalent language proficiency. Readings in modern Japanese short stories, newspaper articles, and essays; conversation practice based on these readings. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

JPN 112—Modern Japanese: Reading and Discussion (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 111 C- or better; Or the equivalent language proficiency. Continuation of course 111. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

JPN 113—Modern Japanese: Reading and Discussion (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 112 C- or better; Or the equivalent language proficiency. Continuation of course 112. GE credit: AH, OL, WC. Effective: 2016 Spring Quarter.

JPN 114A—Spoken Japanese (2)
Discussion—2 hours. Prerequisite(s): Consent of Instructor. Training in spoken Japanese for students with a basic working knowledge of the language. (P/NP grading only.) GE credit: OL. Effective: 2017 Spring Quarter.

JPN 114B—Spoken Japanese (2)
Discussion—2 hours. Prerequisite(s): JPN 114A C- or better; or Consent of Instructor. Or equivalent language proficiency. Continuation of course 114A. Training in spoken Japanese for students with a basic working knowledge of the language. (P/NP grading only.) GE credit: OL. Effective: 2016 Fall Quarter.

JPN 114C—Spoken Japanese (2)
Discussion—2 hours. Prerequisite(s): JPN 114B C- or better; or Consent of Instructor. Or equivalent language proficiency. Continuation of course 114B. Training in spoken Japanese for students with a basic working knowledge of the language. (P/NP grading only.) GE credit: OL. Effective: 2016 Fall Quarter.

JPN 115—Japanese Composition (2)
Lecture—2 hours. Prerequisite(s): JPN 006 C- or better; or Consent of Instructor. Development of skills in the techniques of writing Japanese. Practice in short essay writing with an aim toward mastery of the vocabulary and syntax of written style Japanese. Effective: 2016 Spring Quarter.

JPN 116—Culture and History in Kyoto (8)
Fieldwork; Lecture/Discussion—3 hours. Intensive course exploring the historical and cultural riches in Kyoto and its environs. Limited to students enrolled in the corresponding Quarter Abroad program. Takes place on-site in and around Kyoto, Japan. GE credit: AH, WC. Effective: 2017 Fall Quarter.

JPN 117S—Intensive Modern Japanese: Reading and Discussion (17)
Lecture/Discussion—17 hours. Prerequisite(s): JPN 005 C- or better; or Consent of Instructor. Or the equivalent language proficiency. Introduction to basic Japanese grammar and development of more advanced reading, writing, and conversation skills in a cultural context. Combination of courses 6, 111, 112, and 113 taught intensively in Japan. Not open to students who have taken JPN 006, JPN 111, JPN 112, or JPN 113; an exception can be made for students who have taken JPN 006 or its equivalent, provided that those five units are deducted from the 19 total unit load. GE credit: AH, OL, WC. Effective: 2017 Winter Quarter.

JPN 121—Advanced Japanese I (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 113 C- or better; or Consent of Instructor. First of three courses in a series of fourth year Advanced Japanese which focuses on the levels of formality or politeness in conversation as well as socio-cultural aspects and topics in the Japanese society. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

JPN 122—Advanced Japanese II (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 121 C- or better; or Consent of Instructor. Second of three courses in a series of fourth-year Advanced Japanese which focuses on the levels of formality or politeness in conversation as well as socio-cultural aspects and topics in the Japanese society. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

JPN 123—Advanced Japanese III (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 122 C- or better; or Consent of Instructor. Third of three courses in a series of 4th year Advanced Japanese which focuses on the levels of formality or politeness in conversation as well as socio-cultural aspects and topics in the Japanese society. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

JPN 130—Readings in Modern Japanese Literature to 1926 (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): JPN 113; or equivalent language proficiency. Restricted to completion of course 113 or equivalent as determined by taking a placement exam or consent of instructor. Short stories and essays by Japanese writers of the Meiji and Taishô eras, from 1868 to 1926. Authors include Natsume Sôseki, Izumi Kyôka, Tanizaki Jun'ichirô and Akutagawa Ryûnosuke. Readings and discussion in Japanese with some emphasis on translation into English. GE credit: AH, WC. Effective: 2017 Winter Quarter.

JPN 130—Readings in Modern Japanese Literature to 1926 (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): JPN 113; or equivalent language proficiency, or consent of instructor. Restricted to completion of course 113 or equivalent as determined by taking a placement exam or consent of instructor. Short stories and essays by Japanese writers of the Meiji and Taishô eras, from 1868 to 1926. Authors include Natsume Sôseki, Izumi Kyôka, Tanizaki Jun'ichirô and Akutagawa Ryûnosuke. Readings and discussion in Japanese with some emphasis on translation into English. GE credit: AH, WC. Effective: 2018 Fall Quarter.

JPN 131—Readings in Modern Japanese Literature: 1920-1945 (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 113; Or the equivalent language proficiency. Fourth-year level reading of representative works of modern Japanese literature including short stories, novellas, diaries, memoirs, poetry and excerpts from novels and plays from 1920 through the militaristic era, to the end of the war years in 1945. GE credit: AH. Effective: 2016 Spring Quarter.

JPN 131—Readings in Modern Japanese Literature: 1920-1945 (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 113; or equivalent language proficiency, or consent of instructor. Fourth-year level reading of representative works of modern Japanese literature including short stories, novellas, diaries, memoirs, poetry and excerpts from novels and plays from 1920 through the militaristic era, to the end of the war years in 1945. GE credit: AH. Effective: 2018 Fall Quarter.

JPN 132—Readings in Modern Japanese Literature: 1945-1970 (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 113; Or the equivalent language proficiency. Continuation of course 131, but may be taken independently. Covers selected texts from the immediate post-war years beginning in 1945 down to 1970 and the post-war recovery. GE credit: AH. Effective: 2016 Spring Quarter.

JPN 132—Readings in Modern Japanese Literature: 1945-1970 (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 113; Or equivalent language proficiency, or consent of instructor. Continuation of course 131, but may be taken independently. Covers selected texts from the immediate post-war years beginning in 1945 down to 1970 and the post-war recovery. GE credit: AH. Effective: 2018 Fall Quarter.

JPN 133—Readings in Modern Japanese Literature: 1970 to Present (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 113; Or the equivalent language proficiency. Continuation of course 132, but may be taken independently. Covers selected texts from 1970 to the present. GE credit: AH, WC. Effective: 2016 Spring Quarter.

JPN 133—Readings in Modern Japanese Literature: 1970-Present (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 113; or equivalent language proficiency, or consent of instructor. Continuation of course 132, but may be taken independently. Covers selected texts from 1970 to the present. GE credit: AH, WC. Effective: 2018 Fall Quarter.

JPN 134—Readings in the Humanities: Traditional Culture (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): JPN 113; Or the equivalent language proficiency. Fourth-year level reading of modern works by major specialists on traditional Japanese culture: history, religion, thought, art, international relations, and literary history and criticism. Focus is equally on developing reading skills and learning about Japanese culture. GE credit: AH, WC. Effective: 2016 Spring Quarter.

JPN 134—Readings in the Humanities: Traditional Culture (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): JPN 113; or equivalent language proficiency, or consent of instructor. Fourth-year level reading of modern works by major specialists on traditional Japanese culture: history, religion, thought, art, international relations, and literary history and criticism. Focus is equally on developing reading skills and learning about Japanese culture. GE credit: AH, WC. Effective: 2018 Fall Quarter.

JPN 135—Readings in the Humanities: The Modern Period (4) ***Review all entries***
Lecture—3 hours; Term Paper. Prerequisite(s): JPN 113; Or the equivalent language proficiency. Fourth-year level reading of authentic modern writings on Japanese culture, history, philosophy, society, religion, law, politics, international relations, aesthetics, and comparative culture by prominent critics, commentators, and scholars. GE credit: AH, WC. Effective: 2016 Spring Quarter.

JPN 135—Readings in the Humanities: The Modern Period (4) ***Review all entries***
Lecture—3 hours; Term Paper. Prerequisite(s): JPN 113; or equivalent language proficiency, or consent of instructor. Fourth-year level reading of authentic modern writings on Japanese culture, history, philosophy, society, religion, law, politics, international relations, aesthetics, and comparative culture by prominent critics, commentators, and scholars. GE credit: AH, WC. Effective: 2018 Fall Quarter.

JPN 136—Readings in Newspapers and Magazines (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 113; Or the equivalent language proficiency. Fourth-year level reading of newspaper and magazine reports, articles, and editorials on domestic and international affairs relating to contemporary Japan. GE credit: AH, WC. Effective: 2016 Spring Quarter.

JPN 136—Readings in Newspapers and Magazines (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 113; or equivalent language proficiency, or consent of instructor. Fourth-year level reading of newspaper and magazine reports, articles, and editorials on domestic and international affairs relating to contemporary Japan. GE credit: AH, WC. Effective: 2018 Fall Quarter.

JPN 137—Readings in Contemporary Japanese Literature (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): JPN 113; Consent of Instructor. Or the equivalent language proficiency. Readings of short stories and essays by contemporary writers. Representative writers include Yoshimoto Banana, Otsuichi, Suzuki Koji, Kyogoku Natsuhiko, Ogawa Yoko, and Murakami Haruki. Readings and discussion in Japanese with some emphasis on translation into English. GE credit: AH, WC. Effective: 2016 Spring Quarter.

JPN 137—Readings in Contemporary Japanese Literature (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): JPN 113; or equivalent language proficiency, or consent of instructor. Readings of short stories and essays by contemporary writers. Representative writers include Yoshimoto Banana, Otsuichi, Suzuki Koji, Kyogoku Natsuhiko, Ogawa Yoko, and Murakami Haruki. Readings and discussion in Japanese with some emphasis on translation into English. GE credit: AH, WC. Effective: 2018 Fall Quarter.

JPN 138—Readings in the Humanities: Japan Today (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): JPN 113; or equivalent language proficiency. Restricted to completion of course 113 or equivalent as determined by taking a placement exam or consent of instructor. Topical essays focused on contemporary Japan. Themes center on defining Japan today in terms of its future and past such as through its urban society, trends in architecture, "soft power" industries, and "traditional" elements as mainstays of Japan's cultural currency. GE credit: AH, WC. Effective: 2017 Winter Quarter.

JPN 138—Readings in the Humanities: Japan Today (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): JPN 113; or equivalent language proficiency, or consent of instructor. Restricted to completion of course 113 or equivalent as determined by taking a placement exam or consent of instructor. Topical essays focused on contemporary Japan. Themes center on defining Japan today in terms of its future and past such as through its urban society, trends in architecture, "soft power" industries, and "traditional" elements as mainstays of Japan's cultural currency. GE credit: AH, WC. Effective: 2018 Fall Quarter.

JPN 141—Introduction to Classical Japanese (4)
Lecture/Discussion—4 hours. Prerequisite(s): JPN 113; Or the equivalent language proficiency. Basic features of classical Japanese grammar through careful reading of selected literary texts such as Hojoki or Tsurezuregusa. Effective: 2016 Spring Quarter.

JPN 151—Japanese Linguistics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): JPN 003; Or equivalent language proficiency. Introduction to Japanese linguistics, featuring key aspects of the Japanese language. Analysis of Japanese from the perspectives of phonology, syntax, discourse analysis, sociolinguistics and psycholinguistics. GE credit: AH, WC, WE. Effective: 2017 Winter Quarter.

JPN 152—Traditional Japanese Drama (4)
Discussion—1 hour; Lecture—3 hours. Survey in English of Japanese drama, focusing on traditional forms: noh, kyôgen, bunraku puppet theater, and kabuki, with some attention to modern theater. Texts of plays and secondary works on performance techniques and the composition of plays. GE credit: AH, VL, WC, WE. Effective: 2011 Fall Quarter.

JPN 153—Love, Sexuality and the Family in Modern Japanese Literature (4)
Discussion—1 hour; Lecture—3 hours. Modern Japanese literature from the late 19th century to the present with a focus on love and sexuality in various forms, particularly as understood through the evolving institution of the Japanese family. Lectures, readings and discussions in English. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

JPN 154—Tourism and Heritage in Japan (4)
Discussion—1 hour; Lecture—3 hours. Focus on related concepts of tourism and cultural heritage within Japan, with attention to questions of tradition, authenticity and nostalgia. Examination of cultural heritage sites on various scales, including built environment, national cultural forms, and local performances such as festivals. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

JPN 155—Introduction to Japanese Folklore (4)
Discussion—1 hour; Lecture—3 hours. Focus on narrative genres of myth, legend, and folktale, with additional attention paid to festivals, folk art, belief systems, and the development of folklore studies (minzokugaku) as an academic discipline. Examination the relationship of folklore to ethnic and national identity. GE credit: AH, WC. Effective: 2016 Fall Quarter.

JPN 156—Japanese Literature on Film (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Survey of films based on works of Japanese literature, emphasis on pre-modern and early modern texts. Introduction to major directors of Japan, with a focus on cinematic adaptation. Lectures and readings in English. Films in Japanese with English subtitles. (Cinema and Technocultural Studies 148B.) GE credit: AH, VL, WC, WE. Effective: 2016 Winter Quarter.

JPN 157—Japanese Women Writers (4)
Lecture/Discussion—4 hours. Survey of women writers from earliest times to the present. Genres include poetry, narrative fiction, diaries, short stories, novels, and film. Representative authors include Murasaki Shikibu, Sei Shônagon, Higuchi Ichiyo, Enchi Fumiko and Ogawa Yôko. Readings and discussion in English. GE credit: AH, WC, WE. Effective: 2014 Fall Quarter.

JPN 158—The Supernatural in Japan (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Depictions of the supernatural in Japanese history through the contemporary era. Overview of Japanese literary and visual arts and the socio-historical contexts of the supernatural. Lectures and readings in English. Films in Japanese with English subtitles. GE credit: AH, VL, WC. Effective: 2016 Spring Quarter.

JPN 160—The Culture of Japanese Food (4)
Discussion—2 hours; Lecture—2 hours. Study of Japanese food and the culture of eating and drinking in Japan. Attention to symbolism, historical development, aesthetics, identity and global contexts. Materials examined include critical sources as well as literary texts, art, and films. GE credit: AH, SS, WC. Effective: 2017 Fall Quarter.

JPN 162—Japan Travelogue: Ethnographic Writing on Japanese Culture and People (4)
Lecture/Discussion—4 hours. Focuses on ethnographic writing about Japan. Includes modern scholarly ethnographies, travel writing, blog posts, etc. Critical analysis of how the Japanese "other" is represented across time. GE credit: AH, WC, WE. Effective: 2017 Fall Quarter.

JPN 192—Japanese Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Work experience in Japanese language, with analytical term paper on a topic approved by instructor. (P/NP grading only.) Effective: 2016 Fall Quarter.

JPN 194H—Special Study for Honors Students (1-5) ***Review all entries***
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. Senior standing and qualification for the Japanese Honors Program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in Japanese literature, civilization, or language studies. May be repeated up to 8 unit(s). (P/NP grading only.) GE credit: AH, WC, WE. Effective: 2014 Fall Quarter.

JPN 194H—Special Thesis Honors Project (1-5) ***Review all entries***
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. Senior standing and qualification for the Japanese Senior Thesis Project. Guided research, under the direction of a senate faculty member, leading to a senior thesis project on a topic in Japanese literature, culture, linguistics, or language studies. May be repeated up to 8 unit(s). (P/NP grading only.) GE credit: AH, WC, WE. Effective: 2018 Fall Quarter.

JPN 197T—Tutoring in Japanese (1-5) ***Review all entries***
Tutorial—1-5 hours. Prerequisite(s): Consent of Department Chairperson. Leading of small voluntary discussion groups affiliated with one of the Program's regular courses. May be repeated for credit, but only 2 units may be applied to the minor. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

JPN 197T—Tutoring in Japanese (1-5) ***Review all entries***
Tutorial—1-5 hours. Prerequisite(s): Consent of Department Chairperson. Leading of small voluntary discussion groups affiliated with one of the Program's regular courses. May be repeated for credit. (P/NP grading only.) Effective: 2018 Fall Quarter.

JPN 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study. (P/NP grading only.) GE credit: AH, WC. Effective: 2016 Spring Quarter.

JPN 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: AH, WC. Effective: 1997 Winter Quarter.

JPN 291—Seminar in Modern Japanese Literature: Major Writers (4)
Seminar—4 hours. Prerequisite(s): JPN 130 or JPN 131 or JPN 132 or JPN 133 or JPN 134 or JPN 135 or JPN 136 or JPN 137 or JPN 138; Or the equivalent language proficiency. In-depth reading and critical analyses of major works by and critical literature on one or two prominent modern or contemporary writers such as Natsume Soseki, Mori Ogai, Shimazaki Toson, Akutagawa Ryunosuke, Tanizaki Junichiro, Abe Kobo and Oe Kenzaburo. Effective: 2016 Spring Quarter.

JPN 297—Directed Independent Study (4)
Conference—1 hour; Independent Study; Term Paper. Prerequisite(s): Consent of Instructor. Restricted to graduate students. Directed independent study on a topic culminating in a term paper. Independent Studies may only be arranged with consent of the instructor and when graduate seminars are unavailable. May be repeated up to 5 time(s) when no seminars are available and topic differs. Effective: 2017 Spring Quarter.

JPN 299—Research (1-12)
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 2016 Spring Quarter.

JST Jewish Studies

Courses in JST:

JST 010—Introduction to Jewish Cultures (4)
Lecture—3 hours; Term Paper—1 hour. Diverse Jewish cultures created over the past 2,000 years using examples from less-familiar communities such as India, China, and Ethiopia. Topics include the tensions between homeland/diaspora and questions of identity (race, nationality, culture, or religion). GE credit: SS, WC, WE. Effective: 2002 Winter Quarter.

JST 101—Topics in Jewish Thought (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): JST 010 or RST 023; or Consent of Instructor. Selected themes in Jewish thought in historical and social perspective. This course traces the historical development of topics in Jewish thought such as Messianism, or focuses on one specific historical period, such as modern Jewish thought. May be repeated for credit May be repeated for credit when topic differs. GE credit: AH, WC, WE. Effective: 2004 Spring Quarter.

JST 110—Selected Topics in Jewish Literature (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One lower division literature or Jewish Studies course or consent of instructor. Literature written about the Jewish experience, treated in its historical and social context. Examines literature written in one language, such as English, Hebrew, or Yiddish, or a theme, such as gender or modern identities, as expressed in different literary traditions. May be repeated for credit May be repeated for credit when topic differs. GE credit: AH, WC, WE. Effective: 2004 Spring Quarter.

JST 111—Israeli Writing Since 1960 (4)
Extensive Writing—1 hour; Lecture/Lab—3 hours. Prerequisite(s): One course in American or European literature. Contemporary Hebrew literature, in translation, in relation to post-independence debates about religious, social, and political identity of the Jewish state; literary reflections of Israeli ethnic diversity and changing gender relations; modern Hebrew poetry and postmodern experiments in fiction. No credit will be given to students who have completed HUM 119. GE credit: AH, WC, WE. Effective: 2001 Fall Quarter.

JST 112—Readings in Jewish Writing and Thought in German Culture (4)
Lecture/Discussion—3 hours; Term Paper—1 hour. Prerequisite(s): RST 023; or Consent of Instructor. Historical tradition of Jewish thought in the German cultural context; unique contributions of Jewish writers to culture of the German speaking world; what it means to be "other" in the mainstream culture. May be repeated up to 2 time(s) when topic differs. No credit will be given to students who have completed HUM 121. GE credit: AH, WC, WE. Effective: 2001 Fall Quarter.

JST 116—Readings in Jewish Writing and Thought in German Culture (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): RST 023; or Consent of Instructor. Historical tradition of Jewish thought in the German cultural context; unique contributions of Jewish writers to culture of the German speaking world; what it means to be "other" in the mainstream culture. May be repeated up to 2 time(s) if topic differs. No credit will be given to students who have completed HUM 121. (German 116) GE credit: AH, OL, WC, WE. Effective: 2007 Spring Quarter.

JST 120—Cinema and the American Jewish Experience (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): JST 010 recommended. Examination of American cinema to reveal how Jewish identity is expressed and submerged, tracing the relations between religion, identity, race, politics, and art. Not open for credit to students who have completed HUM 122. GE credit: AH, WE. Effective: 2001 Fall Quarter.

JST 121—Oral History and Jewish Life (4)
Lecture/Discussion—3 hours; Term Paper—1 hour. Oral history methodologies and application to an in-depth oral history interview about Jewish life. Topics include oral history practices and ethics, immigration, migration, religious practice, ethnic relations, and community organization structures. No credit given to students who have completed HUM 123. GE credit: SS. Effective: 2001 Fall Quarter.

LAT Latin

Courses in LAT:

LAT 001—Elementary Latin (5)
Lecture—5 hours. Introduction to basic grammar and vocabulary and development of translation skills with emphasis on Latin to English. Students who have successfully completed LAT 002 or LAT 003 in the 10th grade or higher grade in high school may receive unit credit for this course on a P/NP grading basis only; although a passing grade will be charged to the student's P/NP option, no petition is required; all other students will receive a letter grade unless a P/NP petition is filed. GE credit: AH. Effective: 1997 Winter Quarter.

LAT 002—Elementary Latin (5)
Lecture—5 hours. Prerequisite(s): LAT 001; Or equivalent. Continuation of course 1. GE credit: AH. Effective: 2016 Spring Quarter.

LAT 003—Intermediate Latin (5)
Lecture—5 hours. Prerequisite(s): LAT 002; Or equivalent. Continuation of course 2. Selected readings from Latin authors. GE credit: AH. Effective: 2016 Spring Quarter.

LAT 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

LAT 100—Readings in Latin Prose (4)
Lecture/Discussion—4 hours. Prerequisite(s): LAT 003; Or equivalent. Review of Latin morphology, grammar, and vocabulary. Readings in prose authors, including Julius Caesar. GE credit: AH. Effective: 2016 Fall Quarter.

LAT 101—Livy (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Livy GE credit: AH, WE. Effective: 2016 Spring Quarter.

LAT 102—Roman Comedy (5)
Lecture—4 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Roman comedy. GE credit: AH, WE. Effective: 2016 Spring Quarter.

LAT 103—Vergil: Aeneid (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Vergil: Aeneid. GE credit: AH, WE. Effective: 2016 Spring Quarter.

LAT 104—Sallust (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Sallust. GE credit: AH, WE. Effective: 2016 Spring Quarter.

LAT 105—Catullus (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Catullus. GE credit: AH, WE. Effective: 2016 Spring Quarter.

LAT 106—Horace: Odes and Epodes (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Horace: Odes and Epodes. GE credit: AH, WE. Effective: 2016 Spring Quarter.

LAT 108—Horace: Satires and Epistles (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Horace: Satires and Epistles. GE credit: AH, WE. Effective: 2016 Spring Quarter.

LAT 109—Roman Elegy (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Roman elegy. GE credit: AH, WE. Effective: 2016 Spring Quarter.

LAT 110—Ovid (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): LAT 100; Or equivalent. Translation and discussion of selected readings from the works of Ovid. May be repeated up to 1 time(s) when topic differs and with consent of instructor. GE credit: AH, WC, WE. Effective: 2011 Fall Quarter.

LAT 112—Cicero (4)
Recitation—3 hours; Term Paper. Prerequisite(s): LAT 100; Or equivalent. Translation and discussion of selected readings from the works of Cicero. May be repeated up to 1 time(s) if readings vary and with consent of instructor. GE credit: AH, WE. Effective: 2011 Fall Quarter.

LAT 115—Lucretius (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Lucretius. GE credit: AH, WE. Effective: 2016 Spring Quarter.

LAT 116—Vergil: Eclogues and Georgics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Vergil: Eclogues and Georgics. GE credit: AH, WE. Effective: 2016 Spring Quarter.

LAT 118—Roman Historians (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): LAT 100; Or equivalent. Readings in Latin from one or more of the major Roman historians and biographers. Authors may include Sallust, Nepos, Livy, Tacitus, Suetonius, and Ammianus Marcellinus. GE credit: AH, WC, WE. Effective: 2011 Fall Quarter.

LAT 119—Readings in Republican Latin Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): LAT 100; Or equivalent. Translation and discussion of selected readings from Republican Latin literature. May be repeated for credit when topics vary. GE credit: AH, WC, WE. Effective: 2012 Summer Session 2.

LAT 120—Readings in Imperial Latin Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): LAT 100; Or equivalent. Readings in Imperial Latin literature. May be repeated up to 2 time(s) when topic varies. GE credit: AH, WC, WE. Effective: 2014 Winter Quarter.

LAT 121—Latin Prose Composition (4)
Lecture/Discussion—4 hours. Prerequisite(s): LAT 100; Or equivalent. Intensive grammar and vocabulary review through exercises in Latin prose composition. GE credit: AH. Effective: 2015 Fall Quarter.

LAT 122—Early Christian Writers (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): LAT 100 (can be concurrent); or Consent of Instructor. Latin style of selected early Christian writers. Topics may include: Latin translations of Greek and Hebrew scriptures, Christian Latin, with focus on North Africa, Palestine, or Spain; High literary Christian Latin; Christian Latin oratorical style. GE credit: AH, WC, WE. Effective: 2017 Fall Quarter.

LAT 125—Medieval Latin (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Selected readings from the Vulgate and various medieval authors provide an introduction to the developments in the Latin Language and literature from the fourth to the fifteenth centuries. GE credit: AH, WE. Effective: 2016 Spring Quarter.

LAT 130—Readings in Late Latin (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): LAT 100; or Consent of Instructor. Translation and discussion of selected readings from late imperial-early medieval Christian and pagan literature. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

LAT 135—Themes in Latin Literature (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): LAT 100 (can be concurrent); or Consent of Instructor. Readings in Latin that trace a theme across times, genres, and authors. May be repeated for credit May be repeated for credit if topics differ. GE credit: AH, WC, WE. Effective: 2017 Fall Quarter.

LAT 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study. (P/NP grading only.) Effective: 2016 Spring Quarter.

LAT 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special study for advanced undergraduates. (P/NP grading only.) Effective: 2016 Fall Quarter.

LAW Law

Courses of Instruction. The courses listed below have all been taught at least once in the last three years. There is no guarantee that any given course will be taught within the next three years. The numbers in parentheses indicate the number of semester credits. For current information, see Law School Course Descriptions.

Courses in LAW:

LAW 200—Introduction to Law (1)
Discussion—1 hour. Introduction to basic concepts of the law, the historical roots of common law and equity, the precedent system in its practical operation,
the modes of reasoning used by courts and attorneys, and the fundamentals of statutory interpretation. (S/U grading only.) Effective: 1997 Winter Quarter.

LAW 200A—U S Legal System Seminar (LL.M.) (2)
Discussion—2 hours. History and fundamental principles of the United States legal system. Important current legal issues, developments and trends. Required for LL.M. students who have not attended a U.S. law school. Fall semester only. Effective: 2017 Fall Semester.

LAW 200B—U S Legal Methods I (LL.M.) (3)
Lecture. Course is only offered to LL.M. students. Designed to provide background skills necessary to succeed in both law school and legal practice. Gain an introductory working knowledge of the US legal methods which includes learning various forms of legal writing and speaking. Effective: 2017 Fall Semester.

LAW 200BT—U.S. Legal Methods A (LL.M.) (3)
Lecture/Discussion—3 hours. Course is designed to provide background skills necessary to succeed in both law school and legal practice. Students gain an introductory working knowledge of the US legal method which includes learning various forms of legal writing and speaking. Effective: 2017 Spring Semester.

LAW 200C—U S Legal Methods II (LL.M.) (3)
Lecture. Open to LL.M. students only. Designed to provide background skills necessary to succeed in both law school and legal practice. Gain an introductory working knowledge of the US legal method which includes learning various forms of legal writing and speaking. Effective: 2017 Fall Semester.

LAW 200CT—U.S. Legal Methods B (LL.M.) (3)
Lecture/Discussion—3 hours. Course is designed to provide background skills necessary to succeed in both law school and legal practice. Students gain an introductory working knowledge of the US legal method which includes learning various forms of legal writing and speaking. Effective: 2017 Spring Semester.

LAW 200D—American Legal Concepts I (LL.M.) (3)
Lecture. Prerequisite(s): Consent of Instructor. Course is only offered to LL.M. students. Designed to provide basic skills necessary to succeed in both law school and legal practice. Effective: 2017 Fall Semester.

LAW 200DT—Advanced Introduction to American Legal Concepts and Methods (LL.M.) (3)
Lecture—3 hours. Course is only offered to LL.M. students. Building on the Introduction to American Law course, this course will provide additional instruction in American law and legal methods. Students will audit selected substantive courses and will produce a series of legal memoranda. Effective: 2017 Spring Semester.

LAW 200E—American Legal Concepts II (LL.M.) (3)
Lecture. Course is only offered to LL.M. students. Designed to provide basic skills necessary to succeed in both law school and legal practice. Effective: 2017 Fall Semester.

LAW 201—Property (4)
Discussion—4 hours. Prerequisite(s): AAS 010; LAW 200A; or Consent of Instructor. text here A study of doctrines and concepts of property law with primary emphasis on real property. Course coverage includes: the estates in land system; the landlord-tenant relationship, conveyancing, and private and public land use control. Effective: 2006 Fall Semester.

LAW 202—Contracts (5)
Discussion—5 hours. Examines sorts of promises that are enforced and the nature of protection given promissory obligations in both commercial and noncommercial transactions. Inquiry is made into the means by which traditional doctrine adjusts or fails to adjust to changing social demands Effective: 2006 Fall Semester.

LAW 203—Civil Procedure (5)
Discussion—5 hours. A study of the fundamental and recurrent problems in civil actions including the methods used by federal and state courts to resolve civil disputes. Effective: 2006 Summer Special Session.

LAW 204—Torts (5)
Discussion—5 hours. Familiarizes students with legal rules, concepts and approaches pertinent to the recovery for personal injuries, property damages and harm done to intangible interests. Effective: 2006 Fall Semester.

LAW 205—Constitutional Law I (4)
Discussion—4 hours. The principles, doctrines and controversies regarding the basic structure of and division of powers in American government. Specific topics include judicial review, jurisdiction, standing to sue, federalism, federal and state powers and immunities, and the separation of powers among the Effective: 2004 Fall Semester.

LAW 206—Criminal Law (3)
Discussion—3 hours. Study of the bases and limits of criminal liability. Coverage of the constitutional, statutory, and case law rules which define, limit, and provide defenses to individual liability for the major criminal offenses. Effective: 1997 Winter Quarter.

LAW 207—Legal Research and Writing I (2)
Discussion/Laboratory—2 hours. Fall semester course taught by Wydick Fellowship Program faculty is an integrated legal research and writing skills course. Basic legal research resources and strategies are introduced and practiced. Effective: 2016 Fall Semester.

LAW 207A—Legal Research (LL.M.) (1)
Discussion—1 hour. Restricted to LL.M. students only. Description of the evolution and use of sources of law and secondary authority. Effective: 2016 Fall Semester.

LAW 207B—Advanced Legal Research (2)
Seminar—2 hours. Restricted to 35 students. Will introduce students to advanced legal research tools and techniques used in practice, including efficient computer research techniques. Effective: 2009 Fall Semester.

LAW 208—Legal Research and Writing II (2)
Discussion—2 hours. Focuses on persuasive writing and oral advocacy. Students will complete integrated research and writing assignments, including a complaint, a strategic defense office memorandum, a motion to dismiss in federal court, and an appellate brief, with oral arguments by all students. Effective: 2007 Fall Semester.

LAW 208A—Legal Research and Writing II (LL.M.) (2)
Discussion—2 hours. Persuasive writing and oral advocacy. LL.M. students complete integrated research and writing assignments, including a complaint, a strategic defense office memorandum, a motion to dismiss in federal court, and an appellate brief with oral arguments. Effective: 2017 Spring Semester.

LAW 208E—Introduction to U.S. Legal Methods A (3)
Lecture. Prerequisite(s): Consent of Instructor. Restricted to LL.M. students. Designed to provide foreign students with background skills at a more basic level than U.S. Legal Methods A and B. Students will audit carefully selected courses in the regular curriculum and complete assignments related to those courses. Effective: 2017 Fall Semester.

LAW 208F—Introduction to U.S. Legal Methods B (LLM) (3)
Seminar. Prerequisite(s): Consent of Instructor. Restricted to LL.M. students. Designed to provide foreign students with background skills at a more basic level than U.S. Legal Methods A and B. Students will audit carefully selected courses in the regular curriculum and complete assignments related to those courses. Effective: 2017 Fall Semester.

LAW 208G—U.S. Legal Methods A (LL.M.) (3)
Lecture. Restricted to LL.M. students. Designed to provide foreign and other students with background skills necessary to succeed in both law school and legal practice. Effective: 2017 Fall Semester.

LAW 208H—U.S. Legal Methods B (LL.M.) (3)
Seminar. A description of the evolution and use of sources of law and secondary authority. Effective: 2017 Fall Semester.

LAW 209A—Patent Law (3)
Discussion—3 hours. Prerequisite(s): LAW 274; or Consent of Instructor. Covers all essential aspects of patent law: patentable subject matter, novelty, utility, nonobviousness, enablement, prosecution, infringement, and remedies. Effective: 2011 Fall Semester.

LAW 209B—Patent Prosecution and Practice (3) ***Review all entries***
Seminar. Examines core requirements and strategies for drafting and prosecuting a patent application before the U.S. Patent & Trademark Office. Students will interact with real inventors and US PTO examiners to gain the experience of getting a patent issued. Effective: 2017 Fall Semester.

LAW 209B—Patent Prosecution and Practice (2) ***Review all entries***
Seminar. Examines core requirements and strategies for drafting and prosecuting a patent application before the U.S. Patent & Trademark Office. Interact with real inventors and US PTO examiners to gain the experience of getting a patent issued. Effective: 2018 Fall Semester.

LAW 209C—Patentable Subject Matter: Genes, Methods, and Software (2)
Seminar. In-depth look at recent cases and debates behind genetic patenting, software; business models; diagnostic methods, and others. Reviews the crucial and rapidly evolving field of patent law which affects some of the most important hi-tech industries. Effective: 2018 Spring Semester.

LAW 209DT—Innovation Law (2)
Seminar—2 hours. Explores range of legal issues that innovation lawyers face, from establishing a start-up to high stakes technology mergers & acquisitions, to data protection and privacy, protecting intellectual property through strategic patent litigation. Effective: 2017 Spring Semester.

LAW 209E—Patent Litigation (1)
Lecture—1 hour. Introduces the basics of Patent Law and examines the U.S. patent enforcement system. Learn how a patent litigation proceeds, focusing on both pre- and post-trial proceedings and examines substantive patent laws. Effective: 2018 Spring Semester.

LAW 209T—Innovation and Technology Transfer Seminar (2)
Seminar—2 hours. Prerequisite(s): LAW 209A or LAW 274, recommended but not required. Restricted to 15 students. From biomedicine to cleantech, public institutions are playing leading roles in developing cutting-edge technologies. Explores the law and policy of publicly-supported innovation and technology transfer. Effective: 2010 Fall Semester.

LAW 210—Reforming the Police and Criminal Justice (2)
Seminar—2 hours. Limited to 25 students. Focus on major current issues: policing ethnic neighborhoods; use of deadly force; modernizing the work of prosecutors and defense counsel. Effective: 2016 Fall Semester.

LAW 210A—Privatization of Criminal Justice Seminar (2)
Seminar—2 hours. Prerequisite(s): Prior social theory or ciminal procedure knowledge not required; completion of LAW 227A strongly recommended. Restricted to 10 students. Analyze the legal, historical, and sociological aspects of the growing private sector provision of criminal justice services traditionally assumed by government, including prisons, policing, and adjudication. Effective: 2005 Fall Semester.

LAW 210B—Sociology of Criminal Procedure (2)
Seminar—2 hours. Limited enrollment. What are the expectations and roles of the police in a democratic society? We need order maintenance and crime control, but to assume these tasks the police sometimes intrude upon interests considered fundamental to free societies. Effective: 2014 Spring Semester.

LAW 210C—Sexual Assault and the Law (2)
Seminar—2 hours. Criminal law of sexual assault, traditional and modern offenses, and proposals for reform. Discussion of procedural developments, victim's counsel, evidentiary reform, and ADR. And the implications for civil law, tort liability, Title VI, Title IX, and civil liability of perpetrators. Effective: 2015 Fall Semester.

LAW 210DT—Wrongful Convictions (2)
Seminar—2 hours. Course will explore the magnitude and complexity of the wrongful convictions, their causes and remedies under existing law, and possible fixes (reforms). It will emphasize relevant legal rules (Criminal Procedure, Evidence, Post-Conviction Review). Effective: 2016 Fall Semester.

LAW 210ET—Race, Mass Incarceration and Policing (2)
Seminar—2 hours. Key issues in the historical development and the current state of modern American imprisonment, policing structures, and the criminal justice system in relation to race. Effective: 2017 Spring Semester.

LAW 210F—Restorative Justice (2)
Seminar. Explore both the theory and practice of restorative justice as an alternative approach to the retributive justice model of our current criminal law system and many other institutions. Effective: 2017 Fall Semester.

LAW 210G—Aoki Center Restorative Justice Practicum (1)
Fieldwork. Learn about restorative justice principles and practices, receive training in restorative justice facilitation, and participate in and lead restorative justice circles in Davis and Sacramento schools, Yolo County Juvenile Hall, and other venues. (S/U grading only.) Effective: 2018 Fall Semester.

LAW 210H—Aoki Federal Court Amicus Project (3)
Project (Term Project). Prerequisite(s): LAW 203; LAW 219; both required or consent of instructor. Work on actual federal criminal cases in the Ninth Circuit Court of Appeals and United States Supreme Court. File briefs amicus curiae on critical issues, and develop research, writing, and oral advocacy skills. Effective: 2018 Fall Semester.

LAW 211—Negotiations (2)
Discussion—2 hours. Limited enrollment. Skills course teaches theoretical and empirical approaches to negotiation strategy for the purposes of making deals and resolving disputes. Students participate in simulations to hone their negotiation skills, and write analytical papers. Effective: 2016 Fall Semester.

LAW 211A—Advanced Negotiations Strategy and Client Counseling (3)
Discussion—3 hours. Prerequisite(s): Consent of Instructor. Application course; must apply and secure professor approval to enroll; will involve participating in discussions and a series of simulations; your classmates will be counting on you to actively participate and be well prepared for every simulation; do not apply to take this course unless you are willing and able to participate fully and can accept constructive feedback; if you anticipate missing more than two class sessions, do not apply to take this course. Understand the dynamics of interviewing and counseling process. Designed to be relevant to a broad spectrum of negotiation problems that are faced by legal professionals. Effective: 2012 Fall Semester.

LAW 211BT—International Business Negotiations (3)
Discussion/Laboratory—3 hours. Course is structured around a simulated negotiation exercise with students from a similar class at Stanford Law School. Students will experience the development of a business transaction over an extended negotiation in a context that replicates actual legal practice. Effective: 2016 Fall Semester.

LAW 212A—Medical Liability Law and Policy (2)
Discussion—2 hours. This course will consider the many ways in which society seeks to establish and maintain quality in patient care. Effective: 2007 Fall Semester.

LAW 213A—Transnational Criminal Law (3)
Discussion—3 hours. Prerequisite(s): LAW 205; LAW 206 Will examine the laws responses to a particular aspect of globalization, transnational crime. The course will explore the phenomenon of transnationality and how it affects the power of nation-states, acting alone or together, to prosecute certain crimes. Effective: 2006 Fall Semester.

LAW 213T—Terrorism and International Law (2)
Seminar—2 hours. International terrorism remains a pressing concern. Devising effective remedies for responding to it within the bounds of the law is critical. Therefore, the new generation of international lawyers needs to be familiar with the relevant law and standards. Effective: 2013 Fall Semester.

LAW 214—Tax Issues Related to Estate Planning (2)
Discussion—2 hours. Prerequisite(s): LAW 221 recommended. Tax issues Related to estate planning. Effective: 2017 Fall Semester.

LAW 214A—Migration, Work, and Taxation (2)
Seminar. Explores workers' and prospective workers' choices to move from one place to another, both across and within national borders. In particular, explores how tax policy and broader economic forces shape those choices. Effective: 2018 Fall Semester.

LAW 215—Business Associations (4)
Discussion—4 hours. Legal rules and concepts applicable to business associations, both public and closely held. Corporate form of organization, partnerships and other associational forms. Effective: 2005 Fall Semester.

LAW 215A—The Law of Corporate Governance Seminar (2)
Seminar—2 hours. Prerequisite(s): LAW 215 Advanced issues in the governance of publicly held corporations. Separation of ownership and control and how the law has addressed this issue at the theoretical level and in the context of topics such as the duties of corporate directors, shareholder voting rights, and competition among states to attract corporate charters. Effective: 2003 Fall Semester.

LAW 215S—Special Session Business Associations (4)
Discussion—4 hours. Provides a broad survey of the legal rules and concepts applicable to business associations, both public and closely. Effective: 2011 Spring Semester.

LAW 216A—Law and Religion (2)
Discussion—2 hours. Restricted to 20 students. Federal constitutional law relating to religion; the interpretation and application of the Free Exercise Clause and the Establishment Clause of the First Amendment. Effective: 2014 Spring Semester.

LAW 217—Telecommunications Law (3)
Discussion—3 hours. Economic and administrative regulation of telephony, radio and television broadcasting, and video technologies such as cable and
direct broadcast satellites. Emphasis on the recently enacted Telecommunications Reform Act and the role of the Federal Communications Commission, as well as other sources of regulation such as related antitrust law and state public utility regulation. Effective: 2000 Spring Semester.

LAW 218—Constitutional Law II (4)
Discussion—4 hours. Not open to students who have completed course 218A or 218B. Principally covers the First Amendment and the Equal Protection Clause. Effective: 2011 Fall Semester.

LAW 218A—Constitutional Law II--Equal Protection (2)
Discussion—2 hours. Students who have previously taken course 218, or who plan to take course 218 for 4 units in Spring 2011, may not take this course. Students enrolled in this course will be given priority registration spring semester 2011 to enroll in course 218B. Focuses on the Equal Protection Clause of the Fourteenth Amendment. Effective: 2010 Fall Semester.

LAW 218B—Constitutional Law II -- First Amendment (2)
Discussion—2 hours. Students who have previously taken course 218 or who plan to take course 218 for 4 units in Spring 2011 may not take this course. Students not required to take course 218A in order to take this course. Principally covers the free speech clause of the First Amendment. Effective: 2010 Fall Semester.

LAW 218D—Constitutional Theory Seminar (2)
Seminar—2 hours. Provides students with a broad understanding of the shape of modern constitutional theory, and the ability to understand the implications of that theory for concrete historical and modern constitutional disputes. Effective: 2015 Fall Semester.

LAW 218ET—California Constitutional Law (2)
Discussion—2 hours. Reviews, interpretive meta-rules for constitutional construction, structure and institutions of state government, civil liberties under the Declaration of Rights, the impact of race in California society, and criminal law. Effective: 2015 Fall Semester.

LAW 218T—Selected Topics in Constitutional Law (2)
Seminar—2 hours. Examines two core themes of Constitutional Law I and Federal Jurisdiction: federalism and separation of powers. Concentrates on habeas corpus and the Eleventh Amendment as vehicles for examining the constitutional themes in greater depth. Effective: 2010 Spring Semester.

LAW 218TA—Separation of Powers (2)
Discussion—2 hours. Study of the separation of powers in our federal government by focusing on certain historical events and their impact on constitutional law. Effective: 2012 Spring Semester.

LAW 218TB—Law of War (3)
Discussion—3 hours. Surveys the law of armed conflict as it applies to today’s battlefields. Effective: 2013 Fall Semester.

LAW 218TC—Antidiscrimination Law (4)
Discussion—4 hours. Course offers an overview of federal constitutional and statutory antidiscrimination law in the United States. Effective: 2014 Fall Semester.

LAW 219—Evidence (3) ***Review all entries***
Lecture/Discussion. Covers rules regarding the admissibility of proof during civil and criminal cases, including rules governing relevancy, hearsay, the examination and impeachment of witnesses, expert opinion, and constitutional and statutory privileges. Effective: 2018 Spring Semester.

LAW 219—Evidence (4) ***Review all entries***
Lecture/Discussion. Covers rules regarding the admissibility of proof during civil and criminal cases, including rules governing relevancy, hearsay, the examination and impeachment of witnesses, expert opinion, and constitutional and statutory privileges. Effective: 2018 Fall Semester.

LAW 219A—Advanced Evidence (3)
Discussion—3 hours. Prerequisite(s): LAW 219 Limited to six students; selected by professor. Interested students complete an application form; available in the Law Registrar's Office. Credit is contingent on attending all classes and participating in all exercises. Participation is crucial to the success of the course, as students will be working in teams of three. Do not take this course unless you are willing and able to participate fully and can accept criticism. Public interest lawyers often spend much time in the courtroom. Prosecution, defender, and legal aid offices usually don't have resources to train lawyers in trial work. Seeks to help remedy this deficiency by helping develop witness interrogation skills. (S/U grading only.) Effective: 2010 Fall Semester.

LAW 219B—E-Discovery and Digital Evidence (2)
Lecture. Examines the interplay between the significant e-discovery rules and case law, and the process of electronic discovery, beginning with the duty to preserve electronically stored information (ESI), to the search, identification, collection, review and production of ESI in litigation. Effective: 2018 Fall Semester.

LAW 220—Federal Income Taxation (4)
Discussion—3 hours. Surveys the federal income tax system, with consideration of the nature of income, when and to whom income is taxable, exclusions from the tax base, deductions and credits, and tax consequences of property ownership and disposition. Effective: 2012 Spring Semester.

LAW 220A—State and Local Taxation (3)
Discussion—3 hours. Introduction to fundamentals of state and local taxation. Beginning with historical and constitutional aspects, student analyze recent developments in state and local taxation and their impact on client representation. Effective: 2017 Fall Semester.

LAW 220B—Tax and Distributive Justice (3)
Discussion—3 hours. Advanced tax course designed to introduce students to issues of tax policy, with particular emphasis on tax distribution (i.e., who or what should pay taxes in society) and tax incidence (i.e., who or what ends up paying taxes in society). Effective: 2015 Spring Semester.

LAW 220BT—Law of Banking and Financial Institutions (2)
Discussion—2 hours. Guide to dual regulatory system, and an understanding of banks and other financial institutions, such as thrifts, credit unions, industrial banks, finance companies, and money transmitters, as well as large versus community banks. Effective: 2011 Spring Semester.

LAW 220S—Special Session Federal Income Taxation (2)
Discussion—2 hours. Introduction to the basic principles of federal income taxation using the American federal tax model. Topics include identification of income subject to taxation, gains and losses from property transactions, the timing of income and deductions and the identity of people subject to tax on particular items of income. Effective: 2005 Summer Special Session.

LAW 220T—State and Local Taxation (3)
Discussion—3 hours. Introduction to fundamentals of state and local taxation. Beginning with historical and constitutional aspects, students will analyze recent developments in state and local taxation and their impact on client representation. Effective: 2013 Fall Semester.

LAW 221—Trusts, Wills and Estates (3)
Discussion—3 hours. Study of the law of decedent's estates, wills, and trusts. Effective: 2016 Fall Semester.

LAW 221A—Practical Skills in Will & Trust Drafting and Administration (2)
Seminar—2 hours. Provides the skills to practice law in the area of estate planning and probate/trust administration. Follow an estate planning client and draft actual estate plan documents. A series of related topics will be explored. Effective: 2018 Spring Semester.

LAW 222—Critical Race Theory Seminar (3)
Discussion—3 hours. Examines race relations and racial discrimination in America through the perspectives of proponents of the Critical Race Theory (CRT) movement, a collection of legal scholars who challenge both conservative and liberal political orthodoxies. Effective: 2013 Spring Semester.

LAW 222A—Latinos and Latinas and the Law (2)
Seminar—2 hours. Seminar analyzes some of the legal issues of particular relevance to the Latino community in the United States, including racial identity, immigration, language regulation, national and transnational identity issues, affirmative action, and civil rights. Effective: 2006 Fall Semester.

LAW 222B—Asian Pacific Americans and Law (3)
Seminar. Examines how American Law has shaped Asian Pacific American demographics, experiences, and status in American society. Effective: 2017 Fall Semester.

LAW 222CT—Anti-Corruption Law in India (2)
Seminar—2 hours. Addresses the impact of large corruption scandals on long term social trust, in light of Indian coal block and 2G spectrum allocation scandals. Effective: 2017 Spring Semester.

LAW 223—Estate Planning Seminar (2)
Seminar—2 hours. Limited enrollment. Selected topics in the estates and trusts area. Content varies with instructor. Effective: 2017 Spring Semester.

LAW 224—Animal Law Seminar (2)
Seminar—2 hours. An introduction to legal principles affecting animals and their use. GE credit: WE. Effective: 2013 Fall Semester.

LAW 225—Marital Property (2)
Discussion—2 hours. Covers the California community property system, including the rights of marital and domestic partners during the ongoing relationship, and upon the end of the relationship by death or divorce. Effective: 2004 Fall Semester.

LAW 226—Disability Rights Law (3)
Discussion—3 hours. Examines disability law and theory. Devoted to the Americans with Disabilities Act (particularly Titles I, II, and III) as it applies to employment, education, public accommodations, and government services and programs. Effective: 2017 Fall Semester.

LAW 226ET—Mental Disability Law (3)
Lecture/Discussion—3 hours. Students will examine the civil and constitutional bases of mental disability law, as well as its history, and explore the role of mental disability in the policing and criminal trial process. Effective: 2017 Spring Semester.

LAW 227A—Crimiminal Procedure (3)
Discussion—3 hours. Federal constitutional limits on government authority to gather evidence and investigate crime. Topics include Fourth Amendment limits on search, seizure, and arrest; the Fifth Amendment privilege against self-incrimination; and the Sixth Amendment right to counsel. Effective: 2004 Fall Semester.

LAW 227B—Advanced Criminal Procedure (3)
Discussion—3 hours. Examines a range of issues, including bail, charging decisions, preliminary hearings, discovery, statute of limitations, venue, joinder and severance, pleas, plea bargaining, assistance of counsel, trial, double jeopardy, sentencing, appeal and collateral remedies. Effective: 2007 Fall Semester.

LAW 227C—Topics in California Criminal Practice (2)
Seminar. Advanced criminal law and procedure class aimed at students planning to practice criminal law in California, either as an extern or summer clerk, or after graduation. Effective: 2017 Fall Semester.

LAW 228—Startups and Venture Capital (4)
Lecture/Discussion. Prerequisite(s): LAW 215; Prerequisite will not be waived, do not register for the course unless you have completed LAW 215. Limited enrollment. Introduction to the various legal and business considerations involved in forming and operating an emerging growth business. Effective: 2017 Fall Semester.

LAW 228A—Mergers and Acquisitions (3)
Discussion—3 hours. Prerequisite(s): LAW 215 Practical approach to mergers and acquisitions, with an in-depth look at the planning, negotiation, documentation and completion of mergers and acquisitions. Effective: 2017 Fall Semester.

LAW 228B—Accounting for Lawyers (2)
Discussion—2 hours. Exposes student to basic principles of accounting, from the perspective of the practicing attorney. Effective: 2010 Fall Semester.

LAW 228C—Law and Statistics (3)
Discussion—3 hours. Introduction to fundamentals of statistical analysis and how statistical analysis is used in the law and public policy. Course goal is to help students become excellent consumers of statistical information and evidence. Effective: 2014 Spring Semester.

LAW 229—Scientific Evidence (3)
Discussion—3 hours. Prerequisite(s): LAW 219 Limited enrollment. In addition to examining the evidence law governing the admission of scientific testimony, this course considers trial advocacy in presenting and attacking such testimony. Effective: 2007 Fall Semester.

LAW 230—International Environmental Law (3)
Discussion—3 hours. Prerequisite(s): Prior course work in environmental law and/or international law is helpful. Elective Course for Environmental Law Certificate Program. May satisfy Advanced Writing Requirement with professor's permission. Provides an overview of the structure and basic principles of international environmental law and policy. Effective: 2012 Fall Semester.

LAW 230A—Wine and the Law (2)
Seminar—2 hours. Surveys the legal landscape of this multi-billion dollar industry, focusing on contemporary debates and developments in judicial, legislative, and administrative arenas. Effective: 2018 Spring Semester.

LAW 230T—Free Trade and the Environment (2)
Seminar—2 hours. Examines the relationship between legal rules relating to trade and rules for the protection of the environment. Effective: 2011 Fall Semester.

LAW 231—Sex Based Discrimination (3)
Discussion—3 hours. Issues raised by legal and social distinctions between men and women. Explores potential remedies for discrimination drawn from constitutional law, statutory enactments, and common law developments. Subject matter areas include sex-based discrimination in constitutional law, family law, reproductive rights, educational Effective: 2003 Fall Semester.

LAW 231A—Sexual Orientation, Gender Identity, and the Law (3) ***Review all entries***
Discussion—3 hours. Examines the legal and social regulation of sexual orientation and gender identity. Effective: 2015 Fall Semester.

LAW 231A—Sexual Orientation, Gender Identity, and the Law (2) ***Review all entries***
Discussion—2 hours. Examines the legal and social regulation of sexual orientation and gender identity. Effective: 2018 Fall Semester.

LAW 232—Real Estate Finance (2)
Discussion—2 hours. An examination of the problems involved in the acquisition, financing, and development of real estate, and of lender remedies and debtor protections in the event of debtor default. The course stresses the practical application of California legal doctrines. Effective: 2005 Spring Semester.

LAW 232AT—Real Estate Transactions (2)
Discussion—2 hours. Review of legal issues in the purchase, sale, financing of residential real estate in US, with non-exclusive focus on California. Roles of parties involved, mechanisms of financing and security, survey of remedies, and role of mortgage lending beginning in 2008. Effective: 2015 Spring Semester.

LAW 232T—Property Law & Race (2)
Seminar—2 hours. Seminar explores the extent to which property law (common law, federal, state, and local statutes, and administration regulations) historically impacted and currently shapes conceptions of race, racial groups, and racial relations. Effective: 2014 Fall Semester.

LAW 233—Asylum and Refugee Law (2)
Seminar—2 hours. Course surveys U.S. and international law concerning refugees and asylum-seekers. This class will question the meaning of persecution, the definition of "particular social groups" in U.S. law, protections for gender-related violence, statutory bars to asylum, and U.S. refugee policy. Effective: 2017 Spring Semester.

LAW 234—Sexual Orientation and the Law (2) ***Review all entries Discontinued***
Discussion—2 hours. Examines the legal and social regulation of sexual orientation, emphasizing both the legal subordination of lesbians and gay men and the ongoing struggles to end that subordination. Sexual orientation issues in criminal, employment, constitutional, and family law will be covered. Materials will be both doctrinal and theoretical,and will include fiction and oral history as well as cases and statutes. Effective: 2001 Fall Semester.

LAW 234—Drug Law and Policy (2) ***Review all entries***
Seminar. Engage with the wide variety of policy and legal issues presented in the area of drug law and policy with a particular focus on one of the fastest-evolving fields in drug policy: marijuana law and policy. Effective: 2018 Fall Semester.

LAW 235—Administrative Law (3)
Discussion—3 hours. Examines how the U.S. Constitution and the federal Administrative Procedure Act constrain and regulate decision making by government agencies and officials. Effective: 2007 Fall Semester.

LAW 235B—Counseling and Legal Strategy in the Digital Age (2)
Lecture. Explores the complex challenges that entrepreneurs, businesses, and other organizations face when trying to address legal issues relating to technology. The seminar's approach is both practical and multidisciplinary, and it encourages students to explore the roles of a wide range of stakeholders (including lawyers, policy advocates and policymakers, businesspersons, and technologists) in developing legal and business strategies. Effective: 2017 Fall Semester.

LAW 236—Securities Regulations (3)
Discussion—3 hours. Prerequisite(s): LAW 215 Regulation of the distribution of securities under the Securities Act of 1933 and SEC Rules adopted there under, registration and reporting provisions of the 1934 Securities Exchange Act. Effective: 2014 Spring Semester.

LAW 236A—Securities Regulation I (2)
Discussion—2 hours. Prerequisite(s): LAW 215; or Consent of Instructor. Legal rules and concepts applicable to business associations, both public and closely held. Corporate form of organization, partnerships and other associational forms. Effective: 2016 Fall Semester.

LAW 236B—Securities Regulation II (2)
Discussion—2 hours. Prerequisite(s): LAW 215; or Consent of Instructor. LAW 236A recommended. Securities Exchange Act of 1934 and the regulation of securities markets. Topics covered include regulation of securities markets and securities professionals, responsibilities of securities lawyers, continuous reporting, transnational securities fraud, and enforcement of the securities acts. Effective: 2002 Fall Semester.

LAW 236C—Securities Enforcement (3)
Lecture. Examines the civil and criminal enforcement of the securities laws by both the Securities and Exchange Commission and Justice Department. Surveys the administrative rules and investigative procedures that govern the SEC and the substantive related crimes. Effective: 2018 Fall Semester.

LAW 236CT—Securities Enforcement (3) ***Review all entries***
Lecture—3 hours. Examines civil and criminal enforcement of securities laws by both the Securities and Exchange Commission and Justice Department. Surveys administrative rules and investigative procedures that govern the SEC and the substantive related crimes. Effective: 2017 Spring Semester.

LAW 236CT—Securities Enforcement (3) ***Review all entries Discontinued***
Lecture—3 hours. Examines civil and criminal enforcement of securities laws by both the Securities and Exchange Commission and Justice Department. Surveys administrative rules and investigative procedures that govern the SEC and the substantive related crimes. Effective: 2018 Fall Semester.

LAW 237—Legal History (2)
Discussion—2 hours. Course traces the development of the common law from its origins in medieval England through the twentieth-century. Effective: 2014 Fall Semester.

LAW 237B—Special Topics in Legal Theory: Ancient Athenian Law (2)
Seminar—2 hours. Athenian legal system was different from our own and was far less formal. How did it work? Why did it work? Why have political and legal theorists misunderstood Athens for so long and what can we learn from that failure? Effective: 2016 Spring Semester.

LAW 239—Mediation (3) ***Review all entries***
Discussion/Laboratory—3 hours. Restricted to 24 students. Interactive course focuses on attorney representation of clients in mediation. Effective: 2016 Fall Semester.

LAW 239—Mediation (2) ***Review all entries***
Discussion/Laboratory—2 hours. Restricted to 24 students. Interactive course focuses on attorney representation of clients in mediation. Effective: 2018 Fall Semester.

LAW 240—Reforming Campaign Finance Law and the Initiative Process (2)
Discussion—2 hours. Limited to 25 students. The recent election exposed many campaign finance and initiative issues. Focuses on reforms as well as the current law. Effective: 2017 Spring Semester.

LAW 240A—Law of the Political Process (3)
Discussion—3 hours. Covers many of the foundational issues in the "law of democracy," as that body of statutory and constitutional law has developed in the United States. Effective: 2005 Fall Semester.

LAW 241—Voting Rights Seminar (2)
Seminar—2 hours. Seminar investigates the right to vote as a matter of constitutional and statutory law, with emphasis on the voting rights of racial and ethnic minorities. Effective: 2017 Spring Semester.

LAW 242—Conflict of Laws (2)
Discussion—3 hours. Study of how law operates across state and national borders. Topics include choice of applicable law in transactions involving multiple jurisdictions, recognition of judgments, and the exercise of jurisdiction. Effective: 2014 Spring Semester.

LAW 242S—Special Session Conflict of Laws (2)
Discussion—2 hours. Study of transactions with multi-state and international contracts. Topics include jurisdiction, recognition of foreign judgments, and choice of applicable law. Addresses problems that international lawyers encounter in a wide variety of deals with the emphasis on international commercial deals. Effective: 2005 Summer Special Session.

LAW 243—Commercial and Bankruptcy Law (4)
Discussion—4 hours. Remedies available to creditors to force payment, along with devices that creditors may use to give themselves priority against limited assets. Bankruptcy both as a means for providing funds for creditors and as a device for maximizing asset value. Effective: 2002 Fall Semester.

LAW 243A—Secured Transactions (2)
Discussion—2 hours. Covers secured transactions (where a lender takes an interest in the debtor's property as "collateral," or security, for repayment of a loan) in personal property, such as auto loans and bank loans against business inventory. Effective: 2017 Fall Semester.

LAW 243B—Bankruptcy (3)
Seminar. Introduction to essentials of U.S. law governing bankruptcy of consumers and businesses. The course will address bankruptcy under Chapter 7, Chapter 13, and Chapter 11. Effective: 2017 Fall Semester.

LAW 243C—Advanced Bankruptcy Practice: Corporate Reorganization (2)
Lecture. Corporate chapter 11 bankruptcy under the Federal Bankruptcy Code and alternatives to corporate bankruptcy. Selection of venue. Formation of strategic objectives. Analysis of different professionals' roles. Effective: 2018 Fall Semester.

LAW 243CT—Advanced Bankruptcy Practice (2) ***Review all entries***
Discussion—2 hours. Course will cover corporate chapter 11 and its alternatives and analyze different professionals' roles. Selection of venue and formation of strategic objectives will also be discussed. Effective: 2016 Fall Semester.

LAW 243CT—Advanced Bankruptcy Practice (2) ***Review all entries Discontinued***
Discussion—2 hours. Course will cover corporate chapter 11 and its alternatives and analyze different professionals' roles. Selection of venue and formation of strategic objectives will also be discussed. Effective: 2018 Fall Semester.

LAW 245—Corporate and White Collar Crime (2)
Discussion—2 hours. Covers the law of conspiracy, corporate criminal liability, mail and wire fraud, the Hobbs Act, RICO, money laundering, obstruction of justice, and other white collar crimes and their associated defenses. Effective: 2017 Fall Semester.

LAW 245B—Death Penalty Seminar (2)
Seminar—2 hours. Limited enrollment. Offers overview of the constitutional law governing the death penalty in the United States. Effective: 2005 Spring Semester.

LAW 246—Federal Jurisdiction (3)
Discussion—3 hours. Prerequisite(s): LAW 205 Study of subject-matter jurisdiction of federal courts. Effective: 2006 Fall Semester.

LAW 247—Taxation of Partnerships and LLCs (3)
Lecture/Discussion—3 hours. Prerequisite(s): LAW 220 Study of the federal income tax treatment of partnerships and partners; including entities classified as partnerships. Effective: 2017 Spring Semester.

LAW 247A—International Aspects of U. S. Taxation (3)
Discussion—3 hours. Prerequisite(s): LAW 220 (can be concurrent); Completion or current enrollment in a course covering the domestic taxation of corporations is suggested but not required; Corporate Tax can be concurrent. Examine the U.S. income tax laws and policies related to the taxation of foreign income of U.S. persons and U.S. income of foreign persons. Effective: 2008 Fall Semester.

LAW 247B—Corporate Tax (2) ***Review all entries***
Discussion/Laboratory—2 hours. Examination of the federal income tax relationship between corporations and their owners. Covers the transfer of funds into a corporation on formation and the re-transfer of money and property from the corporation to its shareholders. Effective: 2016 Spring Semester.

LAW 247B—Corporate Tax (3) ***Review all entries***
Discussion/Laboratory. Examination of the federal income tax relationship between corporations and their owners. Covers the transfer of funds into a corporation on formation and the re-transfer of money and property from the corporation to its shareholders. Effective: 2018 Fall Semester.

LAW 248—Public International Law (3)
Discussion—3 hours. Introductory course covers basic international law concepts and the law-making process. Effective: 2007 Fall Semester.

LAW 248A—Jurisdiction in Cyberspace Seminar (2)
Seminar—2 hours. Limited enrollment. Review concepts in international law, conflicts of law, cyberlaw, and federal jurisdiction to address the growing multi-jurisdictional conflicts created by the Internet. Examine European efforts at crafting intra-Europe jurisdictional rules, as well as other international jurisdiction treaty projects such as Effective: 2005 Fall Semester.

LAW 248B—International Human Rights (2)
Discussion—2 hours. Introduces international human rights legal system through an examination of its historical origins and precursors and a review of its international legal backdrop, including the character and sources of international law, the UN Charter and the UN system. Effective: 2013 Spring Semester.

LAW 248C—Business and Human Rights (2)
Seminar—2 hours. Explores the human rights responsibilities of businesses from legal, ethical, historical, and comparative perspectives. Equip students with the tools to be sensitive to human rights considerations as legal practitioners or in other fields of endeavor. Effective: 2018 Spring Semester.

LAW 248CA—United Nations Human Rights Practicum I (2-3)
Variable. Prerequisite(s): Consent of Instructor. Opportunity to work in support of the mandate of the United Nations Special Rapporteur in the field of cultural rights. Effective: 2017 Fall Semester.

LAW 248CB—United Nations Human Rights Practicum II (2-3)
Variable. Prerequisite(s): Consent of Instructor. Build on the knowledge of the workings of the United Nations human rights system they gained in Practicum I, and gain further advanced experience working with UN documents, with individual cases in the field and with thematic reports. Effective: 2017 Fall Semester.

LAW 248D—Globalization and the Law (3)
Discussion—3 hours. Globalization of people, finance, goods, services, and information puts pressure on the nation-state form. In a world of diasporas and multinational corporations, what does citizenship mean? Effective: 2010 Fall Semester.

LAW 248ET—Transitional Justice and Memory Politics in the Asia-Pacific (2)
Seminar—2 hours. Transitional justice (legal responses to wrongdoings of repressive predecessor regimes) can help resolve "memory politics" that plague the relations and societies of many Asia-Pacific states. Together we will examine relevant roles of governments, novel institutions, the judiciary, and civil society. Effective: 2016 Spring Semester.

LAW 248G—Legal Spanish for U.S. Lawyers (2)
Seminar—2 hours. Prerequisite(s): Must satisfy one of the following: undergraduate degree in Spanish; a minor in Spanish with experience living in a Spanish-speaking country; grew up in a Spanish-speaking household and achieved proficiency; able to pass an informal assessment by the instructor. Designed for law students who are native Spanish-speakers or who have achieved proficiency in Spanish through study or experiences in a Spanish-speaking country. (S/U grading only.) Effective: 2010 Fall Semester.

LAW 248T—Advanced International Law (2)
Discussion—2 hours. Review books of international law; Hugo Grotius and Judge Rosalyn Higgins. Themes include peaceful resolutions of dispute, law of war and peace, and international legal process. Effective: 2015 Spring Semester.

LAW 248TA—Human Rights in Post Soviet Central Asia: Legal Tools For Repression and Redress (2)
Discussion—2 hours. Limited enrollment. Provides a historical context for the current political and human rights situation in Central Asia. Effective: 2010 Fall Semester.

LAW 248TC—International Economics Law (3)
Discussion—3 hours. Examine the architecture of the international economic system, with a focus on both trade and investment. Effective: 2010 Fall Semester.

LAW 248TT—Theories of International Law (2)
Discussion—2 hours. International law, once critiqued as powerless and ineffective, is now challenged as a threat to American democracy. Introduction to competing theories of international law, including natural law, positivism, realism, liberalism, constructivism, fairness, legal process, and world public order. Effective: 2010 Spring Semester.

LAW 249—Comparative Law (3)
Discussion—3 hours. The uses of comparative method, principal differences between common law and civil law and the styles of legal reasoning that prevail in these two great legal cultures. Topics include the evolution of the civil law, the phenomenon of codification, the structure of European civil codes and the interpretation of their provisions, the respective roles of counsel, judges and law teachers, civil law procedure, and the analysis of selected areas of substantive law. Knowledge of a foreign language is not required. Effective: 2002 Fall Semester.

LAW 249S—Special Session Comparative Law (1)
Discussion—1 hour. This course will provide a comparative perspective for students of American law. After an initial look at the uses of the comparative
method, discussions will be centered around the main differences between common law and civil law and the different styles of legal thinking. Topics to be covered will be the evolution of the civil law and the idea of codification, the structure of European civil codes and the interpretation of their provisions, the personnel of the law and procedure in civil law countries, and the analysis of selected problems of
substantive law. Knowledge of a foreign language will not be required. Effective: 2005 Summer Special Session.

LAW 250—Jurisprudence Seminar (3)
Seminar—3 hours. Limited enrollment. Deals principally with the question of how judges should decide "hard cases," where the content of the law is in doubt and competent arguments have or could be offered for mutually inconsistent decisions in favor of either party. Effective: 2015 Spring Semester.

LAW 250A—Aoki Legal Scholarship Seminar (3)
Seminar. For students participating in the Aoki Center for Race and Nation Studies' Immigration Law Journal. Research, and write a note on a topic related to immigration. Expectation is production of papers of publishable quality. Effective: 2017 Fall Semester.

LAW 250B—Writing Requirement Workshop (2)
Seminar—2 hours. Second- and third-year students produce a piece of academic writing that satisfies the King Hall writing requirement and is of publishable quality. Receive feedback both from the instructor and from one another in a workshop setting. (S/U grading only.) Effective: 2018 Spring Semester.

LAW 250T—Asian American Jurisprudence (3)
Discussion—3 hours. Legal, social, and political discourse on race relations has traditionally been framed in Black-White terms. This course disrupts the traditional view by taking Asian Americans seriously. Effective: 2007 Fall Semester.

LAW 251—Labor Law (2)
Discussion—2 hours. Survey of the legislative, administrative, and judicial regulation of labor relations under federal law. Historical development of labor law, the scope of national legislation, unions, strikes, picketing, and collective bargaining agreements. Effective: 2017 Spring Semester.

LAW 251T—Labor Law I (2)
Discussion—2 hours. Restricted to students who previously took Labor Law in Fall 2008 may not enroll in Labor Law I. Survey of the legislative, administrative, and judicial regulation of labor relations under federal law. Effective: 2009 Fall Semester.

LAW 251TB—Labor Law II (2)
Discussion—2 hours. Prerequisite(s): LAW 251T preferred; not required. Survey of the legislative, administrative, and judicial regulation of labor relations under federal law. Effective: 2010 Spring Semester.

LAW 252—International Litigation and Arbitration (3)
Discussion—3 hours. Current developments in international law, conflict of laws, civil procedure, arbitration, and comparative law in the context of transactions and disputes that cut across national boundaries. Effective: 2004 Fall Semester.

LAW 253—Policy Advocacy (2)
Lecture. In-depth examination of the legislative process both within the California Legislature and from the advocates' perspective. Train in key policy advocacy skills by legislative leaders and social justice advocates. Effective: 2018 Spring Semester.

LAW 253A—Community Lawyering (3)
Lecture. Study the need for community lawyering including the structural inequalities and privileges embedded in the legal system and society. Skills necessary for community lawyering as well as sites and models for practice will be examined. Effective: 2017 Fall Semester.

LAW 254—Housing Law (2)
Discussion—2 hours. Survey course covers legal and policy issues related to developing, protecting and preserving affordable, safe and accessible housing and sustaining viable, diverse communities. Effective: 2009 Fall Semester.

LAW 254A—White Working Class and the Law (2) ***Review all entries***
Seminar—2 hours. Considers the social, cultural, economic, and legal situation of low-income and/or low-education whites in contemporary U.S. society. Effective: 2017 Fall Semester.

LAW 254A—White Working Class and the Law (3) ***Review all entries***
Seminar. Considers the social, cultural, economic, and legal situation of low-income and/or low-education whites in contemporary U.S. society. Effective: 2018 Fall Semester.

LAW 254B—Access to Justice (2)
Seminar. Study of a variety of barriers that impede the access of unrepresented litigants to the courts--including poverty, racial bias, limited English proficiency and the digital divide--and critically examine existing solutions. Opportunity to develop and propose student's own solution to an access barrier. Effective: 2018 Fall Semester.

LAW 254T—Practicum in Rural Community Advocacy (3)
Seminar—3 hours. Limited enrollment. Provides an opportunity to learn about Participatory Action Research (PAR) methods and community-based lawyering in the context of rural community development and advocacy. Using these skills and knowledge to serve rural California communities. Effective: 2013 Spring Semester.

LAW 255—Pension and Employee Benefits Law (3)
Discussion—3 hours. Prerequisite(s): LAW 220 Federal regulation and taxation of private pensions and employee benefits. This course will cover the Employee Retirement Income Security Act (ERISA) and Internal Revenue Code issues. Effective: 2017 Spring Semester.

LAW 256—Land Use (2)
Discussion—2 hours. Local agencies, developers, environmental interest groups, and others who regularly deal with the administrative and legislative applications of land use planning and development laws. Topics include zoning, general plans, local government land use regulation, and related areas of litigation. The expanding role of the California Environmental Quality Act. Effective: 2004 Spring Semester.

LAW 257—Legislative Process (2)
Discussion—2 hours. Fundamental elements of the legislative process, including legislative procedure; the legislature as an institution; lobbying; statutory interpretation, legislative-executive relations; and the legislature's constitutional powers and limitations. Effective: 2002 Spring Semester.

LAW 257A—Legislative Intent Seminar (2)
Seminar—2 hours. Theories and principles of statutory and constitutional interpretation. Original intent vs. living constitution; permissible kinds of evidence for determining legislative intent; canons of construction; extent to which initiatives should be interpreted similarly to legislative enactments. Effective: 2003 Fall Semester.

LAW 257B—Statutory Interpretation (3)
Discussion—3 hours. Elective course for Environmental Law Certificate Program. Provides an introduction to the theory and practice of statutory interpretation. Effective: 2012 Fall Semester.

LAW 258—Professional Responsibility (3)
Discussion—3 hours. The ABA's Model Rules of Professional Conduct and the Code of Judicial Conduct, which are tested on the MPRE, and the California Rules of Professional Conduct, which are tested on the California Bar Examination. Students who take LAW 258A Legal Ethics and Corporate Practice are not eligible to enroll in this course. Effective: 2017 Fall Semester.

LAW 258A—Legal Ethics and Corporate Practice (3)
Lecture/Discussion—3 hours. Focus on corporate practice to explore the ethical responsibilities of lawyers. Students who take LAW 258 Professional Responsibility are not eligible to enroll in this course. Effective: 2017 Spring Semester.

LAW 258BT—Mindfulness and Professional Identity (2)
Seminar—2 hours. Introduction to the practice of meditation and connect it with readings about the legal profession in three key areas. Effective: 2016 Fall Semester.

LAW 258CT—The Business of Lawyering (2)
Discussion—2 hours. Desired outcome is a thorough understanding of the business side of law practice and to promote an understanding of the relationship and balance between legal skills, business requirements of a practice, client needs and a work-life balance. Effective: 2015 Fall Semester.

LAW 258DT—Setting Up and Maintaining Solo Law Practice (1)
Lecture/Discussion—1 hour. Introduction/overview of how to start a successful solo practice. Effective: 2016 Spring Semester.

LAW 258E—Utility of Law School and Careers in the Law (1)
Lecture. Despite improvements in the economy, some observers continue to question whether law school is a viable option for college graduates. Considers the controversy and expose students to the variety of careers in the legal profession. (S/U grading only.) Effective: 2017 Fall Semester.

LAW 258F—Practice Ready Seminar (2)
Seminar. Includes a discussion and review of the role of the junior attorney within a law firm/legal department, professional goal-setting, strategies for effective communication and work within teams, delegation and resource management, organization and time management, an introduction to common junior-level assignments and how to complete them efficiently and effectively, building a professional network, and an introduction to business development, among other topics. (S/U grading only.) Effective: 2017 Fall Semester.

LAW 259—Feminist Legal Theory (3)
Discussion—3 hours. Provides an overview of feminist legal theory and considers how its various strands inform legislative and judicial law making. Satisfies Advanced Writing Requirement. Effective: 2016 Fall Semester.

LAW 259A—Women, Islam and the Law (2)
Seminar—2 hours. This course will study legal and religious reform movements for women's rights within Muslim communities in the context of current scholarly and political debates about fundamentalism, democracy, equality, secularism, universalism, and multiculturalism. This is a limited enrollment seminar. Effective: 2007 Fall Semester.

LAW 259B—Women's Human Rights (2)
Seminar—2 hours. Overview of international legal and institutional system for the protection of women’s human rights from an academic perspective and the view of the practitioner. Includes the (CEDAW), violence against women, sexual and reproductive rights, economic rights, and more. Effective: 2016 Spring Semester.

LAW 259P—Women and the Law Practicum (1)
Discussion/Laboratory. Prerequisite(s): LAW 259 (can be concurrent) Complements the content of the feminist legal theory course by providing students the opportunity to consider how feminist theory may be used to inform law-making. Effective: 2007 Fall Semester.

LAW 260—Employment Discrimination (3)
Discussion—3 hours. Examine federal laws prohibiting employment discrimination, including Title VII of the Civil Rights Act of 1964, the Equal Pay Act, the Age Discrimination in Employment Act, the Americans with Disabilities Act, the Rehabilitation Act of 1973, and § 1981. Effective: 2008 Fall Semester.

LAW 260A—Employment Law (3)
Discussion—3 hours. Provides an overview of employment law, labor law and employment discrimination law and aims to serve as a foundation for understanding the law and policy (statutory and common law) that surround the employer-employee relationship. Effective: 2016 Spring Semester.

LAW 261—Judicial Process (2)
Discussion—2 hours. Examines a variety of issues concerning the judicial process. Focus is on judge's role in the legal process, the administration of justice, ethical issues, decision making, bias, and critical examination of the strengths and weaknesses in our current judicial system. Effective: 2008 Fall Semester.

LAW 262—Antitrust (3)
Discussion—3 hours. Focus on the federal antitrust laws, concentrating on basic substantive areas of the Sherman and Clayton Acts. Effective: 2009 Fall Semester.

LAW 262AT—US Antitrust Law and Indian Competition Law: A Comparative Perspective (2)
Lecture/Discussion—2 hours. Fundamental principles of Indian Competition Law and US Antitrust Law in a comparative perspective. The course will help American students, interested in future corporate law careers, to develop effective strategies for better managing cross border deals in India. Effective: 2016 Spring Semester.

LAW 262B—Regulated Industries (2)
Seminar. Examines regulation of business in sectors, traditionally described as "common carrier" and "utility" industries, where because of market failures normal competitive mechanism will not protect consumers from exercises of market power. Effective: 2017 Fall Semester.

LAW 262S—Special Session Antitrust (1)
Discussion. A study of the federal antitrust laws including price fixing, limits on distribution, tying arrangements, monopolization and mergers. Effective: 2005 Summer Special Session.

LAW 263—Criminal Trial Skills (4) ***Review all entries***
Seminar. Trial advocacy course centered on client relationship building, preparation for trial, and courtroom practice. Effective: 2017 Fall Semester.

LAW 263—Criminal Trials: Theory and Practice (4) ***Review all entries***
Seminar. Trial advocacy course centered on client relationship building, preparation for trial, and courtroom practice. Effective: 2018 Fall Semester.

LAW 263A—Trial Practice (3)
Discussion—2 hours; Laboratory—1 hour. Prerequisite(s): LAW 219 (can be concurrent) Limited enrollment. Introduction to the preparation and trial of cases, featuring lectures, videotapes, demonstrations, assigned readings and forensic drills. Laboratory held on Tuesday, Wednesday, and Thursday evening. (S/U grading only.) Effective: 2016 Fall Semester.

LAW 263B—Advanced Trial Practice (2)
Discussion—2 hours. Prerequisite(s): LAW 219; LAW 263A Class limited to 40 students. Trains students on the organization and presentation of a complex trial, including pretrial preparation, jury selection, strategy considerations, evidentiary issues, and effective handling of plaintiff and defense cases through verdict. (S/U grading only.) Effective: 2016 Fall Semester.

LAW 264—Water Law (3)
Discussion—3 hours. Property rights in surface waters, including riparian rights, prior appropriation, and public rights use of water bodies; environmental constraints on exercise of water rights; groundwater rights and management; federal allocation and control of water resources; legal aspects of interstate allocation. Effective: 2016 Spring Semester.

LAW 264A—Ocean and Coastal Law (3)
Discussion—3 hours. Introduction to the goals and challenges of coastal and ocean policy; the complicated web of public and private interests in coastal lands and ocean waters; regulation of coastal development; domestic and international fisheries management; and preservation of ocean resources. Effective: 2015 Spring Semester.

LAW 265—Natural Resources Law Seminar (2)
Seminar—2 hours. Prerequisite(s): LAW 285 or LAW 256 recommended, but not required. Restricted to 15 students. In-depth coverage of two foundational principles of natural resources law: public trust doctrine and private property rights protected under the Takings Clause of the U.S. and many state constitutions. Effective: 2011 Spring Semester.

LAW 266A—Cyberlaw (3)
Lecture/Discussion—3 hours. Emerging legal issues crucial to the conduct of business in cyberspace. Discussion of the evolution and current administration of the Internet and the World Wide Web. Effective: 2017 Spring Semester.

LAW 267—Civil Rights Law (2)
Discussion—2 hours. Civil remedies for civil rights violations under the primary United States civil rights statute. Specifically, covers actions for constitutional and statutory violations under 42 USC §1983, affirmative defenses, and abstention doctrines. Effective: 2017 Fall Semester.

LAW 267B—Civil Rights Seminar (2)
Seminar—2 hours. Limited enrollment. The social, political, legal and historical factors which led to the creation of the United States Commission on Civil Rights (USCCR) in 1957. The United States Commission on Civil Rights is a bipartisan, independent agency established by the Civil Rights Act. It is directed to investigate complaints alleging deprivations of the right to vote, and voter fraud; to study and collect information relating to discrimination and the denial of equal protection of the laws under the Constitution on the basis of race, color, religion, sex, age, disability, or national origin; and submit reports, findings and recommendations to the President and to Congress. The role that the USCCR has played and continues to play in American politics, legislative enactments and the national dialogue on equality, fairness and justice in the context of civil and human rights. Satisfies Advanced Legal Writing Requirement. Effective: 2002 Spring Semester.

LAW 268T—Suing the Government: Civil Rights, Torts, Takings, and More (2)
Discussion—2 hours. Explores the basic requirements of suing government, including sovereign immunity, particular schemes for litigating against government (Federal Tort Claims Act, APA, False Claims Act, etc.), direct constitutional claims and the procedural pitfalls and remedies available against government. Effective: 2016 Spring Semester.

LAW 269—Basic Finance for Lawyers (3)
Discussion—3 hours. Prerequisite(s): Students with a non-law basic finance course will not be admitted, except with consent of instructor. Basic techniques of analysis that are part of the core curriculum in a good business school. Gives background necessary for understanding and advising your clients and for understanding other business-related law school courses. Effective: 2017 Spring Semester.

LAW 269AT—The Financial Crisis: Law & Policy and Inequality (2)
Seminar—2 hours. Examines the regulation of financial intermediaries. The stated goal of regulation is to ensure systemic stability and to pursue consumer protection. We will ask whether there is an imbalance between systematic stability and consumer protection before the crisis of 2008. Effective: 2013 Spring Semester.

LAW 269B—Financial Regulation and Consumer Protection (3) ***Review all entries***
Lecture. Examines efforts to ensure a "fair" financial marketplace, focusing on the 2010 Dodd-Frank Act and its creation of the Consumer Financial Protection Bureau and regimes enacted to protect consumers. Effective: 2017 Fall Semester.

LAW 269B—Consumer Protection and Financial Regulation (3) ***Review all entries***
Lecture. Examines efforts to ensure a "fair" financial marketplace, focusing on the 2010 Dodd-Frank Act and its creation of the Consumer Financial Protection Bureau and regimes enacted to protect consumers. Effective: 2018 Fall Semester.

LAW 269C—Corporate Finance (3)
Discussion—3 hours. Prerequisite(s): LAW 215 or concurrent enrollment recommended. Focus on how corporations raise money, stocks and bonds, etc.; how deals are structured and why corporations use one strategy instead of another. Effective: 2010 Fall Semester.

LAW 269D—Seminar on Financial Regulation (2)
Seminar—2 hours. Introduction to the legal and regulatory issues presented by contemporary capital markets. Effective: 2011 Fall Semester.

LAW 269E—Public Finance (3)
Seminar. Introduction to the basic concepts of public finance, the underlying law governing public finance: in particular state law, federal tax law and federal securities law. Effective: 2017 Fall Semester.

LAW 270—International Business Transactions (2) ***Review all entries***
Lecture/Discussion—2 hours. Select legal problems arising from international business transactions. Effective: 2017 Fall Semester.

LAW 270—International Business Transactions (3) ***Review all entries***
Lecture/Discussion. Select legal problems arising from international business transactions. Effective: 2018 Fall Semester.

LAW 270A—Life-Cycle Transactions and Drafting (3)
Discussion—3 hours. Prerequisite(s): Business Associations and/or Trusts, Wills & Estates are recommended for enhanced comprehension. Class focuses on analysis of contract drafting design for various types of transactions and actual transactional documents typically encountered. Effective: 2016 Spring Semester.

LAW 270S—Special Session International Business Transactions (2)
Discussion—2 hours. A consideration of select legal problems arising from international business transactions. Topics include the international sales contract, letters of credit, transfers of technology, regulation of bribery, repatriation of profits, and national efforts to control imports. Effective: 2005 Summer Special Session.

LAW 271—Nonprofit Organizations and Drafting (4)
Extensive Writing/Discussion—4 hours. Prerequisite(s): LAW 215; or Consent of Instructor. Restricted to 13 students. Learn special legal rules and concepts applicable to non-profit organizations; particularly IRC 501(c)(3) nonprofits. Combination skills class and a lecture course. Effective: 2010 Fall Semester.

LAW 271A—NonProfit Organizations: State and Local Governance Issues (2)
Discussion—2 hours. Prerequisite(s): LAW 215 (can be concurrent); or Consent of Instructor. Focuses on the state and local laws applicable to nonprofit organizations; i.e., public interest, cultural, religious, educational and other not-for-profit entities. Effective: 2009 Fall Semester.

LAW 271B—Nonprofit Organizations: Tax Exemptions & Taxation Focus (2)
Discussion—2 hours. Prerequisite(s): LAW 215; or Consent of Instructor. LAW 220 recommended. Focuses on the conceptual basis and substantive law criteria for the federal and state income tax exemption of nonprofit organizations. Effective: 2009 Spring Semester.

LAW 271T—Nonprofit Organizations-Key Legal Topics (2)
Discussion—2 hours. Legal issues raised in operating and governing a nonprofit organization, primarily a public charity. Effective: 2014 Spring Semester.

LAW 272—Family Law (3)
Discussion—3 hours. An introduction to the legal regulation of the family. Effective: 2008 Fall Semester.

LAW 273A—Education Policy and the Law (3)
Discussion—3 hours. Topics include civil rights, inequality and the "right" to an education, bilingual education, school finance litigation, educational access, No Child Left Behind Act, Common Core Standards and charter schools. For students interested in educational policy and social regulatory policy. Effective: 2016 Fall Semester.

LAW 273BT—Special Education Law and Policy (2)
Lecture. Introduction to the law of special education including the Individuals with Disabilities in Education Act (IDEA), Section 504 of the Rehabilitation Act, and federal regulations governing special education law. Effective: 2017 Fall Semester.

LAW 274—Intellectual Property (3)
Discussion—3 hours. Provides a broad survey of intellectual property law. Effective: 2007 Fall Semester.

LAW 274A—International Intellectual Property and Development (3) ***Review all entries***
Discussion—3 hours. Examines international trade law, national customs law, intermediary liability rules, claims for rights in traditional knowledge and genetic resources, protections for geographical indications, technology transfer, and intellectual property piracy. Effective: 2017 Fall Semester.

LAW 274A—International Intellectual Property and Development (2) ***Review all entries***
Discussion. Examines international trade law, national customs law, intermediary liability rules, claims for rights in traditional knowledge and genetic resources, protections for geographical indications, technology transfer, and intellectual property piracy. Effective: 2018 Fall Semester.

LAW 274AS—Special Session Intellectual Property (2)
Discussion—2 hours. This course provides a broad survey of the field of intellectual property. Areas covered will include trademarks, patents, trade secrets, idea protection, unfair competition, and copyright. Effective: 2005 Summer Special Session.

LAW 274BT—Law of Trade Secrets and Restrictive Covenants (2)
Discussion—2 hours. Focus is on the law of trade secrets, including the Uniform Trade Secret Act (UTSA), restrictive covenants not to compete, and current case law developments in the areas of employee mobility and raids, and corporate espionage. Effective: 2013 Fall Semester.

LAW 274CT—Knowledge Commons, Collaborative Authorship, Open Access (2)
Seminar—2 hours. Focuses on the increasingly global diffusion and success of collaborative forms of cultural and technoscientific production rooted in copyright-based licenses. Effective: 2013 Spring Semester.

LAW 274D—Intellectual Property in Historical Context Seminar (2)
Seminar—2 hours. How the legal system has adapted to earlier periods of rapid change by creating, delimiting, and expanding intellectual property rights (IPRs). Required paper satisfies advanced writing requirement. Effective: 2015 Spring Semester.

LAW 274ET—Intellectual Property, Human Rights & Social Justice (2)
Seminar—2 hours. Course will examine the implications of copyright and patents for a broad set of social justice values, with particular emphasis on the interaction between intellectual property law and human rights law on the global stage. Effective: 2016 Fall Semester.

LAW 274FT—Censorship in the Global Age (2)
Seminar—2 hours. Course examines from a globalized perspective a broad range of censorship issues, drawing from established cases and practices. This seminar attempts to identify a globally consistent set of theories that have gained traction in relevant regional or international debates. Effective: 2016 Fall Semester.

LAW 274GT—Race, National Identity and Intellectual Properties (2)
Seminar—2 hours. Drawing upon methods taken from critical race theory, critical/cultural studies, and rhetoric this course addresses the relationships between intellectual properties and processes racial/national identity formation in the US, particularly as exemplified in legal, popular cultural, and political texts. Effective: 2016 Fall Semester.

LAW 274H—Theory and History of Intellectual Property (2)
Seminar. Seminar traces development of intellectual property law in the U.S. and Europe because it is not possible to understand the logic and shape of current Intellectual Property concepts outside of their messy history. Effective: 2017 Fall Semester.

LAW 275—Complex Litigation in a Civil Rights Context (2)
Discussion—2 hours. Study of the issues that frequently arise in large complex litigation involving multiple parties and multiple claims. Effective: 2017 Fall Semester.

LAW 275TA—Intellectual Property Agreement Drafting for Biotech & Pharma (2)
Seminar—2 hours. Prerequisite(s): Upper-division Business Law course or Intellectual Property course; priority given to students that have completed LAW 274. Covers the negotiation and drafting of intellectual property agreements common in the biotechnology and pharmaceutical arena. Effective: 2011 Fall Semester.

LAW 276—Juvenile Justice Process (2)
Lecture/Discussion—2 hours. Legal and philosophical bases of a separate juvenile justice process for crimes committed by minors. The role of counsel at each phase of the process is examined. Effective: 2017 Spring Semester.

LAW 277—Federal Indian Law (3)
Discussion—3 hours. Focuses on legal relations between Native American tribes and the federal and state governments. Effective: 2016 Fall Semester.

LAW 277A—Tribal Justice (2)
Lecture. Examines the administration of justice within tribal governments and courts and the efforts of advocates to achieve justice for tribes through litigation, policy advocacy, public education, organizing, and inter-governmental collaboration. Effective: 2017 Fall Semester.

LAW 277T—Indian Gaming Law Seminar (2)
Seminar—20 hours. Examines unique historical, political and legal context in which Indian tribes operate casinos, including impacts on tribal sovereignty, relations between tribes, states and local governments and changing relationships among the tribes themselves members, with particular reference to experience of California. Effective: 2007 Fall Semester.

LAW 278—Pretrial Skills (2)
Discussion—2 hours. Limited enrollment. This course uses role-playing exercises, videotaped simulations, and related projects to introduce students to lawyering skills basic to the practice of law, including client interviewing, witness interviewing and discovery, including depositions. Effective: 2005 Fall Semester.

LAW 279—Legal Analysis (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. Limited enrollment; for 2Ls only. Focuses on skills critical to law school success, and ultimately, bar exam success. (S/U grading only.) Effective: 2018 Spring Semester.

LAW 280—Advanced Legal Writing: Analytical & Persuasive Writing (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. Develop essay writing skills and performance test drafting typically employed on the bar examination. (S/U grading only.) Effective: 2015 Spring Semester.

LAW 280AT—Legal Analysis (2) ***Review all entries***
Discussion—2 hours. Selected enrollment by permission of professor; 2L's only. Focuses on skills critical to law school success, and ultimately, bar exam success. (S/U grading only.) Effective: 2013 Fall Semester.

LAW 280AT—Legal Analysis (2) ***Review all entries Discontinued***
Discussion—2 hours. Selected enrollment by permission of professor; 2L's only. Focuses on skills critical to law school success, and ultimately, bar exam success. (S/U grading only.) Effective: 2018 Fall Semester.

LAW 280B—Problem Solving and Analysis (2)
Lecture. Prerequisite(s): Consent of Instructor. Restricted to third-year Law students only. Skills focused on the development of legal analytical and organizational methods essential to successful completion of the Performance Test component of the California Bar Exam (and other states), and, by extension, to success in the practice of law. (S/U grading only.) Effective: 2017 Fall Semester.

LAW 281—State and Local Government Law (3)
Discussion—3 hours. Topics include: federalism, relations between states and localities, governmental liability, zoning, educational equity, and public finance. Readings will be drawn not only from case law and statues, but from history, theory and public policy. Effective: 2017 Fall Semester.

LAW 282—Energy Law Seminar (2)
Seminar—2 hours. The history, law, and public policy of energy regulation in the United States with an emphasis on economic and environmental regulation.
Competitive restructuring of the natural gas and electric utility industries emphasized. The basic regulatory schemes for other energy sources such as hydroelectric power, coal, oil, and nuclear power
explored. Recommended to anyone who has an interest in the energy sector, various models of economic regulation, or regulated industries. Effective: 2000 Fall Semester.

LAW 282A—Renewable Energy Seminar (2)
Seminar. Provides a broad overview of renewable energy law and policy with a particular focus on the California policy context. Topics include renewable electricity, California's renewable portfolio standard, and project development. Effective: 2017 Fall Semester.

LAW 283—Remedies (3)
Lecture/Discussion—3 hours. Survey of modern American civil remedies law in both private and public law contexts. Topics include equitable remedies, equitable defenses, contempt power, injunctive relief, restitution, and money damages in torts and contracts. Effective: 2017 Fall Semester.

LAW 284—Law and Economics (4)
Discussion—4 hours. Prior study of economics is not required. Introduces students to the economic analysis of law. Effective: 2013 Fall Semester.

LAW 285—Environmental Law (4)
Discussion—4 hours. Introduction to environmental law, focusing primarily on federal law. Effective: 2014 Fall Semester.

LAW 285A—California Environmental Issues (2)
Discussion—2 hours. The "Nation-state" of California has for many years been a national and global leader in environmental law and policy. Survey of key California environmental law and policy issues. Effective: 2014 Fall Semester.

LAW 285BT—Food Justice (2)
Seminar—2 hours. Focus on the law and policy of the emerging "food justice movement," which combines the goals and principles of the environmental justice movement with some of the policy initiatives involved in "ethical consumption" and "sustainable agriculture" movements. Effective: 2012 Fall Semester.

LAW 285C—Food and Agricultural Law (2)
Discussion—2 hours. Introduction to agricultural law, focusing on legal principles and issues at the forefront of contemporary debates about agriculture in society. Effective: 2016 Fall Semester.

LAW 285E—Climate Change Law and Policy (3)
Discussion—3 hours. Addresses the legal and public policy dimensions of climate change, perhaps the most important environmental issue of our time. Effective: 2011 Fall Semester.

LAW 285F—Environmental Justice (2)
Discussion—2 hours. Introduction to the field of environmental justice. Effective: 2014 Spring Semester.

LAW 285G—Environmental Law Seminar: Emerging Technologies and the Environment (2)
Seminar. Examines legal regimes that might apply to various emerging technologies and consider governance mechanisms and reforms that might enable more foresighted and participatory development and management of technology. Effective: 2016 Spring Semester.

LAW 285H—Comparative Environmental Law (2)
Discussion—2 hours. Focus on Pacific Rim, examining factors, similarities/differences in countries environmental regulation and success of environmental law. Including information and market-based regulatory approaches; compliance and enforcement gaps; citizen and community mobilization; the role of legal institutions; variations in regulatory style. Effective: 2015 Spring Semester.

LAW 285TA—Environmental Law Seminar: Emerging Technologies and the Environment (2)
Seminar—2 hours. Examines legal regimes that might apply to various emerging technologies and consider governance mechanisms and reforms that might enable more foresighted and participatory development and management of technology. Effective: 2013 Fall Semester.

LAW 286—Health Care Law (3)
Discussion—3 hours. Addresses legal issues raised in general areas: access to health care and health care financing. Course materials and discussion focus on both public and private aspects of these issue areas. Effective: 2013 Fall Semester.

LAW 286A—Topical Issues in Health Law (2)
Seminar—2 hours. Limited enrollment. The course focuses on four-six issues at the interface of law, medicine, bioethics, and health policy that are currently the subject of major litigation, legislation, and/or contentious debate in the domains of bioethics and public policy. Effective: 2006 Fall Semester.

LAW 286B—Public Health Law (2)
Discussion—2 hours. Restricted to 15 students. Public health law, seen broadly, is the government's power and responsibility to ensure the conditions for the population's health. Effective: 2010 Fall Semester.

LAW 286C—Bioethics (3) ***Review all entries***
Discussion—3 hours. Limited enrollment. Course examines the ethical and legal issues that arise from biomedical research and use of medical technologies. Effective: 2006 Fall Semester.

LAW 286C—Bioethics (2) ***Review all entries***
Discussion. Limited enrollment. Examines the ethical and legal issues that arise from biomedical research and use of medical technologies. Effective: 2018 Fall Semester.

LAW 286D—Legal Psychology Seminar (2)
Seminar—2 hours. Examines how psychological theory and research can be used to shape laws and policies to make them better reflect what we know empirically about how individuals process information, make decisions and behave. Effective: 2005 Fall Semester.

LAW 286E—Reproductive Rights, Law, and Policy (2)
Seminar—2 hours. Limited enrollment. Addresses a variety of laws and practices that affect reproductive health and procreative decision making. Effective: 2008 Fall Semester.

LAW 287—Public Land Law (2)
Discussion—2 hours. Legal aspects of federal land management, including the history of public land law, the scope of federal and state authority over the federal lands, and the allocation of public land resources among competing uses. Effective: 2017 Fall Semester.

LAW 287A—Poverty Law (2)
Seminar—2 hours. Limited enrollment. Explore the theory and practice of law pertaining to the enactment and enforcement of laws regulating or aiding the poor and other disadvantaged persons. Effective: 2015 Fall Semester.

LAW 287T—Law and Society Seminar (2)
Seminar—2 hours. Limited enrollment. Study of law and society challenges traditional legal scholarship by exploring multiple ways in which law both shapes and is shaped by societies and social interactions. Seminar will introduce students to important literature and debates in the field. Effective: 2006 Fall Semester.

LAW 288—Advanced Constitutional Law Seminar (2)
Seminar—2 hours. Prerequisite(s): LAW 218 (can be concurrent) or LAW 218A (can be concurrent) Limited enrollment. Seminar explores in-depth selected topics or problems in constitutional law and theory. The current focus will include diverse topics including abortion rights, the development of Second Amendment jurisprudence, and other subject areas. Effective: 2011 Fall Semester.

LAW 288A—Comparative Constitutional Law Seminar (2) ***Review all entries Discontinued***
Seminar—2 hours. Understanding of constitutionalism and of the Constitution of the United States. Constitutional protection of individual rights and the structure of constitutions. Effective: 2010 Spring Semester.

LAW 288A—Presidential Powers Seminar (2) ***Review all entries***
Seminar. Explores the Constitutional powers of the President in Article II and how they intersect with Congressional power. Emphasis on executive and legislative power, executive orders, appointment and removal powers, executive privilege and immunity, pardons, impeachment, Congressional investigations, independent and special counsels, and the 25th Amendment. Effective: 2018 Fall Semester.

LAW 288B—Supreme Court Simulation Seminar (3)
Seminar—3 hours. Take on the role of Justices of, and advocates before, the Supreme Court of the United States. Effective: 2017 Fall Semester.

LAW 289A—Biotechnology Law and Policy (2)
Seminar—2 hours. Limited enrollment. Coverage includes the regulation of biotechnology research, including restrictions on cloning and fetal stem cell research; regulation of the products of biotechnology to protect human health or the environment, including restrictions on use or distribution of genetically modified organisms; the Effective: 2002 Fall Semester.

LAW 290—International Trade Dispute Seminar (2)
Seminar—2 hours. The WTO and other regional trading agreements, particularly the NAFTA, provide mechanisms for resolution of trade disputes. Students are introduced to economic, political, and legal theories underlying establishment of such bodies. Effective: 2007 Fall Semester.

LAW 290AT—Privacy, Surveillance, and "Sousveillance" (3)
Discussion—3 hours. Issues of privacy and surveillance are important to businesses, governments and citizens. Surveillance raises issues of autonomy and the abuse of power. "Sousveillance," (citizen holds the camera), is a mechanism for rooting out corruption and exposing individuals to societal scrutiny. Effective: 2015 Fall Semester.

LAW 290BT—Surveillance and States (3)
Seminar—3 hours. Examines the tensions between democracy and the rise of government power entailed by the growth of state surveillance, United States surveillance law and practice, and surveillance law and practice across the world. Also considers international legal constraints on government surveillance. Effective: 2016 Summer Semester.

LAW 290C—Information Privacy Law (2)
Seminar—2 hours. Prerequisite(s): Criminal Procedure strongly recommended. Examine several topics that arise in field of information privacy law, with a special emphasis on law enforcement access to this information. Effective: 2018 Spring Semester.

LAW 290T—International Trade Law (2)
Discussion—2 hours. Review existing landscape of trade regulation from the World Trade Organizations, to regional organizations such as NAFTA, ASEAN, and the European Union. Effective: 2018 Spring Semester.

LAW 291A—International Finance (4)
Discussion—4 hours. Money makes the world go round. We will try to follow that money, learning how a framework of national and international laws and institutions regulates (or perhaps fails to regulate) its flow. Effective: 2009 Fall Semester.

LAW 291B—International Investment Dispute Seminar (2)
Seminar—2 hours. This seminar will examine the law of investor-State dispute resolution. Effective: 2005 Fall Semester.

LAW 291T—International Arbitration and Investment Law (2)
Lecture. Covers international arbitration involving States, individuals, and corporations; including: the parties; the agreement to arbitrate; the arbitrators; the arbitral proceeding; and, the arbitral award. Effective: 2017 Fall Semester.

LAW 292—Immigration Law and Procedure (3)
Discussion—3 hours. Surveys the history of U.S. immigration law and policy. Effective: 2006 Spring Semester.

LAW 292A—Advanced Topics in Immigration and Citizenship Law Seminar (2)
Lecture. Prerequisite(s): LAW 292; May be waived by the professor. Conducts a closer examination of various topics and subject matters that relate to immigration and citizenship law. Effective: 2017 Fall Semester.

LAW 293—Public Interest Law (2)
Seminar—2 hours. This class will examine the issues and problems associated with providing civil legal services to persons and interests in American society that typically have been unable to afford or otherwise obtain representation from the private bar. Effective: 2006 Fall Semester.

LAW 293AT—Contemporary Issues in Economic Justice (2)
Discussion—2 hours. Provides an introduction to the social justice critique of free markets. Effective: 2013 Spring Semester.

LAW 293T—Public Interest Lawyering, Civil Rights and Employment Law (2)
Seminar—2 hours. Prerequisite(s): LAW 260; LAW 260AT Advanced course covers employment law issues through the lens of public interest lawyers and their constituencies. Effective: 2014 Spring Semester.

LAW 294A—Law and Popular Culture (2)
Seminar—2 hours. This course examines works of popular culture, films, and legal texts. Each session will focus on a particular film and its cultural implications, particular problem or problems of law, law practice, legal ethics, traditional ethics, or public policy. Effective: 2006 Spring Semester.

LAW 295A—Trademark and Unfair Competition Law (2)
Discussion—2 hours. Prerequisite(s): LAW 274 recommended, not required. Intensive look at selected issues in Trademark Law, including the concepts of trademarks and unfair competition, acquisition and loss of trademark rights, infringement, trademarks as speech, and international aspects of trademark protection. Effective: 2016 Spring Semester.

LAW 295B—University Brands (3)
Lecture. Universities gain from developing brands, to draw donors and students and lend prestige to a range of activities – merchandise, publishing, technology transfer, continuing education, hospitals, distance learning, etc. Whether private, public, elitist, or inclusive, the university can no longer avoid to brand itself. Discusses the role of trademarks in the university and changes affecting it. Effective: 2018 Fall Semester.

LAW 295T—Brands and Trademarks (2)
Seminar—2 hours. Explores the challenges brands pose to traditional trademark
law. Taking a close, interdisciplinary look at branding: from the business schools' theories of brand management to semiotic analyses of
brand meaning to art criticism of brand advertisements. Effective: 2012 Fall Semester.

LAW 296—Copyright (3)
Discussion—3 hours. Thorough examination of the law of copyright, including its application to literature, music, films, television, art, computer programs, and the Internet. Effective: 2015 Fall Semester.

LAW 296C—Fictional Characters and Real People (2)
Discussion—2 hours. Celebrities and fictional characters both have a powerful hold on the human imagination and are important parts of our modern myths. Examines the legal protection available for each. Effective: 2011 Spring Semester.

LAW 296D—Art Law (2)
Discussion—2 hours. Selected issues in Art Law, including meaning of art, how to represent artists, copyright, publicity, first amendment rights, censorship, street art, government regulation, art markets, international protection of art and cultural property; and more. Effective: 2017 Spring Semester.

LAW 296T—Entertainment Law (2)
Discussion—2 hours. Explores the many facets of Entertainment Law. Effective: 2014 Spring Semester.

LAW 297—Alternative Dispute Resolution (3)
Discussion—3 hours. Limited enrollment. Introduces students to a wide variety of alternative dispute resolution procedures, with an emphasis on negotiation, mediation and arbitration. Effective: 2007 Fall Semester.

LAW 297A—Federal Arbitration Act Seminar (2)
Seminar—2 hours. Trace the development of commercial arbitration law, with a special emphasis on hot-button contemporary issues like consumer and employment arbitration, the separability doctrine, preemption of state law, and the arbitrability of statutory claims. Effective: 2016 Spring Semester.

LAW 297BT—International Commercial Arbitration (3)
Discussion—3 hours. International commercial arbitration, Convention on International Sale of Goods, general understanding of international arbitration provided by World Bank's International Centre for Settlement of Investor-State Disputes under Convention on Settlement of Investment Disputes between States and Nationals of Other States. Effective: 2015 Spring Semester.

LAW 298—Sociology of the Legal Profession Seminar (2)
Seminar—2 hours. Limited enrollment. Comprehensive look at the organization, operation, and ideology of the legal profession. Effective: 2006 Fall Semester.

LAW 400A—Study Abroad - University College Dublin, Ireland (12)
Independent Study. Students must apply and be accepted into the International Study Abroad Program. Semester away study abroad at the University College Dublin, Ireland. Enhance knowledge of international legal regimes and obtain a global legal educational experience. (S/U grading only.) Effective: 2008 Spring Semester.

LAW 400B—Study Abroad--University of Cophengen, Denmark (12)
Independent Study. Students must apply and be accepted into the International Study Abroad Program. Semester study abroad at the University of Copenhagen, Denmark. Enhance knowledge of international legal regimes and obtain a global legal educational experience. (S/U grading only.) Effective: 2008 Spring Semester.

LAW 400C—Study Abroad - China University of Political Science and Law (12)
Independent Study. Student must apply and be acceptance in the International Study Abroad Program. Semester-away study abroad at the China University of Political Science and Law. Enhance knowledge of international legal regimes and obtain a global legal educational experience. (S/U grading only.) Effective: 2009 Spring Semester.

LAW 400D—Study Abroad - University of Lausanne, Switzerland (12)
Independent Study. Student must apply and be accepted in the International Study Abroad Program. Semester-away study abroad at the University of Lausanne, Switzerland. Enhance knowledge of international legal regimes and obtain a global legal educational experience. (S/U grading only.) Effective: 2013 Fall Quarter.

LAW 400E—Study Abroad-Comillas Pontifical University Madrid, Spain (12)
Independent Study. Semester-away study abroad at the Comillas Pontifical University in Madrid, Spain. Enhance knowledge of international legal regimes and obtain a global legal educational experience. (S/U grading only.) Effective: 2017 Fall Semester.

LAW 400S—Critical Topics in Environmental Law in a Comparative Perspective (2)
Seminar—2 hours. Enrollment by application only. Intensive, two-week program provides an opportunity for U.S. and international law students to study environmental law by examining and comparing European Union and U.S. environmental law policies and regulatory regimes. Effective: 2014 Summer Semester.

LAW 408—Community Education Seminar (3)
Clinical Activity; Seminar—3 hours. Limited enrollment. Trains students to educate the community about basic legal rights and responsibilities. Students attend an initial four-hour orientation, followed by weekly seminars that will prepare students to teach in a local high school at least two times per week. (S/U grading only.) Effective: 1997 Winter Quarter.

LAW 409—Environmental Law Moot Court (1)
Variable. During the first eight weeks of fall semester, students research and submit briefs as appellants, respondents, or third parties on a problem of environmental law that is prepared by the National Environmental Law Moot Court Board. (S/U grading only.) Effective: 1997 Winter Quarter.

LAW 410A—Appellate Advocacy I (2)
Discussion/Laboratory. Limited enrollment. Basic appellate practice and procedure. Beginning instruction in oral advocacy skills and an opportunity to practice these skills in front of a moot court. (S/U grading only.) Effective: 2008 Fall Semester.

LAW 410B—Appellate Advocacy II (Moot Court) (2)
Practice—2 hours. Limited enrollment. Continuation of Course 410A. Focuses on the development of effective appellate brief writing skills and the refinement of oral advocacy skills. (S/U grading only.) Effective: 2008 Fall Semester.

LAW 411—Journal of International Law and Policy (1-2)
Independent Study. The Journal is a biannual journal produced by King Hall students with an interest in international law. The editor -in-chief of the journal receives 2 units of credit each semester. The managing editor receives 1 unit of credit each semester. (S/U grading only.) Effective: 2005 Fall Semester.

LAW 411A—Journal of International Law and Policy (1-2)
Variable—1-2 hours. The UC Davis Journal of International Law and Policy publishes semi-annually and strives to contribute pertinent and interesting scholarly works to the field of international law. May be repeated up to 5 time(s) Students are allowed to participate in the journal for more than one term. (S/U grading only.) Effective: 2017 Spring Semester.

LAW 411B—Journal of Juvenile Law and Policy (1-2)
Independent Study—1-2 hours. The Journal of Juvenile Law & Policy is a biannual publication of the UC Davis School of Law that addresses the unique concerns of youth in the American legal system. May be repeated up to 5 time(s) Students are allowed to participate in the journal for more than one term. (S/U grading only.) Effective: 2017 Spring Semester.

LAW 411C—UC Davis Business Law Journal (1-2)
Independent Study—1 hour. The UC Davis Business Law Journal is run by dedicated law students who are committed to providing current and valuable legal and business analysis. May be repeated up to 5 time(s) Students are allowed to participate in the journal for more than one term. (S/U grading only.) Effective: 2017 Spring Semester.

LAW 411D—Immigration and Nationality Law Review (1-2)
Independent Study. Prerequisite(s): Consent of Instructor. The Immigration and Nationality Law Review (INLR) is in part a reprint journal and serves as an anthology of seminal articles in immigration, nationality, and citizenship law. INLR has republished a number of articles authored by King Hall faculty. INLR also creates space for student Notes. The INLR also hosts a symposium or other immigration-related project each year and publishes materials from that enterprise in the year's volume. May be repeated up to 5 time(s) Students are allowed to participate in the journal for more than one term. (S/U grading only.) Effective: 2017 Fall Semester.

LAW 412—Carr Intraschool Trial Advocacy Competition (1)
Variable. Limited enrollment. Named after the late Justice Frances Carr, this competition is open to secondand third-year students. A preliminary round is followed by quarter-finals,semi-finals,and a final round. Students participate in mock trials presided over by judges and critiqued by experienced litigators. (S/U grading only.) Effective: 1997 Winter Quarter.

LAW 413—Interschool Competition (1-3)
Variable. Prerequisite(s): Consent of appropriate faculty advisor. Limited to students actually representing the School in the interschool competitions. Participation in interschool moot court and lawyering skills competitions. Competition must be authorized by the appropriate faculty advisor. Faculty advisor may condition the award of academic credit for any particular competition on the performance of such additional work as may be reasonable to justify the credit. May satisfy advanced legal writing requirement (S/U grading only.) Effective: 1997 Winter Quarter.

LAW 414—Moot Court Board (1)
Variable. Prerequisite(s): LAW 410A; LAW 410B Limited enrollment. Members of Moot Court Board may receive one credit for each semester of service on the board, up to maximum of two.Credit awarded only after certification by Moot Court Board and approval of the faculty advisors to Moot Court Board. (S/U grading only.) Effective: 1997 Winter Quarter.

LAW 414A—Negotiations Board (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Members of the King Hall Negotiations Board assist in the administration of the King Hall Negotiation Team by performing a variety of tasks under the supervision of the course instructor. One unit of credit for each semester of service on the board, up to a maximum of two units per academic year; credit is awarded only after approval by the instructor. (P/NP grading only.) Effective: 2012 Fall Semester.

LAW 415—Trial Practice Honors Board (1)
Variable. Members of the Trial Practice Honors Board administer the Frances Carr competition. Members are nominated by their individual Trial Practice I adjuncts. Students receive one credit for serving on the Board, awarded upon approval of the faculty advisor. (S/U grading only.) Effective: 1997 Winter Quarter.

LAW 416—Law Review Writer (1-2)
Variable—1-2 hours. Writing of a law review article under the editorial supervision of editors of the UC Davis Law Review. Office hours (including but not limited to Bluebooking and cite-checking) are required. 1 or 2 units. May be repeated for credit. In the spring semester, credit is obtained only upon achieving status as a member of the UC Davis Law Review, which requires that the student has made substantial progress towards completing an editorship article; credit is awarded only after certification by the editor in chief and approval of the faculty advisors; one unit of credit is earned the first semester; two units are earned the second semester upon nomination and acceptance of nomination to the Editorial Board; one unit is earned second semester if only a membership draft and office hours are completed. (S/U grading only.) Effective: 2017 Spring Semester.

LAW 417A—Law Review Editor (1-2)
Variable—1-2 hours. Prerequisite(s): Consent of Instructor. Editors must have completed an editorship article and must perform editorial duties (a substantial time commitment). Credit is awarded only after completion of both semesters. (S/U grading only.) Effective: 2015 Fall Semester.

LAW 417B—Law Review Editor (1-2)
Variable—1-2 hours. Prerequisite(s): Consent of Instructor. Editors must have completed an editorship article and must perform editorial duties (a substantial time commitment). Credit is awarded only after completion of both semesters. (S/U grading only.) Effective: 2016 Spring Semester.

LAW 418—Environmental Law and Policy Journal (1-2)
Independent Study. Environs is a biannual environmental law and policy journal that provides an open forum for the discussion of current environmental issues, particularly those pertaining to the state of California. May be repeated up to 5 time(s) Students are allowed to participate in the journal for more than one term. (S/U grading only.) Effective: 2017 Spring Semester.

LAW 419—Advanced Writing Project (1-4)
Variable. The completion of a writing requirement project under the active and regular supervision of a faculty member in satisfaction of the legal writing requirement. The writing project must be an individually authored work of rigorous intellectual effort of at least 20 typewritten double-spaced pages, excluding footnotes. The project may take any of several forms, for example, a paper, a brief, a memorandum of law, a proposed statute, a statutory scheme or set of administrative regulations (with explanatory comments), or a will or agreement (with explanatory comments). The advanced writing project may also be undertaken in connection with another course or seminar to satisfy the leagl writing requirements. The numnber of units shall be approved by the faculty supervisor and will depend upon the scope of the writing effort. (S/U grading only.) Effective: 2005 Fall Semester.

LAW 419A—Advanced Writing Project (1-4)
Variable. The completion of a writing requirement project under the active and regular supervision of a faculty member in satisfaction of the legal writing requirement. The writing project must be an individually
authored work of rigorous intellectual effort of at least 20 typewritten double-spaced pages, excluding footnotes. The project may take any of several forms, for example, a paper, a brief, a memorandum of
law, a proposed statute, a statutory scheme or set of administrative regulations (with explanatory comments), or a will or agreement (with explanatory comments). The advanced writing project may also be undertaken in connection with another course or seminar to satisfy the legal writing requirements. The number of units shall be approved by the faculty supervisor and will depend upon the scope of the writing effort. (S/U grading only.) Effective: 2005 Fall Semester.

LAW 419S—Special Session Advanced Writing Project (1-4)
Variable. The completion of a writing requirement project under the active and regular supervision of a faculty member in satisfaction of the legal writing requirement. The writing project must be an individually
authored work of rigorous intellectual effort of at least 20 typewritten double-spaced pages, excluding footnotes. The project may take any of several forms, for example, a paper, a brief, a memorandum of law, a proposed statute, a statutory scheme or set of administrative regulations (with explanatory comments), or a will or agreement (with explanatory comments). The advanced writing project may also be undertaken in connection with another course or seminar to satisfy the legal writing requirements. The number of units shall be approved by the faculty supervisor and will depend upon the scope of the writing effort. (S/U grading only.) Effective: 2005 Summer Special Session.

LAW 420—Civil Rights Clinic (2-6)
Clinical Activity—2 hours. Prerequisite(s): LAW 219 (can be concurrent); and Consent of Instructor. Priority given to students enrolled in or have taken LAW 267. Limited enrollment. Clinic provides practical experience in providing legal services to indigent clients who have filed civil rights actions in state and federal trial and appellate courts. Students work on clinic cases under the supervision of the clinic director. May be repeated for credit. Effective: 2015 Spring Semester.

LAW 425—Judicial Clinical (2-12)
Clinical Activity. Prerequisite(s): LAW 261; Required for full-time clinical students and recommended for part-time clinical students. Students may arrange judicial clerkship clinical programs with an
approved list of state and federal judges through the Clinical office and under the sponsorship of the faculty member in charge. All students must complete weekly time records and bi-weekly journals. (S/U grading only.) Effective: 1997 Winter Quarter.

LAW 430—Federal and State Taxation Externship (2-6)
Clinical Activity—2-12 hours. Prerequisite(s): LAW 220; and Consent of Instructor. Students will have the opportunity to work with the Internal Revenue Service or other governmental tax agency. Journals and attendance at group meetings are required. (S/U grading only.) Effective: 2013 Fall Semester.

LAW 435—Family Protection Clinic (4)
Clinical Activity—2 hours. Prerequisite(s): LAW 219 (can be concurrent); Full–Year Clinic: prior or concurrent enrollment in LAW 219 to qualify for state court certification; prior or concurrent enrollment in LAW 272 and LAW 263A recommended, not required; One-Semester Clinic: prior or concurrent enrollment in LAW 272 and LAW 263A recommended, not required. Full–Year Clinic: each student required to enroll for two semesters, receiving four units each semester for total of eight units; class limited to seven students; One-Semester Clinic: each student required to meet weekly for a 2-hour seminar; class limited to four students. Represent low-income persons in family law and related matters arising out of situations involving family violence. Effective: 2015 Spring Semester.

LAW 435A—Family Protection Clinic (4)
Clinical Activity—2 hours. Prerequisite(s): LAW 219 (can be concurrent); Consent of Instructor. Full-Year Clinic: LAW 219 is required to qualify for state court certification; prior or concurrent enrollment in LAW 272 and LAW 263A recommended not required. One-Semester Clinic: prior or concurrent enrollment in LAW 272 and LAW 263A recommended not required Full–Year Clinic: each student required to enroll for two semesters receiving four units each semester for total of eight units; class limited to seven students. Represent low-income persons in family law and related matters arising out of situations involving family violence. Effective: 2014 Fall Semester.

LAW 435B—Family Protection Clinic (4)
Clinical Activity—2 hours. Prerequisite(s): LAW 219 (can be concurrent); and Consent of Instructor. Full-Year Clinic: LAW 219 is required to qualify for state court certification; prior or concurrent enrollment in LAW 272 and LAW 263A recommended not required. Full–Year Clinic: each student required to enroll for two semesters receiving four units each semester for total of eight units; class limited to seven students. Represent low-income persons in family law and related matters arising out of situations involving family violence. Effective: 2015 Spring Semester.

LAW 440A—Immigration Law Clinic (4)
Clinical Activity—4 hours. Prerequisite(s): LAW 292 (can be concurrent) Each student is required to enroll for two semesters, receiving four units each semester for total of eight units. Provides legal representation to indigent non-citizens in removal proceedings before U.S. Immigration Courts, the Board of Immigration Appeals, and federal courts, including the Ninth Circuit Court of Appeals. Effective: 2015 Spring Semester.

LAW 440B—Immigration Law Clinic (4)
Clinical Activity—4 hours. Prerequisite(s): LAW 292 (can be concurrent); Consent of Instructor. Each student is required to enroll for two semesters, receiving four units each semester for total of eight units. Provides legal representation to indigent non-citizens in removal proceedings before U.S. Immigration Courts, the Board of Immigration Appeals, and federal courts, including the Ninth Circuit Court of Appeals. Effective: 2015 Spring Semester.

LAW 445—Legislative Process Externship (2-5)
Clinical Activity. Prerequisite(s): LAW 240 (can be concurrent); or Consent of Instructor. Practical experience in the operation of the office of a legislator or a legislative committee. The major thrust of the program is to enable students to become familiar with the give and take realities of making laws, as contracted with (S/U grading only.) Effective: 2001 Spring Semester.

LAW 445A—Aoki Water Justice Clinic (5)
Clinical Activity. Prerequisite(s): Consent of Instructor. Aoki Water Justice Clinic trains students to use community lawyering and transactional legal tools to ensure that low-income, California communities receive safe, clean, and affordable drinking water. Effective: 2017 Fall Semester.

LAW 445B—Advanced Aoki Water Justice Clinic (3-5)
Variable. The Advanced Aoki Water Justice Clinic allows students to leverage their legal research and practical lawyering skills to advance policies that ensure that low-income, California communities receive safe, clean, and affordable drinking water. Effective: 2017 Fall Semester.

LAW 446—UC Davis Capital Law Scholars Externship Program (2-12)
Fieldwork. Program is designed to provide students with hands-on lawyering experience in a legislative office, with a legislative committee, or with a government/nonprofit office engaged in legislative and policy work. Grading is on a S/U basis. (S/U grading only.) Effective: 2016 Fall Semester.

LAW 446A—UC Davis Capital Law Scholars Seminar (1)
Seminar—1 hour. May be required for students enrolled in Capital Law Scholars Externship. Covers issues related to lawyering in California’s state capital, and help students maximize educational and professional experience in their externship placements. Effective: 2016 Fall Semester.

LAW 450—Environmental Law Externship (2-6)
Clinical Activity. Prerequisite(s): LAW 285; or Consent of Instructor. Practical experience in environmental law. Students will work in an approved government, non-profit or private law office engaged in some form of environmental law work for a minimum of 8 hours per week. Students must prepare a journal describing and (S/U grading only.) Effective: 2004 Spring Semester.

LAW 455—Employment Relations Externship (2-6)
Clinical Activity. Prerequisite(s): LAW 251 or LAW 260 (can be concurrent) Practical experience in employment relations, including employment discrimination and public sector labor law. Work under the direct supervision of a government lawyer. Opportunity to participate in a range of with emphasis on observation and participation in actual investigation, interviewing, drafting pleading, and attendance at hearings. May be repeated for credit. (S/U grading only.) Effective: 2003 Fall Semester.

LAW 460—Public Interest Law Externship (2-6)
Clinical Activity—2-6 hours. Prerequisite(s): Prior or concurrent enrollment in LAW 293 recommended. Opportunity to work with a public interest practitioner in a nonprofit organization. Journals and attendance at two group meetings required. Students must complete an evaluative final paper of approximately eight pages. Hours completed in public interest setting may be applied toward the practicum requirement for the Public interest Law Program. (S/U grading only.) Effective: 2002 Fall Semester.

LAW 465—Intellectual Property Externship (2-6)
Clinical Activity—2-6 hours. Prerequisite(s): LAW 293 and Comparative Public Services recommended. Opportunity to work for government, academic, and nonprofit entities. (S/U grading only.) Effective: 2010 Spring Semester.

LAW 470—Administration of Criminal Justice Externship (2-12)
Clinical Activity—2-12 hours. Prerequisite(s): LAW 219; and LAW 227; Completion of or concurrent enrollment in the above courses; LAW 263A recommended. Limited enrollment. Gain practical experience working full or part time in a District Attorney’s or Public Defender’s office in one of several surrounding counties or in a federal Public Defender or U.S. Attorney’s office. Students participate in the many activities associated with May be repeated up to 12 unit(s). (S/U grading only.) Effective: 2005 Fall Semester.

LAW 475—Washington UC-DC Law Program (10)
Clinical Activity—10 hours. Open to 2L and 3L students. Uniquely collaborative externship program in Washington, D.C., combining weekly seminars with full-time field placement offering students an unparalleled opportunity to learn how federal statutes, regulations, and policies are made, changed, and understood in the nation's capital. (S/U grading only.) Effective: 2010 Spring Semester.

LAW 475A—Law Making and Law Changing in the Nation's Capital (3)
Seminar—3 hours. Companion seminar to the Washington UC-DC Externship. Designed to enhance the externship experience in three principal ways. Effective: 2010 Spring Semester.

LAW 480—Clinical Program in Prison Law (2-6)
Clinical Activity—2 hours. Prerequisite(s): Consent of Instructor. Provides practical experience in providing legal services to real clients who have various problems related to their incarceration in state prison. The services require analysis and application of Constitutional Law, state statutory law, agency regulations, and the rules of professional responsibility. Effective: 2015 Spring Semester.

LAW 485—California Supreme Court Clinic (6)
Clinical Activity—6 hours. Class size limited to 6 students. California Supreme Court Clinic provides students with an immersive experience in litigating cases before the state’s highest court. Effective: 2013 Fall Semester.

LAW 490T—Aoki Federal Public Defender Clinic (4)
Clinical Activity—4 hours. Students submit applications for the course. Outgrowth of the work of the Aoki Center on Race and Nation. As part of its work, the Aoki Center provides educational opportunities to students interested in critical race perspectives in practice. Effective: 2014 Fall Semester.

LAW 495—Instruction in Legal Research and Writing Skills (1-2)
Discussion—2 hours. Prerequisite(s): Consent of Instructor. Participants assist in instructing the Legal Research and Writing programs for first-year students under the direction of the Legal Research and Writing instructors. (S/U grading only.) Effective: 2017 Spring Semester.

LAW 498—Group Study (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Class size limited to no fewer than 4 or more than 10 students. Groups of students with common interest in studying a stated legal problem may plan and conduct their own research and seminar program under the direction of faculty. (S/U grading only.) Effective: 2012 Fall Semester.

LAW 498A—Group Study (1-4)
Variable. Prerequisite(s): Consent of Instructor. Groups of students with common interest in studying a stated legal problem may plan and conduct their own research and seminar program under the direction of faculty. Effective: 2012 Fall Semester.

LAW 499—Independent Research Project (1-4)
Variable. Students may receive credit for individual projects, subject to the following regulations: (1) the project may extend over no more than two semesters; (2) each project will be under the supervision of a faculty member; (3) an outline of the project must be approved by the supervising faculty member; (4)normally, no faculty member will be permitted to supervise more than 5 students working on individual programs during any semester; and (5)each student must submit an individual paper or approved alternative to the supervising faculty member. (S/U grading only.) Effective: 2005 Fall Semester.

LAW 499A—Independent Research Project (1-4)
Variable. Students may receive credit for individual projects, subject to the following regulations: (1)the project may extend over no more than two semesters; (2)each project will be under the supervision of a faculty member; (3) an outline of the project must be approved by the supervising faculty member; (4)normally, no faculty member will be permitted to supervise more than 5 students working on individual programs during any semester; and (5)each student must submit an individual paper or approved alternative to the supervising faculty member. Grading is on a Satisfactory/Unsatisfactory basis unless a request for letter grading has been made in advance. May be repeated for credit. (S/U grading only.) Effective: 2010 Fall Semester.

LAW 499B—Law Students Study Away (10)
Independent Study. Students studying away from UC Davis, School of Law. (S/U grading only.) Effective: 2007 Fall Semester.

LAW 499C—Joint Degree Student-GSM (10)
Internship. Joint degree course for graduate School of Management students. (S/U grading only.) Effective: 2009 Spring Semester.

LAW 499S—Special Independent Research Project (1-4)
Students may receive credit for individual projects, subject to the following regulations: (1) the project may extend over no more than two semesters; (2) each project will be under the supervision of a faculty member; (3) an outline of the Effective: 2005 Summer Special Session.

LAW 499SA—Special Session Independent Research Project (1-4)
Students may receive credit for individual projects, subject to the following regulations: (1) the project may extend over no more than two semesters; (2) each project will be under the supervision of a faculty member; (3) an outline of the Effective: 2005 Summer Special Session.

LAW 499SB—Special Session Independent Research Project (1-4)
Variable. Students may receive credit for individual projects, subject to the following regulations: (1) the project may extend over no more than two semesters; (2) each project will be under the supervision of a faculty member; (3) an outline of the project must be approved by the supervising faculty member; (4) normally, no faculty member will be permitted to supervise more than 5 students working on individual programs during any semester; and (5) each student must submit an individual paper or approved alternative to the supervising faculty member. Effective: 2005 Summer Special Session.

LDA Landscape Architecture

Courses in LDA:

LDA 001—Introduction to Environmental Design (4)
Discussion—1 hour; Lecture—3 hours; Term Paper. Introduction to the role of design professionals in contributing to the built environment at a range of scales. Introduction to basic methods used by design professionals to evaluate, design, plan, and manage landscapes and the built environment. GE credit: AH, SE, SS, VL, WC, WE. Effective: 2012 Fall Quarter.

LDA 002—Place, Culture and Community (4)
Lecture—4 hours. Introduction to recognizing and reading cultural landscapes, and the application of cultural landscape meaning to the creation of contemporary built environments. Topics include patterns and influences relating to agriculture, military, transportation, housing, wilderness, recreation and tourism. GE credit: ACGH, SS, VL, WC, WE. Effective: 2012 Fall Quarter.

LDA 003—Sustainable Development: Theory and Practice (4)
Discussion—1 hour; Lecture—3 hours. Origins, theoretical perspectives, and practical applications of the concept of sustainable development across scales (site,
building, neighborhood, city, region, and nation) through lectures, sketch exercises, student projects, walking tours. GE credit: ACGH, SS, VL, WE. Effective: 2018 Winter Quarter.

LDA 010—World Regional Geography (3)
Lecture—3 hours. Major geographic regions of the world; physical and human geography of each region; interactions between the people and the environment; culture and landscape; major resources; physical environments; population distribution and major cities. GE credit: AH, SS, WC. Effective: 2016 Spring Quarter.

LDA 021—Landscape Representation I (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): LDA 001 (can be concurrent); or Consent of Instructor. Pass One is restricted to Pre-Landscape Architecture and Sustainable Environmental Design majors. Introduction to landscape architectural representation techniques. Fundamentals of orthographic drafting, freehand drawing, photography, and basic digital representation. GE credit: AH, OL, VL. Effective: 2017 Fall Quarter.

LDA 023—Landscape Representation II (3)
Project (Term Project); Studio—6 hours. Prerequisite(s): LDA 021; or Consent of Instructor. Restricted to Pre-Landscape Architecture and Landscape Architecture majors only. Instruction of methods to explore and communicate landscape design intentions through digital media Effective: 2017 Fall Quarter.

LDA 030—History of Environmental Design (4)
Discussion—1 hour; Lecture—3 hours. History of Environmental Design across disciplines, including landscape architecture, planning, community and urban design. GE credit: AH, VL, WE. Effective: 2016 Winter Quarter.

LDA 050—Site Ecology (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): BIS 002B Pass One restricted to Pre-Landscape Architecture and Sustainable Environmental Design majors. Introduction to ecological concepts, including nutrient dynamics, population regulation, community structure, ecosystem function. Principles will be applied to human activities such as biological conservation, ecological restoration, landscape planning, and management. Weekly lab devoted to field exercises in local ecosystems. GE credit: SE, VL, WE. Effective: 2016 Fall Quarter.

LDA 060—Landform and Grading Studio (6)
Extensive Problem Solving; Project (Term Project); Studio—8 hours. Prerequisite(s): LDA 070 Pass One restricted to Pre-Landscape Architecture majors. Introduction of landform and topography as landscape medium and utilization of grading and drainage to design meaningful and functional spaces. Intro to site analysis and site planning, with specific attention to topography. GE credit: AH, OL, SE, VL. Effective: 2017 Fall Quarter.

LDA 061—AutoCAD for Landscape Architects (4)
Laboratory—4 hours; Lecture—2 hours. Pass One restricted to Pre-Landscape Architecture, Sustainable Environmental Design, and Landscape Architecture majors. Introduction of computer-aided drafting (CAD) techniques and their application to landscape design. Drawing set-up, layer control, basic drawing and editing commands, dimensioning and text styles, symbol libraries, and display commands used in the creation of landscape architectural drawings. Effective: 2016 Summer Session 1.

LDA 070—Introduction to Spacemaking (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): LDA 021; or Consent of Instructor. Pass One restricted to Pre-Landscape Architecture and Sustainable Environmental Design majors. Introduction to basic principles of design towards the creation of space. Design methodologies and skills to define, manipulate, and represent the built environment. Workshops in 3D physical modeling for spacemaking. GE credit: AH, OL, VL. Effective: 2017 Fall Quarter.

LDA 098—Directed Group Study in Landscape Architecture (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Directed group study. (P/NP grading only.) Effective: 2012 Fall Quarter.

LDA 099—Special Study for Undergraduates in Landscape Architecture (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2012 Fall Quarter.

LDA 101—Advanced Theory in Environmental Design (3)
Lecture/Discussion—3 hours. Prerequisite(s): LDA 070 (can be concurrent); or Consent of Instructor. Open to LDA/SED majors only. Provides exploration of contemporary theories and philosophies impacting design of landscapes and the built environment. Includes exploring competing definitions of "landscape," "nature," and "culture" GE credit: AH. Effective: 2017 Spring Quarter.

LDA 102—Methods in Design and Landscape Research (3)
Lecture—3 hours. Prerequisite(s): LDA 171; or Consent of Instructor. Open to Landscape Architecture majors only. Research, design, and planning methods employed in landscape architecture. Exercises allow students to design independent landscape research. Lectures provide a historical overview of research methodology. GE credit: AH, OL, VL, WE. Effective: 2018 Winter Quarter.

LDA 120—Landscape Representation III (3)
Project (Term Project); Studio—6 hours. Prerequisite(s): LDA 023; or Consent of Instructor. Restricted to Landscape Architecture majors. Provides hands-on workshop environment to explore advanced representation and modeling skills. Digital drawing explored as an analytical research method and generative design technique for creating presentation graphics. Effective: 2017 Fall Quarter.

LDA 140—Green Building, Design, and Materials (4)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): LDA 050; LDA 070 Pass One restricted to Sustainable Environmental Design majors. Sustainable design and construction techniques at site and building scales. Emphasizes real-world case studies, analysis of opportunities for actual sites, and application of LEED and Sustainable Sites green rating systems. GE credit: AH, SE, VL. Effective: 2016 Fall Quarter.

LDA 141—Community Participation and Design (4)
Fieldwork—3 hours; Laboratory—3 hours; Lecture—1 hour; Project (Term Project)—3 hours. Prerequisite(s): LDA 021; LDA 030; LDA 050; LDA 070 Restricted to Sustainable Environmental Design and Landscape Architecture majors. Introduction to community participation and design. Incorporates social and cultural factors, public and community processes, theories and practices related to human-environment behavior; community involvement in design, social analysis, community engagement, accessibility, diversity and politics of place. GE credit: ACGH, AH, DD, SS, VL. Effective: 2015 Winter Quarter.

LDA 142—Applying Sustainable Strategies (6)
Discussion—3 hours; Lecture—3 hours. Prerequisite(s): LDA 140; LDA 141 Restricted to Sustainable Environmental Design Majors. Capstone class examines case studies and techniques of sustainable development. Student teams will develop detailed proposals for real-world sites. GE credit: AH, OL, SE, SS, VL, WE. Effective: 2016 Spring Quarter.

LDA 150—Introduction to Geographic Information Systems (4)
Laboratory—3 hours; Lecture—3 hours. Pass One restricted to Landscape Architecture and Sustainable Environmental Design majors. Basic concepts, principles, and methods of GIS are presented. Data structures, database design, GIS data creation, GPS, and spatial analysis. Not open to credit for students who have completed ABT 180, PLS 180, ABT 181N. (Applied Biological Systems Technology 150.) GE credit: SE, VL. Effective: 2018 Winter Quarter.

LDA 160—Design and Build Studio (6)
Extensive Problem Solving; Fieldwork; Studio—8 hours. Prerequisite(s): LDA 001; LDA 002; LDA 003; LDA 021; LDA 030; LDA 050; LDA 070 Restricted to Landscape Architecture majors. Introduction to the spatial design and construction of small-scale projects. Hands-on approach to learning and understanding materials (including wood, concrete, and stone) and methods in landscape construction, and the application of technical skills (including detailing, cost estimation, and specifications). GE credit: AH, OL, VL. Effective: 2013 Fall Quarter.

LDA 161—Professional Practice and Construction Documents (6)
Fieldwork; Project (Term Project); Studio—8 hours. Prerequisite(s): LDA 171 Open to Landscape Architecture majors only. Legal and professional aspects of landscape architecture, including the development of construction documents (drawings and specifications), proposal writing, fee calculations, project management, cost estimation, and insurance. Effective: 2017 Fall Quarter.

LDA 170—Site Planning and Design Studio (6)
Fieldwork; Studio—8 hours. Prerequisite(s): LDA 160 Open to Landscape Architecture majors only. Application of place-making and problem-solving skills to local landscape sites. Analysis of social and environmental conditions in the field. Lectures link design projects to contemporary theories and practices. GE credit: AH, OL, VL. Effective: 2017 Fall Quarter.

LDA 171—Urban Design and Planning Studio (6)
Studio—8 hours. Prerequisite(s): LDA 170 Restricted to Landscape Architecture majors. Studio designing large-scale landscapes at regional, sub-regional, and neighborhood scales. Focuses on understanding complex social, economic, and environmental factors, developing sustainability priorities and strategies, and applying them through design and policy. GE credit: ACGH, AH, OL, VL. Effective: 2016 Fall Quarter.

LDA 180—Advanced Design and Planning Studio (6)
Extensive Problem Solving; Fieldwork; Studio—8 hours. Prerequisite(s): LDA 060; LDA 160; LDA 170; LDA 171; LDA 172. Restricted to Landscape Architecture majors or consent of instructor. Application of advanced theories and methods of design and planning to real-world projects. May be repeated up to 18 unit(s). GE credit: AH, OL, VL. Effective: 2013 Fall Quarter.

LDA 182—Advanced Landscape Architecture Studio I (6)
Studio—8 hours. Prerequisite(s): LDA 171 Restricted to Landscape Architecture majors (ALDA) or consent of instructor. Landscape architecture studio featuring advanced studies and applications of creative work, design, technology and/or theory. One day long fieldtrip required. Effective: 2016 Fall Quarter.

LDA 183—Advanced Landscape Architecture Studio II (6)
Studio—8 hours. Prerequisite(s): LDA 182 Restricted to Landscape Architecture majors (ALDA) or consent of instructor. Landscape architecture studio featuring advanced studies and applications of creative work, design, technology and/or theory. One day long field trip required. Effective: 2016 Fall Quarter.

LDA 184—Capstone Landscape Architecture Studio (6)
Studio—8 hours. Prerequisite(s): LDA 183 Restricted to Landscape Architecture majors or consent of instructor. Capstone studio that synthesizes learning objectives within the senior-level Landscape Architecture studio sequence. Students required to apply creative problem solving, design theory, technology, and representation skills towards a design approach that addresses complex, real-world environmental design problems. Effective: 2016 Fall Quarter.

LDA 190—Proseminar in Landscape Architecture (1)
Seminar—1 hour. Lectures and discussion of critical issues in landscape architecture. May be repeated three times for credit. May be repeated up to 3 time(s). (P/NP grading only.) Effective: 2012 Fall Quarter.

LDA 191—Landscape Architecture Planning & Design Studio (2-12)
Seminar—1 hour; Workshop—3 hours. Prerequisite(s): LDA 001; LDA 070; LDA 170; or Consent of Instructor. Priority to Landscape Architecture majors. Faculty initiated workshops featuring advanced studies and applications of original work in landscape architecture. May be repeated up to 20 unit(s). Effective: 2012 Fall Quarter.

LDA 192—Internship in Landscape Architecture (1-12)
Internship. Prerequisite(s): Consent of Instructor. Senior standing in Landscape Architecture. Professional field experience in landscape architecture. May be repeated for a total of 12 units. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2012 Fall Quarter.

LDA 193A—Senior Project in Landscape Architecture (3)
Studio—6 hours. Prerequisite(s): Senior standing in Landscape Architecture. Limited enrollment. Projects will focus on a critical area of landscape architectural design, planning, planning, analysis, communication, or research. Limited enrollment. Required of all Landscape Architecture majors. (P/NP grading only.) Effective: 2012 Fall Quarter.

LDA 193B—Senior Project in Landscape Architecture (4)
Studio—8 hours. Prerequisite(s): LDA 193A; And senior standing in Landscape Architecture. Limited enrollment. Projects will focus on a critical area of landscape architectural design, planning, analysis, communication, or research. Limited enrollment. Required of all Landscape Architecture majors. (P/NP grading only.) Effective: 2012 Fall Quarter.

LDA 197T—Tutoring in Landscape Architecture (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of Instructor. Tutoring in Landscape Architecture courses. (P/NP grading only.) Effective: 2012 Fall Quarter.

LDA 198—Directed Group Study in Landscape Architecture (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study. (P/NP grading only.) Effective: 2012 Fall Quarter.

LDA 199—Special Study for Advanced Undergraduates in Landscape Architecture (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2012 Fall Quarter.

LDA 200—Citizenship, Democracy, & Public Space (4)
Seminar—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Introduction to seminal works in political theory, philosophy, and the social sciences that focus on citizenship and the public sphere; development of critical perspective regarding restructuring of public space in a pluralistic and global culture; discussion of contemporary case studies. (Geography 230.) Effective: 2012 Fall Quarter.

LDA 201—Theory and Philosophy of the Designed Environment (4)
Seminar—4 hours. Prerequisite(s): LDA 140; Or the equivalent; graduate standing or consent of instructor. Examines the major theories of environmental design. Epistemology of design serves as framework to examine modern landscape architecture, architecture, urban design and planning. Normative theories of design are reviewed along with the social and environmental sciences. Effective: 2012 Fall Quarter.

LDA 202—Methods in Design and Landscape Research (4)
Seminar—4 hours. Explores many of the research and advanced design and planning methods employed in landscape architecture. Exercises provide the student with a vehicle for designing independent landscape research and creative activities. Lectures provide an historical overview of research methodology. Effective: 2016 Spring Quarter.

LDA 204—Case Studies in Landscape Design and Research (4)
Seminar—4 hours. Prerequisite(s): Graduate standing in Landscape Architecture, Ecology, Geography or Community Development or consent of instructor. Real-world designed environment situations where creative activity and/or basic research is the primary product. May be repeated for credit for a total of 12 units. May be repeated up to 12 unit(s). Effective: 2012 Fall Quarter.

LDA 205—Urban Planning and Design (4)
Discussion—2 hours; Lecture—2 hours. Limited to graduate students. Regulation, design, and development of the built landscape, planning and land development processes, zoning and subdivision regulation, site planning, urban design goals and methods, public participation strategies, creatively designing landscapes to meet community and ecological goals. (Geography 233.) Effective: 2016 Winter Quarter.

LDA 210—Advanced Landscape Architecture Studio (4)
Laboratory—8 hours. Prerequisite(s): LDA 113 or the equivalent; graduate standing or consent of instructor. Exposes students to real-world, designed-environment situations where creative activity and/or basic research is the primary product. Advanced landscape problems will be utilized at the site, urban or rural scale. Effective: 2012 Fall Quarter.

LDA 215—Ecologies of Infrastructure (4)
Seminar—4 hours. Open to graduate standing or consent of instructor. Focus on design practices and theory associated with ecological conceptions of infrastructure, including networked infrastructure, region, bioregion, regionalization, ecological engineering, reconciliation ecology, novel ecosystems, and theory/articulation of landscape change. (Geography 215.) Effective: 2016 Winter Quarter.

LDA 270—Environment and Behavior (4)
Seminar—3 hours; Tutorial—1 hour. Prerequisite(s): Graduate standing or consent of instructor; PSC 144 recommended. Factors that influence human's interaction with their surroundings and the mechanisms used for recognizing and addressing general and specific human needs in community design and development decisions. Effective: 2012 Fall Quarter.

LDA 280—Landscape Conservation (3)
Seminar—3 hours. Prerequisite(s): Contact department for prerequisite courses; graduate standing or consent of instructor. Focus is on land planning, design, and management techniques to further the goal of resource preservation. Examines current critical theory in the establishment and management of conservation areas. Effective: 2012 Fall Quarter.

LDA 290—Graduate Seminar in Landscape Architecture (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Seminar on selected topics in landscape architecture research, analysis, planning, design, communication, or education. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 2012 Fall Quarter.

LDA 297—Practicum in Landscape Architecture (1-10)
Independent Study—1-10 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Opportunity for students to work directly in the field with academics
at other institutions or with professionals in an office setting. Gives experience beyond the confines of campus and allows direct interaction with the community. (S/U grading only.) Effective: 2012 Fall Quarter.

LDA 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 2012 Fall Quarter.

LDA 299—Directed Individual Research for Graduate Students (1-12)
Independent Study. May be repeated for credit. (S/U grading only.) Effective: 2012 Fall Quarter.

LDA 396—Teaching Assistant Training Practicum (1-4)
Variable. May be repeated for credit. (P/NP grading only.) Effective: 2012 Fall Quarter.

LIN Linguistics

Courses in LIN:

LIN 001—Introduction to Linguistics (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the study of language; its nature, diversity, and structure. GE credit: AH, SS. Effective: 1997 Winter Quarter.

LIN 001Y—Introduction to Linguistics (4)
Discussion—1 hour; Web Virtual Lecture—3 hours. Introduction to the study of language; its nature, diversity, and structure. Students may not take both LIN 001 and LIN 001Y for credit. GE credit: AH, SS. Effective: 2014 Spring Quarter.

LIN 003—Language and the Body (4)
Discussion—2 hours; Lecture—2 hours. Open to all students regardless of major. Enrollment will be restricted to 80-100 students. Perspectives on the role of language in issues about bodies. Language-related disabilities. Social implications of language use in discussing body-related conditions. GE credit: OL, SS. Effective: 2018 Winter Quarter.

LIN 005—Global English and Communication (4)
Discussion—2 hours; Lecture—2 hours. English as a global language and its uses in intercultural communication. Cultural, historical, and political dimensions of varieties of English spoken around the world. Experiential grounding in strategies for increasing interpretive and verbal communicative competence for a globalized world. (Communication 5.) GE credit: AH, OL, SS, WC. Effective: 2012 Spring Quarter.

LIN 006—Language and Society (4)
Discussion—1 hour; Lecture—3 hours. Language as a social phenomenon. Topics include linguistic diversity, language policy, language and identity, language and social structure, speech communities and social networks, the effect of social factors on language variation, linguistic consequences of language contact. GE credit: ACGH, DD, SS, WE. Effective: 2008 Fall Quarter.

LIN 015—Academic Oral Communication (3)
Discussion—2 hours; Lecture—1 hour. Structure of oral communication, critical thinking, and persuasion in classroom discourse in American English and in cross-cultural perspective. GE credit: AH, OL, SS. Effective: 2014 Fall Quarter.

LIN 020—Oral English for International Students (3) ***Review all entries***
Lecture/Discussion—3 hours. Open to non-native speakers of English with priority enrollment to international teaching assistants with qualifying placement exam scores. Intensive work in oral English for international students, to increase fluency, accuracy, and use of appropriate discourse strategies in academic settings (e.g., seminar, discussion, laboratory). Training in segmental features of English sounds, intonation, stress, non-verbal cues, and register. May be repeated for credit. (P/NP grading only.) Effective: 2011 Fall Quarter.

LIN 020—Oral English for International Students (3) ***Review all entries Discontinued***
Lecture/Discussion—3 hours. Open to non-native speakers of English with priority enrollment to international teaching assistants with qualifying placement exam scores. Intensive work in oral English for international students, to increase fluency, accuracy, and use of appropriate discourse strategies in academic settings (e.g., seminar, discussion, laboratory). Training in segmental features of English sounds, intonation, stress, non-verbal cues, and register. May be repeated for credit. (P/NP grading only.) Effective: 2018 Fall Quarter.

LIN 024—English Structures and Strategies in Academic Writing (4)
Lecture/Discussion—4 hours. Prerequisite(s): LIN 023 Open to students from language backgrounds other than English. Practice in academic writing designed to prepare undergraduate students from language backgrounds other than English for successful academic work. Development of academic writing, critical thinking, and reading skills. Deveopment of clear, accurate language for presenting an effective argument. Effective: 2006 Fall Quarter.

LIN 025—English for International/ESL Graduate Students (4)
Lecture/Discussion—4 hours. Prerequisite(s): Admission by placement examination or consent of coordinator; open to international and ESL graduate students and limited status international undergraduates (Education Abroad Program participants). Multi-skills ESL course designed to help international/ESL students improve their English language skills for successful academic study. Emphasis on writing, speaking, listening, reading, and academic culture. (P/NP grading only.) Effective: 2003 Fall Quarter.

LIN 026—Writing for International Graduate Students (3)
Lecture—3 hours. Prerequisite(s): Satisfactory completion of LIN 025 if held for it, or consent of instructor. Admission limited to international graduate students. Focuses on writing needed for academic work, including summaries, critiques, research and grant proposals, memos, resumes, and research papers. Includes a review of grammar needed for writing and some focus on reading skills and American vocabulary and idioms. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 096—Directed Group Study in English as a Second Language (1-5)
Variable—1.5 hours. Prerequisite(s): Consent of Instructor. Directed group study of topic in English as a Second Language (ESL). May be repeated for credit May be repeated for credit by consent of the ESL coordinator. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Intended for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Intended for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 103A—Linguistic Analysis I: Phonetics, Phonology, Morphology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 001 recommended. Introduction to fundamental methods and concepts used in linguistic analysis, focusing on phonetic, phonological, and morphological phenomena. Emphasizes development of analytical skills and appreciation of structural regularities and differences among languages. Not open for credit to students who have completed LIN 139. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 103B—Linguistic Analysis II: Morphology, Syntax, Semantics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 001 recommended. Introduction to fundamental methods and concepts used in linguistic analysis, focusing on morphological, syntactic, and semantic phenomena. Emphasizes development of analytical skills and appreciation of structural regularities and differences among languages. Not open for credit to students who have completed LIN 140. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 105—Topics in Language and Linguistics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. LIN 001 recommended. Detailed examination of a major contemporary linguistic theory, a major contemporary issue or related set of issues in linguistics, or the structure of a particular language or language family. May be repeated for credit when topic differs. May be repeated for credit. Effective: 2017 Winter Quarter.

LIN 106—English Grammar (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 001 or LIN 001Y or ENG 003 or UWP 001; or Consent of Instructor. Survey of present-day English grammar as informed by contemporary linguistic theories. The major syntactic structures of English; their variation across dialects, styles, and registers; their development; and their usefulness in describing the conventions of English. (English 106 and University Writing Program 106.) GE credit: AH. Effective: 2018 Winter Quarter.

LIN 111—Introduction to Phonological Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 103A recommended. Contemporary phonological theory with emphasis on syllable structure, metrical structure, phonology-morphology interaction, and typological variation in these areas, from the perspective of optimality-theoretic approaches. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 112—Phonetics (4)
Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): LIN 001 recommended. Detailed examination of articulatory and acoustic phonetics. GE credit: SE. Effective: 2017 Winter Quarter.

LIN 121—Morphology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 103A, 103B recommended. Introduction to the analysis of word structure and the relation of word structure to the lexicon and other grammatical components. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 127—Text Processing and Corpus Linguistics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): LIN 001, LIN 005, LIN 006, or ANT 004 recommended. Investigation of the lexical organization of human languages through corpus linguistics. Application of principles of linguistic analysis, automatic text processing, and statistical research to solving problems of textual evaluation and classification, as well as information retrieval and extraction. GE credit: AH, QL, SS. Effective: 2017 Winter Quarter.

LIN 131—Introduction to Syntactic Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 103B recommended. Introduction to syntactic theory, primarily through the examination of a major theory of syntax, emphasizing theoretical reasoning, argumentation, and problems of theory building in syntax. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 141—Semantics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 103B recommended. Linguistic study of meanings of words and phrases. Meanings expressed by lexical items and derivational and inflectional morphology. Contribution of argument structure, quantification, and coordination to meaning. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 150—Languages of the World (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 001 or ANT 004 recommended. Survey of the world's languages, their geographical distribution and classification, both genetic and typological. Illustrative descriptions of several major languages from different geographical areas; pidgins and creoles, lingua francas and other languages of widespread use. Not open for credit to students who have completed LIN 050. GE credit: AH, SS, WC. Effective: 2017 Winter Quarter.

LIN 151—Historical Linguistics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 103A recommended. Description and methods of the historical study of language, including the comparative method and internal reconstruction; sound change, morphological change, syntactic change, semantic change. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 152—Language Universals and Typology (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 103B recommended. Investigation into common features of all human languages and the classification of languages in terms of their structural features. Theories of universal grammar. Detailed discussion of non-Indo-European languages and comparison with English. GE credit: AH. Effective: 2017 Winter Quarter.

LIN 160—American Voices (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 001 or LIN 001Y or ANT 004; Or upper division standing recommended. Explores the forms of American English: traditional notions of regional dialects and increasingly important social dialects, reflecting age, class, gender, race, ethnicity, and sexual orientation. The influence of language attitudes on perception of dialect speakers; dialect in media, education, and GE credit: SS, WE. Effective: 2018 Winter Quarter.

LIN 163—Language, Gender, and Society (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): LIN 001 or ANT 004 recommended. Investigation of real and putative (stereotyped) gender-linked differences in language structure and usage, with a consideration of some social and psychological consequences of such differences. Focus is on English, but other languages are also discussed. GE credit: ACGH, DD, SS, WE. Effective: 2017 Winter Quarter.

LIN 165—Introduction to Applied Linguistics (4)
Discussion—1 hour; Lecture—3 hours. Applications of linguistic principles and the analysis of language-related issues in the world. Exploration of a range of language-related problems including issues related to language learning and teaching to issues concerning language and gender, race, class and the media. GE credit: SS, WE. Effective: 2002 Winter Quarter.

LIN 166—The Spanish Language in the United States (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 001 or LIN 001Y or SPA 111N; SPA 023; Or equivalent to SPA 023 recommended. Linguistic features of the varieties of the Spanish language spoken throughout the United States; phonology, morphology, syntax, vocabulary. Focus on the relationship between United States Spanish and other world varieties of Spanish, within a historical framework. GE credit: SS. Effective: 2018 Spring Quarter.

LIN 171—Introduction to Psycholinguistics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (LIN 001 or LIN 001Y); LIN 103A, LIN 103B recommended. Introduction to psychological issues relating to the implementation of language and linguistic structure during speech production and comprehension and to the implications of research in psychology and related fields for linguistic theory. GE credit: SS. Effective: 2018 Spring Quarter.

LIN 173—Language Development (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (LIN 001 or LIN 001Y); or Consent of Instructor. LIN 103A, 103B recommended. Theory and research on children's acquisition of their native language, including the sound system, grammatical systems, and basic semantic categories. (Education 173.) GE credit: SS. Effective: 2018 Spring Quarter.

LIN 175—Biological Basis of Language (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. LIN 001 recommended. Overview of issues in the field of neurolinguistics and techniques used to explore representation of language in the human brain. GE credit: SE. Effective: 2017 Winter Quarter.

LIN 177—Computational Linguistics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. LIN 001 recommended. Understanding the nature of language through computer modeling of linguistic abilities. Relationships between human cognition and computer representations of cognitive processing. Not open for credit to students who have taken LIN 007. GE credit: SE. Effective: 2017 Winter Quarter.

LIN 180—Second Language Learning and Teaching (4)
Lecture/Discussion—4 hours. Prerequisite(s): LIN 001 or LIN 001Y; Or equivalent recommended. Psycholinguistic and sociolinguistic theories of second language learning. Connections between theoretical perspectives and pedagogical practices in formal and informal second language settings, with focus on tutoring. Impact of sociocontextual factors (e.g., gender, ethnicity). Fieldwork requirement. GE credit: SS, WE. Effective: 2018 Winter Quarter.

LIN 182—Multilingualism (4)
Lecture/Discussion—4 hours. Limited enrollment. Issues in multilingualism from a global perspective: e.g., multilingual communities; multilingualism and identity (gender, ethnicity, nationality); language ideologies and educational and sociopolitical policies surrounding multilingualism; acquisition of multilingualism; discursive practices of multilinguals. GE credit: SS, WC, WE. Effective: 2006 Spring Quarter.

LIN 192—Internship in Linguistics (1-12)
Internship—3-36 hours. Prerequisite(s): LIN 001 or LIN 001Y; Or equivalent course; consent of instructor. Internship applying linguistic-related skills to a fieldwork project in areas such as media, law, or industry, in approved organizations or institutions. Maximum of four units applicable toward major. (P/NP grading only.) Effective: 2018 Winter Quarter.

LIN 194H—Special Study for Honors Students (1-5)
Independent Study—1-5 hours. Prerequisite(s): Consent of Instructor. Open only to linguistics majors of senior standing who qualify for Honors Program. Guided research, under the direction of a faculty member approved by the
Program Director, leading to a senior honors thesis. May be repeated for credit for up to 6 units. May be repeated up to 6 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 197T—Tutoring in Linguistics (1-4)
Discussion—1-4 hours. Prerequisite(s): Consent of Instructor. Upper division standing and consent of department chairperson. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

LIN 200A—Foundations of Linguistics I (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing. Survey of fundamental issues raised by pre-generative linguistics in the twentieth century, with emphasis on issues crucial to applications of linguistics. Not open for credit to students who have completed LIN 203A. Effective: 2005 Spring Quarter.

LIN 200B—Foundations of Linguistics II (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing. Survey of fundamental issues raised by orthodox generative linguistics, with emphasis on issues crucial to applications of linguistics. Not open for credit to students who have completed LIN 203B. Effective: 2005 Spring Quarter.

LIN 200C—Foundations of Linguistics III (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing. Survey of fundamental issues raised by contemporary linguistic theories lying outside the generative grammar orthodoxy, with emphasis on issues crucial to applications of linguistics. Effective: 2005 Spring Quarter.

LIN 201—Proseminar (1)
Seminar—1 hour. Introduction to research activity of faculty in the Graduate Group in Linguistics and guest speakers. May be repeated up to 4 unit(s). (S/U grading only.) Effective: 2011 Fall Quarter.

LIN 205A—Topics in Linguistic Theory and Methods (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Advanced study of current problems in linguistic theory and methodology. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

LIN 205B—Topics in Linguistic Theory and Methods (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Advanced study of current problems in linguistic theory and methodology. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

LIN 205C—Topics in Linguistic Theory and Methods (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Advanced study of current problems in linguistic theory and methodology. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

LIN 205D—Topics in Linguistic Theory and Methods (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Advanced study of current problems in linguistic theory and methodology. May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

LIN 211—Advanced Phonological Theory and Analysis (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 111 Critical examination of current phonological theories. Effective: 1997 Winter Quarter.

LIN 212—Advanced Phonetics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 112 Advanced investigation of the physiological basis of speech articulation and acoustic phonetics. Effective: 1997 Winter Quarter.

LIN 231—Advanced Syntactic Theory and Analysis (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 131 Critical survey of contemporary theories of syntax. Effective: 1997 Winter Quarter.

LIN 241—Advanced Syntactic Theory and Analysis (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 141; or Consent of Instructor. Advanced critical exploration of contemporary theories of linguistic
semantics. Effective: 1997 Winter Quarter.

LIN 250—Principles of Typological Linguistics (4)
Seminar—3 hours; Term Paper. Cross-linguistic comparison and typology, including word order, morphological typology, complex clauses, semantic categories and their grammaticalization, and applications of typology to language acquisition. Effective: 2011 Fall Quarter.

LIN 251—Principles of Historical Linguistics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 151 Advanced analysis of the theory and methods of historical linguistics. Effective: 1997 Winter Quarter.

LIN 252—Romance Linguistics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): LIN 151 Examination of the development of the Romance languages from Proto-Romance to the modern era. Application and critical examination of

methods of historical and comparative linguistics in particular areas of structural change in Romance. Effective: 1997 Winter Quarter.

LIN 253—Speech Perception (4)
Discussion—3 hours; Extensive Writing. Investigation into how listeners map a continuous and variable acoustic signal to a linguistic interpretation. Phonetic context, variation, linguistic knowledge, and sociolinguistics as factors in perceiving speech. Effective: 2017 Winter Quarter.

LIN 260—Variation in Speech Communities (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): LIN 281; or Consent of Instructor. Linguistic variability in time, space, and society. Theoretical issues related to social and linguistic constraints in variation; issues and methods in the quantitative analysis of variation. Speech community, quantitative analytic methods, and the scope of sociolinguistic competence. Effective: 2005 Spring Quarter.

LIN 263—Discourse Analysis: Text in Context (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing. Introduction to and application of leading theoretical approaches to the analysis of discourse. Approaches to the analysis of (spoken and written) text in context, tools for analyzing different types of texts (narration, conversation, etc.). Theme/rheme, given/new, anaphora, discourse markers, and Effective: 2005 Spring Quarter.

LIN 264—Current Issues in Language and Gender (4)
Project (Term Project); Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing; prior coursework in Linguistics, Gender Studies, or Cultural Studies is desirable; no expectation of bilingual proficiency. Exploration of the construction and performance of gender through language in cross-cultural perspective and in a variety of contexts: informal conversations, narratives, workplaces, schools, households, the mass media. Special topics may include: language acquisition; multilingualism; ecofeminism; queer theory. May be repeated up to 1 time(s) when topic differs. Effective: 2005 Fall Quarter.

LIN 265—Language, Performance, and Power (4)
Seminar—3 hours; Term Paper. Restricted to graduate standing or consent of instructor. Exploration of the intersection between linguistic and social theories in the language-state relation and the performance of identity. Ideological sources of language differentiation; nation-building and linguistic difference. Political economic, sociolinguistic, and ethnographic approaches to understanding linguistic inequality. (Anthropology 265.) Effective: 2003 Fall Quarter.

LIN 275—Neurobiology of Language (4)
Lecture/Discussion—3 hours; Term Paper. Survey of historical and modern conceptions of the neurobiology of language. Aphasia, functional neuroimaging, functional neuroanatomy of human language. Effective: 2011 Fall Quarter.

LIN 280—Theories of Second Language Acquisition (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Covers theoretical perspectives that direct or have directed research in second language acquisition; explores the relationship between linguistics and language teaching and deals with the individual variables that influence second language learning. Effective: 1998 Fall Quarter.

LIN 281—Research Methods in TESOL/SLD (4)
Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): LIN 280 Students will study a variety of research methods in second language research; evaluate research designs and methods of analyses, formulate research questions and hypotheses and design a study of their own, think about various kinds of data they can collect. Effective: 2000 Winter Quarter.

LIN 282—Individual and Social Aspects of Bilingualism (4)
Lecture—3 hours; Term Paper. Broad overview of bi-and multilingualism, with focus on theoretical and
descriptive research; topics covered range from language processing in bilinguals to code-switching to language as political issue in multilingual states. Effective: 1997 Winter Quarter.

LIN 283—Politics of Bi and Multilingual Literacies (4)
Lecture/Discussion—3 hours; Term Paper. Anthropological, psycho-social, political, and educational perspectives on bi- and multi-lingualism. Power, colonialism, "native/non-native" speakers, and varieties and the unequal distribution of social goods. Analysis of how competing factors keep peoples disenfranchised. Effective: 2005 Spring Quarter.

LIN 289—Pedagogical Applications of Second Language Acquisition Theory (4)
Seminar—3 hours; Term Paper. Prerequisite(s): LIN 280 Pedagogical implications of various theories of second language acquisition, facilitation of language acquisition in classroom settings, and techniques for conducting classroom-based research in language learning. Effective: 1999 Winter Quarter.

LIN 297T—English as a Second Language Teaching/Tutoring (1-4)
Tutorial—1-4 hours. Prerequisite(s): LIN 300 or LIN 301 or LIN 302 (can be concurrent); and Consent of Instructor. Teaching classes for ESL graduate students. Aiding the ESL undergraduate composition classes; tutoring foreign graduate student Teaching Assistants in pronunciation. Does not fulfill requirement toward the M.A. degree. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

LIN 298—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

LIN 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

LIN 300—Language Pedagogy (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing in Linguistics or consent of instructor; concurrent enrollment in LIN 297T recommended. Methods of teaching second languages to nonnative speakers, stressing particularly recent linguistic methodology and techniques, as related to teaching and tutoring in the UC Davis ESL program. Effective: 2013 Fall Quarter.

LIN 301—Teaching Academic Literacy (4)
Practice; Project (Term Project); Seminar—3 hours; Tutorial—14 hours. Prerequisite(s): LIN 300; or Consent of Instructor. Graduate standing. Methods of teaching advanced academic literacy in a second language, with a focus on ESL composition. Lesson development, teaching and tutoring in the UC Davis ESL program. Effective: 2007 Fall Quarter.

LIN 302—Recent Research and Special Projects in TESOL (4)
Lecture—4 hours. Prerequisite(s): LIN 300; LIN 301 Review of recent research in second language acquisition and the teaching of English to speakers of other languages. Continued teaching and tutoring in the UCD ESL clinic. Each student also designs and reports on a classroom research project. Effective: 1997 Winter Quarter.

LIN 305—Second Language Literacy and Technology (4)
Lecture/Discussion—1.5 hours; Web Electronic Discussion—1.5 hours. Prerequisite(s): LIN 002 or equivalent coursework/experience in second language pedagogy; consent of instructor; graduate students only. Limited enrollment. Exploration of literacy theory and critical pedagogy in relation to new instructional and communication technologies. Practicum experience in teaching second language literacy; reflection on connections between theory and practice. Fieldwork requirement. Effective: 2007 Fall Quarter.

LIN 310—Language Pedagogy for Teacher Educators (4)
Fieldwork; Project (Term Project); Seminar—3 hours; Tutorial. Prerequisite(s): Admission to Ph.D. program in Linguistics or Foreign Languages, or permission of instructor; significant language teaching experience. Current issues in second language pedagogy, with a focus on communicative methodology, participatory curriculum design, academic literacy, and the social contexts of teaching. Emphasis on reflective teaching and action research. Mentoring of new language teachers. May be repeated up to 12 unit(s). Effective: 2007 Fall Quarter.

LIN 391—Oral English for ESL Students (3)
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): Open only to non-native speakers of English with priority enrollment to international student teaching assistants; completion of any required ESL courses or consent of instructor. Course gives non-native English-speaking students, particularly international student teaching assistants, intensive work in oral
English to increase fluency, accuracy, and use of appropriate discourse strategies in academic settings(e.g., seminar, discussion, laboratory).Course may be repeated for credit with consent of coordinator. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

LIN 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

LTS Letters & Science

Courses in LTS:

LTS 098—Directed Group Study (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Directed group study. May be repeated for credit. (P/NP grading only.) Effective: 2017 Winter Quarter.

LTS 198—Directed Group Study (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Directed group study. May be repeated for credit. (P/NP grading only.) Effective: 2017 Winter Quarter.

MAE Engineering Mechanical and Aeronautical

Courses in MAE:

MAE 207—Engineering Experimentation & Uncertainty Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EME 107A; EME 107B Design and analysis of engineering experiments with emphasis on measurement standards, data analysis, regressions and general and detailed uncertainty analysis, including statistical treatment of experimental data intervals, propagation of bias and precision errors, correlated bias approximations, and using jitter programs. Effective: 2006 Winter Quarter.

MAE 210A—Advanced Fluid Mechanics and Heat Transfer (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 103; ENG 105; EME 165 Development of differential equations governing continuity, momentum and energy transfer. Solutions in laminar flow for exact cases, low and high
Reynolds numbers and lubrication theory. Dynamics of inviscid flow. Effective: 1999 Fall Quarter.

MAE 210B—Advanced Fluid Mechanics and Heat Transfer (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAE 210A Study of stability and transition to turbulence. Introduction to the physics of turbulence. Modeling of turbulence for numerical determination of momentum and heat transfer. Effective: 1997 Winter Quarter.

MAE 211—Fluid Flow and Heat Transfer (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 103; ENG 105; EME 165; Or equivalent. Design aspects of selected topics such as: heat conduction, fins; heat transport in ducts, boundary layers and separated flows; heat exchangers. Effective: 2000 Winter Quarter.

MAE 212—Biomedical Heat and Mass Transport Processes (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EME 165; EBS 125; ECH 153; Or the equivalent. Application of principles of heat and mass transfer to biomedical systems related to heat exchange between the biomedical system and its environment, mass transfer across cell membranes and the design and analysis of artificial human organs. (Biomedical Engineering 212.) Effective: 2000 Winter Quarter.

MAE 213—Advanced Turbulence Modeling (4)
Lecture—4 hours. Prerequisite(s): MAE 210B Methods of analyzing turbulence; kinematics and dynamics of homogeneous turbulence; Reynolds stress and heat-flux equations; second order closures and their simplification; numerical methods; application to boundary layer-type flows; two-dimensional and three-dimensional hydraulic and environmental flows. Effective: 1997 Winter Quarter.

MAE 216—Advanced Thermodynamics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 105 Study of topics important to energy conversion systems, propulsion and other systems using high temperature gases. Classical thermodynamics
and quantum statistical mechanics of nonreacting and chemically reacting gases, gas mixtures, and other substances. Effective: 1999 Fall Quarter.

MAE 217—Combustion (4)
Lecture—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): ENG 103; ENG 105; EME 106 Restricted to graduate students. Review of chemical thermodynamics and chemical kinetics. Discussion of reacting flows, their governing equations and transport phenomena; detonations; laminar flame structure and turbulent combustion. Effective: 2014 Spring Quarter.

MAE 218—Advanced Energy Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 103; ENG 105; Or the equivalent. Review of options available for advanced power generation. Detailed study of basic power balances, component efficiencies, and overall powerplant performance for one advanced concept such as a fusion, magnetohydrodynamic, or solar electric powerplant. Effective: 1999 Fall Quarter.

MAE 219—Introduction to Scientific Computing in Solid and Fluid Dynamics (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ENG 103; ENG 104 Scientific calculations with finite element and finite difference methods for multi-dimensional problems in solid and fluid dynamics are performed with examples in C,C++,FORTRAN,and MATLAB script files.Derivation of the basic equations of motion in finite volume form with applications to elasticity,waves. Effective: 2000 Spring Quarter.

MAE 220—Mechanical Vibrations (4)
Lecture—4 hours. Prerequisite(s): ENG 122 Multiple degrees of freedom; damping measures; Rayleigh's method; vibration absorbers; eigenvalues and modeshapes; modal coordinates; forced vibrations; random processes and vibrations; autocorrelation;
spectral density; first passage and fatigue failure; nonlinear systems; phase plane. Effective: 2000 Winter Quarter.

MAE 222—Advanced Dynamics (4)
Lecture—4 hours. Prerequisite(s): ENG 102 Dynamics of particles, rigid bodies and distributed systems with engineering applications; generalized coordinates; Hamilton's principle; Lagrange's equations; Hamilton-Jacobi theory; modal dynamics orthogonality; wave dynamics; dispersion. Effective: 1999 Fall Quarter.

MAE 223—Multibody Dynamics (4)
Lecture—4 hours. Prerequisite(s): ENG 102 Coupled rigid-body kinematics/dynamics; reference frames; vector differentiation; configuration and motion constraints; holonomicity; generalized speeds; partial velocities; mass; inertia tensor/theorems; angular momentum; generalized forces; comparing Newton/Euler, Lagrange's, Kane's methods; computer-aided equation derivation; orientation; Euler; Rodrigues parameters. (Biomedical Engineering 223.) Effective: 2000 Winter Quarter.

MAE 225—Spatial Kinematics and Robotics (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): MAE 222; C Language. Spatial kinematics, screw theory, spatial mechanisms analysis and synthesis, robot kinematics and dynamics, robot workspace, path planning, robot programming, real-time architecture and software implementation. (Biomedical Engineering 225.) Effective: 2000 Winter Quarter.

MAE 226—Acoustics and Noise Control (4)
Lecture—4 hours. Prerequisite(s): ENG 122 Description of sound using normal modes and waves; interaction between vibrating solids and sound fields; sound absorption in enclosed spaces; sound transmission through barriers; applications in design, acoustic enclosures and sound walls, room acoustics, design of quiet machinery. Effective: 2001 Spring Quarter.

MAE 228—Introduction to BioMEMS (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BS engineering discipline or consent of instructor. Ideal for beginning graduate or advanced undergraduate students interested in microelectromechanical systems (MEMS) topics related to biological applications. Covers topics from various disciplines related to BioMEMS: mechanical, electrical, biomedical, chemical engineering, and materials science. Effective: 2014 Winter Quarter.

MAE 229—Design & Analysis of Micro-Electromechanical Systems (4)
Lecture—4 hours. Prerequisite(s): (ENG 045 or ENG 045Y); ENG 100; ENG 104; and Consent of Instructor. ENG 122 recommended. Mechanical design of micro-electronmechanical systems(MEMS). Device modeling: lumped parameter models; energy methods; nonlinearities; electrical and mechanical noise sources. Actuation and measurement methods: capacitive, piezoresistive, thermal, piezoelectric, and optical techniques. Review of basic electronics: bridge circuits, amplitude modulation; lock-in detection. Effective: 2018 Spring Quarter.

MAE 232—Skeletal Tissue Mechanics (3)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): ENG 104B. Overview of the mechanical properties of the various tissues in the musculoskeletal system, the relationship of these properties to anatomic and histologic structure, and the changes in these properties caused by aging and disease. Tissues covered include bone, cartilage and synovial fluid, ligament and tendon. (Biomedical Engineering 232.) Effective: 1997 Winter Quarter.

MAE 234—Design and Dynamics of Road Vehicles (4)
Lecture—4 hours. Prerequisite(s): EME 134 Analysis and numerical simulation of road vehicles with on design applications. Effective: 2000 Spring Quarter.

MAE 237—Analysis and Design of Composite Structures (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 104; Or equivalent. Modeling and analysis methodology for composite structures including response and failure. Laminated plate bending theory. Introduction to failure processes. Includes discussion of aerospace structural analysis. Effective: 2014 Winter Quarter.

MAE 238—Advanced Aerodynamic Design and Optimization (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Application of aerodynamic theory to obtain optimum aerodynamic shapes. Both analytic solutions and solutions obtained with numerical optimization techniques will be examined. Includes introduction to the calculus of variations and numerical optimization techniques. Effective: 1997 Winter Quarter.

MAE 239—Advanced Finite Elements and Optimization (4)
Lecture—4 hours. Prerequisite(s): ENG 180 or EAD 115 or MAT 128C Introduction to advanced finite elements and design optimization methods, with application to modeling of complex mechanical, aerospace and biomedical systems. Application of states of the art in finite elements in optimum design of components under realistic loading conditions and constraints. (Biomedical Engineering 239.) Effective: 2007 Fall Quarter.

MAE 240—Computational Methods in Nonlinear Mechanics (4)
Lecture—4 hours. Prerequisite(s): EAD 115 or MAT 128B or ENG 180 Deformation of solids and the motion of fluids treated with state-of-the-art computational methods. Numerical treatment of nonlinear dynamics; classification of coupled problems; applications of finite element methods to mechanical, aeronautical, and biological systems. (Biomedical Engineering 240) Effective: 1999 Winter Quarter.

MAE 242—Stability of Thin-Walled Structures (4)
Lecture—4 hours. Prerequisite(s): ENG 104; Or equivalent. Static stability of thin-walled aerospace structures treated from both theoretical and practical design perspectives. Both monolithic and composite construction considered. Buckling of stiffened panels, shells and thin-walled beams, experimental methods and failure/crippling processes. Effective: 2002 Fall Quarter.

MAE 248—Advanced Turbomachinery (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 103; ENG 105 Preliminary aerodynamic design of axial and radial flow compressors and turbines. Design of diffusers. Selection of turbomachine and configurations and approximations to optimum dimensions and flow angles. Introduction to through flow analysis. Rotating stall and surge, and aeromechanical considerations. Effective: 1999 Fall Quarter.

MAE 250A—Advanced Methods in Mechanical Design (4)
Lecture—4 hours. Prerequisite(s): EME 150A; EME 150B; Or the equivalents or consent of instructor. Applications of advanced techniques of solid mechanics to mechanical design problems. Coverage of advanced topics in stress analysis and static failure theories with emphasis in design of machine elements. Design projects emphasizing advanced analysis tools for life cycle evaluation. Effective: 1999 Fall Quarter.

MAE 250B—Advanced Methods in Mechanical Design (4)
Lecture—4 hours. Prerequisite(s): MAE 250A Applications of advanced techniques of solid mechanics to mechanical design problems. Advanced topics in variational methods of mechanics with emphasis in design of machine elements. Design projects emphasizing advanced analysis tools. Effective: 1999 Fall Quarter.

MAE 250C—Mechanical Performance of Materials (4)
Lecture—4 hours. Prerequisite(s): Undergraduate course in stress analysis and mechanical behavior of materials. Occurrence, mechanisms, and prediction of fatigue and fracture phenomenon. Use of stress and strain to predict crack initiation. Use of fracture mechanics to predict failure and crack propagation. Effects of stress concentration, manufacturing, load sequence, irregular loading, and multi-axial loading. Effective: 2000 Spring Quarter.

MAE 251—Mechatronics System Design (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (EME 154, EME 172) or (EEC 157A, EEC 157B) Motion mechanism design, electric actuator, power electronics motion contol, sensor technologies, personal computer-based control systems design, motion control general operating system and real time operating systems, motion control software design, discrete event control software design. Effective: 2002 Fall Quarter.

MAE 252—Information Processing for Autonomous Robotics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EME 154; EME 171; ENG 006; EME 005; Or equivalent programming experience to ENG 006 and EME 005. MAE 154, MAE 171, or consent of instructor. Computational principles for sensing, reasoning, and navigation for autonomous robots. Effective: 2005 Winter Quarter.

MAE 253—Network Theory and Applications (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): MAT 022A; MAT 022B; (STA 013 or STA 120); STA 013Y; Experience with computer software, or consent of instructor. Pass One and Pass Two open to Graduate Students in Mechanical and Aerospace Engineering and Computer Science only. Develops the mathematical theory underlying growth, structure and function of networks with applications to physical, social, biological and engineered systems. Topics include network growth, resilience, epidemiology, phase transitions, software and algorithms, routing and search control, cascading failures. (Computer Science Engineering 253.) Effective: 2018 Spring Quarter.

MAE 253—Network Theory and Applications (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): MAT 022A; MAT 022B; (STA 013 or STA 013Y or STA 120); Experience with computer software, or consent of instructor. Develops the mathematical theory underlying growth, structure and function of networks with applications to physical, social, biological and engineered systems. Topics include network growth, resilience, epidemiology, phase transitions, software and algorithms, routing and search control, cascading failures. (ECS 253.) Effective: 2018 Fall Quarter.

MAE 254—Engineering Software Design (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EME 005; ENG 180 Principle and design of engineering software. Advanced topics in engineering software design, applications of object-oriented programming, very high-level languages, real-time multi-thread computing and sensor fusion, Web-based network computing, graphics, and GUI in engineering. Effective: 2004 Spring Quarter.

MAE 255—Computer Aided Design and Manufacturing (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Proficiency in a high level programming language such as Fortran, Pascal or C. Representation and processing of geometrical information in design and manufacturing. Numeric and symbolic computations. Coordinate systems and transformations. Bezier and B-spline curves and surfaces. Interpolation and approximation methods. Intersections, offsets, and blends. Path planning for machining, inspection, and robotics applications. Effective: 2005 Spring Quarter.

MAE 256—Sustainable Manufacturing and Design (4)
Lecture/Discussion—4 hours. Open to graduate students; undergraduate students allowed only with consent of instructor. Definitions, methods, and dimensions of sustainability in manufacturing and product design. Emphasis on resource efficiency and life cycle engineering in the context of the production environment. Effective: 2018 Spring Quarter.

MAE 258—Hybrid Electric Vehicle System Theory and Design (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EME 150B; Graduate standing in Mechanical and Aeronautical Engineering. Advanced vehicle design for fuel economy, performance, and low emissions, considering regulations, societal demands and manufacturability. Analysis and verification of computer design and control of vehicle systems in real vehicle tests. Advanced engine concepts. Effective: 2000 Spring Quarter.

MAE 262—Advanced Aerodynamics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EAE 126 Study of invicid and viscous flows about aerodynamic shapes at subsonic,
transonic and supersonic conditions. Application of aerodynamic theory to design for reduced drag and increased lift. Effective: 2000 Winter Quarter.

MAE 263—Introduction to Computational Aerodynamics and Fluid Dynamics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 103; or Consent of Instructor. Introduction to numerical methods for solution of fluid flow problems. Discretization techniques and solution algorithms. Finite difference solutions to classical model equations pertinent to wave phenomena, diffusion phenomena, or equilibrium. Application to the incompressible Navier-Stokes equation. Effective: 1999 Fall Quarter.

MAE 267—Parallel Computations in Fluid/Thermal Sciences (4)
Discussion—2 hours; Lecture—2 hours. Prerequisite(s): EME 106; EME 165; ENG 180; or Consent of Instructor. Or equivalent to ENG 180. Graduate or junior/senior undergraduate as a technical elective. Programming languages and constructs for engineering analysis on parallel computers including MPI (distributed), OpenMP (shared), and Fortran95. Effective: 2007 Fall Quarter.

MAE 268—Wind Power Engineering (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): ENG 102; ENG 103; or Consent of Instructor. Or equivalent courses. Fundamentals for understanding the conversion of wind power to mechanical power and electricity. Related engineering, economic and societal issues. Effective: 2006 Fall Quarter.

MAE 269—Fuel Cell Systems (4)
Discussion—2 hours; Lecture—2 hours. Prerequisite(s): EME 106; EME 107; EME 165; or Consent of Instructor. Or equivalent courses. Graduate or junior/senior undergraduate as a technical elective. Basics of electrochemistry and fuel cell engines in mobile and stationary applications. Aspects of fuel cell energy converters and their subsystems including practice with existing fuel cell and hydrogen systems on campus. Effective: 2006 Fall Quarter.

MAE 271—Advanced Modeling and Simulation of Mechatronic Systems (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EME 172; Or equivalent. Multiport models of mechanical, electrical, hydraulic, and thermal devices; bond graphs, block diagrams and state space equations; modeling of multiple energy domain systems; 3-dimensional mechanics; digital simulation laboratory. Effective: 2005 Winter Quarter.

MAE 272—Theory and Design of Control Systems (4)
Lecture—4 hours. Prerequisite(s): EME 172; Or the equivalent. Mathematical representations of linear dynamical systems. Feedback
principles; benefits and cost of feedback. Analysis and design of control systems based on classical and modern approaches, with emphasis on applications to mechanical and aeronautical systems. Effective: 2000 Winter Quarter.

MAE 274—Analysis and Design of Digital Control Systems (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EME 172 Discrete systems analysis; digital filtering; sample data systems; state space and transform design techniques; quantization effects; multi-input, multi-output systems. Effective: 2000 Spring Quarter.

MAE 275—Advance Aircraft Stability and Control (4)
Discussion—1 hour; Lecture—3 hours. Development and analysis of aircraft equations of motion. Flexible modes. Response to control actuation. Random inputs and disturbances. Stability and control augmentation system design. Handling qualities. Effective: 2000 Spring Quarter.

MAE 276—Data Acquisition and Analysis (4)
Discussion—1 hour; Lecture—3 hours. Application of computers for data acquisition and control. Topics
include computer architecture, characteristics of transducers, hardware for laboratory applications of computers, fundamentals of interfaces between computers and experimental equipment, programming techniques for data acquisition and control, basic data analysis. Effective: 1999 Fall Quarter.

MAE 290C—Graduate Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Individual and/or group conference on problems, progress, and techniques in mechanical and aeronautical engineering research. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1999 Fall Quarter.

MAE 297—SEMINAR (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. CURRENT TOPICS IN ENGINEERING INCLUDING DEVELOPEMENTS IN MECHANICAL AND AERONAUTICAL ENGINEERING WITH PRESENTATIONS BY STUDENTS, FACULTY, AND VISITORS. MAY BE REPEATED FOR CREDIT. (S/U grading only.) Effective: 2000 Fall Quarter.

MAE 298—Group Study (1-5)
Variable. Effective: 1997 Winter Quarter.

MAE 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

MAE 390—The Teaching of Aeronautical Science and Engineering (1)
Discussion—1 hour. Prerequisite(s): Meet qualifications for teaching assistant and/or associate-in in Aeronautical Science and Engineering. Methods of leading discussion groups or laboratory sections, writing
and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

MAE 396—Teaching Assistand Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

MAT Mathematics

Note: Mathematics 016A, 016B, and 016C are intended for students who will take no more Mathematics courses. Mathematics 017A, 017B, and 017C have the same level of rigor as 016A, 016B, and 016C, yet are much more broad mathematically (containing algebra, differential equations and probability, besides traditional calculus), and are intended for biology.

Courses in MAT:

MAT 000B—Elementary Algebra (no credit) (0)
Lecture—3 hours. Not open to Concurrent student enrollment. Basic concepts of algebra, including polynomials, factoring, equations, graphs, and inequalities. Offered only if sufficient number of students enroll. (P/NP grading only.) Effective: 1997 Winter Quarter.

MAT 000C—Trigonometry (no credit) (0)
Lecture—2 hours. Not open to Concurrent student enrollment. Basic concepts of trigonometry, including trigonometric functions, identities, inverse functions, and applications. Offered only if sufficient number of students enroll. (P/NP grading only.) Effective: 1997 Winter Quarter.

MAT 000D—Intermediate Algebra (no credit) (0)
Lecture—3 hours. Not open to Concurrent student enrollment. Basic concepts of algebra, prepares student for college work in mathematics, such as course 16A or 21A. Functions, equations, graphs, logarithms, and systems of equations. Offered only if sufficient number of students enroll. (P/NP grading only.) Effective: 1997 Winter Quarter.

MAT 012—Precalculus (3)
Lecture—3 hours. Prerequisite(s): Two years of high school algebra, plane geometry, plane trigonometry; and obtaining required score on the Precalculus Diagnostic Examination. Topics selected for their use in calculus, including functions and their graphs, slope, zeroes of polynomials, exponential, logarithmic and trigonometric functions, sketching surfaces and solids. Not open for credit to students who have completed any of courses MAT 016A, MAT 016B, MAT 016C, MAT 017A, MAT 017B, MAT 017C, MAT 021A, MAT 021B, or MAT 021C with a C- or better. GE credit: QL, SE, SL. Effective: 2012 Winter Quarter.

MAT 016A—Short Calculus (3)
Lecture—3 hours. Prerequisite(s): Two years of high school algebra, plane geometry, plane trigonometry, and satisfying the Mathematics Placement Requirement. Limits; differentiation of algebraic functions; analytic geometry; applications, in particular to maxima and minima problems. Not open for credit to students who have completed MAT 017B, MAT 017C, MAT 021A, MAT 021B, or MAT 021C; only 2 units of credit to students who have completed MAT 17A. GE credit: QL, SE, SL. Effective: 2012 Winter Quarter.

MAT 016B—Short Calculus (3)
Lecture—3 hours. Prerequisite(s): MAT 016A C- or better or MAT 017A C- or better or MAT 021A C- or better or MAT 021AH C- or better Integration; calculus for trigonometric, exponential, and logarithmic functions; applications. Not open for credit to students who have completed MAT 017C, MAT 021B, or MAT 021C; only 2 units of credit to students who have completed MAT 017B. GE credit: QL, SE, SL. Effective: 2017 Winter Quarter.

MAT 016C—Short Calculus (3)
Lecture—3 hours. Prerequisite(s): MAT 016B C- or better or MAT 017B C- or better or MAT 021B C- or better or MAT 021BH C- or better Differential equations; partial derivatives; double integrals; applications; series. Not open for credit to students who have completed MAT 021C; only 2 units of credit to students who have completed MAT 017C. GE credit: QL, SE, SL. Effective: 2017 Winter Quarter.

MAT 017A—Calculus for Biology and Medicine (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Two years of high school algebra, plane geometry, plane trigonometry, and analytical geometry, and satisfying the Mathematics Placement Requirement. Introduction to differential calculus via applications in biology and medicine. Limits, derivatives of polynomials, trigonometric, and exponential functions, graphing, applications of the derivative to biology and medicine. Not open for credit to students who have completed MAT 016B, MAT 016C, MAT 021A, MAT 021B, or MAT 021C; only 2 units of credit to students who have completed MAT 016A. GE credit: QL, SE, SL. Effective: 2014 Fall Quarter.

MAT 017B—Calculus for Biology and Medicine (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016A C- or better or MAT 017A C- or better or MAT 021A C- or better or MAT 021AH C- or better Introduction to integral calculus and elementary differential equations via applications to biology and medicine. Fundamental theorem of calculus, techniques of integration including integral tables and numerical methods, improper integrals, elementary first order differential equations, applications in biology and medicine. Not open for credit to students who have completed MAT 016C, MAT 021B, or MAT 021C; only 2 units of credit for students who have completed MAT 016B. GE credit: QL, SE, SL. Effective: 2017 Winter Quarter.

MAT 017C—Calculus for Biology and Medicine (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 017B C- or better Matrix algebra, functions of several variables, partial derivatives, systems of differential equations, and applications to biology and medicine. Not open for credit to students who have completed MAT 21C; only 2 units of credit to students who have completed MAT 16C. GE credit: SE, SL. Effective: 2016 Fall Quarter.

MAT 021A—Calculus (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Two years of high school algebra, plane geometry, plane trigonometry, and analytical geometry, and satisfying the Mathematics Placement Requirement. Functions, limits, continuity. Slope and derivative. Differentiation of algebraic and transcendental functions. Applications to motion, natural growth, graphing, extrema of a function. Differentials. L'Hopital's rule. Not open for credit to students who have completed MAT 016B, MAT 016C, MAT 017B, or MAT 017C; only 2 units of credit to students who have completed MAT 016A or MAT 017A. GE credit: QL, SE, SL. Effective: 2012 Winter Quarter.

MAT 021AH—Honors Calculus (4)
Lecture/Discussion—4 hours. Prerequisite(s): A Precalculus Diagnostic Examination score significantly higher than the minimum for MAT 021A is required. More intensive treatment of material covered in course 21A. GE credit: QL, SE. Effective: 1997 Winter Quarter.

MAT 021AL—Emerging Scholars Program Calculus Workshop (2)
Workshop—6 hours. Prerequisite(s): MAT 021A (can be concurrent); MAT 021A required concurrently. Functions, limits, continuity. Slope and derivative. Same course content as course 21A. Enrollment for students in the Emerging Scholars Program by instructor's invitation only. (P/NP grading only.) GE credit: SE. Effective: 2006 Fall Quarter.

MAT 021B—Calculus (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (MAT 021A C- or better or MAT 021AH C- or better) or MAT 017A B or better Continuation of course 21A. Definition of definite integral, fundamental theorem of calculus, techniques of integration. Application to area, volume, arc length, average of a function, improper integral, surface of revolution. Only 2 units of credit to students who have completed MAT 016B, MAT 016C, MAT 017B, or MAT 017C. GE credit: QL, SE. Effective: 2017 Winter Quarter.

MAT 021BH—Honors Calculus (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021A B or better or MAT 021AH B or better More intensive treatment of material covered in course 21B. Students completing 21BH can continue with course 21CH or the regular 21C. GE credit: SE. Effective: 1997 Winter Quarter.

MAT 021BL—Emerging Scholars Program Calculus Workshop (2)
Workshop—6 hours. Prerequisite(s): MAT 021B (can be concurrent); Concurrent enrollment in MAT 021B. Continuation of course 21A. Same course content as 21B. Enrollment for students in the Emerging Scholars Program by instructor's invitation only. (P/NP grading only.) GE credit: SE. Effective: 2016 Fall Quarter.

MAT 021C—Calculus (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016C C- or better or MAT 017C C- or better or MAT 021B C- or better or MAT 021BH C- or better or MAT 017B B or better; Continuation of course 21B. Sequences, series, tests for convergence, Taylor expansions. Vector algebra, vector calculus, scalar and vector fields. Partial derivatives, total differentials. Applications to maximum and minimum problems in two or more variables. Applications to physical systems. GE credit: QL, SE. Effective: 2017 Winter Quarter.

MAT 021CH—Honors Calculus (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021B B or better or MAT 021BH B or better More intensive treatment of material covered in course 21C. GE credit: SE. Effective: 1997 Winter Quarter.

MAT 021CL—Emerging Scholars Program Calculus Workshop (2)
Workshop—6 hours. Prerequisite(s): MAT 021C (can be concurrent); Concurrent enrollment in MAT 021C. Continuation of course 21B. Same course content as course 21C. Enrollment for students in the Emerging Scholars Program by instructor's invitation only. (P/NP grading only.) GE credit: SE. Effective: 2016 Fall Quarter.

MAT 021D—Vector Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (MAT 021C C- or better or MAT 021CH C- or better) or MAT 017C B or better Continuation of course 21C. Definite integrals over plane and solid regions in various coordinate systems. Line and surface integrals. Green's theorem, Stoke's theorem, divergence theorem. GE credit: QL, SE. Effective: 2017 Winter Quarter.

MAT 021M—Accelerated Calculus (5)
Discussion/Laboratory—1 hour; Lecture/Discussion—4 hours. Prerequisite(s): Grade of B or higher in both semesters of high school calculus or a score of 4 or higher on the Advanced Placement Calculus AB exam, and obtaining the required score on the Precalculus Diagnostic Examination and its trigonometric component. Accelerated treatment of material from courses 21A and 21B, with detailed presentation of theory, definitions, and proofs, and treatment of computational aspects of calculus at a condensed but sophisticated level. Not open for credit to students who have completed MAT 021A or MAT 021B. GE credit: SE. Effective: 1997 Winter Quarter.

MAT 022A—Linear Algebra (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): MAT 016C C- or better or MAT 017C C- or better or MAT 021C C- or better or MAT 021CH C- or better; (ENG 006 or EME 005 or MAT 022AL (can be concurrent)) Matrices and linear transformations, determinants, eigenvalues, eigenvectors, diagonalization, factorization. Not open for credit to students who have completed course 67. GE credit: QL, SE. Effective: 2017 Winter Quarter.

MAT 022A—Linear Algebra (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): (MAT 016C C- or better or MAT 017C C- or better or MAT 021C C- or better or MAT 021CH C- or better); (ENG 006 or EME 005 or ECH 060 or MAT 022AL (can be concurrent)) Matrices and linear transformations, determinants, eigenvalues, eigenvectors, diagonalization, factorization. Not open for credit to students who have completed course 67. GE credit: QL, SE. Effective: 2018 Summer Session 1.

MAT 022AL—Linear Algebra Computer Laboratory (1)
Laboratory—3 hours. Prerequisite(s): MAT 016C or MAT 017C or MAT 021C or MAT 021CH Introduction to Matlab and its use in linear algebra. (P/NP grading only.) GE credit: QL, SE. Effective: 2017 Winter Quarter.

MAT 022B—Differential Equations (3)
Lecture—3 hours. Prerequisite(s): (MAT 022A C- or better or MAT 067 C- or better) Solutions of elementary differential equations. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 025—Advanced Calculus (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021C C- or better or MAT 021CH C- or better Introduction to the rigorous treatment of abstract mathematical analysis. Proofs in mathematics, induction, sets, cardinality; real number system, theory of convergence of sequences. Not open for credit to students who have completed former MAT 127A. GE credit: SE. Effective: 2017 Spring Quarter.

MAT 036—Fundamentals of Mathematics (3)
Lecture—3 hours. Prerequisite(s): Satisfaction of the Mathematics Placement Requirement. Introduction to fundamental mathematical ideas selected from the principal areas of modern mathematics. Properties of the primes, the fundamental theorems of arithmetic, properties of the rationals and irrationals, binary and other number systems. Not open for credit to students who have taken MAT 108. Effective: 2001 Winter Quarter.

MAT 067—Modern Linear Algebra (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021C C- or better or MAT 021CH C- or better Rigorous treatment of linear algebra; topics include vector spaces, bases and dimensions, orthogonal projections, eigenvalues and eigenvectors, similarity transformations, singular value decomposition and positive definiteness. Only one unit of credit to students who have completed MAT 022A. GE credit: SE. Effective: 2017 Winter Quarter.

MAT 071A—Explorations in Elementary Mathematics (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Two years of high school mathematics. Weekly explorations of mathematical ideas related to the elementary school curriculum will be carried out by cooperative learning groups. Lectures will provide background and synthesize the results of group exploration. Effective: 1997 Winter Quarter.

MAT 071B—Explorations in Elementary Mathematics (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Two years of high school mathematics. Weekly explorations of mathematical ideas related to the elementary school curriculum will be carried out by cooperative learning groups. Lectures will provide background and synthesize the results of group exploration. Effective: 1997 Winter Quarter.

MAT 089—Elementary Problem Solving (1)
Lecture—1 hour. Prerequisite(s): High school mathematics through precalculus. Solve and present solutions to challenging and interesting problems in elementary mathematics. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 2001 Winter Quarter.

MAT 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

MAT 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

MAT 108—Introduction to Abstract Mathematics (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021B A rigorous treatment of mathematical concepts with emphasis on developing the ability to understand abstract mathematical ideas, to read and write mathematical concepts, and to prove theorems. Designed to serve as preparation for the more rigorous upper division courses. GE credit: SE. Effective: 2008 Spring Quarter.

MAT 111—History of Mathematics (4) ***Review all entries***
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 025 or MAT 067 or MAT 108 or MAT 114 or MAT 115A or MAT 141 or MAT 145; One of the courses mentioned; eight units of upper division Mathematics. History of mathematics from ancient times through the development of calculus. Mathematics from Arab, Hindu, Chinese and other cultures. Selected topics from the history of modern mathematics. GE credit: SE. Effective: 2010 Fall Quarter.

MAT 111—History of Mathematics (4) ***Review all entries***
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 025 or MAT 127A or MAT 067 or MAT 108 or MAT 114 or MAT 115A or MAT 141 or MAT 145; Eight units of upper division Mathematics. History of mathematics from ancient times through the development of calculus. Mathematics from Arab, Hindu, Chinese and other cultures. Selected topics from the history of modern mathematics. GE credit: SE. Effective: 2018 Fall Quarter.

MAT 114—Convex Geometry (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021C; (MAT 022A or MAT 067) Topics selected from the theory of convex bodies, convex functions, geometric inequalities, combinatorial geometry, and integral geometry. Designed to serve as preparation for the more rigorous upper-division courses. GE credit: SE. Effective: 2007 Winter Quarter.

MAT 115A—Number Theory (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021B Divisibility and related topics, diophantine equations, selected topics from the theory of prime numbers. Designed to serve as preparation for the more rigorous upper division courses. GE credit: QL, SE. Effective: 2006 Fall Quarter.

MAT 115B—Number Theory (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 115A; (MAT 022A or MAT 067) Euler function, Moebius function, congruences, primitive roots, quadratic reciprocity law. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

MAT 116—Differential Geometry (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 021D; MAT 022B; (MAT 022A or MAT 067) Vector analysis, curves, and surfaces in three dimensions. GE credit: SE. Effective: 2017 Winter Quarter.

MAT 118A—Partial Differential Equations: Elementary Methods (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 021D; MAT 022B; (MAT 022A or MAT 067) Derivation of partial differential equations; separation of variables; equilibrium solutions and Laplace's equation; Fourier series; method of characteristics for the one dimensional wave equation. Solution of nonhomogeneous equations. GE credit: QL, SE. Effective: 2006 Fall Quarter.

MAT 118B—Partial Differential Equations: Eigenfunction Expansions (4)
Lecture—3 hours. Prerequisite(s): MAT 118A Sturm-Liouville Theory; selfadjoint operators; mixed boundary conditions; partial differential equations in two and three dimensions;
Eigenvalue problems in circular domains; nonhomogeneous problems and the method of eigenfunction expansions; Poisson's Equations. GE credit: QL, SE. Effective: 2000 Fall Quarter.

MAT 118C—Partial Differential Equations: Green's Functions and Transforms (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 118B Green's functions for one-dimensional problems and Poisson's equation; Fourier transforms; Green's Functions for time dependent problems; Laplace transform and solution of partial differential equations. GE credit: QL, SE. Effective: 2000 Fall Quarter.

MAT 119A—Ordinary Differential Equations (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 021D; MAT 022B; (MAT 022A or MAT 067) Scalar and planar autonomous systems; nonlinear systems and linearization; existence and uniqueness of solutions; matrix solution of linear systems; phase plane analysis; stability analysis; bifurcation theory; Liapunov's method; limit cycles; Poincare Bendixon theory. GE credit: QL, SE. Effective: 2007 Winter Quarter.

MAT 119B—Ordinary Differential Equations (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 119A Lorentz equations; Poincare maps; center manifolds and normal forms; scalar and planar maps; phase space analysis for iterated maps; period-doubling bifurcation; Lyapunov exponent; chaos and symbolic dynamics; strange attractors; fractals. GE credit: QL, SE. Effective: 2007 Spring Quarter.

MAT 124—Mathematical Biology (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): MAT 022B; (MAT 022A or MAT 067) Methods of mathematical modeling of biological systems including difference equations, ordinary differential equations, stochastic and dynamic programming models. Computer simulation methods applied to biological systems. Applications to population growth, cell biology, physiology, evolutionary ecology and protein clustering. MATLAB programming required. GE credit: QL, SE. Effective: 2007 Spring Quarter.

MAT 125A—Real Analysis (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 025 Functions, limits of functions, continuity and uniform continuity, sequences of functions, series of real numbers, series of functions, power series. Not open for credit to students who have completed former MAT 127B. GE credit: SE. Effective: 2006 Fall Quarter.

MAT 125B—Real Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 125A; (MAT 067 or (MAT 022A, MAT 108)) Theory of the derivative, Taylor series, integration, partial derivatives, Implicit Function Theorem. Not open for credit to students who have completed former MAT 127C. GE credit: SE. Effective: 2017 Winter Quarter.

MAT 127A—Real Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021C or MAT 021CH; MAT 067 or (MAT 022A, MAT 108) Real numbers, sequences, series, and continuous functions. Effective: 2017 Fall Quarter.

MAT 127B—Real Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 127A Derivatives, integrals, sequences of functions, and power series. Effective: 2017 Fall Quarter.

MAT 127C—Real Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 127B Metric spaces and multi-variable calculus. Effective: 2017 Fall Quarter.

MAT 128A—Numerical Analysis (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): MAT 021C; ECS 030 Error analysis, approximation, interpolation, numerical differentiation and integration. Programming in language such as Pascal, Fortran, or BASIC required. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 128B—Numerical Analysis in Solution of Equations (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): MAT 021C; (MAT 022A or MAT 067); ECS 030 Solution of nonlinear equations and nonlinear systems. Minimization of functions of several variables. Simultaneous linear equations. Eigenvalue problems. Linear programming. Programming in language such as Pascal, Fortran, or BASIC required. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 128C—Numerical Analysis in Differential Equations (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): MAT 022B; (MAT 022A or MAT 067); ECS 030 Difference equations, operators, numerical solutions of ordinary and partial differential equations. Programming in language such as Pascal, Fortran, or BASIC required. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 129—Fourier Analysis (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 021D; MAT 022B; (MAT 022A or MAT 067); MAT 025 Fourier series and integrals, orthogonal sets of functions. Topics selected from trigonometric approximation, orthogonal polynomials, applications to signal and image processing, numerical analysis, and differential equations. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 133—Mathematical Finance (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): (MAT 067 or (MAT 022A, MAT 108)), MAT 135A Analysis and evaluation of deterministic and random cash flow streams, yield and pricing of basic financial instruments, interest rate theory, mean-variance portfolio theory, capital asset pricing models, utility functions and general principles. MATLAB programming required. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

MAT 135A—Probability (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021C; (MAT 108 or MAT 025) Probability space; discrete probability, combinatorial analysis; independence, conditional probability; random variables, discrete and continuous distributions, probability mass function, joint and marginal density functions; expectation, moments, variance, Chebyshev inequality; sums of random variables, random walk, large number law, central limit theorem. Not open for credit to students who have completed former MAT 131. GE credit: SE. Effective: 2018 Spring Quarter.

MAT 135B—Stochastic Processes (4)
Discussion/Laboratory—4 hours. Prerequisite(s): MAT 135A; (MAT 022A or MAT 067) Generating functions, branching processes, characteristic function; Markov chains; convergence of random variables, law of iterated logarithm; random processes, Brownian motion, stationary processes, renewal processes, queueing theory, martingales. Not open for credit to students who have completed former MAT 132A. GE credit: QL, SE. Effective: 2009 Spring Quarter.

MAT 141—Euclidean Geometry (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021B; (MAT 022A or MAT 067) Axiomatic and analytic examination of Euclidean geometry from an advanced point of view. In particular, a discussion of its relation to other geometries. Designed to serve as preparation for the more rigorous upper division courses. GE credit: SE. Effective: 2018 Winter Quarter.

MAT 145—Combinatorics (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 021C Combinatorial methods using basic graph theory, counting methods, generating functions, and recurrence relations. Designed to serve as preparation for the more rigorous upper division courses. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 146—Algebraic Combinatorics (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): MAT 145; MAT 025; (MAT 022A or MAT 067) Enumeration, Polya theory, generating functions, current topics in algebraic combinatorics. Not open for credit to students who have completed former course 149A. GE credit: SE. Effective: 2007 Spring Quarter.

MAT 146—Algebraic Combinatorics (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): ((MAT 022A, MAT 108) or MAT 067)); MAT 145 Enumeration, Polya theory, generating functions, current topics in algebraic combinatorics. Not open for credit to students who have completed former MAT 149A. GE credit: SE. Effective: 2018 Fall Quarter.

MAT 147—Topology (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 025 Basic notions of point-set and combinatorial topology. GE credit: SE. Effective: 2016 Fall Quarter.

MAT 148—Discrete Mathematics (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 067 or (MAT 022A, MAT 108) Coding theory, error correcting codes, finite fields and the algebraic concepts needed in their development. Not open for credit to students who have completed former MAT 149B. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 150A—Modern Algebra (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 067 or (MAT 022A, MAT 108) Basic concepts of groups, symmetries of the plane. Emphasis on the techniques used in the proof of the ideas (Lemmas, Theorems, etc.) developing these concepts. Precise thinking, proof writing, and the ability to deal with abstraction. GE credit: SE. Effective: 2016 Fall Quarter.

MAT 150B—Modern Algebra (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 150A Bilinear forms, rings, factorization, modules. GE credit: SE. Effective: 2007 Winter Quarter.

MAT 150C—Modern Algebra (4)
Lecture/Discussion—4 hours. Prerequisite(s): MAT 150B Group representations, fields, Galois theory. GE credit: SE. Effective: 2007 Spring Quarter.

MAT 160—Mathematics for Data Analytics and Decision Making (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): MAT 167 Relational model; relational algebra, relational calculus, normal forms, functional and multivalued dependencies, separability. Cost benefit analysis of physical database design and reorganization. Performance via analytical modeling, simulation, and queueing theory. Block accesses; buffering; operating system contention; CPU intensive operations. GE credit: SE. Effective: 2018 Spring Quarter.

MAT 165—Mathematics and Computers (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): MAT 022A or MAT 067; (MAT 025 or MAT 108 or MAT 114 or MAT 115A or MAT 145) Introduction to computational mathematics, symbolic computation, and computer generated/verified proofs in algebra, analysis and geometry. Investigation of rigorous new mathematics developed in conjunction with modern computational questions and the role that computers play in mathematical conjecture and experimentation. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 167—Applied Linear Algebra (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 022A or MAT 067 Applications of linear algebra; LU and QR matrix factorizations, eigenvalue and singular value matrix decompositions. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 168—Optimization (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 021C; ((MAT 022A, MAT 108) or MAT 067) Linear programming, simplex method. Basic properties of unconstrained nonlinear problems, descent methods, conjugate direction method. Constrained minimization. Programming language required. GE credit: QL, SE. Effective: 2016 Fall Quarter.

MAT 180—Special Topics (3)
Lecture—3 hours. Prerequisite(s): MAT 025; (MAT 067 or (MAT 022A, MAT 108)) Special topics from various fields of modern, pure, and applied mathematics. Some recent topics include Knot Theory, General Relativity, and Fuzzy Sets. May be repeated for credit when topics differs. GE credit: SE. Effective: 2016 Fall Quarter.

MAT 185A—Complex Analysis (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): (MAT 067 or (MAT 022A, MAT 108)), MAT 125A Complex number system, analyticity and the Cauchy-Riemann equations, elementary functions, complex integration, power and Laurent series expansions, residue theory. GE credit: SE. Effective: 2016 Fall Quarter.

MAT 185B—Complex Analysis (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 185A Analytical functions, elementary functions and their mapping properties, applications of Cauchy's integral theorem, conformal mapping and applications to heat flow and fluid mechanics. GE credit: SE. Effective: 2007 Spring Quarter.

MAT 189—Advanced Problem Solving (3)
Lecture—3 hours. Prerequisite(s): MAT 025; ((MAT 022A, MAT 108) or MAT 067) Solution and presentation of advanced problem solving techniques. Solve and present interesting and challenging problems of all areas of mathematics. GE credit: OL, QL, SE, WE. Effective: 2016 Fall Quarter.

MAT 192—Internship in Applied Mathematics (1-3)
Internship. Prerequisite(s): Consent of Instructor. Supervised work experience in applied mathematics. Final report. May be repeated up to 10 unit(s). (P/NP grading only.) Effective: 2016 Fall Quarter.

MAT 194—Undergraduate Thesis (3)
Independent Study. Prerequisite(s): Consent of Instructor. Independent research under supervision of a faculty member. Student will submit written report in thesis form. May be repeated for credit with consent of Vice Chairperson. (P/NP grading only.) GE credit: SE. Effective: 2016 Fall Quarter.

MAT 197TC—Tutoring Mathematics in the Community (1-5)
Laboratory—2-6 hours; Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. Special projects in mathematical education developing techniques for mathematics instruction and tutoring on an individual or small group basis. May be repeated once for credit. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 2016 Fall Quarter.

MAT 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2016 Fall Quarter.

MAT 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

MAT 200A—Problem-Solving in Analysis (1)
Extensive Problem Solving; Lecture—1 hour. Prerequisite(s): MAT 201A; MAT 201B; MAT 201C Problem-solving in graduate analysis: continuous functions, metric spaces, Banach and Hilbert spaces, bounded linear operators, the spectral theorem, distributions, Fourier series and transforms, Lp spaces, Sobolev spaces. May be repeated up to 2 time(s). Effective: 2010 Spring Quarter.

MAT 200B—Problem-Solving in Analysis (2)
Extensive Problem Solving; Lecture—1 hour. Prerequisite(s): MAT 201A; MAT 201B; MAT 201C Problem-solving in graduate analysis: continuous functions, metric spaces, Banach and Hilbert spaces, bounded linear operators, the spectral theorem, distributions, Fourier series and transforms, Lp spaces, Sobolev spaces. May be repeated up to 2 time(s). Effective: 2010 Fall Quarter.

MAT 201A—Analysis (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing in Mathematics or Applied Mathematics, or consent of instructor. Metric and normed spaces. Continuous functions. Topological, Hilbert, and Banach spaces. Fourier series. Spectrum of bounded and compact linear operators. Linear differential operators and Green's functions. Distributions. Fourier transform. Measure theory. Lp and Sobolev spaces. Differential calculus and variational methods. Effective: 2004 Fall Quarter.

MAT 201B—Analysis (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing in Mathematics or Applied Mathematics, or consent of instructor. Metric and normed spaces. Continuous functions. Topological, Hilbert, and Banach spaces. Fourier series. Spectrum of bounded and compact linear operators. Linear differential operators and Green's functions. Distributions. Fourier transform. Measure theory. Lp and Sobolev spaces. Differential calculus and variational methods. Effective: 2005 Winter Quarter.

MAT 201C—Analysis (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing in Mathematics or Applied Mathematics, or consent of instructor. Metric and normed spaces. Continuous functions. Topological, Hilbert, and Banach spaces. Fourier series. Spectrum of bounded and compact linear operators. Linear differential operators and Green's functions. Distributions. Fourier transform. Measure theory. Lp and Sobolev spaces. Differential calculus and variational methods. Effective: 2005 Spring Quarter.

MAT 202—Functional Analysis (4)
Lecture—3 hours; Term Paper. Prerequisite(s): MAT 201A; MAT 201B Hahn-Banach, Open mapping, Closed graph, Banach-Steinhaus, and Krein-Milman. Subspaces and quotient spaces. Projections. Weak and weak-star topologies. Compact and adjoint operators in Banach spaces. Fredholm theory. Functions of operators. Spectral theory of self-adjoint operators. Effective: 2009 Winter Quarter.

MAT 205—Complex Analysis (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 185A; Or equivalent to MAT 185A, or consent of instructor. Analytic continuation, Riemann surfaces, conformal mappings, Riemann mapping theorem, entire functions, special functions, elliptic functions. Effective: 2009 Spring Quarter.

MAT 205A—Complex Analysis (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 185A; Or equivalent to MAT 185A, or consent of instructor. Cauchy's theorem, Cauchy's integral formulas, meromorphic functions, complex logarithm, entire functions, Weierstrass infinite product formula, the gamma and zeta functions, and prime number theorem. No credit given to students who have completed MAT 205. Effective: 2011 Fall Quarter.

MAT 205B—Complex Analysis (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 205A; or Consent of Instructor. Conformal mappings, the Schwarz lemma, analytic automorphisms, the Riemann mapping theorem, elliptic functions, Eisenstein series, the Jacobi theta functions, asymptotics, Bessel functions, the Airy function, topics on special functions and Riemann surfaces. May be repeated up to 2 time(s) if topic varies. Effective: 2011 Spring Quarter.

MAT 206—Measure Theory (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 125B Introduction to measure theory. The study of lengths, surface areas, and volumes in general spaces, as related to integration theory. Effective: 2007 Spring Quarter.

MAT 207A—Methods of Applied Mathematics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Ordinary differential equations and dynamical systems. Variational principles. Eigenfunctions, integral equations and Green's functions. Complex analysis and contour integration. Laplace's equation. Diffusion equations. Wave phenomena. Dimensional analysis and scaling. Asymptotic expansions and perturbation theory. Stochastic processes and Brownian motion. Effective: 2010 Fall Quarter.

MAT 207B—Methods of Applied Mathematics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Ordinary differential equations and dynamical systems. Variational principles. Eigenfunctions, integral equations and Green's functions. Complex analysis and contour integration. Laplace's equation. Diffusion equations. Wave phenomena. Dimensional analysis and scaling. Asymptotic expansions and perturbation theory. Stochastic processes and Brownian motion. Effective: 2011 Winter Quarter.

MAT 207C—Methods of Applied Mathematics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Ordinary differential equations and dynamical systems. Variational principles. Eigenfunctions, integral equations and Green's functions. Complex analysis and contour integration. Laplace's equation. Diffusion equations. Wave phenomena. Dimensional analysis and scaling. Asymptotic expansions and perturbation theory. Stochastic processes and Brownian motion. Effective: 2011 Spring Quarter.

MAT 215A—Topology (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Fundamental group and covering space theory. Homology and cohomology. Manifolds and duality. CW complexes. Fixed point theorems. Effective: 2002 Fall Quarter.

MAT 215B—Topology (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Fundamental group and covering space theory. Homology and cohomology. Manifolds and duality. CW complexes. Fixed point theorems. Effective: 2002 Fall Quarter.

MAT 215C—Topology (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Fundamental group and covering space theory. Homology and cohomology. Manifolds and duality. CW complexes. Fixed point theorems. Effective: 2002 Fall Quarter.

MAT 216—Geometric Topology (4)
Extensive Problem Solving—1 hour; Lecture—3 hours. Prerequisite(s): MAT 215A Topology of two- and three-dimensional manifolds. Surfaces and their diffeomorphisms. Dehn twists. Heegaard surfaces. Theory of 3-dimensional manifolds. Knots and knot theory. Hyperbolic manifolds and geometric structures. <p> May be repeated up to 1 time(s). Effective: 2010 Spring Quarter.

MAT 218A—Partial Differential Equations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 201A; MAT 201B; MAT 201C; or Consent of Instructor. Year-long sequence on PDEs which covers linear transport, Laplace, heat, and wave equations, maximum principles, method of characteristics, Sobelev and Hölder space theory, weak derivatives, semilinear, quasilinear, and fully nonlinear elliptic/parabolic equations, nonlinear hyperbolic equations, and compensated compactness. Effective: 2009 Fall Quarter.

MAT 218B—Partial Differential Equations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 218A; or Consent of Instructor. Year-long sequence on PDEs which covers linear transport, Laplace, heat, and wave equations, maximum principles, method of characteristics, Sobelev and Hölder space theory, weak derivatives, semilinear, quasilinear, and fully nonlinear elliptic/parabolic equations, nonlinear hyperbolic equations, and compensated compactness. Effective: 2010 Winter Quarter.

MAT 218C—Partial Differential Equations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 218B; or Consent of Instructor. Year-long sequence on PDEs which covers linear transport, Laplace, heat, and wave equations, maximum principles, method of characteristics, Sobelev and Hölder space theory, weak derivatives, semilinear, quasilinear, and fully nonlinear elliptic/parabolic equations, nonlinear hyperbolic equations, and compensated compactness. Effective: 2010 Spring Quarter.

MAT 221A—Mathematical Fluid Dynamics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 118B; or Consent of Instructor. Kinematics and dynamics of fluids. The Euler and Navier-Stokes equations. Vorticity dynamics. Irrotational flow. Low Reynolds number flows and the Stokes equations. High Reynolds number flows and boundary layers. Compressible fluids. Shock waves. Effective: 2002 Fall Quarter.

MAT 221B—Mathematical Fluid Dynamics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 118B; or Consent of Instructor. Kinematics and dynamics of fluids. The Euler and Navier-Stokes equations. Vorticity dynamics. Irrotational flow. Low Reynolds number flows and the Stokes equations. High Reynolds number flows and boundary layers. Compressible fluids. Shock waves. Effective: 2003 Winter Quarter.

MAT 226A—Numerical Methods: Fundamentals (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 128A; MAT 128B; Or equivalent, or consent of instructor; familiarity with some programming language. Fundamental principles and methods in numerical analysis, including the concepts of stability of algorithms and conditioning of numerical problems, numerical methods for interpolation and integration, eigenvalue problems, singular value decomposition and its applications. Effective: 2009 Fall Quarter.

MAT 226B—Numerical Methods: Large-Scale Matrix Computations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 167; Or equivalent, or consent of instructor; familiarity with some programming language. Numerical methods for large-scale matrix computations, including direct and iterative methods for the solution of linear systems, the computation of eigenvalues and singular values, the solution of least-squares problems, matrix compression, methods for the solution of linear programs. Effective: 2010 Winter Quarter.

MAT 226C—Numerical Methods: Ordinary Differential Equations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 022B; Or equivalent, or consent of instructor; familiarity with some programming language. Numerical methods for the solution of ordinary differential equations, including methods for initial-value problems and two-point boundary-value problems, theory of and methods for differential algebraic equations, dimension reduction of large-scale dynamical systems. Effective: 2010 Spring Quarter.

MAT 227—Mathematical Biology (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Nonlinear ordinary and partial differential equations and stochastic processes of cell and molecular biology. Scaling, qualitative, and numerical analysis of mathematical models. Applications to nerve impulse, chemotaxis, muscle contraction, and morphogenesis. Effective: 2002 Fall Quarter.

MAT 228A—Numerical Solution of Differential Equations (4)
Discussion; Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 128C Numerical solutions of initial-value, eigenvalue and boundary-value problems for ordinary differential equations. Numerical solution of parabolic and hyperbolic partial differential equations. Effective: 1998 Fall Quarter.

MAT 228B—Numerical Solution of Differential Equations (4)
Discussion; Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 128C Numerical solutions of initial-value, eigenvalue and boundary-value problems for ordinary differential equations. Numerical solution of parabolic and hyperbolic partial differential equations. Effective: 1998 Fall Quarter.

MAT 228C—Numerical Solution of Differential Equations (4)
Discussion; Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 128C Numerical solutions of initial-value, eigenvalue and boundary-value problems for ordinary differential equations. Numerical solution of parabolic and hyperbolic partial differential equations. Effective: 1998 Fall Quarter.

MAT 235A—Probability Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 125B; (MAT 135A or STA 131A); or Consent of Instructor. Measure-theoretic foundations, abstract integration, independence, laws of large numbers, characteristic functions, central limit theorems. Weak convergence in metric spaces, Brownian motion, invariance principle. Conditional expectation. Topics selected from: martingales, Markov chains, ergodic theory. (Statistics 235A.) Effective: 2007 Fall Quarter.

MAT 235B—Probability Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 235A or STA 235A; or Consent of Instructor. Measure-theoretic foundations, abstract integration, independence, laws of large numbers, characteristic functions, central limit theorems. Weak convergence in metric spaces, Brownian motion, invariance principle. Conditional expectation. Topics selected from: martingales, Markov chains, ergodic theory. (Statistics 235B.) Effective: 2008 Spring Quarter.

MAT 235C—Probability Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 235B or STA 235B; or Consent of Instructor. Measure-theoretic foundations, abstract integration, independence, laws of large numbers, characteristic functions, central limit theorems. Weak convergence in metric spaces, Brownian motion, invariance principle. Conditional expectation. Topics selected from: martingales, Markov chains, ergodic theory. (Statistics 235C.) Effective: 2008 Spring Quarter.

MAT 236A—Stochastic Dynamics and Applications (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 201C or (MAT 235B or STA 235B); MAT 235A, MAT 235B, MAT 235C/ STA 235A, STA 235B, STA 235C recommended. Stochastic processes, Brownian motion, Stochastic integration, martingales, stochastic differential equations. Diffusions, connections with partial differential equations, mathematical finance. Effective: 2002 Fall Quarter.

MAT 236B—Stochastic Dynamics and Applications (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 201C or (MAT 235B or STA 235B); MAT 235A, MAT 235B, MAT 235C/ STA 235A, STA 235B, STA 235C recommended. Stochastic processes, Brownian motion, Stochastic integration, martingales, stochastic differential equations. Diffusions, connections with partial differential equations, mathematical finance. Effective: 2002 Fall Quarter.

MAT 239—Differential Topology (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 201A; or Consent of Instructor. Vector calculus, point-set topology; MAT 250A and MAT 250B is highly recommended. Topics include: differentiable manifolds, vector fields, transversality, Sard's theorem, examples of differentiable manifolds; orientation, intersection theory, index of vector fields; differential forms, integration, Stokes' theorm, deRham cohomology; Morse functions, Morse lemma, index of critical points. Effective: 2007 Spring Quarter.

MAT 240A—Differential Geometry (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 201A; MAT 239; MAT 250A and MAT 250B highly recommended; intended primarily for second-year graduate students. Riemannian metrics, connections, geodesics, Gauss lemma, convex neighborhoods, curvature tensor, Ricci and scalar curvature, connections and curvature on vector bundles. Effective: 2008 Fall Quarter.

MAT 240B—Differential Geometry (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 240A; Intended primarily for second-year graduate students. Jacobi fields, conjugate points, completeness, Hopf-Rinow theorem, Cartan-Hadamard theorem, energy, variation theorems and their applications, Rauch comparison theorem and its applications. Effective: 2009 Winter Quarter.

MAT 245—Enumerative Combinatorics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 145; MAT 150; or the equivalent, or consent of instructor. Introduction to modern combinatorics and its applications. Emphasis on enumerative aspects of combinatorial theory. Effective: 2004 Fall Quarter.

MAT 246—Algebraic Combinatorics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 245; or Consent of Instructor. Algebraic and geometric aspects of combinatorics. The use of structures such as groups, polytopes, rings, and simplicial complexes to solve combinatorial problems. Effective: 2005 Winter Quarter.

MAT 248A—Algebraic Geometry (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 250A; MAT 250B; MAT 250C Affine varieties and radical ideals. Projective varieties. Abstract varieties. Morphisms and rational maps. Smoothness. Algebraic curves and the Riemann-Roch theorem. Special topics. Effective: 2009 Fall Quarter.

MAT 248B—Algebraic Geometry (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): MAT 248A Complex varieties and the analytic topology. Sheaves and schemes.
Fiber products. Separatedness and properness. Applications of scheme
theory. Effective: 2010 Winter Quarter.

MAT 249A—Problem-Solving in Algebra (1)
Extensive Problem Solving; Lecture—1 hour. Prerequisite(s): MAT 250A; MAT 250B Problem-solving in graduate algebra: groups, rings, modules, matrices, tensor products, representations, Galois theory, ring extensions, commutative algebra and homological algebra. May be repeated up to 2 time(s). Effective: 2011 Spring Quarter.

MAT 249B—Problem-Solving in Algebra (2)
Extensive Problem Solving; Lecture—1 hour. Prerequisite(s): MAT 250A; MAT 250B Problem-solving in graduate algebra: groups, rings, modules, matrices, tensor products, representations, Galois theory, ring extensions, commutative algebra and homological algebra. May be repeated up to 2 time(s). Effective: 2011 Fall Quarter.

MAT 250A—Algebra (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing in mathematics or consent of instructor. Group and rings. Sylow theorems, abelian groups, Jordan-Holder theorem. Rings, unique factorization. Algebras, and modules. Fields and vector spaces over fields. Field extensions. Commutative rings. Representation theory and its applications. Effective: 2002 Fall Quarter.

MAT 250B—Algebra (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing in mathematics or consent of instructor. Group and rings. Sylow theorems, abelian groups, Jordan-Holder theorem. Rings, unique factorization. Algebras, and modules. Fields and vector spaces over fields. Field extensions. Commutative rings. Representation theory and its applications. Effective: 2002 Fall Quarter.

MAT 250C—Algebra (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Graduate standing in mathematics or consent of instructor. Group and rings. Sylow theorems, abelian groups, Jordan-Holder theorem. Rings, unique factorization. Algebras, and modules. Fields and vector spaces over fields. Field extensions. Commutative rings. Representation theory and its applications. Effective: 2002 Fall Quarter.

MAT 258A—Numerical Optimization (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 025; MAT 167 Numerical methods for infinite dimensional optimization problems. Newton and Quasi-Newton methods, linear and sequential quadratic programming, barrier methods; large-scale optimization; theory of approximations; infinite and semi-infinite programming; applications to optimal control, stochastic optimization and distributed systems. Effective: 2007 Fall Quarter.

MAT 258B—Discrete and Mixed-Integer Optimization (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 025; MAT 167; or Consent of Instructor. Combinatorial, integer, and mixed-integer linear optimization problems. Ideal and strong formulations, cutting planes, branch and cut, decomposition methods. Effective: 2014 Fall Quarter.

MAT 261A—Lie groups and their representations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 215A; MAT 240A; MAT 250A; MAT 250B; Or the equivalent, or consent of instructor. Lie groups and Lie algebras. Classification of semi-simple Lie groups. Classical and compact Lie groups. Representations of Lie groups and Lie algebras. Root systems, weights, Weil character formula. Kac-Moody and Virasoro algebras. Applications. Effective: 2002 Fall Quarter.

MAT 261B—Lie groups and their representations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 215A; MAT 240A; MAT 250A; MAT 250B; Or the equivalent, or consent of instructor. Lie groups and Lie algebras. Classification of semi-simple Lie groups. Classical and compact Lie groups. Representations of Lie groups and Lie algebras. Root systems, weights, Weil character formula. Kac-Moody and Virasoro algebras. Applications. Effective: 2002 Fall Quarter.

MAT 265—Mathematical Quantum Mechanics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 201; or Consent of Instructor. Mathematical foundations of quantum mechanics: the Hilbert space and Operator Algebra formulations; the Schrödinger and Heisenberg equations, symmetry in quantum mechanics, basics of spectral theory and perturbation theory. Applications to atoms and molecules. The Dirac equation. Effective: 2003 Fall Quarter.

MAT 266—Mathematical Statistical Mechanics and Quantum Field Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): MAT 265; or Consent of Instructor. Mathematical principles of statistical mechanics and quantum field theory. Topics include classical and quantum lattice systems, variational principles, spontaneous symmetry breaking and phase transitions, second quantization and Fock space, and fundamentals of quantum field theory. May be repeated up to 1 time(s). Effective: 2010 Spring Quarter.

MAT 271—Applied and Computational Harmonic Analysis (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): (MAT 125B or MAT 201C); (MAT 128B or MAT 167); MAT 129; Or the equivalent, or consent of instructor. Introduction to mathematical basic building blocks (wavelets, local Fourier basis, and their relatives) useful for diverse fields (signal and image processing, numerical analysis, and statistics). Emphasis on the connection between the continuum and the discrete worlds. Effective: 2007 Fall Quarter.

MAT 280—Topics in Pure and Applied Mathematics (3)
Lecture—3 hours. Prerequisite(s): Graduate standing. Special topics in various fields of pure and applied mathematics. Topics selected based on the mutual interests of students and faculty. May be repeated for credit when topic differs. May be repeated for credit May be repeated for credit when topic differs. Effective: 1997 Winter Quarter.

MAT 290—Seminar (1-6)
Seminar—1-6 hours. Advanced study in various fields of mathematics, including analysis, applied mathematics, discrete mathematics, geometry, mathematical biology, mathematical physics, optimization, partial differential equations, probability, and topology. May be repeated for credit. (S/U grading only.) Effective: 2003 Spring Quarter.

MAT 298—Group Study (1-5)
Variable. Effective: 1997 Winter Quarter.

MAT 299—Individual Study (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

MAT 299D—Dissertation Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

MAT 301A—Mathematics Teaching Practicum (3)
Discussion—1 hour; Fieldwork—5 hours. Prerequisite(s): MAT 302A (can be concurrent); MAT 303A (can be concurrent); MAT 302A and MAT 303A required concurrently or consent of instructor. Specialist training in mathematics teaching. Teaching, training, and cross observing classes taught using large group Socratic techniques, small group guided inquiry experiences, and/or other approaches to teaching at various grade levels. Required for advanced degrees in mathematics education. May be repeated up to 1 time(s). Effective: 2001 Fall Quarter.

MAT 301B—Mathematics Teaching Practicum (3)
Discussion—1 hour; Fieldwork—5 hours. Prerequisite(s): MAT 302B (can be concurrent); MAT 303B (can be concurrent); MAT 302B and MAT 303B required concurrently or consent of instructor. Specialist training in mathematics teaching. Teaching, training, and cross observing classes taught using large group Socratic techniques, small group guided inquiry experiences, and/or other approaches to teaching at various grade levels. Required for advanced degrees in mathematics education. May be repeated up to 1 time(s). Effective: 2002 Winter Quarter.

MAT 301C—Mathematics Teaching Practicum (3)
Discussion—1 hour; Fieldwork—5 hours. Prerequisite(s): MAT 302C (can be concurrent); MAT 303B (can be concurrent); MAT 302C and MAT 303C required concurrently or consent of instructor. Specialist training in mathematics teaching. Teaching, training, and cross observing classes taught using large group Socratic techniques, small group guided inquiry experiences, and/or other approaches to teaching at various grade levels. Required for advanced degrees in mathematics education. May be repeated up to 1 time(s). Effective: 2002 Spring Quarter.

MAT 302A—Curriculum Development in Mathematics (1)
Lecture/Discussion—1 hour. Prerequisite(s): MAT 303A (can be concurrent); MAT 303A required concurrently or consent of instructor. Mathematics curriculum development for all grade levels. Required for advanced degrees in mathematics education. May be repeated up to 1 time(s). Effective: 2001 Fall Quarter.

MAT 302B—Curriculum Development in Mathematics (1)
Lecture/Discussion—1 hour. Prerequisite(s): MAT 303B (can be concurrent); MAT 303B required concurrently or consent of instructor. Mathematics curriculum development for all grade levels. Required for advanced degrees in mathematics education. May be repeated up to 1 time(s). Effective: 2002 Winter Quarter.

MAT 302C—Curriculum Development in Mathematics (1)
Lecture/Discussion—1 hour. Prerequisite(s): MAT 303C (can be concurrent); MAT 303C required concurrently or consent of instructor. Mathematics curriculum development for all grade levels. Required for advanced degrees in mathematics education. May be repeated for credit. Effective: 2002 Spring Quarter.

MAT 303A—Mathematics Pedagogy (1)
Lecture/Discussion—1 hour. Prerequisite(s): MAT 302A (can be concurrent) or MAT 210AL (can be concurrent); MAT 302A or MAT 210AL required concurrently or consent of instructor. An investigation of the interplay of mathematical pedagogy and mathematical content, including a historical survey of past and present methods in view of some of the influences that shaped their development. May be repeated up to 1 time(s). Effective: 2001 Fall Quarter.

MAT 303B—Mathematics Pedagogy (1)
Lecture/Discussion—1 hour. Prerequisite(s): MAT 302B (can be concurrent) or MAT 210BL (can be concurrent); MAT 302A or MAT 210AL required concurrently or consent of instructor. An investigation of the interplay of mathematical pedagogy and mathematical content, including a historical survey of past and present methods in view of some of the influences that shaped their development. May be repeated up to 1 time(s). Effective: 2002 Winter Quarter.

MAT 303C—Mathematics Pedagogy (1)
Lecture/Discussion—1 hour. Prerequisite(s): MAT 302C (can be concurrent) or MAT 210CL (can be concurrent); MAT 302C or MAT 210CL required concurrently or consent of instructor. An investigation of the interplay of mathematical pedagogy and mathematical content, including a historical survey of past and present methods in view of some of the influences that shaped their development. May be repeated up to 1 time(s). Effective: 2002 Spring Quarter.

MAT 390—Teaching Assistantship Training (3)
Lecture—3 hours. Prerequisite(s): Graduate standing in the Department of Mathematics. Experience in methods of assisting and teaching of mathematics at the university level. Includes discussion of lecturing techniques, running discussion sessions, holding office hours, preparing and grading of examinations, student-teacher interaction, and related topics. Required of departmental teaching assistants. (S/U grading only.) Effective: 2008 Fall Quarter.

MAT 399—Individual Study (2-4)
Discussion—1 hour; Independent Study—2-3 hours. Individual study of some aspect of mathematics education or a focused work on a curriculum design project under supervision of a faculty member in mathematics. May be repeated up to 1 time(s). (S/U grading only.) Effective: 2002 Spring Quarter.

MCB Molecular & Cellular Biology

Courses in MCB:

MCB 010—Introduction to Human Heredity (4)
Discussion—1 hour; Lecture—3 hours. Topics in human heredity and human gene structure and function, including the genetic basis of human development, causes of birth defects, mental retardation, genetic diseases, sexual determination, development, and behavior. GE credit: QL, SE, SL. Effective: 2004 Spring Quarter.

MCB 023—Biography of Cancer: Past, Present and Future (3)
Lecture/Discussion—3 hours. Historical account of the progression of cancer treatment, prevention, and human understanding of the biological basis of cancer. Past, present and future social implications of cancer treatment and prevention. GE credit: ACGH, SE, SL, SS, WE. Effective: 2018 Spring Quarter.

MCB 099—Special Study (1-5)
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

MCB 110Y—iBioseminars in Cell and Molecular Biology (3)
Lecture/Discussion—2 hours; Web Electronic Discussion—1.5 hours; Web Virtual Lecture—1.5 hours. Prerequisite(s): BIS 101; BIS 102; (BIS 103 or BIS 105); BIS 104 Hybrid course in Cell and Molecular Biology for senior level (1) Biochemistry/Molecular Biology; (2) Genetics; or (3) Cell Biology majors. Face-to-face instruction combined with online lectures available at iBioseminars website delivered by leading researchers in Cell and Molecular Biology. Students who have previously taken MCB 110V cannot receive credit for MCB 110Y. GE credit: SE, SL. Effective: 2014 Fall Quarter.

MCB 120—Molecular Biology and Biochemistry Laboratory Associated Lecture (3)
Discussion/Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): BIS 102; or Consent of Instructor. Pass One restricted to upper division Biochemistry & Molecular Biology majors; concurrent enrollment in MCB 120L required; on-time attendance for first lecture is mandatory. Introduction to laboratory methods and procedures employed in studying molecular biology and biochemical processes. Lecture component for MCB 120L. GE credit: SE, SL. Effective: 2018 Winter Quarter.

MCB 120L—Molecular Biology and Biochemistry Laboratory (3)
Laboratory—10 hours. Prerequisite(s): BIS 102; or Consent of Instructor. Must be taken concurrently with MCB 120. Pass One restricted to upper division Biochemistry & Molecular Biology majors; concurrent enrollment in MCB 120 required; on-time attendance for first lab is mandatory. Introduction to laboratory methods and procedures employed in studying molecular biology and biochemical processes. Designed for students who need experience in use of molecular biology and biochemical techniques as research and analytical tools. GE credit: QL, SE, VL, WE. Effective: 2018 Winter Quarter.

MCB 121—Advanced Molecular Biology (3)
Lecture—3 hours. Prerequisite(s): BIS 101; (BIS 102 (can be concurrent) or BIS 105 (can be concurrent) or ABI 102 (can be concurrent)); BIS 102 or BIS 105 or ABI 102 can be concurrent although prior completion is recommended. Structure, expression, and regulation of eukaryotic genes. Chromosome structure and replication; gene structure, transcription, and RNA processing; protein synthesis and translation control; development, immune system, and oncogenes. Not open for credit to students who have completed MCB 161. GE credit: QL, SE, SL. Effective: 2014 Fall Quarter.

MCB 123—Behavior and Analysis of Enzyme and Receptor Systems (3)
Lecture—3 hours. Prerequisite(s): BIS 103 Introduction to the principles of enzyme kinetics and receptor-ligand interactions with emphasis on metabolic regulation and data analysis. Topics include simultaneous equilibria, chemical and steady-state kinetics, allosteric enzymes, mulitreactant systems, enzyme assays, membrane transport and computer-assisted simulations and analyses. GE credit: QL, SE. Effective: 1997 Winter Quarter.

MCB 124—Macromolecular Structure and Function (4)
Lecture—4 hours. Prerequisite(s): BIS 103; CHE 118C An in-depth investigation into protein and nucleic acid structure and thermodynamics and how these properties influence their biological functions. Key examples of important functional classes of these molecules will be examined. Not open for credit to students who have completed MCB 122 or CHE 108. GE credit: SE. Effective: 2012 Fall Quarter.

MCB 126—Plant Biochemistry (3)
Lecture—3 hours. Prerequisite(s): BIS 103 or BIS 105 The biochemistry of important plant processes and metabolic pathways. Discussion of methods used to understand plant processes, including use of transgenic plants. (Plant Biology 126.) GE credit: SE, SL. Effective: 2008 Spring Quarter.

MCB 138—Undergraduate Seminar in Biochemistry (1)
Seminar—1 hour. Prerequisite(s): BIS 103 Discussion of the historical developments of modern biochemistry or current major research problems. May be repeated twice for credit when topic differs. May be repeated up to 2 time(s). (P/NP grading only.) GE credit: OL, SE. Effective: 1997 Winter Quarter.

MCB 139—Undergraduate Seminar in Biochemistry (2)
Seminar—2 hours. Prerequisite(s): BIS 103 Discussion of the historical developments of modern biochemistry or current major research problems. May be repeated up to 2 time(s) when topic differs. (P/NP grading only.) GE credit: OL, SE. Effective: 2015 Spring Quarter.

MCB 140—Cell Biology Laboratory Associated Lecture (3)
Discussion/Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): BIS 104; or Consent of Instructor. Pass One restricted to upper division Cell Biology majors; concurrent enrollment in MCB 140L required; on-time attendance for first lecture is mandatory. Lectures illustrating the principles of cell biology with emphasis on light microscopy. Accompanies MCB 140L. GE credit: OL, SE, SL, WE. Effective: 2018 Winter Quarter.

MCB 140L—Cell Biology Laboratory (5)
Discussion—1 hour; Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): BIS 104 (can be concurrent) Exercises illustrating the principles of cell biology with emphasis on light microscopy. GE credit: OL, QL, SE, SL, VL. Effective: 2009 Winter Quarter.

MCB 142—Advanced Cell Biology: Contractile and Motile Systems (4)
Lecture—3 hours; Term Paper. Prerequisite(s): BIS 102; BIS 104 (can be concurrent); MAT 016B Advanced cell biology with emphasis on molecular, biophysical and cellular properties of contractile and motile systems. GE credit: SE. Effective: 1998 Spring Quarter.

MCB 143—Cell and Molecular Biophysics (3)
Lecture—3 hours. Prerequisite(s): BIS 101; BIS 102; BIS 103; BIS 104 Physical chemical principles by which molecules form living, moving, reproducing cells. Physical nature of cytoplasm; molecular structure/bonding in macromolecules, macromolecular assemblies and protein machines. Physical techniques and modeling of cytoskeletal polymer-motor dynamics and function during intracellular transport, mitosis and motility. GE credit: QL, SE. Effective: 2008 Fall Quarter.

MCB 144—Mechanisms of Cell Division (3)
Lecture—3 hours. Prerequisite(s): BIS 101; BIS 102; BIS 104 The molecules and mechanisms that allow eukaryotic cells to coordinate cell growth, DNA replication, segregation of chromosomes and cell division. GE credit: SE, WE. Effective: 2002 Winter Quarter.

MCB 145—Assembly and Function of Cell Signaling Machinery (3)
Lecture—3 hours. Prerequisite(s): BIS 101; BIS 102; BIS 104 Molecular basis of cell signaling, including positioning of cellular machinery, components of various signaling pathways, and downstream effects of signaling on cell adhesion, cell differentiation, and programmed cell death. GE credit: SE. Effective: 2002 Spring Quarter.

MCB 148—Undergraduate Seminar in Cell Biology (2)
Seminar—2 hours. Prerequisite(s): Upper division standing in the biological sciences or a related discipline. Student reports on current topics in cell biology with emphasis on integration of concepts, synthesis, and state-of-the-art research approaches. Reviews of literature and reports of undergraduate research may be included. May be repeated for credit. (P/NP grading only.) GE credit: OL, SE. Effective: 1997 Winter Quarter.

MCB 150—Developmental Biology (4)
Lecture—4 hours. Prerequisite(s): BIS 101 Analysis of the mechanistic basis for animal development with a focus on experimental evidence and the relevant fundamental experimental strategies. Fertilization and early development, morphogenesis and patterning, cell differentiation, regulation of cell proliferation and tissue growth. GE credit: SE, SL. Effective: 2012 Fall Quarter.

MCB 158—Undergraduate Seminar in Developmental Biology (2)
Seminar—2 hours. Prerequisite(s): Upper division standing in the biological sciences or a related discipline. Student reports on current topics in cell biology with emphasis on integration of concepts, synthesis, and state-of-the-art research approaches. Reviews of literature and reports of undergraduate research may be included. May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: OL, SE. Effective: 1997 Winter Quarter.

MCB 160—Genetics Laboratory Associated Lecture (3)
Discussion/Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): BIS 101; or Consent of Instructor. Pass One restricted to upper division Genetics and Genomics majors; concurrent enrollment in MCB 160L required; on-time attendance for first lecture is mandatory. Lecture instruction in the theoretical basis of laboratory techniques in transmission and molecular genetics, discussion of lab results and experiment interpretation. GE credit: QL, SE, WE. Effective: 2018 Winter Quarter.

MCB 160L—Principles of Genetics Laboratory (5)
Discussion/Laboratory—1 hour; Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): BIS 101 Laboratory work in basic and molecular genetics including gene mapping, isolation and characterization of mutants in eukaryotic model systems, reverse genetics, gel electrophoresis, recombinant DNA techniques, and PCR. GE credit: QL, SE, VL, WE. Effective: 2012 Fall Quarter.

MCB 162—Human Genetics and Genomics (3)
Lecture—3 hours. Prerequisite(s): BIS 101 The human genome and genetic variation in human populations, molecular and genomic approaches in the practice of human genetics, epigenetic gene regulation, personal genetics and genomic medicine. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

MCB 163—Developmental Genetics (3)
Lecture—3 hours. Prerequisite(s): MCB 121 (can be concurrent) Current aspects of developmental genetics. Historical background and current genetic approaches to the study of development of higher animals. GE credit: SE. Effective: 2017 Fall Quarter.

MCB 164—Advanced Eukaryotic Genetics (3)
Lecture—3 hours. Prerequisite(s): MCB 121 Five basic operations of genetic analysis: mutation, segregation, recombination, complementation, and regulation. Emphasis on the theory and practice of isolating and analyzing mutations, as well as understanding mechanisms underlying both Mendelian and epigenetic inheritance. GE credit: SE, SL. Effective: 2011 Fall Quarter.

MCB 178—Undergraduate Seminar in Molecular Genetics (1)
Seminar—1 hour. Prerequisite(s): BIS 101; MCB 121 (can be concurrent); Upper division standing, and completion or concurrent enrollment in MCB 121. Discussion of current topics in molecular genetics to show advanced applications of basic principles and to highlight professional career opportunities. May be repeated up to 1 time(s) when topic differs. (P/NP grading only.) GE credit: OL, SE. Effective: 2011 Fall Quarter.

MCB 182—Principles of Genomics (3)
Lecture—3 hours. Prerequisite(s): BIS 101 Fundamentals of genomics, including structural genomics, functional genomics, proteomics, and bioinformatics, focusing on the impact of these disciplines on research in the biological sciences. Social impacts of genomic research. GE credit: SE. Effective: 2017 Winter Quarter.

MCB 190C—Undergraduate Research Conference (1)
Discussion—1 hour. Prerequisite(s): MCB 193 (can be concurrent) or MCB 199 (can be concurrent); and Consent of Instructor. Upper division standing; MCB 193 or MCB 199 required concurrently. Presentation and discussion of current research by faculty and students. May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

MCB 191—Introduction to Research (1)
Seminar—1 hour. Prerequisite(s): BIS 102 (can be concurrent); or Consent of Instructor. Various topics in molecular and cellular biology including biochemistry, genetics, and cell biology will be discussed, along with ways undergraduates can participate in research projects of faculty members. May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

MCB 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Technical and/or practical experience on and off campus, supervised by a member of the Section of Molecular and Cellular Biology faculty. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

MCB 193—Advanced Research (3)
Discussion—1 hour; Laboratory—6 hours. Prerequisite(s): Consent of Instructor. Upper division standing, completion of an upper division Molecular and Cellular Biology laboratory course. Research project carried out under the supervision of a faculty sponsor.
Discussion and analysis of results and proposed experiments on a weekly basis with faculty sponsor. May include presentation of a seminar to a research group.May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

MCB 194—Thesis Research (3)
Independent Study—9 hours. Prerequisite(s): Consent of Instructor. 6 units of course 193 and/or 199 with faculty director; senior standing. Continuation of an intensive, individual laboratory research project in biochemistry, genetics, or cell biology culminating with the presentation of the work in a written thesis and in a seminar. (P/NP grading only.) GE credit: OL, SE, WE. Effective: 2015 Fall Quarter.

MCB 194H—Research Honors (3)
Independent Study—9 hours. Prerequisite(s): Consent of Instructor. 6 units of MCB 193 and/or MCB 199 with faculty director; senior standing; GPA of at least 3.250. Honors project. Continuation of an intensive, individual laboratory research project in biochemistry, genetics, or cell biology culminating with the presentation of the work in a written thesis and in a seminar. (P/NP grading only.) GE credit: OL, SE, WE. Effective: 1997 Winter Quarter.

MCB 197T—Tutoring in Molecular and Cellular Biology (1-5)
Tutorial—2-6 hours. Prerequisite(s): Consent of Instructor. Upper division standing, completion of course to be tutored. Assisting the instructor in one of the section's regular courses by tutoring individual or small groups of students in a laboratory, in voluntary discussion groups, or other voluntary course activities. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 2004 Fall Quarter.

MCB 198—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

MCB 199—Special Study for Advanced Undergraduates (1-5)
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

MCB 248—Seminar in Cell Biology (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. Discussion of recent literature on the physical and chemical aspects of organization and function of living systems, topics of current interest in ultrastructure and function of cells. Organizational and functional properties of the molecular and cellular levels of biological systems. May be repeated for credit. Effective: 1997 Winter Quarter.

MCB 258—Seminar in Development (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. Reports and discussion on embryology, morphogenesis, and developmental mechanisms. May be repeated for credit. May be repeated for credit. Effective: 1997 Winter Quarter.

MCB 259—Literature in Developmental Biology (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Critical presentation and analysis of recent journal articles in developmental biology. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

MCB 282—Biotechnology Internship (7-12)
Internship—21-36 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Open only to students participating in the Designated Emphasis in Biotechnology program. Research at a biotechnology company or interdisciplinary cross-college lab for a minimum of 3 months as part of the Designated Emphasis in Biotechnology Program. (S/U grading only.) Effective: 2004 Winter Quarter.

MCB 290C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Presentations and critical discussions of faculty and graduate student research in molecular and cellular biology including biochemistry,
genetics, and cell biology. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

MCB 291—Current Progress in Molecular and Cellular Biology (1)
Seminar—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Seminars presented by guest lecturers on subject of their own research activities. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

MCB 295—Literature in Molecular and Cellular Biology (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Critical reading and evaluation of current literature in molecular and cellular biology disciplines. Papers will be presented and discussed in detail. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

MCB 298—Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

MCB 299—Research (1-12)
Independent Study—3-36 hours. (S/U grading only.) Effective: 1997 Winter Quarter.

MCB 390—Methods of Teaching (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Practical experience in the methods and problems of teaching biochemistry/genetics/cell biology.Includes analysis of texts and
supporting material,discussion of teaching techniques, preparing for and conducting discussion and laboratory sections,formulating examinations under supervision of instructor.Participating in the teaching program required for Ph.D. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

MCN Maternal and Child Nutrition

Courses in MCN:

MCN 260—Nutrition During Pregnancy (6)
Lecture—5 hours; Term Paper. Prerequisite(s): Acceptance into the Master of Advanced Studies in Maternal and Child Nutrition; other students by consent of instructor. Open to Graduate standing. Overview of the anatomical, physiological and biochemical changes that occur during pregnancy and early development. Discussion and evaluation of nutritional/lifestyle factors associated with pregnancy outcomes and nutrition programs/interventions for pregnant women. Effective: 2016 Fall Quarter.

MCN 261—Lactation and Infant Nutrition (6)
Lecture—5 hours; Term Paper. Prerequisite(s): MCN 260; Graduate standing. Restricted to students enrolled in the MAS program; other graduate students by consent of instructor. Overview of the physiological and biochemical processes underlying human lactation and nutritional needs of both mother and infant. Development of skills in assessment, nutrition counseling, education and support of new mothers and their families. Effective: 2016 Fall Quarter.

MCN 262—Child and Adolescent Nutrition (6)
Lecture—5 hours; Term Paper. Prerequisite(s): MCN 261; Graduate Standing. Restricted to students enrolled in the MAS program; other graduate students by consent of instructor. Relationships among nutrition, growth, and development during childhood and adolescence. Nutritional assessment for normal and high risk groups; psychological, social, and economic factors contributing to nutritional status. Nutritional needs and interventions for special groups, including obese children/adolescents, athletes, and eating disordered. Effective: 2016 Fall Quarter.

MCN 263—Applied Research Methods in Maternal and Child Nutrition (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing. Restricted to students enrolled in the MAS program; other graduate students by consent of instructor. Application of epidemiological principles to the study of maternal and child nutrition. Topics include quantitative and qualitative study procedures, including study design, data collection, and related analytical techniques. Effective: 2018 Winter Quarter.

MCN 264A—Current Topics in Maternal and Child Nutrition: Principles of Adult Education (2)
Seminar—2 hours. Prerequisite(s): Graduate standing. Restricted to students enrolled in the MAS program; other graduate students by consent of instructor. Current scientific literature related to Maternal and Child Nutrition in adult education settings. Topics include methods and theories of adult education and critical thinking skills related to research evaluation. Effective: 2017 Spring Quarter.

MCN 264B—Current Topics in Maternal and Child Nutrition: Epidemiology and Evidence-Based Practice (2)
Seminar—2 hours. Prerequisite(s): Graduate standing. Restricted to students enrolled in the MAS program; other graduate students by consent of instructor. Current scientific literature related to Maternal and Child Nutrition. Topics include epidemiology, evidence-based practice, breastfeeding promotion, and nutritional assessment of populations. Effective: 2017 Spring Quarter.

MCN 264C—Current Topics in Maternal and Child Nutrition: Public Policy Development and Implementation (2)
Seminar—2 hours. Prerequisite(s): Graduate standing. Restricted to students enrolled in the MAS program; other graduate students by consent of instructor. Current scientific literature related to Maternal and Child Nutrition. Topics include nutrition surveillance and monitoring, as well as public policy development and implementation. Effective: 2017 Fall Quarter.

MCP Molecular, Cellular, and Integrative Physiology

Courses in MCP:

MCP 200L—Animal Cell Culture Laboratory (4)
Discussion—2 hours; Laboratory—6 hours. Prerequisite(s): Courses in undergraduate Biochemistry, Cell Biology, or General Physiology, or consent of instructor. Techniques of cell culture, with emphases on cell physiology and the actions of drugs and toxicants on cultured somatic cells. Design, performance and interpretation of experiments with animal cells in vitro. Effective: 2003 Fall Quarter.

MCP 210A—Advanced Physiology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Physiology Ph.D. program, or consent of instructor. Advanced course in general principles of physiology, surveying homeostasis, cellular and selected topics, and neurophysiology. (Human Physiology 210A.) Effective: 2003 Fall Quarter.

MCP 210B—Advanced Physiology (6)
Discussion—1 hour; Lecture—5 hours. Prerequisite(s): Physiology Ph.D. program, or consent of instructor. Advanced course in general principles of physiology, surveying homeostasis, cellular and selected topis, and neurophysiology. Effective: 2003 Fall Quarter.

MCP 210C—Advanced Physiology (5)
Lecture—5 hours. Prerequisite(s): Doctoral student in the Molecular, Integrative and Comparative Physiology Graduate Group, or consent of instructor. Graduate level instruction in the general principles of physiology and the neural and humoral control of the cardiovascular, renal, respiratory, gastrointestinal, sensory, musculoskeletal, and reproductive systems. Effective: 2008 Spring Quarter.

MCP 210L—Physiology Laboratory Rotations (5)
Laboratory—15 hours. Restricted to Molecular, Cellular and Integrative Physiology (MCIP) graduate students. One mandatory rotation and up-to two voluntary rotations. Students learn techniques and perform experiments related to particular research problems. At the end of the rotations students give a short talk and hand in a research paper. May be repeated up to 2 time(s). (S/U grading only.) Effective: 2014 Spring Quarter.

MCP 215—Electrophysiology Techniques and Applications (3)
Discussion—1.5 hours; Lecture—1.5 hours. Broad scope of topics in electrophysiology techniques and applications. (Pharmacology and Toxicology 215.) (S/U grading only.) Effective: 2015 Spring Quarter.

MCP 216—Neurophysiology Literature (3)
Discussion—2 hours; Lecture—1 hour. Lectures covering experimental and theoretical methods in studying cell membrane ion channels and the resulting characterization of the physiological functions and structure/function relationships of some of the most important channel types. Discussion of classical and current original papers. Effective: 2003 Fall Quarter.

MCP 219—Muscle Growth and Development (3)
Lecture—2 hours; Seminar—1 hour. Prerequisite(s): BIS 103; (BIS 104 or MCB 150); or Consent of Instructor. Integration of growth and development of skeletal muscle; morphology, biochemistry, neural control mechanisms, circulatory and nutritional factors. Prenatal and neonatal differentiation of fiber types. Experimental and hereditary myopathies. Effective: 2003 Fall Quarter.

MCP 220—Biological Sciences 103, Biological Sciences 104 or Molecular and Cellular Biology 150, or consent of instructor. (3)
Lecture—3 hours. Prerequisite(s): BIS 101; BIS 103; NPB 110; NPB 110L. Basic phenomena of sexual and asexual reproduction and comparisons of processes in a wide variety of animals; gamete formation, structure, and metabolism; fertilization; neuroendocrine mechanisms in maturation and reproductive cycles; behavioral aspects. Effective: 2003 Fall Quarter.

MCP 222—Mammalian Gametogenesis and Fertilization (3)
Lecture—3 hours. Prerequisite(s): NPB 121; Or the equivalent. Course will emphasize our current understanding of events in mammalian gametogenesis and the fertilization process. Published results, conclusions drawn from these results, and their contribution to our understanding will be discussed. Effective: 2003 Fall Quarter.

MCP 230—Advanced Endocrinology (2)
Lecture—2 hours. Prerequisite(s): NPB 130; Or the equivalent, and graduate standing. Focus on timely topic of endrocrine research. Critical review of current literature and discussion of future research strategies in the area. May be repeated for credit when topic differs. Effective: 2003 Fall Quarter.

MCP 231—Neuroendocrinology (3)
Lecture—3 hours. Prerequisite(s): NPB 130; or the equivalent course in endocrinology; NPB 110 or the equivalent course in systemic physiology. Neural-endocrine interactions; neural regulation of the endocrine system, especially in relation to reproduction; the role of hormones and growth factors in sexual differentiation of the brain. Effective: 2003 Fall Quarter.

MCP 234—Current Topics in Neurotoxicology (3)
Lecture—3 hours. Prerequisite(s): Core courses in one of the following graduate programs: Pharmacology and Toxicology, Agricultural and Environmental Chemistry, Biochemistry and Molecular Biology, Cell and Developmental Biology, Immunology, Molecular Cellular and Integrative Physiology or Neuroscience. Restricted to upper level undergraduate students must obtain permission from the course coordinator. General principles of neurotoxicology, the cell and molecular mechanisms and health impacts of specific neurotoxicants and the contribution of neurotoxic compounds to complex neurodevelopmental disorders and neurodegenerative diseases. (Environmental Toxicology 234 and Molecular Biosciences 234.) Effective: 2010 Fall Quarter.

MCP 242—Biological Rhythms (3)
Lecture—2 hours; Lecture/Discussion—1 hour. Prerequisite(s): NPB 110 or the equivalent. General aspects and basic mechanisms of biological rhythms; the importance of rhythm desynchronization in areas of pharmacology and space medicine; telemetry; mathematical methods; chronometry; daily, reproductive, and annual periods; shift-work, jet lag and sleep disorders. Effective: 2003 Fall Quarter.

MCP 255—Physiology of the Stress Response (2)
Lecture/Discussion—2 hours. Prerequisite(s): Graduate Student Status. Definition of Stress; Physiological mechanisms of adaptation to stress; Hormonal control of the systemic stress response; Mechanisms of the cellular stress response; Discussion of current trends in stress physiology and current methods for studying the stress response; (ABG 255) Effective: 2006 Summer Session 2.

MCP 261A—Topics in Vision: Eyes and Retinal Mechanisms (2)
Lecture/Discussion—2 hours. Prerequisite(s): NPB 100 or NPB 112; Or the equivalent; graduate standing. Structure and function of the visual system, with emphasis on the eye and retina, including optics, anatomy, transduction, retinal synapses, adaptation, and parallel processing. (NSC261A and NPB261A) (S/U grading only.) Effective: 2004 Winter Quarter.

MCP 261B—Topics in Vision: Systems, Psychophysics, Computational Models (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. MCP 261A recommended. Functions of the central visual pathways and their underlying mechanisms. Recent research on aspects of anatomy, biochemistry, electrophysiology, psychophysics, development, and genetics of the visual system. (NSC261B and NPB261B) (S/U grading only.) Effective: 2004 Winter Quarter.

MCP 261C—Topics in Vision: Clinical Vision Science (2)
Lecture/Discussion—2 hours. Prerequisite(s): MCP 261A; MCP 261B; or Consent of Instructor. Causes and mechanistic bases of major blinding diseases. Recent research on aspects of anatomy, biochemistry, electrophysiology , psychophysics, development, and genetics of the visual system related to disease. (NSC261C and NPB261C) (S/U grading only.) Effective: 2005 Spring Quarter.

MCP 275—Neurohumoral Regulatory Mechanisms of Thermogenesis (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): BIS 104; BIS 102; and Consent of Instructor. Or equivalent courses. Designed for graduate and advanced undergraduate students, this course will examine thermogenic systems in homeotherms (primarily mammals) with respect to regulation (hormonal and central nervous control) and effector mechanisms (basis of heat generation at the target cell). Effective: 2003 Fall Quarter.

MCP 290—Seminar (1)
Seminar—1 hour. Discussion and critical evaluation of advanced topics and current trends in research. (P/NP grading only.) Effective: 2003 Fall Quarter.

MCP 290C—Research Conference in Physiology (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Presentation and discussion of faculty and graduate student research in physiology. May be repeated for credit. (P/NP grading only.) Effective: 2003 Fall Quarter.

MCP 291B—Seminar in Cellular Mechanisms of Adaptation (1)
Discussion—0.5 hours; Seminar—0.5 hours. Prerequisite(s): BIS 103; NPB 100B; Consent of Instructor. Review and evaluation of current literature and research in cellular adaptations to the environment. May be repeated for credit when topic differs. (P/NP grading only.) Effective: 2003 Fall Quarter.

MCP 291D—Research Approaches in Physiology (2)
Seminar—2 hours. Current research in physiology. Overall design of experiments and particular research areas. (P/NP grading only.) Effective: 2003 Fall Quarter.

MCP 293—Current Progress in Physiology (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Seminars presented by guest lecturers describing their current research activities. May be repeated for credit. (P/NP grading only.) Effective: 2003 Fall Quarter.

MCP 298—Group Study (1-5)
Variable. Effective: 2003 Fall Quarter.

MCP 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

MCP 300A—Pedagogical Aspects of Physiology in Higher Education (3)
Discussion; Laboratory; Lecture. Prerequisite(s): Meet qualifications for teaching assistant in physiology. Participation as a teaching assistant for one quarter in a designated physiology course. Instruction in methods of leading discussion groups, leading laboratory sections, writing and grading quizzes, operation and use of laboratory equipment, and reading and grading laboratory reports. Course meets teaching requirements for Ph.D. program in Physiology. (P/NP grading only.) Effective: 2003 Fall Quarter.

MCP 300B—Pedagogical Aspects of Physiology in Higher Education (3)
Discussion; Laboratory; Lecture. Prerequisite(s): Meet qualifications for teaching assistant in physiology. Participation as a teaching assistant for one quarter in a designated physiology course. Instruction in methods of leading discussion groups, leading laboratory sections, writing and grading quizzes, operation and use of laboratory equipment, and reading and grading laboratory reports. Course meets teaching requirements for Ph.D. program in Physiology. (P/NP grading only.) Effective: 2003 Fall Quarter.

MCP 390—The Teaching of Physiology (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Teaching Assistant assignment to a physiology lecture course. Practical experience in methods and problems of teaching physiology lecture courses. May include analyses of texts and supporting material, discussion of teaching techniques, preparing for and conducting discussion sessions, and formulation of topics and questions for examinations under supervision of instructor. May be repeated for credit. (P/NP grading only.) Effective: 2003 Fall Quarter.

MDS Med - Medical Sciences

Courses in MDS:

MDS 099—Special Study in Medicine for Undergraduates (1-5)
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. Participate in research projects relating to medicine with faculty in the School of Medicine. (P/NP grading only.) Effective: 1997 Fall Quarter.

MDS 192—Medical Education Internship for Advanced Undergraduates (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Competency with computers. Enrollment dependent on availability of intern positions. Participate in projects related to curriculum development in support of curriculum for M.D. degree. Gain work experience and appreciation for innovative approaches to learning in basic and clinical sciences of medical education. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

MDS 400—Summer Pre-Matriculation Program (2)
Independent Study—15 hours; Lecture—14 hours; PE Activity—7 hours. Prerequisite(s): Consent of Instructor. Two week program provides students from diverse backgrounds an early introduction to learning skills that will facilitate success in medical school. (P/F grading only.) Effective: 2016 Summer Quarter.

MDS 401—Applications of Computers to Medical Practice (2)
Auto Tutorial—2 hours. Prerequisite(s): Enrollment in medical school. Proficiency in computer applications relative to practice of medicine, with emphasis on email, literature searching, file transfer, and hospital information services. Course given online, at home or in lab; time and place determined by student. (H/P/F grading only.) Effective: 1997 Winter Quarter.

MDS 402—Clinical & Cultural Spanish (2)
Independent Study—4 hours; Lecture—1 hour; Practice—1 hour. Prerequisite(s): Consent of Instructor. Medical students, nursing students and physician assistants students who are fluent Spanish speakers will learn a comprehensive set of medical vocabulary and cultural aspects related to the treatment of Spanish speaking patients. (P/F grading only.) Effective: 2015 Winter Quarter.

MDS 403—Science & Practice of Mindfulness and Compassion (1)
Independent Study—20 hours; Lecture/Discussion—10 hours. Course will examine current scientific evidence for the effects of different mindfulness and compassion meditation practices in both healthy and clinical samples. (P/F grading only.) Effective: 2015 Summer Quarter.

MDS 406—Endocrinology, Nutrition, Reproduction and Genetics (9.5)
Discussion/Laboratory—2.8 hours; Lecture—3.8 hours. Prerequisite(s): BCM 410A; HPH 400; and Consent of Instructor. Restricted to Medical students only. Basic and pathophysiologic processes involved in human reproductive and endocrine control systems, nutritional regulation, and foundational genetics across the lifespan. Integrate information across these systems and use clinical reasoning process to identify and understand relevant perturbations and diseases. May be repeated up to 3 time(s). (P/F grading only.) Effective: 2016 Winter Quarter.

MDS 411—Doctoring 1 (9)
Clinical Activity—1 hour; Discussion—1 hour; Lecture—1 hour. Prerequisite(s): Consent of Instructor. Small group training in patient communication, interviewing techniques, physical exam and clinical identification. Outpatient clinical experiences and didactic presentations also included. (P/F grading only.) Effective: 2017 Summer Quarter.

MDS 411B—Doctoring 1 (5)
Clinical Activity—1.5 hours; Discussion—1.5 hours; Lecture/Discussion—1.8 hours. Medical students only. Small, case-based learning groups with training in patient communication and interviewing techniques, clinical identification and problem solving, applications of social, psychological, cultural, bioethical, and basic science concepts to patient case scenarios, outpatient clinical experiences and didactic presentations. (P/F grading only.) Effective: 2018 Winter Quarter.

MDS 411KA—ACE-PC Program Doctoring 1 (13)
Clinical Activity—5 hours; Lecture/Discussion—6 hours. Prerequisite(s): Consent of Instructor. Small case-based learning groups with training in patient communication and interviewing techniques clinical identification and problem solving applications of social psychological cultural bioethical and basic science concepts to patient case scenarios outpatient clinical experiences and didactic presentations. (P/F grading only.) Effective: 2014 Summer Quarter.

MDS 411KB—ACE-PC Program Doctoring 1 (5)
Clinical Activity—4 hours; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Application of multidisciplinary basic, social and clinical science to clinical cases in small groups. History, physical examination with preceptors. Didactics in epidemiology, ethics, sexuality and clinical reasoning. Evaluation of professional competencies, attitudes and skills needed in the practice of medicine. (P/F grading only.) Effective: 2015 Winter Quarter.

MDS 415—Population Health and Evidence-Based Medicine (2) ***Review all entries***
Discussion—4 hours; Lecture—12 hours. Prerequisite(s): Consent of Instructor. Focuses on the bedrock themes of public health: populations and prevention. (P/F grading only.) Effective: 2017 Summer Quarter.

MDS 415—Population Health and Evidence-Based Medicine (2) ***Review all entries Discontinued***
Discussion—4 hours; Lecture—12 hours. Prerequisite(s): Consent of Instructor. Focuses on the bedrock themes of public health: populations and prevention. (P/F grading only.) Effective: 2018 Summer Quarter.

MDS 415A—Population Health and Evidence-Based Medicine (2)
Discussion—4 hours; Lecture—12 hours. Prerequisite(s): Consent of Instructor. Introduces the fundamental concepts and tools of population health, evidence-based medicine, and system science. (P/F grading only.) Effective: 2018 Summer Quarter.

MDS 415B—Critical Appraisal of Topics in Population Health (0.5)
Discussion—6 hours. Apply foundational skills to explore critical issues in 21st century public health, including tobacco control, firearm violence, and obesity. In a series of small-group discussions "interpreting the medical literature," key concepts from epidemiology and biostatistics are reinforced while students are armed with specific strategies for addressing high-risk behaviors in the context of population health. (P/F grading only.) Effective: 2018 Summer Quarter.

MDS 415C—Population Health and System Science (1.5)
Discussion—6 hours; Fieldwork—3 hours; Lecture—4 hours. Prerequisite(s): Consent of Instructor. Addresses the social, economic, cultural, policy-related, and environmental factors that affect the health of populations and individuals, and the role of health care systems (locally, regionally, nationally, and globally) in moderating the effects of these factors. Content builds on MDS 415A/B, the TeamPEACE (Teamwork for Professionalism, Ethics, and Cultural Enrichment) curriculum in Doctoring 1, and students' lived experience in UC Davis free clinics. (P/F grading only.) Effective: 2018 Summer Quarter.

MDS 420—Multisystem Clinical Presentations (0.5)
Extensive Problem Solving—15 hours; Independent Study—6 hours. Prerequisite(s): Consent of Instructor. Completion of Pathophysiology Block. Capstone course integrates coursework, knowledge, skills and experiential learning to enable the student to demonstrate a broad mastery of learning across the curriculum. (P/F grading only.) Effective: 2014 Winter Quarter.

MDS 421A—Doctoring 2 (6)
Discussion—1 hour; Internship—0.5 hours; Lecture/Discussion—1 hour. Prerequisite(s): Approval by the School of Medicine Committee on Student Progress; medical students only. Application of multidisciplinary basic, social and clinical science to clinical cases in small groups. History, physical examination with preceptors. Didactics in epidemiology, ethics, sexuality and clinical reasoning. Evaluation of professional competencies, attitudes and skills needed in the practice of medicine. (P/F grading only.) Effective: 2007 Summer Quarter.

MDS 421B—Doctoring 2 (6)
Discussion—1 hour; Internship—0.5 hours; Lecture/Discussion—1 hour. Prerequisite(s): Approval by the School of Medicine on Student Progress; medical students only. Application of multidisciplinary basic, social & clinical science concepts to cases in small groups. History, physical examination with preceptors. Didactics in epidemiology, ethics, sexuality, and clinical reasoning. Evaluation of professional competencies, attitudes and skills needed in the practice of medicine. (P/F grading only.) Effective: 2007 Summer Quarter.

MDS 421C—Doctoring 2 (6)
Discussion—1 hour; Internship—0.5 hours; Lecture/Discussion—1 hour. Prerequisite(s): Approval by the School of Medicine Committee on Student Progress; medical students only. Application of multidisciplinary basic, social and clinical science concepts to clinical cases in small group discussions facilitated by medical school faculty. Evaluation of professional competencies, attitudes and skills needed in the practice of clinical medicine. (P/F grading only.) Effective: 2007 Summer Quarter.

MDS 421KA—ACE-PC Program Doctoring 2 (6)
Discussion—1 hour; Internship—0.5 hours; Lecture/Discussion—1 hour. Prerequisite(s): MDS 411KA; MDS 411KB; Admission into ACE-PC. MDS 421KA-C are a year-long series of courses. Objectives and assessments have been accelerated to accommodate the students enrolled in the ACE-PC Program. Students will participate in all aspects of Doctoring 2, other than what was done in 411KA/KB. (P/F grading only.) Effective: 2015 Summer Quarter.

MDS 421KB—ACE-PC Program Doctoring 2 (6)
Discussion—1 hour; Internship—0.5 hours; Lecture/Discussion—1 hour. Prerequisite(s): Approval by the School of Medicine on Student Progress; medical students only. MDS 421KA-C are a year-long series of courses. Objectives and assessments have been accelerated to accommodate the students enrolled in the ACEPC Program. Students will participate in all aspects of Doctoring 2, other than what was done in 411KA/KB. (P/F grading only.) Effective: 2015 Summer Quarter.

MDS 421KC—ACE-PC Program Doctoring 2 (6)
Discussion—1 hour; Internship—0.5 hours; Lecture/Discussion—1 hour. Prerequisite(s): Approval by the School of Medicine Committee on Student Progress; medical students only. MDS 421KA-C are a year-long series of courses. Objectives and assessments have been accelerated to accommodate the students enrolled in the ACEPC Program. Students will participate in all aspects of Doctoring 2, other than what was done in 411KA/KB. (P/F grading only.) Effective: 2015 Summer Quarter.

MDS 428—Foundations of Bioethics (1)
Discussion—3 hours; Independent Study—16.5 hours; Lecture/Discussion—3 hours; Web Virtual Lecture—1 hour. Prerequisite(s): Consent of Instructor. Course will expose students to core content in bioethics and the law and introduce a framework for ethical decision-making, while emphasizing relationships between bioethics and clinical care. (P/F grading only.) Effective: 2014 Summer Quarter.

MDS 429—Transition to Clerkships (1)
Discussion—7 hours; Discussion/Laboratory—12 hours; Independent Study—2 hours; Workshop—13 hours. Incoming third-year medical students will participate in a variety of educational experiences designed to prepare them to begin their clerkship curriculum. Course content will be disseminated in large and small group settings. (P/F grading only.) Effective: 2015 Spring Quarter.

MDS 430—Introduction to Doctoring 3 (1)
Discussion/Laboratory—2 hours. Prerequisite(s): Approval by SOM Committee on Student Progress. Restricted to Medical students only. Application of multidisciplinary basic, social and clinical science concepts to clinical cases in small group discussions facilitated by medical school faculty. Evaluation of professional competencies, attitudes and skills needed in the practice of clinical medicine. (H/P/F grading only.) Effective: 2011 Spring Quarter.

MDS 430A—Doctoring 3 (1)
Discussion—3 hours. Prerequisite(s): Approval by SOM Committee on Student Progress. Restricted to Medical students only. Application of multidisciplinary basic, social and clinical science concepts to clinical cases in small group discussions facilitated by medical school faculty. Evaluation of professional competencies, attitudes and skills needed in the practice of clinical medicine. (H/P/F grading only.) Effective: 2015 Spring Quarter.

MDS 430B—Doctoring 3 (1)
Discussion—2 hours. Prerequisite(s): Approval by SOM Committee on Student Progress. Restricted to Medical students only. Application of multidisciplinary basic, social & clinical science concepts to clinical cases in small group discussions facilitated by medical school faculty. Evaluation of professional competencies, attitudes and skills needed in the practice of clinical medicine. (H/P/F grading only.) Effective: 2015 Spring Quarter.

MDS 430C—Doctoring 3 (1)
Discussion—2 hours. Prerequisite(s): Approval by SOM Committee on Student Progress. Restricted to Medical students only. Application of multidisciplinary basic, social & clinical science concepts to clinical cases in small group discussions facilitated by medical school faculty. Evaluation of professional competencies, attitudes and skills needed in the practice of clinical medicine. (H/P/F grading only.) Effective: 2015 Spring Quarter.

MDS 430D—Doctoring 3 (1)
Discussion—2 hours. Prerequisite(s): Approval by SOM Committee on Student Progress. Restricted to Medical students only. Application of multidisciplinary basic, social & clinical science concepts to clinical cases in small group discussions facilitated by medical school faculty. Evaluation of professional competencies, attitudes and skills needed in the practice of clinical medicine. (H/P/F grading only.) Effective: 2015 Summer Quarter.

MDS 435KA—ACE-PC Longitudinal Integrated Clerkship A (18)
Clinical Activity—45 hours; Discussion—4 hours; Independent Study—6 hours. Prerequisite(s): Consent of Instructor. Longitudinal Clerkship will combine the Internal Medicine, OBGYN, Pediatrics, Psychiatry and Surgery Clerkships for the ACE-PC Program. (H/P/F grading only.) Effective: 2016 Spring Quarter.

MDS 435KB—ACE-PC Longitudinal Integrated Clerkship B (21)
Clinical Activity—45 hours; Discussion—4 hours; Independent Study—6 hours. Prerequisite(s): Consent of Instructor. Longitudinal Clerkship will combine the Internal Medicine, OBGYN, Pediatrics, Psychiatry and Surgery Clerkships for the ACE-PC Program. (H/P/F grading only.) Effective: 2016 Spring Quarter.

MDS 435KC—ACE-PC Longitudinal Integrated Clerkship C (18)
Clinical Activity—45 hours; Discussion—4 hours; Independent Study—6 hours. Prerequisite(s): Consent of Instructor. Longitudinal Clerkship will combine the Internal Medicine, OBGYN, Pediatrics, Psychiatry and Surgery Clerkships for the ACE-PC Program. (H/P/F grading only.) Effective: 2016 Spring Quarter.

MDS 440—Doctoring 4 Teaching Fellowship (3)
Discussion—0.5 hours; Seminar—0.25 hours. Prerequisite(s): MDS 430A; MDS 430B; MDS 430C; MDS 430D; and Consent of Instructor. Restricted to Medical student only. Instruction on teaching methodology and pedagogy. Mentored teaching of junior medical students in seminar, lecture, and bedside. (H/P/F grading only.) Effective: 2015 Spring Quarter.

MDS 441—Combined Ophthalmology and Otolaryngology Clerkship (6)
Clinical Activity—4 hours. Prerequisite(s): Approval by Committee on Student Promotion and Evaluation. Fundamental knowledge of ophthalmology and otolaryngology for the treatment of eye, ear, nose and throat problems at a level of training of general physicians, including when to refer patients to a specialist. (H/P/F grading only.) Effective: 1997 Summer Quarter.

MDS 445—Race and Health in the United States (3-6)
Discussion—4 hours. Interprofessional course facilitates the professional and personal developmental of medical students and other health professions students who think they would like to be leaders in securing equity in population health and work environments. (P/F grading only.) Effective: 2017 Fall Quarter.

MDS 449—Transition to Residency (3-6)
Clinical Activity. Prerequisite(s): Consent of Instructor. Transition to Residency program addresses the graduating medical students need to improve clinical skills necessary for the first six months of residency and unmet graduation competencies in our competency-based curriculum. (P/F grading only.) Effective: 2017 Fall Quarter.

MDS 450—Introduction to UCD Medical Center (1)
Seminar. Prerequisite(s): Second-year medical student. Designed to assist medical student in transition from classroom to hospital setting. (H/P/F grading only.) Effective: 1997 Winter Quarter.

MDS 455—Student Run Clinics (1-3)
Clinical Activity—3-9 hours. Open to medical students in good standing. Will learn counseling, diagnosis and treatment of patients with chronic and acute disease under supervision of physician. Meet all requirements and prerequisites of the particular clinic within which they work. May be repeated for credit. (P/F grading only.) Effective: 2011 Summer Quarter.

MDS 460CR—Introduction to Clinical Research (2)
Independent Study—3 hours; Lecture—2 hours. Restricted to completion of M.D., D.D.S, D.M.D., O.D., N.D., Pharm.D., D.V.M., Ph.D., or D.N.S. in nursing; application and acceptance into the Clinical Research Graduate Group, K30 program Introduction to the CRGG program and overview of major clinical research topics. Overview of basic clinical skills needed to accomplish CRGG mentored research project. (P/F grading only.) Effective: 2006 Summer Special Session.

MDS 461CR—Strategies for Grant Writing (2)
Lecture—2 hours. Restricted to completion of M.D., D.D.S, D.M.D., O.D., N.D., Pharm.D., D.V.M., Ph.D., or D.N.S. in nursing; application and acceptance into the Clinical Research Graduate Group, K30 program. Practical skills and strategies to create successful grant proposals in the NIH style and format. Generating ideas, identifying and accessing research resources, grant components, specific aims, backgound and significance, preliminary studies, budgets, and bios. Matriculation through UC system, and resubmissions. (S/U grading only.) Effective: 2007 Spring Quarter.

MDS 462CR—Introduction to Clinical Epidemiology and Study Design (3)
Discussion—10 hours; Lecture—25 hours. Restricted to completion of M.D., D.D.S, D.M.D., O.D., N.D., Pharm.D., D.V.M., Ph.D., or D.N.S. in nursing; application and acceptance into the Clinical Research Graduate Group, K30 program. Anatomy and physiology of conducting clinical epidemiologic research. Familiarity with three basic study designs (cross-sectional, case-control,and cohort). Discussion of principles of measurements in clinical epidemiological studies, basic methods for analyzing data, and ethical issues involved in conducting research. (S/U grading only.) Effective: 2004 Summer Special Session.

MDS 463CR—Methods in Clinical Research (5)
Discussion—2 hours; Lecture—3 hours. Restricted to completion of M.D., D.D.S, D.M.D., O.D., N.D., Pharm.D., D.V.M., Ph.D., or D.N.S. in nursing; application and acceptance into the Clinical Research Graduate Group, K30 program. Overview of major approaches to clinical research, including health services research techniques, informatics, the GCRC, and preclinical methodologies to enhance clinical projects. Overview of UC Davis clinical research support infrastructure. Methodologies applicable to clinical research and its multi-disciplinary perspective. (S/U grading only.) Effective: 2007 Spring Quarter.

MDS 464CR—Responsible Conduct of Research (3)
Lecture—3 hours. Restricted to completion of M.D., D.D.S, D.M.D., O.D., N.D., Pharm.D., D.V.M., Ph.D., or D.N.S. in nursing; application and acceptance into the Clinical Research Graduate Group, K30 program. The nine NIH-mandated modules: Data Acquisition and Reporting, Mentor Training, Publication Practices and Authorship, Peer Review/Grant Process, Collaborative Science, Human Subjects, Research with Animals, Conflict of Interest, Research Misconduct, and Entrepreneurship/Industry Collaborations/Intellectual Property/Technology Transfer. (S/U grading only.) Effective: 2004 Summer Special Session.

MDS 465CR—Introduction to Medical Statistics (4)
Laboratory—2 hours; Lecture—3 hours. Restricted to completion of M.D., D.D.S, D.M.D., O.D., N.D., Pharm.D., D.V.M., Ph.D., or D.N.S. in nursing; application and acceptance into the Clinical Research Graduate Group, K30 program. Biomedical applications of statistical methods in clinical, laboratory and population medicine. Graphical/tabular data presentation, probability, binomial, Poisson, normal, t-, F-, and Chi-square distributions, elementary nonparametric methods, simple linear regression/correlation, life tables. Microcomputer applications of statistical procedures in population medicine. (S/U grading only.) Effective: 2005 Summer Special Session.

MDS 468C—International Clinical Preceptorship (1-12)
Clinical Activity—30 hours. Prerequisite(s): Consent of Instructor. Medical students. Multidisciplinary preceptorship in a foreign country. Clinical credit will be awarded using this course, once approval has been received from the appropriate governing committee. May be repeated for credit. (H/P/F grading only.) Effective: 2015 Spring Quarter.

MDS 468D—International Elective (1-12)
Clinical Activity—10 hours; Independent Study—20 hours. Prerequisite(s): Consent of Instructor. Medical students. Multidisciplinary preceptorship in a foreign country. Course used to award non-clinical credit for international experiences which have been approved by the appropriate governing committee. May be repeated for credit. (H/P/F grading only.) Effective: 2015 Summer Quarter.

MDS 470—Introduction to Dentistry (3-18)
Clinical Activity—34 hours; Lecture—6 hours; Variable—3-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good standing. Introduction to Dentistry and basic Oral and Maxillofacial Surgery. Course is offered by the Oral and Maxillofacial Surgery department at UC San Francisco. (P/F grading only.) Effective: 2009 Fall Quarter.

MDS 480—Insights in Clinical Research (1)
Lecture—1 hour. Prerequisite(s): Medical student in good standing. Seminars on research presented by Medical School faculty; overview of pertinent issues, including medical ethics, human subjects protocols, case control methods, etc. May be repeated for credit. (P/F grading only.) Effective: 2005 Spring Quarter.

MDS 481—Insights into Clinical Specialties (1)
Lecture/Discussion—1 hour. Prerequisite(s): Medical student in good standing. Exposure to various medical specialties, their residency programs and ways in which medical students can prepare for and improve their candidacy for such programs. May be repeated for credit. (H/P/F grading only.) Effective: 1998 Winter Quarter.

MDS 482—Lecture Series in Reproductive Health (1)
Lecture—1 hour. Psychosocial and public health aspects of providing quality reproductive health care and application in student-run free clinics and in 3rd year clerkships. May be repeated up to 2 time(s). Only medical students may enroll for credit; undergraduates may audit the course. (P/F grading only.) Effective: 2002 Winter Quarter.

MDS 483—Insights in Political, Legal and Business Aspects of Medicine (1)
Lecture—1 hour. Prerequisite(s): Medical students in good standing. Restricted to Medical student only. The practical aspects of a medical career. May be repeated up to 2 time(s). (P/F grading only.) Effective: 2002 Spring Quarter.

MDS 485—Health Policy Lecture Series (1)
Lecture—1 hour. Lecture series provides an overview of local, state, national and international health policy. The current challenges health care reform implementation is facing provides how medical students can successfully advocate for changes in health policy. May be repeated for credit. (P/F grading only.) Effective: 2011 Fall Quarter.

MDS 486—Topics in Health Care Improvement (0.5)
Lecture/Discussion—15 hours. Lecture series will cover major topics in health care improvement, presented by guest speakers who are leaders in the field. May be repeated for credit. (P/F grading only.) Effective: 2015 Spring Quarter.

MDS 487—History and Ethics of Medicine (1)
Lecture—1.25 hours. Introduction to ethical problems and events in health care in both modern and historical contexts. Eight one-hour and fifteen-minute interactive sessions designed to introduce students to historical topics in medicine and medical ethics. (P/F grading only.) Effective: 2004 Winter Quarter.

MDS 489—Directed Studies (1-9)
Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for modified curriculum, USMLE exams, and/or as required by Committee on Student Progress. Independent studies to accommodate modified curriculums, prepare for taking USMLE exams and for remediation course work directed by the Committee on Student Progress. May be repeated for credit. (P/F grading only.) Effective: 2009 Winter Quarter.

MDS 489C—Clinical Reintroduction Experience (1-9)
Clinical Activity—20 hours. Prerequisite(s): Consent of Instructor. Learn and practice basic clinical skills in a supervised clinical setting. Skills include patient interviewing, history, physical examination, diagnostic and clinical reasoning, case presentation, and medical records documentation. Direct observation and individual feedback on clinical skills development is provided. (P/F grading only.) Effective: 2012 Summer Quarter.

MDS 489R—USMLE Directed Remedial Studies (1-9)
Independent Study—20 hours. Prerequisite(s): Recommendation by Committee on Student Progress. Independent studies to accommodate remediation for taking USMLE exams directed by the Committee on Student Progress. May be repeated for credit. (P/F grading only.) Effective: 2011 Spring Quarter.

MDS 490A—Community Health Scholars Seminar A (1.5)
Lecture—1 hour. Prerequisite(s): Consent of Instructor. Longitudinal year-long course starting on July 1 and concluding at the end of Block 2. Focuses on immersing students in their respective communities to understand the strengths and challenges they face in relation to health. May be repeated for credit. (P/F grading only.) Effective: 2017 Summer Quarter.

MDS 490B—Community Health Scholars Seminar B (0.5)
Lecture—1 hour. Prerequisite(s): Consent of Instructor. Longitudinal year-long course starting on July 1 and concluding at the end of Block 2. Focuses on immersing students in their respective communities to understand the strengths and challenges they face in relation to health. May be repeated for credit. (P/F grading only.) Effective: 2017 Summer Quarter.

MDS 490C—Community Health Scholars Seminar C (0.5)
Lecture—1 hour. Prerequisite(s): Consent of Instructor. Longitudinal year-long course starting on July 1 and concluding at the end of Block 2. Focuses on immersing students in their respective communities to understand the strengths and challenges they face in relation to health. May be repeated for credit. (P/F grading only.) Effective: 2017 Summer Quarter.

MDS 490D—Community Health Scholars Seminar D (0.5)
Lecture—1 hour. Prerequisite(s): Consent of Instructor. Longitudinal year-long course starting on July 1 and concluding at the end of Block 2. Focuses on immersing students in their respective communities to understand the strengths and challenges they face in relation to health. May be repeated for credit. (P/F grading only.) Effective: 2017 Summer Quarter.

MDS 493—Independent Special Study Module (3-12)
Variable—20 hours. Prerequisite(s): Consent of Instructor. FYOC approval required. Student developed alternative to the SSM/SPO Requirement. Approval by FYOC is required. (H/P/F grading only.) Effective: 2015 Winter Quarter.

MDS 493A—International and Comparative Health Care--SSM (6)
Discussion—20 hours; Lecture—10 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. Through a series of lectures, seminars and clinical experiences, all occurring in other nations, students will research how health care systems address critical health issues. In 2007, Chronic Disease is the focal issue. SSM Component. (H/P/F grading only.) Effective: 2012 Spring Quarter.

MDS 493B—International and Comparative Health Care--Clinical (3-9)
Clinical Activity—30 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. Through a series of lectures, seminars and clinical experiences, all occurring in other nations, students will research how health care systems address critical health issues. In 2007, Chronic Disease is the focal issue. Clinical Component. (H/P/F grading only.) Effective: 2014 Spring Quarter.

MDS 493D—Teaching the Basic Sciences SSM (6)
Laboratory—30 hours; Lecture—6 hours; Lecture/Lab—8 hours; Tutorial—10 hours. Prerequisite(s): MDS 440 (can be concurrent); and Consent of Instructor. MDS 440 required concurrently. Restricted to UC Davis School of Medicine students only. Special Studies Module, a yearlong in progress court to teach lecture and discussion education technique and theory. (H/P/F grading only.) Effective: 2015 Spring Quarter.

MDS 493Q—Improving Quality in Health Care (6)
Discussion/Laboratory—10 hours; Lecture—8 hours; Project (Term Project)—10 hours. Prerequisite(s): Consent of Instructor. Working in interdisciplinary teams, will explore the theory and practical methods being employed to make improvement in health care systems while providing an opportunity for interprofessional educational experience. (H/P/F grading only.) Effective: 2015 Fall Quarter.

MDS 493QA—Improving Quality in Health Care (3)
Discussion/Laboratory—10 hours; Lecture—8 hours; Project (Term Project)—10 hours. Prerequisite(s): Consent of Instructor. Working in interdisciplinary teams, will explore the theory and practical methods being employed to make improvement in health care systems while providing an opportunity for interprofessional educational experience. (H/P/F grading only.) Effective: 2012 Fall Quarter.

MDS 493QB—Improving Quality in Health Care (3)
Discussion/Laboratory—10 hours; Lecture—8 hours; Project (Term Project)—10 hours. Prerequisite(s): Consent of Instructor. Working in interdisciplinary teams, will explore the theory and practical methods being employed to make improvement in health care systems while providing an opportunity for interprofessional educational experience. (H/P/F grading only.) Effective: 2012 Fall Quarter.

MDS 493QC—Enhancing Patient Safety in Health Care (6)
Clinical Activity—8 hours; Discussion—6 hours; Seminar—6 hours. Prerequisite(s): Consent of Instructor. Fourth-year Medical student. Inter-professional module is designed to explore the theory and practical methods being employed to improve patient safety in health care while providing an opportunity for interprofessional educational experience. (H/P/F grading only.) Effective: 2013 Spring Quarter.

MDS 494—Non-Clinical Medical Student Externship (3-9)
Clinical Activity—10 hours; Independent Study—20 hours. Prerequisite(s): Consent of Instructor. Restricted to students with approval of credit by the Fourth Year Oversight Committee. Generic course for awarding externship credit for medical student rotations that are not primarily focused on patient care. May be repeated for credit. (H/P/F grading only.) Effective: 2014 Fall Quarter.

MDS 495—Medicine Literature Review (1-9)
Discussion—3-27 hours. Prerequisite(s): Medical student in good academic standing and permission of the Associate Dean of Curricular Affairs. Independent study: topics for selection include, but are not restricted to, medical ethics, economics and jurisprudence, culture and medicine, ethnicity and medicine, gender and medicine, history of medicine, health manpower, and medical education. A prepared paper on the selected topic will be required. (P/F grading only.) Effective: 1997 Fall Quarter.

MDS 497—Scholarly Project (6)
Independent Study—0.5 hours; Seminar—0.25 hours. Prerequisite(s): Consent of Instructor. Project proposal must be accepted by the Scholarly Project Executive Committee (SPEC). Restricted to 4th year medical school students only. Develop a research project on a focused topic area, implements the research, writes a publishable paper, and presents an oral summary of the project. (H/P/F grading only.) Effective: 2015 Spring Quarter.

MDS 499—Research in Medical Education & Curriculum Development (4-9) ***Review all entries***
Independent Study—10-36 hours. Prerequisite(s): Medical students in good standing and competency with computers. Research and development of an independent project related to expanding computer-assisted resources in support of the MD curriculum at UC Davis. (H/P/F grading only.) Effective: 1997 Fall Quarter.

MDS 499—Medical Student Research Fellowship (1-9) ***Review all entries***
Independent Study—10-36 hours. Prerequisite(s): Medical students in good standing and competency with computers. Independent research project as part of the Medical Student Research Fellowship. (H/P/F grading only.) Effective: 2018 Summer Quarter.

MGB Management - Work Prof Bay Area

Students must complete the Management core course requirement before enrolling in any of the following elective courses, or petition with consent of the instructor. The core courses include: 200A, 201A, 201B, 202A, 203A, 204, 205, 252, 268, 440, 440A, 440B, 440C. For a list of elective courses, see https://webapps.gsm.ucdavis.edu/Raps/courses/curriculumOverviewByProgram?program=SMBA.

Courses in MGB:

MGB 200A—Financial Accounting (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management. Introduction to the concepts and objectives underlying the preparation
of financial statements. Topics include understanding the accounting cycle, measurement and valuation problems associated with financial statement components, consideration of the usefulness of financial statements in the analysis of a corporation's operations. Effective: 2009 Fall Quarter.

MGB 200B—Managerial Accounting (3)
Lecture—3 hours. Prerequisite(s): MGT 200A or MGB 200A or MGP 200A Information managers should know to be effective, including: product costing, motivating people, and differential analysis for decision making. Includes team projects and written and oral presentations. Effective: 2017 Fall Quarter.

MGB 201A—The Individual and Group Dynamics (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management. Examines basic psychological and social psychological processes shaping human behavior and applies knowledge of these processes to the following
organizational problems: motivation, job design, commitment, socialization, culture, individual and group decision making, and team building. Effective: 2009 Fall Quarter.

MGB 201B—Organizational Strategy and Structure (3)
Lecture/Discussion—3 hours. Prerequisite(s): Completion of first year courses in Graduate School of Management or the equivalent. Open to MBA students only. Strategic management of organizations, including analysis of industries, firm resources and capabilities and corporate strategy. Strategy formulation, implementation and strategic decision-making. Firm and industry life cycles and change. Analysis of organizational design and structure including differentiation and integration. Effective: 2011 Fall Quarter.

MGB 202A—Markets and the Firm (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management. Examines the interaction of consumers, firms and government, and the effect this interaction has on the use of resources and firm profitability. Fundamental economic concepts such as marginal analysis, opportunity cost, pricing, and externalities are introduced and applied. Effective: 2009 Fall Quarter.

MGB 202B—Business, Government, and the International Economy (3)
Lecture—3 hours. Prerequisite(s): MGB 202A or MGT 202A or MGP 202A Examines the influence of government and international factors on business. Topics include distribution of income, business cycles, inflation and interest rates, the federal debt, monetary policy and international trade and finance. Effective: 2017 Fall Quarter.

MGB 203A—Data Analysis for Managers (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management MBA program or consent of instructor. Introduction to statistics and data analysis for managerial decision making. Descriptive statistics, principles of data collection, sampling, quality control, statistical inference. Application of data analytic methods to problems in marketing, finance, accounting, production, operations, and public policy. Effective: 2009 Fall Quarter.

MGB 203B—Forecasting and Managerial Research Methods (3)
Lecture—3 hours. Prerequisite(s): MGT 203A or MGP 203A or MGB 203A Practical statistical methods for managerial decision making covers regression analysis, time series analysis and forecasting, design and analysis of experiments in managerial research and contingency table analysis. Application of these methods to marketing, finance, accounting, production, operations, and public policy. Effective: 2017 Fall Quarter.

MGB 204—Marketing Management (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management. Analysis of market opportunities, elements of market research, development of marketing strategies, market planning and implementations, and control systems. Consumer and industrial markets, market segmentation, pricing strategies, distribution channels, promotion, and sales. Effective: 2009 Fall Quarter.

MGB 205—Financial Theory and Policy (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management. Corporate financial policy and investment management. Covers capital budgeting, optimal financial structure, cost-of-capital determination, risk measurement. Develops basic valuation principles for investments with long-lived and risky cash-flows, and extends these to derivative securities, asset portfolios, investment management and hedging. Effective: 2010 Spring Quarter.

MGB 206—Decision Making and Management Science (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management MBA program or consent of instructor. Develops decision-making and problem-solving skills in conjunction with a quantitative model-building approach. Emphasizes how structured modeling techniques, probability forecasts, simulations, and computer optimization models are used in the overall process of making decisions in an uncertain environment. Effective: 2009 Fall Quarter.

MGB 207—Management Information Systems (3)
Lecture—3 hours. Prerequisite(s): Graduate Student or consent of instructor. Introduction to computer programming and data handling skills. Use of computer in organizations, emphasis on managerial aspects of computing. Standard and nonstandard uses of data files, centralization versus decentralization of computing, office automation, computer security. Effective: 2009 Fall Quarter.

MGB 215—Business Law (3)
Lecture—3 hours. Prerequisite(s): Completion of administration core requirements or petition with consent of instructor. Introduction to law and legal process in the United States. Sources of law. Structure and operation of courts, federal-state relationships, fundamentals of administrative law, fundamentals of business law. Effective: 2009 Fall Quarter.

MGB 216—Managing Professionals, Budgets, Controls and Ethics (3)
Lecture—3 hours. Prerequisite(s): Graduate standing. Performance measures, budgetary controls and ethical pressures which occur at middle management levels in service-type operations. Addresses such organizations as engineering, medical groups, law offices, management consultants. Effective: 2009 Fall Quarter.

MGB 220—Management of Social Networks (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGB 201A Open to MBA students only. Principles and applications of social network theory: coordinating divergent interests to create value for individuals and organizations. Emphasis on conceptual models, web-based diagnostic tools, and practical applications. Effective: 2009 Fall Quarter.

MGB 223—Power and Influence in Management (3)
Seminar—3 hours. Prerequisite(s): MGT 201A or MGB 201A or MGP 201A; Consent of Instructor. Investigation of the bases of power in organizations and the tactics used to translate power into influence. Topics include the control of resources (including information), social psychological processes (including commitment), the construction of meaning, and ethics. Effective: 2017 Fall Quarter.

MGB 224—Managing People in High-Performance Organizations (3)
Lecture—3 hours. Prerequisite(s): MGT 201A or MGB 201A or MGP 201A Restricted to students in the MBA program. Strategic approach to the management of people within organization. Analyze employment systems' fit with firms' environments and strategies. Explore consequences of choices firms make in managing people—decisions as to selection, performance evaluation, compensation, and other management policies and practices. Not open to students who have taken MGT 224 or MGP 224. Effective: 2017 Fall Quarter.

MGB 234—Pricing (3)
Lecture/Discussion—3 hours. Prerequisite(s): (MGT 202A or MGB 202A or MGP 202A); (MGP 203B or MGB 203B or MGT 203B); (MGT 204 or MGB 204 or MGP 204) Restricted to students in the MBA program. Combines lectures, cases and homework to teach students tools and skills necessary to analyze pricing situations, make pricing decisions, and implement them, in a systematic manner. Effective: 2017 Fall Quarter.

MGB 239—Digital Marketing (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGB 204 or MGT 204 or MGP 204 Course equips students for a career in digital marketing and social media. Topics include online advertising, search engine optimization, interactive mktg, online privacy issues, e-commerce, social influence, social network theory, measurement of social influence, integrating social and traditional media. Effective: 2017 Fall Quarter.

MGB 240—Management Policy and Strategy (3)
Lecture—3 hours. Prerequisite(s): First-year core courses of M.B.A. program. Examines the scope of missions, objectives strategies, policies, structures, measurements and incentives which bear on the management of an organization. Real client organizations, in the private and public sectors, are assigned to student teams as the subjects of study. Effective: 2009 Fall Quarter.

MGB 241—New Product Development (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 204 or MGB 204 or MGP 204 Open to graduate students in the Graduate School of Management. State-of-the-art concepts and methods to enhance the effectiveness of new product development activities. Focuses on the understanding of managerial issues and acquiring the ability to solve problems. Effective: 2017 Fall Quarter.

MGB 242—Marketing Communications (3)
Lecture—3 hours. Issues in designing a marketing communications strategy. Topics include mass and direct communications, institutional aspects of advertising, consumer behavior, evaluating ad effectiveness, determining ad budget, creative strategy, and use and abuse of promotions. Effective: 2009 Fall Quarter.

MGB 243—Customer Relationship Management (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 204 or MGB 204 or MGP 204 Restricted to MBA students only. Customer Relationship Management (CRM) is a management approach under which marketing activities are organized and measured around customers (rather than around brands.) This approach is appealing because customers, not brands, are those who make buying decisions. Effective: 2017 Fall Quarter.

MGB 244—New and Small Business Ventures (3)
Lecture—3 hours. Prerequisite(s): MGT 204 or MGP 204 or MGB 204 Student teams develop complete business plans for their own start-up ventures. Process includes: elevator pitch, business strategy, comprehensive bottoms-up financial projections, capital requirements, product differentiation, competitive, alliance, and go-to-market strategy development, investor presentation, and comprehensive written business plan. Effective: 2017 Fall Quarter.

MGB 245—Business Writing (3)
Lecture/Discussion—3 hours. Prerequisite(s): Completion of first-year core courses at the Graduate School of Management or the equivalent. Restricted to MBA students only. Techniques for sharpening writing skills are introduced, along with grammatical structure, word choice, and punctuation. Learn to develop styles that are pitch-perfect for given situations and to think strategically about each communication challenge in a management setting. Effective: 2011 Fall Quarter.

MGB 246—Negotiation and Team Building (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGB 205; MGB 202. Basic theory of negotiation; applies theory to process of building teams to achieve business purposes. Covers integrative and distributive strategies of claiming value, how to recognize bargaining tricks, uncovering hidden agendas, brainstorming to extend Pareto frontier. Effective: 2011 Fall Quarter.

MGB 247—Customer Service as a Marketing Tool (3)
Lecture—3 hours. Understanding the distinct features of services, how to create value through service, methods of building strong relationships with customers, methods of measuring and building customer satisfaction, and measuring the financial impact of service improvement. Effective: 2009 Fall Quarter.

MGB 248—Marketing Strategies (3)
Lecture—3 hours. Prerequisite(s): (MGT 202A or MGB 202A or MGP 202A); (MGP 204 or MGT 204 or MGB 204) Examines process by which organizations develop strategic marketing plans. Includes definition of activities and products, marketing audits, appraising market opportunities, design of new activities and products, and organizing marketing planning function. Applications to problems in private and public sector marketing. Effective: 2017 Fall Quarter.

MGB 249—Marketing Research (3)
Lecture—3 hours. Prerequisite(s): (MGT 202A or MGB 202A or MGP 202A); (MGP 203A or MGB 203A or MGT 203A); (MGT 204 or MGB 204 or MGP 204) Course addresses the managerial issues and problems of systematically gathering and analyzing information for making private and public marketing decisions. Covers the cost and value of information, research design, information collection, measuring instruments, data analysis, and marketing research applications. Effective: 2017 Fall Quarter.

MGB 250—Technology Competition and Strategy (3)
Lecture—3 hours. Prerequisite(s): (MGT 202A or MGB 202A or MGP 202A); (MGP 203A or MGB 203A or MGT 203A) Restricted to students in the MBA program. Why is software typically so defective? Why do many firms in the IT industry give away their best products free? This course helps you analyze questions like these by modeling competition and strategy in the network, technology and information industries. Effective: 2017 Fall Quarter.

MGB 251—Management of Innovation (3)
Lecture—3 hours. Prerequisite(s): MGT 201A or MGB 201A or MGP 201A Managing innovative enterprise in changing and uncertain environments. Covers technology forecasting and assessment, program selection and control, financial management, regulation, and ethics. Effective: 2017 Fall Quarter.

MGB 252—Managing for Operational Excellence (3)
Lecture—3 hours. Prerequisite(s): MGB 203A or MGP 203A or MGT 203A Open to students in the Graduate School of Management. Explores the management of operations as applied to manufacturing as well as services provided both inside and outside the organization. Develop an understanding of how uncertainty affects planning and delivery by looking at fundamental models of operations. Effective: 2018 Spring Quarter.

MGB 253—Corporate Social Responsibility (3)
Lecture—3 hours. Goal in this course will be to develop a thought process and approach to corporate social responsibility that students will be able to build on during their post-school leadership roles, whether as corporate executives, entrepreneurs, or NGO leaders. Effective: 2016 Spring Quarter.

MGB 255—Entrepreneurship and Venture Investment Clinic (3)
Lecture—3 hours. Class size limited to 30 students. Provides the necessary analytical and design tools to create business ideas and refine business models based on emerging technologies. Students learn to work closely in small teams to synthesize technical, strategic, and marketing needs into designs for new ventures. Effective: 2016 Spring Quarter.

MGB 258—Mergers and Acquisitions (3)
Lecture—3 hours. Prerequisite(s): MGB 205 Course focuses on the market for corporate acquisitions and restructuring activity. Topics include: sources of value creation; takeovers; anti-takeover provisions; bidding strategies; use of leverage in buyouts; regulatory risk and hurdles; and, valuation approaches for highly leveraged transactions. Effective: 2015 Spring Quarter.

MGB 259—Banking and the Financial System (3)
Lecture—3 hours. Prerequisite(s): MGP 205 or MGT 205; Consent of Instructor. Analyzes the role of financial markets and institutions in allocating capital. Focuses on: bank lending; debt securities; financial market innovations; regulation; functions of commercial banks and other financial intermediaries. Utilizes case studies. Effective: 2016 Spring Quarter.

MGB 260—Corporate Finance (3)
Lecture—3 hours. Prerequisite(s): (MGT 200A or MGB 200A or MGP 200A); (MGP 202A or MGB 202A or MGT 202A); (MGT 205 or MGB 205 or MGP 205) Focuses on planning, acquiring, and managing a company's financial resources. Includes discussion of financial aspects of mergers and other forms of reorganization; analysis of investment, financial, and dividend policy; and theories of optimal capital structure. Effective: 2017 Fall Quarter.

MGB 261—Investment Analysis (3)
Lecture—3 hours. Prerequisite(s): (MGT 203A or MGB 203A or MGP 203A); (MGP 205 or MGT 205 or MGB 205) Examines asset pricing theories and relevant evidence, including the investment performance of stocks and bonds. Topics include the efficiency of markets, domestic and international portfolio diversification, factors influencing the value of stocks and other investments, and portfolio management and performance. Effective: 2017 Fall Quarter.

MGB 262—Money and Security Markets (3)
Lecture—3 hours. Examines how money and securities markets are organized; how public agencies, businesses, others obtain and invest funds in those markets. Relationship between interest rates, monetary policy, government's role in improving capital markets, approaches to assessing changes in regulation of specific markets. Effective: 2009 Fall Quarter.

MGB 263—Derivative Securities (3)
Lecture/Discussion—3 hours. Prerequisite(s): (MGT 203A or MGB 203A or MGP 203A); (MGP 205 or MGT 205 or MGB 205) Open to students enrolled in the MBA program. Behavior of options, futures, and other derivative securities markets and how public agencies, business and others use those markets. Trading strategies involving options, swaps, and financial futures contracts. Pricing of derivative securities, primarily by arbitrage methods. Effective: 2017 Fall Quarter.

MGB 264—Business Taxation (3)
Lecture—3 hours. Analysis of the impact of business taxation on investment, production, and finance decisions. Discussion of the relationship between business organization and tax liability. Course is not intended for tax specialists. Effective: 2009 Fall Quarter.

MGB 265—Venture Capital and the Finance of Innovation (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 205 or MGB 205 or MGP 205 Restricted to students in the MBA program. Examines venture capital finance and the related practice of R&D finance. Goal is to apply finance tools and framework to the world of venture capital and financing of projects in high-growth industries. Effective: 2017 Fall Quarter.

MGB 266—International Finance (3)
Lecture—3 hours. Prerequisite(s): MGT 205 or MGB 205 or MGP 205; Or the equivalent. Studies fixed and floating exchange-rate systems. Topics include determinants of a nation's balance of international payments; macroeconomic interdependence of nations under various exchange-rate regimes and its implications for domestic stabilization policies; and the international coordination of monetary and stabilization policies. Effective: 2017 Fall Quarter.

MGB 267—Teams and Technology (3)
Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Restricted to working professional MBA students. Theory and practice of managing teams with primary goals of: providing conceptual guidelines for analyzing and diagnosing group dynamics and determining strategic options as a manager; imparting interpersonal skills for implementing effective strategies; understanding how technological change affects team processes. Effective: 2010 Fall Quarter.

MGB 268—Articulation and Critical Thinking (3)
Lecture/Discussion—3 hours. With commitment to this course, students will become competent public speakers, write well at a level expected in business, think efficiently and critically about business challenges and have a useful personal code of ethics to shape their actions and decisions. No student may repeat course for credit. Effective: 2014 Winter Quarter.

MGB 269—Business Intelligence Technologies-Data Mining (3)
Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Restricted to students in the MBA program. Descriptive and Predictive Data mining methods covering association rules, clustering, classification, text mining, etc. Big data Technologies. Business applications. Hands-on data mining skills. Business intelligence for managerial decision making. Effective: 2016 Spring Quarter.

MGB 270—Corporate Financial Reporting (3)
Lecture—3 hours. Prerequisite(s): MGT 200A or MGP 200A or MGB 200A Analyzes and evaluates contemporary issues in financial reporting and develops implications of those issues for business decision makers, investment managers, and accounting policymakers. Effective: 2017 Fall Quarter.

MGB 271—Strategic Cost Management (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 202A or MGP 202A or MGB 202A Restricted to students in the MBA program. Theoretical frameworks and associated techniques for using organizational design and cost management to achieve a sustainable, profitable cost structure. Topics include: target costing, process design for low cost, total cost of ownership, cost of customers, implementing structural change, and incentives. Effective: 2017 Fall Quarter.

MGB 272—Evaluation of Financial Information (3)
Lecture—3 hours. Prerequisite(s): MGT 200A or MGP 200A or MGB 200A Studies how investors, creditors, others use accounting and other information in making rational investment, lending decisions. Emphasis is placed on the analysis of financial information in a variety of contexts. Where applicable, recent research in finance and economics is discussed. Effective: 2017 Fall Quarter.

MGB 273—Accounting and Reporting for Government Nonprofit Entities (3)
Lecture—3 hours. Concepts, methods, and uses of accounting and financial reporting by governmental and nonprofit entities. Introduction to budgeting and performance evaluation, and accounting for entities such as hospitals, universities, and welfare agencies. Effective: 2009 Fall Quarter.

MGB 274—Corporate Governance (3)
Lecture—3 hours. Prerequisite(s): Full-time MBA students or consent of instructor. Discusses how corporations can better operate in the interests of shareholders and public. Directly relevant to managers, consultants in compensation and incentives, staff working on mergers and acquisitions, corporate regulators, shareholder rights activists, and board members. Effective: 2009 Fall Quarter.

MGB 276—Real Estate, Finance and Development (3)
Lecture—3 hours. Prerequisite(s): (MGT 205 or MGP 205 or MGB 205); (MGT 201A or MGB 201A or MGP 201A) Focus on single family, attached, detached, multi-family, and light commercial development. Students will study factors which make up successful real estate developments. Course will consider financial aspects involved in land acquisition, land development, construction, and project lending. Effective: 2017 Fall Quarter.

MGB 281—Systems Analysis and Design (3)
Lecture—3 hours. Design and specification of computer-based information systems. Applications systems development life cycle, use requirements and feasibility assessment, logical and physical design, program development and testing, conversion and implementation. Effective: 2015 Spring Quarter.

MGB 282—Supply Chain Management (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 203A or MGB 203A or MGP 203A Restricted to students in the MBA program. Matching supply with demand is a primary challenge for a firm: excess supply is too costly, inadequate supply irritates customers. Matching supply to demand is easiest when a firm has a flexible supply process, but flexibility is generally expensive. Effective: 2017 Fall Quarter.

MGB 284—Applied Linear Models for Management (3)
Lecture—3 hours. Covers regression, analysis of variance, and multivariate analysis. Topics will focus on applications to management and policy problems. Effective: 2015 Spring Quarter.

MGB 285—Time Series Analysis and Forecasting (3)
Lecture—3 hours. Prerequisite(s): MGB 203B or MGT 203B or MGP 203B Considers application of time series methods to evaluation and forecasting problems. Covers univariate and multivariate ARIMA models and transfer function models. Applications will be in such areas as economics, finance, budgeting, program evaluation, and industrial process control. Effective: 2016 Spring Quarter.

MGB 286—Telecommunications and Computer Networks (3)
Lecture—3 hours. Prerequisite(s): MGB 280. Communication system components; common carrier services; design and control of communications networks; network management and distributed environment; local area networks; data security in computer networks. Effective: 2015 Spring Quarter.

MGB 287—Business Database and Database Marketing (3)
Lecture—3 hours. Practical introduction to fundamental principles of database management systems and database marketing. Database design. SQL queries. Concepts of database marketing, data warehouse, data visualization and big data analytics. Effective: 2016 Spring Quarter.

MGB 290—Topics in General Management (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Advanced topics in general management. Varied topics to cover more extensively issues discussed in courses 201A and 201B, or current business interest topics in fields of business writing, business communications, development, or workplace processes. May be repeated for credit. Effective: 2009 Spring Quarter.

MGB 291—Topics in Organizational Behavior (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Advanced topics in social psychology and sociology of organizations. Varied topics to cover more extensively issues discussed in courses 201A and 201B, or current business interest topics in fields of organization design, strategy, development, or workplace processes. May be repeated for credit. Effective: 2009 Fall Quarter.

MGB 292—Topics in Finance (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Contemporary and emerging issues in finance. Application of modern techniques of finance to business problems. Use of appropriate electronic database and research techniques. May be repeated for credit. Effective: 2009 Fall Quarter.

MGB 293—Topics in Marketing (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Advanced topics in marketing, which may include marketing research, new product development, brand management, pricing, distribution management, service marketing, hitech marketing, advertising, sales promotions, marketing through the Web. May be repeated for credit. Effective: 2009 Fall Quarter.

MGB 294—Topics in Accounting (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Contemporary and emerging issues in financial management accounting. Application of modern techniques of evaluation and analysis of financial information. Use of appropriate electronic database and research techniques. May be repeated for credit. Effective: 2009 Fall Quarter.

MGB 295—Topics in Information Technology (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Applications of information technology to management and management of information technology. Adaptation to the dynamic nature of the field. May be repeated for credit. Effective: 2009 Fall Quarter.

MGB 296—Topics in Technology Management (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Cyclical nature of innovation and technological change, features of innovative firms and industries, national innovation systems, and impact of information technologies on innovation processes. May be repeated for credit. Effective: 2009 Fall Quarter.

MGB 297—Topics in International Management (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Broader environment in which U.S. firms and their foreign competitors operate. Integration of material from other topics courses (marketing, strategy, finance, accounting, information technology, technology management) into the international setting. May be repeated for credit. Effective: 2010 Fall Quarter.

MGB 298—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 2009 Fall Quarter.

MGB 299—Individual Study (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 2009 Fall Quarter.

MGB 401—Crisis Management (1)
Discussion/Laboratory—1 hour. Establishes and explores the defining characteristics of crises. Will learn to anchor crisis management firmly within overall strategic management and also acquire a set of useful tools and techniques for planning for and handling actual crises. Effective: 2017 Winter Quarter.

MGB 402—Crisis Communications and Reputation Management (1)
Discussion/Laboratory—1 hour. Intended to provide you with an understanding of the framework and tools necessary to successfully address communications and reputation management tasks in a variety of crisis situations. Effective: 2016 Summer Quarter.

MGB 403—Business Statistics Practicum (1)
Project (Term Project)—1 hour. Prerequisite(s): (MGT 203A or MGP 203A or MGB 203A); (MGT 203B (can be concurrent) or MGP 203B (can be concurrent) or MGB 203B (can be concurrent)); MGT 203B, MGP 203B, or MGB 203B completed or required concurrently. Restricted to students in the MBA program. Applies techniques and concepts in business statistics to real case studies. Effective: 2011 Fall Quarter.

MGB 404—Organizational Change Management (1)
Lecture/Discussion—1 hour. Challenges in getting significant changes made in organizations. Learn Organization Change Management (OCM) techniques and discuss case situations where OCM techniques play a role. Effective: 2016 Fall Quarter.

MGB 405—Business Literature (1)
Lecture/Discussion—1 hour. Will examine Business history – historical trends that might influence contemporary business. Some argue that the recent collapse of our financial system might have been averted if business leaders had a better sense of history. Effective: 2017 Winter Quarter.

MGB 406—Ethical Issues in Management (1)
Lecture/Discussion—1 hour. Explores the philosophical foundation of ethical theory and its recent applications to business situations. Professional codes of ethics, such as those promulgated by educational, managerial, engineering, scientific, medical and legal professional societies, are presented. Effective: 2017 Winter Quarter.

MGB 407—Storytelling for Leadership (1)
Lecture/Discussion—1 hour. Internalize the fundamental principles behind stories that educate, influence, motivate, inspire, persuade and connect. Effective: 2016 Fall Quarter.

MGB 408—The Business of the Media (1)
Lecture/Discussion—1 hour. Focuses on the media industries and how emerging digital technologies are disrupting the way media consumption, distribution and business models work. Will highlight the economics of several media, both news and entertainment. Effective: 2016 Summer Quarter.

MGB 409—Managing Multi-Asset Class Investment Portfolios (1)
Lecture/Discussion—1 hour. Prerequisite(s): MGB 202A; MGB 203A; MGB 205 Examines top down management of multi-asset class portfolios. Topics include bonds, hedge funds, private equity, real estate, commodities, endowments, return generation, performance analysis, credit cycles, financial crises, manager selection, investment policy, and investment careers. Student teams present endowment portfolio recommendations. Effective: 2015 Spring Quarter.

MGB 410—Corporate Governance (1)
Lecture/Discussion—1 hour. Covers recent and not-so-recent business and accounting scandals, discuss how corporations can better operate in the interests of shareholders and the public, and learn from people who rely on corporate governance in making investment decisions. Effective: 2017 Winter Quarter.

MGB 411—Turnaround Management (1)
Lecture/Discussion—1 hour. Evaluate the financial performance of a company, identify opportunities for improvement, propose real solutions to enhance performance, and most important inspire action in staff. Effective: 2017 Winter Quarter.

MGB 412—International Marketing (1)
Lecture/Discussion—1 hour. Basic concepts of international marketing. Understanding and managing heterogeneous, dynamic, and interdependent environments across countries. How to develop and implement an international marketing strategy: where and how to compete, how to adapt your marketing mix. Effective: 2016 Fall Quarter.

MGB 413—Sustainable Business Ventures: Business and Energy (1)
Lecture/Discussion—1 hour. Introduction to sustainability goals, indicators, values, measurement techniques, and practice how it applies to large and small enterprise. Effective: 2013 Spring Quarter.

MGB 414—Multi-Channel Marketing (1)
Lecture/Discussion—1 hour. Multi-channel marketing strategies empower managers to create value for different customer segments. Covers the necessary concepts to evaluate and select go-to market strategies in order to capitalize on the ubiquity of modern customers. Effective: 2017 Winter Quarter.

MGB 415—Climate Risks and Opportunities (1)
Lecture/Discussion—1 hour. Provide a working knowledge of the risks and opportunities arising from climate change and climate policy for businesses. Effective: 2016 Summer Quarter.

MGB 416—Topics in Private Equity (1)
Lecture—1 hour. Prerequisite(s): MGB 205 or MGP 205 or MGT 205 Restricted to students in the MBA program. Focuses on the finance principles related to the risk and return of the private equity (PE) industry, valuation of PE target companies, the structuring of leveraged buyouts (LBOs), and the management of portfolio companies. Effective: 2017 Fall Quarter.

MGB 417—Incentives and Controls (1)
Lecture/Discussion—1 hour. Understand how organizations use financial and nonfinancial performance management and incentive systems to motivate people and manage resources. Effective: 2017 Winter Quarter.

MGB 418—Scientific Discovery and Business Innovation at Scale in the Food and Agriculture Sector (1)
Lecture—3 hours. Restricted to students in the MBA program. Scientific discovery and business innovation within the food and agriculture sector profoundly influences the sustainability of society and enterprise competitiveness. Students will learn how business innovation models co-exist antagonistically or synergistically with scientific discovery and its influence on enterprise competitiveness. Effective: 2017 Winter Quarter.

MGB 419—Business Strategy Consulting Skills (1)
Lecture—5 hours. Restricted to students enrolled in the MBA program. Students will learn practical business consulting skills which will help apply strategy theories in the workplace. Students will learn and practice tools to frame and analyze problems, conduct research, communicate findings and navigate client relationships. Effective: 2017 Winter Quarter.

MGB 420—Advanced Optimization in a Python-based Modeling Language (1)
Web Virtual Lecture—1 hour. Prerequisite(s): (MGB 252 or MGT 252 or MGP 252); (MGB 206 or MGT 206 or MGP 206) Restricted to students enrolled in the MBA program. Covers advanced optimization modeling techniques and practical application of modern, scalable modeling language. Techniques will be developed using examples from production planning in a supply chain, but students may explore other areas of application of optimization for their final project. Effective: 2017 Winter Quarter.

MGB 421—Monte Carlo Simulation for Managerial Analysis (1)
Lecture—1 hour. Students create Excel-based simulation models across business domains, from finance to hypothesis testing and inventory management. By course-end, students are experts at recognizing this decision-making fallacy and fixing it. Effective: 2017 Spring Quarter.

MGB 422—Behavioral Finance and Valuation (1)
Lecture—1 hour. Prerequisite(s): (MGT 260 or MGP 260 or MGB 260); (MGT 261 or MGP 261 or MGB 261) Restricted to students enrolled in the MBA program. Investor psychology and market frictions can cause asset prices to deviate from fundamental values, creating profit opportunities for sophisticated investors. The course will cover techniques of financial analysis with the goal of learning how to value assets and identify mispricing. Effective: 2017 Winter Quarter.

MGB 423—Leader as Coach: An Introduction to Coaching Skills for Leaders (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program. Course introduces the fundamental coaching skills and coaching models that leaders can apply in everyday interactions with their team and colleagues in order to build trust, overcome challenges and help others discover their own full potential. Effective: 2017 Winter Quarter.

MGB 424—Practicum for Managing People in Modern Organizations (1)
Project (Term Project)—1 hour. Prerequisite(s): MGB 224 Restricted to students in the MBA program. Provides solid grounding in the management of work and the employment relationship. Examines firms' interrelated policies and practices for managing people. Effective: 2011 Winter Quarter.

MGB 425—Digital Marketing Techniques (1)
Lecture—1 hour. Course provides students with an introduction to digital marketing. The course introduces MBA students to the fundamental aspects and tools of online marketing communication, i.e., how organizations use digital channels to effectively communicate their value propositions to the target customers. Effective: 2017 Winter Quarter.

MGB 426—The Business of Healthcare (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program (Business Administration—Working Professional, Business Administration—Bay Area, Business Administration—Full-Time). Course is intended to provide students with an overall understanding of the unique business aspects of the healthcare industry. Effective: 2017 Winter Quarter.

MGB 427—Implementing International Strategy (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program (Business Administration—Working Professional, Business Administration—Bay Area, Business Administration—Full-Time). Course looks at the pitfalls of implementing international strategies, and suggest several accessible, yet powerful frameworks to help international managers implement strategies successfully and completely. Effective: 2017 Winter Quarter.

MGB 428—Renewable Energy Ventures: Planning, Funding and Regulatory Risk Assessment for Entrepreneurs and Investors (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program. Advanced innovation lab will introduce students to issues addressed by entrepreneurs and investors in renewable ventures. Lectures, simulations, case studies and practical experience of the presenters will be delivered. Effective: 2016 Summer Quarter.

MGB 429—Detection and Prevention of Asset Misappropriation Fraud in the Workplace (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program. Course will discuss the fundamentals of fraud detection and prevention in the workplace. Students will learn the major schemes involving workplace fraud, how management can detect fraud and what policies and procedures can be implemented to prevent fraud. Effective: 2016 Fall Quarter.

MGB 430—Learning From Catastrophes: Lessons for Managers (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program. Catastrophes unfold in surprisingly similar ways. In this course, students will analyze catastrophes to understand these common patterns and investigate how they can be prevented and mitigated. Students will then apply these lessons to management to gain unconventional insights. Effective: 2016 Summer Quarter.

MGB 431—Project Management (1)
Lecture—10 hours. Open to students enrolled in the MBA program. Students learn project management; including project scope, project planning, milestones and project closing. Important themes include leadership, team dynamics, storytelling/creating a narrative, communication, and conflict management. Effective: 2016 Fall Quarter.

MGB 432—Project Management with Applications in Healthcare (1)
Lecture—1 hour. Course will focus on the heart of healthcare administration and how project management can be applied as a key lever to increase efficiency, decrease costs and improve the patient experience. Effective: 2017 Spring Quarter.

MGB 433—Corporate Social Responsibility (1)
Lecture—1 hour. Learn practical information that will help students understand the basics of designing, managing and evaluating an effective CSR program. Expose students to a basic set of CSR issues in the context of cross-purpose business challenges and then focus on the analysis and critical decisions that managers must make to move their business and their social agenda forward. Effective: 2018 Spring Quarter.

MGB 434—Practicum for Pricing (1)
Project (Term Project)—1 hour. Prerequisite(s): MGB 234 Restricted to students in the MBA program. Enhance understanding of the principles and concepts learned in Pricing by (1) teaching the necessary statistical and mathematical skills, and (2) requiring a report for a real Pricing case. Effective: 2011 Winter Quarter.

MGB 440—Integrated Management Project (5)
Project (Term Project)—3 hours. Prerequisite(s): First-year core courses of MBA program. Applies classroom learning to solve complex business challenges for real world clients. Student teams learn practical consulting skills while their clients benefit from the student's experience, insights, and work product. Effective: 2016 Fall Quarter.

MGB 440A—Integrated Management Project (3)
Lecture/Discussion—3 hours. Prerequisite(s): First-year core courses of MBA program. Restricted to full-time MBA students. Applies classroom learning to solve complex business challenges for real world clients. Student teams learn practical consulting skills while their clients benefit from the student's experience, insights, and work product. Effective: 2015 Spring Quarter.

MGB 440B—Integrated Management Project (3)
Project (Term Project)—3 hours. Prerequisite(s): First-year core courses of MBA program. Restricted to full-time MBA students. Applies classroom learning to solve complex business challenges for real world clients. Student teams learn practical consulting skills while their clients benefit from the student's experience, insights, and work product. Effective: 2015 Spring Quarter.

MGB 440C—Integrated Management Project Lead (1)
Project (Term Project)—1 hour. Integrated Management Project Team leader. Effective: 2016 Fall Quarter.

MGB 442—Practicum for Marketing Communication (1)
Project (Term Project)—1 hour. Prerequisite(s): MGB 242 Restricted to students in the MBA program. Provides experience applying concepts learned in Marketing Communications to a realistic advertising or communication problem faced by firms. Effective: 2011 Spring Quarter.

MGB 443—Practicum for Customer Relationship Management (1)
Project (Term Project)—1 hour. Prerequisite(s): MGB 243 Restricted to students in the MBA program. Hands-on training in applying Customer Relationship Management concepts and metrics to secondary data. Enhances ability to interpret results and decide the right type of marketing actions by requiring an executive report at the end of the quarter. Effective: 2010 Fall Quarter.

MGB 448—Practicum for Marketing Strategies (1)
Project (Term Project)—1 hour. Prerequisite(s): MGB 248 Restricted to students in the MBA program. Provides opportunities to apply the concepts covered in the Marketing Strategies class through a group project involving the analysis of strategic marketing decisions based on business-related issues, simulation and modeling. Effective: 2010 Fall Quarter.

MGB 449—Marketing Research Practicum (1)
Project (Term Project)—1 hour. Prerequisite(s): MGB 249 Restricted to students in the MBA program, or in some cases with permission of instructor. Provides opportunities to apply the concepts and methods covered in the Marketing Research class. Hands-on and project-based, work could be either individual or in groups depending on enrollments and/or interests of students. Effective: 2011 Spring Quarter.

MGB 450—Practicum for Technology Strategy and Competition (1)
Project (Term Project)—1 hour. Prerequisite(s): MGB 250 Restricted to students in the MBA program. In-depth practicum project course. Apply theories, concepts, and models, learned in course 250 to a real-world business problem, through data collection, data analysis, simulation, modeling and post-model interpretation. Effective: 2011 Winter Quarter.

MGB 460—Practicum for Corporate Finance and Real Estate (1)
Project (Term Project)—1 hour. Prerequisite(s): MGB 260 Restricted to students in the MBA program. Work in groups to select and value a financial entity. It could be a firm, a sports player, a building, a project, or a patent. Grade based on an in-class presentation and a write-up. Effective: 2011 Spring Quarter.

MGB 461—Practicum for Investment Analysis (1)
Project (Term Project)—1 hour. Prerequisite(s): MGB 261 Restricted to students in the MBA program. Provides practical experience applying concepts learned in Investment Analysis to a realistic portfolio management setting via a hypothetical exercise. Produce a realistic executive summary and presentation of an investment proposal for a hypothetical client. Effective: 2010 Fall Quarter.

MGB 464—Practicum for Taxes and Business Strategy (1)
Project (Term Project)—1 hour. Prerequisite(s): MGB 264 Restricted to students in the MBA program. Practical application project drawing from the tax planning theory contained in course 264. Project consists of a business formation and operation, change in organization (incorporation), and movement into multi-national and multi-jurisdictional tax. Effective: 2010 Fall Quarter.

MGB 465—Practicum for Venture Capital (1)
Project (Term Project)—1 hour. Prerequisite(s): MGB 265 Restricted to students in the MBA program. Provides an opportunity to apply concepts learned in Venture Capital in a realistic setting. Complete project analyzing a potential investment in a hypothetical venture and prepare an deal term sheet/investment agreement. Effective: 2011 Winter Quarter.

MGB 467—Practicum for Teams and Technology (1)
Project (Term Project)—1 hour. Prerequisite(s): MGB 267 Restricted to students in the MBA program. Groups investigate the performance, creativity, conflict, information sharing, and leadership behaviors of a real world team. Provide consulting advice to the team, which not only gives analytic skills, but also builds presentation skills. Effective: 2011 Spring Quarter.

MGB 469—Practicum for Business Intelligence Technologies (1)
Project (Term Project)—1 hour. Prerequisite(s): MGB 269 Restricted to students in the MBA program. Projects applying concepts learned in Business Intelligence Technologies to real business problems. Effective: 2011 Winter Quarter.

MGB 482—Practicum for Supply Chain Management (1)
Project (Term Project)—1 hour. Prerequisite(s): MGT 282 (can be concurrent) or MGP 282 (can be concurrent) or MGB 282 (can be concurrent); Course is a pre-requisite or co-requisite. Restricted to students in the MBA program. Provides experience applying concepts learned in Supply Chain Management to a realistic management setting via a project. Effective: 2011 Spring Quarter.

MGB 490—Directed Group Study Management Practicum (3)
Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Sponsorship of a GSM Academic Senate faculty member; approval of graduate advisor. Provides opportunity for students to gain experience in applying business methodologies previously acquired in other GSM courses. May be repeated for credit. Effective: 2015 Spring Quarter.

MGB 498—Directed Group Study Management Practicum (1-12)
Project (Term Project). Prerequisite(s): Consent of Instructor. Sponsorship of a GSM Academic Senate faculty member, and approval of graduate advisor. Provides the opportunity for students to gain experience in applying business methodologies previously acquired in other GSM courses. May be repeated up to 6 unit(s). (S/U grading only.) Effective: 2011 Summer Quarter.

MGB 499—Directed Individual Study Management Practicum (1-12)
Project (Term Project). Prerequisite(s): Consent of Instructor. Sponsorship of a Graduate School of Management Academic Senate faculty member and approval of graduate advisor. Provides the opportunity for students to gain experience in applying business methodologies previously acquired in other Graduate School of Management courses. May be repeated for credit. (S/U grading only.) Effective: 2011 Summer Quarter.

MGP Management - Working Professional

Students must complete the Management core course requirement before enrolling in any of the following elective courses, or petition with consent of the instructor. The core courses include: 200A, 201A, 201B, 202A, 203A, 204, 205, 252, 268, 440, 440A, 440B, 440C. For a list of elective courses, see https://webapps.gsm.ucdavis.edu/Raps/courses/curriculumOverviewByProgram?program=SMBA.

Courses in MGP:

MGP 200A—Financial Accounting (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management. Introduction to the concepts and objectives underlying the preparation
of financial statements. Topics include understanding the accounting cycle, measurement and valuation problems associated with financial statement components, consideration of the usefulness of financial statements in the analysis of a corporation's operations. Effective: 1994 Fall Quarter.

MGP 200B—Managerial Accounting (3)
Lecture—3 hours. Prerequisite(s): MGT 200A or MGB 200A or MGP 200A Information managers should know to be effective, including: product costing, motivating people, and differential analysis for decision making. Includes team projects and written and oral presentations. Effective: 2017 Fall Quarter.

MGP 201A—The Individual and Group Dynamics (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management. Examines basic psychological and social psychological processes shaping human behavior and applies knowledge of these processes to the following
organizational problems: motivation, job design, commitment, socialization, culture, individual and group decision making, and team building. Effective: 1994 Fall Quarter.

MGP 201B—Organizational Strategy and Structure (3)
Lecture/Discussion—3 hours. Prerequisite(s): Completion of first year courses in Graduate School of Management or equivalent. Open to MBA students only. Strategic management of organizations, including analysis of industries, firm resources and capabilities and corporate strategy. Strategy formulation, implementation and strategic decision-making. Firm and industry life cycles and change. Analysis of organizational design and structure including differentiation and integration. Effective: 2011 Fall Quarter.

MGP 202A—Markets and the Firm (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management. Examines the interaction of consumers, firms and government, and the effect this interaction has on the use of resources and firm profitability. Fundamental economic concepts such as marginal analysis, opportunity cost, pricing, and externalities are introduced and applied. Effective: 1994 Fall Quarter.

MGP 202B—Business, Government, and the International Economy (3)
Lecture—3 hours. Prerequisite(s): MGP 202A or MGT 202A or MGB 202A Examines the influence of government and international factors on business. Topics include distribution of income, business cycles, inflation and interest rates, the federal debt, monetary policy and international trade and finance. Effective: 2017 Fall Quarter.

MGP 203A—Data Analysis for Managers (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management MBA program or consent of instructor. Introduction to statistics and data analysis for managerial decision making. Descriptive statistics, principles of data collection, sampling, quality control, statistical inference. Application of data analytic methods to problems in marketing, finance, accounting, production, operations, and public policy. Effective: 1994 Fall Quarter.

MGP 203B—Forecasting and Managerial Research Methods (3)
Lecture—3 hours. Prerequisite(s): MGP 203A or MGT 203A or MGB 203A Practical statistical methods for managerial decision making covers regression analysis, time series analysis and forecasting, design and analysis of experiments in managerial research and contingency table analysis. Application of these methods to marketing, finance, accounting, production, operations, and public policy. Effective: 2017 Fall Quarter.

MGP 204—Marketing Management (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management. Analysis of market opportunities, elements of market research, development of marketing strategies, market planning and implementations, and control systems. Consumer and industrial markets, market segmentation, pricing strategies, distribution channels, promotion, and sales. Effective: 1997 Fall Quarter.

MGP 205—Financial Theory and Policy (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management. Corporate financial policy and investment management. Covers capital budgeting, optimal financial structure, cost-of-capital determination, risk measurement. Develops basic valuation principles for investments with long-lived and risky cash-flows, and extends these to derivative securities, asset portfolios, investment management and hedging. Effective: 1994 Fall Quarter.

MGP 206—Decision Making and Management Science (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management MBA program or consent of instructor. Develops decision-making and problem-solving skills in conjunction with a quantitative model-building approach. Emphasizes how structured modeling techniques, probability forecasts, simulations, and computer optimization models are used in the overall process of making decisions in an uncertain environment. Effective: 1994 Fall Quarter.

MGP 207—Management Information Systems (3)
Lecture—3 hours. Prerequisite(s): Graduate student or consent of instructor. Introduction to computer programming and data handling skills. Use of computer in organizations, emphasis on managerial aspects of computing. Standard and nonstandard uses of data files, centralization versus decentralization of computing, office automation, computer security. Effective: 1994 Fall Quarter.

MGP 215—Business Law (3)
Lecture—3 hours. Prerequisite(s): Completion of administration core requirements or petition with consent of instructor. Introduction to law and legal process in the United States. Sources of law. Structure and operation of courts, federal-state relationships, fundamentals of administrative law, fundamentals of business law. Effective: 1997 Winter Quarter.

MGP 216—Managing Professionals, Budgets, Controls and Ethics (3)
Lecture—3 hours. Prerequisite(s): Graduate standing. Performance measures, budgetary controls and ethical pressures which occur at middle management levels in service-type operations. Addresses such organizations as engineering, medical groups, law offices, management consultants. Effective: 1997 Winter Quarter.

MGP 220—Management of Social Networks (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGP 201A Open to MBA students only. Principles and applications of social network theory: coordinating divergent interests to create value for individuals and organizations. Emphasis on conceptual models, web-based diagnostic tools, and practical applications. Effective: 2004 Winter Quarter.

MGP 223—Power and Influence in Management (3)
Seminar—3 hours. Prerequisite(s): MGT 201A or MGB 201A or MGP 201A; Consent of Instructor. Investigation of the bases of power in organizations and the tactics used to translate power into influence. Topics include the control of resources (including information), social psychological processes (including commitment), the construction of meaning, and ethics. Effective: 2017 Fall Quarter.

MGP 224—Managing People in High-Performance Organizations (3)
Lecture—3 hours. Prerequisite(s): MGT 201A or MGB 201A or MGP 201A Restricted to students in the MBA program. Strategic approach to the management of people within organization. Analyze employment systems' fit with firms' environments and strategies. Explore consequences of choices firms make in managing people—decisions as to selection, performance evaluation, compensation, and other management policies and practices. Not open to students who have taken MGB 224 or MGT 224. Effective: 2017 Fall Quarter.

MGP 234—Pricing (3)
Lecture/Discussion—3 hours. Prerequisite(s): (MGT 202A or MGB 202A or MGP 202A); (MGP 203B or MGB 203B or MGT 203B); (MGT 204 or MGB 204 or MGP 204) Restricted to students in the MBA Program. Combines lectures, cases and homework to teach students tools and skills necessary to analyze pricing situations, make pricing decisions, and implement them, in a systematic manner. Effective: 2017 Fall Quarter.

MGP 239—Digital Marketing (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGP 204 or MGT 204 or MGB 204 Course equips students for a career in digital marketing and social media. Topics include online advertising, search engine optimization, interactive mktg, online privacy issues, e-commerce, social influence, social network theory, measurement of social influence, integrating social and traditional media. Effective: 2017 Fall Quarter.

MGP 240—Management Policy and Strategy (3)
Lecture—3 hours. Prerequisite(s): First-year core courses of M.B.A. program. Examines the scope of missions, objectives strategies, policies, structures, measurements and incentives which bear on the management of an organization. Real client organizations, in the private and public sectors, are assigned to student teams as the subjects of study. Effective: 1994 Fall Quarter.

MGP 241—New Product Development (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 204 or MGB 204 or MGP 204 Open to students in the MBA Program for Working Professionals. State-of-the-art concepts and methods to enhance the effectiveness of new product development activities. Focuses on the understanding of managerial issues and acquiring the ability to solve problems. Effective: 2017 Fall Quarter.

MGP 242—Marketing Communications (3)
Lecture—3 hours. Issues in designing a marketing communications strategy. Topics include mass and direct communications, institutional aspects of advertising, consumer behavior, evaluating ad effectiveness, determining ad budget, creative strategy, and use and abuse of promotions. Effective: 2000 Fall Quarter.

MGP 243—Customer Relationship Management (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 204 or MGP 204 or MGB 204 Restricted to MBA students only. Customer Relationship Management (CRM) is a management approach under which marketing activities are organized and measured around customers (rather than around brands.) This approach is appealing because customers, not brands, are those who make buying decisions. Effective: 2017 Fall Quarter.

MGP 244—New and Small Business Ventures (3)
Lecture—3 hours. Prerequisite(s): MGT 204 or MGB 204 or MGP 204 Student teams develop complete business plans for their own start-up ventures. Process includes: elevator pitch, business strategy, comprehensive bottoms-up financial projections, capital requirements, product differentiation, competitive, alliance, and go-to-market strategy development, investor presentation, and comprehensive written business plan. Effective: 2017 Fall Quarter.

MGP 245—Business Writing (3)
Lecture/Discussion—3 hours. Prerequisite(s): Completion of first-year core courses at the Graduate School of Management or the equivalent. Restricted to MBA students only. Techniques for sharpening writing skills are introduced, along with grammatical structure, word choice, and punctuation. Learn to develop styles that are pitch-perfect for given situations and to think strategically about each communication challenge in a management setting. Effective: 2011 Fall Quarter.

MGP 246—Negotiation and Team Building (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGP 205; MGP 202. Basic theory of negotiation; applies theory to process of building teams to achieve business purposes. Covers integrative and distributive strategies of claiming value, how to recognize bargaining tricks, uncovering hidden agendas, brainstorming to extend Pareto frontier. Effective: 2011 Fall Quarter.

MGP 247—Customer Service as a Marketing Tool (3)
Lecture—3 hours. Understanding the distinct features of services, how to create value through service, methods of building strong relationships with customers, methods of measuring and building customer satisfaction, and measuring the financial impact of service improvement. Effective: 1998 Spring Quarter.

MGP 248—Marketing Strategies (3)
Lecture—3 hours. Prerequisite(s): (MGT 202A or MGB 202A or MGP 202A); (MGP 204 or MGB 204 or MGT 204) Examines process by which organizations develop strategic marketing plans. Includes definition of activities and products, marketing audits, appraising market opportunities, design of new activities and products, and organizing marketing planning function. Applications to problems in private and public sector marketing. Effective: 2017 Fall Quarter.

MGP 249—Marketing Research (3)
Lecture—3 hours. Prerequisite(s): (MGT 202A or MGB 202A or MGP 202A); (MGP 203A or MGB 203A or MGT 203A); (MGT 204 or MGB 204 or MGP 204) Course addresses the managerial issues and problems of systematically gathering and analyzing information for making private and public marketing decisions. Covers the cost and value of information, research design, information collection, measuring instruments, data analysis, and marketing research applications. Effective: 2017 Fall Quarter.

MGP 250—Technology, Competition and Strategy (3)
Lecture—3 hours. Prerequisite(s): (MGT 202A or MGB 202A or MGP 202A); (MGP 203A or MGB 203A or MGT 203A) Restricted to students in the MBA program. Why is software typically so defective? Why do many firms in the IT industry give away their best products free? This course helps you analyze questions like these by modeling competition and strategy in the network, technology and information industries. Effective: 2017 Fall Quarter.

MGP 251—Management of Innovation (3)
Lecture—3 hours. Prerequisite(s): MGT 201A or MGB 201A or MGP 201A Managing innovative enterprise in changing and uncertain environments. Covers technology forecasting and assessment, program selection and control, financial management, regulation, and ethics. Effective: 2017 Fall Quarter.

MGP 252—Managing for Operational Excellence (3)
Lecture—3 hours. Prerequisite(s): MGP 203A or MGB 203A or MGT 203A Open to students in the Graduate School of Management. Explores the management of operations as applied to manufacturing as well as services provided both inside and outside the organization. Develop an understanding of how uncertainty affects planning and delivery by looking at fundamental models of operations. Effective: 2018 Spring Quarter.

MGP 253—Corporate Social Responsibility (3)
Lecture—3 hours. Goal in this course will be to develop a thought process and approach to corporate social responsibility that students will be able to build on during their post-school leadership roles, whether as corporate executives, entrepreneurs, or NGO leaders. Effective: 2016 Spring Quarter.

MGP 255—Entrepreneurship and Venture Investment Clinic (3)
Lecture—3 hours. Class size limited to 30 students. Provides the necessary analytical and design tools to create business ideas and refine business models based on emerging technologies. Students learn to work closely in small teams to synthesize technical, strategic, and marketing needs into designs for new ventures. Effective: 2016 Spring Quarter.

MGP 258—Mergers and Acquisitions (3)
Lecture—3 hours. Prerequisite(s): MGP 205 or MGT 205 or MGB 205 Course focuses on the market for corporate acquisitions and restructuring activity. Topics include: sources of value creation; takeovers; anti-takeover provisions; bidding strategies; use of leverage in buyouts; regulatory risk and hurdles; and, valuation approaches for highly leveraged transactions. Effective: 2015 Spring Quarter.

MGP 259—Banking and the Financial System (3)
Lecture—3 hours. Prerequisite(s): MGB 205 or MGT 205; Consent of Instructor. Analyzes the role of financial markets and institutions in allocating capital. Focuses on: bank lending; debt securities; financial market innovations; regulation; functions of commercial banks and other financial intermediaries. Utilizes case studies. Effective: 2016 Spring Quarter.

MGP 260—Corporate Finance (3)
Lecture—3 hours. Prerequisite(s): (MGT 200A or MGB 200A or MGP 200A); (MGP 202A or MGB 202A or MGT 202A); (MGT 205 or MGB 205 or MGP 205) Focuses on planning, acquiring, and managing a company's financial resources. Includes discussion of financial aspects of mergers and other forms of reorganization; analysis of investment, financial, and dividend policy; and theories of optimal capital structure. Effective: 2017 Fall Quarter.

MGP 261—Investment Analysis (3)
Lecture—3 hours. Prerequisite(s): (MGT 203A or MGP 203A or MGB 203A); (MGB 205 or MGT 205 or MGP 205) Examines asset pricing theories and relevant evidence, including the investment performance of stocks and bonds. Topics include the efficiency of markets, domestic and international portfolio diversification, factors influencing the value of stocks and other investments, and portfolio management and performance. (P/NP grading only.) Effective: 2017 Fall Quarter.

MGP 262—Money and Security Markets (3)
Lecture—3 hours. Examines how money and securities markets are organized; how public agencies, businesses, others obtain and invest funds in those markets. Relationship between interest rates, monetary policy, government's role in improving capital markets, approaches to assessing changes in regulation of specific markets. Effective: 1994 Fall Quarter.

MGP 263—Derivative Securities (3)
Lecture/Discussion—3 hours. Prerequisite(s): (MGT 205 or MGP 205 or MGB 205); (MGT 203A or MGP 203A or MGB 203A) Open to students enrolled in the MBA program. Behavior of options, futures, and other derivative securities markets and how public agencies, business and others use those markets. Trading strategies involving options, swaps, and financial futures contracts. Pricing of derivative securities, primarily by arbitrage methods. Effective: 2017 Fall Quarter.

MGP 264—Business Taxation (3)
Lecture—3 hours. Analysis of the impact of business taxation on investment, production, and finance decisions. Discussion of the relationship between business organization and tax liability. Course is not intended for tax specialists. Effective: 1994 Fall Quarter.

MGP 265—Venture Capital and the Finance of Innovation (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGB 205 or MGP 205 or MGT 205 Restricted to students in the MBA program. Examines venture capital finance and the related practice of R&D finance. Goal is to apply finance tools and framework to the world of venture capital and financing of projects in high-growth industries. Effective: 2017 Fall Quarter.

MGP 266—International Finance (3)
Lecture—3 hours. Prerequisite(s): MGT 205 or MGB 205 or MGP 205; Or the equivalent. Studies fixed and floating exchange-rate systems. Topics include determinants of a nation's balance of international payments; macroeconomic interdependence of nations under various exchange-rate regimes and its implications for domestic stabilization policies; and the international coordination of monetary and stabilization policies. Effective: 2017 Fall Quarter.

MGP 267—Teams and Technology (3)
Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Restricted to working professional MBA students. Theory and practice of managing teams with primary goals of: providing conceptual guidelines for analyzing and diagnosing group dynamics and determining strategic options as a manager; imparting interpersonal skills for implementing effective strategies; understanding how technological changae affects team processes. Effective: 2009 Spring Quarter.

MGP 268—Articulation and Critical Thinking (3)
Lecture/Discussion—3 hours. With commitment to this course, students will become competent public speakers, write well at a level expected in business, think efficiently and critically about business challenges and have a useful personal code of ethics to shape their actions and decisions. No student may repeat course for credit. Effective: 2013 Fall Quarter.

MGP 269—Business Intelligence Technologies-Data Mining (3)
Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Restricted to students in the MBA program. Descriptive and Predictive Data mining methods covering association rules, clustering, classification, text mining, etc. Big data Technologies. Business applications. Hands-on data mining skills. Business intelligence for managerial decision making. Effective: 2016 Spring Quarter.

MGP 270—Corporate Financial Reporting (3)
Lecture—3 hours. Prerequisite(s): MGT 200A or MGP 200A or MGB 200A Analyzes and evaluates contemporary issues in financial reporting and develops implications of those issues for business decision makers, investment managers, and accounting policymakers. Effective: 2017 Fall Quarter.

MGP 271—Strategic Cost Management (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 202A or MGP 202A or MGB 202A Restricted to students in the MBA program. Theoretical frameworks and associated techniques for using organizational design and cost management to achieve a sustainable, profitable cost structure. Topics include: target costing, process design for low cost, total cost of ownership, cost of customers, implementing structural change, and incentives. Effective: 2017 Fall Quarter.

MGP 272—Evaluation of Financial Information (3)
Lecture—3 hours. Prerequisite(s): MGT 200A or MGB 200A or MGP 200A Studies how investors, creditors, others use accounting and other information in making rational investment, lending decisions. Emphasis is placed on the analysis of financial information in a variety of contexts. Where applicable, recent research in finance and economics is discussed. Effective: 2017 Fall Quarter.

MGP 273—Accounting and Reporting for Government Nonprofit Entities (3)
Lecture—3 hours. Concepts, methods, and uses of accounting and financial reporting by governmental and nonprofit entities. Introduction to budgeting and performance evaluation, and accounting for entities such as hospitals, universities, and welfare agencies. Effective: 1994 Fall Quarter.

MGP 274—Corporate Governance (3)
Lecture—3 hours. Prerequisite(s): Full-time MBA students or consent of instructor. Discusses how corporations can better operate in the interests of shareholders and public. Directly relevant to managers, consultants in compensation and incentives, staff working on mergers and acquisitions, corporate regulators, shareholders rights activists, and board members. Effective: 2009 Winter Quarter.

MGP 276—Real Estate, Finance and Development (3)
Lecture—3 hours. Prerequisite(s): (MGT 205 or MGB 205 or MGP 205); (MGP 201A or MGB 201A or MGT 201A) Focus on single family, attached, detached, multi-family, and light commercial development. Students will study factors which make up successful real estate developments. Course will consider financial aspects involved in land acquisition, land development, construction, and project lending. Effective: 2017 Fall Quarter.

MGP 281—Systems Analysis and Design (3)
Lecture—3 hours. Design and specification of computer-based information systems. Applications systems development life cycle, use requirements and feasibility assessment, logical and physical design, program development and testing, conversion and implementation. Effective: 1994 Fall Quarter.

MGP 282—Supply Chain Management (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 203A or MGB 203A or MGP 203A Restricted to students in the MBA program. Matching supply with demand is a primary challenge for a firm: excess supply is too costly, inadequate supply irritates customers. Matching supply to demand is easiest when a firm has a flexible supply process, but flexibility is generally expensive. Effective: 2017 Fall Quarter.

MGP 284—Applied Linear Models for Management (3)
Lecture—3 hours. Covers regression, analysis of variance, and multivariate analysis. Topics will focus on applications to management and policy problems. Effective: 2015 Spring Quarter.

MGP 285—Time Series Analysis and Forecasting (3)
Lecture—3 hours. Prerequisite(s): MGP 203B or MGT 203B or MGB 203B Considers application of time series methods to evaluation and forecasting problems. Covers univariate and multivariate ARIMA models and transfer function models. Applications will be in such areas as economics, finance, budgeting, program evaluation, and industrial process control. Effective: 2016 Spring Quarter.

MGP 286—Telecommunications and Computer Networks (3)
Lecture—3 hours. Prerequisite(s): MGP 280. Communication system components; common carrier services; design and control of communications networks; network management and distributed environment; local area networks; data security in computer networks. Effective: 1995 Spring Quarter.

MGP 287—Business Database and Database Marketing (3)
Lecture—3 hours. Practical introduction to fundamental principles of database management systems and database marketing. Database design. SQL queries. Concepts of database marketing, data warehouse, data visualization and big data analytics. Effective: 2016 Spring Quarter.

MGP 290—Topics in General Management (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Advanced topics in general management. Varied topics to cover more extensively issues discussed in courses 201A and 201B, or current business interest topics in fields of business writing, business communications, development, or workplace processes. May be repeated for credit. Effective: 2009 Fall Quarter.

MGP 291—Topics in Organizational Behavior (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of
Management or the equivalent. Advanced topics in social psychology and sociology of organizations. Varied topics to cover more extensively issues discussed in courses 201A and 201B, or current business interest topics in fields of organization design, strategy, development, or workplace processes. May be repeated for credit. Effective: 1999 Fall Quarter.

MGP 292—Topics in Finance (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Contemporary and emerging issues in finance. Application of modern techniques of finance to business problems. Use of appropriate electronic database and research techniques. May be repeated for credit. Effective: 1999 Fall Quarter.

MGP 293—Topics in Marketing (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Advanced topics in marketing, which may include marketing research, new product development, brand management, pricing, distribution management, service marketing, hitech marketing, advertising, sales promotions, marketing through the Web. May be repeated for credit. Effective: 1999 Fall Quarter.

MGP 294—Topics in Accounting (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of
Management or the equivalent. Contemporary and emerging issues in financial management accounting. Application of modern techniques of evaluation and analysis of financial information. Use of appropriate electronic database and research techniques. May be repeated for credit. Effective: 1999 Fall Quarter.

MGP 295—Topics in Information Technology (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Applications of information technology to management and management of information technology. Adaptation to the dynamic nature of the field. May be repeated for credit. Effective: 1999 Fall Quarter.

MGP 296—Topics in Technology Management (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Cyclical nature of innovation and technological change, features of innovative firms and industries, national innovation systems, and impact of information technologies on innovation processes. May be repeated for credit. Effective: 1999 Fall Quarter.

MGP 297—Topics in International Management (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Broader environment in which U.S. firms and their foreign competitors operate. Integration of material from other topics courses (marketing, strategy, finance, accounting, information technology, technology management) into the international setting. May be repeated for credit. May be repeated for credit. Effective: 1999 Fall Quarter.

MGP 298—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1994 Fall Quarter.

MGP 299—Individual Study (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 2000 Spring Quarter.

MGP 401—Crisis Management (1)
Discussion/Laboratory—1 hour. Establishes and explores the defining characteristics of crises. Will learn to anchor crisis management firmly within overall strategic management and also acquire a set of useful tools and techniques for planning for and handling actual crises. Effective: 2017 Winter Quarter.

MGP 402—Crisis Communications and Reputation Management (1)
Discussion/Laboratory—1 hour. Intended to provide you with an understanding of the framework and tools necessary to successfully address communications and reputation management tasks in a variety of crisis situations. Effective: 2016 Summer Quarter.

MGP 403—Business Statistics Practicum (1)
Project (Term Project)—1 hour. Prerequisite(s): (MGT 203A or MGP 203A or MGB 203A); (MGT 203B (can be concurrent) or MGP 203B (can be concurrent) or MGB 203B (can be concurrent)); MGT 203B, MGP 203B, or MGB 203B completed or required concurrently. Restricted to students in the MBA program. Applies techniques and concepts in business statistics to real case studies. Effective: 2011 Fall Quarter.

MGP 404—Organizational Change Management (1)
Lecture/Discussion—1 hour. Challenges in getting significant changes made in organizations. Learn Organization Change Management (OCM) techniques and discuss case situations where OCM techniques play a role. Effective: 2016 Fall Quarter.

MGP 405—Business Literature (1)
Lecture/Discussion—1 hour. Will examine Business history – historical trends that might influence contemporary business. Some argue that the recent collapse of our financial system might have been averted if business leaders had a better sense of history. Effective: 2017 Winter Quarter.

MGP 406—Ethical Issues in Management (1)
Lecture/Discussion—1 hour. Explores the philosophical foundation of ethical theory and its recent applications to business situations. Professional codes of ethics, such as those promulgated by educational, managerial, engineering, scientific, medical and legal professional societies, are presented. Effective: 2017 Winter Quarter.

MGP 407—Storytelling for Leadership (1)
Lecture/Discussion—1 hour. Internalize the fundamental principles behind stories that educate, influence, motivate, inspire, persuade and connect. Effective: 2016 Fall Quarter.

MGP 408—The Business of the Media (1)
Lecture/Discussion—1 hour. Focuses on the media industries and how emerging digital technologies are disrupting the way media consumption, distribution and business models work. Will highlight the economics of several media, both news and entertainment. Effective: 2016 Summer Quarter.

MGP 409—Managing Multi-Asset Class Investment Portfolios (1)
Lecture/Discussion—1 hour. Prerequisite(s): MGP 202A; MGP 203A; MGP 205 Examines top down management of multi-asset class portfolios. Topics include bonds, hedge funds, private equity, real estate, commodities, endowments, return generation, performance analysis, credit cycles, financial crises, manager selection, investment policy, and investment careers. Student teams present endowment portfolio recommendations. Effective: 2015 Spring Quarter.

MGP 410—Corporate Governance (1)
Lecture/Discussion—1 hour. Covers recent and not-so-recent business and accounting scandals, discuss how corporations can better operate in the interests of shareholders, and the public and learn from people who rely on corporate governance in making investment decisions. Effective: 2017 Winter Quarter.

MGP 411—Turnaround Management (1)
Lecture/Discussion—1 hour. Evaluate the financial performance of a company, identify opportunities for improvement, propose real solutions to enhance performance, and most important inspire action in staff. Effective: 2017 Winter Quarter.

MGP 412—International Marketing (1)
Lecture/Discussion—1 hour. Basic concepts of international marketing. Understanding and managing heterogeneous, dynamic, and interdependent environments across countries. How to develop and implement an international marketing strategy: where and how to compete, how to adapt to your marketing mix. Effective: 2016 Fall Quarter.

MGP 413—Sustainable Business Ventures: Business and Energy (1)
Lecture/Discussion—1 hour. Introduction to sustainability goals, indicators, values, measurement techniques, and practice how it applies to large and small enterprise. Effective: 2013 Spring Quarter.

MGP 414—Multi-Channel Marketing (1)
Lecture/Discussion—1 hour. Multi-channel marketing strategies empower managers to create value for different customer segments. Covers the necessary concepts to evaluate and select go-to market strategies in order to capitalize on the ubiquity of modern customers. Effective: 2017 Winter Quarter.

MGP 415—Climate Risks and Opportunities (1)
Lecture/Discussion—1 hour. Provide a working knowledge of the risks and opportunities arising from climate change and climate policy for businesses. Effective: 2016 Summer Quarter.

MGP 416—Topics in Private Equity (1)
Lecture—1 hour. Prerequisite(s): MGP 205 or MGT 205 or MGB 205 Restricted to students in the MBA program. Focuses on the finance principles related to the risk and return of the private equity (PE) industry, valuation of PE target companies, the structuring of leveraged buyouts (LBOs), and the management of portfolio companies. Effective: 2017 Fall Quarter.

MGP 417—Incentives and Controls (1)
Lecture/Discussion—1 hour. Understand how organizations use financial and nonfinancial performance management and incentive systems to motivate people and manage resources. Effective: 2017 Winter Quarter.

MGP 418—Scientific Discovery and Business Innovation at Scale in the Food and Agriculture Sector (1)
Lecture—3 hours. Restricted to students in the MBA program. Scientific discovery and business innovation within the food and agriculture sector profoundly influences the sustainability of society and enterprise competitiveness. Students will learn how business innovation models co-exist antagonistically or synergistically with scientific discovery and its influence on enterprise competitiveness. Effective: 2017 Winter Quarter.

MGP 419—Business Strategy Consulting Skills (1)
Lecture—5 hours. Restricted to students enrolled in the MBA program. Students will learn practical business consulting skills which will help apply strategy theories in the workplace. Students will learn and practice tools to frame and analyze problems, conduct research, communicate findings and navigate client relationships. Effective: 2017 Winter Quarter.

MGP 420—Advanced Optimization in a Python-based Modeling Language (1)
Web Virtual Lecture—1 hour. Prerequisite(s): (MGP 252 or MGB 252 or MGT 252); (MGP 206 or MGB 206 or MGT 206) Restricted to students enrolled in the MBA program. Covers advanced optimization modeling techniques and practical application of modern, scalable modeling language. Techniques will be developed using examples from production planning in a supply chain, but students may explore other areas of application of optimization for their final project. Effective: 2017 Winter Quarter.

MGP 421—Monte Carlo Simulation for Managerial Analysis (1)
Lecture—1 hour. Students create Excel-based simulation models across business domains, from finance to hypothesis testing and inventory management. By course-end, students are experts at recognizing this decision-making fallacy and fixing it. Effective: 2017 Spring Quarter.

MGP 422—Behavioral Finance and Valuation (1)
Lecture—1 hour. Prerequisite(s): (MGT 260 or MGP 260 or MGB 260); (MGT 261 or MGP 261 or MGB 261) Restricted to students enrolled in the MBA program. Investor psychology and market frictions can cause asset prices to deviate from fundamental values, creating profit opportunities for sophisticated investors. The course will cover techniques of financial analysis with the goal of learning how to value assets and identify mispricing. Effective: 2017 Winter Quarter.

MGP 423—Leader as Coach: An Introduction to Coaching Skills for Leaders (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program. Course introduces the fundamental coaching skills and coaching models that leaders can apply in everyday interactions with their team and colleagues in order to build trust, overcome challenges and help others discover their own full potential. Effective: 2017 Winter Quarter.

MGP 424—Practicum for Managing People in Modern Organizations (1)
Project (Term Project)—1 hour. Prerequisite(s): MGP 224 Restricted to students in the MBA program. Provides solid grounding in the management of work and the employment relationship. Examines firms' interrelated policies and practices for managing people. Effective: 2011 Winter Quarter.

MGP 425—Digital Marketing Techniques (1)
Lecture—1 hour. Course provides students with an introduction to digital marketing. The course introduces MBA students to the fundamental aspects and tools of online marketing communication, i.e., how organizations use digital channels to effectively communicate their value propositions to the target customers. Effective: 2017 Spring Quarter.

MGP 426—The Business of Healthcare (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program (Business Administration—Working Professional, Business Administration—Bay Area, Business Administration—Full-Time). Course is intended to provide students with an overall understanding of the unique business aspects of the healthcare industry. Effective: 2017 Winter Quarter.

MGP 427—Implementing International Strategy (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program (Business Administration—Working Professional, Business Administration—Bay Area, Business Administration—Full-Time). Course looks at the pitfalls of implementing international strategies, and suggest several accessible, yet powerful frameworks to help international managers implement strategies successfully and completely. Effective: 2017 Winter Quarter.

MGP 428—Renewable Energy Ventures: Planning, Funding and Regulatory Risk Assessment for Entrepreneurs and Investors (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program. Advanced innovation lab will introduce students to issues addressed by entrepreneurs and investors in renewable ventures. Lectures, simulations, case studies and practical experience of the presenters will be delivered. Effective: 2016 Summer Quarter.

MGP 429—Detection and Prevention of Asset Misappropriation Fraud in the Workplace (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program. Course will discuss the fundamentals of fraud detection and prevention in the workplace. Students will learn the major schemes involving workplace fraud, how management can detect fraud and what policies and procedures can be implemented to prevent fraud. Effective: 2016 Fall Quarter.

MGP 430—Learning From Catastrophes: Lessons for Managers (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program. Catastrophes unfold in surprisingly similar ways. In this course, students will analyze catastrophes to understand these common patterns and investigate how they can be prevented and mitigated. Students will then apply these lessons to management to gain unconventional insights. Effective: 2016 Summer Quarter.

MGP 431—Project Management (1)
Lecture—10 hours. Open to students enrolled in the MBA program. Students learn project management; including project scope, project planning, milestones and project closing. Important themes include leadership, team dynamics, storytelling/creating a narrative, communication, and conflict management. Effective: 2016 Fall Quarter.

MGP 432—Project Management with Applications in Healthcare (1)
Lecture—1 hour. Course will focus on the heart of healthcare administration and how project management can be applied as a key lever to increase efficiency, decrease costs and improve the patient experience. Effective: 2017 Spring Quarter.

MGP 433—Corporate Social Responsibility (1)
Lecture—1 hour. Learn practical information that will help students understand the basics of designing, managing and evaluating an effective CSR program. Expose students to a basic set of CSR issues in the context of cross-purpose business challenges and then focus on the analysis and critical decisions that managers must make to move their business and their social agenda forward. Effective: 2018 Spring Quarter.

MGP 434—Practicum for Pricing (1)
Project (Term Project)—1 hour. Prerequisite(s): MGP 234 Restricted to students in the MBA program. Enhance understanding of the principles and concepts learned in Pricing by (1) teaching the necessary statistical and mathematical skills, and (2) requiring a report for a real Pricing case. Effective: 2011 Winter Quarter.

MGP 440—Integrated Management Project (5)
Project (Term Project)—3 hours. Prerequisite(s): First-year core courses of MBA program. Applies classroom learning to solve complex business challenges for real world clients. Student teams learn practical consulting skills while their clients benefit from the student's experience, insights, and work product. Effective: 2016 Fall Quarter.

MGP 440A—Integrated Management Project (3)
Lecture/Discussion—3 hours. Prerequisite(s): First-year core courses of MBA program. Restricted to full-time MBA students. Applies classroom learning to solve complex business challenges for real world clients. Student teams learn practical consulting skills while their clients benefit from the student's experience, insights, and work product. Effective: 2015 Spring Quarter.

MGP 440B—Integrated Management Project (3)
Project (Term Project)—3 hours. Prerequisite(s): First-year core courses of MBA program. Restricted to full-time MBA students. Applies classroom learning to solve complex business challenges for real world clients. Student teams learn practical consulting skills while their clients benefit from the student's experience, insights, and work product. Effective: 2015 Spring Quarter.

MGP 440C—Integrated Management Project Lead (1)
Project (Term Project)—1 hour. Integrated Management Project Team leader. Effective: 2016 Fall Quarter.

MGP 442—Practicum for Marketing Communication (1)
Project (Term Project)—1 hour. Prerequisite(s): MGP 242 Restricted to students in the MBA program. Provides experience applying concepts learned in Marketing Communications to a realistic advertising or communication problem faced by firms. Effective: 2011 Spring Quarter.

MGP 443—Practicum for Customer Relationship Management (1)
Project (Term Project)—1 hour. Prerequisite(s): MGP 243 Restricted to students in the MBA program. Hands-on training in applying Customer Relationship Management concepts and metrics to secondary data. Enhances ability to interpret results and decide the right type of marketing actions by requiring an executive report at the end of the quarter. Effective: 2010 Fall Quarter.

MGP 448—Practicum for Marketing Strategies (1)
Project (Term Project)—1 hour. Prerequisite(s): MGP 248 Restricted to students in the MBA program. Provides opportunities to apply the concepts covered in the Marketing Strategies class through a group project involving the analysis of strategic marketing decisions based on business-related issues, simulation and modeling. Effective: 2010 Fall Quarter.

MGP 449—Marketing Research Practicum (1)
Project (Term Project)—1 hour. Prerequisite(s): MGP 249 Restricted to students in the MBA program, or in some cases with permission of instructor. Provides opportunities to apply the concepts and methods covered in the Marketing Research class. Hands-on and project-based, work could be either individual or in groups depending on enrollments and/or interests of students. Effective: 2011 Spring Quarter.

MGP 450—Practicum for Technology Strategy and Competition (1)
Project (Term Project)—1 hour. Prerequisite(s): MGP 250 Restricted to students in the MBA program. In-depth practicum project course. Apply theories, concepts, and models, learned in course 250 to a real-world business problem, through data collection, data analysis, simulation, modeling and post-model interpretation. Effective: 2011 Winter Quarter.

MGP 460—Practicum for Corporate Finance and Real Estate (1)
Project (Term Project)—1 hour. Prerequisite(s): MGP 260 Restricted to students in the MBA Program. Work in groups to select and value a financial entity. It could be a firm, a sports player, a building, a project, or a patent. Grade based on an in-class presentation and a write-up. Effective: 2011 Spring Quarter.

MGP 461—Practicum for Investment Analysis (1)
Project (Term Project)—1 hour. Prerequisite(s): MGP 261 Restricted to students in the MBA program. Provides practical experience applying concepts learned in Investment Analysis to a realistic portfolio management setting via a hypothetical exercise. Produce a realistic executive summary and presentation of an investment proposal for a hypothetical client. Effective: 2010 Fall Quarter.

MGP 464—Practicum for Taxes and Business Strategy (1)
Project (Term Project)—1 hour. Prerequisite(s): MGP 264 Restricted to students in the MBA program. Practical application project drawing from the tax planning theory contained in course 264. Project consists of a business formation and operation, change in organization (incorporation), and movement into multi-national and multi-jurisdictional tax. Effective: 2010 Fall Quarter.

MGP 465—Practicum for Venture Capital (1)
Project (Term Project)—1 hour. Prerequisite(s): MGP 265 Restricted to students in the MBA program. Provides an opportunity to apply concepts learned in Venture Capital in a realistic setting. Complete project analyzing a potential investment in a hypothetical venture and prepare an deal term sheet/investment agreement. Effective: 2011 Winter Quarter.

MGP 467—Practicum for Teams and Technology (1)
Project (Term Project)—1 hour. Prerequisite(s): MGP 267 Restricted to students in the MBA program. Groups investigate the performance, creativity, conflict, information sharing, and leadership behaviors of a real world team. Provide consulting advice to the team, which not only gives analytic skills, but also builds presentation skills. Effective: 2011 Spring Quarter.

MGP 469—Practicum for Business Intelligence Technologies (1)
Project (Term Project)—1 hour. Prerequisite(s): MGP 269 Restricted to students in the MBA program. Projects applying concepts learned in Business Intelligence Technologies to real business problems. Effective: 2011 Winter Quarter.

MGP 482—Practicum for Supply Chain Management (1)
Project (Term Project)—1 hour. Prerequisite(s): MGT 282 (can be concurrent) or MGP 282 (can be concurrent) or MGB 282 (can be concurrent); Course is a pre-requisite or co-requisite. Restricted to students in the MBA program. Provides experience applying concepts learned in Supply Chain Management to a realistic management setting via a project. Effective: 2011 Spring Quarter.

MGP 490—Directed Group Study Management Practicum (3)
Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Sponsorship of a GSM Academic Senate faculty member; approval of graduate advisor. Provides opportunity for students to gain experience in applying business methodologies previously acquired in other GSM courses. May be repeated for credit. Effective: 2012 Summer Quarter.

MGP 498—Directed Group Study Management Practicum (1-12)
Project (Term Project). Prerequisite(s): Consent of Instructor. Sponsorship of a GSM Academic Senate faculty member; approval of graduate advisor. Provides the opportunity for students to gain experience in applying business methodologies previously acquired in other GSM courses. May be repeated up to 6 unit(s). (S/U grading only.) Effective: 2011 Summer Quarter.

MGP 499—Directed Individual Study Management Practicum (1-12)
Project (Term Project). Prerequisite(s): Consent of Instructor. Sponsorship of a Graduate School of Management Academic Senate faculty member; approval of graduate advisor. Provides the opportunity for students to gain experience in applying business methodologies previously acquired in other Graduate School of Management courses. May be repeated for credit. (S/U grading only.) Effective: 2011 Summer Quarter.

MGT Management

Students must complete the Management core course requirement before enrolling in any of the following elective courses, or petition with consent of the instructor. The core courses include: 200A, 201A, 201B, 202A, 203A, 204, 205, 252, 268, 440, 440A, 440B, 440C. For a list of elective courses, see https://webapps.gsm.ucdavis.edu/Raps/courses/curriculumOverviewByProgram?program=SMBA.

Courses in MGT:

MGT 011A—Elementary Accounting (4)
Discussion—1 hour; Lecture—3 hours. Basic concepts of accounting; interpreting and using financial statements; understanding accounting principles. GE credit: SS. Effective: 2017 Summer Session 1.

MGT 011B—Elementary Accounting (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MGT 011A Theory of product costing; Analyzing the role and impact of accounting information on decision making; planning and performance evaluation. GE credit: SS. Effective: 2017 Spring Quarter.

MGT 012Y—Navigating Life's Financial Decisions (3)
Lecture—2 hours; Web Virtual Lecture—1 hour. Survey of major life financial decisions (e.g., career choice, consumption v. saving, investments, mortgages, insurance) and how decision-making biases (e.g., overconfidence, present bias, limited attention) can lead to suboptimal choice. The course draws on research from economics, psychology, and sociology. GE credit: QL, SS. Effective: 2016 Winter Quarter.

MGT 098—Directed Group Study (1-5)
Seminar—3-15 hours. Open to all undergraduates, but is primarily intended for lower division students. May be repeated for credit. (P/NP grading only.) Effective: 2016 Fall Quarter.

MGT 100—Introduction to Financial Accounting (3)
Lecture—3 hours. Prerequisite(s): MGT 011A Course is open to all upper division undergraduate and graduate students, except those in the Graduate School of Management. Introduction to the concepts, methods, and uses of accounting and financial reporting. Effective: 2016 Summer Session 1.

MGT 101—Sources and Uses of Accounting Information (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MGT 011A; MGT 011B Develops an understanding of the supply and demand of accounting information. Topics include the generation and processing of accounting information, the examination of accounting information by auditors, and the use of accounting information by capital markets and tax authorities. Effective: 2017 Fall Quarter.

MGT 103—Intermediate Financial Accounting I (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MGT 011A; MGT 011B Course begins to develop expertise in the accounting for assets and introduces students to the analysis of financial statements. Effective: 2017 Fall Quarter.

MGT 105—Intermediate Financial Accounting II (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MGT 103 Course continues to develop expertise in the preparation of financial statements by studying the accounting for liabilities and stockholders' equity. Course also examines the accounting for contracts that can have significant effects on firms' financial statements. Effective: 2017 Fall Quarter.

MGT 107—Intermediate Financial Accounting III (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MGT 105 Course finishes the Intermediate Financial Accounting series by examining in depth the accounting for contracts related to pensions and leases. Course teaches the preparation of the statement of cash flows and footnote disclosures. Effective: 2017 Spring Quarter.

MGT 120—Managing and Using Information Technology (4)
Discussion—1 hour; Lecture—3 hours. Develop an analytical framework to manage and monitor business systems concerned with operational, human, and organizational interactions. Introduction to computer hardware, systems software, and information systems. Management of information technology and the impact of information systems on modern management. GE credit: SS. Effective: 2016 Summer Session 1.

MGT 140—Marketing for the Technology-Based Enterprise (4)
Discussion—1 hour; Lecture—3 hours. Quantitative analysis of needs in a product (technology-based) economy, with emphasis on how scientists, engineers, and business people interact to develop and market products and services. GE credit: SS. Effective: 2017 Winter Quarter.

MGT 150—Technology Management (4)
Discussion—1 hour; Lecture—3 hours. Management of firms in high technology industries such as software development and biotechnology research. Motivating and managing workers, organizing for innovation, and making decisions. GE credit: SS. Effective: 2016 Fall Quarter.

MGT 160—Financing New Business Ventures (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MGT 011A; (MAT 016B or MAT 017B or MAT 021B); STA 013 Concepts/methods used to structure and finance new business ventures. Topics include evaluating the net social (financial) benefit of new investment projects; raising venture capital; the role of the venture capitalist; and the choice of organizational structure in new ventures. GE credit: SS. Effective: 2016 Fall Quarter.

MGT 170—Managing Costs and Quality (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MGT 011B; or Consent of Instructor. Designing cost systems in high technology organizations and managing operations to maximize quality and minimize costs. Topics include activity based costing and management, managing quality and time to create value, ethical issues in cost assignment, and differential costing for decision. GE credit: SS. Effective: 2017 Fall Quarter.

MGT 170—Managing Costs and Quality (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MGT 011B; MGT 011A; or Consent of Instructor. Designing cost systems in high technology organizations and managing operations to maximize quality and minimize costs. Topics include activity based costing and management, managing quality and time to create value, ethical issues in cost assignment, and differential costing for decision. GE credit: SS. Effective: 2018 Summer Session 1.

MGT 180—Supply Chain Planning and Management (4)
Discussion—1 hour; Lecture—3 hours. Course develops key concepts and relationships between supply chain design and business models and strategies. Much of the focus is on quantitative techniques for analysis and management of the production and delivery of goods and services by an organization. GE credit: SS. Effective: 2017 Winter Quarter.

MGT 190—Special Topics in Accounting (4)
Seminar—4 hours. Prerequisite(s): MGT 011A; MGT 011B; MGT 101 Seminar in the theory and practice of advanced or emerging areas related to the practice of professional accountancy. Specific topics will vary according to the interests of the instructor or students. Effective: 2017 Spring Quarter.

MGT 200A—Financial Accounting (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management. Introduction to the concepts and objectives underlying the preparation
of financial statements. Topics include understanding the accounting cycle, measurement and valuation problems associated with financial statement components,consideration of the usefulness of financial statements in the analysis of a corporation's operations. Effective: 1997 Fall Quarter.

MGT 200B—Managerial Accounting (3)
Lecture—3 hours. Prerequisite(s): MGT 200A or MGB 200A or MGP 200A Information managers should know to be effective, including: product costing, motivating people, and differential analysis for decision making. Includes team projects and written and oral presentations. Effective: 2017 Fall Quarter.

MGT 201A—The Individual and Group Dynamics (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management. Examines basic psychological and social psychological processes shaping human behavior and applies knowledge of these processes to the following
organizational problems: motivation, job design, commitment, socialization, culture, individual and group decision making, and team building. Effective: 1997 Fall Quarter.

MGT 201B—Organizational Strategy and Structure (3)
Lecture/Discussion—3 hours. Prerequisite(s): Completion of first year courses in Graduate School of Management or the equivalent. Open to MBA students only. Strategic management of organizations, including analysis of industries, firm resources and capabilities and corporate strategy. Strategy formulation, implementation and strategic decision-making. Firm and industry life cycles and change. Analysis of organizational design and structure including differentiation and integration. Effective: 2010 Fall Quarter.

MGT 202A—Markets and the Firm (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management. Examines the interaction of consumers, firms and government, and the effect this interaction has on the use of resources and firm profitability. Fundamental economic concepts such as marginal analysis, opportunity cost, pricing, and externalities are introduced and applied. Effective: 1997 Fall Quarter.

MGT 202B—Business, Government, and the International Economy (3)
Lecture—3 hours. Prerequisite(s): MGT 202A or MGB 202A or MGP 202A Examines the influence of government and international factors on business. Topics include distribution of income, business cycles, inflation and interest rates, the federal debt, monetary policy and international trade and finance. Effective: 2017 Fall Quarter.

MGT 203A—Data Analysis for Managers (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management MBA program or consent of instructor. Introduction to statistics and data analysis for managerial decision making. Descriptive statistics, principles of data collection, sampling, quality control, statistical inference. Application of data analytic methods to problems in marketing, finance, accounting, production, operations, and public policy. Effective: 1997 Winter Quarter.

MGT 203B—Forecasting and Managerial Research Methods (3)
Lecture—3 hours. Prerequisite(s): MGT 203A or MGB 203A or MGP 203A Practical statistical methods for managerial decision making covers regression analysis, time series analysis and forecasting, design and analysis of experiments in managerial research and contingency table analysis. Application of these methods to marketing, finance, accounting, production, operations, and public policy. Effective: 2017 Fall Quarter.

MGT 204—Marketing Management (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management. Analysis of market opportunities, elements of market research, development of marketing strategies, market planning and implementations, and control systems. Consumer and industrial markets, market segmentation, pricing strategies, distribution channels, promotion, and sales. Effective: 1997 Fall Quarter.

MGT 205—Financial Theory and Policy (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management. Corporate financial policy and investment management. Covers capital budgeting, optimal financial structure, cost-of-capital determination, risk measurement. Develops basic valuation principles for investments
with long-lived and risky cash-flows, and extends these to derivative securities, asset portfolios, investment management and hedging. Effective: 2009 Fall Quarter.

MGT 206—Decision Making and Management Science (3)
Lecture—3 hours. Prerequisite(s): Graduate student in the Graduate School of Management MBA program or consent of instructor. Develops decision-making and problem-solving skills in conjunction with a quantitative model-building approach. Emphasizes how structured modeling techniques, probability forecasts, simulations, and computer optimization models are used in the overall process of making decisions in an uncertain environment. Effective: 1997 Winter Quarter.

MGT 207—Management Information Systems (3)
Lecture—3 hours. Prerequisite(s): Graduate student or consent of instructor. Introduction to computer programming and data handling skills. Use of computer in organizations, emphasis on managerial aspects of computing. Standard and nonstandard uses of data files, centralization versus decentralization of computing, office automation, computer security. Effective: 1997 Winter Quarter.

MGT 215—Business Law (3)
Lecture—3 hours. Prerequisite(s): Completion of administration core requirements or petition with consent of instructor. Introduction to law and legal process in the United States. Sources of law. Structure and operation of courts, federal-state relationships, fundamentals of administrative law, fundamentals of business law. Effective: 1997 Winter Quarter.

MGT 216—Managing Professionals, Budgets, Controls and Ethics (3)
Lecture—3 hours. Prerequisite(s): Graduate standing. Performance measures, budgetary controls and ethical pressures which occur at middle management levels in service-type operations. Addresses such organizations as engineering, medical groups, law offices, management consultants. Effective: 1997 Winter Quarter.

MGT 220—Management of Social Networks (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 201A Open to MBA students only. Principles and applications of social network theory: coordinating divergent interests to create value for individuals and organizations. Emphasis on conceptual models, web-based diagnostic tools, and practical applications. Effective: 2004 Winter Quarter.

MGT 223—Power and Influence in Management (3)
Seminar—3 hours. Prerequisite(s): MGT 201A or MGB 201A or MGP 201A; Consent of Instructor. Investigation of the bases of power in organizations and the tactics used to translate power into influence. Topics include the control of resources (including information), social psychological processes (including commitment), the construction of meaning, and ethics. Effective: 2017 Fall Quarter.

MGT 224—Managing People in High-Performance Organizations (3)
Lecture—3 hours. Prerequisite(s): MGT 201A or MGB 201A or MGP 201A Restricted to students in the MBA program. Strategic approach to the management of people within organization. Analyze employment systems' fit with firms' environments and strategies. Explore consequences of choices firms make in managing people—decisions as to selection, performance evaluation, compensation, and other management policies and practices. Not open to students who have taken MGB 224 or MGP 224. Effective: 2017 Fall Quarter.

MGT 234—Pricing (3)
Lecture/Discussion—3 hours. Prerequisite(s): (MGT 202A or MGB 202A or MGP 202A); (MGT 203B or MGB 203B or MGP 203B); (MGB 204 or MGP 204 or MGT 204) Restricted to students in the MBA program. Combines lectures, cases and homework to teach students tools and skills necessary to analyze pricing situations, make pricing decisions, and implement them, in a systematic manner. Effective: 2017 Fall Quarter.

MGT 239—Digital Marketing (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 204 or MGB 204 or MGP 204 Course equips students for a career in digital marketing and social media. Topics include online advertising, search engine optimization, interactive mktg, online privacy issues, e-commerce, social influence, social network theory, measurement of social influence and integrating social and traditional media. Effective: 2017 Fall Quarter.

MGT 240—Management Policy and Strategy (3)
Lecture—3 hours. Prerequisite(s): First-year core courses of M.B.A. program. Examines the scope of missions, objectives strategies, policies, structures, measurements and incentives which bear on the management of an organization. Real client organizations, in the private and public sectors, are assigned to student teams as the subjects of study. Effective: 1997 Winter Quarter.

MGT 240A—Intergrated Management Project (3)
Lecture/Discussion—3 hours. Prerequisite(s): First-year core courses of MBA program. Restricted to full-time MBA students. Applies classroom learning to solve complex business challenges for real world clients. Student teams learn practical consulting skills while their clients benefit from the student's experience, insights, and work product. Effective: 2013 Spring Quarter.

MGT 241—New Product Development (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 204 or MGB 204 or MGP 204 Open to graduate students in the Graduate School of Management. State-of-the-art concepts and methods to enhance the effectiveness of new product development activities. Focuses on the understanding of managerial issues and acquiring the ability to solve problems. Effective: 2017 Fall Quarter.

MGT 242—Marketing Communications (3)
Lecture—3 hours. Issues in designing a marketing communications strategy. Topics include mass and direct communications, institutional aspects of advertising, consumer behavior, evaluating ad effectiveness, determining ad budget, creative strategy, and use and abuse of promotions. Effective: 2000 Fall Quarter.

MGT 243—Customer Relationship Management (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 204 or MGB 204 or MGP 204 Restricted to MBA students only. Customer Relationship Management (CRM) is a management approach under which marketing activities are organized and measured around customers (rather than around brands.) This approach is appealing because customers, not brands, are those who make buying decisions. Effective: 2017 Fall Quarter.

MGT 244—New and Small Business Ventures (3)
Lecture—3 hours. Prerequisite(s): MGT 204 or MGB 204 or MGP 204 Student teams develop complete business plans for their own start-up ventures. Process includes: elevator pitch, business strategy, comprehensive bottoms-up financial projections, capital requirements, product differentiation, competitive, alliance, and go-to-market strategy development, investor presentation, and comprehensive written business plan. Effective: 2017 Fall Quarter.

MGT 245—Business Writing (3)
Lecture/Discussion—3 hours. Prerequisite(s): Completion of first-year core courses at the Graduate School of Management or the equivalent. Restricted to MBA students only. Techniques for sharpening writing skills are introduced, along with grammatical structure, word choice, and punctuation. Learn to develop styles that are pitch-perfect for given situations and to think strategically about each communication challenge in a management setting. Effective: 2011 Fall Quarter.

MGT 246—Negotiation and Team Building (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 205; MGT 202. Basic theory of negotiation; applies theory to process of building teams to achieve business purposes. Covers integrative and distributive strategies of claiming value, how to recognize bargaining tricks, uncovering hidden agendas, brainstorming to extend Pareto frontier. Effective: 2011 Fall Quarter.

MGT 247—Customer Service as a Marketing Tool (3)
Lecture—3 hours. Understanding the distinct features of services, how to create value through service, methods of building strong relationships with customers, methods of measuring and building customer satisfaction, and measuring the financial impact of service improvement. Effective: 1998 Spring Quarter.

MGT 248—Marketing Strategies (3)
Lecture—3 hours. Prerequisite(s): (MGT 202A or MGB 202A or MGP 202A); (MGP 204 or MGB 204 or MGT 204) Examines process by which organizations develop strategic marketing plans. Includes definition of activities and products, marketing audits, appraising market opportunities, design of new activities and products, and organizing marketing planning function. Applications to problems in private and public sector marketing. Effective: 2017 Fall Quarter.

MGT 249—Marketing Research (3)
Lecture—3 hours. Prerequisite(s): (MGT 202A or MGB 202A or MGP 202A); (MGP 203A or MGB 203A or MGT 203A); (MGT 204 or MGB 204 or MGP 204) Course addresses the managerial issues and problems of systematically gathering and analyzing information for making private and public marketing decisions. Covers the cost and value of information, research design, information collection, measuring instruments, data analysis, and marketing research applications. Effective: 2017 Fall Quarter.

MGT 250—Technology, Competition and Strategy (3)
Lecture—3 hours. Prerequisite(s): (MGT 202A or MGB 202A or MGP 202A); (MGP 203A or MGT 203A or MGB 203A) Restricted to students in the MBA program. Why is software typically so defective? Why do many firms in the IT industry give away their best products free? This course helps you analyze questions like these by modeling competition and strategy in the network, technology and information industries. Effective: 2017 Fall Quarter.

MGT 251—Management of Innovation (3)
Lecture—3 hours. Prerequisite(s): MGT 201A or MGB 201A or MGP 201A Managing innovative enterprise in changing and uncertain environments. Covers technology forecasting and assessment, program selection and control, financial management, regulation, and ethics. Effective: 2017 Fall Quarter.

MGT 252—Managing for Operational Excellence (3)
Lecture—3 hours. Prerequisite(s): MGT 203A or MGB 203A or MGP 203A Open to students in the Graduate School of Management. Explores the management of operations as applied to manufacturing as well as services provided both inside and outside the organization. Develop an understanding of how uncertainty affects planning and delivery by looking at fundamental models of operations. Effective: 2018 Spring Quarter.

MGT 253—Corporate Social Responsibility (3)
Lecture—3 hours. Goal in this course will be to develop a thought process and approach to corporate social responsibility that students will be able to build on during their post-school leadership roles, whether as corporate executives, entrepreneurs, or NGO leaders. Effective: 2016 Spring Quarter.

MGT 255—Entrepreneurship and Venture Investment Clinic (3)
Lecture—3 hours. Class size limited to 30 students. Provides the necessary analytical and design tools to create business ideas and refine business models based on emerging technologies. Students learn to work closely in small teams to synthesize technical, strategic, and marketing needs into designs for new ventures. Effective: 2016 Spring Quarter.

MGT 258—Mergers and Acquisitions (3)
Lecture—3 hours. Prerequisite(s): MGT 205 Course focuses on the market for corporate acquisitions and restructuring activity. Topics include: sources of value creation; takeovers; anti-takeover provisions; bidding strategies; use of leverage in buyouts; regulatory risk and hurdles; and, valuation approaches for highly leveraged transactions. Effective: 2015 Spring Quarter.

MGT 259—Banking and the Financial System (3)
Lecture—3 hours. Prerequisite(s): MGB 205 or MGP 205; Consent of Instructor. Analyzes the role of financial markets and institutions in allocating capital. Focuses on: bank lending; debt securities; financial market innovations; regulation; functions of commercial banks and other financial intermediaries. Utilizes case studies. Effective: 2016 Spring Quarter.

MGT 260—Corporate Finance (3)
Lecture—3 hours. Prerequisite(s): (MGT 200A or MGB 200A or MGP 200A); (MGP 202A or MGB 202A or MGT 202A); (MGT 205 or MGP 205 or MGB 205) Focuses on planning, acquiring, and managing a company's financial resources. Includes discussion of financial aspects of mergers and other forms of reorganization; analysis of investment, financial, and dividend policy; and theories of optimal capital structure. Effective: 2017 Fall Quarter.

MGT 261—Investment Analysis (3)
Lecture—3 hours. Prerequisite(s): (MGT 203A or MGB 203A or MGP 203A); (MGP 205 or MGT 205 or MGB 205) Examines asset pricing theories and relevant evidence, including the investment performance of stocks and bonds. Topics include the efficiency of markets, domestic and international portfolio diversification, factors influencing the value of stocks and other investments, and portfolio management and performance. Effective: 2017 Fall Quarter.

MGT 262—Money and Security Markets (3)
Lecture—3 hours. Examines how money and securities markets are organized; how public agencies, businesses, others obtain and invest funds in those markets. Relationship between interest rates, monetary policy, government's role in improving capital markets, approaches to assessing changes in regulation of specific markets. Effective: 1997 Fall Quarter.

MGT 263—Derivative Securities (3)
Lecture/Discussion—3 hours. Prerequisite(s): (MGT 203A or MGB 203A or MGP 203A); (MGP 205 or MGT 205 or MGB 205) Open to students enrolled in the MBA program. Behavior of options, futures, and other derivative securities markets and how public agencies, business and others use those markets. Trading strategies involving options, swaps, and financial futures contracts. Pricing of derivative securities, primarily by arbitrage methods. Effective: 2017 Fall Quarter.

MGT 264—Business Taxation (3)
Lecture—3 hours. Analysis of the impact of business taxation on investment, production, and finance decisions. Discussion of the relationship between business organization and tax liability. Course is not intended for tax specialists. Effective: 1997 Winter Quarter.

MGT 265—Venture Capital and the Finance of Innovation (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 205 or MGP 205 or MGB 205 Restricted to students in the MBA program. Examines venture capital finance and the related practice of R&D finance. Goal is to apply finance tools and framework to the world of venture capital and financing of projects in high-growth industries. Effective: 2017 Fall Quarter.

MGT 266—International Finance (3)
Lecture—3 hours. Prerequisite(s): MGB 205 or MGT 205 or MGP 205; Or the equivalent. Studies fixed and floating exchange-rate systems. Topics include determinants of a nation's balance of international payments; macroeconomic interdependence of nations under various exchange-rate regimes and its implications for domestic stabilization policies; and the international coordination of monetary and stabilization policies. Effective: 2017 Fall Quarter.

MGT 267—Teams and Technology (3)
Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Restricted to working professional MBA students. Theory and practice of managing teams with primary goals of: providing conceptual guidelines for analyzing and diagnosing group dynamics and determining strategic options as a manager; imparting interpersonal skills for implementing effective strategies; understanding how technological change affects team processes. Effective: 2009 Spring Quarter.

MGT 268—Articulation and Critical Thinking (3)
Lecture/Discussion—3 hours. Commitment to this course, become competent public speakers, write well at a level expected in business, think efficiently and critically about business challenges and have a useful personal code of ethics to shape their actions and decisions. No student may repeat course for credit. Effective: 2013 Fall Quarter.

MGT 269—Business Intelligence Technologies-Data Mining (3)
Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Restricted to students in the MBA program. Descriptive and Predictive Data mining methods covering association rules, clustering, classification, text mining, etc. Big data Technologies. Business applications. Hands-on data mining skills. Business intelligence for managerial decision making. Effective: 2016 Spring Quarter.

MGT 270—Corporate Financial Reporting (3)
Lecture—3 hours. Prerequisite(s): MGT 200A or MGP 200A or MGB 200A Analyzes and evaluates contemporary issues in financial reporting and develops implications of those issues for business decision makers, investment managers, and accounting policymakers. Effective: 2017 Fall Quarter.

MGT 271—Strategic Cost Management (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 202A or MGP 202A or MGB 202A Restricted to students in the MBA program. Theoretical frameworks and associated techniques for using organizational design and cost management to achieve a sustainable, profitable cost structure. Topics include: target costing, process design for low cost, total cost of ownership, cost of customers, implementing structural change, and incentives. Effective: 2017 Fall Quarter.

MGT 272—Evaluation of Financial Information (3)
Lecture—3 hours. Prerequisite(s): MGT 200A or MGP 200A or MGB 200A Studies how investors, creditors, others use accounting and other information in making rational investment, lending decisions. Emphasis is placed on the analysis of financial information in a variety of contexts. Where applicable, recent research in finance and economics is discussed. Effective: 2017 Fall Quarter.

MGT 273—Accounting and Reporting for Government Nonprofit Entities (3)
Lecture—3 hours. Concepts, methods, and uses of accounting and financial reporting by governmental and nonprofit entities. Introduction to budgeting and performance evaluation, and accounting for entities such as hospitals, universities, and welfare agencies. Effective: 1997 Winter Quarter.

MGT 274—Corporate Governance (3)
Lecture—3 hours. Prerequisite(s): Full-time MBA students or consent of instructor. Discusses how corporations can better operate in the interests of shareholders and public. Directly relevant to managers, consultants in compensation and incentives, staff working on mergers and acquisitions, corporate regulators, shareholder rights activists, and board members. Effective: 2009 Fall Quarter.

MGT 276—Real Estate, Finance and Development (3)
Lecture—3 hours. Prerequisite(s): (MGP 205 or MGT 205 or MGB 205); (MGP 201A or MGB 201A or MGT 201A) Focus on single family, attached, detached, multi-family, and light commercial development. Students will study factors which make up successful real estate developments. Course will consider financial aspects involved in land acquisition, land development, construction, and project lending. Effective: 2017 Fall Quarter.

MGT 281—Systems Analysis and Design (3)
Lecture—3 hours. Design and specification of computer-based information systems. Applications systems development life cycle, use requirements and feasibility assessment, logical and physical design, program development and testing, conversion and implementation. Effective: 1997 Winter Quarter.

MGT 282—Supply Chain Management (3)
Lecture/Discussion—3 hours. Prerequisite(s): MGT 203A or MGP 203A or MGB 203A Restricted to students in the MBA program. Matching supply with demand is a primary challenge for a firm: excess supply is too costly, inadequate supply irritates customers. Matching supply to demand is easiest when a firm has a flexible supply process, but flexibility is generally expensive. Effective: 2017 Fall Quarter.

MGT 284—Applied Linear Models for Management (3)
Lecture—3 hours. Covers regression, analysis of variance, and multivariate analysis. Topics will focus on applications to management and policy problems. Effective: 1997 Winter Quarter.

MGT 285—Time Series Analysis and Forecasting (3)
Lecture—3 hours. Prerequisite(s): MGT 203B or MGP 203B or MGP 203B Considers application of time series methods to evaluation and forecasting problems. Covers univariate and multivariate ARIMA models and transfer function models. Applications will be in such areas as economics, finance, budgeting, program evaluation, and industrial process control. Effective: 2016 Spring Quarter.

MGT 286—Telecommunications and Computer Networks (3)
Lecture—3 hours. Prerequisite(s): MGT 280. Communication system components; common carrier services; design and control of communications networks; network management and distributed environment; local area networks; data security in computer networks. Effective: 1997 Winter Quarter.

MGT 287—Business Database and Database Marketing (3)
Lecture—3 hours. Practical introduction to fundamental principles of database management systems and database marketing. Database design. SQL queries. Concepts of database marketing, data warehouse, data visualization and big data analytics. Effective: 2016 Spring Quarter.

MGT 288—Special Topics in Management of Information Systems (3)
Lecture—3 hours. Managerial aspects of information systems. Topics stressing applications in organizations chosen from: economics of computers and information systems, decision support systems, management of computer-based information systems, office automation. Effective: 1997 Winter Quarter.

MGT 290—Topics in General Management (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Advanced topics in general management. Varied topics to cover more extensively issues discussed in courses 201A and 201B, or current business interest topics in fields of business writing, business communications, development, or workplace processes. May be repeated for credit. Effective: 2009 Fall Quarter.

MGT 291—Topics in Organizational Behavior (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Advanced topics in social psychology and sociology of organizations. Varied topics to cover more extensively issues discussed in courses 201A and 201B, or current business interest topics in fields of organization design, strategy, development, or workplace processes. May be repeated for credit. Effective: 2009 Fall Quarter.

MGT 292—Topics in Finance (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Contemporary and emerging issues in finance. Application of modern techniques of finance to business problems. Use of appropriate electronic database and research techniques. May be repeated for credit. Effective: 1999 Fall Quarter.

MGT 293—Topics in Marketing (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Advanced topics in marketing, which may include marketing research, new product development, brand management, pricing, distribution management, service marketing, hitech marketing, advertising, sales promotions, marketing through the Web. May be repeated for credit. Effective: 2009 Fall Quarter.

MGT 294—Topics in Accounting (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Contemporary and emerging issues in financial management accounting. Application of modern techniques of evaluation and analysis of financial information. Use of appropriate electronic database and research techniques. May be repeated for credit. Effective: 1999 Fall Quarter.

MGT 295—Topics in Information Technology (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Applications of information technology to management and management of information technology. Adaptation to the dynamic nature of the field. May be repeated for credit. Effective: 1999 Fall Quarter.

MGT 296—Topics in Technology Management (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Cyclical nature of innovation and technological change, features of innovative firms and industries, national innovation systems, and impact of information technologies on innovation processes. May be repeated for credit. Effective: 1999 Fall Quarter.

MGT 297—Topics in International Management (3)
Seminar—3 hours. Prerequisite(s): Completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Broader environment in which U.S. firms and their foreign competitors operate. Integration of material from other topics courses (marketing, strategy, finance, accounting, information technology, technology management) into the international setting. May be repeated for credit. May be repeated for credit. Effective: 1999 Fall Quarter.

MGT 298—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

MGT 299—Individual Study (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

MGT 401—Crisis Management (1)
Discussion/Laboratory—1 hour. Establishes and explores the defining characteristics of crises. Will learn to anchor crisis management firmly within overall strategic management and also acquire a set of useful tools and techniques for planning for and handling actual crises. Effective: 2017 Winter Quarter.

MGT 402—Crisis Communications and Reputation Management (1)
Discussion/Laboratory—1 hour. Intended to provide you with an understanding of the framework and tools necessary to successfully address communications and reputation management tasks in a variety of crisis situations. Effective: 2016 Summer Quarter.

MGT 403—Business Statistics Practicum (1)
Project (Term Project)—1 hour. Prerequisite(s): (MGT 203A or MGP 203A or MGB 203A); (MGT 203B (can be concurrent) or MGP 203B (can be concurrent) or MGB 203B (can be concurrent)); MGT 203B, MGP 203B, or MGB 203B completed or required concurrently. Restricted to students in the MBA program. Applies techniques and concepts in business statistics to real case studies. Effective: 2011 Fall Quarter.

MGT 404—Organizational Change Management (1)
Lecture/Discussion—1 hour. Challenges in getting significant changes made in organizations. Learn Organization Change Management (OCM) techniques and discuss case situations where OCM techniques play a role. Effective: 2016 Fall Quarter.

MGT 405—Business Literature (1)
Lecture/Discussion—1 hour. Will examine Business history – historical trends that might influence contemporary business. Some argue that the recent collapse of our financial system might have been averted if business leaders had a better sense of history. Effective: 2017 Winter Quarter.

MGT 406—Ethical Issues in Management (1)
Lecture/Discussion—1 hour. Explores the philosophical foundation of ethical theory and its recent applications to business situations. Professional codes of ethics, such as those promulgated by educational, managerial, engineering, scientific, medical and legal professional societies, are presented. Effective: 2017 Winter Quarter.

MGT 407—Storytelling for Leadership (1)
Lecture/Discussion—1 hour. Internalize the fundamental principles behind stories that educate, influence, motivate, inspire, persuade and connect. Effective: 2016 Fall Quarter.

MGT 408—The Business of the Media (1)
Lecture/Discussion—1 hour. Focuses on the media industries and how emerging digital technologies are disrupting the way media consumption, distribution and business models work. Will highlight the economics of several media, both news and entertainment. Effective: 2016 Summer Quarter.

MGT 409—Managing Multi-Asset Class Investment Portfolios (1)
Lecture/Discussion—1 hour. Prerequisite(s): MGT 202A; MGT 203A; MGT 205 Examines top down management of multi-asset class portfolios. Topics include bonds, hedge funds, private equity, real estate, commodities, endowments, return generation, performance analysis, credit cycles, financial crises, manager selection, investment policy, and investment careers. Student teams present endowment portfolio recommendations. Effective: 2015 Spring Quarter.

MGT 410—Corporate Governance (1)
Lecture/Discussion—1 hour. Covers recent and not-so-recent business and accounting scandals, discuss how corporations can better operate in the interests of shareholders and the public, and learn from people who rely on corporate governance in making investment decisions. Effective: 2017 Winter Quarter.

MGT 411—Turnaround Management (1)
Lecture/Discussion—1 hour. Evaluate the financial performance of a company, identify opportunities for improvement, propose real solutions to enhance performance, and most important inspire action in staff. Effective: 2017 Winter Quarter.

MGT 412—International Marketing (1)
Lecture/Discussion—1 hour. Basic concepts of international marketing. Understanding and managing heterogeneous, dynamic, and interdependent environments across countries. How to develop and implement an international marketing strategy: where and how to compete, how to adapt your marketing mix. Effective: 2016 Fall Quarter.

MGT 413—Sustainable Business Ventures: Business and Energy (1)
Lecture/Discussion—1 hour. Introduction to sustainability goals, indicators, values, measurement techniques, and practice how it applies to large and small enterprise. Effective: 2013 Winter Quarter.

MGT 414—Multi-Channel Marketing (1)
Lecture/Discussion—1 hour. Multi-channel marketing strategies empower managers to create value for different customer segments. Covers the necessary concepts to evaluate and select go-to market strategies in order to capitalize on the ubiquity of modern customers. Effective: 2017 Winter Quarter.

MGT 415—Climate Risks and Opportunities (1)
Lecture/Discussion—1 hour. Provide a working knowledge of the risks and opportunities arising from climate change and climate policy for businesses. Effective: 2016 Summer Quarter.

MGT 417—Incentives and Controls (1)
Lecture/Discussion—1 hour. Understand how organizations use financial and nonfinancial performance management and incentive systems to motivate people and manage resources. Effective: 2017 Winter Quarter.

MGT 418—Scientific Discovery and Business Innovation at Scale in the Food and Agriculture Sector (1)
Lecture—3 hours. Restricted to students in the MBA program. Scientific discovery and business innovation within the food and agriculture sector profoundly influences the sustainability of society and enterprise competitiveness. Students will learn how business innovation models co-exist antagonistically or synergistically with scientific discovery and its influence on enterprise competitiveness. Effective: 2017 Winter Quarter.

MGT 419—Business Strategy Consulting Skills (1)
Lecture—5 hours. Restricted to students enrolled in the MBA program. Students will learn practical business consulting skills which will help apply strategy theories in the workplace. Students will learn and practice tools to frame and analyze problems, conduct research, communicate findings and navigate client relationships. Effective: 2017 Winter Quarter.

MGT 420—Advanced Optimization in a Python-based Modeling Language (1)
Web Virtual Lecture—1 hour. Prerequisite(s): (MGT 252 or MGB 252 or MGP 252); (MGT 206 or MGB 206 or MGP 206) Restricted to students enrolled in the MBA program. Covers advanced optimization modeling techniques and practical application of modern, scalable modeling language. Techniques will be developed using examples from production planning in a supply chain, but students may explore other areas of application of optimization for their final project. Effective: 2017 Winter Quarter.

MGT 421—Monte Carlo Simulation for Managerial Analysis (1)
Lecture—1 hour. Students create Excel-based simulation models across business domains, from finance to hypothesis testing and inventory management. By course-end, students are experts at recognizing this decision-making fallacy and fixing it. Effective: 2017 Spring Quarter.

MGT 422—Behavioral Finance and Valuation (1)
Lecture—1 hour. Prerequisite(s): (MGT 260 or MGP 260 or MGB 260); (MGT 261 or MGP 261 or MGB 261) Restricted to students enrolled in the MBA program. Investor psychology and market frictions can cause asset prices to deviate from fundamental values, creating profit opportunities for sophisticated investors. The course will cover techniques of financial analysis with the goal of learning how to value assets and identify mispricing. Effective: 2017 Winter Quarter.

MGT 423—Leader as Coach: An Introduction to Coaching Skills for Leaders (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program. Course introduces the fundamental coaching skills and coaching models that leaders can apply in everyday interactions with their team and colleagues in order to build trust, overcome challenges and help others discover their own full potential. Effective: 2017 Winter Quarter.

MGT 424—Practicum for Managing People in Modern Organizations (1)
Project (Term Project)—1 hour. Prerequisite(s): MGT 224 Restricted to students in the MBA program. Provides solid grounding in the management of work and the employment relationship. Examines firms' interrelated policies and practices for managing people. Effective: 2011 Winter Quarter.

MGT 425—Digital Marketing Techniques (1)
Lecture—1 hour. Course provides students with an introduction to digital marketing. The course introduces MBA students to the fundamental aspects and tools of online marketing communication, i.e., how organizations use digital channels to effectively communicate their value propositions to the target customers. Effective: 2017 Winter Quarter.

MGT 426—The Business of Healthcare (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program (Business Administration—Working Professional, Business Administration—Bay Area, Business Administration—Full-Time). Course is intended to provide students with an overall understanding of the unique business aspects of the healthcare industry. Effective: 2017 Winter Quarter.

MGT 427—Implementing International Strategy (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program (Business Administration—Working Professional, Business Administration—Bay Area, Business Administration—Full-Time). Course looks at the pitfalls of implementing international strategies, and suggest several accessible, yet powerful frameworks to help international managers implement strategies successfully and completely. Effective: 2017 Winter Quarter.

MGT 428—Renewable Energy Ventures: Planning, Funding and Regulatory Risk Assessment for Entrepreneurs and Investors (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program. Advanced innovation lab will introduce students to issues addressed by entrepreneurs and investors in renewable ventures. Lectures, simulations, case studies and practical experience of the presenters will be delivered. Effective: 2016 Summer Quarter.

MGT 429—Detection and Prevention of Asset Misappropriation Fraud in the Workplace (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program. Course will discuss the fundamentals of fraud detection and prevention in the workplace. Students will learn the major schemes involving workplace fraud, how management can detect fraud and what policies and procedures can be implemented to prevent fraud. Effective: 2016 Fall Quarter.

MGT 430—Learning From Catastrophes: Lessons for Managers (1)
Lecture—1 hour. Restricted to students enrolled in the MBA program. Catastrophes unfold in surprisingly similar ways. In this course, students will analyze catastrophes to understand these common patterns and investigate how they can be prevented and mitigated. Students will then apply these lessons to management to gain unconventional insights. Effective: 2016 Summer Quarter.

MGT 431—Project Management (1)
Lecture—10 hours. Open to students enrolled in the MBA program. Students learn project management; including project scope, project planning, milestones and project closing. Important themes include leadership, team dynamics, storytelling/creating a narrative, communication, and conflict management. Effective: 2016 Fall Quarter.

MGT 432—Project Management with Applications in Healthcare (1)
Lecture—1 hour. Course will focus on the heart of healthcare administration and how project management can be applied as a key lever to increase efficiency, decrease costs and improve the patient experience. Effective: 2017 Spring Quarter.

MGT 433—Corporate Social Responsibility (1)
Lecture—1 hour. Learn practical information that will help students understand the basics of designing, managing and evaluating an effective CSR program. Expose students to a basic set of CSR issues in the context of cross-purpose business challenges and then focus on the analysis and critical decisions that managers must make to move their business and their social agenda forward. Effective: 2018 Spring Quarter.

MGT 434—Practicum for Pricing (1)
Project (Term Project)—1 hour. Prerequisite(s): MGT 234 Restricted to students in the MBA program. Enhance understanding of the principles and concepts learned in Pricing by (1) teaching the necessary statistical and mathematical skills, and (2) requiring a report for a real Pricing case. Effective: 2011 Winter Quarter.

MGT 440—Integrated Management Project (5)
Project (Term Project)—3 hours. Prerequisite(s): First-year core courses of MBA program. Applies classroom learning to solve complex business challenges for real world clients. Student teams learn practical consulting skills while their clients benefit from the student’s experience, insights, and work product. Effective: 2016 Fall Quarter.

MGT 440A—Integrated Management Project (3)
Lecture/Discussion—3 hours. Prerequisite(s): First-year core courses of MBA program. Restricted to full-time (day) MBA students. Applies classroom learning to solve complex business challenges for real world clients. Student teams learn practical consulting skills while their clients benefit from the student's experience, insights, and work product. Effective: 2012 Fall Quarter.

MGT 440B—Integrated Management Project (3)
Project (Term Project)—3 hours. Prerequisite(s): First-year core courses of MBA program. Restricted to full-time (day) MBA students. Applies classroom learning to solve complex business challenges for real world clients. Student teams learn practical consulting skills while their clients benefit from the student's experience, insights, and work product. Effective: 2013 Winter Quarter.

MGT 440C—Integrated Management Project Team Lead (1)
Project (Term Project)—1 hour. Integrated Management Project Team leader. Effective: 2016 Fall Quarter.

MGT 442—Practicum for Marketing Communication (1)
Project (Term Project)—1 hour. Prerequisite(s): MGT 242 Restricted to students in the MBA program. Provides experience applying concepts learned in Marketing Communications to a realistic advertising or communication problem faced by firms. Effective: 2011 Spring Quarter.

MGT 443—Practicum for Customer Relationship Management (1)
Project (Term Project)—1 hour. Prerequisite(s): MGT 243 Restricted to students in the MBA program. Hands-on training in applying Customer Relationship Management concepts and metrics to secondary data. Enhances ability to interpret results and decide the right type of marketing actions by requiring an executive report at the end of the quarter. Effective: 2010 Fall Quarter.

MGT 448—Practicum for Marketing Strategies (1)
Project (Term Project)—1 hour. Prerequisite(s): MGT 248 Restricted to students in the MBA program. Provides opportunities to apply the concepts covered in the Marketing Strategies class through a group project involving the analysis of strategic marketing decisions based on business-related issues, simulation and modeling. Effective: 2010 Fall Quarter.

MGT 449—Marketing Research Practicum (1)
Project (Term Project)—1 hour. Prerequisite(s): MGT 249 Restricted to students in the MBA program, or in some cases with permission of instructor. Provides opportunities to apply the concepts and methods covered in the Marketing Research class. Hands-on and project-based, work could be either individual or in groups depending on enrollments and/or interests of students. Effective: 2011 Spring Quarter.

MGT 450—Practicum for Technology Strategy and Competition (1)
Project (Term Project)—1 hour. Prerequisite(s): MGT 250 Restricted to students in the MBA program. In-depth practicum project course. Apply theories, concepts, and models, learned in course 250 to a real-world business problem, through data collection, data analysis, simulation, modeling and post-model interpretation. Effective: 2011 Winter Quarter.

MGT 460—Practicum for Corporate Finance and Real Estate (1)
Project (Term Project)—1 hour. Prerequisite(s): MGT 260 Restricted to students in the MBA Program. Work in groups to select and value a financial entity. It could be a firm, a sports player, a building, a project, or a patent. Grade based on an in-class presentation and a write-up. Effective: 2011 Spring Quarter.

MGT 461—Practicum for Investment Analysis (1)
Project (Term Project)—1 hour. Prerequisite(s): MGT 261 Restricted to students in the MBA program. Provides practical experience applying concepts learned in Investment Analysis to a realistic portfolio management setting via a hypothetical exercise. Produce a realistic executive summary and presentation of an investment proposal for a hypothetical client. Effective: 2010 Fall Quarter.

MGT 464—Practicum for Taxes and Business Strategy (1)
Project (Term Project)—1 hour. Prerequisite(s): MGT 264 Restricted to students in the MBA program. Practical application project drawing from the tax planning theory contained in course 264. Project consists of a business formation and operation, change in organization (incorporation), and movement into multi-national and multi-jurisdictional tax. Effective: 2010 Fall Quarter.

MGT 465—Practicum for Venture Capital (1)
Project (Term Project)—1 hour. Prerequisite(s): MGT 265 Restricted to students in the MBA program. Provides an opportunity to apply concepts learned in Venture Capital in a realistic setting. Complete project analyzing a potential investment in a hypothetical venture and prepare an deal term sheet/investment agreement. Effective: 2011 Winter Quarter.

MGT 467—Practicum for Teams and Technology (1)
Project (Term Project)—1 hour. Prerequisite(s): MGT 267 Restricted to students in the MBA program. Groups investigate the performance, creativity, conflict, information sharing, and leadership behaviors of a real world team. Provide consulting advice to the team, which not only gives analytic skills, but also builds presentation skills. Effective: 2011 Spring Quarter.

MGT 469—Practicum for Business Intelligence Technologies (1)
Project (Term Project)—1 hour. Prerequisite(s): MGT 269 Restricted to students in the MBA program. Projects applying concepts learned in Business Intelligence Technologies to real business problems. Effective: 2011 Winter Quarter.

MGT 482—Practicum for Supply Chain Management (1)
Project (Term Project)—1 hour. Prerequisite(s): MGT 282 (can be concurrent) or MGP 282 (can be concurrent) or MGB 282 (can be concurrent); Course is a pre-requisite or co-requisite. Restricted to students in the MBA program. Provides experience applying concepts learned in Supply Chain Management to a realistic management setting via a project. Effective: 2011 Spring Quarter.

MGT 490—Directed Group Study Management Practicum (3)
Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Sponsorship of a GSM Academic Senate faculty member; approval of graduate advisor. Provides opportunity for students to gain experience in applying business methodologies previously acquired in other GSM courses. May be repeated for credit. Effective: 2015 Spring Quarter.

MGT 498—Directed Group Study Management Practicum (1-12)
Project (Term Project). Prerequisite(s): Consent of Instructor. Sponsorship of a GSM Academic Senate faculty member, and approval of graduate advisor. Provides the opportunity for students to gain experience in applying business methodologies previously acquired in other GSM courses. May be repeated up to 6 unit(s). (S/U grading only.) Effective: 2012 Winter Quarter.

MGT 499—Directed Individual Study Management Practicum (1-12)
Project (Term Project). Prerequisite(s): Consent of Instructor. Sponsorship of a Graduate School of Management Academic Senate faculty member and approval of graduate advisor. Provides the opportunity for students to gain experience in applying business methodologies previously acquired in other Graduate School of Management courses. May be repeated for credit. (S/U grading only.) Effective: 2011 Summer Quarter.

MGV Management - Online

Courses in MGV: Coming soon…

MHI Health Informatics

Courses in MHI:

MHI 202—Computer-Based Patient Records (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Current enrollment within the Health Informatics Graduate Program or consent of instructor. Introduction and overview of computer-based clinical record systems. Topics include data modeling, health system standards and terminologies; security, privacy and confidentiality; workflow modeling; data visualization; legal; decision support; public health; and evidence-based practice. Effective: 2009 Winter Quarter.

MHI 207—Decision Support Systems (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Explores decision support systems for medical application. Topics include medical decision making, uncertainty, review of existing decision support systems, knowledge engineering, data mining, and knowledge based systems. Effective: 2010 Winter Quarter.

MHI 208—Medical Informatics in Web-Based Enterprise Computing (4)
Discussion—2 hours; Lecture—2 hours. Introduction to the decision making processes and technologies that are involved in developing web-based distributed enterprise applications in medicine. Focus on the Informatician's role as a team member. Effective: 2010 Spring Quarter.

MHI 209—Data Acquisition and Analysis (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Examines the nature, acquisition, and analysis of medical data. Data ranges from signals of electrical potentials, sounds, text, images (still and motion), and data from nucleic acid and protein expression and sequencing instruments. Effective: 2010 Spring Quarter.

MHI 210—Introduction to Health Informatics (4)
Discussion—1 hour; Lecture—3 hours. Overview course to give the student a broad exposure to the field of Health Informatics. Topics covered include, but are not limited to, networking, information systems, coding, HL7, Security, and HIPPA. Effective: 2009 Winter Quarter.

MHI 211V—Telemedicine (4)
Web Electronic Discussion—1 hour; Web Virtual Lecture—3 hours. Issues for the development and maintenance of a successful telemedicine program with focus on strategic planning, clinical applications, project management, risk management and legal issues; reimbursement and contracting; human resources and program sustainability. Effective: 2013 Fall Quarter.

MHI 212—Computer Security in Health Informatics (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): MHI 210; MHI 202; MHI 209 Critical thinking about basic concepts in computer security and privacy. How the computer security and privacy impact health informatics, ranging from electronic health records to telemedicine to remote, virtual surgery. Effective: 2012 Fall Quarter.

MHI 215—Beginning and Intermediate Programming in M (MUMPS) (3)
Lecture—3 hours. Project-oriented approach to fundamentals of programming in ANSI Standard M (MUMPS) language. Basic syntax, Hierarchical file structure; arrays and string subscripts, indirection and extrinsic functions. (S/U grading only.) Effective: 2009 Winter Quarter.

MHI 289A—Special Topics in Medical Informatics: Data Acquisition (1-5)
Laboratory—1-5 hours; Lecture—1-5 hours. Prerequisite(s): Consent of Instructor. Special topics in Data Acquisition. May be repeated for credit when topic differs. Effective: 2010 Fall Quarter.

MHI 289B—Special Topics in Health Informatics; Seminars in Clinical Translational Informatics (1)
Seminar—1 hour. Seminars in current clinical translational informatics research topics. Guest presenters and faculty led discussions. Effective: 2015 Spring Quarter.

MHI 289E—Clinical Knowledge for the Health Informaticist (3)
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Basic clinical knowledge for health informatics students. Human systems, disease states and conditions, treatments and prognosis. Effective: 2018 Winter Quarter.

MHI 289F—Database and Knowledge Management (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Course objectives include understanding the informatics techniques for data capture, information management, and knowledge generation that a student will use throughout their career. May be repeated for credit. Effective: 2010 Winter Quarter.

MHI 289G—Special Topics in Health Informatics; Biostatistics (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Special topics in Biostatistics. Evaluation Methods and Statistics in Biomedical Informatics. Research design and analysis with special emphasis on Biomedical Informatics. Effective: 2016 Spring Quarter.

MHI 289H—Modeling Biological Systems (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Class size limited to 20 students. Create awareness of how modern computer graphics have led to VR-Sim-Rob applications, and how they are modifying the teaching of medicine and in some cases the diagnosis and treatment of patients. Effective: 2011 Winter Quarter.

MHI 289I—Programming in Health Informatics (3)
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Basics of computer programming essential to the study of informatics. Impacts on systems within healthcare, public health, nursing, research, and others. Effective: 2018 Winter Quarter.

MHI 290—Seminar in Medical Informatics (1)
Seminar—1 hour. Restricted to 20 students. Discussion of current graduate research and topics in Medical Informatics. Oral presentations of individual study. (S/U grading only.) Effective: 2009 Fall Quarter.

MHI 299—Research in Health Informatics (1-12)
Variable. Independent research in Health Informatics. (S/U grading only.) Effective: 2010 Spring Quarter.

MIB Microbiology

Courses in MIB:

MIB 200A—Microbial Biology (3)
Lecture—3 hours. Prerequisite(s): MIC 102; Or equivalent; prior coursework in Microbiology. Designed to provide an overview of various aspects of microbiology and microbial processes. Topics will include microbial genetics and genomics, microbial metabolism, signaling, and adaptations. Effective: 2011 Fall Quarter.

MIB 201L—Advanced Microbiology Laboratory Rotations (5)
Laboratory—15 hours. Two five-week assignments in microbiology research laboratories. Individual research problems with emphasis on methodological/procedural experience and experimental design. May be repeated up to 2 time(s). Effective: 2011 Fall Quarter.

MIB 210—Microbial Interactions (2)
Lecture—2 hours. Prerequisite(s): MIB 200A; or Consent of Instructor. Analysis at the molecular level of the interactions of microbes with the environment, microbes with other microbes, and microbes in symbiotic and/or pathogenic associations with eukaryotic hosts. Topics discussed will vary. May be repeated up to 2 time(s). Effective: 2011 Fall Quarter.

MIB 290C—Advanced Research Conference (1)
Conference—1 hour; Discussion—1 hour. Prerequisite(s): Graduate standing and/or consent of instructor. Presentation and critical discussion of staff research activities.
Designed for advanced graduate students. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

MIB 299—Research (1-12)
Variable. Research under the guidance of dissertation committee. (S/U grading only.) Effective: 1997 Winter Quarter.

MIC Microbiology

Courses in MIC:

MIC 010—Natural History of Infectious Diseases (3)
Lecture—3 hours. Topics in the natural history of infectious diseases principally affecting humans. Introduction to infectious microbial agents, ecology, epidemiology, and induction of disease. Focus on diseases of a contemporary nature. Not open for credit to students who have completed MIC 101, MIC 102, or MIC 104. GE credit: SE. Effective: 2014 Fall Quarter.

MIC 091—Introduction to Research (1)
Seminar—1 hour. Prerequisite(s): BIS 002A; Or equivalent. Restricted to lower division standing. Discussion of faculty research focusing on the biochemistry, genetics, and cell biology of microorganisms, along with ways undergraduates can participate in research projects of faculty members. May be repeated up to 3 time(s). (P/NP grading only.) GE credit: SE. Effective: 2016 Fall Quarter.

MIC 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Primarily for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

MIC 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2003 Spring Quarter.

MIC 101—Introductory Microbiology (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (BIS 001A or BIS 002A); CHE 002B (can be concurrent) Survey of microorganisms emphasizing their interactions with humans and diseases. Topics include microscopy, survey of various microbes, the immune system, food microbiology, microbial pathogens, and mechanisms of disease transmission. Designed for students requiring microbiology for professional schools. Not open for credit to students who have completed MIC 102, MIC 102L, MIC 104, or MIC 104L. GE credit: SE, SL. Effective: 2014 Winter Quarter.

MIC 102—Introductory Microbiology (3)
Lecture—3 hours. Prerequisite(s): (BIS 001A or BIS 002A); CHE 002B (can be concurrent) Essentials of microbial biology, emphasizing phylogeny, physiology, genetics, ecology, and pathogenesis. Interactions with other microbes, humans, and the biosphere. Uses of microbes in agriculture and biotechnology. Not open for credit to students who have completed MIC 101 or MIC 104. GE credit: QL, SE, SL. Effective: 2016 Winter Quarter.

MIC 103L—Introductory Microbiology Laboratory (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): MIC 102 C- or better; CHE 002B Introduction to principles and laboratory methods employed in working with microorganisms. Designed for students requiring microbiology for professional school admission. Not open to students who completed MIC 101 before spring 2016, or who have completed MIC 102L or MIC 104L. Effective: 2016 Fall Quarter.

MIC 104L—General Microbiology Laboratory (3)
Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): MIC 102 C or better; (CHE 008B or CHE 118B or CHE 129A); and Consent of Instructor. Students must complete a petition for consideration of enrollment; petition available on department of Microbiology and Molecular Genetics website. Principles and laboratory methods employed in working with microorganisms. Designed for students continuing in microbiology, genetics, or biochemistry. Only two units of credit for students who completed MIC 101 before spring 2016, or who have completed MIC 103L; not open to students who have completed MIC 102L. GE credit: SE, WE. Effective: 2016 Fall Quarter.

MIC 105—Microbial Diversity (3)
Lecture—3 hours. Prerequisite(s): MIC 102 or MIC 104; BIS 101; BIS 103 or BIS 105 strongly recommended. Survey of the major groups of microorganisms emphasizing diversity of energy metabolism, morphology, evolution, and natural history. GE credit: SE. Effective: 2017 Winter Quarter.

MIC 105L—Microbial Diversity Laboratory (3)
Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): (MIC 102 or MIC 104); (MIC 102L or MIC 104L); MIC 105 (can be concurrent) Classical enrichments for the isolation of metabolically diverse microbes; modern molecular methods for the identification of isolates; cultivation independent analysis of microbial communities from local environmental samples. GE credit: SE, WE. Effective: 2017 Winter Quarter.

MIC 111—Human Microbiology (3)
Lecture—3 hours. Prerequisite(s): MIC 102; BIS 101 Biology of microorganisms that form commensal, mutualistic, and pathogenic relationships with human beings, emphasizing their phylogeny, physiology, genetics, and ecology. Effects on human nutrition, development and physiology. Mechanisms of pathogenesis, immune response evasion, antibiotic action, and antibiotic resistance. GE credit: SE. Effective: 2016 Spring Quarter.

MIC 115—Recombinant DNA Cloning and Analysis (3)
Lecture—3 hours. Prerequisite(s): BIS 101; Or the equivalent. Cloning and analysis of recombinant DNA, with emphasis on Escherichia coli host-vector systems. DNA-modifying enzymes; vectors and their use; manipulation and expression of insert DNA; polymerase chain reaction; and sequence annotation. Graduate students see course 215. GE credit: SE. Effective: 2006 Fall Quarter.

MIC 120—Microbial Ecology (3)
Lecture—3 hours. Prerequisite(s): MIC 105; (BIS 102 or BIS 105) Interactions between non-pathogenic microorganisms and their environment, emphasizing physiological and metabolic characteristics
of various groups and their adaptation to and modification of specific habitats. GE credit: SE. Effective: 2008 Fall Quarter.

MIC 140—Bacterial Physiology (3)
Lecture—3 hours. Prerequisite(s): (BIS 101, BIS 102, BIS 103 (can be concurrent)) or (BIS 101, BIS 105); MIC 102 recommended. Fundamentals of bacterial growth and bacterial responses to environmental stresses. Topics will include carbon and nitrogen regulation, growth rate control, post-exponential growth, and motility and chemotaxis. Not open for credit to students who have completed MIC 130A. GE credit: SE. Effective: 2008 Fall Quarter.

MIC 150—Genomes of Pathogenic Bacteria (3)
Lecture—3 hours. Prerequisite(s): MIC 102; BIS 101 Molecular genetics and comparative genomics of representative pathogenic bacteria. Roles of mobile genetic elements, lateral gene transfer, and genome rearrangements in pathogen evolution. Mutation, recombination, and complementation as tools for genetic analysis. Content includes close examination of primary research articles. GE credit: SE. Effective: 2016 Spring Quarter.

MIC 155L—Bacterial Physiology Lab (4)
Laboratory—8 hours; Lecture/Discussion—1 hour. Prerequisite(s): (MIC 140 or MIC 150); MIC 120L; and Consent of Instructor. Physiology and genetics of bacteria. Isolation and characterization of mutant strains. Mapping of mutations by conjugation and transduction studies of control of enzyme synthesis by induction, repression, and catabolite repression. Effective: 2004 Spring Quarter.

MIC 162—General Virology (4)
Lecture—4 hours. Prerequisite(s): BIS 101; BIS 102 or BIS 105 recommended. Integrated presentation of the nature of animal, bacterial, and plant viruses, including their structure, replication and genetics. Three units to students who have completed PMI 128. GE credit: SE. Effective: 2017 Winter Quarter.

MIC 170—Yeast Molecular Genetics (3)
Lecture—3 hours. Prerequisite(s): BIS 101; MIC 102 or MIC 105 strongly recommended. Survey of the genetics, cell biology and technologies in yeasts and related lower eukaryotes. Topics include diversity of yeasts; cell structure; metabolism; cell cycle; genetic approaches and genomics; gene expression; yeasts as models to study higher eukaryotes; and contemporary techniques. GE credit: SE. Effective: 2016 Fall Quarter.

MIC 172—Host-Parasite Interactions (3)
Lecture—3 hours. Prerequisite(s): MIC 102 or MIC 101 or MIC 104; BIS 101; Biological Sciences 102 or 105 strongly recommended. Exploration of host-parasite interactions at multiple levels, with an emphasis on global health and medically important human parasites. GE credit: SE, SL. Effective: 2017 Fall Quarter.

MIC 175—Cancer Biology (3)
Lecture—3 hours. Prerequisite(s): BIS 101; (BIS 102 or BIS 105) Exploration of the causes and treatments of cancer at multiple levels: molecular/cell biology, clinical manifestations, epidemiology and prevention. GE credit: SE, SL. Effective: 2016 Spring Quarter.

MIC 190C—Undergraduates Research Conference (1)
Discussion—1 hour. Prerequisite(s): MIC 199 (can be concurrent); and Consent of Instructor. Upper division standing, MIC 199 required concurrently. Presentation and critical discussion of staff research activities: designed for advanced undergraduate students. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 1997 Fall Quarter.

MIC 191—Introduction to Research for Advanced Undergraduates (1)
Seminar—1 hour. Prerequisite(s): BIS 002A; Or equivalent. Restricted to upper division standing. Discussion of faculty research focusing on the biochemistry, genetics, and cell biology of microorganisms, along with ways undergraduates can participate in research projects of faculty members. May be repeated up to 3 time(s). (P/NP grading only.) GE credit: SE. Effective: 2016 Fall Quarter.

MIC 192—Internship (1-12)
Internship—3-36 hours. Technical and/or professional experience on or off campus. Supervised by a member of the Microbiology Section faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

MIC 194H—Microbiology Honors Research (2)
Independent Study—6 hours. Prerequisite(s): Senior standing; eligibility for college honors; completion of six units of MIC 199; consent of section. Continuation of an individual microbiological research project culminating in writing of a senior thesis under a faculty director. (P/NP grading only.) Effective: 1997 Winter Quarter.

MIC 197T—Tutoring in Microbiology (1-12)
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Assisting the instructor in one of the section's regular courses by tutoring individual or small groups of students in a laboratory, in voluntary discussion groups, or other voluntary course activities. May be repeated for credit. (P/NP grading only.) Effective: 2004 Spring Quarter.

MIC 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

MIC 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

MIC 200B—Advanced Bacteriology (3)
Lecture—3 hours. Prerequisite(s): MIB 200A Intended for first-year graduate students in Microbiology and closely-related fields. Advanced topics in phylogeny, physiology and diversity of bacteria. Effective: 2001 Winter Quarter.

MIC 215—Recombinant DNA (3)
Lecture—3 hours. Prerequisite(s): BIS 101; BIS 102; BIS 103; Or the equivalent. Application of recombinant DNA technology to modern problems in biology, biochemistry, and genetics, emphasizing molecular cloning strategies, choice of vectors, preparation of insert DNA, and selection procedures. Effective: 1998 Fall Quarter.

MIC 262—Advanced General and Molecular Virology (3)
Lecture—3 hours. Prerequisite(s): Graduate standing. Advanced integrated presentation of animal, bacterial, and plant viruses, including their structure, modes of regulation, expression and replication, and effects on host cells and organisms. Effective: 1997 Winter Quarter.

MIC 263—Principles of Protein-Nucleic Acid Interactions (3)
Lecture—3 hours. Prerequisite(s): Advanced graduate standing and completion of one year of basic graduate course work in biochemistry, biophysics, chemistry, genetics, microbiology, or molecular biology. Physical basis of protein-nucleic acid interaction. Topics include nucleic acid recognition by proteins,thermodynamics of protein-nucleic acid stability,and kinetics of binding process for both non-specific and sequence-specific nucleic acid binding proteins. Emphasis on systems that represent paradigms in protein-nucleic acid interactions. Effective: 1997 Winter Quarter.

MIC 274—Seminar in Genetic Recombination (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Biochemical and genetic aspects of genetic recombination in prokaryotes and eukaryotes. Mechanisms of recombination and biochemical and genetic characteristics of recombination proteins. Proteins include DNA strand
exchange, DNA helicases, and Holliday junction resolving proteins. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1998 Winter Quarter.

MIC 275—Seminar in DNA Repair and Recombination (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing in Microbiology or closely-related field. Review and discussion of current research and literature in DNA repair and recombination with presentations by individual students and invited speakers. May be repeated for credit. (S/U grading only.) Effective: 2006 Fall Quarter.

MIC 276—Advanced Concepts in DNA Metabolism (3)
Lecture—3 hours. Prerequisite(s): MCB 221C or GGG 201C or equivalent course recommended. DNA damage checkpoints, homologous recombination, and meiotic recombination. An advanced treatment of the clinical and current literature to discuss emerging principles and current models in these research areas. Effective: 2008 Fall Quarter.

MIC 290C—Advanced Research Conference (1)
Conference—1 hour; Discussion—1 hour. Prerequisite(s): Graduate standing and/or consent of instructor. Presentation and critical discussion of staff research activities.
Designed for advanced graduate students. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

MIC 291—Selected Topics in Microbiology (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Current progress in microbiology and cellular and molecular biology. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

MIC 292—Seminar in Bacterial Physiology and Genetics (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing in Microbiology or closely-related field. Review and discussion of current research and literature in bacterial physiology and genetics, with presentations by individual students. (S/U grading only.) Effective: 2000 Spring Quarter.

MIC 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

MIC 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

MIC 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

MMI Med - Medical Microbiology

Courses in MMI:

MMI 130—Medical Mycology (2)
Lecture—2 hours. Prerequisite(s): Consent of Instructor. A course in pathogenic microbiology. Various aspects of pathogenic fungi, particularly affecting humans, will be discussed including epidemiology, pathogenesis and pathology, diagnosis and therapy. (430) Effective: 1997 Winter Quarter.

MMI 188—Human Immunology (3)
Lecture—3 hours. Prerequisite(s): Undergraduate level introductory Biology course. Human immune system and mechanisms of immunity. Basic components and function of immune system. Molecular basis of immune response; basic cellular and molecular mechanisms. Interactions between cells of immune system producing immune responses; regulating molecules. Effective: 2004 Spring Quarter.

MMI 192—Internship in Medical Microbiology (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project prior to period of internship. Supervised work experience in medical microbiology and related fields. (P/NP grading only.) Effective: 1997 Winter Quarter.

MMI 194H—Senior Honors Project in Medical Microbiology and Immunology (5)
Independent Study—15 hours. Prerequisite(s): MMI 199; and Consent of Instructor. Project in research related to immunology of medically important viruses. Development of a hypothesis-driven project, performance of experimental protocols and preparation of graphical representation of original data. Requires oral and written presentation of research results. May be repeated up to 3 time(s) with consent of instructor. (P/NP grading only.) Effective: 2004 Spring Quarter.

MMI 198—Group Study in Medical Microbiology (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. Directed reading and discussion and/or laboratory investigation on selected topics. (P/NP grading only.) Effective: 1997 Winter Quarter.

MMI 199—Research in Medical Microbiology (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. Individual research. (P/NP grading only.) Effective: 1997 Winter Quarter.

MMI 200D—Mechanisms for Microbial Interactions with Hosts (3)
Lecture/Discussion—3 hours. Prerequisite(s): MIB 200A; or Consent of Instructor. Study of mechanisms involved in microbial interactions within a host
environment. The following principles are basic to understanding these interactions: host recognition, invasion, competition and growth, and host defense. Effective: 1997 Winter Quarter.

MMI 210A—Critical Analysis of Contemporary Research on Animal Models of Human Infectious Disease (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Students funded by the Animal Models of Infectious Diseases Training Grant. Limited enrollment. Topics will include diverse vertebrate and invertebrate models of human infectious diseases. May be repeated for credit. (S/U grading only.) Effective: 2013 Fall Quarter.

MMI 210B—Comparative Analysis of Animal Models of Human Infectious Diseases (1)
Lecture/Discussion—1 hour. Prerequisite(s): Students funded by the Animal Models of Infectious Diseases Training Grant; others by consent of instructor. Limited enrollment. Compares the major vertebrate and invertebrate animal models that are used most commonly to study human infectious disease, including mouse, non-human primate, Caenorhabditis elegans, and drosophila. May be repeated for credit. (S/U grading only.) Effective: 2014 Winter Quarter.

MMI 215—Medical Parasitology (3)
Discussion—1.5 hours; Lecture—1.5 hours. Prerequisite(s): Graduate student with consent of instructor. Epidemiology, pathogenesis, diagnostic methods and current literature discussion of protozoa, helminths and arthropods of medical importance. Effective: 2011 Spring Quarter.

MMI 280—The Endogenous Microbiota in Health and Disease (3)
Lecture—3 hours. Prerequisite(s): Graduate standing. Recent insights into the microbial communities inhabiting mucosal surfaces, and will discuss how the composition of these communities contributes to normal development, metabolism, education of the immune system, and disease susceptibility. Effective: 2016 Spring Quarter.

MMI 291—Seminar in Microbiology and Immunology (1)
Seminar—1 hour. Restricted to students with upper division or graduate standing. Research seminars on current topics in microbiology and immunology. May be repeated for credit when topic differs. (S/U grading only.) Effective: 2007 Spring Quarter.

MMI 298—Group Study in Medical Microbiology and Immunology (1-5)
Variable. Prerequisite(s): Consent of Instructor. Open to graduate students. Directed reading and discussion and/or laboratory investigation on selected topics. Sections 1, 2, 4, 5 are S/U grading only. (S/U grading only.) Effective: 1997 Winter Quarter.

MMI 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Open to graduate students. Laboratory investigation contributing to the dissertation for a graduate degree. (S/U grading only.) Effective: 1997 Winter Quarter.

MMI 410—Physician Scientist Molecular Medicine Journal Club (1)
Lecture/Discussion—1 hour. Weekly seminars by students on research articles in current literature. Topics/articles to be selected by instructors to include a broad range of frontiers in biomedical literature. May be repeated for credit. (H/P/F grading only.) Effective: 2004 Fall Quarter.

MMI 430—Medical Mycology (2)
Lecture—2 hours. Prerequisite(s): Consent of Instructor. A course in pathogenic microbiology. Various aspects of pathogenic fungi, particularly affecting humans, will be discussed including epidemiology, pathogenesis and pathology, diagnosis and therapy. (130) (H/P/F grading only.) Effective: 1997 Winter Quarter.

MMI 480A—Medical Immunology (2.5)
Discussion/Laboratory—0.5 hours; Lecture—2 hours. Restricted to Medical students only. Helping to understand the immune system, the nomenclature and functional significance of the tissues, cells, proteins and genes of the immune system, as well as the normal regulatory mechanisms and pathologic outcomes related to the immune response. (P/F grading only.) Effective: 2016 Spring Quarter.

MMI 480B—Medical Microbiology (5.5)
Discussion/Laboratory—1 hour; Lecture—2.75 hours. Restricted to Medical students only. Discussion of the diseases caused by infectious agents includes their pathogenesis, clinical manifestations, diagnosis, treatment epidemiology and prevention. Covers the general properties of and diagnostic techniques for bacteria, fungi and viruses. (P/F grading only.) Effective: 2016 Spring Quarter.

MMI 497T—Tutoring in Medical Microbiology (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of Instructor. Appropriate preparation in subject matter. Assist instructor by tutoring medical students in one of the departmental courses that is a component of the required curriculum of the School of Medicine. (H/P/F grading only.) Effective: 1997 Winter Quarter.

MMI 498—Group Study in Medical Microbiology and Immunology (1-5)
Variable. Prerequisite(s): Medical students with consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics. (H/P/F grading only.) Effective: 1997 Winter Quarter.

MMI 499—Research (1-12)
Variable. Prerequisite(s): Medical students with consent of instructor. May be repeated for credit. (H/P/F grading only.) Effective: 2008 Winter Quarter.

MPM Masters Preventive Veterinary Medicine

Courses in MPM:

MPM 200—Introduction to Information Management for Epidemiologists (1)
Laboratory—1 hour. Restricted to students in the Master of Preventive Veterinary Medicine program. Introduction to practical application of epidemiological methods to solve problems involving population health data. Emphasis on using worksheet/database software tools for organizing, analyzing, reporting, and interpreting data. Ten, three-hour sessions. Effective: 2016 Summer Session 2.

MPM 201—Emerging Issues at the Interface of Animal, Human, and Ecosystem Health (2.5)
Discussion—1.5 hours; Lecture—1 hour. Class size limited to 35 students. Introduce one health topics emphasizing relationships between environmental, animal and human health. Topics include ecosystem change and impacts on animals and humans, cross-species disease transmission and approaches for addressing critical data gaps to inform ecosystem health and disease prevention. Effective: 2016 Fall Quarter.

MPM 202—Medical Statistics I (4)
Laboratory—10 hours; Lecture—15 hours. Prerequisite(s): MPVM or MPH standing or consent of instructor. Restricted to 80 students. Basic statistics in clinical, laboratory and population medicine: descriptive statistics; probability; binomial, Poisson, normal, t-, F-, and Chi-square distributions; sampling distributions; parameter estimation; hypothesis testing; elementary nonparametric methods, simple linear regression and correlation; life table construction and analysis. Effective: 2015 Summer Session 2.

MPM 203—Medical Statistics II (4)
Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): MPM 202; or Consent of Instructor. Or equivalent. Continuation of course 202. Analysis of variance in biomedical sciences; nonparametric methods; multiple regression; unconditional logistic regression; biomedical applications of statistical methods. Microcomputer applications in population medicine to reinforce principles that are taught in lecture. Required for students in the Preventive Veterinary Program Graduate Group (PVM) and the Masters of Public Health Program (MPH). Effective: 2015 Fall Quarter.

MPM 204—Medical Statistics III (4)
Laboratory—2 hours; Lecture—3 hours. Continuation of course 203. Selecting the best regression equation, conditional logistic regression, Poisson regression, survival analysis, analysis of time dependent variation and trends. Microcomputer applications in population medicine to reinforce principles that are taught in lecture. Effective: 2016 Fall Quarter.

MPM 205—Principles of Epidemiology (4)
Lecture—4 hours. Prerequisite(s): MPM 202; or Consent of Instructor. An introductory statistics course. Basic epidemiologic concepts and approaches to epidemiologic research, with examples from veterinary and human medicine, including outbreak investigation, infectious disease epidemiology, properties of tests, and an introduction to epidemiologic study design and surveillance. (Epidemiology 205.) Effective: 2017 Winter Quarter.

MPM 206—Epidemiologic Study Design (4)
Discussion—9 hours; Laboratory—2 hours; Lecture—30 hours. Prerequisite(s): MPM 205; or Consent of Instructor. Builds on concepts presented in course 205. Concepts of epidemiologic study design—clinical trials, observational cohort studies, case control studies—introduced in course 205A are covered in more depth, using a problem-based format. Discussion of published epidemiologic studies (Epidemiology 206.) Effective: 2015 Winter Quarter.

MPM 207—Applied Epidemiologic Problem Solving (1)
Discussion/Laboratory—2 hours. Integration of epidemiologic and statistical methodology in a problem-solving approach to contemporary animal population health issues. Data validation and manipulation. Effective: 2014 Fall Quarter.

MPM 208—Research Planning and Reporting I (2)
Lecture/Discussion—2 hours. MPVM standing or consent of instructor Identify and implement research questions through hypothesis construction, articulation of aims, acquiring permits, working as a team, and all other techniques needed to develop a successful research program. Not open for credit to students who have previously taken MPM 408B. Effective: 2017 Winter Quarter.

MPM 209—Research Planning and Reporting II (1)
Lecture/Discussion. Prerequisite(s): MPM 208 Concepts and skills in effective scientific writing for publication in a peer-reviewed journal in animal health or biomedicine. Includes developing an argument, organizing and writing a manuscript, improving readability, and responding to peer review. Effective: 2016 Fall Quarter.

MPM 210—Advanced Health Leadership (1.5)
Discussion; Lecture. Class size limited to 35 students. Develop skills for effective scientific leadership, including: project management and collaboration, conflict resolution, communication with the public, dynamic distribution of health information, and evidence-based policy influence. Effective: 2017 Winter Quarter.

MPM 212—Concepts and Methods in Infectious Disease Surveillance and Control (3)
Discussion/Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Basic and advanced level of conceptual and methodological foundations in infectious disease epidemiology necessary for veterinarians to develop and evaluate programs for detection, prevention, and control of infectious diseases in animal populations. Effective: 2016 Fall Quarter.

MPS Mathematical and Physical Sciences

Courses in MPS:

MPS 001—General Science: Science in the News (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): Lower division standing. Basic principles in science including numeracy, scale, energy, and time; the scientific method; good and bad science. Emphasis on science topics recently in the news. Effective: 2002 Spring Quarter.

MPS 011A—Mathematical and Physical Sciences Seminar (2)
Lecture—2 hours. Prerequisite(s): Mentorship for undergraduate research participants in the physical and mathematical sciences. Research and writing in the mathematical and physical sciences. Presentations by various science faculty members. Effective: 1997 Fall Quarter.

MPS 011B—Mathematical and Physical Sciences Seminar (2)
Lecture—2 hours. Prerequisite(s): Mentorship for undergraduate research participants in the physical and mathematical sciences. Research and writing in the mathematical and physical sciences. Presentations by various science faculty members. Effective: 1997 Fall Quarter.

MSA Middle East/South Asia Studies

Courses in MSA:

MSA 092—ME/SA 92. Internship in Middle East/South Asia Studies (3-15)
Internship. Prerequisite(s): Consent of Instructor. Work experience on and off campus in all subject areas offered as part of the ME/SA Studies program. Internship supervised by a member of the ME/SA faculty. May be repeated up to 15 unit(s). (P/NP grading only.) Effective: 2007 Fall Quarter.

MSA 098—Directed Group Study (1-5)
Variable—3-15 hours. May be repeated for credit. (P/NP grading only.) Effective: 2006 Fall Quarter.

MSA 099—Special Study for Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2006 Fall Quarter.

MSA 100—Middle East and South Asia: Comparative Perspectives (4)
Extensive Writing; Lecture—3 hours. Ethnographic and historical points of intersection and divergence in various aspects of the Middle East and South Asia in precolonial, colonial, and postcolonial societies. Anthropological, historical, and theoretical debates surrounding the region. GE credit: AH, SS, WC, WE. Effective: 2004 Summer Session 1.

MSA 111A—Great Cities of Arab Middle East and South Asia (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Some knowledge of Islamic/Middle Eastern history is very useful. In-depth examination of the great cities of North Africa, the Middle East and South Asia as cultural and historical artifacts. Topics include: the concept of the Islamic city, processes of modernity, and representations that reinforce imagination, memory and personal identity. GE credit: AH, SS, WC, WE. Effective: 2013 Fall Quarter.

MSA 112—History of South Asian Islam (4)
Discussion—1 hour; Lecture—3 hours. Comparative study of Muslim communities of South Asia. Commonalities in cultural identity and historical experience. Rise and spread of Islam, comparative history of Islamic Empires, colonial rule, and post-colonial nationalism. Effective: 2007 Fall Quarter.

MSA 121A—Shahnameh: The Persian Book of Kings (4)
Lecture/Discussion—3 hours; Term Paper. In-depth analysis of the Persian Book of Kings (Shahnameh) by Abu al-Qasim Ferdowsi (d. 1020 CE) in its historical context with a comparative perspective on the role of this work in Persian and world literature. (Comparative Literature 175.) GE credit: AH, WC, WE. Effective: 2015 Winter Quarter.

MSA 121C—A Story for a Life: The Arabian Nights (4)
Lecture/Discussion—3 hours; Term Paper. In-depth exploration of The Arabian Nights, the best-known work of pre-modern Arabic literature and a major work of world literature. Analysis of the work in its historical context and in comparison to other frame tales in world literature. (Comparative Literature 172 and Arabic 140.) GE credit: AH, WC, WE. Effective: 2016 Winter Quarter.

MSA 122A—Themes in the Arabic Novel (4)
Extensive Writing; Independent Study; Lecture/Discussion—3 hours. Class size limited to 30 students. Select modern Arabic fiction (novels and short stories) in translation. Thematically connected readings supplemented by non-fictional writings when appropriate. May be repeated up to 2 time(s) if the texts/theme of required course readings sufficiently change. GE credit: AH, OL, WC, WE. Effective: 2013 Fall Quarter.

MSA 131A—Modern Iranian Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): Upper division standing, or consent of instructor. Iranian cinema of the 20th century in the context of profound cultural and social changes in Iran especially since the Iranian Revolution. Productions by representative directors such as Kiarostami, Makhmalbaf, Bahram Beizaie are included. Knowledge of Persian not required. (Cinema & Technocultural Studies 146A.) GE credit: AH, OL, VL, WC, WE. Effective: 2013 Fall Quarter.

MSA 131B—Modern South Asia Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): Upper-division standing or consent of instructor. South Asian cinema of last 100 years in the context of cultural, social, and political changes. South Asian history, Independence, Partition, urban life, class, migration, postcolonial identity, diaspora, gender, sexuality, religion, sport, performance, etc (CTS146B/ANT147) GE credit: AH, SS, VL, WC, WE. Effective: 2017 Winter Quarter.

MSA 131C—Religion and Media in Arab World (4)
Lecture—4 hours. Exploration of the role and experience of media technologies in the Arab world. Study of digital and electronic media as well as alternative media practices. Investigation of new trends in political activism and identity formation. (Religious Studies 166.) GE credit: OL, SS, VL, WC, WE. Effective: 2014 Fall Quarter.

MSA 131D—Modern Turkish Cinema (4)
Film Viewing—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): Upper-division standing or consent of instructor. Turkish cinema of the 20th & 21st century in the context of cultural, social, & political changes. Issues covered include history, nationalism, political dissent, identity, migration, diaspora, gender, sexuality, religion, and incorporate viewpoints of Kurdish & other minority members. (CTS 146D and HIS 193E) GE credit: AH, OL, SS, VL, WC, WE. Effective: 2016 Winter Quarter.

MSA 150—Women and Islamic Discourses (4)
Lecture/Discussion—4 hours. Prerequisite(s): WMS 050; Or comparable course. Introduction to the debates/discourses about women and Islam. Transformations in debates/discourses in colonial and postcolonial periods in the Middle East & South Asia. Comparative study of debates/discourses on family, work, law, sexuality, religion, comportment, human rights, feminist and religious movements. (Women's Studies 185.) GE credit: AH, SS, WC. Effective: 2008 Fall Quarter.

MSA 151A—Iranian Society & Culture (4)
Discussion—1 hour; Lecture—2 hours; Term Paper. In-depth investigation of modern Iranian society and culture. Exploration of structures of Iranian society: family, gender, religion, minorities, economy, politics, and state. Iran's role in the globalizing world, and the role of Iranian diasporas. GE credit: AH, OL, VL, WC, WE. Effective: 2013 Spring Quarter.

MSA 180—Topics in Middle East and South Asian Studies (4)
Extensive Writing; Lecture—3 hours. Comparative perspective on the Middle East and South Asia. Topics may include: modernity, religious traditions, colonialism, subalternity and social movements, gender and sexuality, history and memory, science and development, ritual and performance, public culture, diasporas. May be repeated up to 1 time(s) topic varies. GE credit: AH, SS, WC, WE. Effective: 2004 Fall Quarter.

MSA 181A—Topics in Regional ME/SA Studies (4)
Lecture—3 hours; Term Paper. Iran & Persian topics for students specializing in region-specific Middle East and South Asia Studies. May be repeated up to 3 time(s). GE credit: AH, SS, WC, WE. Effective: 2015 Winter Quarter.

MSA 181B—Topics in Regional ME/SA Studies (4)
Lecture—3 hours; Term Paper. Indian/South Asia topics for students specializing in region-specific Middle East and South Asia Studies. May be repeated up to 3 time(s). GE credit: AH, SS, WC, WE. Effective: 2013 Fall Quarter.

MSA 181C—Topics in Regional ME/SA Studies: Arab Studies (4)
Lecture—3 hours; Term Paper. Arab Studies topics. May be repeated up to 3 time(s) when different topics and themes are studied. GE credit: AH, SS. Effective: 2013 Fall Quarter.

MSA 182A—Undergraduate Proseminar in Middle East/South Asia (4)
Seminar—3 hours; Term Paper. Prerequisite(s): MSA 100 recommended. Class size limited to 15 students. Seminar in Iran & Persian topics specializing in region-specific Middle East and South Asia studies. May be repeated up to 3 time(s). Effective: 2015 Winter Quarter.

MSA 182B—Undergraduate Proseminar in Middle East/South Asia (4)
Seminar—3 hours; Term Paper. Prerequisite(s): MSA 100 recommended. Class size limited to 15 students. Seminar in India/South Asia topics specializing in region-specific Middle East and South Asia studies. May be repeated up to 3 time(s) when different topics and themes are studied. Effective: 2012 Fall Quarter.

MSA 182C—Undergraduate Proseminar in Middle East/South Asia: Arab Studies Seminar (4)
Seminar—3 hours; Term Paper. Prerequisite(s): MSA 100 recommended. Class size limited to 15 students. Seminar in Arab Studies topics. May be repeated up to 3 time(s). GE credit: WE. Effective: 2013 Fall Quarter.

MSA 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Supervised internship on and off campus in the area of Middle East and South Asia Studies. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2018 Spring Quarter.

MSA 194H—Special Study for Honors Students (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Open only to majors of senior standing who qualify for honors program. Independent study of a problem in Middle East/South Asian studies involving the writing of an honors thesis. May be repeated up to 12 unit(s). Effective: 2009 Winter Quarter.

MSA 198—Directed Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2018 Spring Quarter.

MSA 199—Special Study for Advanced Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2018 Spring Quarter.

MSC Military Science

Courses in MSC:

MSC 011—U.S. Army Leadership and Personal Development (1)
Lecture—1 hour. Prerequisite(s): Lower division standing. United States Army, its organization, customs, courtesies, and rank structure. Course surveys personal development skills needed for effective leadership such as critical thinking, time management, and health and fitness. Familiarization with the Army ROTC program. Effective: 2011 Fall Quarter.

MSC 012—Introduction to Tactical Military Leadership (1)
Lecture—1 hour. Prerequisite(s): Lower division standing. Military leadership fundamentals to include setting direction, problem-solving, presenting briefs, and using effective writing skills. Basic military tactics, orienteering and land navigation. Dimensions of leadership values, attributes, skills, and actions. Effective: 2008 Fall Quarter.

MSC 013—Introduction to Basic Military Operations (1)
Lecture—1 hour. Prerequisite(s): Lower division standing. Basic military tactical theories and their application at the individual and squad level. Military tactical operations and basic military first aid. Effective: 2008 Fall Quarter.

MSC 014A—Introduction to Military Leadership Skills (0.5)
Laboratory—2 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Personal and organizational leadership skills introduced in leadership laboratory. Extensive supervised leadership experiences conducted in a military environment. Basic military skills necessary to function in a leadership role. (P/NP grading only.) Effective: 2008 Fall Quarter.

MSC 014B—Introduction to Military Leadership Skills (0.5)
Laboratory—2 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Continuation of development of leadership and military skills introduced in course 14A. Emphasis on the role of the individual, the basic organizational element of the Army, the squad. Supervisory controls reduced as students gain capabilities. (P/NP grading only.) Effective: 2008 Fall Quarter.

MSC 014C—Introduction to Military Leadership Skills (0.5)
Laboratory—2 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Development of skills required for promotion to junior non-commissioned officer level. Chain of command from company through individual levels. Interrelationship of squad and platoon organizations. (P/NP grading only.) Effective: 2008 Fall Quarter.

MSC 021—Military History, Study of Battles (2)
Lecture—2 hours. Prerequisite(s): MSC 022B; or Consent of Instructor. Application of the nine Principles of War to key battles in American and World history. Tactics on a strategic and operational level. Evaluation of leadership and decision-making processes of key leaders. Effective: 2008 Fall Quarter.

MSC 022A—Innovative Team Leadership (2)
Lecture—2 hours. Prerequisite(s): Lower division standing or consent of instructor. Leadership values, attributes and theories. Use of basic military skills such as land navigation and squad operations to enhance understanding of the Army. Types of military briefings. Practice in interpersonal skills. Presentation of a briefing. Effective: 2008 Fall Quarter.

MSC 022B—Foundations of Tactical Leadership (2)
Lecture—2 hours. Prerequisite(s): MSC 022A; or Consent of Instructor. Leadership of tactical teams in complex operating environment. Self-assessment of leadership style. Basic military skills: terrain analysis, patrolling and operations orders. Dynamics of adaptive leadership in the context of military operations. Effective: 2008 Fall Quarter.

MSC 024A—Individual Military Leadership Skills (0.5)
Laboratory—2 hours. Prerequisite(s): MSC 014A; MSC 014B; MSC 014C; MSC 022A (can be concurrent); or Consent of Instructor. MSC 022A required concurrently. Develop and practice personal military leadership skills in extensive supervised leadership labs. Cadets perform basic military skills, improve on troop leading procedures and lead subordinates in tactical situations. Begin with drill and ceremony, land navigation and individual movement techniques. (P/NP grading only.) Effective: 2008 Fall Quarter.

MSC 024B—Individual Military Leadership Skills (0.5)
Laboratory—2 hours. Prerequisite(s): MSC 014A; MSC 014B; MSC 014C; MSC 022B (can be concurrent); or Consent of Instructor. MSC 022B required concurrently. Development and practice of personal military leadership skills in extensive supervised leadership labs. Performance of basic military skills, improvement on troop-leading procedures, leadership of subordinates in tactical situations. (P/NP grading only.) Effective: 2008 Fall Quarter.

MSC 024C—Individual Military Leadership Skills (0.5)
Laboratory—2 hours. Prerequisite(s): MSC 014A; MSC 014B; MSC 014C; MSC 021 (can be concurrent); or Consent of Instructor. MSC 021 required concurrently. Develop and practice personal military leadership skills in extensive supervised leadership labs. Begin with drill and ceremony, land navigation and individual movement techniques. Cadets perform basic military skills, improve on troop leading procedures and lead subordinates in tactical situations. (P/NP grading only.) Effective: 2008 Fall Quarter.

MSC 131—Military Leadership and Management (2)
Lecture—2 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Leadership and management in organizational context. Team dynamics, leadership styles, professional ethics, development of a leadership framework. Management skills for planning, decision making, and organizing developed through definition of problems, development of courses of action, implementation of solutions. Effective: 2008 Fall Quarter.

MSC 132A—Advanced Military Operations (2)
Lecture—2 hours. Prerequisite(s): MSC 131; or Consent of Instructor. Upper division standing. Military small unit tactical theory as the basis for leadership development. Principles of war, contemporary operating environment, Geneva Law of Land Warfare, military offensive and defensive operations. Emphasis on development of critical thinking, problem solving, and communication skills. Effective: 2008 Fall Quarter.

MSC 132B—Applied Leadership (2)
Lecture—2 hours. Prerequisite(s): MSC 132A; or Consent of Instructor. Upper division standing. Military small unit tactical theory and application as basis for leadership development. Application of leadership styles and skills to complete problem-solving exercises and the development of an adaptable framework applicable to a variety of shifting environments and situations. Effective: 2008 Fall Quarter.

MSC 134A—Adaptive Tactical Leadership (0.5)
Laboratory—2 hours. Prerequisite(s): MSC 131; or Consent of Instructor. Upper division standing. Small unit tactical operations serve as the basis for enhancement of leadership performance through tactical application. Assessment of leadership attributes, skills, and actions through participation in a variety of leadership roles in problem-solving exercises. (P/NP grading only.) Effective: 2008 Fall Quarter.

MSC 134B—Adaptive Tactical Leadership (0.5)
Laboratory—2 hours. Prerequisite(s): MSC 132A; or Consent of Instructor. Upper division standing. Small unit tactical operations as the basis for enhancement of leadership performance through tactical application. Assessment of leadership attributes, skills, and actions through participation in a variety of leadership roles in problem-solving exercises. (P/NP grading only.) Effective: 2008 Fall Quarter.

MSC 134C—Adaptive Tactical Leadership (0.5)
Laboratory—2 hours. Prerequisite(s): MSC 132B; or Consent of Instructor. Upper division standing. Small unit tactical operations are taught, serve as basis for students exploration, development. Serve in variety of leadership roles in which leadership attributes, skills, actions are closely assessed and developed while they are faced with series of problem solving exercises. (P/NP grading only.) Effective: 2008 Fall Quarter.

MSC 141—Ethical Leadership (2)
Lecture—2 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Direct influence of leaders on individual motivation and group processes. The complexities of balancing moral, legal, and ethical obligations while applying fundamental business principles in determining the best possible outcome from competing solutions. Effective: 2008 Fall Quarter.

MSC 142—Military Law (2)
Lecture—2 hours. Prerequisite(s): MSC 141; or Consent of Instructor. Upper division standing. The United States Constitution and the Military Justice System. Basic law of war, with an emphasis on issues that might arise on the battlefield or during a national emergency. Effective: 2008 Fall Quarter.

MSC 143—U.S. Army Management Systems (2)
Lecture—2 hours. Prerequisite(s): MSC 142; or Consent of Instructor. Upper division standing. Leadership and management, focusing on four management systems: planning, organizing, leading and controlling. Practical methodologies for assessing management decisions while balancing competing ethical, economic, infrastructure and future growth trade-offs. Effective: 2008 Fall Quarter.

MSC 144A—Military Training Leadership Skills (0.5)
Laboratory—2 hours. Prerequisite(s): MSC 141; or Consent of Instructor. Upper division standing. Enhancement of student leadership performance through practical application. Small unit military tactical operations as the basis for the student exploration and development. (P/NP grading only.) Effective: 2008 Fall Quarter.

MSC 144B—Military Training Leadership Skills (0.5)
Laboratory—2 hours. Prerequisite(s): MSC 142; or Consent of Instructor. Upper division standing. Enhancement of student leadership performance through practical application. Small unit military tactical operations serve as the basis for student exploration and development. (P/NP grading only.) Effective: 2008 Fall Quarter.

MSC 144C—Military Training Leadership Skills (0.5)
Laboratory—2 hours. Prerequisite(s): MSC 143; or Consent of Instructor. Upper division standing. Enhancement of student leadership performance through practical application. Small unit military tactical operations as the basis for student exploration and development. (P/NP grading only.) Effective: 2008 Fall Quarter.

MSC 191—Special Studies in Military Science (2)
Independent Study—6 hours. Prerequisite(s): MSC 131; MSC 132A; MSC 132B; MSC 141; MSC 142; MSC 143; Consent of department chair. Intensive examination of one or more special problems in military science. Possible areas of study include leadership dimensions, principles of war, air-land battle imperatives, military strategy, the operational art and professional ethics. May be repeated up to 2 time(s) when topic differs. (P/NP grading only.) Effective: 1997 Winter Quarter.

MST Medieval Studies

Courses in MST:

MST 020A—Early Medieval Culture (5) ***Review all entries***
Discussion—1 hour; Extensive Writing; Lecture—3 hours. Readings (in translation) in medieval culture, such as Codes of Justinian, Confessions of Saint Augustine, Beowulf, the Nibelungenlied, The Song of Roland, the Summa Theologica of Thomas Aquinas, the Chronicles of Froissart, Chaucer's Canterbury Tales, and Dante's Divine Comedy. GE credit: AH, WC, WE. Effective: 2012 Fall Quarter.

MST 020A—Early Medieval Culture (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Readings (in translation) in medieval culture, such as Codes of Justinian, Confessions of Saint Augustine, Beowulf, the Nibelungenlied, The Song of Roland, the Summa Theologica of Thomas Aquinas, the Chronicles of Froissart, Chaucer's Canterbury Tales, and Dante's Divine Comedy. GE credit: AH, WC, WE. Effective: 2018 Fall Quarter.

MST 020B—The Culture of the High Middle Ages (4)
Discussion—1 hour; Lecture—3 hours. Great transformations that created the modern world: Constitutional Government, the Hundred Years War, the Black Death, and the Peasants Revolts, the Renaissance, Reformation and Counter-Reformation, and the Baroque. GE credit: AH, WC, WE. Effective: 2018 Spring Quarter.

MST 098—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

MST 098F—Student Facilitated Course (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Student facilitated course intended primarily for lower division students. (P/NP grading only.) Effective: 2017 Winter Quarter.

MST 099—Special Study for Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

MST 130A—Special Themes in Medieval Cultures (4)
Discussion—1 hour; Lecture—3 hours. Each offering concentrates on an interdisciplinary aspect of medieval
culture in the Middle East and Europe: the idea of the hero, mysticism, urban development. Extensive readings focused on medieval source material. May be repeated for credit. May be repeated for credit. GE credit: AH, WC, WE. Effective: 1997 Spring Quarter.

MST 130B—Special Themes in Renaissance Culture (4)
Discussion—1 hour; Lecture—3 hours. Each theme illuminates an interdisciplinary aspect of Renaissance culture in the eastern and western hemispheres: exploration, medical pathology, daily life, baroque culture. Immersion in source material from 1500-1650. May be repeated for credit. May be repeated for credit. GE credit: AH, WC, WE. Effective: 1997 Fall Quarter.

MST 131—Cross-Cultural Relations in the Medieval and/or Early Modern World (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): MST 020A or MST 020B; or Consent of Instructor. Medieval and/or Renaissance aspects of cross culturalism. Relations between Christians, Jews, and Muslims: Europeans, Africans, and Asians; Old World and New World. GE credit: WC, WE. Effective: 2011 Fall Quarter.

MST 189—Seminar in Medieval and Early Modern Culture (4)
Seminar—3 hours; Term Paper. Prerequisite(s): MST 020A or MST 020B; or Consent of Instructor. Focus on a particular problem or issue in the Medieval or Early Modern periods. Seminar topics might include (but not limited to) monasticism, origins of the university, chivalry, exploration, the role of women in the Medieval and Early Modern world. GE credit: WE. Effective: 2011 Fall Quarter.

MST 190—Senior Thesis (4)
Seminar—4 hours. Prerequisite(s): Senior standing and major in Medieval Studies. Preparation of a research paper dealing with a selected aspect of
medieval culture, under supervision of three members of the Committee in Charge. Effective: 1997 Winter Quarter.

MST 197T—Tutoring in Medieval Studies (1-4)
Seminar—2 hours. Prerequisite(s): MST 020A; MST 020B; Upper division standing; consent of instructor and chairperson of curriculum committee. Tutoring in Medieval Studies 20A and 20B, including leadership in small discussion groups affiliated with the course. May be repeated for credit for a total of 6 units. May be repeated up to 6 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

MST 198—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

MST 198F—Student Facilitated Course (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Student facilitated course intended primarily for upper division students. (P/NP grading only.) Effective: 2017 Winter Quarter.

MST 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

MST 199FA—Student Facilitated Course Development (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Under the supervision of a faculty member, an undergraduate student plans and develops the course they will offer under 98F/198F. (P/NP grading only.) Effective: 2017 Winter Quarter.

MST 199FB—Student Facilitated Teaching (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Student facilitated. Under the supervision of a faculty member, an undergraduate student teaches a course under 98F/198F. (P/NP grading only.) Effective: 2017 Winter Quarter.

MUS Music

Courses in MUS:

MUS 002A—Keyboard Competence, Part 1 (2)
Performance Instruction—2 hours. Prerequisite(s): MUS 006A (can be concurrent); MUS 016A (can be concurrent); Consent of Instructor. MUS 006A and MUS 016A required concurrently. Training to meet the minimum piano requirements for the major in music. Scales and simple harmonic progressions in twelve keys, both major and minor. (P/NP grading only.) GE credit: AH. Effective: 2016 Spring Quarter.

MUS 002B—Keyboard Competence, Part 2 (2)
Performance Instruction—2 hours. Prerequisite(s): MUS 002A; (MUS 006B (can be concurrent), MUS 016B (can be concurrent)); Consent of Instructor. MUS 006B and MUS 016B required concurrently. Completion of MUS 002A or demonstration of required keyboard proficiency level on diagnostic exam. Training to meet the minimum piano requirements for the major in music. Harmonic progressions, modulations and score reading at the piano. (P/NP grading only.) GE credit: AH. Effective: 2016 Spring Quarter.

MUS 002C—Keyboard Competence, Part 3 (2)
Performance Instruction—2 hours. Prerequisite(s): MUS 002B; (MUS 006C (can be concurrent), MUS 016C (can be concurrent)); Consent of Instructor. MUS 006C and MUS 016C required concurrently; completion of MUS 002B or demonstration of required keyboard proficiency level on diagnostic exam. Training to meet the minimum piano requirements for the major in music. Harmonic progressions, figured bass realization, sight reading and keyboard repertory. (P/NP grading only.) GE credit: AH. Effective: 2016 Spring Quarter.

MUS 003A—Introduction to Music Theory, Part 1 (4)
Lecture—1 hour; Recitation—3 hours. Fundamentals of music theory, ear-training, harmony, counterpoint, and analysis directed toward the development of listening and writing techniques. Intended for the general student. GE credit: AH. Effective: 2008 Fall Quarter.

MUS 003B—Introduction to Music Theory, Part 2 (4)
Lecture—1 hour; Recitation—3 hours. Prerequisite(s): MUS 003A; or Consent of Instructor. Continuation of course 3A. Development of melodic and harmonic writing skills. Basic analysis training. Intended for the general student. GE credit: AH. Effective: 2016 Spring Quarter.

MUS 006A—Elementary Theory, Part 1 (3)
Lecture—3 hours. Prerequisite(s): MUS 002A (can be concurrent); MUS 016A (can be concurrent); Courses required concurrently. Development of music writing and listening skills through the study of music fundamentals, species counterpoint, harmony, analysis of repertory. Intended primarily for music majors. GE credit: AH. Effective: 2016 Fall Quarter.

MUS 006B—Elementary Theory, Part 2 (3)
Lecture—3 hours. Prerequisite(s): MUS 002B (can be concurrent); MUS 016B (can be concurrent); Courses required concurrently. Completion of MUS 006A or demonstration of required proficiency level on diagnostic exam. Continuation of course 6A. GE credit: AH. Effective: 2016 Fall Quarter.

MUS 006C—Elementary Theory, Part 3 (3)
Lecture—3 hours. Prerequisite(s): MUS 002C (can be concurrent); MUS 016C (can be concurrent); Courses 002C and 016C required concurrently. Completion of MUS 006B or demonstration of required proficiency level on diagnostic exam. Continuation of courses 6A-B. GE credit: AH. Effective: 2016 Fall Quarter.

MUS 007A—Intermediate Theory, Part 1 (3)
Lecture—3 hours. Prerequisite(s): MUS 006C; MUS 017A (can be concurrent) Homophonic music of the Classical era with a focus on analysis of music by Haydn, Mozart, and Beethoven. Composition of pieces in the homophonic forms such as minuet and trio, theme and variations, rondo and sonata. Intended for music majors. GE credit: AH. Effective: 2016 Fall Quarter.

MUS 007B—Intermediate Theory, Part 2 (3)
Lecture—3 hours. Prerequisite(s): MUS 007A; MUS 017B (can be concurrent) Nineteenth-century harmony and voice leading through the music of the Romantic era. Focus on analysis of music by Chopin, Schumann, Brahms, Wagner, and Wolf. Composition of character pieces and songs. Intended for Music majors. GE credit: AH. Effective: 2016 Fall Quarter.

MUS 007C—Intermediate Theory, Part 3 (3)
Lecture—3 hours. Prerequisite(s): MUS 007B; MUS 017C (can be concurrent) Music of the first thirty years of the twentieth century and various analytical tools pertaining to it. Works of Debussy, Stravinsky, Schoenberg, Berg, and others. Composition of small pieces for solo instruments, voice and piano. Intended for music majors. GE credit: AH. Effective: 2016 Fall Quarter.

MUS 010—Introduction to Musical Literature (4)
Discussion—1 hour; Lecture—3 hours. Introduction to composers and major styles of Western music. Lectures, listening sections, and selected readings. For non-majors. GE credit: AH, VL, WC. Effective: 2018 Spring Quarter.

MUS 011—Musics of the World (4)
Lecture—3 hours; Listening—1 hour. Survey of selected art, folk, and popular music cultures from different parts of the world. Emphasis on understanding relationship of musical style, aesthetic principles, and performance practice to wider cultural contexts. GE credit: AH, VL, WC. Effective: 2008 Fall Quarter.

MUS 016A—Elementary Musicianship, Part 1 (2)
Lecture/Lab—2 hours. Prerequisite(s): MUS 002A (can be concurrent); MUS 006A (can be concurrent); MUS 002A and MUS 006A required concurrently. Melodic, rhythmic, and harmonic materials of Western music. Includes sight singing, explanations, drills, melodic/rhythmic/harmonic dictations, and listening analysis. GE credit: AH. Effective: 2016 Spring Quarter.

MUS 016B—Elementary Musicianship, Part 2 (2)
Lecture/Lab—2 hours. Prerequisite(s): MUS 016A; (MUS 002B (can be concurrent), MUS 006B (can be concurrent)); MUS 002B and MUS 006B required concurrently. Completion of MUS 016A or demonstration of required proficiency level on diagnostic exam. Melodic, rhythmic, and harmonic materials of Western music. Includes sight singing, explanations, drills, melodic/rhythmic/harmonic dictations, and listening analysis. GE credit: AH. Effective: 2016 Spring Quarter.

MUS 016C—Elementary Musicianship, Part 3 (2)
Lecture/Lab—2 hours. Prerequisite(s): MUS 016B; (MUS 002C (can be concurrent), MUS 006C (can be concurrent)); MUS 002C and MUS 006C required concurrently. Completion of MUS 016B or demonstration of required proficiency level on diagnostic exam. Melodic, rhythmic, and harmonic materials of Western music. Includes sight singing, explanations, drills, melodic/rhythmic/harmonic dictations, and listening analysis. GE credit: AH. Effective: 2016 Spring Quarter.

MUS 017A—Intermediate Musicianship, Part 1 (2)
Lecture/Lab—2 hours. Prerequisite(s): MUS 016C; MUS 007A (can be concurrent); Or demonstrate required proficiency level on diagnostic exam. Melodic, rhythmic, and harmonic materials of Western music. Includes sight singing, explanations, drills, melodic/rhythmic/harmonic dictations, and listening analysis. GE credit: AH. Effective: 2016 Fall Quarter.

MUS 017B—Intermediate Musicianship, Part 2 (2)
Lecture/Lab—2 hours. Prerequisite(s): MUS 017A; (MUS 007B (can be concurrent); MUS 007B required concurrently. Completion of MUS 017A or demonstration of required proficiency level on diagnostic exam. Melodic, rhythmic, and harmonic materials of Western music. Includes sight singing, explanations, drills, melodic/rhythmic/harmonic dictations, and listening analysis. GE credit: AH. Effective: 2017 Winter Quarter.

MUS 017C—Intermediate Musicianship, Part 3 (2)
Lecture/Lab—2 hours. Prerequisite(s): MUS 017B; Completion of MUS 017B or demonstration of required proficiency level on diagnostic exam; MUS 007C required concurrently. The melodic, rhythmic, and harmonic materials of Western music. Includes sight singing, explanations, drills, melodic/rhythmic/harmonic dictations, and listening analysis. GE credit: AH. Effective: 2006 Fall Quarter.

MUS 024A—Introduction to the History of Music I (3)
Lecture—3 hours. Prerequisite(s): MUS 006A (can be concurrent); or Consent of Instructor. History of music from the late Baroque to Beethoven. Intended primarily for majors in music. GE credit: AH, VL, WE. Effective: 2016 Spring Quarter.

MUS 024B—Introduction to the History of Music II (3)
Lecture—3 hours. Prerequisite(s): MUS 024A; or Consent of Instructor. History of music from the Romantic Period to the nineteenth century. Intended primarily for majors in Music. GE credit: AH, VL, WE. Effective: 2016 Spring Quarter.

MUS 024C—Introduction to the History of Music III (3)
Lecture—3 hours. Prerequisite(s): MUS 024B; or Consent of Instructor. History of music of the 20th century. Intended primarily for majors in music. GE credit: AH, VL, WE. Effective: 2016 Spring Quarter.

MUS 028—Introduction to African American Music (4)
Discussion—1 hour; Lecture/Discussion—3 hours; Listening; Project (Term Project). Survey of African American music, such as spirituals, blues, ragtime, jazz, theater, gospel, R&B, rap, and art music. Emphasis on historical and sociocultural contexts, as well as African roots. GE credit: ACGH, AH, DD, VL, WE. Effective: 2011 Fall Quarter.

MUS 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study. (P/NP grading only.) GE credit: AH. Effective: 2016 Spring Quarter.

MUS 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special study for undergraduates. (P/NP grading only.) GE credit: AH. Effective: 2016 Spring Quarter.

MUS 101A—Advanced Theory, Part 1 (4)
Lecture—3 hours; Lecture/Lab—1 hour. Prerequisite(s): MUS 007C Twentieth-century music from 1930 through 1950 and the various analytical tools pertaining to it. Works of Copland, Sessions, Schoenberg, Bartók, and Stravinsky. Composition of small pieces for piano and voice. GE credit: AH. Effective: 2017 Winter Quarter.

MUS 101B—Advanced Theory, Part 2 (4)
Lecture—3 hours; Lecture/Lab—1 hour. Prerequisite(s): MUS 101A Music from 1950 to the present and the analytical tools pertaining to it. Works of Babbit, Carter, Dallapiccola, Ligeti, Messiaen, Reich and others. Composition of small pieces for ensemble. GE credit: AH. Effective: 2016 Spring Quarter.

MUS 102—Tonal Counterpoint (4)
Lecture—3 hours; Practice—1 hour. Prerequisite(s): MUS 006C; or Consent of Instructor. Imitative tonal counterpoint with an analytical focus on the Two-Part Inventions and fugues from the The Well-Tempered Klavier by J. S. Bach. Composition of exercises and short pieces using contrapuntal techniques. Intended for music majors. GE credit: AH. Effective: 2017 Winter Quarter.

MUS 103—Workshop in Composition (3)
Workshop—3 hours. Prerequisite(s): MUS 006C; or Consent of Instructor. Workshop in musical composition for undergraduates who are interested in pursuing serious compositional studies and intending to follow the composition track of the major. Course will explore the techniques and materials of musical composition. May be repeated for credit. GE credit: AH. Effective: 2016 Spring Quarter.

MUS 105—History and Analysis of Jazz (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MUS 003A or MUS 010 or MUS 028; or Consent of Instructor. Jazz and the evolution of jazz styles in historical and cultural context. For non-majors. GE credit: ACGH, AH, DD, WE. Effective: 2017 Winter Quarter.

MUS 106—History of Rock Music (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MUS 003A or MUS 010 or MUS 028; or Consent of Instructor. Rock and the evolution of rock styles in historical and cultural context. For non-majors. GE credit: ACGH, AH, VL, WE. Effective: 2017 Winter Quarter.

MUS 107A—Computer and Electronic Music (3)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Limited enrollment. Studies in electronic and computer music composition. The principles and procedures of composition in various electronic media are explored through compositional exercises. Limited enrollment. GE credit: AH. Effective: 2016 Spring Quarter.

MUS 107B—Handmade Electronic Music (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): MUS 107A; Consent of Instructor. Hacking, bending, and creating electronic circuits to make sound. Learning to read circuit diagrams, to build prototypes, and to solder components together. Repertoire study. GE credit: AH. Effective: 2018 Winter Quarter.

MUS 108A—Orchestration (2)
Lecture—2 hours. Prerequisite(s): MUS 006C; or Consent of Instructor. Techniques of orchestration from study of basic instrumental techniques to analysis of orchestral scores and scoring for various instrumental combinations. GE credit: AH, VL. Effective: 2016 Spring Quarter.

MUS 108B—Orchestration (2)
Lecture—2 hours. Prerequisite(s): MUS 108A; or Consent of Instructor. Techniques of orchestration from study of basic instrumental techniques to analysis of orchestral scores and scoring for various instrumental combinations. GE credit: AH, VL. Effective: 2016 Spring Quarter.

MUS 110A—The Music of a Major Composer: Beethoven (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MUS 010 or MUS 003A; or Consent of Instructor. Work of Beethoven will be studied in the context of his time and his contemporaries. Lectures, discussion/guided listening sections, and selected readings. For non-majors. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

MUS 110B—The Music of a Major Composer: Stravinsky (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MUS 010 or MUS 003A; or Consent of Instructor. Work of Stravinsky will be studied in the context of his time and his contemporaries. Lectures, discussion/guided listening sections, and selected readings. For non-majors. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

MUS 110C—The Music of a Major Composer: Bach (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MUS 010 or MUS 003A; or Consent of Instructor. Work of Bach will be studied in the context of his time and his contemporaries. Lectures, discussion/guided listening sections, and selected readings. For non-majors. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

MUS 110D—The Music of a Major Composer: Mozart (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MUS 010 or MUS 003A; or Consent of Instructor. Work of Mozart will be studied in the context of his time and his contemporaries. Lectures, discussion/guided listening sections, and selected readings. For non-majors. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

MUS 110E—The Music of a Major Composer: Haydn (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MUS 010 or MUS 003A; or Consent of Instructor. Work of Haydn in the context of his time and his contemporaries. Lectures, discussion/guided listening sections, and selected readings. For non-majors. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

MUS 110F—American Masters (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MUS 010 or MUS 003A; or Consent of Instructor. Overview of American concert music by master composers from Charles Ives to the present. Lectures, discussion/guided listening sections, and selected readings. For non-majors. GE credit: ACGH, AH, DD, VL, WE. Effective: 2016 Spring Quarter.

MUS 110G—Music of a Major Composer--Handel (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MUS 010 or MUS 003A; or Consent of Instructor. Work of Handel in the context of his time and his contemporaries. Lectures, discussion/guided listening sections, and selected readings. For non-majors. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

MUS 112A—Jazz Fundamentals (2)
Lecture/Lab—2 hours. Prerequisite(s): MUS 003A C- or better; or Consent of Instructor. Concurrent enrollment with MUS 140 or MUS 146 required. Fundamentals of Jazz music theory, ear training, harmony and composition techniques. Designed to complement participation in Jazz Combo or Jazz Band. First course of a three course sequence. GE credit: AH. Effective: 2017 Winter Quarter.

MUS 112B—Jazz Theory (2)
Lecture/Lab—2 hours. Prerequisite(s): MUS 112A C- or better; Consent of Instructor. Concurrent enrollment in MUS 140 or MUS 146 required. Intermediate level Jazz music theory, ear training, harmony, and composition techniques including improvisation. Designed to complement participation in Jazz Combo or Jazz Band. Second course of a sequence. GE credit: AH. Effective: 2017 Winter Quarter.

MUS 112C—Jazz Composition (2)
Lecture/Lab—2 hours. Prerequisite(s): MUS 112B C- or better; Consent of Instructor. Concurrent enrollment in MUS 140 required. Jazz compositions and arranging in different styles using techniques of Jazz theory, harmony and improvisation. Third course of a sequence. GE credit: AH. Effective: 2017 Winter Quarter.

MUS 113—Introduction to Conducting (2)
Lecture—1 hour; Performance Instruction—1 hour. Prerequisite(s): MUS 006C; or Consent of Instructor. Principles and techniques of conducting as they apply to both choral and instrumental ensembles. GE credit: AH. Effective: 2016 Spring Quarter.

MUS 114—Intermediate Conducting (2)
Lecture—1 hour; Performance Instruction—1 hour. Prerequisite(s): MUS 113; or Consent of Instructor. Intermediate conducting with a continued focus on principles and techniques as they apply to both choral and instrumental ensembles. GE credit: AH. Effective: 2016 Spring Quarter.

MUS 115—History of Film Music (4)
Film Viewing—3 hours; Lecture—3 hours. Prerequisite(s): MUS 003A or MUS 010; or Consent of Instructor. Film music from silent films to movies of the past decade. How music supports and shapes film narrative and structure. Use of jazz, rock and classical music in film. GE credit: AH, VL, WE. Effective: 2016 Spring Quarter.

MUS 116—Introduction to the Music of The Beatles (4)
Lecture—3 hours; Listening—1 hour. Prerequisite(s): MUS 003A or MUS 010; or Consent of Instructor. Survey of music of The Beatles, focusing on the songs of Lennon and McCartney. Emphasis on understanding their evolution as musicians, composers and cultural figures. Discussion of their musical influences in wider cultural contexts. GE credit: AH, VL, WC. Effective: 2016 Spring Quarter.

MUS 117—The Broadway Musical (4)
Discussion—1 hour; Lecture—3 hours. Exploration of a variety of Broadway and film musicals from different time periods, and how musicals reflect and help create social reality, and the different aspects of the creative process as manifested through music, dance, scenery, and acting. GE credit: AH, DD, VL. Effective: 2018 Winter Quarter.

MUS 121—Topics in Music Scholarship (4)
Seminar—4 hours. Prerequisite(s): MUS 006C; MUS 024C; or Consent of Instructor. Sources and problems of a historical period or musical style selected by the instructor and announced in advance. May be repeated for credit. May be repeated for credit. GE credit: AH, OL. Effective: 2016 Spring Quarter.

MUS 122—Topics in Analysis and Theory (4)
Seminar—4 hours. Prerequisite(s): MUS 006C; MUS 024C; or Consent of Instructor. Analysis of works of a composer or musical style selected by the instructor and announced in advance. Consideration of theoretical issues. May be repeated for credit. May be repeated for credit. GE credit: AH, OL. Effective: 2016 Spring Quarter.

MUS 123—Music as Culture (3)
Lecture/Discussion—3 hours. Prerequisite(s): MUS 024C; or Consent of Instructor. Introduction to the study of music in cross-cultural perspective. Basic theories and frameworks of ethnomusicology; in-depth case studies of three musical traditions from around the world. Intended for music majors. GE credit: AH, WC, WE. Effective: 2017 Winter Quarter.

MUS 124A—History of Western Music: Middle Ages to 1600 (3)
Lecture—3 hours. Prerequisite(s): MUS 024C; or Consent of Instructor. Historical survey of composers and musical styles from the Middle Ages to the beginning of the 17th century. GE credit: AH, VL, WE. Effective: 2016 Spring Quarter.

MUS 124B—History of Western Music: 1600-1750 (3)
Lecture—3 hours. Prerequisite(s): MUS 124A; or Consent of Instructor. Historical survey of composers and musical styles from the late 1500s to the mid-18th century. GE credit: AH, VL, WE. Effective: 2016 Spring Quarter.

MUS 126—American Music (4)
Lecture—3 hours; Listening—1 hour. Prerequisite(s): MUS 010 or MUS 003A; or Consent of Instructor. Introductory survey of American musics, including Native American music, Hispanic polyphony, New England psalmody, and selected 20th-century composers and styles. GE credit: ACGH, AH, DD, WE. Effective: 2016 Spring Quarter.

MUS 127—Music from Latin America (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Examination of music from Latin America. Characteristic music (i.e., tango, bossa nova, salsa, musica motena, musica andina) as well as its implications in other musical genres. Taught in English or Spanish depending on instructor. May be repeated up to 1 time(s) when topic differs. Not open to students who have taken SPA 171S or MUS 127S. (Spanish 171) GE credit: AH, VL, WC, WE. Effective: 2018 Winter Quarter.

MUS 127S—Music from Latin America (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Examination of music from Latin America. Characteristic music (i.e. tango, bossa nova, salsa, musica motena, musica andina) as well as its implications in other musical genres. Taught in Spanish or English depending on instructor. May be repeated up to 1 time(s) when content differs. Not open to students who have taken SPA 171 or MUS 127. (Spanish 171S) GE credit: AH, VL, WC, WE. Effective: 2018 Winter Quarter.

MUS 129A—Musics of the Americas (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MUS 011 or MUS 003A or MUS 010; or Consent of Instructor. Survey of music cultures from North, Central, and South America, including the Caribbean, with emphasis on the role of music in society and on the elements of music (instruments, theory, genres and form, etc.). Introduction to ethnomusicological theory, methods, approaches. GE credit: AH, DD, VL, WC, WE. Effective: 2016 Spring Quarter.

MUS 129B—Musics of Africa, Middle East, Indian Subcontinent (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MUS 011 or MUS 003A or MUS 010; or Consent of Instructor. Survey of music cultures with special emphasis on the role of music in society and on the elements of music (instruments, theory, genres and form, etc.). Introduction to ethnomusicological theory, methods, approaches. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

MUS 129C—Musics of East and Southeast Asia (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MUS 011 or MUS 003A or MUS 010; or Consent of Instructor. Survey of music cultures from Japan, China, Korea, Vietnam, and Indonesia, with special emphasis on the role of music in society and on the elements of music (instruments, theory, genres and form, etc.). Introduction to ethnomusicological theory, methods, approaches. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

MUS 129D—Folk Musics of Europe (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MUS 011 or MUS 003A or MUS 010; or Consent of Instructor. Survey of folk musics from all of Europe, with emphasis on the role of music in society and on the elements of music (instruments, genres, form, etc.). Introduction to ethnomusicological theory, methods, approaches. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

MUS 130A—Applied Study of Music: Advanced; Voice (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; Voice. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130B—Applied Study of Music: Advanced; Piano (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; Piano. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130C—Applied Study of Music: Advanced; Harpsichord (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; Harpsichord. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130D—Applied Study of Music: Advanced; Organ (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; Organ. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130E—Applied Study of Music: Advanced: Violin (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; Violin. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130F—Applied Study of Music: Advanced; Viola (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; Viola. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130G—Applied Study of Music: Advanced; Cello (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; Cello. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130H—Appied Study of Music: Advanced; Double Bass (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; Double Bass. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130I—Applied Study of Music: Advanced; Flute (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; Flute. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130J—Applied Study of Music: Advanced; Oboe (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; Oboe. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130K—Applied Study of Music: Advanced; Clarinet (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; Clarinet. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130L—Applied Study of Music: Advanced; Bassoon (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; Bassoon. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130M—Applied Study of Music: Advanced; French Horn (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; French Horn. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130N—Applied Study of Music: Advanced; Trumpet (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; Trumpet. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130O—Applied Study of Music: Advanced; Trombone (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; Trombone. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130P—Applied Study of Music: Advanced; Tuba (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; Tuba. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130Q—Applied Study of Music: Advanced; Percussion (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section; Percussion. Offered as demand indicates. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 130R—Applied Study of Music: Advanced; Classical Guitar (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Admission by audition. Class instruction, arranged by section. Offered as demand indicates. May be repeated for credit. Effective: 2016 Fall Quarter.

MUS 131A—Applied Study of Music: Advanced (Individual) (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in voice. May be repeated for credit. Effective: 2016 Fall Quarter.

MUS 131B—Applied Study of Music: Advanced (Individual); Piano (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in Piano. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 131C—Applied Study of Music: Advanced (Individual); Harpsichord (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in Harpsichord. May be repeated for credit. Effective: 2016 Winter Quarter.

MUS 131D—Applied Study of Music: Advanced (Individual); Organ (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in Organ. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 131E—Applied Study of Music: Advanced (Individual); Violin (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in Violin. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 131F—Applied Study of Music: Advanced (Individual); Viola (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Open to Music majors only; admission by audition. Individual instruction in Viola. May be repeated for credit. Effective: 1997 Fall Quarter.

MUS 131G—Applied Study of Music: Advanced (Individual); Cello (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in Cello. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 131H—Applied Study of Music; Advanced (Individual); Double Bass (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in Double Bass. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 131I—Applied Study of Music: Advanced (Individual); Flute (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in Flute. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 131J—Applied Study of Music: Advanced (Individual); Oboe (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in Oboe. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 131K—Applied Study of Music: Advanced (Individual); Clarinet (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in Clarinet. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 131L—Applied Study of Music: Advanced (Individual); Bassoon (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in Bassoon. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 131M—Applied Study of Music: Advanced (Individual); French Horn (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in French Horn. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 131N—Applied Study of Music: Advanced (Individual); Trumpet (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in Trumpet. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 131O—Applied Study of Music: Advanced (Individual);Trombone (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in Trombone. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 131P—Applied Study of Music: Advanced (Individual); Tuba (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in Tuba. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 131Q—Applied Study of Music: Advanced (Individual); Percussion (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in Percussion. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 131R—Applied Study of Music: Advanced (Individual); Classical Guitar (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Individual instruction in Classical Guitar. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 131U—Applied Study of Music: Advanced (Individual); Saxophone (2)
Independent Study—5 hours; Performance Instruction—0.5 hours. Prerequisite(s): Consent of Instructor. Open to Music majors only; admission by audition. Individual instruction in Saxophone. May be repeated for credit. Effective: 2016 Fall Quarter.

MUS 132—Singing for Actors (1)
Performance Instruction—1 hour. Prerequisite(s): Consent of Instructor. Elements of basic singing techniques, through selected exercises, vocalises, and songs. May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: AH. Effective: 2016 Spring Quarter.

MUS 140—University Jazz Band (2)
Practice; Rehearsal—2 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Open to students in any major. rehearsal, study, and performance of jazz band music and full variety of jazz band style, including swing, be-bob, and contemporary jazz styles. May be repeated for credit. (P/NP grading only.) GE credit: AH. Effective: 2017 Spring Quarter.

MUS 141—University Symphony (2)
Rehearsal—4 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Open to any student in the University whose proficiency meets the requirements of concert performance. Sight-reading, rehearsal and performance of music from the orchestral literature. May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: AH. Effective: 2016 Spring Quarter.

MUS 142—University Chamber Singers (2)
Rehearsal—3 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Rehearsal and performance of works for small choral group. May be repeated for credit. (P/NP grading only.) GE credit: AH. Effective: 2016 Spring Quarter.

MUS 143—University Concert Band (2)
Rehearsal—4 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Open to any student in the University whose proficiency meets the
requirements of concert performance. Rehearsal and performance of music for band. May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: AH. Effective: 2016 Spring Quarter.

MUS 144—University Chorus (2)
Rehearsal—4 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Open to any student in the University. Rehearsal and performance of choral music. May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: AH. Effective: 2016 Spring Quarter.

MUS 145—Early Music Ensemble (2)
Rehearsal—4 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Rehearsal and performance of Medieval, Renaissance, and Baroque music for vocal ensemble and historical instruments. May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: AH. Effective: 2016 Fall Quarter.

MUS 146—Chamber Music Ensemble (1)
Practice—1 hour; Rehearsal—2 hours. Prerequisite(s): Consent of Instructor. Admission by audition. Open to any student in the University whose proficiency meets the requirements of concert performance. Study, rehearsal, and performance of ensemble music for strings, winds, voice, piano, harpsichord, and organ. May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: AH. Effective: 2016 Fall Quarter.

MUS 147—University Wind Ensemble (2)
Rehearsal—4 hours. Prerequisite(s): Consent of Instructor. Rehearsal, study, and performance of a full variety of wind ensemble music; and to have students share their work in public performances. May be repeated for credit. (P/NP grading only.) GE credit: AH. Effective: 2016 Fall Quarter.

MUS 148—Hindustani Vocal Ensemble (2)
Rehearsal—2 hours. Prerequisite(s): Consent of Instructor. Basics of Hindustani music through theory and practice. Fundamentals of raga (mode) and tala (rhythms) with special emphasis on improvisation, a central feature of khyal (singing style). Five ragas each quarter. May be repeated up to 6 time(s). (P/NP grading only.) GE credit: AH. Effective: 2016 Fall Quarter.

MUS 149—Indonesian Gamelan Ensemble (2)
Rehearsal—2 hours. Prerequisite(s): Consent of Instructor. Indonesian music practice. Basic instrumental technique and repertory.
Focus on two styles of Sundanese gamelan (tuned percussion orchestras):
salendro and degung. May be repeated for credit. (P/NP grading only.) GE credit: AH. Effective: 2016 Spring Quarter.

MUS 150—Brasilian Samba School (2)
Rehearsal—2 hours. Prerequisite(s): Consent of Instructor. Practice of Brasilian music. Basic instrumental technique and repertory. Focus on the percussion traditions of Rio de Janeiro and Bahia. May be repeated up to 6 time(s). (P/NP grading only.) GE credit: AH. Effective: 2016 Spring Quarter.

MUS 151—Korean Percussion Ensemble (2)
Listening—2 hours; Practice—2 hours; Rehearsal—2 hours. Prerequisite(s): Consent of Instructor. Class size limited to 20 students. Practice of Korean percussion styles. Basic instrumental technique and repertory. Focus on the percussion traditions of samulnori and basic concepts of p'ungmul. May be repeated up to 6 time(s). (P/NP grading only.) GE credit: AH. Effective: 2016 Spring Quarter.

MUS 192—Internship in Music (1-4)
Internship—3-12 hours. Prerequisite(s): Consent of instructor or academic advisor. Student must submit a written proposal to an appropriate Music Department instructor. Internship outside the university related to music. May be repeated up to 8 unit(s). (P/NP grading only.) GE credit: AH. Effective: 2016 Fall Quarter.

MUS 194HA—Special Study for Honors Students (2-4)
Independent Study—6-12 hours. Prerequisite(s): MUS 007C; MUS 123; Consent of Instructor. Open only to students who qualify for the honors program and admission to music Senior Honors Program. Preparation and presentation of a culminating project, under the supervision of an instructor, in one of the creative or scholarly areas of music. GE credit: AH. Effective: 2016 Spring Quarter.

MUS 194HB—Special Study for Honors Students (2-4)
Independent Study—6-12 hours. Prerequisite(s): MUS 194HA; and Consent of Instructor. Open only to students who qualify for honors program and admission to Music Senior Honors Program. Preparation and presentation of a culminating project, under the supervision of an instructor, in one of the creative or scholarly areas of music. GE credit: AH. Effective: 2016 Spring Quarter.

MUS 195—Senior Project (2)
Project (Term Project)—6 hours. Prerequisite(s): MUS 007C; MUS 123; Consent of Instructor. Preparation of a senior project in music composition (public presentation of a new work), in music performance (a public recital), or in music history and theory (public presentation of research results). GE credit: AH. Effective: 2016 Fall Quarter.

MUS 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Directed group study. (P/NP grading only.) GE credit: AH. Effective: 2016 Spring Quarter.

MUS 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Special study for advanced undergraduates. (P/NP grading only.) GE credit: AH. Effective: 2016 Spring Quarter.

MUS 202—Notation (4)
Seminar—3 hours; Term Paper. Open to graduate students in music; advanced undergraduates with consent of instructor. Study of musical notation; investigation of techniques for editing Medieval and Renaissance music. Effective: 2016 Spring Quarter.

MUS 203—Music Composition (4)
Seminar—3 hours; Term Paper. Open to graduate students in music; advanced undergraduates with consent of instructor. Technical projects that explore compositional problems, the skill and techniques with which to solve them, and free composition. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 204—Advanced Conducting (3)
Practice; Tutorial—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in conducting. Technical aspects of conducting and the broader issues in music history and analysis that conductors must face before leading a rehearsal or performance. May be repeated for credit. Effective: 2016 Fall Quarter.

MUS 207—Advanced Electronic and Computer Music (4)
Seminar—2 hours. Prerequisite(s): MUS 107A; MUS 107B; MUS 107C; Consent of Instructor. Advanced composition of computer and electronic music. Effective: 2016 Spring Quarter.

MUS 210A—Proseminar in Music (Theory and Analysis) (4)
Seminar—3 hours; Term Paper. Open to graduate students in music; advanced undergraduates with consent of instructor. Voice-leading analysis of tonal music derived from Schenker and pitchclass set theory. Recent work on compositional design, generalizations of the concept of interval, psychologically oriented music theory, and theories of durational structure and timbre. Effective: 2016 Spring Quarter.

MUS 210B—Proseminar in Music (Musicology and Criticism) (4)
Seminar—3 hours; Term Paper. Open to graduate students in music; advanced undergraduates with consent of instructor. Issues and concepts of music history, including performance practice questions for specific repertoires and periods; principles, aims, and methods of archival study; historical theory; evolution of musical styles; philosophical debates about goals and aims of the discipline in general. Effective: 2016 Spring Quarter.

MUS 210C—Proseminar in Music (Ethnomusicology) (4)
Seminar—3 hours; Term Paper. Open to graduate students in music; advanced undergraduates with consent of instructor. Introduction to ethnomusicology through its intellectual history, theoretical approaches, analytical techniques, and methodologies. Effective: 2016 Spring Quarter.

MUS 212—Ethics of Musical Ethnography (4)
Fieldwork; Seminar—3 hours. Open to graduate students in music. Advanced undergraduates with consent of instructor. Role, methodology, perception, and assumptions of the ethnomusicologist in ethnographic scholarship. Examination of complex ethical and political questions in relation to practical fieldwork techniques. Effective: 2016 Fall Quarter.

MUS 213—Transcription and Notation (4)
Project (Term Project); Seminar—3 hours. Open to graduate students in music. Advanced undergraduates with consent of instructor. Practical instruction in the transcription and analysis of primarily non-Western musics. Analytical and theoretical issues, the politics of representation, and the cultural values and ideologies implicit in notation. Effective: 2016 Fall Quarter.

MUS 214—Recent Issues in Ethnomusicology (4)
Seminar—3 hours; Term Paper. Open to graduate students in music; advanced undergraduates with consent of instructor. Issues, schools of thought, and basic literature in ethnomusicology from the 1980s to present. Emphasis on theory and methodology. Effective: 2016 Spring Quarter.

MUS 221—Topics in Music History (4)
Seminar—3 hours. Open to graduate students in music; advanced undergraduates with consent of instructor. Studies in selected areas of music history and theory. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 222—Techniques of Analysis (4)
Seminar—3 hours. Open to graduate students in music; advanced undergraduates with consent of instructor. Analysis and analytical techniques as applied to music of all historical style periods. May be repeated for credit. Effective: 2016 Spring Quarter.

MUS 223—Topics in Ethnomusicology (4)
Seminar—4 hours. Prerequisite(s): Open to graduate students in music. Advanced undergraduates with consent of instructor. Intended for graduate students in Music; Anthropology students may enroll with consent of instructor. In-depth ethnomusicological studies of selected cultures and their musics; study of historical, theoretical, contextual, and cultural features. May be repeated for credit. Effective: 2016 Fall Quarter.

MUS 299—Individual Study (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

MUS 396—Teaching Assistant Training Practicum (1-4)
Variable—3-12 hours. Prerequisite(s): Consent of Instructor. Teaching Assistant Training Practicum May be repeated for credit. (S/U grading only.) Effective: 1998 Winter Quarter.

NAS Native American Studies

Courses in NAS:

NAS 001—Introduction to Native American Studies (4)
Discussion—1 hour; Lecture—3 hours. Introduction to Native American Studies with emphasis upon basic concepts relating to Native American historical and political development. GE credit: ACGH, DD, SS, WC, WE. Effective: 2011 Fall Quarter.

NAS 005—Introduction to Native American Literature (4)
Lecture/Discussion—4 hours. Prerequisite(s): Completion of Subject A requirement. Intensive focus on analysis of Native American literary texts, with frequent writing assignments to develop critical thinking and composition skills. GE credit: AH, DD, OL, WE. Effective: 2011 Fall Quarter.

NAS 007—Indigenous and Minority Languages (4)
Discussion—1 hour; Lecture—3 hours. Survey of the status of indigenous, immigrant, and other minority languages in the Americas and around the world. Topics include linguistic diversity, language endangerment and revitalization, heritage language maintenance in immigrant communities, and language change due to transcultural interactions. GE credit: AH, DD, SS, WC, WE. Effective: 2015 Fall Quarter.

NAS 010—Native American Experience (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the diverse cultures of Native American peoples from North, Central, and South America. Emphasis on Native American voices in the expression of cultural views and in the experience of conflicting values. GE credit: AH, DD, SS, WC, WE. Effective: 2011 Fall Quarter.

NAS 012—Native American/Indigenous Film (4)
Discussion—1 hour; Film Viewing; Lecture—3 hours. Survey and analysis of the visual colonization of Native American peoples and the contemporary responses by Native American/Indigenous filmmakers claiming visual sovereignty. Examines a range of filmic genres including documentary, features, shorts, festivals, TV and Internet screening. GE credit: ACGH, AH, DD, SS, VL, WC, WE. Effective: 2011 Fall Quarter.

NAS 032—Native American Music and Dance (4)
Lecture/Discussion—4 hours. Introduction to the music and dance of the native peoples of the Americas. Students will study secular native music and dance from a cross-section of regions and tribes. Effective: 1997 Winter Quarter.

NAS 033—Introduction to Native American Art (4)
Lecture—4 hours. Introduction to Native American Art from throughout North America, inclusive of traditional forms, techniques and designs in a range of media including ceramics, basketry, fiberwork, carving, painting, sculpture and photography within a context of social and political history. GE credit: ACGH, AH, DD, OL, SS, VL, WE. Effective: 2012 Fall Quarter.

NAS 034—Native American Art Studio (4)
Lecture—2 hours; Studio—6 hours. Limited enrollment. Studio projects to be influenced by contemporary and traditional Native American arts. Examples of designs and media presented in lectures will be of indigenous origin. Introduction and familiarized with various materials and techniques. GE credit: ACGH, AH, DD, OL, VL, WC. Effective: 2011 Fall Quarter.

NAS 046—Orientation to Research in Native American Studies (4) ***Review all entries***
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Native American Studies major or minor, or consent of instructor. Limited enrollment. Introduces students to basic research resources pertinent to Native American subjects available in the region, including libraries, archives, museums, etc. Emphasis is upon learning to use documentary resources or other collections of data. Students will carry out individual projects. Effective: 1997 Winter Quarter.

NAS 046—Orientation to Research in Native American Studies (4) ***Review all entries Discontinued***
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Native American Studies major or minor, or consent of instructor. Limited enrollment. Introduces students to basic research resources pertinent to Native American subjects available in the region, including libraries, archives, museums, etc. Emphasis is upon learning to use documentary resources or other collections of data. Students will carry out individual projects. Effective: 2018 Fall Quarter.

NAS 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2007 Winter Quarter.

NAS 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

NAS 101—Contemporary Native American Art (4)
Extensive Writing; Lecture—3 hours. Examination of contemporary artworks by selected Native American and Indigenous Master artists, in a wide range of media, including ceramics, metal arts, photography, video, painting, installation and performance within a context of political and social histories. GE credit: ACGH, AH, DD, OL, SS, VL, WE. Effective: 2012 Fall Quarter.

NAS 107—Special Topics in Native American Languages (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Investigation of various subjects in contemporary and historical Native American language studies. May be repeated for credit when a different
topic is studied. May be repeated for credit. Effective: 1997 Winter Quarter.

NAS 108—Indigenous Languages of California (4)
Lecture/Discussion—3 hours; Term Paper. Survey of the indigenous languages of the California region: linguistic prehistory, languages at first European contact, subsequent language loss, current efforts at language and cultural revitalization, indigenous languages of recent immigrants to California. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Spring Quarter.

NAS 109—Native American Language Spotlight (4)
Discussion—1 hour; Lecture—3 hours. In-depth examination of the history, structure, and sociolinguistics of a particular Native American language or language family. Different language studied each time the course is offered. Oral proficiency component included in some years. May be repeated for credit May be repeated for credit when a different language/language family is the focus of the course. GE credit: AH, SS, WC, WE. Effective: 2018 Winter Quarter.

NAS 110A—Quechua Language and Society, Beginning Level 1 (4)
Lecture/Discussion—4 hours. Not open to students who took course 107 in the Fall quarter of 2007. Quechua language and society emphasizing the practical use of the language. Provides the student with some basic Quechua communication skills and with an initial knowledge about contemporary Andean society and the status of Quechua language today. GE credit: SS. Effective: 2012 Spring Quarter.

NAS 110B—Quechua Language and Society, Beginning Level 2 (4)
Lecture/Discussion—4 hours. Prerequisite(s): NAS 110A Second Level of the teaching of Quechua language and society. Emphasis on development of conversational and reading skills. Continuation of the study of aspects of contemporary Andean society and the status of Quechua language today. GE credit: SS. Effective: 2012 Fall Quarter.

NAS 110C—Quechua Language and Society, Intermediate Level 1 (4)
Lecture/Discussion—4 hours. Prerequisite(s): NAS 110A; NAS 110B Third level of the teaching of Quechua language and society. Emphasis on development of conversational and reading skills. Introduction to more complex grammatical structures. Continuing the study of contemporary Andean society and the status of Quechua language today. GE credit: SS. Effective: 2012 Fall Quarter.

NAS 110D—Quechua Language and Society, Intermediate Level 2 (4)
Lecture/Discussion—4 hours. Prerequisite(s): NAS 110A; NAS 110B; NAS 110C Fourth level of the teaching of Quechua language and society. Emphasis on complex structural patterns while emphasizing conversational skills and improving reading competence. Study of different sociopolitical processes that have affected Andean identity and the status of Quechua language. GE credit: SS. Effective: 2012 Fall Quarter.

NAS 115—Native Americans in the Contemporary World (4)
Lecture/Discussion—4 hours. Prerequisite(s): Upper division standing or consent of instructor. Important issues facing Native Americans in the contemporary world. Focus primarily on the diverse ways of life, histories and realities of indigenous people throughout the Americas as they develop their own cultural and political institutions. GE credit: ACGH, AH, DD, OL, SS, WE. Effective: 2016 Fall Quarter.

NAS 116—Native American Traditional Governments (4)
Lecture—4 hours. Prerequisite(s): NAS 001; ANT 002 Study of selected Native American Tribal Governments, confederations, leagues, and alliance systems. Effective: 1997 Winter Quarter.

NAS 117—Native American Governmental Decision Making (4)
Lecture—4 hours. Prerequisite(s): NAS 116; POL 002; ANT 123 recommended. Native American governmental and community decision making with emphasis on federal and state programs, tribal sovereignty, current political trends and funding for tribal services. Effective: 1997 Winter Quarter.

NAS 118—Native American Politics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Upper division standing or consent of instructor. Examination of the various interest groups and movements found among Native people and how they relate to the determination of Indian affairs. Study of political action available to Native groups, and local communities, along with relevant theory relating to underdevelopment. GE credit: ACGH, DD, SS, WC, WE. Effective: 2016 Spring Quarter.

NAS 119—Introduction to Federal Indian Law (4)
Lecture—3 hours; Term Paper. Introduction to the foundational cases and statutes of federal Indian law, from European Contact through the 20th century. GE credit: ACGH, SS, WE. Effective: 2011 Fall Quarter.

NAS 120—Ethnopolitics of South American Indians (4)
Lecture/Discussion—4 hours. Prerequisite(s): NAS 001; (NAS 010 or NAS 055) Social, political, cultural movements of indigenous South Americans in response to establishment, expansion of European colonialism, post-colonial nation-states. Ethnopolitical processes developed through interactions between Indians, Euroamericans. Socioethnographic analysis of main indigenous areas and the development of national societies. Effective: 1997 Winter Quarter.

NAS 121—Corporate Colonialism (4)
Lecture/Discussion—4 hours. Prerequisite(s): NAS 001, NAS 010 or NAS 012 encouraged, but not required. Price of progress and modernity for native and non-native people. History of the corporation and neoliberalism, military and intelligence agencies, debt, Taylorism, education institutions, media, and law. Discussion of alternatives advocated by contemporary and indigenous social movements. GE credit: ACGH, DD, SS, WC, WE. Effective: 2015 Fall Quarter.

NAS 122—Native American Community Development (4)
Lecture—4 hours. Prerequisite(s): NAS 001 or NAS 010 Application of community development theory and techniques to the
development problems of Native American communities. GE credit: ACGH, DD, OL, SS, WE. Effective: 2012 Fall Quarter.

NAS 123—Native Foods and Farming of the Americas (4)
Lecture/Discussion—4 hours. Crop domestication, agrodiversity, and cuisines of the Americas. Cultural and social history of native American foods like maize, potatoes, quinoa, chocolate, peppers, beans, avocados, etc. Discussion of socio-economic, environmental, legal challenges facing indigenous and peasant farmers today. GE credit: DD, OL, SE, SS, WC. Effective: 2016 Spring Quarter.

NAS 125—Performance and Culture Among Native Americans (4)
Film Viewing—3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Interdisciplinary study of public expressive forms among Native Americans. Comparison and analysis of music, dances, rituals, and dramas from throughout North, Central, and South America in their social and cultural contexts. Extensive film viewing. Not open for credit to students who have completed MUS 125. GE credit: AH, SS, WC, WE. Effective: 2018 Spring Quarter.

NAS 130A—Native American Ethno-Historical Development (4)
Lecture—4 hours. Prerequisite(s): Upper division standing or consent of instructor. Study of Native American ethno-history in North America before 1770s. GE credit: ACGH, DD, SS, WC, WE. Effective: 2016 Spring Quarter.

NAS 130B—Native American Ethno-Historical Development (4)
Lecture/Discussion—4 hours. Prerequisite(s): Upper division standing or consent of instructor. Study of Native American ethno-history in North America, 1770-1890. GE credit: ACGH, DD, SS, WE. Effective: 2016 Spring Quarter.

NAS 130C—Native American Ethno-Historical Development (4)
Lecture/Discussion—4 hours. Prerequisite(s): Upper division standing or consent of instructor. Study of Native American ethno-history in North America after 1890. GE credit: ACGH, DD, SS, WE. Effective: 2016 Spring Quarter.

NAS 133—Ethnohistory of Native People of Mexico and Central America (4)
Lecture/Discussion—4 hours. Ethnohistorical development of pre-colonial, colonial, post-colonial Mexican and Central American indigenous people; the impact of economic and political factors on the process of cultural adaptation. Attention is given to the questions of nation-building, forced assimilation, indigenous resistance, organized political responses. GE credit: SS. Effective: 2017 Winter Quarter.

NAS 133A—Ethnohistory of Native Peoples of Mexico and Central America to 1500 (4)
Lecture/Discussion—3 hours; Term Paper. Ethnohistorical development of the indigenous peoples of Mexico and Central America up to and including the earliest period of European contact. Focus is on indigenous written historical records of the Maya, Mixtec, and Nahuatl peoples. May be repeated up to 1 time(s). GE credit: SS. Effective: 2017 Winter Quarter.

NAS 133B—Ethnohistory of Native Peoples of Mexico and Central America 1500 to 2000 (4)
Lecture/Discussion—4 hours. Ethnohistory of indigenous peoples of Mexico and Central America from 1500 to contemporary times. Focus on social and cultural dynamics, particularly the role of indigenous people in the process of nation-state building in Mexico and Central America. GE credit: AH, OL, SS, WE. Effective: 2017 Winter Quarter.

NAS 134—Race, Culture, and Nation (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): Upper division standing or consent of instructor. Exploration of complexities of Native American racial, cultural and national identities and alliances. Study of tribal and federal citizenship, mixed descent and diasporic people(s), claims to resources, ethnic fraud and contemporary movements of cultural resurgence and political sovereignty and self-determination. GE credit: ACGH, DD, SS, WE. Effective: 2016 Spring Quarter.

NAS 134—Race, Culture, and Nation (4) ***Review all entries***
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Upper division standing or consent of instructor. NAS 001 or NAS 010 encouraged, but not required. Exploration of complexities of Native American racial, cultural and national identities and alliances. Study of tribal and federal citizenship, mixed descent and diasporic people(s), claims to resources, ethnic fraud and contemporary movements of cultural resurgence and political sovereignty and self-determination. GE credit: ACGH, DD, SS, WE. Effective: 2018 Fall Quarter.

NAS 135—Gender Construction in Native Societies (4)
Lecture—4 hours. Prerequisite(s): Upper division standing or consent of instructor. Historical and traditional Native American constructions of feminine and masculine genders as well as third, fourth, and fifth genders. Examines gender roles and statuses. Addresses the problems with contemporary terminologies and impacts of colonization on contemporary constructions of gender identities. GE credit: AH, DD, OL, SS, WE. Effective: 2016 Spring Quarter.

NAS 146—Orientation to Research in Native American Studies (4)
Lecture/Discussion—4 hours; Term Paper. Prerequisite(s): Native American Studies major or minor, or consent of instructor. Limited enrollment. Introduction to basic research resources pertinent to Native American subjects available in the region, including libraries, archives, museums, etc. Emphasis on learning to use documentary resources or other collections of data. Students will carry out individual projects. GE credit: ACGH, DD, SS, WE. Effective: 2011 Fall Quarter.

NAS 157—Native American Religion and Philosophy (4)
Lecture/Discussion—4 hours. Religious and philosophical traditions of Native American/indigenous peoples of the Americas. GE credit: AH, OL, WE. Effective: 2016 Fall Quarter.

NAS 161—California Indian Environmental Policy I (4)
Lecture/Discussion—4 hours; Term Paper. Contemporary California Indian environmental policy issues, with a focus on water, minerals, contamination, and alliance-building. Issues will be placed within historical and political context, drawing on theories of Native environmental ethics, environmental justice, and Federal Indian law. GE credit: ACGH, DD, SS, WE. Effective: 2012 Fall Quarter.

NAS 162—California Indian Environmental Policy II (4)
Lecture/Discussion—4 hours; Term Paper. Contemporary California Indian environmental policy issues, with a focus on planning, site protection, and collaborative structures. Issues will be placed within historical and political context, drawing on theories of Native environmental ethics, environmental justice, and Federal Indian law. GE credit: ACGH, DD, SS, WE. Effective: 2013 Spring Quarter.

NAS 180—Native American Women (4)
Lecture/Discussion—4 hours. Native American women's life experiences, cross-cultural comparisons of gender roles, and Native women's contemporary feminist thought. Utilizes texts from literature, social science, and autobiography/biography. GE credit: AH, DD, OL, SS, WE. Effective: 2016 Fall Quarter.

NAS 181A—Native American Literature (4)
Lecture/Discussion—4 hours. Prerequisite(s): NAS 005 or ENG 003 or COM 001 or COM 002 or COM 003 Works of fiction (short story, novel) by contemporary Native American authors, with an emphasis on writers from the United States. GE credit: ACGH, AH, DD, OL, WE. Effective: 2011 Fall Quarter.

NAS 181B—Native American Literature (4)
Lecture/Discussion—4 hours. Prerequisite(s): NAS 005 or ENG 003 or COM 001 or COM 002 or COM 003 Works by or about Native Americans including non-fiction novels, biographies and autobiographies. Explore ways Native Americans create and recreate their culture through the creative process in literature. Examine from a critical perspective autobiographies and testimonial literature. GE credit: AH, DD, OL, WE. Effective: 2011 Fall Quarter.

NAS 181C—Contemporary Native American Poetry (4)
Lecture—4 hours. Works of poetry by contemporary Native American/indigenous poets, with some attention to traditional cultural poetic expressions. GE credit: AH, DD, OL, WE. Effective: 2016 Fall Quarter.

NAS 184—Contemporary Indigenous Literature of Mexico (4)
Lecture/Discussion—4 hours. Prerequisite(s): NAS 001 or NAS 010; NAS 181A or NAS 181C recommended; reading knowledge of Spanish required. Contemporary indigenous literature of Mexico, with a focus on the genres (poetry, fiction, drama, essay); analysis of cultural, historical, and spiritual themes, imagery, styles and performances; biographies of and influences on the Native writers themselves. GE credit: AH, OL, SS, WC. Effective: 2011 Fall Quarter.

NAS 185—Native American Literature in Performance (4)
Performance Instruction—4 hours. Prerequisite(s): Consent of Instructor. Performance of contemporary Native American literature onstage, through adaptations of selected literature as well as the creation of original pieces. May be repeated up to 4 unit(s). GE credit: AH, DD, OL, WC. Effective: 2011 Fall Quarter.

NAS 188—Special Topics in Native American Literary Studies (4)
Lecture/Discussion—4 hours. Prerequisite(s): Upper division standing and one of the following recommended: NAS 005, NAS 010, NAS 181A, NAS 181C. Special topics drawn from Native American literature. May be repeated for credit when topic differs. GE credit: AH, DD, OL, WE. Effective: 2011 Fall Quarter.

NAS 190—Seminar in Native American Studies (2)
Discussion—2 hours. Prerequisite(s): Senior Standing. Seminar of critical issues faced by Native American people. (P/NP grading only.) Effective: 1997 Winter Quarter.

NAS 191—Topics in Native American Studies (4)
Lecture/Discussion—4 hours. Prerequisite(s): Upper division standing. Selected topics in Native American Studies related to indigenous knowledges and worldviews from a historical, cultural, hemispheric perspective. May be repeated for credit when topic differs and/or when offered by a different instructor. GE credit: AH, DD, OL, SS, WE. Effective: 2013 Spring Quarter.

NAS 192—Internship (1-12)
Internship—1 hour. Prerequisite(s): Consent of Instructor. Enrollment dependent on availability of intern position in Native American Studies or the CN Gorman Museum, with priority to Native American Studies minors/majors. Restricted to upper division standing. Supervised internship in the CN Gorman Museum, community, and institutional settings related to Native American concerns. May be repeated up to 12 unit(s) including course 192 and other interships taken in other departments and institutions. (P/NP grading only.) GE credit: AH. Effective: 2011 Fall Quarter.

NAS 194HA—Special Studies for Honors Students (4)
Independent Study—12 hours. Prerequisite(s): Senior qualifying for honors. Directed reading, research and writing culminating in the completion of a senior honors thesis or project under direction of faculty advisor. Effective: 1997 Winter Quarter.

NAS 194HB—Special Studies for Honors Students (4)
Independent Study—12 hours. Prerequisite(s): Senior qualifying for honors. Directed reading, research and writing culminating in the completion of a senior honors thesis or project under direction of faculty advisor. Effective: 1997 Winter Quarter.

NAS 195—Field Experience in Native American Studies (12)
Fieldwork—36 hours. Prerequisite(s): NAS 161; Senior standing and major in Native American Studies, completion of lower division major requirements. Field work with governmental and community groups, under supervision of faculty advisor and sponsor. Knowledge acquired in other courses to be applied in field work. (P/NP grading only.) Effective: 1997 Winter Quarter.

NAS 196—Senior Project in Native American Studies (4)
Discussion—1 hour; Independent Study—3 hours. Prerequisite(s): NAS 195 (can be concurrent); and Consent of Instructor. Senior standing and major in Native American Studies. Guided research project that enables student to apply the theory and research principles from major course work. Final product is to be a major senior project or thesis. (P/NP grading only.) Effective: 1997 Winter Quarter.

NAS 197TC—Community Tutoring in Native American Studies (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of major committee; upper division standing with major in Native American Studies. Supervise tutoring in community. (P/NP grading only.) Effective: 1997 Winter Quarter.

NAS 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

NAS 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

NAS 200—Basic Concepts in Native American Studies (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Analysis of the characteristics of the discipline of Native American Studies. Concentration is on both traditional and contemporary native scholarship and thought as well as the theoretical and methodological consequences derived from application of these ideas. Effective: 1997 Winter Quarter.

NAS 202—Advanced Topics in Native American Studies (4)
Seminar—4 hours. Prerequisite(s): Graduate standing. Advanced study of selected topics or themes relevant to the field of Native American studies. Topics will be announced at the time of offering. May be repeated for credit when topic differs. May be repeated for credit. Effective: 1997 Winter Quarter.

NAS 207—Leadership Skills and Strategies in California Language Documentation & Revitalization (4)
Seminar—3 hours; Term Paper. Introduction to the indigenous languages of the Americas, with a focus on California; an examination of how contemporary Native communities document and revitalize their heritage languages. Learn to assist and administer language programs. Effective: 2010 Fall Quarter.

NAS 212—Community Development for Sovereignty and Autonomy (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Examines a sample of contemporary indigenous communities from south, central and north America with the goal of understanding and evaluating the strategies adopted by Native American communities to develop and
implement forms of sovereignty or autonomous self-management. Effective: 1997 Winter Quarter.

NAS 213—Native Criminality and (4)
Seminar—4 hours. Prerequisite(s): Graduate standing. Examination of "deviance" in Native communities with focus on Native criminality in North America. Analysis of the concept of deviance from several different world views. Readings from a range of theories to incorporate varying theoretical perspective on criminality and deviance. Effective: 1998 Fall Quarter.

NAS 217—Public Law 83-280: Colonial Termination (4)
Seminar—4 hours. Prerequisite(s): Graduate standing, including school of law students. Examination of the signature law of the Termination Era, Public Law 83-280. Discussions to include termination, societal conformity, political consent, jurisdiction, self-determination & decolonization, and colonial relationship between Native Peoples and the United States. Effective: 2007 Spring Quarter.

NAS 220—Colonialism, Neoliberalism, and Indigenous Self-Determination (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. History, political economy and legacies of imperial/colonial systems. Continuities and discontinuities with corporate globalization and neoliberalism. Focus on resistance and self-determination of indigenous peoples, but with comparison to other groups. Effective: 2016 Winter Quarter.

NAS 224—Performance in the Americas (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Ethnomusicological and anthropological approaches to study of public performance in the Americas. New ways of looking at music, dance, rituals and other forms of public expressive forms normally called "folklore" or "popular culture." Not open for credit to students who have completed MUS 224. (Former course MUS 224.). Effective: 1999 Fall Quarter.

NAS 233—Visual Sovereignty (4)
Film Viewing—2 hours; Seminar—3 hours; Term Paper. Extensively examine the field of contemporary Native American and Indigenous photography, film and performance through research of artworks, writings by artists, theorists, and material in museum collections. May be repeated up to 2 time(s) when topic differs. Effective: 2011 Fall Quarter.

NAS 237—Native American Art Collections and Museums (4)
Seminar—3 hours; Term Paper. Research and examination of regional Native American art held in museums and other public institutions, as well as privately-held collections. Includes onsite viewing and research of museum collections and archives. Effective: 2012 Fall Quarter.

NAS 240—Native American Public Health: Topics and Issues (4)
Seminar—3 hours; Term Paper. Introduction to Native American public health issues and contributing causal factors (including environmental justice and historical trauma); the dimensions of cultural competency in diagnosis and service provision; the structure of Native health care institutions; and debates in Native treatment modalities. Effective: 2011 Fall Quarter.

NAS 246—Native American/Indigenous Research Methodologies (4)
Seminar—3 hours; Term Paper. Introduction to advanced methodologies currently influencing research in Native American Studies and amongst Indigenous communities. Students will develop an original project and course assignments will guide them through the process of research design and implementation. Effective: 2015 Fall Quarter.

NAS 250—Indigenous Critique of Classic Maya Ethnographies (4)
Seminar—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Construction of the Maya world through ethnographic writing during the
present century. Deconstruction of ethnographies about the Mayans considering the modern theories and social/anthropological critiques of modern ethnographies. Effective: 1998 Fall Quarter.

NAS 280—Ethnohistorical Theory and Method (4)
Seminar—3 hours; Term Paper. Discussion of the ethnohistorical method; the utilization of diverse types of data, especially documentary sources, to reconstruct socio-cultural history. Particular attention to the applied area of ethnohistory in the solution of contemporary social problems. Effective: 1997 Winter Quarter.

NAS 298—Group Study for Graduate Students (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

NAS 299—Special Study for Graduate Students (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

NAS 396—Teaching Assistant Training Practicum (1-4)
Internship. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

NEM Nematology

Courses in NEM:

NEM 010V—General Biology (4)
Web Electronic Discussion—1 hour; Web Virtual Lecture—3 hours. Concepts and issues in biology. Emphasis on composition and structure of organisms; regulation and signaling; heredity, evolution and the interaction and interdependence among life forms and their environments. Significant writing is required. Designed for students not specializing in biology. Not open for credit to students who have completed course BIS 001A, BIS 001B, BIS 001C, BIS 002A, BIS 002B, BIS 002C, BIS 010 or BIS 010V. GE credit: SE, SL, WE. Effective: 2015 Fall Quarter.

NEM 100—General Plant Nematology (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): BIS 001B or BIS 010 An introduction to the classification, morphology, biology, and control of the nematodes attacking cultivated crops. GE credit: SE. Effective: 2013 Fall Quarter.

NEM 110—Introduction to Nematology (2)
Lecture—2 hours. Prerequisite(s): BIS 001B; or Consent of Instructor. Or the equivalent. The relationship of nematodes to human environment. Classification, morphology, ecology, distribution, and importance of nematodes occurring in water and soil as parasites of plants and animals. Effective: 2013 Fall Quarter.

NEM 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2013 Fall Quarter.

NEM 201—Molecular and Physiological Plant Nematology (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): BIS 101; PLP 120; (NEM 100 or NEM 110) Molecular biology and physiology of nematodes using Caenorhabditis elegans as a model, but with emphasis on plant-parasitic species. Plant responses to nematodes. Discussion of current literature emphasized. Effective: 2013 Summer Quarter.

NEM 203—Ecology of Parasitic Nematodes (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): (NEM 100 or NEM 110 or ENT 156); (EVE 101 or PLB 117) Major concepts in population and community ecology of animal- and plant-parasitic nematodes. Current advances in techniques, theory, and basic information about nematode-host dynamics, and application to management of nematode diseases. Effective: 2013 Fall Quarter.

NEM 204—Management of Plant-Parasitic Nematodes (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): NEM 100 or NEM 110 Theory, foundation, principles and practices of nematode management. Techniques and equipment used to manage nematodes and methods used to analyze their effectiveness. Effective: 2013 Fall Quarter.

NEM 205—Insect Nematology and Biological Control (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): NEM 100; NEM 110; (ENT 100 or ENT 110) The biology of insect-parasitic nematodes, their effect on the host, and their potential as biological control agents of insect and other invertebrate pests. Application of ecological theory in classical and augmentative biological control. Effective: 2013 Fall Quarter.

NEM 206—Nematode Systematics and Evolution (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): NEM 100 or NEM 110 or ENT 156; EVE 100 recommended. Nematode diversity as revealed by morphological and molecular evidence. Laboratory experience focuses on structural features used in taxonomy. Phylogenetic relationships based on morphological and molecular data used to consider patterns of character change among taxa. Effective: 2013 Fall Quarter.

NEM 210—Molecular Phylogenetic Analysis (3)
Laboratory—3 hours; Lecture—2 hours. Theory and practice of inferring phylogenetic trees using molecular sequence data. Practical techniques for obtaining sequence data, advantages and disadvantages of common approaches for inferring trees, statistical methods for comparing alternative hypotheses. (Evolution and Ecology 210.) Effective: 2013 Fall Quarter.

NEM 245—Field Nematology (1)
Fieldwork. Prerequisite(s): NEM 100 Sixday demonstration and field study in applied nematology including diagnosis and prediction of nematode field problem strategies for control field plot design, and establishment in association with diverse California crops. (S/U grading only.) Effective: 2013 Fall Quarter.

NEM 290—Seminar (1)
Seminar—1 hour. (S/U grading only.) Effective: 2013 Fall Quarter.

NEM 290C—Advanced Research Conference (1)
Discussion—1 hour. Prerequisite(s): Graduate standing and consent of instructor. Planning and results of research programs, proposals, and experiments. Discussion and critical evaluation of original research being conducted by the group. Discussion led by individual research instructors for research group. (S/U grading only.) Effective: 2013 Fall Quarter.

NEM 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 2013 Fall Quarter.

NEM 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 2013 Fall Quarter.

NEP Med - Intl: Nephrology

Courses in NEP:

NEP 192—Internship in Nephrology (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project by preceptor prior to internship. Supervised work experience in nephrology. May be repeated for credit up to 12 units. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

NEP 299—Nephrology Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Research topics in Nephrology. May be repeated for credit. (S/U grading only.) Effective: 2002 Summer Quarter.

NEP 444—Curriculum Design for Doctoring (1)
Project (Term Project)—2 hours; Seminar—1 hour. Prerequisite(s): Consent of Instructor. Second year standing in School of Medicine. Design of Doctoring curriculum for medical students in focused topic areas to be announced annually. Students will design sessions, consider resource needs, and work with IORs to initiate the curriculum. (P/F grading only.) Effective: 2007 Summer Quarter.

NEP 460—Nephrology and Fluid Balance (3-6)
Clinical Activity—4 hours; Lecture/Discussion—10 hours. Prerequisite(s): Consent of Instructor. Completion of third-year medical school; completion of Medicine Core Clerkship. Limited enrollment. Active participation in all inpatient/outpatient clinical activities, attendance at specific lectures and conferences at UCD Medical Center covering the field of nephrology and fluid-electrolyte disorders. (H/P/F grading only.) Effective: 2001 Summer Quarter.

NEP 499—Research in Nephrology (3-18)
Variable. Prerequisite(s): Consent of Instructor. Individual arrangement. Independent laboratory research on a specific problem related to biochemical or immunologic causes of renal disease and/or uremic disorders in humans or animals. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

NEU Med - Neurology

Course in NEU:

NEU 103—Human Clinical Neuroanatomy (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHA 101; or Consent of Instructor. Open to upper division students. Clinically relevant anatomy of the normal human nervous system, including external and internal anatomy of the brain, spinal cord, and cranial nerves. Blood supply to the brain and spinal cord. Functional neuroanatomy of motor, sensory, and cognitive systems. Application of neuroanatomical principles relevant to clinical problem solving for students entering health care professions. (CHA 103.) GE credit: SE. Effective: 2018 Spring Quarter.

NEU 199—Individual Special Study and Research (1-4)
Variable. Prerequisite(s): Consent of Instructor. Individual special study in neurophysiology and biomedical engineering
is offered to qualified students. Studies on psychophysics, single-unit electrophysiology and instrumentation are offered in Davis. (P/NP grading only.) Effective: 1997 Winter Quarter.

NEU 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. For graduate students desiring to explore particular topics in depth.
Lectures and conferences may be involved. (S/U grading only.) Effective: 1997 Winter Quarter.

NEU 299—Individual Special Study and Research (1-12)
Laboratory—3-36 hours. Prerequisite(s): Consent of Instructor. Individual special study and research in Neurophysiology and Biomedical engineering is offered at both Davis and Sacramento Medical Center. (S/U grading only.) Effective: 1997 Winter Quarter.

NEU 420—Clinical Neurosciences (2)
Lecture—1.5 hours; Lecture/Discussion—1 hour. Restricted to Medical Students only. Pathophysiology underlying neurological disorders, including disorders of development, muscle, nerve, cerebral circulation, metabolism, myelin, cortical function, movement, cerebrospinal fluid, autonomic function and special senses. Anatomical basis of clinical testing, nervous system infection, neoplasia and trauma. (P/F grading only.) Effective: 2007 Summer Quarter.

NEU 440—Where Drugs Come From: How They are Discovered, Developed, Regulated, and Marketed (3-6)
Lecture. Includes the following topics: Overview of the Drug Discovery Process; Drug Regulation in the United States; Patents and Other Forms of Exclusivity; Drug Targets and Pharmacology; Identification of Lead Candidates; Preclinical Assessment; ADME Including Basic Pharmacokinetic Principles; Principles of Drug Toxicity; Principles of Drug Safety; Clinical Trials; Generic Drugs; Pharmaceutical Industry; Drug Distribution and Marketing; Dietary Supplements; Controlled Substances. (H/P/F grading only.) Effective: 2018 Winter Quarter.

NEU 450—Clinical Neurology Clerkship (3-6)
Clinical Activity—24 hours; Conference—12 hours; Independent Study—10 hours; Seminar—4 hours. Prerequisite(s): Open to all fourth year medical students and third year medical students with consent of instructor. Restricted to six students per rotation. Critical elements of neurological clinical skills (history & exam) and basic and clinical neurological concepts expected for general residency preparation. Active, didactic, experiential and independent learning to encourage maturation of general professional competencies. May be repeated for credit. (H/P/F grading only.) Effective: 2011 Winter Quarter.

NEU 452—Advanced Clinical Neurology (6)
Clinical Activity. Prerequisite(s): Consent of Instructor. Completion of four-week Neurology selective. Extension of basic Neurology clerkship. Designed for students with special interest in medical disorders of nervous system. By arrangement
with department, student may serve as an acting intern. Principles of neurological differential diagnosis and therapeutics emphasized. (H/P/F grading only.) Effective: 1997 Winter Quarter.

NEU 455—Child Neurology (6)
Clinical Activity. Prerequisite(s): IMD 430; OBG 430; PED 430; and Consent of Instructor. Student exposed to children with disorders of the nervous system, both in outpatient and inpatient services. Cases presented to a member of full-time faculty who will discuss clinical findings,differential diagnosis, management and therapy.This course satisfies the fourth year neuroscience requirement. (H/P/F grading only.) Effective: 1997 Winter Quarter.

NEU 460—Externship in Neurology (3-6)
Clinical Activity. Prerequisite(s): Consent of Instructor. Externship course for Neurology rotations not meeting the qualifications to be an Acting Internship. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Summer Quarter.

NEU 462—Externship in Advanced Neurology (3-6)
Clinical Activity. Prerequisite(s): Consent of Instructor. Away rotation in Neurology where coursework meets the standards to be counted as an Acting Internship. (H/P/F grading only.) Effective: 2017 Summer Quarter.

NEU 493F—Issues in Geriatric Care (6)
Seminar. Four-week module teaches an approach to common problems in the elderly through history and exam, with an emphasis on integration of underlying anatomy, physiology, and pathophysiology in common geriatric presentations. May be repeated for credit. (H/P/F grading only.) Effective: 2018 Winter Quarter.

NEU 498NE—Group Study in Neurology (1-6)
Variable—3-5 hours. Prerequisite(s): Medical students with consent of instructor. Directed readings and discussions with a comprehensive written examination at the end of course. (P/F grading only.) Effective: 2002 Summer Session 2.

NEU 499—Research (1-12)
Laboratory—2-24 hours. Prerequisite(s): Consent of Instructor. Approved for graduate degree credit. Laboratory investigation on selected topics. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

NPB Neurobiology, Physiology, & Behavior

Courses in NPB:

NPB 010—Elementary Human Physiology (3)
Lecture—3 hours. Introduction to physiology for non-science majors. Includes basic cell physiology and survey of major organ systems and how they function in homeostasis and human health. Not open for credit to students who have completed NPB 101. GE credit: SE. Effective: 2016 Winter Quarter.

NPB 012—The Human Brain and Disease (3)
Lecture—3 hours. Normal function and diseases of the human brain and nervous system. Diseases discussed include Parkinson's, Alzheimer's, leprosy, amnesia and schizophrenia. Intended for non-science majors. Not open for credit for students who have completed NPB 100, NPB 101, NPB 112, or PSC 121. GE credit: SL. Effective: 1997 Spring Quarter.

NPB 014—Illusions: Fooling the Brain (3)
Lecture—3 hours. Introduction to perceptual processing in the human nervous system; illusions. GE credit: QL, SE, SL. Effective: 2012 Winter Quarter.

NPB 015—The Biology and Physiology of Aging (4)
Discussion—1 hour; Lecture—3 hours. Broad examination of age-associated changes in body functions. Includes basic cell physiology, a survey of major organ systems and the age-induced alterations in system function. Some age-associated diseases will also be examined. Intended for non-science majors. Not open for credit to students who have completed NPB 15V. GE credit: SE. Effective: 2012 Fall Quarter.

NPB 015V—The Biology and Physiology of Aging (4)
Web Electronic Discussion—1 hour; Web Virtual Lecture—3 hours. Broad examination of the biological and physiological basis of aging in animals and plants. Concepts in demographic, evolutionary, genetic, and cell aging. Major human organ systems, age-related alterations in system function, and age-related diseases. Intended for non-science majors. Not open for credit to students who have completed NPB 15. GE credit: SE, SL. Effective: 2012 Fall Quarter.

NPB 017—The Path to Cyborgs: Introduction to Prostheses and Human Machine Interfaces (3)
Lecture—3 hours. Interface of biology and technology. Mind-controlled prosthetic limbs, artificial organs, and implantable devices. Emphasis on basic physiological functions and how they can be replaced by devices. Suitable for majors and non-majors. GE credit: SE, SL. Effective: 2016 Winter Quarter.

NPB 018—Biological Science for Social Justice (3)
Lecture—3 hours. Broad survey of the many ways one can use the biological sciences to better the lives of others and break down barriers that have restricted social mobility. GE credit: DD, SE, SL, SS. Effective: 2018 Spring Quarter.

NPB 068—Biology of Drug Addiction and Abuse (3)
Lecture—3 hours. Broad examination of addictive substances and their use/abuse. Topics include historical perspective, physiological effects, etiology, neurobiology of addiction and the impact of drugs on contemporary society. Intended for non-science majors. Not open for credit to students having completed NPB 168. Effective: 2008 Spring Quarter.

NPB 090A—Lower Division Seminar: Issues in Body Weight Regulation (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Limited enrollment. Critical examination of issues in body weight regulation through shared readings, discussions, written assignments, debates and oral presentations. Limited enrollment. Effective: 2000 Winter Quarter.

NPB 090B—Human Color Perception (2)
Seminar—2 hours; Term Paper. Prerequisite(s): Lower division standing. Class size limited to 15 students with lower division standing. Neural determinants of color appearance, and why we see the world in the way we do. Discussions center around demonstrations of color phenomena and what they tell us about the human brain. Effective: 2008 Spring Quarter.

NPB 090C—Current Issues in Animal Behavior (2)
Seminar—2 hours. Prerequisite(s): Lower division standing. Limited enrollment. The mechanisms and outcomes of sexual selection (mate choice and mate competition). Theory, current models and evidence that supports or refutes the models. Effective: 2003 Winter Quarter.

NPB 090D—Lower Division Seminar: Current Issues in Reproductive Endocrinology (2)
Seminar—2 hours. Prerequisite(s): Lower division standing. The integrative roles of reproductive hormones in mammalian reproduction and health. Current theory and models regarding hormone function and use in reproductive health and contraception, and evidence that supports or refutes the models. Effective: 2002 Fall Quarter.

NPB 090E—Biology of Aging (2)
Seminar—2 hours. Prerequisite(s): Freshman standing. Current theories on the biology of aging covering genetic, biochemical, and physiological aspects. Emphasis on critical evaluation of controversial and contemporary issues. Effective: 2003 Fall Quarter.

NPB 090F—Visual Impairment and Blindness: A World Wide Problem (2)
Seminar—2 hours. Prerequisite(s): Lower division standing. Examination of various abnormalities of the eye and the important geographic and cultural factors that influence the epidemiology of those abnormalities. Effective: 2007 Winter Quarter.

NPB 091C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): NPB 099 (can be concurrent); and Consent of Instructor. Lower division standing in Neurobiology, Physiology and Behavior or related biological science; NPB 099 required concurrently. Restricted to lower division students. Research findings and methods in neurobiology, physiology, and/or behavior. Presentation and discussion of research by faculty and students. May be repeated for credit. (P/NP grading only.) Effective: 2003 Fall Quarter.

NPB 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Work experience off and on campus in all subject areas offered in the
Department of Neurobiology, Physiology, and Behavior. Internships supervised by a member of the faculty. May be repeated for credit. (P/NP grading only.) Effective: 2008 Fall Quarter.

NPB 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) Effective: 2000 Winter Quarter.

NPB 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) Effective: 1999 Winter Quarter.

NPB 100—Neurobiology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 002A; PHY 009A, PHY 009B or PHY 007A, PHY 007B recommended. Brains and nervous systems, neurons and neural circuits. Coordination of movement. Development of nervous systems. Vision, hearing, and feature extraction by the central nervous system. The cell biology of learning and memory. Perception, cognition, and disorders of the brain. Not open for credit to students who have completed NPB 110B, NPB 112, NPB 160, NPB 161 or NPB 162, or NSC 221 or NSC 222. GE credit: QL, SE. Effective: 2018 Spring Quarter.

NPB 100L—Neurobiology Laboratory (3)
Extensive Writing/Discussion; Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): NPB 100 (can be concurrent) or NPB 110B (can be concurrent) Experimental basis of neurobiology principles discussed in course 100. Topics include neurophysiology, sensory systems, motor systems, cellular neuroscience, cognitive neuroscience, and quantitative data analysis and modeling techniques. GE credit: SE. Effective: 2017 Winter Quarter.

NPB 100Q—Quantitative Foundations of Neurobiology (1)
Auto Tutorial—1.5 hours; Extensive Problem Solving—1.5 hours. Prerequisite(s): NPB 100 (can be concurrent) Computational methods and mathematical models used to study phenomena in neurobiology. GE credit: QL, VL. Effective: 2010 Spring Quarter.

NPB 101—Systemic Physiology (5)
Lecture—5 hours. Prerequisite(s): BIS 001A or BIS 002A; CHE 002B; PHY 001B or PHY 007C strongly recommended. Systemic physiology with emphasis on aspects of human physiology. Functions of major organ systems, with the structure of those systems described as a basis for understanding the functions. Not open for credit to students who have completed NSC 110C. GE credit: SE. Effective: 2017 Winter Quarter.

NPB 101D—Systemic Physiology Discussion (1.5)
Discussion—1.5 hours. Prerequisite(s): NPB 101 (can be concurrent); Consent of Instructor. Discussion and problem solving related to fundamental principles of systemic physiology as presented in course 101. (P/NP grading only.) Effective: 2017 Spring Quarter.

NPB 101L—Systemic Physiology Laboratory (3)
Discussion—2 hours; Laboratory—3 hours; Term Paper. Prerequisite(s): NPB 101 or NPB 110C Selected experiments to illustrate functional characteristics of organ systems discussed in course 101. Effective: 2017 Winter Quarter.

NPB 102—Animal Behavior (3)
Lecture—3 hours. Prerequisite(s): (BIS 001A, BIS 001B, BIS 001C) or (BIS 002A, BIS 002B, BIS 002C) Basic principles of behavioral organization in vertebrate and invertebrate animals. Underlying physiological and ethological mechanisms. The evolution of behavior, with special emphasis on behavior under natural conditions. Not open for credit to students who have completed NPB 155. (Former NPB 155.). GE credit: SL. Effective: 2008 Fall Quarter.

NPB 102Q—Quantitative Topics in Animal Behavior (1)
Auto Tutorial—1.5 hours; Extensive Problem Solving—1.5 hours. Prerequisite(s): MAT 016B; NPB 102 (can be concurrent) Study of the quantitative concepts and exemplar models used in animal behavior. Effective: 2009 Spring Quarter.

NPB 103—Cellular Physiology/Neurobiology (3)
Lecture—3 hours. Prerequisite(s): (BIS 103 or BIS 105); BIS 104; PHY 007C recommended. Cellular physiology with emphasis on membrane transport processes and neuronal physiology. Fundamental physical-chemical and biological mechanisms of membrane transport will be considered in relation to
cytoplasmic homeostasis, communication between cells,and the cellular mechanisms of sensory and motor transduction. Not open for credit to students who have completed NPB 100B. (Former NPB 100B.). Effective: 2008 Spring Quarter.

NPB 104L—Cellular Physiology/Neurobiology Laboratory (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—1 hour; Term Paper/Discussion. Prerequisite(s): NPB 101L; (BIS 103 or BIS 105) Experiments in the physical and chemical processes of cells and tissues. Effective: 2018 Winter Quarter.

NPB 105—Introduction to Computer Models (4)
Lecture—3 hours; Lecture/Lab—1 hour. Prerequisite(s): CHE 002C; PHY 007C; (NPB 100 or NPB 101); MAT 016C; Or the equivalent to MAT 016C. Introduction to the ideas, mathematical techniques and computer tools required for developing models of cellular processes in physiology and neurobiology. Applications include membrane transport, ionic channels, action potentials, Ca2+ oscillations, respiration, and muscle contraction. Effective: 1997 Winter Quarter.

NPB 106—Experiments in Neurobiology, Physiology, and Behavior: Design and Execution (3)
Discussion—0.5 hours; Laboratory—7.5 hours. Prerequisite(s): (NPB 110A or NPB 100 or NPB 101 or NPB 102); NPB 199; and Consent of Instructor. Design and execution of experiments in neurobiology, physiology, and/or behavior. Students choose and design a project in consultation with the sponsoring faculty member. May be repeated once for credit to complete the project, with consent of instructor. May be repeated up to 1 time(s). (P/NP grading only.) GE credit: OL, QL, VL, WE. Effective: 2018 Winter Quarter.

NPB 107—Cell Signaling in Health and Disease (3)
Lecture—3 hours. Prerequisite(s): BIS 102 or BIS 105 Basics of cell signaling pathways, their disruption in disease, and their current utility and future potential as therapeutic targets. Focus is on signaling pathways specific to nervous, endocrine and immune systems, and those fundamental to all cells. GE credit: SL. Effective: 2009 Winter Quarter.

NPB 108Y—Animal Behavior Laboratory (3)
Lecture—3 hours; Web Electronic Discussion—12 hours. Hybrid course, consisting of limited in-person lectures and the rest laboratory exercises. The laboratory exercises will be online, and will require students to view and score videos of animal behavior in order to test behavioral hypotheses. Effective: 2016 Summer Session 2.

NPB 109—Kinesiology—Analysis and Control of Human Movement (4)
Lecture—4 hours. Prerequisite(s): PHY 007A; PHY 007B; NPB 101 or NPB 110C recommended; CHA 101 and CHA 101L (same as EXB 106 and EXB 106L) or equivalent recommended. Functional anatomy, motor control, and biomechanics of human movement understood in the context of body structures, basic principles of physics, and functional characteristics of muscle. GE credit: SE. Effective: 2018 Spring Quarter.

NPB 110A—Foundations 1: From Molecules to Individuals (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): (BIS 002A, BIS 002B); (CHE 002B or CHE 003A); PHY 007A and PHY 007B recommended; BIS 002C recommended. Pass One restricted to majors in Neurobiology, Physiology and Behavior. Major concepts in cell biology with special emphasis on connections between cell biology and behavior. Includes: cellular metabolism, cellular sensing and signaling, membrane structure-function, molecular switches, electrical and chemical signaling, endocrine signaling, cell cycle and differentiation, cytoskeleton, and integrative examples. Credit limited to 3 units for students who have taken BIS 104. GE credit: SE. Effective: 2018 Winter Quarter.

NPB 110B—Foundations 2: Neurobiology (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): NPB 110A C- or better; PHY 007A and PHY 007B recommended. Open to declared NPB majors only. Core concepts of neurobiology including single-neuron biophysics, synapses and transmitters, neuronal development, motor systems, central pattern generation, neuronal circuits, intracellular signal transduction, sensory processing, multisensory integration, autonomic nervous system, neuromodulation, learning and memory, and higher cognition and disease. Credit limited to 2 units for students who have taken NPB 100. GE credit: SE. Effective: 2017 Winter Quarter.

NPB 110C—Foundations 3: Physiology (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): NPB 110A C- or better; PHY 007A; PHY 007B and PHY 007C recommended. Open to declared NPB majors only. Focuses on the structure, function, and interactions of animal organ systems in homeostasis and reproduction, and the response to perturbations of homeostasis; neural and endocrine signaling; skeletal muscle and movement; cardiovascular and respiratory systems; renal, digestive, immune, and reproductive physiology. Credit limited to 2 units for students who have taken NPB 101. GE credit: SE. Effective: 2018 Winter Quarter.

NPB 111L—Advanced Systemic Physiology Laboratory (4)
Discussion—2 hours; Laboratory—6 hours; Lecture—1 hour; Term Paper. Prerequisite(s): NPB 101L Selected comprehensive experiments in the autonomic nervous system and the cardiovascular, respiratory, and neuromuscular systems. Emphasis on conceptual and methodological approaches in demonstrating the physiology of organ systems. Effective: 2018 Winter Quarter.

NPB 113—Cardiovascular, Respiratory, and Renal Physiology (4)
Lecture—4 hours. Prerequisite(s): (NPB 110C or NPB 101); CHE 008B, PHY 007B and PHY 007C recommended. An intense and advanced presentation of concepts in cardiovascular, respiratory, and renal physiology including discussion of acid-base balance. Effective: 2018 Winter Quarter.

NPB 114—Gastrointestinal Physiology (3)
Lecture—3 hours. Prerequisite(s): (NPB 110C or NPB 101); BIS 105 or BIS 103 recommended, BIS 105 preferred. Gastrointestinal anatomy and physiology. Digestion, secretion, absorption, motility, comparative physiology and pathology. Strong emphasis on neural and hormonal regulation and on cellular mechanisms of secretion and absorption. Effective: 2018 Winter Quarter.

NPB 117—Avian Physiology (3)
Lecture—3 hours. Prerequisite(s): (BIS 002A, BIS 002B); CHE 002B; NPB 101 or NPB 110C strongly recommended. Physiology of the various systems of birds with emphasis on digestion, respiration, excretion, and endocrine systems. Effective: 2018 Spring Quarter.

NPB 121—Physiology of Reproduction (4)
Lecture/Discussion—4 hours. Prerequisite(s): NPB 101 or NPB 110C or ANS 100 Physiological mechanisms related to reproduction, breeding efficiency and fertility, with special reference to domestic animals. GE credit: QL, SL. Effective: 2018 Spring Quarter.

NPB 121L—Physiology of Reproduction Laboratory (1)
Laboratory—3 hours. Prerequisite(s): NPB 121 (can be concurrent) Experiments on the reproductive systems of domestic animals including male and female gametes. (P/NP grading only.) Effective: 2017 Spring Quarter.

NPB 122—Developmental Endocrinology (3)
Lecture—3 hours. Prerequisite(s): NPB 101 Restricted to upper division standing. Hormonal control of development, maturation and senescence from the cellular to organismal level, with emphasis on the human. Prenatal and neonatal life, childhood and adolescence, adulthood and pregnancy, as well as the endocrinology of aging. Effective: 2003 Spring Quarter.

NPB 123—Comparative Vertebrate Organology (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (BIS 001A, BIS 001B) or (BIS 002A, BIS 002B) Functional anatomy of major organ systems in vertebrates. Each system examined from cellular to gross level in fish, birds, and mammals. Emphasis on how differentiated cell types are integrated into tissues and organs to perform diverse physiological functions. (Anatomy, Physiology and cell Biology 100.) Effective: 2008 Winter Quarter.

NPB 124—Comparative Neuroanatomy (4) ***Review all entries***
Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): PSC 101 or NPB 100 or NPB 101 Overview of the neuroanatomy of the nervous system in a variety of mammalian and non-mammalian vertebrates. Examine changes or modifications to neural structures as a result of morphological or behavioral specializations. (Psychology 124) GE credit: SL. Effective: 1997 Fall Quarter.

NPB 124—Comparative Neuroanatomy (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): NPB 101 or NPB 100 or NPB 110B or PSC 121 Overview of the neuroanatomy in mammalian vertebrates, focusing on the cerebral cortex and experimental techniques. Examine changes or modifications to neural structures as a result of morphological or behavioral specializations. (PSC 124.) Effective: 2018 Fall Quarter.

NPB 124L—Comparative Neuroanatomy Laboratory (2)
Laboratory—6 hours. Prerequisite(s): NPB 124 (can be concurrent) Pass One restricted to PSC and NPB majors; must be concurrently enrolled in NPB 124. Comparative neuroanatomy laboratory illustrating modern neuroanatomical techniques in determining neural connections within the mammalian brain. Includes experimentation and presentation of results. (PSC 124L.) Effective: 2018 Fall Quarter.

NPB 126—Comparative Physiology: Sensory Systems (3)
Lecture—3 hours. Prerequisite(s): NPB 100 or NPB 101 Basic physiological mechanisms involved in sensory systems. Comparative approach to considerations of mechanosensitive systems (audition, lateral lines, touch, echolocation, equilibrium), chemosensitive systems (olfaction, taste, pheromones), photosensitive systems (vision, infrared detection, UV detection), electroreception, and pain. Emphasis on receptors. Effective: 1997 Winter Quarter.

NPB 128—Comparative Physiology: Endrocrinology (3)
Lecture—3 hours. Prerequisite(s): NPB 101 Comparison of physiological functions in the animal kingdom: animal hormones and their functions. Effective: 1997 Winter Quarter.

NPB 130—Physiology of the Endocrine Glands (4)
Lecture—4 hours. Prerequisite(s): NPB 110C or NPB 101 Advanced presentation of concepts in endocrinology with emphasis on the role of hormones in reproduction, metabolism, and disease. GE credit: VL. Effective: 2018 Winter Quarter.

NPB 132—Nature vs. Nurture: Physiological Interactions Among Genes, Nutrients and Health (3)
Lecture—3 hours. Prerequisite(s): BIS 001A or BIS 002A; or Consent of Instructor. Biochemical, physiological, genetic, and nutritional causes of important medical problems such as obesity, anorexia, heart disease and diabetes. One unit of credit allowed to students who have completed NPB 131. Effective: 2008 Fall Quarter.

NPB 134—General Immunology for Physiologists (3)
Lecture—2 hours; Lecture/Discussion—1 hour. Prerequisite(s): NPB 101 C- or better or NPB 110C C- or better; or Consent of Instructor. Immunology for undergrads interested in physiology aimed at understanding the physiological role of immune responses. Illustrated with examples of human diseases including diabetes, allergies and asthma, and emerging diseases such as Ebola and Zika. GE credit: SE. Effective: 2017 Fall Quarter.

NPB 139—Frontiers in Physiology (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): NPB 100; NPB 101; NPB 102 (can be concurrent) Lectures by leading authorities and discussion of the latest research in newly emerging areas in physiology. Offered every fourth year. GE credit: QL, SE. Effective: 2010 Fall Quarter.

NPB 140—Principles of Environmental Physiology (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): NPB 101; BIS 102 recommended. Physiological aspects of interactions of organisms and environmental,
cellular, system, and organismal levels. Emphasis on regulatory responses/mechanisms to thermal, pressure, gravity and light environmental variables. Not open for credit to students who have completed course 148. (Former course 148.). GE credit: WE. Effective: 1997 Winter Quarter.

NPB 140—Principles of Environmental Physiology (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): NPB 101 or NPB 110C; BIS 102 recommended. Physiological aspects of interactions of organisms and environmental, cellular, system, and organismal levels. Emphasis on regulatory responses/mechanisms to thermal, pressure, gravity and light environmental variables. Not open for credit to students who have completed NPB 148. (Former NPB 148.). GE credit: WE. Effective: 2018 Fall Quarter.

NPB 141—Physiological Adaptation of Marine Organisms (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Upper division standing; residence at Bodega Marine Laboratory required. Students must submit application available at http://www.bml.ucdavis.edu. Physiological adaptation to the environment among organisms in marine and estuarine habitats. GE credit: QL, VL, WE. Effective: 2006 Summer Session 1.

NPB 141P—Physiological Adaptation of Marine Organisms/Advanced Laboratory Topics (5)
Discussion—1 hour; Laboratory—12 hours. Prerequisite(s): NPB 141 (can be concurrent); Residence at Bodega Marine Laboratory required; NPB 141 required concurrently. Students must submit application available at http://www.bml.ucdavis.edu. Training in scientific research from hypothesis to publication, including methods of library research. Research related to a topic covered in course 141. GE credit: VL, WE. Effective: 2006 Spring Quarter.

NPB 142—Environmental Endocrinology: Mechanisms for Life Cycles (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B; BIS 002C Effects of environmental factors on endocrine responses that affect vertebrate life history and fitness. Introduction to finite state machine theory and allostasis in life histories and coping strategies. Focus on life history stages including non-breeding, hibernation, reproduction, migration and moult. GE credit: SE, WE. Effective: 2015 Winter Quarter.

NPB 150—Advanced Animal Behavior (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): NPB 102 or PSC 101; or Consent of Instructor. Advanced integrative survey of biological principles of behavioral organization, emphasizing historical roots, current research directions, conceptual issues and controversies. Laboratory exercises on the description and analysis of the behavior of captive and free-living animals. (Psychology 122) Effective: 2018 Winter Quarter.

NPB 152—Hormones and Behavior (3)
Lecture—3 hours. Prerequisite(s): (NPB 101 or NPB 110C); (NPB 102 or PSC 101) Endocrine physiology with an emphasis on the principles of behavior. Fundamental relationships between hormones and various behaviors engaged in by the organism during its lifetime. Role of hormones in behavioral homeostasis, social behavior, reproductive behavior, parental behavior, adaptation to stress. (Psychology 123) Effective: 2018 Winter Quarter.

NPB 157—Advanced Physiology of Animal/Human Disease (3)
Lecture—1 hour; Lecture/Discussion—2 hours. Prerequisite(s): NPB 101 B+ or better or NPB 110C B+ or better; Consent of Instructor. Limited to 35 students initially. Centers on fundamental mechanisms and pathophysiological basis for animal and human diseases. Course is case-based and uses animal and human diseases to help exemplify the physiological consequences of organ dysfunction. (HPH 157.
) Effective: 2017 Spring Quarter.

NPB 159—Frontiers in Behavior (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): NPB 100; NPB 101; NPB 102 Lectures by leading authorities and discussion of the latest research in newly emerging areas in behavioral biology. Offered every fourth year. GE credit: QL, SE. Effective: 2010 Fall Quarter.

NPB 161—Developmental Neurobiology (3)
Lecture—3 hours. Prerequisite(s): NPB 100 or NPB 101 or NPB 110B Issues, theoretical concepts, and methodologies in developmental neurobiology. Topics include prenatal and postnatal differentiation of neurons, and plasticity in the mature and aging brain. Integration of neurochemical, structural, physiological and behavioral perspectives. GE credit: SE. Effective: 2018 Winter Quarter.

NPB 162—Neural Mechanisms of Behavior (3)
Lecture—3 hours. Prerequisite(s): NPB 100 or NPB 101 or NPB 110B Relationship between brain and behavior. Identification and analysis of the relevant neural circuits involved. Examples of systems to be considered are birdsong, locomotion, echolocation. Effective: 2018 Winter Quarter.

NPB 163—Systems Neuroscience (4)
Lecture—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): NPB 100 or NPB 110B; Or equivalent basic neuroscience training with consent of instructor. Concepts and techniques in systems neuroscience: e.g., measuring and manipulating neural activity, structure of neocortex, sensory processing, motor control, storage of information, neural codes, neural mechanisms underlying cognitive functions. GE credit: SE. Effective: 2017 Spring Quarter.

NPB 164—Mammalian Vision (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): NPB 100 or NPB 110B or PSC 101 Structure and function of the mammalian visual system, from the formation of images on the retina through visually guided behavior and perception. Emphasis on biological mechanisms underlying vision. Effective: 2017 Spring Quarter.

NPB 165—Neurobiology of Speech Perception (3)
Lecture—3 hours. Prerequisite(s): NPB 110B or NPB 100 or NPB 101; or Consent of Instructor. Interdisciplinary approach to speech perception with emphasis on functional neuroanatomy and behavior. Topics include auditory processing in time and space, intelligibility in noisy environments, visual speech, evolution of vocal communication, models of speech perception, development, and hearing impairment. GE credit: SL. Effective: 2018 Winter Quarter.

NPB 166—Math Tools for Neuroscience (4)
Lecture—4 hours. Prerequisite(s): (NPB 100 or NPB 110B); (MAT 016A, MAT 016B, MAT 016C) or (MAT 017A, MAT 017B, MAT 017C) or (MAT 021A, MAT 021B, MAT 021C); or Consent of Instructor. Introduction to mathematics techniques used in neuroscience. Applications to neuroscience of differential equations, linear algebra, Fourier transforms, correlation and convolution, and probability theory. GE credit: QL. Effective: 2018 Winter Quarter.

NPB 167—Computational Neuroscience (5)
Lecture—4 hours; Lecture/Lab—3 hours. Prerequisite(s): (NPB 100 or NPB 110B); (MAT 016A, MAT 016B, MAT 016C) or (MAT 017A, MAT 017B, MAT 017C) or (MAT 021A, MAT 021B, MAT 021C); or Consent of Instructor. PHY 007A, PHY 007B or equivalent recommended. Mathematical models and data analysis techniques used to describe computations performed by nervous systems. Lecture topics include single neuron biophysics, neural coding, network dynamics, memory, plasticity, and learning. Lab topics include programming mathematical models and data analysis techniques in MATLAB. GE credit: QL, SE. Effective: 2018 Winter Quarter.

NPB 168—Neurobiology of Addictive Drugs (4)
Lecture/Discussion—4 hours. Prerequisite(s): NPB 100 or NPB 110B or NPB 110C or NPB 101; Or equivalents. Neurobiological basis for the effects and mechanisms of action of drugs with addictive potential, including opiates (morphine, heroin, methadone), amphetamines, cocaine, nicotine, marijuana (cannabinoids), alcohol, caffeine, and mind-altering drugs such as LSD and antidepressants. GE credit: SL, VL. Effective: 2018 Winter Quarter.

NPB 169—Frontiers in Neurobiology (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): NPB 100; NPB 101; NPB 102 (can be concurrent) Lectures by leading authorities and discussion of the latest research in newly emerging areas in neurobiology. Offered every fourth year. GE credit: QL. Effective: 2010 Fall Quarter.

NPB 171—Physiology of Neuroimmune Interactions (4)
Lecture—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): BIS 002A; (NPB 012 (can be concurrent) or NPB 100 (can be concurrent) or NPB 110B (can be concurrent)); or Consent of Instructor. Completion of PMI 126 or MMI 188 recommended prior to this course. Explores the complex interactions of the nervous and immune systems, and examine how the systems function together to serve homeostasis, behavior, and disease (such as Alzheimer's, autism, and multiple sclerosis). GE credit: SL. Effective: 2017 Fall Quarter.

NPB 172—Map Formation in the Brain (3)
Lecture—3 hours. Prerequisite(s): NPB 100 C- or better or NPB 110B C- or better; or equivalent basic neuroscience training with consent of instructor. Topographic map connection is a fundamental principle for establishing neural network in the brain. This course will provide comprehensive understanding of the current concepts of map formation in various sensory and motor nervous systems. GE credit: SE. Effective: 2017 Spring Quarter.

NPB 173—Neurobiology of Brain Disorders (3)
Lecture—3 hours. Prerequisite(s): NPB 110B or NPB 100; or Consent of Instructor. Examination of brain disorders from a basic science perspective to gain insights into the mechanisms of their action. Genetic, molecular, cellular, circuit, and environmental basis of a variety of brain disorders. How insights about underlying mechanisms may lead to the development of improved therapies. Effective: 2018 Spring Quarter.

NPB 190C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): NPB 199 (can be concurrent); and Consent of Instructor. Upper division standing in Neurobiology, Physiology, and Behavior or related biological science; NPB 199 required concurrently. Research findings and methods in neurobiology, physiology, and/or behavior. Presentation and discussion of research by faculty and students. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 1999 Spring Quarter.

NPB 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Work experience off and on campus in all subject areas offered in neurobiology, physiology, & behavior. May be repeated for credit. (P/NP grading only.) Effective: 2008 Fall Quarter.

NPB 194HA—Neurobiology, Physiology, and Behavior–Honors (1)
Laboratory—12 hours. Prerequisite(s): Senior standing; minimum 3.500 GPA in courses counted toward major; approval by the master advisor. Honors project in Neurobiology, Physiology, and Behavior. Laboratory research on a specific question. The project is developed with the sponsoring faculty member and approved by the student's Honors Thesis Committee. Honors thesis to be submitted upon completion of the project. (P/NP grading only.) Effective: 1997 Winter Quarter.

NPB 194HB—Neurobiology, Physiology and Behavior–Honors (4)
Laboratory—12 hours. Prerequisite(s): Senior standing; minimum 3.500 GPA in courses counted toward major; approval by the master advisor. Honors project in Neurobiology, Physiology, and Behavior. Laboratory research on a specific question. The project is developed with the sponsoring faculty member and approved by the student's Honors Thesis Committee. Honors thesis to be submitted upon completion of the project. (P/NP grading only.) Effective: 2003 Spring Quarter.

NPB 194HC—Neurobiology, Physiology, and Behavior–Honors (2)
Laboratory—12 hours. Prerequisite(s): Senior standing; minimum 3.500 GPA in courses counted toward major; approval by the master advisor. Honors project in Neurobiology, Physiology, and Behavior. Laboratory research on a specific question. The project is developed with the sponsoring faculty member and approved by the student's Honors Thesis Committee. Honors thesis to be submitted upon completion of the project. (P/NP grading only.) Effective: 1997 Winter Quarter.

NPB 197T—Tutoring in Neurobiology, Physiology, and Behavior (1-5)
Discussion—2-6 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Assisting the instructor by tutoring students in one of the Department's regular courses. May be repeated for credit. (P/NP grading only.) Effective: 2008 Fall Quarter.

NPB 198—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

NPB 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

NPB 211—Advanced Topics in Neuroimaging (3)
Laboratory—1 hour; Seminar—2 hours. Prerequisite(s): PSC 210; or Consent of Instructor. Restricted to 16 students. Critical presentation and discussion of the most influential advanced issues in neuroimaging, emphasizing fMRI design/analysis and the integration of fMRI with EEG/MEG. May be repeated for credit Course may be repeated when topics differ. (Neuroscience 211 and Psychology 211.) (S/U grading only.) Effective: 2017 Spring Quarter.

NPB 212—Light and Fluorescence Microscopy (3)
Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Restricted to maximum 16 students. Theory and practical application of light and fluorescence microscopy in the biological sciences. Laboratory component will focus on an optics bench, where we build simple compound and confocal microscopes on an optical rail. Effective: 2017 Spring Quarter.

NPB 217—Advanced Avian Physiology (1)
Project (Term Project)—1 hour. Prerequisite(s): NPB 117; and Consent of Instructor. Graduate standing; NPB 117 required concurrently. Study in depth of a topic in avian physiology through development of a lecture with associated instructional materials such as lesson plan, readings, presentation, and evaluation aids. Effective: 2009 Summer Session 1.

NPB 221—Cellular Neuroscience (4)
Discussion—1.5 hours; Lecture—3 hours. Advanced course on cellular and subcellular organization of the nervous system. Membrane channels, sensory transduction, synaptic transmission and cellular aspects of development and learning. Effective: 2015 Winter Quarter.

NPB 222—Systems Neuroscience (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Integrative and information-processing aspects of nervous system organization. Topics include sensory systems, motor function, sensorimotor integration, the limbic system, and the neurobiology of learning and memory. (Neuroscience 222.) Effective: 2002 Winter Quarter.

NPB 245—Computational Models of Cellular Signaling (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Computational and mathematical techniques in modeling of regulatory and signaling phenomena in neurobiology and cell physiology, focusing on linear and nonlinear ordinary differential equation models. Applications include ion channel kinetics, electrical activity, signal transduction, calcium oscillations, and simple neural circuits. Effective: 1997 Winter Quarter.

NPB 247—Topics in Functional Neurogenomics (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): Graduate standing or consent of instructor. The theory, methods and principles of functional neurogenomics with emphasis on the relationship to molecular mechanisms involved in development and disease of the nervous system. (Neuroscience 247.) Effective: 2003 Spring Quarter.

NPB 261A—Topics in Vision: Eyes and Retinal Mechanisms (2)
Lecture/Discussion—2 hours. Prerequisite(s): NPB 100 or NPB 112; Or the equivalent; graduate standing. Structure and function of the visual system, with emphasis on the eye and retina, including optics, anatomy, transduction, retinal synapses, adaptation, and parallel processing. (Neuroscience 261A and Molecular, Cellular, and Integrative Physiology 261A.) (S/U grading only.) Effective: 2004 Winter Quarter.

NPB 261B—Topics in Vision: Systems, Psychophysics, Computational Models (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. NPB 261A recommended. Functions of the central visual pathways and their underlying mechanisms. Recent research on aspects of anatomy, biochemistry, electrophysiology, psychophysics, development, and genetics of the visual system. (Neuroscience 261B and Molecular, Cellular, and Integrative Physiology 261B.) (S/U grading only.) Effective: 2004 Winter Quarter.

NPB 261C—Topics in Vision: Clinical Vision Science (2)
Lecture/Discussion—2 hours. Prerequisite(s): NPB 261A; NPB 261B; or Consent of Instructor. Causes and mechanistic bases of major blinding diseases. Recent research on aspects of anatomy, biochemistry, electrophysiology, psychophysics, development, and genetics of the visual system related to disease. (Neuroscience 261C and Molecular, Cellular, and integrative Physiology 261C.) (S/U grading only.) Effective: 2005 Spring Quarter.

NPB 263—Modeling in Systems Neuroscience (4)
Lecture—3 hours; Lecture/Lab—1 hour. Prerequisite(s): Consent of Instructor. Modeling as a tool in systems neuroscience. Mathematical techniques will be introduced and used to explore advanced topics in echolocation, sound localization, electroreception, communications, and motor systems. Other topics include transforms, modeling assumptions, scales and linearity. Effective: 1997 Winter Quarter.

NPB 267—Computational Neuroscience (5)
Lecture—4 hours; Lecture/Lab—3 hours. Prerequisite(s): One course in general Neuroscience at the level of NPB 100 or NPB 110B; one year college-level Calculus at the level of MAT 016A, MAT 016B, MAT 016C or higher; one year Physics at the level of PHY 007A, PHY 007B, PHY 007C recommended; or Consent of Instructor. Mathematical models and data analysis techniques used to describe computations performed by nervous systems. Lecture topics include single-neuron biophysics, neural coding, network dynamics, memory, plasticity, and learning. Lab topics include programming mathematical models and data analysis techniques in MATLAB. (Neuroscience 267.) Effective: 2018 Winter Quarter.

NPB 270—How to Write a Fundable Grant Proposal in the Biomedical Sciences (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Restricted to members of the Neuroscience and BMCDB graduate groups; graduate students in other biomedical programs may enroll with instructor permission. Teaches the do's and don'ts of writing grants in the biomedical sciences and the mechanisms of the review process. May be repeated for credit. (Neuroscience 270.
) Effective: 2016 Spring Quarter.

NPB 285—Literature in Visual Neuroscience (2)
Seminar—2 hours. May be repeated for credit. (Neuroscience 285.) (S/U grading only.) Effective: 2008 Fall Quarter.

NPB 287A—Topics in Theoretical Neuroscience (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. In-depth exploration of topics in theoretical neuroscience. Topic varies each year. Fall quarter (287A): foundational material from books and review articles. Spring quarter (287B): continuation of year's topic through readings of seminal articles from the primary literature. May be repeated for credit. (Neuroscience 287A.) (S/U grading only.) Effective: 2017 Spring Quarter.

NPB 287B—Topics in Theoretical Neuroscience (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. In-depth exploration of topics in theoretical neuroscience. Topic varies each year. Fall quarter (287A): foundational material from books and review articles. Spring quarter (287B): continuation of year's topic through readings of seminal articles from the primary literature. May be repeated for credit. (Neuroscience 287B.) (S/U grading only.) Effective: 2009 Spring Quarter.

NPB 291—Auditory Neuroscience (1)
Discussion—0.5 hours; Seminar—0.5 hours. Prerequisite(s): NPB 100 or NPB 112 or NSC 222; Or the equivalent. Exploration of various important aspects of auditory physiology, behavior and psychophysics through review of original literature. New topic each quarter. May be repeated for credit with consent of instructor. May be repeated for credit. (S/U grading only.) Effective: 1998 Spring Quarter.

NRS Nursing

Courses in NRS:

NRS 201—Health Status and Care Systems (4)
Discussion/Laboratory; Lecture/Discussion—3 hours; Project (Term Project). Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Comparative health status data, major current health issues globally, nationally, regionally. Theoretical perspectives on social, political, economic determinants of health. Health-care systems examined, linked to data, and evaluated in regards to outcomes. Aging, rural, ethnic minority populations highlighted. Effective: 2010 Fall Quarter.

NRS 202—Implementation Science (4)
Lecture/Discussion—4 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Change processes in health care from political, historic, economic and sociologic frameworks. Historic and current examples of transformative change in the health-care system. Skills for system transformation through health policy, practice, research and education are emphasized. Effective: 2010 Winter Quarter.

NRS 203—Leadership in Health Care (4)
Fieldwork; Lecture/Discussion—3 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Critical examination of leadership from a variety of theoretical and philosophical perspectives and focuses on specific challenges in health care and leadership at various levels, e.g., patient, organizational, and policy levels. Effective: 2010 Fall Quarter.

NRS 204—Research Skills for Nursing Science and Health-Care Leadership (4)
Discussion/Laboratory—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Foundation for analyzing research, health, and systems data to answer clinical, systems, or policy questions. Use and examine multiple sources of data and information as a basis for planned change and transformation in health care. Effective: 2014 Winter Quarter.

NRS 205—Research Design in Nursing and Health Care (4)
Lecture/Discussion—4 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Major types of quantitative and qualitative research design and their application to nursing and health-care research. Implications of choosing alternative research designs and critical analysis of philosophical underpinnings. Evaluation of control and validity, sampling, instruments to measure health concepts. Effective: 2010 Fall Quarter.

NRS 205A—Overview of Research in Nursing Science and Health Care (2)
Lecture—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Provides an overview of quantitative and qualitative paradigms in scientific inquiry and the major designs related to each paradigm. First of a three-course series on research design and methods in nursing science and healthcare research. Effective: 2015 Fall Quarter.

NRS 205B—Quantitative Research in Nursing Science and Health Care (4)
Lecture—4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Introduces principles of quantitative data collection and analysis as applied to major study designs in nursing and health-care research. Provides a basic foundation for producing, interpreting, and applying quantitative research findings to answer clinical, system, and policy questions. Effective: 2015 Fall Quarter.

NRS 205C—Qualitative Research in Nursing Science and Health Care (4)
Lecture—4 hours. Prerequisite(s): Consent of Instructor. Restricted to current Ph.D. students in NSHL program or consent of instructor. Introduces principles of qualitative data collection and analysis as applied to major study designs in nursing and health-care research. Provides a basic foundation for producing, interpreting, and applying qualitative research findings to answer clinical, system, and policy questions. Effective: 2015 Fall Quarter.

NRS 206—Community Connections (2-5)
Variable—6 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Open to NSHL MS students only. Community-based learning and experiences including community participation, assessment, data collection and analysis using multiple approaches, community health improvement projects, collaborative leadership practice, all with the guidance of community members and nursing faculty. May be repeated for credit. (S/U grading only.) Effective: 2010 Fall Quarter.

NRS 210Y—Applied Health Informatics (4)
Lecture/Discussion—1 hour; Web Virtual Lecture—3 hours. Prerequisite(s): Consent of Instructor. Open to current student in NSHL graduate programs or consent of instructor. Within the conceptual framework of the Foundation of Knowledge model, this course integrates nursing science, information science, computer science and cognitive science to acquire, process, generate and disseminate knowledge. Effective: 2014 Winter Quarter.

NRS 211Y—Rural Health (2-3)
Fieldwork—1 hour; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Interprofessional graduate course provides an introduction to rural health theory, research, policy, and practice, with an emphasis on rural health assets and disparities. Effective: 2015 Spring Quarter.

NRS 212—Technology & Innovations in Health Care (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Multidisciplinary approach to stimulate new thinking in the practice, process, and delivery of health care. Focus on improving overall health outcomes. Effective: 2017 Winter Quarter.

NRS 220—Social, Cultural, and Behavioral Determinants of Health (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Effects of globalization, political systems, local and global economies, culture, race, class, gender, and sexuality on population health. Effective: 2016 Summer Quarter.

NRS 221—Biophysical Concepts in Nursing (3)
Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Pathophysiological processes that contribute to different disease states across the lifespan; case studies; selective clinical decisions using current, reliable sources of pathophysiology information. Effective: 2016 Summer Quarter.

NRS 222A—Research Quality Improvement and Evidence Based Practice (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Introduction to providing safe, competent and compassionate care in a highly technical and digital environment. Emphasis on safety, quality and research to clinical practice. Accessing and analyzing reliable sources of evidence for integration in care-plan. Effective: 2016 Summer Quarter.

NRS 222B—Research Quality Improvement and Evidence Based Practice (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Introduction to providing safe, competent and compassionate care in a highly technical and digital environment. Emphasis on safety, quality and research to clinical practice. Accessing and analyzing reliable sources of evidence for integration in care-plan. Effective: 2016 Fall Quarter.

NRS 223—Quality and Safety Education in Health Care (2)
Lecture/Discussion—2 hours. Prerequisite(s): NRS 221; NRS 272; NRS 420; NRS 421; NRS 273; NRS 422; NRS 423; NRS 425; Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Implementing best practices alongside technological tools and focusing on continuous quality improvement. Emphasis on providing safe, competent care in a highly technical and digital environment. Building capacity to apply concepts related to safety, quality and research to clinical practice. Effective: 2017 Spring Quarter.

NRS 224—Developing Future Nurse Leaders (2)
Lecture/Discussion—2 hours. Prerequisite(s): NRS 221; NRS 272; NRS 420; NRS 421; NRS 273; NRS 422; NRS 423; NRS 425; NRS 223; NRS 426; Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Develop skills around effective decision making, fiscal and environmental stewardship, initiating and maintaining effective working relationships, using mutually respectful communication and collaboration, care coordination, delegation and supervision. Emphasis on conflict resolution, leadership and interprofessional teamwork. Effective: 2017 Summer Quarter.

NRS 225—Professional Nursing Role Formation (3)
Lecture/Discussion—3 hours. Prerequisite(s): NRS 220; NRS 221; NRS 222A; NRS 272; NRS 420; NRS 421; NRS 429A; NRS 222B; NRS 273; NRS 422; NRS 423; NRS 429B; NRS 203; NRS 212; NRS 425; NRS 429C; NRS 202; NRS 223; NRS 426; NRS 429D; NRS 224; NRS 424; NRS 427; NRS 429E; Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Transition from nursing student to professional nurse. Focus on ethical comportment, professional values of social justice, autonomy, advocacy, altruism, human dignity, and integrity. Students must pass a mastery exit examination and complete a capstone project. Effective: 2017 Fall Quarter.

NRS 242A—Implementation Science for Clinicians (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course focuses on identification of relevant research or improvement questions specific to patient care and evaluating the pertinent research literature related to the implementation of evidence based care. The course is 1st of a 3-course series. Effective: 2014 Summer Quarter.

NRS 242B—Implementation Science for Clinicians (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course is a continuation of course 242A, Implementation Science for Clinicians, with a focus on implementing and evaluating a change. Effective: 2014 Summer Quarter.

NRS 242C—Implementation Science for Clinicians (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Advanced skills in application of implementation science into systems based practice and incorporating quality improvement and patient safety knowledge with particular focus on prevention of medical errors. Effective: 2014 Spring Quarter.

NRS 243A—Leadership in Professional Practice (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course is a critical examination of leadership using theoretical and philosophical perspectives with an applied approach applicable to clinical practice. The 3 course series is conducted across three quarters in the 1st, 3rd and 8th quarters. Effective: 2013 Summer Quarter.

NRS 243B—Leadership in Professional Practice (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course introduces professional role topics including history of the profession, the role in interprofessional teams and the health care system, transitioning to the role from other health professions, scope of practice, certification and licensure and professional organizations. Effective: 2014 Winter Quarter.

NRS 243C—Leadership in Professional Practice (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course expands upon the leadership role as it relates to their clinical practice and professional role. Professional role topics including: transitioning from student to practicing professional, scope of practice, the physician relationship, and more advanced concepts in ethics. Effective: 2014 Spring Quarter.

NRS 250—Foundations of Primary Health Care (7)
Laboratory—3 hours; Lecture/Discussion—6 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course is designed to promote the understanding and clinical application of human anatomy, physiology, histology, immunology and pathology. Effective: 2013 Summer Quarter.

NRS 251A—Primary Health Care (8)
Lecture/Discussion—8 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course introduces primary health care concepts essential to the care of common medical problems seen in primary care settings. Module content will focus on various organ systems and specialty areas. Effective: 2013 Fall Quarter.

NRS 251B—Foundations of Primary Health Care (8)
Lecture/Discussion—8 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course introduces primary health care concepts essential to the care of common medical problems seen in primary care settings. Effective: 2014 Winter Quarter.

NRS 251C—Primary Heath Care (8)
Lecture/Discussion—8 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course introduces primary health care concepts essential to the care of common medical problems seen in primary care settings. Effective: 2014 Spring Quarter.

NRS 251D—Primary Heath Care (6)
Lecture/Discussion—6 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course introduces primary health care concepts essential to the care of common medical problems seen in primary care settings. Effective: 2014 Summer Quarter.

NRS 260—Foundations of Behavioral Health (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course focuses on the spectrum of normal psychological development over the lifespan for children, adults and elders. Theories of stress and coping mechanism are presented as a framework for the assessment of individuals. Effective: 2013 Summer Quarter.

NRS 270—Foundations of Pharmacology (2)
Laboratory—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course introduces the student to the major concepts in pharmacology and relevant human physiology related to pharmacotherapeutics and toxicology. Effective: 2013 Summer Quarter.

NRS 271A—Pharmacology (2)
Laboratory—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Systems based pharmacology focused on classes of drugs used to treat disorders in specialty systems. Effective: 2013 Fall Quarter.

NRS 271B—Pharmacology (2)
Laboratory—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Systems based pharmacology focused on classes of drugs used to treat disorders in specialty systems. Effective: 2013 Fall Quarter.

NRS 271C—Pharmacology (2)
Laboratory—3 hours; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Systems based pharmacology focused on classes of drugs used to treat disorders in specialty systems. Effective: 2014 Spring Quarter.

NRS 272—Foundations of Pharmacology (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Theoretical background to providing safe and effective care related to drugs and natural products. Effective: 2016 Summer Quarter.

NRS 273—Pharmacology Concepts in Nursing (2)
Lecture/Discussion—2 hours. Prerequisite(s): NRS 221; NRS 272; NRS 420; NRS 421; Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Application of principles for safe and effective use of medications and natural products; use of current, reliable information to make clinical decisions. Effective: 2016 Fall Quarter.

NRS 290—Master's Seminar (2)
Discussion—2 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Open to NSHL MS students only or by consent of course instructor. Subject varies from quarter to quarter. Current knowledge and issues relevant to one of two fields of emphasis: population health or health systems. May be repeated up to 10 time(s). Effective: 2010 Fall Quarter.

NRS 291—Doctoral Seminar (2)
Discussion—2 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Focus on the theory, research and knowledge relevant to one of two fields of emphasis: population health or health systems. Emphasis placed on reading, critique and synthesis of classic and cutting-edge research in nursing and health care. May be repeated up to 10 time(s). Effective: 2010 Fall Quarter.

NRS 291D—Doctoral Seminar (2)
Discussion—2 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Focus on the theory, research and knowledge relevant to one of two fields of emphasis: population health or health systems. Emphasis placed on reading, critique and synthesis of classic and cutting-edge research in nursing and health care. May be repeated up to 10 time(s). (S/U grading only.) Effective: 2014 Winter Quarter.

NRS 298—Special Topics in Nursing Science and Health-Care Leadership (1-4)
Lecture/Discussion—1-2 hours; Variable—1-3 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. In-depth study of topics in Nursing Science and Health-Care Leadership, selected from: policy and politics in health care, health-care disparities, current issues in health care, approaches to the conduct of science, or other related areas, with year to year variation. May be repeated for credit. Effective: 2014 Spring Quarter.

NRS 298V—Online Special Topics in Nursing Science and Health-Care Leadership (1-4)
Web Electronic Discussion—1-4 hours; Web Virtual Lecture—1-4 hours. Prerequisite(s): Current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. In-depth study of topics in Nursing Science and Health-Care Leadership, selected from: policy and politics in health care, health-care disparities, current issues in health care, approaches to the conduct of science, or other related areas, with year to year variation. May be repeated for credit. Effective: 2014 Winter Quarter.

NRS 299—Research and Writing (1-12)
Extensive Writing/Discussion—3-36 hours. Prerequisite(s): Consent of Instructor. Students in the Nursing Science and Health-Care Leadership graduate programs conduct research and writing under the supervision of a faculty member. May be repeated for credit. (S/U grading only.) Effective: 2011 Winter Quarter.

NRS 299D—Dissertation Research and Writing (1-12)
Extensive Writing/Discussion—3-36 hours. Prerequisite(s): Consent of Instructor. Students in the Nursing Science and Health-Care Leadership graduate programs conduct dissertation research and writing under the supervision of a faculty member. May be repeated for credit. (S/U grading only.) Effective: 2011 Winter Quarter.

NRS 301—Learner Centered Teaching (3-4)
Lecture/Discussion—3 hours; Practice—1 hour. Prerequisite(s): Consent of Instructor. Open to current students in the Nursing Science and Health-care Leadership graduate programs; outside students with prior educational or work experience in education may register for this class with the consent of instructor. Students will explore best practices in learner-centered teaching, performance-based curriculum models, instructional design, and assessing/evaluating student learning. Students will have experience in planning learner-centered activities that are engaging and effective in achieving desired student performance. Effective: 2016 Spring Quarter.

NRS 302—Teaching Methods - Use of Emerging Technologies to Improve Student Learning (4)
Lecture/Discussion—3 hours; Practice—1 hour. Prerequisite(s): Consent of Instructor. Open to current students in the Nursing Science and Health-care Leadership graduate programs; outside students with prior educational or work experience in education may register for this class with the consent of instructor. Students will examine, design and develop instructional strategies that use innovative and emerging technologies to promote motivation, performance and learning in health professions education. Research findings associated with use of various emerging technologies will be examined. Effective: 2016 Fall Quarter.

NRS 303—Professional Role Formation (2-4)
Laboratory—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Open to current students in the Nursing Science and Health-care Leadership graduate programs; outside students with prior educational or work experience in education may register for this class with the consent of instructor. Exploration of the educator role. Topics include Role Expectations, Legal and Regulatory Issues, Professional Ethics, Educational Scholarship, Individual Differences, Learning Environments, and Lifelong Learning. Placements for the optional practicum are arranged in a wide variety of settings. Effective: 2017 Winter Quarter.

NRS 400—Basic Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Instruction and practice of the fundamental clinical skills necessary for patient care comprise this course with a primary focus on principles of effective communication in establishing the therapeutic provider-patient relationship. Effective: 2013 Summer Quarter.

NRS 401—Basic Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content. Effective: 2013 Fall Quarter.

NRS 410A—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content. Effective: 2014 Winter Quarter.

NRS 410B—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related specified systems. Effective: 2014 Spring Quarter.

NRS 410C—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related specified systems. Effective: 2014 Summer Quarter.

NRS 410D—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related to specified systems. Effective: 2013 Fall Quarter.

NRS 410E—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related to specified systems. Effective: 2013 Fall Quarter.

NRS 410F—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related to specified specialty systems. Effective: 2014 Spring Quarter.

NRS 410G—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related to specified specialty systems. Effective: 2015 Fall Quarter.

NRS 420—Foundations of Clinical Nursing Practice (3)
Clinical Activity—9 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Foundational course introduces students to core concepts of clinical nursing, including clinical reasoning, professional ethics, therapeutic communication and activities of daily living. Develop skills for the provision of safe, high quality, culturally-sensitive, person-centered care across the lifespan. Effective: 2016 Summer Quarter.

NRS 421—Health Assessment Across the Lifespan (3)
Clinical Activity—6 hours; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Prepares students to conduct a health history assessment using developmentally and culturally appropriate approaches for individuals across the lifespan. Acquire the knowledge, understanding, and skills needed to perform, interpret and communicate a health history. Effective: 2016 Summer Quarter.

NRS 422—Care of Adults with Chronic Conditions (6)
Clinical Activity—9 hours; Lecture/Discussion—3 hours. Prerequisite(s): NRS 221; NRS 272; NRS 420; NRS 421; Consent of Instructor. This course is open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Learn concepts central to the effective management of a variety of common chronic illness and disabling conditions across the lifespan in a variety of different settings. Practice conducting in-depth health assessments of individuals with chronic conditions. Effective: 2016 Fall Quarter.

NRS 423—Psychosocial Wellness & Illness (5)
Clinical Activity—6 hours; Lecture/Discussion—3 hours. Prerequisite(s): NRS 221; NRS 272; NRS 420; NRS 421; Consent of Instructor. This course is open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Explore the biological, psychological, cultural, societal, and environmental factors that affect psychological wellness and illness. Practice providing care to individuals and families experiencing disruptions in mental health secondary to physical or psychiatric illness, trauma or loss. Effective: 2016 Fall Quarter.

NRS 424—Nursing Care of Older Adults (3)
Clinical Activity—3 hours; Lecture/Discussion—2 hours. Prerequisite(s): NRS 221; NRS 272; NRS 420; NRS 421; NRS 273; NRS 422; NRS 423; NRS 425; NRS 223; NRS 426; Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Build skills for situations involving older adults, such as in the management of complex clinical and administering and interpreting standardized assessment tools. Develop plans of care for older adults experiencing a variety of geriatric syndromes. Effective: 2017 Summer Quarter.

NRS 425—Family Focused Nursing (9)
Clinical Activity—12 hours; Lecture/Discussion—5 hours. Prerequisite(s): NRS 221; NRS 272; NRS 420; NRS 421; NRS 273; NRS 422; NRS 423; Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Focuses on family as the unit of nursing and interprofessional care. Includes influences of family on health and illness, reproductive and gender/sexuality issues, pregnancy, birth and child-rearing, and the health and illness in children and youth. Effective: 2017 Winter Quarter.

NRS 426—Nursing Care of Adults with Complex Illness or Injury (8)
Clinical Activity—12 hours; Lecture/Discussion—4 hours. Prerequisite(s): NRS 221; NRS 272; NRS 420; NRS 421; NRS 273; NRS 422; NRS 423; NRS 425; Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Prepares students to provide comprehensive, patient-centered nursing care for patients with acute or complex illness and injury. Theory portion focuses on concepts associated with complex physiological alterations. Effective: 2017 Spring Quarter.

NRS 427—Fostering Healthy Communities (7)
Clinical Activity—9 hours; Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Focuses on populations & communities, and emphasizes working with diverse communities in providing health promotion, chronic disease management, transitional support and crisis intervention. Develop skills to critically analyze and shape health policy and develop accessible community resources. Effective: 2017 Summer Quarter.

NRS 428—Capstone Clinical Nursing Practicum (8)
Clinical Activity—24 hours. Prerequisite(s): NRS 220; NRS 221; NRS 222A; NRS 272; NRS 420; NRS 421; NRS 429A; NRS 222B; NRS 273; NRS 422; NRS 423; NRS 429B; NRS 203; NRS 212; NRS 425; NRS 429C; NRS 202; NRS 223; NRS 426; NRS 429D; NRS 224; NRS 424; NRS 427; NRS 429E; Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Practicum experience is designed to facilitate transition to professional practice. Opportunity to choose a clinical practice area of interest and to work with a preceptor with expertise in that area. Effective: 2017 Fall Quarter.

NRS 429A—Collaborative Practice A (1)
Clinical Activity—3 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Interprofessional course uses experiential learning activities including simulation, role play, and case studies. Concepts include but are not limited to; communication, person-centered care, ethical decision making, end-of-life decisions, culturally appropriate care, quality and safety, social justice, and professionalism. Effective: 2016 Summer Quarter.

NRS 429B—Collaborative Practice B (1)
Clinical Activity—3 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Interprofessional course uses experiential learning activities including simulation, role play, and case studies. Concepts include but are not limited to; communication, person-centered care, ethical decision making, end-of-life decisions, culturally appropriate care, quality and safety, social justice, and professionalism. Effective: 2016 Fall Quarter.

NRS 429C—Collaborative Practice C (1)
Clinical Activity—3 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Interprofessional course uses experiential learning activities including simulation, role play, and case studies. Concepts include but are not limited to; communication, person-centered care, ethical decision making, end-of-life decisions, culturally appropriate care, quality and safety, social justice, and professionalism. Effective: 2017 Winter Quarter.

NRS 429D—Collaborative Practice D (1)
Clinical Activity—3 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Interprofessional course uses experiential learning activities including simulation, role play, and case studies. Concepts include but are not limited to; communication, person-centered care, ethical decision making, end-of-life decisions, culturally appropriate care, quality and safety, social justice, and professionalism. Effective: 2017 Spring Quarter.

NRS 429E—Collaborative Practice E (1)
Clinical Activity—3 hours. Prerequisite(s): Consent of Instructor. This course is open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Interprofessional course uses experiential learning activities including simulation, role play, and case studies. Concepts include but are not limited to; communication, person-centered care, ethical decision making, end-of-life decisions, culturally appropriate care, quality and safety, social justice, and professionalism. Effective: 2017 Summer Quarter.

NRS 429F—Collaborative Practice F (1)
Clinical Activity—3 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Interprofessional course uses experiential learning activities including simulation, role play, and case studies. Concepts include but are not limited to; communication, person-centered care, ethical decision making, end-of-life decisions, culturally appropriate care, quality and safety, social justice, and professionalism. Effective: 2017 Fall Quarter.

NRS 440—Preparation for Clinical Practice (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Students are placed in clinical settings and/or clinical simulation laboratories to observe and practice the integration of clinical skills with direct supervision by faculty. Effective: 2016 Winter Quarter.

NRS 450A—Supervised Clinical Practice-Primary Health Care (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Each of the required primary care rotations is a four-week supervised clinical practice experience in primary care, under the supervision of an appropriate community-based primary care provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 450B—Supervised Clinical Practice-Primary Health Care (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Each of the required primary care rotations is a four-week supervised clinical practice experience in primary care, under the supervision of an appropriate community-based primary care provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 450C—Supervised Clinical Practice-Primary Health Care (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Each of the required primary care rotations is a four-week supervised clinical practice experience in primary care, under the supervision of an appropriate community-based primary care provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 450D—Supervised Clinical Practice-Primary Health Care (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Each of the required primary care rotations is a four-week supervised clinical practice experience in primary care, under the supervision of an appropriate community-based primary care provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 450E—Supervised Clinical Practice-Primary Health Care (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Each of the required primary care rotations is a four-week supervised clinical practice experience in primary care, under the supervision of an appropriate community-based primary care provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 451—Supervised Clinical Practice-Pediatrics (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical rotation under the supervision of an appropriate community-based Pediatric Medicine provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 452—Supervised Clinical Practice-Women's Health (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical rotation under the supervision of an appropriate community-based women’s health and prenatal care provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 453—Supervised Clinical Practice-Mental Health (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical rotation under the supervision of an appropriate community-based psychiatrist, psychiatric/mental health provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 454—Supervised Clinical Practice-Emergency Medicine (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical rotation under the supervision of an appropriate Emergency Medicine provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 455—Supervised Clinical Practice-Inpatient Surgery (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical experience under the supervision of an appropriate surgical provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 456—Supervised Clinical Practice-Inpatient Medicine (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical rotation under the supervision of an appropriate inpatient provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 459—Supervised Clinical Practice-Other Specialties (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Two four-week selective rotations are available to accommodate student interest and/or accommodate a student's clinical deficits identified by the program. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 470—Health Care Ethics (3-9)
Discussion/Laboratory—1 hour; Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Guided independent study of issues in biomedical ethics, with discussion of readings that are based on student interests and needs. Participation in ethics rounds. (General Medicine 470.) (S/U grading only.) Effective: 2012 Spring Quarter.

NRS 471—Supervised Clinical Practice-Geriatrics (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical rotation under the supervision of an appropriate community-based Geriatric Medicine provider per accreditation requirements. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 475—Supervised Clinical Practice-Acute Care (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Two- to four-week rotation focus on providing acute care in inpatient settings. Students will work directly with specific inpatient units. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 480—Supervised Clinical Practice-Rural Health (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Rural health rotations focus on providing care in medically underserved rural sites. Students will experience care across the continuum in ambulatory, inpatient, and community based settings. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 490—Supervised Clinical Practice-Quality and Safety (1-16)
Clinical Activity—48 hours. Prerequisite(s): Consent of Instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Clinical rotation that allow students to work directly with patient safety and quality improvement committees in various organizations. May be repeated up to 5 time(s). Effective: 2016 Winter Quarter.

NRS 493A—Improving Quality in Health Care (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Open to Nursing Science and Health-Care Leadership Students. Working in interdisciplinary teams, will explore the theory and practical methods being employed to make improvement in health care systems while providing an opportunity for interprofessional educational experience. Effective: 2017 Fall Quarter.

NRS 493B—Improving Quality in Health Care (4)
Lecture/Discussion—4 hours. Prerequisite(s): NRS 493A; Consent of Instructor. Open to Nursing Science and Health-Care Leadership Students. Working in interdisciplinary teams, will explore advanced theory and practical methods being employed to make improvement in health care systems while providing an opportunity for interprofessional educational experience. Effective: 2018 Winter Quarter.

NRS 493C—Enhancing Patient Safety in Health Care (3)
Clinical Activity—1 hour; Discussion—1 hour; Seminar—1 hour. Prerequisite(s): Consent of Instructor. Nursing Science and Health-Care Leadership graduate students. Inter-professional module is designed to explore the theory and practical methods being employed to improve patient safety in health care while providing an opportunity for inter-professional educational experience. Effective: 2017 Spring Quarter.

NSC Neuroscience

Courses in NSC:

NSC 200LA—Laboratory Methods in Neurobiology (6)
Laboratory—18 hours. Prerequisite(s): Graduate standing in the Neuroscience Graduate Group. Individual research in the laboratory of a faculty member. Research problems emphasize the use of contemporary methods and good experimental design. May be repeated three times for credit. May be repeated up to 3 time(s). (S/U grading only.) Effective: 1997 Winter Quarter.

NSC 200LB—Laboratory Methods in Neurobiology (3)
Laboratory—9 hours. Prerequisite(s): Graduate standing in the Neuroscience Graduate Group. Individual research in the laboratory of a faculty member. Research problems emphasize the use of contemporary methods and good experimental design. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

NSC 201—Neuroanatomy (3)
Discussion/Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Mix of lectures, demonstrations, and dissections, emphasizing functional significance of neuroanatomy from a biological perspective, with comparisons between human and non-human brains. Emphasis placed on functional anatomy of the nervous system, integrated with cellular, molecular, cognitive, and developmental concepts. Effective: 2005 Fall Quarter.

NSC 211—Advaced Topics in Neuroimaging (3)
Laboratory—1 hour; Seminar—2 hours. Prerequisite(s): PSC 210; or Consent of Instructor. Restricted to 16 students. Critical presentation and discussion of the most influential advanced issues in neuroimaging, emphasizing fMRI design/analysis and the integration of fMRI with EEG/MEG. May be repeated for credit Course may be repeated when topics differ. (Neurobiology, Physiology, and Behavior 211 and Psychology 211.) (S/U grading only.) Effective: 2017 Spring Quarter.

NSC 220—How to Give a Scientific Seminar (3)
Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Presentation of effective seminars. Student presentations of selected neuroscience topics in seminar format. Must be taken in two consecutive quarters. May be repeated up to 1 time(s). Effective: 2002 Spring Quarter.

NSC 221—Cellular Neurophysiology (4)
Lecture—4.5 hours. Prerequisite(s): Graduate standing or consent of instructor. Physiological aspects of cellular and subcellular organization of the nervous system. Neuronal cell biology, the structure and function of ion channels, electrical excitability, signaling cascades, sensory transduction and, mechanisms of synaptic transmission, and the cellular basis of learning and memory. Effective: 2009 Fall Quarter.

NSC 222—Systems Neuroscience (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Integrative and information-processing aspects of nervous system organization. Topics include sensory systems, motor function, sensorimotor integration, the limbic system, and the neurobiology of learning and memory. (Neurobiology, Physiology, and Behavior 222.) Effective: 2006 Winter Quarter.

NSC 223—Cognitive Neuroscience (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Graduate student standing in Psychology or Neuroscience or consent of instructor. Graduate core course for neuroscience. Neurobiological bases of higher mental function including attention, memory, language. One of three in three-quarter sequence. (Psychology 261) Effective: 1997 Winter Quarter.

NSC 224A—Molecular and Developmental Neurobiology (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Key issues in developmental and molecular neurobiology. Discussion emphasis on critical evaluation of the experiments and methods described in research papers. Readings of seminal, primary research papers, reviews, and book chapters. Reading materials will be distributed one week in advance. Effective: 2006 Winter Quarter.

NSC 224B—Molecular and Developmental Neurobiology (2)
Lecture/Discussion—2 hours. Prerequisite(s): NSC 224A; or Consent of Instructor. Continuation of NSC 224A: Key issues in developmental and molecular neurobiology, focusing on developmental topics. Discussion emphasis on critical evaluation of experiments and methods described in associated literature. Effective: 2006 Spring Quarter.

NSC 225—Translational Research in the Neurobiology of Disease (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): NSC 221 (can be concurrent); NSC 222 (can be concurrent); NSC 223 (can be concurrent); or Consent of Instructor. Past or concurrent enrollment in all courses. Provides an overview of major neuropsychiatric and neurological disorders from both the clinical and fundamental science perspectives. Effective: 2008 Spring Quarter.

NSC 226—Molecular and Developmental Neurobiology (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Introduction to molecular and developmental neurobiology for graduate students. Topics will range from neurulation to development of sensory systems and will include modern molecular methods and their application in developmental neuroscience. Effective: 2003 Winter Quarter.

NSC 243—Topics in Cellular and Behavioral Neurobiology (2)
Discussion—1 hour; Seminar—1 hour. Prerequisite(s): Consent of Instructor. An advanced examination of several currrent problems in neurobiology. Topics will vary in different years; may be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

NSC 247—Topics in Functional Neurogenomics (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): Graduate standing or consent of instructor. The theory, methods and principles of functional neurogenomics with emphasis on the relationship to molecular mechanisms involved in development and disease of the nervous system. (Same Course as Neurobiology, Physiology, and Behavior 247.) Effective: 2003 Spring Quarter.

NSC 250—Biology of Neuroglia (2)
Lecture/Discussion—1.5 hours. Prerequisite(s): Consent of Instructor. The properties and functions of non-neuronal or neuroglial cells in the mammalian central nervous system with relevance to neuronal development, physiology and injury response. (S/U grading only.) Effective: 1997 Winter Quarter.

NSC 261A—Topics in Vision: Eyes and Retinal Mechanisms (2)
Lecture/Discussion—2 hours. Prerequisite(s): NPB 100 or NPB 112; Or the equivalent; graduate standing. Structure and function of the visual system, with emphasis on the eye and retina, including optics, anatomy, transduction, retinal synapses, adaptation, and parallel processing. (Neurobiology, Physiology, and Behavior 261A and Molecular, Cellular, and Integrative Physiology 261A.) (S/U grading only.) Effective: 2004 Winter Quarter.

NSC 261B—Topics in Vision: Systems, Psychophysics, Computational Models (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. NSC 261A recommended. Functions of the central visual pathways and their underlying mechanisms. Recent research on aspects of anatomy, biochemistry, electrophysiology, psychophysics, development, and genetics of the visual system. (Neurobiology, Physiology, and Behavior 261B and Molecular, Cellular, and Integrative Physiology 261B.) (S/U grading only.) Effective: 2004 Winter Quarter.

NSC 261C—Topics in Vision: Clinical Vision Science (2)
Lecture/Discussion—2 hours. Prerequisite(s): NSC 261A; NSC 261B; or Consent of Instructor. Causes and mechanistic bases of major blinding diseases. Recent research on aspects of anatomy, biochemistry, electrophysiology, psychophysics, development, and genetics of the visual system related to disease. (NPB 261C and MCP 261C) (S/U grading only.) Effective: 2005 Spring Quarter.

NSC 267—Computational Neuroscience (5)
Lecture—4 hours; Lecture/Lab—3 hours. Prerequisite(s): Consent of Instructor. One course in general Neuroscience at the level of NSC 100; or NPB 110B; one year college-level Calculus at level of MAT 016A, MAT 016B, MAT 016C or higher; one year Physics at the level of PHY 007A, PHY 007B, PHY 007C, recommended; or Consent of Instructor. Mathematical models and data analysis techniques used to describe computations performed by nervous systems. Lecture topics include single neuron biophysics, neural coding, network dynamics, memory, plasticity, and learning. Lab topics include programming mathematical models and data analysis techniques in MATLAB. (Neurobiology, Physiology & Behavior 267.) Effective: 2018 Winter Quarter.

NSC 270—How to Write a Fundable Grant Proposal in the Biomedical Sciences (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Restricted to members of the Neuroscience and BMCDB graduate groups; graduate students in other biomedical programs may enroll with instructor permission. Teaches the do's and don'ts of writing grants in the biomedical sciences and the mechanisms of the review process. May be repeated for credit. (Neurobiology, Physiology and Behavior 270.) Effective: 2016 Spring Quarter.

NSC 283—Neurobiological Literature (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Critical presentation and analysis of recent journal articles in neurobiology. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

NSC 284—Development of Sensory Systems (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Presentation and discussion of recent literature on the development of sensory systems. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1998 Winter Quarter.

NSC 285—Literature in Visual Neuroscience (2)
Seminar—2 hours. Critical presentation and discussion of current literature in visual neuroscience. May be repeated for credit when topic differs. (Neurobiology, Physiology, and Behavior 285.) (S/U grading only.) Effective: 2004 Spring Quarter.

NSC 287A—Topics in Theoretical Neuroscience (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. In-depth exploration of topics in theoretical neuroscience. Topic varies each year. Fall quarter (287A): foundational material from books and review articles. Spring quarter (287B): continuation of year's topic through readings of seminal articles from the primary literature. May be repeated for credit. (Neurobiology, Physiology & Behavior 287A.) (S/U grading only.) Effective: 2017 Spring Quarter.

NSC 287B—Topics in Theoretical Neuroscience (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. In-depth exploration of topics in theoretical neuroscience. Topic varies each year. Fall quarter (287A): foundational material from books and review articles. Spring quarter (287B): continuation of year's topic through readings of seminal articles from the primary literature. May be repeated for credit. (Neurobiology, Physiology & Behavior 287B) (S/U grading only.) Effective: 2009 Spring Quarter.

NSC 289—Topics in Molecular and Developmental Neurobiology (2)
Seminar—2 hours. Analysis and discussion of seminal and current research papers in molecular and developmental neurobiology. Different topics will be covered each quarter. In the past topics have included, "Synaptic vesicle dynamics," "Neuronal polarity," and "Glutamate receptors." May be repeated up to 10 time(s) when topic differs. (S/U grading only.) Effective: 2011 Spring Quarter.

NSC 290C—Research Conference in Neurobiology (1)
Discussion—1 hour. Prerequisite(s): NSC 299 (can be concurrent); Graduate standing in Neuroscience or consent of instructor; NSC 299 required concurrently. Presentation and discussion of faculty and graduate student research in neurobiology. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

NSC 292—Cortical Plasticity and Perception (2)
Lecture/Discussion—2 hours. Prerequisite(s): NPB 100 or NPB 112; Or equivalent or consent of instructor. Examination of research articles on cortical plasticity and changes in perception. Examples drawn from studies of the somatosensory, visual, auditory, and motor cortex. (S/U grading only.) Effective: 2000 Winter Quarter.

NSC 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

NSC 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

NSU Med - Neurosurgery

Courses in NSU:

NSU 199—Special Study in Neurosurgery for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Advanced undergraduate standing with consent of instructor. Students may participate in ongoing neurosurgical projects or may pursue and design independent projects. (P/NP grading only.) Effective: 1997 Winter Quarter.

NSU 299—Neurosurgery Research (3-12)
Prerequisite(s): Graduate student with consent of instructor. Student may participate in ongoing neurosurgical projects or may pursue and design independent projects. (S/U grading only.) Effective: 1997 Winter Quarter.

NSU 451—Neurosurgical Critical Care Clerkship (3)
Clinical Activity. Prerequisite(s): Third- or fourth-year medical student having completed a neurosurgical clerkship or consent of instructor. Students participate in the care of neurosurgical patients in the NSICU and in the admission and surgical management of patients admitted through the Emergency Room. (H/P/F grading only.) Effective: 1997 Winter Quarter.

NSU 455—Clinical Pediatric Neurosurgery (6)
Clinical Activity. Prerequisite(s): NSU 460; and Consent of Instructor. Third- or fourth-year medical students. Admission and follow-up of pediatric patients. Neurological history, examination, and diagnostic procedures are emphasized. Students will participate in surgical procedures and are required to attend all pediatric neurosurgery conferences. (H/P/F grading only.) Effective: 1997 Winter Quarter.

NSU 460—Clinical Neurosurgery (6-18)
Clinical Activity. Prerequisite(s): Consent of Instructor. Third- and fourth-year medical students. Approved for graduate degree credit. Admission and follow-up of patients. Neurological history, examination and further diagnostic procedures emphasized. Students participate in meaningful aspects of surgical procedures and attend listed conferences, rounds, and seminars. (H/P/F grading only.) Effective: 1997 Winter Quarter.

NSU 464—Externship (3-9)
Clinical Activity. Prerequisite(s): Fourth-year medical student having completed a neurosurgical clerkship or consent of instructor. Clerkship in neurosurgery to be arranged at another institution with accredited residency program in neurosurgery under proper supervision. (H/P/F grading only.) Effective: 2016 Summer Quarter.

NSU 470—Advanced Clinical Neurosurgery (6-18)
Clinical Activity. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing. Student will function as acting intern on neurosurgery service. Admission and management of patients. Neurological history, examination, diagnostic procedures, and surgical management are emphasized. Students participate in meaningful aspects of surgical procedures and attend required conferences and rounds. (H/P/F grading only.) Effective: 1997 Winter Quarter.

NSU 480—Insights in Neurosurgery (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. First- and second-year medical students in good academic standing. Observation of neurosurgical care in emergency room, operating room
and hospital floors, including manner of treatment of a variety of chronic and acute neurological diseases. (H/P/F grading only.) Effective: 1997 Winter Quarter.

NSU 499—Neurosurgery Research (1-18)
Variable. Prerequisite(s): Medical student with consent of instructor. Student may participate in ongoing neurosurgical projects or may pursue and design independent projects. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

NUB Nutritional Biology

Courses in NUB:

NUB 210A—Advanced Nutrition I: Nutrition and Metabolism, Macronutrients (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): Admission to the Nutritional Biology Graduate Group or consent of instructor. Class size limited to 30 students. Advanced general nutritional concepts. Integrating nutrition with biological systems, population nutrition issues, and research approaches. Advanced concepts on lipid and protein metabolism. Effective: 2014 Winter Quarter.

NUB 210B—Advanced Nutrition II: Nutrition and Cell Biology, Micronutrients (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): Admission to the Nutritional Biology Graduate Group or consent of instructor. Class size limited to 30 students. Effects of nutrients at the cellular level. Principles of cell signaling and signaling modulation by nutrients. Advanced concepts of mineral and vitamin metabolism. Mineral and vitamin deviencies and associated pathologies. Effective: 2014 Fall Quarter.

NUB 210C—Advanced Nutrition III: Nutrition in Health and Disease (5)
Discussion—1 hour; Lecture—4 hours. Integration of biochemical, physiological, and genetic aspects of nutrition in the context of clinical and epidemiological observations related to health and disease, including obesity and diabetes, cancer, vascular and neurodegenerative diseases, osteoporosis, and birth defects. Review and consideration of governmental. Effective: 2014 Winter Quarter.

NUB 290C—Research Group Conference (1)
Discussion—1 hour. Prerequisite(s): Graduate standing. Weekly conference on research problems, progress and techniques in animal sciences. May be repeated for credit. (S/U grading only.) Effective: 2013 Fall Quarter.

NUB 298—Directed Group Study (1-5)
Variable. Prerequisite(s): Graduate standing in Nutritional Biology Graduate Group or consent of instructor. May be repeated up to 3 time(s) when topics differs and consent of instructor. Effective: 2013 Fall Quarter.

NUB 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. May be repeated for credit. (S/U grading only.) Effective: 2013 Fall Quarter.

NUT Nutrition

Courses in NUT:

NUT 010—Discoveries and Concepts in Nutrition (3)
Lecture—3 hours; Project (Term Project). Nutrition as a science; historical development of nutrition concepts; properties of nutrients and foods. Not open for credit to students who have taken an upper division course in nutrition. No credit will be granted to students who have completed NUT 010Y or NUT 010V or an upper-division nutrition course. GE credit: SE, SL. Effective: 2018 Winter Quarter.

NUT 010V—Discoveries and Concepts in Nutrition (3)
Project (Term Project); Web Virtual Lecture—3 hours. Nutrition as a science; historical development of nutrition concepts; properties of nutrients and foods. Not open for credit to students who have taken an upper division course in nutrition. No credit will be granted to students who have completed NUT 010 or NUT 010Y or an upper-division nutrition course. GE credit: SE, SL. Effective: 2018 Winter Quarter.

NUT 010Y—Discoveries and Concepts in Nutrition (3)
Project (Term Project); Web Virtual Lecture—3 hours. Nutrition as a science; historical development of nutrition concepts; properties of nutrients and foods. Not open for credit to students who have taken an upper division course in nutrition. No credit will be granted to students who have completed NUT 010 or NUT 010V or an upper-division nutrition course. GE credit: SE, SL. Effective: 2018 Winter Quarter.

NUT 011—Current Topics and Controversies in Nutrition (2)
Discussion—1.5 hours; Term Paper. Exploration of current applications and controversies in nutrition. Students read scientific journal articles and write summaries, as well as give brief oral presentations. Topics change to reflect current interests and issues. GE credit: OL, SE, WE. Effective: 2010 Winter Quarter.

NUT 099—Individual Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

NUT 104—Environmental & Nutritional Factors in Cellular Regulation and Nutritional Toxicants (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 101; (BIS 103 or ABI 103) Cellular regulation from nutritional/toxicological perspective. Emphasis: role of biofactors on modulation of signal transduction pathways, role of specific organelles in organization/regulation of metabolic transformations, major cofactor functions, principles of pharmacology/toxicology important to understanding nutrient/toxicant metabolism. (Environmental Toxicology 104.) GE credit: OL, SE, SL. Effective: 2008 Fall Quarter.

NUT 105—Nutrition and Aging (3)
Lecture—3 hours. Prerequisite(s): (NUT 111AV or NUT 111AY); ABI 103; Or the equivalent course to ABI 103. Role of nutrition in the aging process from both an organismal/cell perspective, including demographics, theories of aging, nutrition and evolution, nutritional manipulation and life-span extension, and nutrition's impact on the diseases of aging. GE credit: SE. Effective: 2017 Spring Quarter.

NUT 111AY—Introduction to Nutrition and Metabolism (3)
Lecture/Discussion—1 hour; Web Virtual Lecture—2 hours. Prerequisite(s): CHE 008B; NPB 101; Or the equivalent of NPB 101. Restricted to upper division or graduate level students only. Introduction to metabolism of protein, fat and carbohydrate: the biological role of vitamins and minerals; nutrient requirements during the life cycle; assessment of dietary intake and nutritional status. Not open for credit to students who have completed NUT 101 or NUT 111AV. GE credit: SE. Effective: 2016 Fall Quarter.

NUT 111B—Recommendations and Standards for Human Nutrition (2)
Lecture—2 hours. Prerequisite(s): CHE 008B; NPB 101; (NUT 111AV or NUT 111AY); Or the equivalent of NPB 101. Critical analysis of the development of nutritional recommendations for humans. Topics include: history of modern recommendations, development of the Recommended Dietary Allowance (RDA) and other food guides; the Dietary Reference Intakes (DRI); administrative structure of regulatory agencies pertinent to nutrition recommendations; introduction to scientific methods used to determine the recommendations; food labeling laws; nutrition recommendations in other countries and cultures. Not open for credit to students who have completed NUT 111. Effective: 2017 Spring Quarter.

NUT 112—Nutritional Assessment (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): ((ABI 102, ABI 103) or (BIS 102, BIS 103)); NUT 111AY; (STA 013 or STA 013Y or PLS 120) Restricted to upper division or graduate level Nutrition students only. Methods of human nutritional assessment, including dietary, anthropometric, biochemical methods. Principles of precision, accuracy, and interpretation of results for individuals and populations. GE credit: QL, SE. Effective: 2018 Spring Quarter.

NUT 113—Principles of Epidemiology in Nutrition (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): PLS 120; Or equivalent. Introduction to epidemiology as it relates to the field of nutrition, including study design, principles of epidemiologic inference, criteria for causality, and interpreting measures of disease risk. GE credit: QL, SE. Effective: 2014 Fall Quarter.

NUT 113—Principles of Epidemiology in Nutrition (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): STA 013 or STA 013Y or PLS 120 or STA 100 Introduction to epidemiology as it relates to the field of nutrition, including study design, principles of epidemiologic inference, criteria for causality, and interpreting measures of disease risk. GE credit: QL, SE. Effective: 2018 Fall Quarter.

NUT 114—Developmental Nutrition (4)
Lecture—4 hours. Prerequisite(s): ABI 102; ABI 103; (NUT 111AV or NUT 111AY); NUT 111B Role of nutritional factors in embryonic and postnatal development. GE credit: SE. Effective: 2017 Winter Quarter.

NUT 115—Animal Nutrition (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): CHE 008B or CHE 118B; or Consent of Instructor. Comparative differences among animals in digestion and metabolism of nutrients. Nutrient composition of feeds, digestive systems, digestion, absorption, feeding strategies. GE credit: OL, QL, SE, SL, VL, WE. Effective: 2017 Winter Quarter.

NUT 116A—Clinical Nutrition (3)
Lecture—3 hours. Prerequisite(s): (NUT 111AV or NUT 111AY); NUT 111B; NUT 112; NPB 101; Or the equivalent to NPB 101. Biochemical and physiological bases for therapeutic diets. Problems in planning diets for normal and pathological conditions. GE credit: SE. Effective: 2016 Fall Quarter.

NUT 116AL—Clinical Nutrition Practicum (3)
Discussion—1 hour; Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): NUT 116A (can be concurrent) Fundamental principles of planning and evaluating therapeutic diets and patient education for pathological conditions covered in 116A. GE credit: SE. Effective: 1997 Fall Quarter.

NUT 116B—Clinical Nutrition (3)
Lecture—3 hours. Prerequisite(s): (NUT 111AV or NUT 111AY); NUT 111B; NUT 112; NPB 101; Or the equivalent to NPB 101. Biochemical and physiological bases for therapeutic diets. Problems in planning diets for normal and pathological conditions. GE credit: SE. Effective: 2017 Winter Quarter.

NUT 116BL—Clinical Nutrition Practicum (3)
Discussion—1 hour; Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): NUT 116AL; NUT 116B (can be concurrent) Fundamental principles of planning and evaluating therapeutic diets and patient education for pathological conditions covered in 116B. Continuation of course 116AL. GE credit: SE. Effective: 2017 Winter Quarter.

NUT 117—Experimental Nutrition (6)
Extensive Writing; Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): (NUT 111AV or NUT 111AY); NUT 111B; NUT 112; BIS 102; BIS 103; MCB 120L or other laboratory course in biochemistry is recommended. Methods of assessing nutritional status. Application of chemical, microbiological, chromatographic and enzymatic techniques to current problems in nutrition. GE credit: SE, WE. Effective: 2016 Fall Quarter.

NUT 118—Community Nutrition (4)
Lecture—4 hours. Prerequisite(s): NUT 116A; (NUT 111AV or NUT 111AY); NUT 111B Nutrition problems in contemporary communities and of selected target groups in the United States and in developing countries. Nutrition programs and policy, principles of nutrition education. GE credit: SE, SL. Effective: 2017 Winter Quarter.

NUT 119A—International, community-based nutritional assessment. (1)
Lecture/Discussion—1 hour. Prerequisite(s): NUT 112 (can be concurrent); and Consent of Instructor. Issues and problems related to community-based nutritional assessment in a low-income country, major nutritional problems in low-income countries; ethical issues in human investigation; survey design, data collection techniques, and data analysis; preparation for international travel; cross-cultural communication, health, and safety while living abroad. Effective: 2002 Spring Quarter.

NUT 119B—International, Community-Based Nutritional Assessment (6)
Fieldwork—12 hours; Lecture—2 hours. Prerequisite(s): NUT 119A; and Consent of Instructor. Restricted to upper division students in Clinical Nutrition, Community Nutrition, Dietetics, and Nutrition Science. A six-week summer course in Peru. Implementation of a community-based nutritional assessment survey, including development of the survey instrument, selection. Effective: 2002 Summer Special Session.

NUT 120AN—Nutritional Anthropology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): NUT 010 and ANT 002 recommended. Nutritional anthropology from historical and contemporary perspectives; the anthropological approach to food and diet; field work methods; case histories that explore food patterns and their nutritional implications. GE credit: SE, SS. Effective: 2017 Spring Quarter.

NUT 120BN—Nutritional Geography (4)
Discussion—1 hour; Lecture—3 hours. Nutritional geography from historical and contemporary perspectives; the geographical approach to food and diet; cultural and environmental factors that influence dietary practices; food-related landscapes and patterns. GE credit: SE, SS. Effective: 2016 Fall Quarter.

NUT 122—Ruminant Nutrition and Digestive Physiology (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (ABI 103 or BIS 103); BIS 002A; BIS 002B; BIS 002C; (ANS 100 or NPB 101); or Consent of Instructor. MAT 016B recommended. Study of nutrient utilization as influenced by the unique aspects of digestion and fermentation in ruminants, both domestic and wild. Laboratories include comparative anatomy, feed evaluation, digestion kinetics using fistulated cows, computer modeling, and microbial exercises. GE credit: QL, SE. Effective: 2017 Spring Quarter.

NUT 123—Comparative Animal Nutrition (3)
Lecture—3 hours. Prerequisite(s): ABI 103 or BIS 103 Restricted to upper division and graduate level students. Comparative nutrition of animals; including laboratory, companion, zoo, and wild, animals. Digestion and metabolic adaptations required for animal species to consume diverse diets. Relation of nutrition to metabolic adaptations and physiological states, including growth, reproduction, and diseases. GE credit: SE. Effective: 2017 Spring Quarter.

NUT 123L—Comparative Animal Nutrition Laboratory (1)
Laboratory—3 hours. Prerequisite(s): ABI 103 or BIS 103 Laboratory exercises leading to written reports on establishment of nutritional requirements and formulation of complete diets for laboratory, companion, zoo and wild animals. Effective: 2017 Spring Quarter.

NUT 124—Nutrition and Feeding of Finfishes (3)
Lecture—3 hours. Prerequisite(s): BIS 103 or ABI 103 Principles of nutrition and feeding of fishes under commercial situations; implication of fish nutrition to the environment and conservation of endangered species. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

NUT 127—Environmental Stress and Development in Marine Organisms (10)
Discussion—2 hours; Laboratory—12 hours; Lecture—4 hours. Prerequisite(s): ETX 101 or BIS 102 or BIS 104; or equivalent course. ETX 114A or NUT 114 recommended. Course taught at Bodega Marine Laboratory. Effects of environmental and nutritional stress, including pollutants, on development and function in embryos and larvae of marine organisms. Emphasis on advanced experimental methods. (Environmental Toxicology 127.) GE credit: OL, QL, SE, SL, VL, WE. Effective: 2002 Summer Session 1.

NUT 129—Journalistic Practicum in Nutrition (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): (NUT 111AV or NUT 111AY); NUT 111B; or Consent of Instructor. A course in written or oral expression. Critical analysis and discussion of current, controversial issues in nutrition; use of journalistic techniques to interpret scientific findings for the lay public. Students required to write several articles for campus media. May be repeated up to 1 time(s). GE credit: OL, SE, SL, WE. Effective: 2017 Spring Quarter.

NUT 130—Experiments in Nutrition: Design and Execution (2)
Laboratory—6 hours. Prerequisite(s): Consent of Instructor. NUT 111AV, NUT 111AY, NUT 111B or NUT 114 recommended. Experiments in current nutritional problems. Experimental design:students choose project and, independently or in groups of two-three, design a protocol, complete the project, and report findings. May be repeated for credit up to six times(three times per instructor)with consent of instructor. May be repeated up to 6 time(s) three times per instructor with consent of instructor. GE credit: SE. Effective: 2016 Fall Quarter.

NUT 190—Proseminar in Nutrition (1)
Seminar—1 hour. Prerequisite(s): (NUT 111AV or NUT 111AY); NUT 111B Restricted to senior standing. Discussion of human nutrition problems. Each term will involve a different emphasis among experimental, clinical, and dietetic problems of community, national and international scope. May be repeated twice for credit with consent of instructor. May be repeated up to 2 time(s). GE credit: OL, SE, VL. Effective: 2016 Fall Quarter.

NUT 190C—Nutrition Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing in Nutrition or related biological science. Introduction to research findings and methods in nutrition. Presentation and discussion of research by faculty and students. May be repeated for credit. May be repeated for credit. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

NUT 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. One upper division course in nutrition. Work experience on or off campus in practical application of nutrition, supervised by a faculty member. (P/NP grading only.) Effective: 1997 Winter Quarter.

NUT 197T—Tutoring in Nutrition (1-2)
Discussion/Laboratory—3-6 hours. Prerequisite(s): Consent of Instructor. Nutrition Science, Clinical Nutrition or related major. Tutoring of students in nutrition courses, assistance with discussion groups or laboratory sections, weekly conference with instructor in charge of course: written evaluations. May be repeated if tutoring a different course. May be repeated for credit. (P/NP grading only.) Effective: 2016 Fall Quarter.

NUT 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

NUT 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

NUT 219A—International Nutrition (3)
Lecture—3 hours. Prerequisite(s): NUT 111AV; NUT 111AY; Graduate Standing; undergraduates only admitted with consent of instructor. Epidemiology, etiology, and consequences of undernutrition, with particular focus on the nutritional problems of children and women in low income populations. Effective: 2018 Spring Quarter.

NUT 219B—International Nutrition (3)
Lecture—3 hours. Prerequisite(s): NUT 219A Intervention programs to prevent or ameliorate nutritional problems in low-income populations. Planning, implementing, and evaluating nutrition intervention programs. Effective: 2004 Fall Quarter.

NUT 230—Experiments in Nutrition: Design and Execution (2)
Laboratory—6 hours. Prerequisite(s): Consent of Instructor. NUT 201, NUT 202, NUT 203, NUT 204, or the equivalent recommended. Student selected projects to enhance laboratory skills. Independently, or in groups of two-three students, design a protocol, carry out the project, analyze the results and report the findings. May be repeated up to 6 time(s) with consent of instructor (limit of three times per instructor). Effective: 1999 Fall Quarter.

NUT 250—Metabolic Homeostasis (3)
Discussion—1.5 hours; Lecture—2 hours. Prerequisite(s): Passing the Nutrition Graduate Group Preliminary Examination or consent of instructor. Preference given to students in advanced standing in the Nutrition Graduate Group. Regulatory mechanisms of carbohydrate, lipid, and protein homeostasis; mechanisms of metabolic enzyme regulation and of the metabolic hormones; homeostatic mechanisms and interactions; fuel-fuel interactions; nutrition-energy balance. Effective: 2001 Spring Quarter.

NUT 251—Nutrition and Immunity (2)
Lecture/Discussion—2 hours. Prerequisite(s): PMI 126; ABI 102; MMI 107; Or the equivalent to MMI 107. Cellular and molecular mechanisms underlying interactions of nutrition and immune function, including modulation of immunocompetence by diet and effects of immune responses on nutritional needs. Lectures and discussion explore implications for resistance to infection, autoimmunity and cancer. Effective: 2000 Winter Quarter.

NUT 252—Nutrition and Development (3)
Lecture—3 hours. Prerequisite(s): NUB 210A, NUB 210B, and NUB 210C recommended. Relationship of nutrition to prenatal and early postnatal development. Effective: 2018 Spring Quarter.

NUT 253—Control of Energy Balance and Body Weight (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Comprehensive study of the biochemical, nutritional and physiological mechanisms controlling food intake, body composition and energy expenditure. Subject matter will be approached through lectures and discussions where students and staff will critically evaluate the literature. Effective: 2016 Spring Quarter.

NUT 254—Applications of Systems Analysis in Nutrition (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): NUT 202; Or the equivalent. Quantitative aspects of digestion and metabolism; principles of systems analysis. Evolution of models of energy metabolism as applied in current
feeding systems. Critical evaluations of mechanistic models used analytically in support of nutritional research. Effective: 1997 Winter Quarter.

NUT 258—Field Research Methods in International Nutrition (3)
Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Issues and problems related to implementation of nutrition field research in less-developed countries, including ethics; relationships with local governments, communities, and scientists; data collection techniques and quality assurance; field logistics; research budgets; and other administrative and personal issues. Effective: 1997 Winter Quarter.

NUT 259—Nutrition and Aging (2)
Lecture—2 hours. Prerequisite(s): NUT 201; NUT 202; NUT 203; NUT 204; Three courses. Interaction between nutrition and aging. Topics include physiological/biochemical basis of aging, age-related changes affecting
nutritional requirements, nutrition and mortality rate, assessment of nutritional status in the elderly, and relationship between developmental nutrition and the rate of aging. Effective: 1997 Fall Quarter.

NUT 270—Scientific Ethics in Biomedical Studies: Emphasis on Nutrition (3)
Discussion—1 hour; Lecture—1 hour; Term Paper. Restricted to graduate standing or consent of instructor. Scientific ethics in biomedical studies, especially nutrition. Discussion and case study presentations on scientific integrity, fraud, misconduct, conflict of interest, human and animal research protections. Not open for credit to students who have completed NUT 492B. Effective: 2003 Spring Quarter.

NUT 290—Beginning Nutrition Seminar (2)
Lecture/Discussion—1 hour; Seminar—1 hour. Prerequisite(s): First-year graduate standing. Discussion and critical evaluation of topics in nutrition with emphasis on literature review and evaluation in this field. Students give oral presentations on relevant topics. Effective: 1997 Fall Quarter.

NUT 290C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Major professors lead research discussions with their graduate students.
Research papers are reviewed and project proposals presented and evaluated. Format will combine seminar and discussion style. (S/U grading only.) Effective: 1997 Winter Quarter.

NUT 291—Advanced Nutrition Seminar (1)
Seminar—1 hour. Prerequisite(s): Second-year graduate standing. Advanced topics in nutrition research. Multiple sections may be taken concurrently for credit. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

NUT 293A—Current Topics in Obesity, Food Intake and Energy Balance (3)
Discussion—1 hour; Lecture—1 hour; Seminar—1 hour. Prerequisite(s): NUT 129; Or graduate standing; Undergraduates with upper division standing with at least one writing course may enroll with consent of instructor. Current research and its evaluation. Principles of experimental design and scientific background for given article. Articles summarized for
posting on Internet for use by healthcare professionals. May be repeated for credit with consent of instructor. May be repeated for credit. Effective: 1997 Fall Quarter.

NUT 293B—Current Topics in Obesity, Food Intake, and Energy Balance with Special Topics (3)
Discussion—1 hour; Lecture—1 hour; Seminar—1 hour. Prerequisite(s): NUT 129; Graduate standing. Undergraduates with upper division standing with at least one writing course may enroll with consent of instructor. A continuation of course 293A, with additional special topics. May be repeated for credit up to 3 times with consent of instructor. May be repeated up to 3 time(s). Effective: 1997 Fall Quarter.

NUT 294A—Current Topics in Developmental Nutrition (2)
Seminar—2 hours. Prerequisite(s): NUT 114 or NUT 252; or Consent of Instructor. Restricted to graduate standing or consent of instructor. Effects of nutrition on embryology, morphogenesis, and developmental mechanisms. May be repeated for credit when topic differs. Effective: 2004 Winter Quarter.

NUT 297T—Supervised Teaching in Nutrition (1-3)
Variable. Prerequisite(s): Graduate standing in nutrition or consent of instructor. Practical experience in teaching nutrition at the university level; curriculum design and evaluation; preparation and presentation of material. Assistance in laboratories, discussion sections, and evaluation of student work. (S/U grading only.) Effective: 1997 Winter Quarter.

NUT 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Effective: 1997 Winter Quarter.

NUT 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

NUT 492A—Professionalism: An Academic Perspective (2)
Lecture/Discussion—2 hours. Prerequisite(s): Graduate standing. For graduate students in their initial quarter of residence. Professionalism topics are presented and examples drawn from both the biological and social sciences. Effective: 1997 Fall Quarter.

NUT 492C—Grant Writing (3)
Discussion—1.5 hours; Lecture—1.5 hours. Prerequisite(s): Graduate standing in Nutrition or consent of instructor. Preparation of grants for governmental agencies (particularly NIH and USDA) and private foundations. Students will write a research grant or
fellowship application. May be repeated once for credit with consent of instructor. May be repeated up to 1 time(s). Effective: 1997 Fall Quarter.

OBG Med - Obstetrics & Gynecology

Courses in OBG:

OBG 192—Shifa Clinic/student volunteer (1)
Clinical Activity—8 hours; Conference—2 hours; Discussion—2 hours. Open to undergraduates only. Supervised work experience in Obstetrics & Gynecology. May be repeated up to 3 time(s). (P/NP grading only.) Effective: 2003 Fall Quarter.

OBG 194—Shifa Clinic Student Volunteer (1)
Clinical Activity—6 hours; Conference—1 hour. Prerequisite(s): Consent of Instructor. The applications will be available for students. Selection of students will be made by selection committee of medical students coordinators and the IOR. Attend clinic every third Sunday performing duties of receptionist, intake, translation, monitor. Students attend a meeting immediately after end of clinic. There is a mandatory Monday meeting with Clinic co-directors. Students are expected to participate on various committees. May be repeated up to 3 time(s). (P/NP grading only.) Effective: 2008 Fall Quarter.

OBG 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

OBG 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

OBG 220—Genetics of Reproduction (3)
Lecture/Discussion—3 hours. Introduction to genetics of mammalian reproduction for domestic species,
species used in research, and the human. Mendelian and non-Mendelian modes of inheritance. Research paper. Effective: 2000 Winter Quarter.

OBG 290—Current Topics in Research (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Selected topics in reproductive biology. (S/U grading only.) Effective: 1997 Winter Quarter.

OBG 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. Effective: 1997 Winter Quarter.

OBG 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

OBG 430—Obstetrics and Gynecology Clerkship (12)
Clinical Activity—45 hours. Prerequisite(s): Approval by School of Medicine Committee on Student Progress. Obstetrics, gynecologic and gynecological oncology experience in the delivery room, operating room, clinics and wards at UCDMC and affiliated sites. Rounds, conferences, interactive student presentations and seminars ongoing. (H/P/F grading only.) Effective: 2001 Summer Quarter.

OBG 430F—SJVP OBGYN Clerkship at UCSF (6-12)
Clinical Activity—45 hours. Prerequisite(s): Approval by School of Medicine Committee on Student Progress. Obstetrics, gynecologic and gynecological oncology experience in the delivery room, operating room, clinics and wards at UCSF Fresno. Rounds, conferences, interactive student presentations and seminars ongoing. (H/P/F grading only.) Effective: 2017 Spring Quarter.

OBG 430R—Rural PRIME OBGYN Longitudinal Clerkship (2)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Obstetrics and Gynecology Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

OBG 430RA—Rural PRIME OBGYN Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Obstetrics and Gynecology Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

OBG 430RB—Rural PRIME OBGYN Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Obstetrics and Gynecology Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

OBG 430RC—Rural PRIME OBGYN Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Obstetrics and Gynecology Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

OBG 430RD—Rural PRIME OBGYN Longitudinal Clerkship (1)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Obstetrics and Gynecology Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

OBG 439D—Directed Clinical Studies in OBGYN (1-12)
Clinical Activity—40 hours. Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for modified curriculum or to complete a clinical rotation following a leave of absence. May be repeated for credit. (P/F grading only.) Effective: 2011 Spring Quarter.

OBG 439R—Directed Studies in OBGYN (1-12)
Clinical Activity—30 hours; Independent Study—10 hours. Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for remediation of all or part of clinical rotation. Clinical studies to accommodate and satisfy remedial work as directed by the Committee on Student Progress and approved by the course IOR. May be repeated for credit. (P/F grading only.) Effective: 2011 Summer Quarter.

OBG 460—Away Clinical Elective in OBGYN (3-18)
Clinical Activity—30 hours; Variable—10 hours. Prerequisite(s): OBG 430; and Consent of Instructor. Or the equivalent; third- or fourth-year medical student. Active participation in inpatient and/our outpatient care. Attendance at specified conferences; student-faculty member informal conferences. May be repeated for credit. (H/P/F grading only.) Effective: 2010 Spring Quarter.

OBG 465—Away Acting Internship in OBGYN (3-18)
Clinical Activity—40 hours; Variable—10 hours. Prerequisite(s): OBG 430; and Consent of Instructor. Other third-year core clerkships. Work at the level of a sub intern in Inpatient and/or Outpatient settings. Students are expected to provide direct patient management. (H/P/F grading only.) Effective: 2010 Summer Quarter.

OBG 470—Gynecologic Oncology Acting Internship (3-18)
Clinical Activity—40 hours; Variable—10 hours. Prerequisite(s): OBG 430; and Consent of Instructor. The third-year core clerkships. Four week elective primarily involves direct inpatient management of women on the UCDMC Gyn/Onc service. Students will be acting at the level of a sub-intern and will work under the supervision of house staff, fellows, and attendings. May be repeated up to 99 unit(s). (H/P/F grading only.) Effective: 2010 Spring Quarter.

OBG 471—Ambulatory Gynecology and Obstetrics Elective (3-18)
Clinical Activity—35 hours. Prerequisite(s): OBG 430; and Consent of Instructor. Third- or fourth-year Medical Student. Conduct examinations, present patients and discuss treatment regimens at the following ambulatory clinics: General Obstetrics & Gynecology, New and Return Obstetrics (including Post-Partum), High-Risk Obstetrics, Pre-Operative Clinic, and other sub-specialty clinics as assigned. May be repeated for credit. (H/P/F grading only.) Effective: 2010 Summer Quarter.

OBG 472—Family Planning and Reproductive Health (1-6)
Clinical Activity—30 hours; Seminar—5 hours. Prerequisite(s): OBG 430; and Consent of Instructor. Elective that will focus on the Gynecologic Subspecialty of Family Planning. Counseling and provision of contraceptive methods, experience with pelvic ultrasounds, management of spontaneous, inevitable and induced abortion and post-abortion care by both surgical and medical techniques are included. May be repeated for credit. (H/P/F grading only.) Effective: 2014 Spring Quarter.

OBG 475—Labor & Delivery Acting Internship (3-18)
Clinical Activity—40 hours; Variable—10 hours. Prerequisite(s): OBG 430; and Consent of Instructor. The third-year core clerkships. Four week elective primarily involves direct inpatient management of women on the UCDMC L&D unit. Students will be acting at the level of a sub-intern and will work under the supervision of house staff, fellows, and attendings. May be repeated for credit. (H/P/F grading only.) Effective: 2010 Spring Quarter.

OBG 480—The Birthing Process (1)
Lecture/Discussion—1 hour. Open only to UC Davis medical students. Training to assist in the birthing process as a Doula. Topics not covered in the summer course. (S/U grading only.) Effective: 2000 Fall Quarter.

OBG 493—Gender Specific Medicine SSM (6)
Clinical Activity—4 hours; Laboratory—16 hours; Lecture—5 hours; Lecture/Lab—10 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. Special Studies Module, a four week course on the topic: Basic Science Principles Relating to Gender Specific Medicine. (Cardiology 493.) (H/P/F grading only.) Effective: 2007 Spring Quarter.

OBG 494—Shifa Clinic (6)
Clinical Activity—8 hours. Prerequisite(s): Medical student in good standing. Restricted to Medical student only. Interaction with patients from multiple ethnic and cultural backgrounds under the direct supervision of a physician/preceptor. Women's health issues and primary care issues in a diversely mixed population. May be repeated up to 3 time(s). (P/F grading only.) Effective: 2008 Fall Quarter.

OBG 494A—Shifa Clinic (1)
Clinical Activity—8 hours. Prerequisite(s): Consent of Instructor. Medical student in good standing. Interaction with patients from multiple ethnic and cultural backgrounds under the direct supervision of a physician/preceptor. Women's health issues and primary care issues in a diversely mixed population. (H/P/F grading only.) Effective: 2012 Summer Quarter.

OBG 494B—Shifa Clinic (1)
Clinical Activity—8 hours. Prerequisite(s): Consent of Instructor. Medical student in good standing. Interaction with patients from multiple ethnic and cultural backgrounds under the direct supervision of a physician/preceptor. Women's health issues and primary care issues in a diversely mixed population. (H/P/F grading only.) Effective: 2012 Summer Quarter.

OBG 494C—Shifa Clinic (1)
Clinical Activity—8 hours. Prerequisite(s): Consent of Instructor. Medical student in good standing. Interaction with patients from multiple ethnic and cultural backgrounds under the direct supervision of a physician/preceptor. Women's health issues and primary care issues in a diversely mixed population. (H/P/F grading only.) Effective: 2012 Summer Quarter.

OBG 498—Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Explore particular topics in-depth in Obstetrics and Gynecology. Extensive contact with and oversight by instructor. May be repeated for credit. (H/P/F grading only.) Effective: 2004 Fall Quarter.

OBG 499—Research in Obstetrics & Gynecology (2-12)
Clinical Activity; Variable. Prerequisite(s): Consent of Instructor. Fourth-year medical student. Research in Obstetrics and Gynecology arranged with instructor. May be repeated up to 8 time(s). (H/P/F grading only.) Effective: 2006 Fall Quarter.

OPT Med - Ophthalmology

Courses in OPT:

OPT 192—Research Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in ophthalmology research. Research staff in Ophthalmology have programs in cell biology, electron microscopy, biochemistry, immunology and visual psychophysics. (P/NP grading only.) Effective: 1997 Winter Quarter.

OPT 199—Special Study for Advanced Undergraduates (1-4)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

OPT 299—Basic Research in Visual Science (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

OPT 442—Introduction to Ophthalmology (3)
Clinical Activity—40 hours. Prerequisite(s): Third- or fourth-year Medical Student with consent of instructor; consent of advisor; completion of third-year clerkships in Medicine and Surgery; consult Course Coordinator. Ocular disease diagnosis and management relevant to the clinical practice of future primary care physicians and others. (H/P/F grading only.) Effective: 2010 Summer Quarter.

OPT 465—Advanced Subspecialty Ophthalmology (3-6)
Clinical Activity—40 hours; Variable—40 hours. Prerequisite(s): IMD 430; and Consent of Instructor. Medical students in third or fourth year. Participation in disciplines of neuro-ophthalmology/pediatric ophthalmology, diseases of the cornea and external eye, glaucoma and retina. (H/P/F grading only.) Effective: 2010 Summer Quarter.

OPT 498—Group Study (1-3)
Variable. Prerequisite(s): Medical students with consent of instructor. Directed reading and discussion. (H/P/F grading only.) Effective: 1997 Winter Quarter.

OPT 499—Research in Ophthalmology (1-12)
Variable—3-36 hours. Prerequisite(s): Medical students with consent of instructor. Individual research on selected topics in optics and visual physiology, cornea and external disease. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

OSU Med - Orthopaedic Surgery

Course in OSU:

OSU 099—Special Studies for Undergraduates (1-4)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

OSU 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

OSU 421—The Musculoskeletal System (2.5)
Discussion—2 hours; Lecture/Discussion—4 hours. Prerequisite(s): Consent of committee on student progress. Restricted to Medical students only. Basic and clinical science of orthopaedic surgery and rheumatology. (P/NP grading only.) Effective: 2012 Summer Quarter.

OSU 428—Ambulatory and Emergency Room Orthopaedics (3-6)
Clinical Activity. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing. Limited enrollment. Introduction to general orthopaedic problems and trauma and their management in an outpatient environment, including the emergency room. Student will conduct orthopaedic examinations, present patients to staff rotating through trauma, hand, pediatrics, adult and foot clinics. (H/P/F grading only.) Effective: 1997 Winter Quarter.

OSU 462—Community Preceptorship (3-6)
Clinical Activity. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing; consent of instructor. Acquaints student with private practice of orthopaedics in the community setting. Opportunity to observe and assist private practitioners in office, emergency room, operating room and inpatient environment. Student must provide own transportation. (H/P/F grading only.) Effective: 1997 Winter Quarter.

OSU 464—Acting Internship (6)
Clinical Activity. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing. Rotation designed to increase basic knowledge of musculoskeletal abnormalities at clinical level. Attention focused on selective case material. For those students who demonstrate proficiency, responsibility will be similar to that of intern. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

OSU 465—Externship in Advanced Orthopaedics (3-6)
Clinical Activity—40 hours. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing. Advanced Orthopaedic rotation done at an approved institution. Topics may include Trauma, Sports, Spine, Pediatrics, Joint and/or Foot/Ankle. Students are expected to perform at the level of an Intern. May be repeated for credit. (H/P/F grading only.) Effective: 2013 Summer Quarter.

OSU 480—Insights in Orthopardic Surgery (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. First- and second-year medical students in good academic standing. Exposure to aims, methods and procedures in orthopaedic surgery via attendance at grand rounds, patient care conferences, and group discussions. (H/P/F grading only.) Effective: 1997 Winter Quarter.

OSU 481—History of Medicine for Medical Students (1.5)
Lecture/Discussion—2.5 hours. Prerequisite(s): Third- or fourth-year students in the School of Medicine or second-year students with consent of instructor. Overview of the history of medicine throughout the world to introduce medical students to landmark accomplishments and key figures in the
development of health care and to provide an expanded philosophical perspective on the everchanging field of modern medicine. (H/P/F grading only.) Effective: 1997 Winter Quarter.

OSU 499—Orthopardics Research (1-12)
Clinical Activity. Prerequisite(s): Consent of Instructor. Third- or fourth-year medical student in good academic standing. Laboratory or clinical investigation on selected topics. May be repeated for credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

OTO Med - Otolaryngology

Course in OTO:

OTO 192—Internship in Otolaryngology (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in otolaryngology and related fields. Final project report. (P/NP grading only.) Effective: 1997 Winter Quarter.

OTO 199—Special Study in Otolaryngology for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Advanced undergraduate with consent of instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

OTO 290C—Research Conference in Otolaryngology (1)
Lecture/Discussion—1 hour. Prerequisite(s): Graduate students; medical students; advanced undergraduates with consent of instructor. Presentation and discussion of faculty and student research in otolaryngology. (S/U grading only.) Effective: 1997 Winter Quarter.

OTO 291—Principles of Speech, Hearing and Equilibrium (3)
Lecture/Discussion—3 hours. Prerequisite(s): Graduate students; medical students; advanced undergraduates with consent of instructor. Presentations by faculty and guest lecturers on anatomy, physiology, and
behaviors involved in speech production, hearing, and equilibrium. Each student will be expected to make one class presentation. Effective: 1997 Winter Quarter.

OTO 299—Individual Study in Otolaryngology for Advanced Graduate Students (1-12)
Variable. Prerequisite(s): Advanced graduate student with consent of instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

OTO 403—Basic Principles of Reconstructive Surgery (1)
Lecture. Prerequisite(s): Third- or fourth-year medical student with consent of instructor. Formal presentations covering basic principles of reconstructive surgery, including wound healing, treatment of lacerations, skin and bone grafts, flaps, Z-plasties and revision of scars. Laboratory session utilizing animal tissues. Effective: 1997 Winter Quarter.

OTO 440—Otolaryngology Required Clerkship (3-9)
Clinical Activity—30 hours. Prerequisite(s): Consent by Committee on Student Evaluation and Promotion. Provide fundamental knowledge of otorhinolaryngologic diagnosis and principles, develop facility with basic ENT instruments, provide an understanding of treatment for ear, nose and throat problems and provide knowledge of what patients should be referred for otorhinolaryngologic care. May be repeated for credit. (H/P/F grading only.) Effective: 2011 Summer Quarter.

OTO 450—Fourth Year Otolaryngology Elective (6)
Clinical Activity—35 hours; Discussion—1 hour; Film Viewing—0.25 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Third- or fourth-year Medical Students. Participation in Otolaryngology Clinic and operating room. Evaluation and management of common Otolaryngologic diseases. (H/P/F grading only.) Effective: 2001 Fall Quarter.

OTO 460—Clinical Otolaryngology Elective (3-18)
Clinical Activity. Prerequisite(s): Third- and fourth-year medical students with consent of instructor; open to graduate students. Approved for graduate degree credit. Total involvement in clinical activities of the department. (H/P/F grading only.) Effective: 1997 Winter Quarter.

OTO 465—Away Acting Internship in Otolaryngology (3-6)
Clinical Activity. Externship rotation for Acting Internships in Otolaryngology. May be repeated for credit. (H/P/F grading only.) Effective: 2018 Spring Quarter.

OTO 490—Journal Seminar (1)
Lecture/Discussion—10 hours. Prerequisite(s): Fourth-year medical students with consent of instructor; open to graduate students. Approved for graduate degree credit. Monthly review of current otolaryngologic and related literature and recent advances. (H/P/F grading only.) Effective: 1997 Winter Quarter.

OTO 498—Individual or Group Study (1-5)
Laboratory—1-4 hours; Lecture/Discussion—1-2 hours. Prerequisite(s): Consent of Instructor. Introduction to basic research in Otolaryngology. Lectures, discussion
and laboratory study of sensory and motor systems. (H/P/F grading only.) Effective: 1997 Winter Quarter.

OTO 499—Research (1-12)
Variable. Prerequisite(s): Medical students with consent of instructor; Open to graduate students. Approved for graduate degree credit. Participation in ongoing projects. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

PAS Physician Assistant Studies

Courses in PAS:

PAS 299—Research and Writing (1-4)
Extensive Writing/Discussion—3-12 hours. Prerequisite(s): Consent of Instructor. Open to Graduate Students in the Nursing Science and Health-Care Leadership Graduate Degree programs, or by consent of instructor. Students in the Nursing Science and Health-Care Leadership graduate programs conduct research and writing under the supervision of a faculty member. May be repeated for credit Students may repeat this course for credit in different quarters, depending on the length of their program of study to complete their Master's Degree. (S/U grading only.) Effective: 2013 Fall Quarter.

PAS 400—Basic Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to Graduate Students in the Nursing Science and Health-Care Leadership Graduate Degree programs, or by consent of instructor. Instruction and practice of the fundamental clinical skills necessary for patient care comprise this course with a primary focus on principles of effective communication in establishing the therapeutic provider-patient relationship. Effective: 2013 Summer Quarter.

PAS 401—Basic Clinical Skills (1-4)
Lecture/Discussion—1-4 hours. Prerequisite(s): Consent of Instructor. Open to Graduate Students in the Nursing Science and Health-Care Leadership Graduate Degree programs, or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content. Effective: 2013 Fall Quarter.

PAS 410A—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Open to Graduate Students in the Nursing Science and Health-Care Leadership Graduate Degree programs, or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content. Effective: 2014 Winter Quarter.

PAS 410B—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to Graduate Students in the Nursing Science and Health-Care Leadership Graduate Degree programs, or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related specialty systems. Effective: 2014 Spring Quarter.

PAS 410C—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Open to Graduate Students in the Nursing Science and Health-Care Leadership Graduate Degree programs, or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related to specified systems. Effective: 2014 Summer Quarter.

PAS 410D—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to Graduate Students in the Nursing Science and Health-Care Leadership Graduate Degree programs, or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related to specified systems. Effective: 2013 Fall Quarter.

PAS 410E—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to Graduate Students in the Nursing Science and Health-Care Leadership Graduate Degree programs, or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related to specified systems. Effective: 2013 Fall Quarter.

PAS 410F—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to Graduate Students in the Nursing Science and Health-Care Leadership Graduate Degree programs, or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related to specified systems. Effective: 2014 Spring Quarter.

PAS 410G—Advanced Clinical Skills (1-4)
Lecture/Lab—1-4 hours. Prerequisite(s): Consent of Instructor. Open to Graduate Students in the Nursing Science and Health-Care Leadership Graduate Degree programs. Continuation of focus on history taking and physical examination skills with advanced/specialized content related to specified systems. Effective: 2015 Fall Quarter.

PAS 440—Preparation for Clinical Practice (1-3)
Clinical Activity—36 hours. Prerequisite(s): Consent of Instructor. Open to Graduate Students in the Nursing Science and Health-Care Leadership Graduate Degree programs, or by consent of instructor. Students are placed in clinical settings and/or clinical simulation laboratories to observe and practice the integration of clinical skills with direct supervision by faculty. Effective: 2014 Spring Quarter.

PBG Population Biology

Courses in PBG:

PBG 200A—Principles of Population Biology (5)
Discussion—2 hours; Lecture—3 hours. Prerequisite(s): PBG 231 (can be concurrent); and Consent of Instructor. PBG 231 required concurrently. Principles of single-species ecology and evolution. Topics include ecology of individuals, population growth models, structured populations, life history strategies, stochastic populations, basic population genetics theory, deleterious alleles in natural populations,
and molecular population genetics. Effective: 1997 Winter Quarter.

PBG 200B—Principles of Population Biology (6)
Discussion—1 hour; Lecture—5 hours. Prerequisite(s): PBG 200A; PBG 231 Principles of multi-species communities. Topics include competition, mutualism, metapopulations, food webs and trophic cascades, interactions between simple ecological communities, island biogeography, succession, and large-scale patterns. Effective: 1998 Winter Quarter.

PBG 200C—Principles of Population Biology (6)
Discussion—1 hour; Lecture—5 hours. Prerequisite(s): PBG 200B Principles of microevolution and macroevolution. Topics include evolutionary quantitative genetics, analysis of hybrid zones, speciation, the fossil record, biogeography, and phylogeny reconstruction. Effective: 1998 Spring Quarter.

PBG 203—Advanced Evolution (3)
Discussion—2 hours; Lecture—1 hour. Prerequisite(s): Graduate standing. Adaptation and speciation, and biochemical and morphological evolution in plants and animals with emphasis on the appropriateness of different methods of analysis. Effective: 1997 Winter Quarter.

PBG 206—Ecology of Insect Parasitoids (4)
Lecture—3 hours; Seminar—1 hour. Prerequisite(s): Introductory animal ecology or behavior. Insect parasitoids will be investigated as model systems to address current topics in behavioral, population, and evolutionary ecology. Theory will be synthesized and critical empirical tests of ecological
hypotheses emphasized. Effective: 1997 Winter Quarter.

PBG 207—Plant Population Biology (3)
Discussion/Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): Advanced undergraduate ecology course (e.g., ESP 100, EVE 101, ENT 104, PLB 117), and advanced undergraduate course in genetics and/or evolution (e.g., BIS 101 or EVE 100). Introduction to theoretical and empirical research in plant population biology. Emphasis placed on linking ecological and genetic approaches to plant population biology. (Ecology 207) Effective: 2000 Winter Quarter.

PBG 212—Topics in INvertebrate Evolution (2)
Seminar—2 hours. Prerequisite(s): Graduate standing or consent of instructor; courses in evolutionary biology, systematics, and ecology highly recommended. Advanced seminar that critically examines problems relevant to evolutionary patterns among the invertebrates. May be repeated for credit when topic differs. (S/U grading only.) Effective: 1997 Winter Quarter.

PBG 221—Animal Behavior, Ecology and Evolution (3)
Lecture—3 hours. Prerequisite(s): NPB 102; EVE 100; EVE 101; and Consent of Instructor. Or the equivalent, graduate standing. The interface between animal behavior, ecology and evolution. New developments in behavioral ecology development and testing of hypotheses in this discipline. (Animal Behavior 221.) Effective: 2002 Winter Quarter.

PBG 224—Field Reconnaissance for Population Biologists (2)
Fieldwork—6 hours. Prerequisite(s): Graduate student in Population Biology, or consent of instructor. Biweekly field trips to acquaint students with plant and animal communities, biodiversity, and ecological and evolutionary research opportunities in northern and central California. May be repeated for
credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Fall Quarter.

PBG 225—Terrestrial Field Ecology (4)
Fieldwork—12 hours; Seminar—1 hour. Prerequisite(s): Introductory ecology and introductory statistics, or consent of instructor. A field course conducted over spring break and four weekends at Bodega
Bay emphasizing student projects. Ecological hypothesis testing, data gathering, analysis, and written and oral presentation of results will be stressed. (Ecology/Entomology 225) Effective: 1997 Spring Quarter.

PBG 231—Mathematical Methods in Population Biology (3)
Lecture—3 hours. Prerequisite(s): MAT 016C or MAT 021C; Or the equivalent. Mathematical methods used in population biology. Linear and nonlinear difference equation and differential equation models are studied, using stability analysis and qualitative methods. Partial differential equation models are introduced. Applications to population biology models are stressed. (Ecology 231) Effective: 1997 Winter Quarter.

PBG 233—Computational Methods in Population Biology (3)
Discussion/Laboratory—1 hour; Lecture/Lab—2 hours. Prerequisite(s): A course in theoretical ecology (e.g., ECL 231 or an equivalent to ESP 121 from your undergraduate institution) or consent of instructor; no programming experience required. Numerical methods for simulating population dynamics using the computational software package R. Emphasis placed on model formulation and development, theoretical concepts and philosophical principles to guide simulation efforts, model parameterization, and implementing simulations with R. (Ecology 233.) (S/U grading only.) Effective: 2013 Fall Quarter.

PBG 250A—Interdisciplinary Approaches to Biological Invasions (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing. An integrative consideration of biological invasions, including an overview of concepts from ecology, ecological theory, evolution, genetics, philosophy, and other areas. Emphasis on potential contributions of each area for interdisciplinary problem-solving. Effective: 2004 Fall Quarter.

PBG 250B—Interdisciplinary Approaches to Biological Invasions (4)
Lecture/Discussion—4 hours. Prerequisite(s): Graduate standing. An integrative consideration of biological invasions, including an overview of concepts from history, sociology, communications, law, policy, management, and other areas. Emphasis on potential contributions of each area for interdisciplinary problem-solving. Effective: 2004 Fall Quarter.

PBG 251—Collaborative Project in Biological Invasions (3)
Discussion—1 hour; Project (Term Project). Prerequisite(s): PBG 250A; PBG 250B; and Consent of Instructor. Or equivalent courses. A year-long interdisciplinary collaborative project focusing on biological invasions, resulting in a paper or other suitable product presented at a symposium at the conclusion of the project. May be repeated up to 5 time(s). (S/U grading only.) Effective: 2004 Fall Quarter.

PBG 270—Research Conference in Evolutionary Biology (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Critical presentation and evaluation of current literature and ongoing research in evolutionary biology. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

PBG 271—Research Conference in Ecology (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Critical presentation and evaluation of current literature and ongoing research in ecology. Requirements include active participation in weekly discussions and the presentation of a paper or chapter once per quarter. May be repeated for credit. (Ecology 271.) (S/U grading only.) Effective: 2014 Winter Quarter.

PBG 287—Advanced Animal Behavior (2)
Seminar—2 hours. Prerequisite(s): NPB 102; (EVE 100; and Consent of Instructor. or ECL 101); or the equivalents; graduate standing; Consent of Instructor. Reading, reports and discussion on current topics in animal behavior, with a focus on topics that lie at the interface between animal behavior, ecology and evolution. May be repeated up to 2 time(s). (Animal Behavior 287.) Effective: 2002 Spring Quarter.

PBG 290—Seminar (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Seminars presented by visiting lecturers, UC Davis graduate students and faculty. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

PBG 290C—Research Conference in Population Biology (1)
Discussion—1 hour. Prerequisite(s): PBG 299 (can be concurrent); and Consent of Instructor. Graduate standing; PBG 299 required concurrently. Presentation and discussion of faculty and graduate student research in population biology. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

PBG 292—Topics in Ecology and Evolution (1)
Seminar—1 hour. Prerequisite(s): Graduate standing. Seminar presented by visiting lecturers, UC Davis faculty and graduate students. May be repeated for credit. May be repeated for credit. (Ecology 296) (S/U grading only.) Effective: 1997 Winter Quarter.

PBG 296—Seminar in Geographical Ecology (2)
Seminar—2 hours. Prerequisite(s): EVE 100 or EVE 101; or Consent of Instructor. Recent developments in theoretical and experimental biogeography, historical biogeography and related themes in systematics, the biology of colonizing species, and related topics. May be repeated for credit. (Geography 214.) (S/U grading only.) Effective: 2012 Fall Quarter.

PBG 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

PBG 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

PBI Plant Biology

Courses in PBI:

PBI 200A—PBGG Core Course Series - Fall quarter (5)
Discussion—2 hours; Lecture—3 hours. Prerequisite(s): Graduate standing; a broad background of undergraduate level coursework in Plant Biology is recommended. The first of three PBGG graduate core courses. Coverage includes (1) plant genes, (2) biotechnology, (3) genomes and gene flow, (4) principles of plant systematics, and (5) the evolution of flowering plants. Effective: 2005 Fall Quarter.

PBI 200B—PBGG Core Course Series - Winter quarter (5)
Discussion—2 hours; Lecture—3 hours. Prerequisite(s): PBI 200A The second of three PBGG graduate core courses. Coverage includes (1) embryo development, (2) cytoskeleton and vesicle trafficking, (3) cell walls, (4) cell growth, (5) secondary metabolism, (6) plastids and (7) senescence. Effective: 2006 Winter Quarter.

PBI 200C—PBGG Core Course Series - Spring quarter (5)
Discussion—2 hours; Lecture—3 hours. Prerequisite(s): PBI 200A; PBI 200B The third of three PBGG graduate core courses. Coverage includes (1) plant water relations, (2) cellular & long distance transport processes, (3) mineral nutrition, (4) environmental impacts on growth & development, (5) stress perception & responses, (6) canopy processes, and (7) plant interactions with other organisms. Effective: 2006 Spring Quarter.

PBI 203N—Biology of the Plant Cell (4)
Discussion/Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): PLB 111 or BIS 104; Or the equivalent. Open to senior undergraduate students in Plant Biology major. Recent progresses in plant cell biology. Intracellular motility in plant cells. Common techniques associated with the progress of plant cell biology. Effective: 2006 Fall Quarter.

PBI 210—Plant Ecophysiology (3)
Lecture—3 hours. Prerequisite(s): PLB 111; PLB 112; PLB 117 Study of the mechanisms of physiological adaptation of plants to their environment. Effective: 1997 Winter Quarter.

PBI 212—Physiology of Herbicidal Action (3)
Lecture—3 hours. Prerequisite(s): PLB 112 Study of the fundamental processes involved in the physiological action of herbicides. Detailed consideration of the fate of herbicides in plants. Effective: 1997 Spring Quarter.

PBI 214—Higher Plant Cell Walls (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): PLB 112; A course in Biochemistry. Lectures focus on the structure, analysis, synthesis, and development-related metabolism of cell walls. Discussions center on analysis of scientific papers related to lecture topics. Effective: 1997 Winter Quarter.

PBI 220—Plant Developmental Biology (4)
Discussion—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): Plant Anatomy, Physiology, and Biochemistry. A survey of the concepts of plant development and organization. Examines plant cells, tissues, and organs with special emphasis on experimental
evidence for mechanisms regulating developmental processes. Effective: 1997 Winter Quarter.

PBI 223—Special Topics in Scientific Method (2)
Discussion—2 hours. Examine the historical and philosophical background of the scientific method. Analyze the rational, perceptual, causal, creative and social aspects of scientific knowledge. Clarify the roles of reason, experimentation and creativity in scientific research. (S/U grading only.) Effective: 1997 Winter Quarter.

PBI 227—Plant Molecular Biology (4)
Lecture/Discussion—4 hours. Prerequisite(s): MCB 121 or MCB 161 Molecular aspects of higher plant biology with emphasis on gene expression. Plant nuclear and organelle genome organization, gene structure, mechanisms of gene regulation, gene transfer, and special topics related to development and response to biological and environmental stimuli. Effective: 1997 Winter Quarter.

PBI 229—Molecular Biology of Plant Reproduction (3)
Lecture—3 hours. Molecular genetic basis of plant reproduction. Emphasis on understanding developmentally regulated gene expression as it relates to the major changes that occur during plant reproduction and on the genetic control of flowering. Effective: 1997 Winter Quarter.

PBI 290A—Faculty Seminar (1)
Discussion—1 hour. Restricted to Plant Biology (PBGG) graduate students. Discussion of research area of seminar speakers in Plant Biology Graduate Group Seminar Series. May be repeated up to 6 time(s). (S/U grading only.) Effective: 2006 Winter Quarter.

PBI 290B—Seminar (1)
Seminar—1 hour. Seminars presented by visiting scientists on research topics of current interest. (S/U grading only.) Effective: 1997 Winter Quarter.

PBI 290C—Research Conference in Botany (1)
Discussion—1 hour. Prerequisite(s): Graduate standing and/or consent of instructor. Presentation and discussion by faculty and graduate students of research
projects in botany. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

PBI 291—Graduate Student Seminar in Plant Biology (1)
Seminar—1 hour. Prerequisite(s): Graduate student standing. Student-given seminars on topics in plant biology, with critiques by instructor and peers. How to give a seminar, including preparation of visual and other teaching aids. Topic determined by instructor in charge. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Summer Session 1.

PBI 292—Seminars in Plants Biology (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Review of current literature in botanical disciplines. Disciplines and special subjects to be announced quarterly. Students present and analyze assigned topics. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

PBI 293—Seminar in Postharvest Biology (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Open to advanced undergraduates. Intensive study of selected topics in the postharvest biology of fruits, vegetables, and ornamentals. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

PBI 297T—Tutoring in Plant Biology (1-5)
Tutorial—3-15 hours. Offers graduate students, particularly those not serving as teaching assistants, the opportunity to gain teaching experience. (S/U grading only.) Effective: 1997 Winter Quarter.

PBI 298—Group Study (1-5)
Variable. May be repeated up to 4 time(s). (S/U grading only.) Effective: 2001 Fall Quarter.

PBI 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

PBI 390—The Teaching of Plant Biology (2)
Discussion—2 hours. Prerequisite(s): Graduate standing; concurrent appointment as a teaching assistant in Plant Biology. Consideration of the problems of teaching botany, especially of preparing for and conducting discussions, guiding student laboratory work, and the formulation of questions and topics for examinations. (S/U grading only.) Effective: 1997 Winter Quarter.

PED Med - Pediatrics

Courses in PED:

PED 199—Special Study in Pediatric Research (1-5)
Variable. Prerequisite(s): Undergraduate student with consent of instructor based upon adequate preparation as determined by instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

PED 299—Pediatric Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate students who are candidates for a degree in some area of biology or behavioral sciences. (S/U grading only.) Effective: 1997 Winter Quarter.

PED 401—Preceptorship in Pediatrics (2)
Variable. Prerequisite(s): Second-year medical student or first-year medical student with consent of instructor. Opportunity to observe and participate in primary medical care in a practicing pediatricians office. Participation in history-taking and physical examination will be at discretion of preceptor and dependent on students experience. Evaluation by student. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PED 402—Clinical Experience in Private Practice (1-18)
Clinical Activity. Prerequisite(s): PED 430; Third-or fourth-year medical student; consent of preceptor and Chairperson. Opportunity to participate in practice of preceptor, performing such tasks as history taking, physical examination, and patient management. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PED 405—Pediatrics Lecture Series (0.5)
Lecture—15 hours. Prerequisite(s): Consent of Instructor. Lecture series covers major topics in pediatrics with case presentations and panels from pediatric subspecialists. Topics include, but are not limited to: cardiology, pulmonology, nephrology, gastroenterology, critical care, and primary care pediatrics. May be repeated for credit. (P/F grading only.) Effective: 2014 Fall Quarter.

PED 415—Fetal and Neonatal Physiology (1)
Independent Study—4 hours; Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Elective is designed to combine for study a variety of aspects of the physiology, anatomy and biochemistry of the fetus and newborn with relevant clinical examples of disorders in each of the 10 topics that will be discussed. (P/F grading only.) Effective: 2014 Spring Quarter.

PED 430—Pediatric Clerkship (12)
Clinical Activity—45 hours. Prerequisite(s): Approval by School of Medicine Committee on Student Progress. Restricted to Medical students only. Eight week clinical clerkship providing students with the opportunity to learn fundamentals of caring for the pediatric patient by participating in nursery, ambulatory and inpatient services at UCDMC and affiliated clinical sites. Rounds, conferences, student presentations ongoing. (P/NP grading only.) Effective: 2001 Summer Quarter.

PED 430F—SJVP Pediatric Clerkship at UCSF (12)
Clinical Activity—45 hours. Prerequisite(s): Approval by School of Medicine Committee on Student Progress. Restricted to Medical students only. Eight-week clinical clerkship providing students with the opportunity to learn fundamentals of caring for the pediatric patient by participating in nursery, ambulatory and inpatient services at UCSF Fresno. Rounds, conferences, student presentations ongoing. (H/P/F grading only.) Effective: 2013 Fall Quarter.

PED 430FA—SJVP Longitudinal Pediatrics Clerkship (1.5-6)
Clinical Activity—40-60 hours. Prerequisite(s): Consent of Instructor. Longitudinal Pediatrics Clerkship runs concurrently with Internal Medicine, Family Medicine and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PED 430FB—SJVP Longitudinal Pediatrics Clerkship (1.5-6)
Clinical Activity—40-60 hours. Prerequisite(s): Consent of Instructor. Longitudinal Pediatrics Clerkship runs concurrently with Internal Medicine, Family Medicine and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PED 430FC—SJVP Longitudinal Pediatrics Clerkship (1.5-6)
Clinical Activity—40-60 hours. Prerequisite(s): Consent of Instructor. Longitudinal Pediatrics Clerkship runs concurrently with Internal Medicine, Family Medicine and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PED 430FD—SJVP Longitudinal Pediatrics Clerkship (1.5-6)
Clinical Activity—40-60 hours. Prerequisite(s): Consent of Instructor. Longitudinal Pediatrics Clerkship runs concurrently with Internal Medicine, Family Medicine and Psychiatry for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PED 430R—Rural PRIME Pediatrics Longitudinal Clerkship (2)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Pediatrics Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PED 430RA—Rural PRIME Pediatrics Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Pediatrics Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PED 430RB—Rural PRIME Pediatrics Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Pediatrics Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PED 430RC—Rural PRIME Pediatrics Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Pediatrics Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PED 430RD—Rural PRIME Pediatrics Longitudinal Clerkship (1)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Pediatrics Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PED 430TA—TeachMS Longitudinal Pediatrics Clerkship (A) (4)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Longitudinal Clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. (H/P/F grading only.) Effective: 2016 Fall Quarter.

PED 430TB—TeachMS Longitudinal Pediatrics Clerkship (B) (6)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Longitudinal clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. (H/P/F grading only.) Effective: 2016 Fall Quarter.

PED 430TC—TeachMS Longitudinal Pediatrics Clerkship (C) (2)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Longitudinal clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. (H/P/F grading only.) Effective: 2016 Fall Quarter.

PED 439D—Directed Clinical Studies in Pediatrics (1-12)
Clinical Activity—40 hours. Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for modified curriculum or to complete a clinical rotation following a leave of absence. May be repeated for credit. (P/F grading only.) Effective: 2011 Spring Quarter.

PED 439R—Directed Studies in Pediatrics (1-12)
Clinical Activity—30 hours; Independent Study—10 hours. Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for remediation of all or part of clinical rotation. Clinical studies to accommodate and satisfy remedial work as directed by the Committee on Student Progress and approved by the course IOR. May be repeated for credit. (P/F grading only.) Effective: 2011 Summer Quarter.

PED 460A—Acting Internship: General Inpatient Pediatric Clerkship (3-18)
Clinical Activity. Prerequisite(s): PED 430 B or better; and Consent of Instructor. Letter of recommendation from Pediatrics faculty member. Limited enrollment. The Ward Acting Intern functions in a manner similar to that of a pediatric intern. The Acting Intern takes admissions in the regular sequence and is expected to take night call. (H/P/F grading only.) Effective: 2016 Fall Quarter.

PED 460B—Acting Internship: Outpatient Pediatrics (3-18)
Clinical Activity. Prerequisite(s): PED 430 B or better; and Consent of Instructor. Letter of recommendation from Pediatrics faculty member. Limited enrollment. Supervised experience in pediatric care on outpatient service at UCDMC. Student functions as Acting Intern with appropriate supervision by residents and attending faculty. Limited enrollment. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PED 461—Pediatric Inpatient AI in Hematology/Oncology (6)
Clinical Activity—37.5 hours; Lecture—7.5 hours. Prerequisite(s): PED 430; and Consent of Instructor. Satisfactory completed. Limited Enrollment. Inpatient and outpatient experience in diagnosis and management of oncologic and hematologic disorders in children. Laboratory experience and participation in clinical investigation may be arranged. (H/P/F grading only.) Effective: 2009 Spring Quarter.

PED 462—Elective in Pediatric Endocrinology (3-18)
Clinical Activity. Prerequisite(s): Consent of Instructor. Completion of second-year study or the equivalent. Limited enrollment. Inpatient and outpatient experience in diagnosis and management of endocrine endocrine disorders in children. Laboratory experience and participation in clinical investigation may be arranged. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PED 463—Medical and Mental Health Evaluation of Children at Risk for Maltreatment (3-9)
Clinical Activity—30 hours; Discussion—4 hours. Elective for fourth-year medical students covers basic areas of knowledge needed for child abuse prevention and consultation. Rotation includes legals cases, abuse exams, child and parent interactive therapy and visits to community organizations. May be repeated for credit. (H/P/F grading only.) Effective: 2012 Spring Quarter.

PED 464—Acting Internship in Neonatology (3-12)
Clinical Activity—60 hours. Prerequisite(s): PED 430 B or better; and Consent of Instructor. Letter of recommendation from Pediatrics faculty member. Limited enrollment. Diagnostic and therapeutic aspect of the medical and surgical high-risk neonate. Student expected to take night call. May be repeated for credit. (H/P/F grading only.) Effective: 2014 Fall Quarter.

PED 465—Pediatrics Specialty Clinic Elective (3-18)
Clinical Activity. Prerequisite(s): PED 430; and Consent of Instructor. Satisfactory completed. Limited enrollment. Supervised experience in a variety of pediatric subspecialty clinics. Limited enrollment. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PED 466—Elective in Pediatric Cardiology (3-18)
Clinical Activity. Prerequisite(s): PED 430; Satisfactory completed. Inpatient and outpatient experience in diagnosis and management of cardiologic disorders in children. Laboratory experience and participation in clinical investigation may be arranged. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PED 467—Elective in Pulmonary Medicine (3-18)
Clinical Activity. Prerequisite(s): Pediatric clerkship. Inpatient and outpatient management of pediatric patients with pulmonary diseases. These will include but will not be limited to cystic fibrosis, asthma, and other forms of chronic pulmonary diseases as well as congenital abnormalities. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PED 468—Elective in Pediatrics Nephrology (3-18)
Clinical Activity. Prerequisite(s): PED 430; and Consent of Instructor. Satisfactory completed. Limited enrollment. Inpatient and outpatient experience in diagnosis and management of renal disorders in children. Laboratory experience and participation in clinical investigation may be arranged. Limited enrollment. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PED 469—Elective in Pediatric Infectious Disease (3-18)
Clinical Activity. Prerequisite(s): PED 430; and Consent of Instructor. Satisfactory completed. Limited enrollment. Inpatient and outpatient experience in diagnosis and treatment of infectious disease of infants and children. Laboratory and clinical investigation may be arranged. Limited enrollment. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PED 470—Elective in Pediatric Neurology (3-18)
Clinical Activity. Prerequisite(s): PED 430; IMD 430; OBG 430; and Consent of Instructor. All courses satisfactory completed. Limited enrollment. Inpatient and outpatient experience in diagnosis and management of neurological disorders in children. Students will also participate in other pediatric subspecialty clinics which serve children with neurological disorders. This course does not satisfy the fourth year neurology requirement. Limited enrollment. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PED 471—Elective in Pediatric Gastroenterology (3-18)
Clinical Activity. Prerequisite(s): PED 430; and Consent of Instructor. Satisfactory completed. Limited enrollment. Inpatient and outpatient experience in diagnosis and management of gastroenterology disorders in children. Laboratory experience and participation in clinical investigation may be arranged. Limited enrollment. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PED 472—Clinical Rotation in Adolescent Medicine (3-9)
Clinical Activity—39 hours; Lecture—1 hour. Prerequisite(s): Consent of Instructor. Fourth-year Medical Student. Under supervision, students will see patients in the UCD clinic and at a number of community-based sites. Emphasis on the socially-mediated problems that face adolescents, including substance abuse, STD's, pregnancy, depression and suicide. One hour of lecture each week. (H/P/F grading only.) Effective: 2011 Summer Quarter.

PED 473—Away Acting Internship in Pediatrics (6-18)
Clinical Activity—40 hours; Lecture—6 hours; Variable. Prerequisite(s): Consent of Instructor. Satisfactory completion of Pediatrics Clerkship. Work at the level of a sub intern in Inpatient and/or Outpatient settings. Expectation is to provide direct patient management. (H/P/F grading only.) Effective: 2010 Spring Quarter.

PED 476—Acting Internship in Pediatric Intensive Care (3-18)
Clinical Activity. Prerequisite(s): PED 430 A is required; or Consent of Instructor. Letter of recommendation from Pediatrics faculty member. Limited enrollment. Evaluation and support of critically ill infants and children. In general, student expected to take night call every third night during rotation. May be repeated for credit. (H/P/F grading only.) Effective: 2016 Fall Quarter.

PED 493—Ethical, Legal and Social Issues in Clinical Genetics (6)
Auto Tutorial—8 hours; Clinical Activity—18 hours; Independent Study—2 hours; Seminar—12 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. Develop advanced knowledge, communication skills and attitudes necessary to provide compassionate, knowledgeable, and expert care to patients who may be at increased genetic risk for disease. Seminars cover ethical and legal principles, epidemiology, and genetics. (H/P/F grading only.) Effective: 2010 Summer Quarter.

PED 493B—Living with Intellectual & Developmental Disability in the Community (1-6)
Clinical Activity—4 hours; Fieldwork—4 hours; Lecture—10 hours; Seminar—4 hours. Prerequisite(s): Consent of Instructor. In-depth experience with Intellectual & Developmental Disability across the lifespan. (H/P/F grading only.) Effective: 2012 Summer Quarter.

PED 493C—Fetal and Neonatal Physiology SSM (6)
Clinical Activity—8 hours; Lecture/Discussion—24 hours. Prerequisite(s): Consent of Instructor. Elective is available for students interested in exploring the fascinating world of the fetus and neonate. The elective is designed to combine the basic sciences with relevant clinical examples of disorders. (H/P/F grading only.) Effective: 2014 Fall Quarter.

PED 498—Directed Group Study (1-5)
Variable—3-15 hours. Explore in-depth various topics in Pediatrics. Extensive contact with and oversight by instructor. May be repeated for credit. (H/P/F grading only.) Effective: 2004 Fall Quarter.

PED 499—Research Topics in Pediatrics (1-18)
Variable. Prerequisite(s): Student in Medical School with consent of instructor. Individual research project in pediatric subspecialty areas (cardiology, endocrinology, hematology, metabolism, newborn physiology and others) may be arranged with faculty member. Independent research by student will be emphasized and long-term projects are possible. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

PER Persian

Courses in PER:

PER 001—Elementary Persian (5)
Lecture/Discussion—5 hours. Introduction to listening, speaking, reading and writing skills in Persian and to Persian culture. GE credit: AH, WC. Effective: 2016 Fall Quarter.

PER 002—Elementary Persian (5)
Lecture/Discussion—5 hours. Prerequisite(s): PER 001; or Consent of Instructor. Continuation of course 001. Introduction to listening, speaking, reading and writing skills in Persian and to Persian culture. GE credit: WC. Effective: 2017 Winter Quarter.

PER 003—Elementary Persian (5)
Lecture/Discussion—5 hours. Prerequisite(s): PER 002; or Consent of Instructor. Continuation of PER 002. Introduction to listening, speaking, reading and writing skills in Persian and to Persian culture. GE credit: AH, WC. Effective: 2017 Spring Quarter.

PER 021—Intermediate Persian (5)
Lecture/Discussion—5 hours. Prerequisite(s): PER 003; or the equivalent. Integrated presentation of listening, speaking, reading and writing skills as well as cultural topics in intermediate Persian. GE credit: AH, WC. Effective: 2016 Fall Quarter.

PER 022—Intermediate Persian (5)
Lecture/Discussion—5 hours. Prerequisite(s): PER 021; or the equivalent. Integrated presentation of listening, speaking, reading and writing as well as cultural topics in Intermediate Persian. GE credit: AH, WC. Effective: 2017 Winter Quarter.

PER 023—Intermediate Persian (5)
Lecture/Discussion—5 hours. Prerequisite(s): PER 022; or equivalent knowledge of Persian. Integrated presentation of listening, speaking, reading and writing skills as well as cultural topics in Intermediate Persian. GE credit: AH, WC. Effective: 2017 Spring Quarter.

PER 098—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Directed group study. May be repeated for credit. (P/NP grading only.) Effective: 2017 Winter Quarter.

PER 099—Special Study for Undergraduates (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special study. May be repeated for credit. (P/NP grading only.) Effective: 2017 Winter Quarter.

PER 101—Advanced Persian: Topics in Modern Persian Culture 1900-Present (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): PER 023; or Consent of Instructor. Integrated work on reading, listening, discussion and writing about modern Persian cultural production using fiction and poetry as well as cinema and theory. May be repeated up to 1 time(s) if content is different from the first time. GE credit: AH, WC, WE. Effective: 2017 Fall Quarter.

PER 103—Advanced Persian: Topics in Medieval Persian Culture 900-1500 (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): PER 023; or Consent of Instructor. Integrated work on reading, listening, discussion, writing about medieval Persian culture with a focus on lyric and narrative poetry and representative selections of literary prose, rhetoric, biography, history, religious and philosophical discourse. May be repeated up to 1 time(s) if content differs. GE credit: AH, OL, WC, WE. Effective: 2018 Winter Quarter.

PER 396—Teaching Assistant Training Practicum (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Restricted to graduate students. Teaching practicum. May be repeated up to 18 time(s). (S/U grading only.) Effective: 2017 Winter Quarter.

PFS Performance Studies

Courses in PFS:

PFS 200—Methods and Materials in Theatre Research (4)
Seminar—3 hours; Term Paper. Essential research tools in theatre and related fields; bibliographies,
primary sources; methods of evaluating and presenting evidence; delineating research areas in the field. Effective: 2012 Fall Quarter.

PFS 259—Topics in Contemporary Theatre and Performance (4)
Seminar—3 hours; Term Paper. Special topics designed to study in depth aspects of contemporary performance including performance analysis, cultural and historical context, modes of production, theoretical and political entailments, and issues of spectatorship; e.g., "Brecht and After," "British Theater," "Race and Gender in Performance." May be repeated up to 5 time(s). Effective: 2012 Fall Quarter.

PFS 265A—Performance Studies: Modes of Production (4)
Seminar—3 hours; Term Paper. Introduction to the literature of performance production in a variety of media: theatre, dance, film, video, computer-based, looking at cultural, aesthetic, rhetorical and political theory. May be repeated up to 3 time(s) when topic differs. Effective: 2012 Fall Quarter.

PFS 265B—Performance Studies: Signification and the Body (4)
Seminar—3 hours; Term Paper. Introduction to analysis of the body in performance, drawing on theoretical models from several fields. May be repeated up to 3 time(s) when topic differs. Effective: 2012 Fall Quarter.

PFS 265C—Performance Studies: Performance and Society (4)
Seminar—3 hours; Term Paper. Introduction to the role of performance (broadly defined), in everyday life, sociopolitical negotiation, identity, social movements, the media, and the state. May be repeated up to 3 time(s) when topic differs. Effective: 2012 Fall Quarter.

PFS 265D— Performance Studies: Theory, History, Criticism (4)
Seminar—3 hours; Term Paper. Introduction to the theory, history and criticism, informing performance studies. May be repeated up to 3 time(s) when topic differs. Effective: 2012 Fall Quarter.

PFS 270A—Individually Guided Research in Performance Studies (4)
Discussion—1 hour; Extensive Writing; Independent Study. Prerequisite(s): PFS 200; (PFS 265A or PFS 265B or PFS 265C or PFS 265D); and Consent of Instructor. Restricted to students in the Graduate Group PhD in Performance Studies. Individually guided research, under the supervision of a faculty member, on a Performance Studies topic related to the student's proposed dissertation project to produce a dissertation prospectus. Effective: 2012 Fall Quarter.

PFS 270B—Individually Guided Research in Performance Studies (4)
Discussion—1 hour; Extensive Writing; Independent Study. Prerequisite(s): PFS 200; (PFS 265A or PFS 265B or PFS 265C or PFS 265D); and Consent of Instructor. Restricted to students in the Graduate Group PhD in Performance Studies. Individually guided research, under the supervision of a faculty member, on a Performance Studies topic related to the student's proposed dissertation project, to produce a dissertation prospectus. Effective: 2012 Fall Quarter.

PFS 270C—Individually Guided Research in Performance Studies (4)
Discussion/Laboratory—2 hours; Fieldwork—2 hours; Term Paper. Prerequisite(s): PFS 200; (PFS 265A or PFS 265B or PFS 265C or PFS 265D); and Consent of Instructor. Restricted to students in the Graduate Group PhD in Performance Studies. Individually guided research, under the supervision of a faculty member, on a Performance Studies topic related to the student's proposed dissertation project to produce a dissertation prospectus. Effective: 2012 Fall Quarter.

PFS 290—Colloquia in Performance Studies (4)
Discussion/Laboratory—1 hour; Lecture/Discussion—2 hours; Term Paper. Prerequisite(s): Registration in Performance Studies Graduate Group and prior to Qualifying Examination. Designed to provide cohort identity and faculty exchange. Opportunity to present papers, hear guest lecturers, and see faculty presentations, gather for organizational and administrative new, exchange of information and make announcements. Course must be taken every year that a Performance Studies graduate is registered, prior to taking the Qualifying Examination. May be repeated up to 4 time(s). Limited to four units per year. (S/U grading only.) Effective: 2011 Fall Quarter.

PFS 298—Group Study (1-5)
Independent Study—1-5 hours. Prerequisite(s): Consent of Instructor. Effective: 2012 Fall Quarter.

PFS 299—Individual Study (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 2012 Fall Quarter.

PFS 299D—Dissertation Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Advancement to Candidacy. May be repeated for credit. (S/U grading only.) Effective: 2012 Fall Quarter.

PFS 459—Approaches to Theatre and Dance (4)
Project (Term Project); Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Advanced graduate students. Work on approaches to theatre, dance, film/video, design and performance, with a focus on methodology and professional development. May be repeated up to 5 time(s). Effective: 2012 Fall Quarter.

PHA Med - Medical Pharmacology & Toxicology

Courses in PHA:

PHA 092—Internship in Pharmacology (1-12)
Internship—3-36 hours. Prerequisite(s): Lower division student with good academic standing; approval of project prior to period of internship. Supervised work experience in pharmacology and related fields. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHA 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHA 192—Internship in Pharmacology (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Upper division standing; approval of project prior to period of internship. Supervised work experience in pharmacology and related fields. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHA 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHA 199—Special Study for Advanced Undergraduates (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHA 205—Problem Solving in Pharmacology (1)
Lecture/Discussion—1 hour. Restricted to Graduate Students in Pharmacology and Toxicology, Chemistry and Clinical Research Graduate Groups; other students may be accepted with consent of instructor. Students will be introduced to a current biomedical problem that would benefit from a developing drug and will develop an experimental strategy for addressing the issue. Students will develop model systems for testing various classic and recent pharmacological approaches. May be repeated up to 12 time(s) Course changes subjects every quarter; each course is unique and can be taken as often as desirable; certain students (Trainees of the Training Program in Pharmacological Sciences) must take course for at least three years. Effective: 2014 Fall Quarter.

PHA 207—Drug Discovery and Development (3)
Extensive Writing—1 hour; Lecture/Discussion—2 hours. Prerequisite(s): An equivalent course in general pharmacology, or knowledge of basic pharmacology. Intended for graduate students in Pharmacology and Toxicology, Chemistry and Clinical Research Graduate Groups; other students, including undergraduates, may be accepted with consent of instructors. Survey of the process by which a drug is discovered, developed and made available to the public. Topics include drug identification and optimization, safety testing, clinical evaluation, regulatory issues, intellectual property, formulation, and the global pharmaceutical industry. May be repeated for credit. Effective: 2010 Winter Quarter.

PHA 208—Advanced Cardiac Physiology and Pharmacology (3)
Lecture—2 hours; Lecture/Discussion—1 hour. Prerequisite(s): An equivalent course in general pharmacology or physiology (example, BIM 204), or knowledge of basic pharmacology/physiology. Open to graduate students from the Pharmacology and Toxicology, Molecular, Cellular and Integrated Physiology, Biomedical Engineering and Clinical Research Graduate Groups; other students (including undergraduates) may be accepted upon consultation with the instructors. Detailed characterization of the mechanisms involved in cardiac excitation–contraction coupling, alterations that occur in heart disease and pharmacological interventions. Topics include cardiac contractile apparatus, action potential, Ca cycling, excitation–transcription coupling, cardiac inotropy, heart failure and arrhythmias. Effective: 2013 Spring Quarter.

PHA 225—Gene and Cellular Therapies (3)
Lecture/Discussion—3 hours. Gene therapy from basic concepts to clinical applications. Topics include the human genome and genetic variation, genetic diseases, methods to manipulate gene expression, viral and non-viral delivery vectors, history and progress of gene therapy, case studies, and ethical issues. (Genetics 225.) Effective: 2017 Winter Quarter.

PHA 250—Functional Genomics: From Bench to Bedside (3)
Lecture/Discussion—3 hours. Prerequisite(s): GGG 201C; MCB 214; Or equivalent. Functional genomics (how genetic variation and epigenomics affect gene expression), with an emphasis on clinical relevance and applications. Topics include genetic variation and human disease, cancer therapeutics, and biomarker discovery. (Genetics 250.) Effective: 2015 Spring Quarter.

PHA 291—Pharmacology Research Seminar Series (1)
Discussion—1 hour; Seminar—1 hour. Prerequisite(s): Consent of Instructor. Upper division or graduate standing. Research seminars on current topics in Pharmacology. May be repeated for credit when topic differs. (S/U grading only.) Effective: 2007 Fall Quarter.

PHA 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Effective: 1997 Winter Quarter.

PHA 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

PHA 400A—Pharmacology (2)
Discussion/Laboratory—0.3 hours; Lecture—1 hour. Prerequisite(s): Approval by School of Medicine Committee on Student Progress. Restricted to Medical student only. Principles in pharmacology, including pharmacokinetics, drug metabolism and the actions, uses and toxicities of the major classes of drugs. (P/F grading only.) Effective: 2012 Winter Quarter.

PHA 400B—Pharmacology (1.5)
Discussion—0.25 hours; Lecture—1 hour. Prerequisite(s): Approval by School of Medicine Committee on Student Progress; medical students only. Principles in pharmacology, including autonomic pharmacology, general anesthetics, neuropharmacology and sedative/hypnotics. (P/F grading only.) Effective: 2008 Fall Quarter.

PHA 400C—Pharmacology (3.5)
Discussion—0.5 hours; Lecture—2 hours. Prerequisite(s): PHA 400A; PHA 400B; Approval by School of Medicine Committee on Student Progress; medical students only. Treatment of respiratory and cardiovascular disease, central nervous system drugs, GI, Toxicology and chemotherapy. Specific topics include: asthma, chronic obstructive pulmonary disease, hypertension, congestive heart failure, and the treatment of arrhythmias. Pain Management, depression, psychosis, acid reflux, IBS and toxicology. (P/F grading only.) Effective: 2015 Fall Quarter.

PHA 445—Introduction to Integrative Medicine (1)
Lecture/Discussion—1 hour. Prerequisite(s): Medical student in good standing. Basic principles of alternative medical systems (e.g., traditional Chinese, Ayurvedic, Tibetan), alternative practices (e.g., chiropractic, osteopathy, naturopathy, homeopathy, herbalism, guided imagery/meditation, massage therapy), and mind/body connection are presented as introduction to integrating alternative treatments into traditional medicinal practice. (H/P/F grading only.) Effective: 2000 Winter Quarter.

PHA 490—Seminar in Pharmacology for Medical Students (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Seminar in pharmacology for medical students. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PHA 497T—Tutoring in Pharmacology (1-5)
Tutorial—3-15 hours. Prerequisite(s): Advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum of the School of Medicine. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PHA 498—Special Study for Medical Students (1-5)
Discussion; Lecture. Prerequisite(s): Consent of Instructor. Special study in pharmacology for medical students. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PHA 499—Directed Research for Medical Students (1-12)
Laboratory—3-36 hours. Prerequisite(s): Consent of Instructor. Directed research in pharmacology for medical students. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

PHE Physical Education

Courses in PHE:

PHE 001—Physical Activities (0.5)
Laboratory—2 hours. Physical Education Activities classes offered in the following areas: aquatics, personal fitness, martial arts, individual sports, and team sports. These academic classes are instructional rather than recreational and are intended to improve activity specific skills and knowledge. May be repeated up to 6 unit(s) along with PHE 6, for a combined total of 6 units. Credit limited to 6 units in combination with PHE 6. (P/NP grading only.) Effective: 2016 Winter Quarter.

PHE 001A—Physical Activity-Archery (0.5)
Laboratory—2 hours. Physical Education Activity classes in Archery. The academic classes are instructional rather than recreational and are intended to improve activity specific skills and knowledge. May be repeated up to 6 unit(s) along with course 6, for a combination total of 6 units. Credit limited to 6 units in combination with course 6. (P/NP grading only.) Effective: 2018 Fall Quarter.

PHE 001AQ—Physical Activity-Aquatic Family (0.5)
Laboratory—2 hours. Physical Education Activity classes in Aquatics. The academic classes are instructional rather than recreational and are intended to improve activity specific skills and knowledge. May be repeated up to 6 unit(s) along with course 6, for a combination total of 6 units. Credit limited to 6 units in combination with course 6. (P/NP grading only.) Effective: 2018 Fall Quarter.

PHE 001F—Physical Activity-Fitness Family (0.5)
Laboratory—2 hours. Physical Education Activity classes in personal fitness. The academic classes are instructional rather than recreational and are intended to improve activity specific skills and knowledge. May be repeated up to 6 unit(s) along with course 6, for a combination total of 6 units. Credit limited to 6 units in combination with course 6. (P/NP grading only.) Effective: 2018 Fall Quarter.

PHE 001G—Physical Activity-Golf (0.5)
Laboratory—2 hours. Physical Education Activity classes in Golf. These academic classes are instructional rather than recreational and are intended to improve activity specific skills and knowledge. May be repeated up to 6 unit(s) along with course 6, for a combination total of 6 units. Credit limited to 6 units in combination with course 6. (P/NP grading only.) Effective: 2018 Fall Quarter.

PHE 001I—Physical Activity-Individual Sport Family (0.5)
Laboratory—2 hours. Physical Education Activity classes in Individual Sports. The academic classes are instructional rather than recreational and are intended to improve activity specific skills and knowledge. May be repeated up to 6 unit(s) along with course 6, for a combination total of 6 units. Credit limited to 6 units in combination with course 6. (P/NP grading only.) Effective: 2018 Fall Quarter.

PHE 001M—Physical Activity-Martial Arts Family (0.5)
Laboratory—2 hours. Physical Education Activity classes in Martial Arts. The academic classes are instructional rather than recreational and are intended to improve activity specific skills and knowledge. May be repeated up to 6 unit(s) along with course 6, for a combination total of 6 units. Credit limited to 6 units in combination with course 6. (P/NP grading only.) Effective: 2018 Fall Quarter.

PHE 001R—Physical Activity-Racquet Family (0.5)
Laboratory—2 hours. Physical Education Activity classes in Racquet sports. The academic classes are instructional rather than recreational and are intended to improve activity specific skills and knowledge. May be repeated up to 6 unit(s) along with course 6, for a combination total of 6 units. Credit limited to 6 units in combination with course 6. (P/NP grading only.) Effective: 2018 Fall Quarter.

PHE 001RC—Physical Activity-Rock Climbing (0.5)
Laboratory—2 hours. Physical Education Activity classes in Rock Climbing. The academic classes are instructional rather than recreational and are intended to improve activity specific skills and knowledge. May be repeated up to 6 unit(s) along with course 6, for a combination total of 6 units. Credit limited to 6 units in combination with course 6. (P/NP grading only.) Effective: 2018 Fall Quarter.

PHE 001S—Physical Activity-Self Defense for Women (0.5)
Laboratory—2 hours. Physical Education Activity classes in Self Defense for Women. The academic classes are instructional rather than recreational and are intended to improve activity specific skills and knowledge. May be repeated up to 6 unit(s) along with course 6, for a combination total of 6 units. Credit limited to 6 units in combination with course 6. (P/NP grading only.) Effective: 2018 Fall Quarter.

PHE 001T—Physical Activity-Team Sports Family (0.5)
Laboratory—2 hours. Physical Education Activity classes in Team Sports. The academic classes are instructional rather than recreational and are intended to improve activity specific skills and knowledge May be repeated up to 6 unit(s) along with course 6, for a combination total of 6 units. Credit limited to 6 units in combination with course 6. (P/NP grading only.) Effective: 2018 Fall Quarter.

PHE 006—Preparation and Participation in ICA Competition (1) ***Review all entries***
Practice—3 hours. Prerequisite(s): Consent of instructor (head coach). Classes offered in all UC Davis intercollegiate athletic sports and are restricted to student-athletes who are members. May be repeated up to 6 unit(s) , along with course 1, for a combined total of 6 units. (P/NP grading only.) Effective: 2016 Winter Quarter.

PHE 006—Preparation and Participation in ICA Competition (1) ***Review all entries***
Practice—3 hours. Prerequisite(s): Consent of instructor (head coach). Sport specific advanced comprehensive training, instruction, and practice for the highly skilled collegiate varsity athlete. Development and improvement of performance skills utilizing motor-learning, nutritional science, and motivational theory. Classes offered in all UC Davis intercollegiate athletic sports and are restricted to student-athletes who are members. May be repeated up to 6 unit(s) Course 6 and course 1 may be repeated for a combined total of 6 units. (P/NP grading only.) Effective: 2018 Fall Quarter.

PHE 007—Professional Physical Education Activities: Men and Women (1)
Laboratory—2 hours; Lecture—1 hour. Fundamental skills for: (a) coaching competitive athletics; (b) classroom teaching and coaching, and (c) classroom teaching and officiating. May be repeated for a total of six units. May be repeated up to 6 unit(s). Effective: 1997 Winter Quarter.

PHE 008—Student-Athlete Life Skills (1)
Lecture—1 hour. Prerequisite(s): Consent of Instructor. Open to intercollegiate student-athletes only. For intercollegiate student-athletes. Balancing academic and athletic demands. Academic, psychological, and sociocultural issues which influence success as a college student-athlete. (P/NP grading only.) Effective: 2012 Fall Quarter.

PHE 015—Administration of Intramural Sports (2)
Lecture—2 hours. Planning and administering intramural sports programs at the high school and college level. Effective: 1997 Winter Quarter.

PHE 025—Theory of Lifesaving and Water Safety (2)
Laboratory—2 hours; Lecture—1 hour. Prerequisite(s): Sound physical condition, and no physical handicap that would render student unable to perform the required skills and ability to pass preliminary swimming test. Provides the student with the knowledge, organizational procedures, and skill development necessary to provide for water safety and save his/her own life or the life of another in an aquatic emergency. Effective: 1997 Winter Quarter.

PHE 027—Training Course for Water Safety Instructors (2)
Laboratory—2 hours; Lecture—1 hour. Prerequisite(s): PHE 001; Advanced swimming (PHE 001) or consent of instructor; and current Advanced Life-Saving Certificate. Theoretical knowledge and practical experience necessary for the organization and teaching of swimming and lifesaving classes. (American
Red Cross Water Safety Instructors Certificate awarded upon successful completion of necessary requirements.) Effective: 1997 Winter Quarter.

PHE 040—Drugs and Society (2)
Fieldwork—2 hours; Film Viewing—5 hours; Lecture—2 hours. Pharmacology, methods of use, and effects of use of psychoactive and performance-enhancing drugs. Historical overview of drug use. Identification of behavior of at-risk and user populations. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHE 044—Principles of Healthful Living (2)
Lecture—2 hours. Application of scientific and empirical knowledge to personal, family, and community health problems. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHE 092—Physical Education Internship (1-5)
Internship—3-15 hours. Prerequisite(s): Consent of Instructor. Enrollment dependent on availability of intern positions, with priority given to Exercise Biology majors. Work experience in the application of physical activity programs to teaching, recreational, clinical or research situations under department faculty supervision. May be repeated for credit once but no internship units will be counted toward Exercise Biology major. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

PHE 097T—Tutoring in Physical Education (1-5)
Tutorial—1-5 hours. Prerequisite(s): Lower division standing and consent of Program Director. Tutoring of students in lower division physical activity courses. Weekly meetings with instructor in charge of courses. Written reports on methods and materials required. May be repeated once for credit. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

PHE 097TC—Tutoring in the Community (1-5)
Discussion—1 hour; Tutorial—2-15 hours. Prerequisite(s): Lower division standing and consent of Program Director. Tutoring in the community in physical activity related projects under the guidance of the Physical Education faculty. Regular meetings with
instructor in charge and written report required. May be repeated once for credit. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

PHE 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of instructor and Program Director. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHE 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2002 Fall Quarter.

PHE 100—Field Experience in Teaching Physical Education (2)
Discussion—1 hour; Fieldwork—4 hours. Prerequisite(s): PHE 001 or PHE 007; Upper division standing. Tutoring or teachers aide in physical education activities, including athletic coaching, in public schools under the guidance of a regular teacher with supervision by a departmental faculty person. May be repeated once for credit. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

PHE 120—Sport in American Society (3)
Lecture—3 hours. Sociological approaches to the study of sport and contemporary American culture, including sport's interaction with politics, economics, religion, gender, race, media and ethics. Socialization factors involving youth, scholastic, collegiate, and Olympic sport. (Exercise Biology 120.) GE credit: SS. Effective: 2009 Summer Session 1.

PHE 131—Physical Activity and the Disabled (4)
Laboratory—3 hours; Lecture—3 hours. The study of the diverse and complex nature of individuals with disabilities and how they adapt to their disabilities in daily living. Integration of individuals with disabilities into the community, schools, and physical activity and recreational programs. Not open for credit to students who have taken EXB 131. Effective: 2002 Fall Quarter.

PHE 133—Prevention and Care of Sports Injuries (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): CHA 101 (can be concurrent) Prevention, care, and rehabilitation of injuries incurred by athletes. Laboratory on anatomy, emergency care, physical therapy methods, and taping techniques. Not open for credit to students who have previously taken EXB 133. Effective: 2003 Spring Quarter.

PHE 135—Advanced Procedures in Evaluation & Management of Athletic Injuries (3)
Lecture—3 hours. Prerequisite(s): PHE 133 or EXB 133; (CHA 101); and Consent of Instructor. Advanced study of the evaluation and management of athletic injuries, including mechanism of injury, biomechanics and pathophysiology. Current topics in athletic training. Not open for credit to students who have completed EXB 135. Effective: 2003 Fall Quarter.

PHE 141—Coaching Principles and Methods (3)
Lecture/Discussion—3 hours. Prerequisite(s): PHE 143; Upper division standing. Technical, tactical, and strategic aspects of coaching. Methods for organizing and delivering effective information in coaching. Biomechanical basis of motor skills and motor learning principles applied to coaching. Classroom development of coaching skills and outside observations of coaching required. Effective: 2012 Spring Quarter.

PHE 142—Physical Education in the Public Schools (3)
Lecture—3 hours. Analysis and study of the principles and methods basic to teaching physical education at the elementary and secondary levels. Effective: 1997 Winter Quarter.

PHE 143—Coaching Effectiveness (3)
Lecture—3 hours. Prerequisite(s): Upper division standing; 3.0 units of PHE 001 and PHE 006 combined. Synthesis and application of basic components of sport psychology, sport pedagogy, and sport physiology and basic management and administration of athletics in public high schools. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHE 144—Principles of Health Education (2)
Lecture—2 hours. Prerequisite(s): PHE 044; Upper division standing or consent of instructor. Principles of teaching health education in the public schools. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHE 150—Recreation in the Community (3)
Discussion—1 hour; Lecture—2 hours. The nature and scope of community recreation programs in California emphasizing low income, highly populated areas, and poor rural communities. Effective: 1997 Winter Quarter.

PHE 192—Physical Education Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing and consent of instructor; enrollment dependent on availability of intern positions, with priority given to Exercise Science majors. Work experience in the application of physical activity programs to teaching, recreational, clinical or research situations under department faculty supervision. May be repeated up to 12 unit(s) (including course 92) but no internship units will be counted toward Exercise Science major. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHE 197T—Tutoring in Physical Education (1-5)
Tutorial—1-5 hours. Prerequisite(s): Consent of chairperson. Tutoring of students in lower division physical activity courses. Written reports on methods and materials required. May be repeated once for credit. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

PHE 197TC—Tutoring in the Community (1-5)
Discussion—1 hour; Tutorial—2-15 hours. Prerequisite(s): Upper division standing and consent of Department Chairperson. Tutoring in the community in physical education related projects under the guidance of the Physical Education faculty. Regular meetings with instructor in charge and written report required. May be repeated once for credit. May be repeated up to 1 time(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

PHE 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of instructor and Department Chairperson. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHE 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2002 Fall Quarter.

PHE 300—The Elementary Physical Education Program (2)
Laboratory—2 hours; Lecture—1 hour. Prerequisite(s): Consent of Instructor. Restricted to senior standing or credential student. Introduction to principles, theories, material, and practices of elementary school physical education program. Effective: 2014 Spring Quarter.

PHE 380—Methods of Teaching Physical Education (3)
Laboratory—6 hours; Lecture—1 hour. Prerequisite(s): PHE 142; or Consent of Instructor. Six units of PHE 007. The methods of teaching group and individual activities for grades K-12; program planning, class management, organization, and evaluation. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHI Philosophy

Courses in PHI:

PHI 001—Introduction to Philosophy (4)
Discussion—1 hour; Lecture—3 hours. Problems of philosophy through major writings from various periods.
Problems are drawn from political, aesthetic, religious, metaphysical, and epistemological concerns of philosophy. GE credit: AH, WE. Effective: 1997 Winter Quarter.

PHI 005—Critical Reasoning (4)
Discussion—1 hour; Lecture—3 hours. Criteria of good reasoning in everyday life and in science. Topics to be covered may include basic principles of deduction and induction; fallacies in reasoning; techniques and aids to reasoning; principles of scientific investigation; aids to clarity. Not open for credit to students who have completed PHI 006. GE credit: WE. Effective: 1997 Winter Quarter.

PHI 007—Philosophical Perspectives on Sexuality (3)
Lecture—3 hours. Philosophical issues related to sexuality, including, but not limited to, ethical and social issues regarding sexual practice, orientation, classification and identity. GE credit: AH. Effective: 2013 Winter Quarter.

PHI 007Y—Philosophical Perspectives on Sexuality (3)
Discussion—1 hour; Web Virtual Lecture—1.5 hours. Philosophical issues related to sexuality, including, but not limited to, ethical and social issues regarding sexual practice, orientation, classification and identity. Not open for credit to students who have completed PHI 007. GE credit: AH, DD. Effective: 2015 Winter Quarter.

PHI 010—Introduction to Cognitive Science (4)
Lecture/Discussion—4 hours. Pass One open to Cognitive Science majors only. Introduction to the interdisciplinary cognitive scientific approach to the study of mind, drawing concepts and methods from psychology, philosophy, linguistics, artificial intelligence, and other disciplines. (CGS 001) GE credit: SE, SL. Effective: 2017 Fall Quarter.

PHI 011—Asian Philosophy (4)
Discussion—1 hour; Lecture—3 hours. Survey of the main philosophical systems of south and east Asia: Hinduism, Buddhism, Confucianism, and Taoism. Topics include the nature of reality, including God, the universe and the human self, human knowledge, and the proper conduct of human life. GE credit: AH, WC, WE. Effective: 2014 Fall Quarter.

PHI 012—Introduction to Symbolic Logic (4)
Discussion—1 hour; Lecture—3 hours. Syntax and semantics of the symbolic language sentence logic. Symbols of sentence logic. Translation between sentence logic and English. Truth table interpretation of sentence logic. Proof techniques. Application of truth tables and proof techniques to arguments in English. Not open for credit to students who have taken PHI 112, PHI 113, PHI 134, or PHI 135 and passed with a grade of C or better. GE credit: AH. Effective: 2011 Summer Session 1.

PHI 013—Minds, Brains, and Computers (3)
Lecture—3 hours. Computational theories of the nature of the mind. The mind as a computer process. The possibility of machine intelligence, consciousness, and mentality. Not open for credit for students who have completed PHI 013G for four units. GE credit: SE, SL, SS. Effective: 2014 Fall Quarter.

PHI 013G—Minds, Brains, and Computers with Discussion (4)
Discussion—1 hour; Lecture—3 hours. Computational theories of the nature of the mind. The mind as a computer process. The possibility of machine intelligence, consciousness, and mentality. Not open for credit for students who have completed PHI 013. GE credit: AH, SE, SL, WE. Effective: 2014 Fall Quarter.

PHI 014—Ethical and Social Problems in Contemporary Society (4)
Discussion—1 hour; Lecture—3 hours. Philosophical issues and positions involved in contemporary moral and social problems. Possible topics include civil disobedience and revolution, racial and sex discrimination, environment, population control, technology and human values, sexual morality, freedom in society. GE credit: AH, WE. Effective: 1997 Spring Quarter.

PHI 015—Introduction to Bioethics (4)
Discussion—1 hour; Lecture—3 hours. Critical analysis of normative issues raised by contemporary medicine and biology. Possible topics include euthanasia, reproductive technologies, genetic engineering, informed consent and patient autonomy, experimentation on human subjects and non-human animals. GE credit: AH, WE. Effective: 2016 Spring Quarter.

PHI 016—Philosophical Foundations of American Democracy (4)
Discussion—1 hour; Lecture—3 hours. The philosophical underpinnings of democratic government and the tension between the goals of providing security and of preserving democracy and civil liberties. Illustration of the tension through focus on issues related to war and terrorism. GE credit: ACGH, AH, WE. Effective: 2009 Fall Quarter.

PHI 017—Language, Thought, and World (4)
Discussion—1 hour; Lecture—3 hours. Puzzles in the philosophy of language, such as what language is, how language conveys thoughts, whether we each speak our own private language, and what we can learn about the world by studying language. GE credit: SS, WE. Effective: 2007 Fall Quarter.

PHI 021—Philosophical Classics of the Ancient Era (4)
Discussion—1 hour; Lecture—3 hours. Survey of ancient Western philosophy with special attention to the Pre-Socratics, Plato, Aristotle, and the Sceptics. GE credit: AH, WE. Effective: 2017 Spring Quarter.

PHI 022—Philosophical Classics of the Modern Era (4)
Discussion—1 hour; Lecture—3 hours. Survey of modern Western philosophy, including Descartes, Locke, Hume, and Kant. GE credit: AH, WE. Effective: 2017 Spring Quarter.

PHI 024—Introduction to Ethics (4)
Discussion—1 hour; Lecture—3 hours. Reading of historical and contemporary philosophical works in ethics. Topics include the nature of morality, the justification of moral claims, and major ethical theories, such as consequentialist, deontological, and virtue theories. GE credit: AH, WE. Effective: 2014 Fall Quarter.

PHI 030—Introduction to Philosophy of Science (4)
Discussion—1 hour; Lecture—3 hours. Not open for credit to students who have taken course 104. Basic problems in the philosophy of science, common to the physical, biological, and social sciences. Analysis of explanation, confirmation theory, observational and theoretical terms, the nature of theories, operationalism and behaviorism, realism, reduction. GE credit: AH, SE, SL, WE. Effective: 2000 Fall Quarter.

PHI 031—Appraising Scientific Reasoning (4)
Discussion—1 hour; Lecture—3 hours. Introduction to scientific hypotheses and the kinds of reasoning used to justify such hypotheses. Emphasis on adequate justification, criteria, and strategies for distinguishing scientific from pseudoscientific theories. Concrete historical and contemporary cases. GE credit: AH, SE, SL, WE. Effective: 1997 Winter Quarter.

PHI 032—Understanding Scientific Change (4)
Discussion—1 hour; Lecture—3 hours. Concepts of scientific change in historical and philosophical perspective. Survey of models of growth of knowledge, 17th century to present. Relationship between logic of theories and theory choice. Kuhns revolution model. Examples from various sciences. GE credit: AH, SE, WE. Effective: 1997 Winter Quarter.

PHI 038—Introduction to Philosophy of Biology (4)
Discussion—1 hour; Lecture—3 hours. Non-technical introduction to philosophical, social, and scientific ideas, methods and technologies in contemporary biological fields such as evolution, genetics, molecular biology, ecology, behavior. Philosophical consideration of determinism, reductionism, explanation, theory, modeling, observation, experimentation. Evaluation of scientific explanations of human nature. GE credit: AH, SE, SL, WE. Effective: 2001 Spring Quarter.

PHI 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHI 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHI 101—Metaphysics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): One course in Philosophy recommended. Theories of being. Such topics as reality, substance, universals, space, time, causality, becoming, body, experience, persons, freedom, and determinism. Views of the nature and method of metaphysics. Anti-metaphysical arguments. GE credit: AH, WE. Effective: 1997 Winter Quarter.

PHI 102—Theory of Knowledge (4)
Discussion; Extensive Writing; Lecture—3 hours. Prerequisite(s): One course in philosophy recommended. Analysis of the concept of knowledge. The relation between knowledge, belief and truth. Development of foundationalist, coherentist and externalist theories of justified belief. Examination of skepticism. GE credit: AH, WE. Effective: 2016 Fall Quarter.

PHI 103—Philosophy on Mind (4)
Lecture/Discussion—3 hours; Term Paper. The relation between mind and body, our knowledge of other minds, and the explanation of mental acts. Discussion of such concepts as action, intention, and causation. GE credit: AH, WE. Effective: 1997 Winter Quarter.

PHI 104—The Evolution of Mind (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): One previous course in Philosophy recommended. Interpretation of human thought and behavior through the lens of evolutionary theory. Topics include the nature/nurture debate concerning cognitive and other mental capacities and traits, and the interaction between evolution, learning and development. GE credit: SS, WE. Effective: 2016 Fall Quarter.

PHI 105—Philosophy of Religion (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): One course in Philosophy recommended. Logical, metaphysical, epistemological, and existential aspects of selected religious concepts and problems. GE credit: AH, WE. Effective: 1997 Winter Quarter.

PHI 107—Philosophy of the Physical Sciences (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): One Philosophy course or a science background recommended. Nature of testability and confirmation of scientific hypotheses; nature of scientific laws, theories, explanations, and models. Problems of causality, determininism, induction, and probability; the structure of scientific revolutions. GE credit: AH, SE, WE. Effective: 1997 Winter Quarter.

PHI 108—Philosophy of the Biological Sciences (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): One course in Biology or one course in Philosophy recommended. Scientific method in biology. Nature of biological theories, explanations, and models. Problems of evolutionary theory, ecology, genetics, and sociobiology. Science and human values. GE credit: AH, SE, SL, WE. Effective: 2016 Fall Quarter.

PHI 109—Philosophy of the Social Sciences (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): One course in Philosophy or a social science recommended. The nature of the social sciences, their subject matter and methods. Similarities to and differences from natural and life sciences. Predicting and explaining human behavior. Behaviorism. Reduction, holism, and individualism. Related moral issues. The social sciences and philosophy. GE credit: AH, SS, WE. Effective: 1997 Winter Quarter.

PHI 111—Philosophy of Space and Time (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): One upper division Philosophy course recommended. Philosophical problems of space and time. The philosophical implications of space-time theories, such as those of Newton and Einstein. Topics may
include the nature of geometry, conventionalism, absolutist versus relationist views of space and time, philosophical impact of relativity theory. GE credit: AH, WE. Effective: 2016 Fall Quarter.

PHI 112—Intermediate Symbolic Logic (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PHI 012 C- or better; or Consent of Instructor. Predicate logic syntax and semantics. Transcription between predicate logic and English. Models, truth-trees, and derivations. Identity, functions, and definite descriptions. Introduction to concepts of metatheory. GE credit: AH. Effective: 2018 Winter Quarter.

PHI 113—Metalogic (4)
Lecture/Discussion—4 hours. Prerequisite(s): PHI 112; MAT 108; Or the equivalent. The metalogic of classical propositional and first-order predicate logic. Consistency, soundness and completeness of both propositional and predicate logic. The Löwenheim-Skolem theorem for predicate logic. Undecidablity of predicate logic. GE credit: AH. Effective: 2006 Fall Quarter.

PHI 114—History of Ethics (4)
Lecture/Discussion—4 hours. Prerequisite(s): One previous Philosophy course recommended. Study of some classic texts from the history of philosophical writing on central problems of ethics, taking the form either of a survey or concentrated examination of selected historical figures. Readings from such philosophers as Aristotle, Butler, Hume, Kant, Mill. GE credit: AH, WE. Effective: 2016 Fall Quarter.

PHI 115—Problems in Normative Ethics (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): One previous course in Philosophy recommended. Moral philosophy studied through examination of moral problems and the moral principles and common sense intuitions that bear on them. Problems discussed may include: animal rights, fetal rights, euthanasia, justice and health care, war, nuclear deterrence, world hunger, environmental protection. GE credit: AH, WE. Effective: 2016 Fall Quarter.

PHI 116—Ethical Theories (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): One course in ethics recommended. Study of fundamental concepts and problems in ethical theory through an examination of classical and contemporary philosophical theories of ethics. Among the theories that may be discussed are utilitarianism, virtue theory, theories of natural rights, Kantian ethical theory, and contractarianism. GE credit: AH, WE. Effective: 2016 Fall Quarter.

PHI 117—Foundations of Ethics (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): PHI 114, 115, 116, 101, or 137 recommended. Advanced investigation of questions about the nature and foundations of morality. Among the topics that may be discussed are moral realism and anti-realism, cognitivism and non-cognitivism, types of relativism, moral skepticism, normative language and normative belief. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 118—Political Philosophy (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): One course in philosophy recommended. Intensive examination of some central concepts of political thought such as the state, sovereignty, rights, obligation, freedom, law, authority, and responsibility. GE credit: AH, SS, WE. Effective: 2017 Winter Quarter.

PHI 119—Philosophy of Law (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. One course in philosophy recommended. Philosophical theories of the nature of law, legal obligation, the relation of law and morals. Problems for law involving liberty and justice: freedom of expression, privacy, rights, discrimination and fairness, responsibility, and punishment. GE credit: AH, SS, WE. Effective: 2017 Winter Quarter.

PHI 120—Environmental Ethics (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One course in Philosophy recommended. Conceptual and ethical issues concerning the environment. Extension of ethical theory to animals, all life, and ecosystem wholes. Topics may include contemporary environmental issues such as global warming, sustainability and biodiversity. Not open for credit for students who have completed PHI 115 prior to fall 2011. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 121—Bioethics (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): PHI 015 recommended. In-depth coverage of topics in bioethics including resource allocation, measures of health and disease/disability, public health, and ethical issues related to research on human subjects and emerging technologies. GE credit: AH, WE. Effective: 2016 Spring Quarter.

PHI 123—Aesthetics (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): One course in Philosophy recommended. Nature of art, of artistic creation, of the work of art, and of aesthetic experience; nature and validity of criticism; relations of art to its environment. GE credit: AH, WE. Effective: 1997 Winter Quarter.

PHI 125—Theory of Action (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): One course in Philosophy recommended. Survey of prominent contemporary approaches to leading problems in action theory. Problems include issues about the nature of intentional action and the conceptual character of explanations of actions in terms of the agent's reasons. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 128—Rationality (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One course in Philosophy recommended. Philosophical issues concerning rationality in its various forms. Focus is on theoretical and practical reasoning and conditions for rational belief, choice, and action. Possible additional topics include rationality and human limitations; paradoxes of rationality; varieties of irrationality; rationality and objectivity. GE credit: AH. Effective: 2017 Winter Quarter.

PHI 129—Knowledge and the A Priori (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One course in Philosophy recommended. Self-evidence, intuition, the (in)fallibility and (in)defeasibility of a priori methods. Analytic, formalist and Kantian accounts of how knowledge can be acquired through reasoning and intuition alone, without recourse to empirical methods. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 131—Philosophy of Logic and Mathematics (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): PHI 012; Or one course for credit in mathematics. Nature of formal systems and mathematical theories. Selected topics include logical and semantical paradoxes; foundations of mathematics; set theory, type theory, and intuitionistic theory; philosophy of geometry; philosophical implications of Gödels incompleteness results. GE credit: AH, WE. Effective: 1997 Winter Quarter.

PHI 133—Logic, Probability, and Artificial Intelligence (4)
Lecture/Discussion—4 hours. Prerequisite(s): PHI 012; PHI 112 Introduction to theoretical artificial intelligence with a focus on nonmonotonic logic, Bayesian networks, and learning theory. Effective: 2016 Fall Quarter.

PHI 134—Modal Logic (4)
Lecture/Discussion—4 hours. Prerequisite(s): PHI 112 or MAT 108; Or the equivalent. Survey of the main systems of modal logic, including Lewis systems S4 and S5. Possible worlds semantics and formal proofs. Applications to epistemology, ethics, or temporality. GE credit: AH. Effective: 1998 Spring Quarter.

PHI 135—Alternative Logics (4)
Lecture/Discussion—4 hours. Prerequisite(s): PHI 012 or MAT 108; Or the equivalent. Alternatives to standard truth-functional logic, including many-valued logics, intuitionist logics, relevance logics, and non-monotonic logics. GE credit: AH. Effective: 1997 Winter Quarter.

PHI 136—Formal Epistemology (4)
Lecture/Discussion—4 hours. Prerequisite(s): PHI 012 Formal (mathematical) approaches to belief revision, knowledge and deduction, meta-knowledge, (multi-agent) epistemic logic, Bayesian confirmation, Bayes nets, epistemic and probabilistic paradoxes. GE credit: AH. Effective: 2014 Fall Quarter.

PHI 137A—Philosophy of Language: Theory of Reference (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One course in Philosophy or Linguistics recommended. Survey of issues and views concerning reference, or how words refer to things. Topics include names and descriptions, the distinction between sense and reference, the puzzle of non-referring terms, causal theories of reference, and possibility and necessity. Only two units of credit for students who have taken PHI 137. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 137B—Philosophy of Language: Truth and Meaning (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One course in Philosophy or Linguistics recommended. Comparative treatment of theories about the relationship between truth and meaning. Topics include: the identification of meaning with truth conditions, the nature of propositions, theories of linguistic understanding, the roles of mind and world in determining meaning. Only two units of credit for students who have taken PHI 137. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 137C—Philosophy of Language: Semantics and Pragmatics (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One course in Philosophy or Linguistics recommended. Philosophical issues and positions concerning the meaning and use of language. Topics include the distinction between meaning and implication, the roles of context and convention in language use, speaker meaning versus linguistic meaning and speech act theory. Only two units of credit for students who have taken PHI 137. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 141—Socrates and the Socratic Dialogue (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): PHI 021 recommended. Philosophy of Socrates as found in the Socratic dialogues of Plato. Topics include the Socratic practice of refutation, its method, epistemological foundation, and moral purpose; Socratic eudaimonism and Socratic virtue theory; the paradoxes of Socratic intellectualism. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 143—Hellenistic Philosophy (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): PHI 021 recommended. Positions and arguments of the major philosophical schools of the Hellenistic period: Stoicism, Epicureanism, and Scepticism. Focus is on ethical, epistemological and metaphysical questions and their interconnectedness. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 145—Christian, Islamic, and Jewish Philosophers of the Middle Ages (4)
Lecture/Discussion—4 hours. Prerequisite(s): PHI 021 recommended. Major Christian, Islamic, and Jewish philosophers of the Middle Ages. GE credit: AH, WC. Effective: 2018 Winter Quarter.

PHI 151—Nineteenth Century European Philosophy (4)
Lecture/Discussion—4 hours. Prerequisite(s): PHI 022 recommended. Survey of the main movements in nineteenth century philosophy on the European continent. Idealism in Schopenhauer and Hegel, dialectical materialism in Marx, irrationalism in Kierkegaard, Nietzsche and Dostoevsky. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 156—Contemporary Analytic Philosophy (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): One course in Philosophy recommended. Consideration of central issues such as meaning/reference, analytic/synthetic, reductionism, formal and ordinary language, essential properties, ontological commitment, possible world semantics; influential works by philosophers such as Russell, Moore, Wittgenstein, Austin, Carnap, Quine, Putnam, Kripke, van Fraassen. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 157—Twentieth Century European Philosophy (4)
Lecture/Discussion—4 hours. Prerequisite(s): One course in Philosophy recommended. Survey of the main movements in twentieth century philosophy on the European continent, including phenomenology, existentialism, post-structuralism and post-modernism. Philosophers covered are Husserl, Heidegger, Sartre, Foucault, Derrida. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 160—Pre-Socratics (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): PHI 021 recommended. Study of the metaphysical views of such pre-Socratic figures as the Milesians, the Pythagoreans, Heracleitus, Parmenides, Empedocles, Anaxagoras, and the atomists. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 161—Plato (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): PHI 021 recommended. Examines Platos most important contributions in metaphysics, epistemology, psychology, cosmology, ethics and political philosophy. Dialogues will be selected from Platos middle and later writings. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 162—Aristotle (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): PHI 021 recommended. Overview of Aristotles most central and influential writings. Topics selected from fields such as metaphysics, physics, ethics, logic, and psychology. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 168—Descartes (4)
Lecture/Discussion—4 hours. Prerequisite(s): PHI 022 recommended. Philosophical writings of René Descartes. Topics include the refutation of skepticism, the nature and existence of mind and body, the existence of God, and the foundations of science. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 170—Spinoza and Leibniz (4)
Lecture/Discussion—4 hours. Prerequisite(s): PHI 022 recommended. Seventeenth-century philosophical writings of Spinoza and Leibniz. Topics drawn from both philosophers include: the nature and existence of God, the nature of mind, the relation between mind and body, human freedom, metaphysical monism vs. pluralism. GE credit: AH, WE. Effective: 2016 Fall Quarter.

PHI 172—Locke and Berkeley (4)
Lecture/Discussion—4 hours. Prerequisite(s): PHI 022 recommended. Principal metaphysical works of John Locke and George Berkeley. Topics include abstract ideas, existence of matter, primary and secondary qualities, essence, substance, the existence of God, and the nature of scientific knowledge. May be repeated for credit. GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 174—Hume (4)
Lecture/Discussion—4 hours. Prerequisite(s): PHI 022N David Hume's Treatise of Human Nature and related writings. Topics include empiricism, space, causality, belief, skepticism, the passions, and morality. GE credit: AH, WE. Effective: 2003 Fall Quarter.

PHI 175—Kant (4)
Lecture/Discussion—4 hours. Prerequisite(s): PHI 022 recommended. Immanuel Kant's Critique of Pure Reason and related writings. Topics include the nature of human cognition, space and time, a priori concepts, substance, causality, human freedom, and the existence of God. GE credit: AH, WE. Effective: 2016 Fall Quarter.

PHI 178—Frege (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. One upper division course in Philosophy recommended. Development of Gottlob Frege's views about language and logic. Formulation of his grand mathematical idea known as logicism and how it led to the philosophy of language. GE credit: AH, WE. Effective: 2016 Fall Quarter.

PHI 189A—Special Topics in Philosophy; History of Philosophy (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One course in the area of the special topic recommended. Special topics in History of Philosophy. May be repeated up to 8 unit(s). GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 189B—Special Topics in Philosophy; Metaphysics (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One course in the area of the special topic recommended. Special topics in Metaphysics. May be repeated up to 8 unit(s). GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 189C—Special Topics in Philosophy; Theory of Knowledge (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One course in the area of the special topic recommended. Special topics in Theory of Knowledge. May be repeated up to 8 unit(s). GE credit: WE. Effective: 2017 Winter Quarter.

PHI 189D—Special Topics in Philosophy; Ethics (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One course in the area of the special topic recommended. Special topics in Ethics. May be repeated up to 8 unit(s). GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 189E—Special Topics in Philosophy; Political Philosophy (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One course in the area of the special topic recommended. Special topics in Political Philosophy. May be repeated up to 8 unit(s). GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 189F—Special Topics in Philosophy; Philosophy of Law (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One course in the area of the special topic recommended. Special topics in Philosophy of Law. May be repeated up to 8 unit(s). GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 189G—Special Topics in Philosophy; Aesthetics (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One course in the area of the special topic recommended. Special topics in Aesthetics. May be repeated up to 8 unit(s). GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 189H—Special Topics in Philosophy; Philosophy of Mind (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One course in the area of the special topic recommended. Special topics in Philosophy of Mind. May be repeated up to 8 unit(s). GE credit: AH, WE. Effective: 2017 Winter Quarter.

PHI 189I—Special Topics in Philosophy; Philosophy of Science (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One course in the area of the special topic recommended. Special Topics in Philosophy of Science. May be repeated up to 8 unit(s). GE credit: AH, SE, WE. Effective: 2017 Winter Quarter.

PHI 189J—Special Topics in Philosophy; Philosophy of Language (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): One course in the area of the special topic recommended. Special topics in Philosophy of Language. May be repeated up to 8 unit(s). GE credit: AH. Effective: 2017 Winter Quarter.

PHI 189K—Special Topics in Philosophy; Logic (4)
Lecture/Discussion—4 hours. Prerequisite(s): One course in the area of the special topic recommended. Special topics in Logic. May be repeated up to 8 unit(s). GE credit: AH. Effective: 2017 Winter Quarter.

PHI 194HA—Honors Research Project (4)
Term Paper; Tutorial—3 hours. Prerequisite(s): Consent of Instructor. Open to students who are members of the honors program in Philosophy. Completion of honors research project under direction of an instructor. Consult departmental major advisor for list of instructors available in a given quarter. Effective: 1997 Winter Quarter.

PHI 194HB—Research Project (4)
Term Paper; Tutorial—3 hours. Prerequisite(s): Consent of Instructor. Open to students who are members of the honors program in Philosophy. Completion of honors research project under direction of an instructor. Consult departmental major advisor for list of instructors available in a given quarter. Effective: 1997 Winter Quarter.

PHI 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHI 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHI 200A—Proseminar I (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Open only to students in their first quarter of the Philosophy Ph.D. program. Intensive study of core works in a selected area of philosophy. Intensive experience in philosophical writing, discussion, and presentation of written work. Effective: 2007 Fall Quarter.

PHI 200B—Proseminar II (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Open only to students in their first quarter of the Philosophy Ph.D. program. Intensive study of core works in a selected area of philosophy. Intensive experience in philosophical writing, discussion, and presentation of written work. Effective: 2007 Winter Quarter.

PHI 201—Metaphysics (4)
Seminar—3 hours; Term Paper—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Topics vary from quarter to quarter and may include the following: What are things? Do names refer to things? If so, how? Do things have essential properties? What is the nature of necessity? May be repeated for credit topic differs and with consent of instructor. Effective: 2000 Fall Quarter.

PHI 202—Theory of Knowledge (4)
Seminar—3 hours; Term Paper—1 hour. Prerequisite(s): Graduate standing in Philosophy or consent of instructor. Topics vary from quarter to quarter. Sample topics include belief, skepticism, justification, externalism, naturalized epistemology. Course may be repeated for credit with consent of instructor. May be repeated for credit topic is sufficiently distinct. Effective: 2000 Fall Quarter.

PHI 203—Philosophy of Mind (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Topics in the philosophy of mind, such as the mind-body problem, mental representation, consciousness, intentionality. Course may be repeated for credit with consent of instructor. May be repeated for credit with consent of instructor. Effective: 2000 Winter Quarter.

PHI 203P—Philosophy of Mind Practicum (4)
Practice—12 hours. Prerequisite(s): Consent of Instructor. Specific research conducted and prepared for publication by advanced students in a team setting. Topics include knowledge representation and learning in neural networks, the nature and formal properties of mental representation. May be repeated for credit topic differs and with consent of instructor. (S/U grading only.) Effective: 2001 Spring Quarter.

PHI 207—Philosophy of Physics (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing in Philosophy or consent of instructor. Intensive treatment of one (or more) topic(s) in the philosophy of physics, such as foundations of spacetime theories, the interpretation of quantum mechanics, or foundations of statistical mechanics. May be repeated for credit topic differs and with consent of instructor. Effective: 2001 Winter Quarter.

PHI 208—Philosophy of Biology (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Intensive treatment of one (or more) topic(s) in the philosophy of biology, such as foundations of evolutionary theories, reductionism in biology, sociobiology and cultural evolution. May be repeated for credit topic differs and with consent of instructor. Effective: 2001 Spring Quarter.

PHI 210—Philosophy of Science (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Treatment of one or more general topics of current interest in philosophy of science. Topics may include scientific explanation, theories of confirmation, scientific realism, reduction in physics and biology. May be repeated for credit topic differs and with consent of instructor. Effective: 2001 Winter Quarter.

PHI 212—Philosophy of Logic and Mathematics (4)
Seminar—3 hours; Term Paper. Prerequisite(s): PHI 112 or PHI 113 or MAT 108; or MAT 125 or the equivalent. Philosophical issues in logic and math. Topics may include nature of logical and mathematical truth or knowledge, correctness of logical systems, foundations of mathematics, metaphysical and epistemological presuppositions, applications to philosophical problems and formalization of philosophical theories May be repeated for credit topic differs and with consent of instructor. Effective: 2001 Winter Quarter.

PHI 213—Advanced Logic for Graduate Students (4)
Extensive Problem Solving; Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing in Philosophy. Enrollment in the Philosophy Ph.D. program. Intensive study of advanced logic, including set theory, metatheory of predicate logic, and modal logic. May be repeated up to 2 time(s) when topic differs. Effective: 2011 Fall Quarter.

PHI 214—Ethics (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing in Philosophy or consent of instructor. Topics may include morality and motivation, objectivity in ethics, the relationship between the factual and the moral. Topics vary from quarter to quarter. May be repeated for credit topic differ and with consent of instructor. Effective: 2001 Winter Quarter.

PHI 217—Political Philosophy (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Advanced studies in political philosophy. Topics vary but may include distributive justice, enforcement of morality by the state, equality, obligation to obey the law, social contract theory. May be repeated for credit topic differs and with consent of instructor. Effective: 2000 Fall Quarter.

PHI 220—Environmental Ethics (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Intensive treatment of one or more topic(s) in environmental ethics, such as biodiversity, sustainability, composition of the moral community, invasive species, endangered species, applications of ethical theories to contemporary environmental issues. Effective: 2012 Winter Quarter.

PHI 237—Philosophy of Language (4)
Seminar—3 hours; Term Paper—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Study of philosophical issues raised by language, such as the nature of semantic content, proper semantics for verbs of propositional attitude, feasibility and limitations of formal semantics and pragmatics for natural languages. May be repeated for credit if topic differs and consent of instructor. Effective: 2000 Fall Quarter.

PHI 238—Philosophy of Language Workshop (4)
Extensive Writing; Seminar—3 hours. Open to graduate students only. Discussion of recently published, unpublished and in-progress research in philosophy of language, including work on the relation of language and mind, of language and logic, and linguistic theory. May be repeated for credit when topic differs. Effective: 2007 Fall Quarter.

PHI 261—Plato (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Advanced seminar designed for analysis of arguments, doctrines, and texts from Plato's works. Methods of argumentation and interpretation are especially stressed. Topics vary according to instructor. May be repeated for credit with consent of instructor. Effective: 2000 Winter Quarter.

PHI 262—Aristotle (4)
Seminar—3 hours; Term Paper—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Advanced seminar designed for analysis of arguments, doctrines, and texts from Aristotle's works. Methods of argumentation and interpretation are especially stressed. Topics vary according to instructor. Course may be repeated for credit with consent of instructor. May be repeated for credit with consent of instructor. Effective: 2001 Spring Quarter.

PHI 275—Kant (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing in Philosophy or consent of instructor. Intensive study of a topic in the philosophy of Kant, in such areas as metaphyics, theory of knowledge, ethics. May be repeated for credit with consent of instructor. Effective: 2000 Winter Quarter.

PHI 290—History of Philosophy (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Topics in the history of philosophy. Topics vary according to instructor from quarter to quarter. May be repeated for credit when topic differs and with consent of instructor. Effective: 2001 Winter Quarter.

PHI 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Effective: 1997 Winter Quarter.

PHI 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

PHI 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHR VM - Population Health & Reproduction

Courses in PHR:

PHR 092—Internship in Veterinary Science (1-4)
Clinical Activity—3-36 hours; Discussion/Laboratory—1-4 hours. Prerequisite(s): Approval of project prior to period of internship by faculty sponsor. Supervised work experience in reproduction. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHR 106—Human-Animal Interactions: Benefits and Issues (2)
Fieldwork—1 hour; Lecture—18 hours. Prerequisite(s): Upper division standing or consent of instructor. The contributions of animals to human society, including historic, anthropologic, developmental, human health and therapeutic perspectives, as well as effects of humans on animals. One field trip required. Effective: 2009 Winter Quarter.

PHR 192—Internship in Veterinary Science (1-12)
Clinical Activity—3-36 hours; Discussion/Laboratory—1-12 hours. Prerequisite(s): Upper division standing; approval of project prior to period of internship. Supervised work experience in Reproduction. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHR 198—Directed Group Study (1-5)
Variable—3-15 hours. May be repeated for credit. (P/NP grading only.) Effective: 2010 Spring Quarter.

PHR 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

PHR 202—Sampling in Health-Related Research (3)
Lecture—3 hours. Prerequisite(s): MPM 403; and Consent of Instructor. Or the equivalent. A very thorough coverage of simple random sampling, stratified sampling, cluster sampling, systematic sampling and other sampling methods applied extensively in epidemiology and other health-related disciplines. Emphasis on application of the sampling methods. Effective: 1997 Winter Quarter.

PHR 203—Multivariate Biostatistics (3)
Lecture—3 hours. Prerequisite(s): MPM 403; MPM 404; and Consent of Instructor. Or the equivalent. Multivariate procedures covered are principal component analysis, factor analysis, Two-group and k-group multivariate ANOVA, multivariate
regression, Two-group and k-group discriminant analysis and repeated measures analysis, cluster analysis, and canonical analysis. Emphasis is on application of procedures. Effective: 1997 Winter Quarter.

PHR 210—Epidemiological Approaches to Waterborne Zoonotic Pathogens (1)
Lecture—1 hour. Waterborne zoonotic diseases remain a significant cause of human illness. Review key waterborne pathogens; their biology, fate and transport in aquatic systems; on-farm management practices for reducing microbial contamination of California's fresh and marine aquatic resources from livestock production systems. (S/U grading only.) Effective: 2012 Winter Quarter.

PHR 212—Epidemiology of the Zoonoses (4)
Discussion—5 hours; Lecture—35 hours. Prerequisite(s): Graduate standing or third-year standing in the School of Veterinary Medicine or consent of instructor. Epidemiological, biological and ecological features of some major infections shared by humans and other animals. Wildlife and domestic animals zoonoses of major health and economic significance are presented to illustrate how knowledge of zoonoses epidemiology is essential for implementing control measures. Effective: 2005 Winter Quarter.

PHR 241—Advanced Topics in Canine Genetics and Genomics (2)
Discussion—2 hours. Prerequisite(s): GGG 201A; GGG 201C; Or equivalents, with consent of instructor. Limited enrollment. In-depth study of topics in canine genomics and genetics. Topics will vary annually, but can include positional cloning, whole genome association, complex traits and linkage disequilibrium. Students will lead discussions on assigned readings. May be repeated for credit when topic differs. Effective: 2007 Fall Quarter.

PHR 243—Advanced Topics in Conservation Genetics (2)
Discussion—18 hours; Lecture—2 hours. Prerequisite(s): Undergraduate genetics and ecology or consent of instructor. Restricted to 16 students. In-depth study of topics related to the application of genetic tools to wildlife conservation. Topics will vary annually, but may include use of non-invasive methods of genetic assessment and monitoring of wildlife populations. Students will lead discussions on assigned readings. May be repeated up to 1 time(s) when topics differ. (S/U grading only.) Effective: 2010 Spring Quarter.

PHR 266—Applied Analytic Epidemiology (3)
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): MPM 404; or Consent of Instructor. Principles and applications in analysis of epidemiologic data. Methods of analyzing stratified and matched data, logistic regression for cohort and case-control studies, Poisson regression, survival-time methods. (Public Health Sciences 266) Effective: 2009 Spring Quarter.

PHR 277—Mathematical Models in Epidemiology (3)
Laboratory—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): MPM 403; (EPI 205A or MPM 405); Consent of instructor; although not required, students are encouraged to refresh their knowledge of high school calculus and differential equations. Class size limited to 30 students. Theory of epidemics and mathematical modeling concepts for infectious diseases to include discrete and continuous time models, their use to explore disease dynamics and investigate prevention and control strategies for human and veterinary infectious diseases. (Epidemiology 277.) Effective: 2013 Fall Quarter.

PHR 290—Seminar (1)
Seminar—1 hour. Presentation and discussion of advanced and current topics in population health and reproduction. (S/U grading only.) Effective: 2016 Winter Quarter.

PHR 298—Group Study (1-5)
Variable. Effective: 1997 Winter Quarter.

PHR 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

PHY Physics

Physics 001 is a two-quarter sequence requiring some mathematics (trigonometry). Either 001A alone or both quarters may be taken. The sequence is not intended to satisfy entrance requirements of a year of physics for professional schools, but will satisfy requirements of 3 or 6 units of physics.

Physics 007 is a one-year (three-quarter) introductory physics course with laboratory intended for students majoring in the biological sciences. It has a calculus prerequisite. If you don't want a full year of introductory physics, you should take one or two quarters of Physics 1 instead. Read the following information carefully if you are using Physics 007 to complete an introductory course you have already begun.

The sequence of material in Physics 007 is different from that in most traditionally taught introductory physics courses. Physics 007B is most like the first quarter or semester of traditionally taught courses which treat classical mechanics. Physics 007C is most like the last quarter or semester which, in traditionally taught courses, treats optics, electricity and magnetism, and modern physics. The content and sequence of Physics 007A is unlike that of most other traditionally taught courses.

If you have completed one introductory quarter or semester of a traditionally taught physics course and want to continue with Physics 007, you should first take (and will receive full credit for) Physics 007A. Then, either skip 007B, but self-study the last three weeks of material, or take 007B and receive reduced credit. Finally, take 007C for full credit.

If you have taken two quarters of a year-long introductory physics course and have not had extensive work in optics, electricity and magnetism, and modern physics, you should take Physics 007C. In no case should you take Physics 007B without first taking Physics 007A. All other situations should be discussed directly with a Physics 007 instructor.

Students not intending to take the entire sequence should instead take Physics 001.

Physics 009 is a four-quarter sequence using calculus throughout and including laboratory work as an integral component. The course is primarily for students in the physical sciences and engineering.

Physics 009H is a five-quarter honors physics sequence, which may be taken instead of Physics 009. It is intended primarily for first-year students with a strong interest in physics and with advanced placement in mathematics to Mathematics 021B. Students who plan to major in physics, and also motivated non-majors, should take Physics 009H instead of Physics 009 if they are ready to begin Mathematics 021B in fall quarter. In course requirements and prerequisites, Physics 009HA-009HE can be substituted for Physics 009A-009D. Students may not switch between the 009H and 009 series beyond 009HA or 009A.

Physics 010 is primarily a concept-oriented one-quarter lecture/discussion course requiring relatively little mathematical background.

Courses in PHY:

PHY 001A—Principles of Physics (3)
Lecture—3 hours. Prerequisite(s): Trigonometry or consent of instructor. Mechanics. Introduction to general principles and analytical methods used in physics with emphasis on applications in applied agricultural and biological sciences and in physical education. Not open to students who have received credit for PHY 007B or PHY 009A. GE credit: SE. Effective: 1997 Winter Quarter.

PHY 001B—Principles of Physics (3)
Lecture—3 hours. Prerequisite(s): PHY 001A or PHY 009A Not open for credit to students who have received credit for course 7A, 7B, 7C, 9B, 9C, or 9D. Continuation of course 1A. Heat, optics, electricity, modern physics. Not open for credit to students who have received credit for course 7A, 7B, 7C, 9B, 9C, or 9D. GE credit: SE. Effective: 1997 Winter Quarter.

PHY 007A—General Physics (4)
Discussion/Laboratory—5 hours; Lecture—1.5 hours. Prerequisite(s): MAT 016B (can be concurrent) or MAT 017B (can be concurrent) or MAT 021B (can be concurrent); Completion or concurrent enrollment in MAT 016B or MAT 017B or MAT 021B. Introduction to general principles and analytical methods used in physics for students majoring in a biological science. Only two units of credit allowed to students who have completed PHY 001B or PHY 009B. GE credit: SE. Effective: 2010 Winter Quarter.

PHY 007B—General Physics (4)
Discussion/Laboratory—5 hours; Lecture—1.5 hours. Prerequisite(s): PHY 007A Continuation of course 7A. Only two units of credit allowed to students who have completed course 9A, or 1A. GE credit: SE. Effective: 1997 Winter Quarter.

PHY 007C—General Physics (4)
Discussion/Laboratory—5 hours; Lecture—1.5 hours. Prerequisite(s): PHY 007B Continuation of course 7B. Only two units of credit allowed to students who have completed course 9C or 5C. GE credit: SE. Effective: 1997 Winter Quarter.

PHY 009A—Classical Physics (5) ***Review all entries***
Discussion—1 hour; Laboratory—2.5 hours; Lecture—3 hours. Prerequisite(s): MAT 021B; MAT 021M Introduction to general principles and analytical methods used in physics for physical science and engineering majors. Classical mechanics. Only 2 units of credit for students who have completed 1A or 7B. Not open for credit to students who have completed course 9HA. GE credit: SE. Effective: 2018 Winter Quarter.

PHY 009A—Classical Physics (5) ***Review all entries***
Discussion—1 hour; Laboratory—2.5 hours; Lecture—3 hours. Prerequisite(s): MAT 021B or MAT 021M; or Consent of Instructor. Introduction to general principles and analytical methods used in physics for physical science and engineering majors. Classical mechanics. Only 2 units of credit for students who have completed PHY 001A or PHY 007B; not open for credit to students who have completed course PHY 009HA. GE credit: SE. Effective: 2018 Summer Session 1.

PHY 009B—Classical Physics (5)
Discussion—1 hour; Laboratory—2.5 hours; Lecture—3 hours. Prerequisite(s): PHY 009A; MAT 021C; MAT 021D (can be concurrent) Continuation of course 9A. Fluid mechanics, thermodynamics, wave phenomena, optics. Only two units of credit for students who have completed PHY 007A; not open for credit to students who have completed PHY 009HB, PHY 009HC, or ENG 105. GE credit: SE. Effective: 2004 Fall Quarter.

PHY 009C—Classical Physics (5)
Discussion—1 hour; Laboratory—2.5 hours; Lecture—3 hours. Prerequisite(s): PHY 009B; MAT 021D; MAT 022A (can be concurrent) Electricity and magnetism including circuits and Maxwell's equations. Only 3 units of credit for students who have completed PHY 007C; not open for credit to students who have completed PHY 009HD. GE credit: SE. Effective: 2005 Winter Quarter.

PHY 009D—Modern Physics (4)
Discussion—1.5 hours; Lecture—3 hours. Prerequisite(s): PHY 009C; MAT 022A; MAT 022B recommended (may be taken concurrently). Not open for credit to students who have completed course 9HB, 9HC, or 9HE. Introduction to physics concepts developed since 1900. Special relativity, quantum mechanics, atoms, molecules, condensed matter, nuclear and particle physics. Not open for credit to students who have completed course 9HB, 9HC, or 9HE. GE credit: SE. Effective: 1999 Spring Quarter.

PHY 009HA—Honors Physics (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): MAT 021B (can be concurrent); or Consent of Instructor. Classical mechanics. Same material as course 9A in greater depth. For students in physical sciences, mathematics, and engineering. Only 2 units of credit for students who have completed PHY 007B; not open for credit to students who have completed PHY 009A. GE credit: SE. Effective: 2003 Fall Quarter.

PHY 009HB—Honors Physics (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): (PHY 009HA or PHY 009A); MAT 021C (can be concurrent) Special relativity, thermal physics. Continuation of course 9HA. Only 2 units of credit for students who have completed PHY 007A; not open for credit to students who have completed PHY 009B or PHY 009D. GE credit: SE. Effective: 2004 Winter Quarter.

PHY 009HC—Honors Physics (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): PHY 009HB; MAT 021D (can be concurrent) Waves, sound, optics, quantum physics. Continuation of Physics 9HB. Only 2 units of credit for students who have completed PHY 007C; not open for credit to students who have completed PHY 009B or PHY 009D. GE credit: SE. Effective: 2004 Spring Quarter.

PHY 009HD—Honors Physics (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): PHY 009HC; MAT 021D Electricity and magnetism. Continuation of Physics 9HC. Not open for credit to students who have completed PHY 009C. GE credit: SE. Effective: 2003 Fall Quarter.

PHY 009HE—Honors Physics (5)
Discussion/Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): PHY 009HD; MAT 022B (can be concurrent) Application of quantum mechanics. Not open for credit to students who have completed PHY 009D. GE credit: SE. Effective: 2004 Winter Quarter.

PHY 010—Topics in Physics for Nonscientists (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): High school algebra. Emphasis varies: survey of basic principles or a deeper exploration of some particular branch. Past topics included black holes, space time, and relativity; physics of music; history and philosophy; energy and the environment; and natural phenomena. No units of credit allowed if taken after any other PHY course. GE credit: SE. Effective: 1997 Winter Quarter.

PHY 010C—Physics of California (3)
Lecture—3 hours. Atmospheric phenomena common in CA, local weather patterns and microclimes. Applications to CA energy, water, and resource management policies. Physics underlying regional sports in CA. Not open for credit to students who have completed any quarter of PHY 009 or PHY 009H, or any upper division PHY course. GE credit: SE, SL, VL. Effective: 2014 Fall Quarter.

PHY 010CY—Physics of California (3)
Discussion—1.5 hours; Web Electronic Discussion—0.5 hours; Web Virtual Lecture—1 hour. Conceptual understanding of the physics underlying regional sports in CA. Focus on skiing, surfing, and scuba diving. Atmospheric phenomena common in CA, local weather patterns and microclimes, applications to CA energy, and water are also discussed. Not open for credit to students who have completed PHY 010C, any quarter of PHY 09A, PHY 009B, PHY 009C, PHY 009D, PHY 009HA, PHY 009HB, PHY 009HC, PHY 009HD, or PHY 009HE, or any upper division PHY course. GE credit: SE, SL, VL. Effective: 2017 Winter Quarter.

PHY 012—Visualization in Science (3)
Lecture—3 hours. Production, interpretation, and use of images in physics, astronomy, biology, and chemistry as scientific evidence and for communication of research results. GE credit: SE, SL, VL. Effective: 2017 Winter Quarter.

PHY 030—Fractals, Chaos and Complexity (3)
Lecture/Discussion—3 hours. Prerequisite(s): MAT 016A or MAT 021A Modern ideas about the unifying ideas of fractal geometry, chaos and complexity. Basic theory and applications with examples from physics, earth sciences, mathematics, population dynamics, ecology, history, economics, biology, computer science, art and architecture. (Geology 30.) GE credit: QL, SE. Effective: 2010 Winter Quarter.

PHY 049—Supplementary Work in Lower Division Physics (1-3)
Variable. Students with partial credit in lower division physics courses may, with consent of instructor, complete the credit under this heading. May be repeated for credit. May be repeated for credit. GE credit: SE. Effective: 1999 Fall Quarter.

PHY 080—Experimental Techniques (4)
Laboratory—5 hours; Lecture—2 hours. Prerequisite(s): PHY 009D or PHY 009HD Open to Physics and Applied Physics majors only. Experimental techniques. Design of circuits. Data analysis, sources of noise, statistical and systematic uncertainties. Light sources, detection, and measurement in basic optical systems. Effective: 2017 Fall Quarter.

PHY 090X—Lower Division Seminar (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Limited enrollment. Examination of a special topic in Physics through shared readings, discussions, written assignments, or special activities such as laboratory work. May be repeated for credit. GE credit: SE. Effective: 1998 Fall Quarter.

PHY 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Primary for lower division students. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

PHY 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

PHY 102—Computational Laboratory in Physics (1)
Laboratory—4 hours. Prerequisite(s): MAT 021D; ECS 030; (PHY 009D or PHY 009HD); PHY 104A (can be concurrent); MAT 22AB; PHY 104A required concurrently. Introduction to computational physics and to the computational resources in the physics department. Preparation for brief programming assignments required in other upper division physics classes. Not open to students who have completed PHY 104B or PHY 105AL. GE credit: SE. Effective: 2008 Summer Session 1.

PHY 104A—Introductory Methods of Mathematical Physics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): (PHY 009B C- or better, PHY 009C C- or better, PHY 009D C- or better); (MAT 021D C- or better, MAT 022A C- or better, MAT 022B C- or better); or Consent of Instructor. Introduction to the mathematics used in upper-division physics courses, including applications of vector spaces, Fourier analysis, partial differential equations. Effective: 2000 Fall Quarter.

PHY 104B—Computational Methods of Mathematical Physics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): PHY 104A C- or better; PHY 105AL; or Consent of Instructor. Introduction to the use of computational techniques to solve the mathematical problems that arise in advanced physics courses, complementing the analytical approaches emphasized in course 104A. GE credit: SE. Effective: 2000 Fall Quarter.

PHY 104C—Intermediate Methods of Mathematical Physics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): PHY 104A C- or better; or Consent of Instructor. Applications of complex analysis, conditional probability, integral transformations and other advanced topics. Effective: 2000 Fall Quarter.

PHY 105A—Analytical Mechanics (4)
Lecture—3 hours. Prerequisite(s): (PHY 009B C or better, PHY 009C C or better, PHY 009D C or better); (MAT 021D C or better, MAT 022A C or better, MAT 022B C or better); Or consent of department for any of the courses. Principles and applications of Newtonian mechanics; introduction to Lagrange’s and Hamilton’s equations GE credit: SE. Effective: 1999 Fall Quarter.

PHY 105B—Analytical Mechanics (4)
Lecture—3 hours. Prerequisite(s): PHY 104A C or better; PHY 105A C or better; Or consent of department for any of the courses. Principles and applications of Newtonian mechanics; introduction to Lagrange’s and Hamilton’s equations GE credit: SE. Effective: 1999 Fall Quarter.

PHY 105C—Continuum Mechanics (4)
Lecture—3 hours. Prerequisite(s): PHY 104A C- or better; PHY 105A C- or better; or Consent of Instructor. The continuum hypothesis and limitations, tensors, isotropic constitutive equations, and wave propagation. Applications such as elastic solids,heat flow, aerodynamics, and ocean waves. GE credit: SE. Effective: 2006 Spring Quarter.

PHY 108—Optics (3)
Lecture—3 hours. Prerequisite(s): ((PHY 009A, PHY 009B, PHY 009C, PHY 009D) or (PHY 007A, PHY 007B, PHY 007C)); (MAT 021A, MAT 021B, MAT 021C, MAT 021D); or Consent of Instructor. The phenomena of diffraction, interference, and polarization of light, with applications to current problems in astrophysics, material science,
and atmospheric science. Study of modern optical instrumentation. Open to non-majors. GE credit: SE. Effective: 1997 Winter Quarter.

PHY 108L—Optics Laboratory (1)
Laboratory—3 hours. Prerequisite(s): PHY 108 (can be concurrent); PHY 108 required concurrently. The laboratory will consist of one major project pursued throughout the quarter, based on modern applications of optical techniques. GE credit: SE. Effective: 1997 Winter Quarter.

PHY 110A—Electricity and Magnetism (4)
Lecture—3 hours. Prerequisite(s): PHY 009B C- or better; PHY 009C C- or better; PHY 009D C- or better; MAT 021D C- or better; MAT 022A C- or better; MAT 022B C- or better; PHY 104A; PHY 105A; Or consent of department. Theory of electrostatics, electromagnetism, Maxwell's equations, electromagnetic waves. GE credit: SE. Effective: 2018 Winter Quarter.

PHY 110B—Electricity and Magnetism (4)
Lecture—3 hours. Prerequisite(s): PHY 110A C- or better; PHY 104A C- or better; Or consent of department. Theory of electrostatics, electromagnetism, Maxwell's equations, electromagnetic waves. GE credit: SE. Effective: 2010 Winter Quarter.

PHY 110C—Electricity and Magnetism (4)
Lecture—3 hours. Prerequisite(s): PHY 110B C- or better; Or consent of department. Theory of electrostatics, electromagnetism, Maxwell's equations, electromagnetic waves. GE credit: SE. Effective: 2010 Winter Quarter.

PHY 112—Thermodynamics and Statistical Mechanics (4)
Lecture—3 hours. Prerequisite(s): PHY 115A; Or the equivalent. Introduction to classical and quantum statistical mechanics and their
connections with thermodynamics. The theory is developed for the ideal gas model and simple magnetic models and then extended to studies of solids, quantum fluids, and chemical equilibria. GE credit: SE. Effective: 2000 Winter Quarter.

PHY 115A—Foundation of Quantum Mechanics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): PHY 104A C- or better; PHY 105A C- or better; Or consent of department. Introduction to the methods of quantum mechanics with applications to atomic, molecular, solid state, nuclear and elementary particle physics. Extensive problem solving. GE credit: SE. Effective: 2007 Winter Quarter.

PHY 115B—Applications of Quantum Mechanics (4)
Lecture—3 hours. Prerequisite(s): PHY 115A C- or better; Or consent of department. Angular momentum and spin; hydrogen atom and atomic spectra; perturbation theory; scattering theory. GE credit: SE. Effective: 1999 Fall Quarter.

PHY 116A—Electronic Instrumentation (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): PHY 009C; MAT 022B; or Consent of Instructor. Experimental and theoretical study of important analog electronic circuits. Linear circuits, transmission lines, input impedance, feedback, amplifiers, oscillators, noise. GE credit: SE, VL. Effective: 2008 Fall Quarter.

PHY 116B—Electronic Instrumentation (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): PHY 009C or PHY 009HD; or Consent of Instructor. Continuation of course 116A. Introduction to the use of digital electronics and microcomputers in experimental physics. Nonlinear electronics, integrated circuits, analog-to-digital and digital-to-analog converters, transducers, actuators. GE credit: SE. Effective: 2008 Spring Quarter.

PHY 116C—Introduction to Computer-Based Experiments in Physics (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (PHY 009D or PHY 009HD); PHY 116B; MAT 022B; or Consent of Instructor. Introduction to techniques for making physical measurements using computer-based instrumentation. GE credit: SE, WE. Effective: 2004 Spring Quarter.

PHY 122A—Advanced Laboratory in Condensed Matter Physics (4)
Laboratory—8 hours. Prerequisite(s): PHY 104A; PHY 105A; PHY 110B; PHY 115A; PHY 112 (can be concurrent); Or consent of the department. Registration by Permission to Add (PTA) number only; priority given to graduating PHY and APP majors. Experimental techniques and measurements in solid-state physics. Student performs three to six experiments depending on difficulty. Individual work is stressed. Thorough write-ups of the experiments are required. GE credit: SE, WE. Effective: 2018 Winter Quarter.

PHY 122B—Advanced Laboratory in Particle Physics (4)
Laboratory—8 hours. Prerequisite(s): PHY 104A; PHY 105A; PHY 110B; PHY 115A; PHY 112 (can be concurrent); Or consent of the department. Registration by Permission to Add (PTA) number only; priority given to graduating PHY and APP majors. Experimental techniques and measurements in nuclear and particle physics. Students perform three to six experiments depending on difficulty. Individual work is stressed. Thorough write-ups of the experiments are required. GE credit: SE, WE. Effective: 2018 Winter Quarter.

PHY 123—Signals and Noise in Physics (4)
Lecture—3 hours; Project (Term Project)—1 hour. Prerequisite(s): PHY 009A; PHY 009B; PHY 009C; PHY 009D; PHY 104A; or Consent of Instructor. Not open to students who have taken this course previously as course 198. Techniques of measurement and analysis designed to avoid systematic error and maximize signal/noise ratio. Illustrative examples of optimal filters ranging from condensed matter to cosmology. GE credit: SE. Effective: 2007 Winter Quarter.

PHY 129A—Introduction to Nuclear Physics (4)
Lecture—3 hours. Prerequisite(s): PHY 115A C- or better; or Consent of Instructor. Survey of basic nuclear properties and concepts requiring introductory
knowledge of quantum mechanics: nuclear models and forces, radioactive decay and detecting nuclear radiation and nuclear reaction products,
alpha, beta and gamma decay. GE credit: SE. Effective: 2000 Winter Quarter.

PHY 129B—Nuclear Physics, Extensions and Applications (4)
Lecture—3 hours; Term Paper. Prerequisite(s): PHY 129A Continuation of course 129A. Nuclear reactions, neutrons, fission, fusion accelerators, introduction to meson and particle physics, nuclear

astrophysics, and applications of nuclear physics and techniques to mass spectrometry, nuclear medicine, trace element analysis. GE credit: SE. Effective: 1997 Winter Quarter.

PHY 130A—Elementary Particle Physics (4)
Lecture—3 hours. Prerequisite(s): PHY 115A C- or better; or Consent of Instructor. Properties and classification of elementary particles and their interactions. Experimental techniques. Conservation laws and symmetries. Strong, electromagnetic, and weak interactions. Introduction to Feynman calculus. GE credit: SE. Effective: 2000 Winter Quarter.

PHY 130B—Elementary Particle Physics (4)
Lecture—3 hours. Prerequisite(s): PHY 115A C- or better; or Consent of Instructor. Properties and classification of elementary particles and their interactions. Experimental techniques. Conservation laws and symmetries. Strong, electromagnetic, and weak interactions. Introduction to Feynman calculus. GE credit: SE. Effective: 2000 Winter Quarter.

PHY 140A—Introduction to Solid State Physics (4)
Lecture—3 hours. Prerequisite(s): PHY 115A C- or better; or Consent of Instructor. Or equivalent course passed with C- or better. Survey of fundamental ideas in the physics of solids, with selected device applications. Crystal structure, x-ray and neutron diffraction, phonons, simple metals, energy bands and Fermi surfaces, semiconductors, optical properties, magnetism, superconductivity. GE credit: SE. Effective: 2000 Winter Quarter.

PHY 140B—Introduction to Solid State Physics (4)
Lecture—3 hours. Prerequisite(s): PHY 115A C- or better; or Consent of Instructor. Or equivalent course passed with C- or better. Survey of fundamental ideas in the physics of solids, with selected device applications. Crystal structure, x-ray and neutron diffraction, phonons, simple metals, energy bands and Fermi surfaces, semiconductors, optical properties, magnetism, superconductivity. GE credit: SE. Effective: 2000 Winter Quarter.

PHY 150—Special Topics in Physics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): (PHY 009A, PHY 009B, PHY 009C, PHY 009D) or (PHY 009HA, PHY 009HB, PHY 009HC, PHY 009HD, PHY 009HE); or Consent of Instructor. Topics vary, covering areas of contemporary research in physics. May be repeated for credit. GE credit: SE. Effective: 2007 Fall Quarter.

PHY 151—Stellar Structure and Evolution (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): PHY 009A; PHY 009B; PHY 009C; PHY 009D; or Consent of Instructor. The chemical composition, structure, energy sources and evolutionary history of stars, with equal emphasis on both the observational data and theoretical models, including black holes, neutron stars and white dwarfs and the formation of substellar masses. GE credit: SE. Effective: 2007 Fall Quarter.

PHY 152—Galactic Structure and the Interstellar Medium (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): PHY 009A; PHY 009B; PHY 009C; PHY 009D; PHY 105A (can be concurrent); or Consent of Instructor. PHY 105A required concurrently. The structure, contents, and formation of our Milky Way galaxy, viz. its shape and size, the nature of the interstellar medium, stellar populations, rotation curves, mass determination and evidence of dark matter. GE credit: SE. Effective: 2007 Spring Quarter.

PHY 153—Extragalactic Astrophysics (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): PHY 009A; PHY 009B; PHY 009C; PHY 009D; PHY 104A; PHY 105A; or Consent of Instructor. Structure and evolution of galaxies and clusters of galaxies, including distance and mass determination, galaxy types and environments, active galactic nuclei and quasars, gravitational lensing and dark matter, global cosmological properties. Not open to students who have taken PHY 127. GE credit: SE. Effective: 2007 Winter Quarter.

PHY 154—Astrophysical Applications of Physics (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): PHY 105A; PHY 105B; PHY 110B (can be concurrent); PHY 115A (can be concurrent); PHY 112; PHY 112 or consent of instructor; PHY 110B and 115A required concurrently. Not open to students who have taken this course previously as course 198. Applications of classical and quantum mechanics, thermodynamics, statistical mechanics, and electricity and magnetism to astrophysical settings such as the Big Bang, degenerate white dwarf and neutron stars, and solar neutrinos. GE credit: SE. Effective: 2007 Spring Quarter.

PHY 155—General Relativity (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): PHY 104A; PHY 105A; PHY 105B; PHY 110A; PHY 105B and PHY 110A or consent of instructor. Definition of the mathematical frame work for the description of the gravitational field, introduction of the dynamical equations of Einstein governing its evolution and review of the key solutions, including black holes and expanding universes. GE credit: SE. Effective: 2007 Fall Quarter.

PHY 156—Introduction to Cosmology (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): PHY 009A; PHY 009B; PHY 009C; PHY 009D; PHY 105A (can be concurrent); or Consent of Instructor. PHY 105A required concurrently. Contemporary knowledge regarding the origin of the universe, including the Big Bang and nucleosynthesis, microwave background radiation, formation of cosmic structure, cosmic inflation, cosmic acceleration and dark energy. Not open to students who have completed PHY 126. GE credit: SE. Effective: 2007 Fall Quarter.

PHY 157—Astronomy Instrumentation and Data Analysis Laboratory (4)
Laboratory—8 hours. Prerequisite(s): PHY 104A; PHY 105A; PHY 110A; PHY 115A (can be concurrent); PHY 110B (can be concurrent); and Consent of Instructor. Registration by Permission to Add (PTA) number only; priority given to graduating PHY astrophysics emphasis seniors. Experimental techniques, data acquisition and analysis involving laboratory astrophysics plus stellar, nebular and galaxy digital imaging, photometry and/or spectroscopy. Students perform three experiments. Individual work stressed. Minimum 10-15 page journal style articles of two experiments are required. GE credit: SE, WE. Effective: 2018 Winter Quarter.

PHY 160—Environmental Physics and Society (3)
Lecture—3 hours. Prerequisite(s): (PHY 009D or PHY 007C); (PHY 010 or PHY 001B); MAT 016B; Or the equivalent. Impact of humankind on the environment will be discussed from the point of view of the physical sciences. Calculations based on physical principles will be made, and the resulting policy implications will be considered. (Engineering 160.) GE credit: SE, SL. Effective: 1997 Winter Quarter.

PHY 185—Alumni Seminar Series (1)
Seminar—1 hour. Weekly guest speakers (usually a physics alumnus or alumna) tell students about their careers. Speakers use their experience to give students valuable perspectives on life after a degree in physics. May be repeated up to 2 time(s). (P/NP grading only.) GE credit: SE. Effective: 2013 Fall Quarter.

PHY 190—Careers in Physics (1)
Seminar—2 hours. Restricted to Physics and Applied Physics majors only. Overview of important research areas in physics, discussions of research opportunities and internships, strategies for graduate school and industrial careers, the fellowship and assistantship selection process, preparation of resumes, personal statements, and letters of recommendation. (P/NP grading only.) GE credit: SE. Effective: 2007 Fall Quarter.

PHY 194HA—Special Study for Honors Students (4)
Independent Study—12 hours. Prerequisite(s): Consent of Instructor. Open only to Physics and Applied Physics majors who satisfy the College of Letters and Science requirements for entrance into the Honors Program. Independent research project at a level significantly beyond that defined by the normal physics curriculum. GE credit: SE. Effective: 1997 Winter Quarter.

PHY 194HB—Special Study for Honors Students (4)
Independent Study—12 hours. Prerequisite(s): Consent of Instructor. Open only to Physics and Applied Physics majors who satisfy the College of Letters and Science requirements for entrance into the Honors Program. Independent research project at a level significantly beyond that defined by the normal physics curriculum. GE credit: SE. Effective: 1997 Winter Quarter.

PHY 195—Senior Thesis (5)
Independent Study—15 hours. Prerequisite(s): Consent of Instructor. Open only to Physics and Applied Physics majors with senior standing. Preparation of a senior thesis on a topic selected by the student with approval of the department. May be repeated for a total of 15 units. May be repeated up to 15 unit(s). GE credit: SE. Effective: 1997 Winter Quarter.

PHY 197T—Tutoring in Physics and Astronomy (1-5)
Tutorial. Tutoring of students in lower division courses. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. Weekly meeting with instructor (P/NP grading only.) GE credit: SE. Effective: 2004 Spring Quarter.

PHY 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

PHY 199—Special Study for Advanced Undergraduates (1-5)
Variable. June 2012: GE2 Topical Breadth updated per Davis Division of the Academic Senate May 18th announcement of an administrative correction "To allow Topical Breadth designations of GE3 to apply to GE2." (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

PHY 200A—Theory of Mechanics and Electromagnetics (4)
Independent Study—1 hour; Lecture—3 hours. Prerequisite(s): PHY 204A (can be concurrent); PHY 104B; PHY 105B; PHY 110C; Or equivalent to PHY 110C; PHY 204A required concurrently. Theoretical approaches in classical mechanics including the use of generalized coordinates and virtual work; variational calculus; Lagrange equations; symmetries, conservation laws, and Noether theorem; Lagrangian density; Hamilton formalism; canonical transformations; Poisson brackets; and Hamilton-Jacobi equations. Effective: 1997 Winter Quarter.

PHY 200B—Theory of Mechnics and Electromagnetics (4)
Independent Study—1 hour; Lecture—3 hours. Prerequisite(s): PHY 200A; PHY 204B (can be concurrent); PHY 204B concurrently. Theoretical approaches in electromagnetics including static electromagnetic fields; Maxwell's equations; plane waves in various media; magnetohydrodynamics; diffraction theory; radiating systems; and special relativity. Effective: 1997 Winter Quarter.

PHY 200C—Theory of Mechanics and Electromagnetics (4)
Independent Study—1 hour; Lecture—3 hours. Prerequisite(s): PHY 200A; PHY 204B (can be concurrent); PHY 204B concurrently. Theoretical approaches in electromagnetics including static electromagnetic fields; Maxwell's equations; plane waves in various media; magnetohydrodynamics; diffraction theory; radiating systems; and special relativity. Effective: 1997 Winter Quarter.

PHY 204A—Methods of Mathematical Physics (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): PHY 104A; Or the equivalent. Linear vector spaces, operators and their spectral analysis, complete sets of functions, complex variables, functional analysis, Greens functions, calculus of variations, introduction to numerical analysis. Effective: 2016 Spring Quarter.

PHY 204B—Methods of Mathematical Physics (4)
Independent Study—1 hour; Lecture—3 hours. Prerequisite(s): PHY 104A; PHY 104B; Or the equivalent. Linear vector spaces, operators and their spectral analysis, complete sets of functions, complex variables, functional analysis, Green's functions, calculus of variations, introduction to numerical analysis. Effective: 1997 Winter Quarter.

PHY 210—Computational Physics (3)
Lecture—3 hours. Prerequisite(s): Knowledge of Fortran or C. Analytic techniques to solve differential equations and eignevalue problems. Physics content of course will be self-contained, and adjusted according to background of students. Effective: 1999 Spring Quarter.

PHY 215A—Quantum Mechanics (4)
Independent Study—1 hour; Lecture—3 hours. Prerequisite(s): PHY 115B; Or the equivalent. Formal development and interpretation of non-relativistic quantum mechanics; its application to atomic, nuclear, molecular, and solid-state problems; brief introduction to relativistic quantum mechanics and the Dirac equation. Effective: 1997 Winter Quarter.

PHY 215B—Quantum Mechanics (4)
Independent Study—1 hour; Lecture—3 hours. Prerequisite(s): PHY 115B; Or the equivalent. Formal development and interpretation of non-relativistic quantum mechanics; its application to atomic, nuclear, molecular, and solid-state problems; brief introduction to relativistic quantum mechanics and the Dirac equation. Effective: 1997 Winter Quarter.

PHY 215C—Quantum Mechanics (4)
Independent Study—1 hour; Lecture—3 hours. Prerequisite(s): PHY 115B; Or the equivalent. Formal development and interpretation of non-relativistic quantum mechanics; its application to atomic, nuclear, molecular, and solid-state problems; brief introduction to relativistic quantum mechanics and the Dirac equation. Effective: 1997 Winter Quarter.

PHY 219A—Statistical Mechanics (4)
Extensive Problem Solving—1 hour; Lecture—3 hours. Prerequisite(s): PHY 215B; Or equivalent. Foundations of thermodynamics and classical and quantum statistical mechanics with simple applications to properties of solids, real gases, nuclear matter, etc. and a brief introduction to phase transitions. Effective: 2002 Winter Quarter.

PHY 219B—Statistical Mechanics (4)
Extensive Problem Solving—1 hour; Lecture—3 hours. Prerequisite(s): PHY 219A Further applications of thermodynamics and classical and quantum statistical mechanics. The modern theory of fluctuations about the equilibrium state, phase transitions and critical phenomena. Effective: 2002 Winter Quarter.

PHY 223A—Group Theoretical Methods of Physics-Condensed Matter (3)
Lecture—3 hours. Prerequisite(s): PHY 215A; PHY 215B; PHY 215C (can be concurrent); or Consent of Instructor. PHY 215C required concurrently. Theory of groups and their representations with applications in condensed matter. Effective: 1997 Winter Quarter.

PHY 223B—Group Theoretical Methods of Physics-Elementary Particles (3)
Lecture—3 hours. Prerequisite(s): PHY 215A; PHY 215B; PHY 215C (can be concurrent); or Consent of Instructor. PHY 215C required concurrently. Theory of groups and their representations with applications in elementary particle physics. Effective: 1997 Winter Quarter.

PHY 224A—Nuclear Physics (3)
Lecture—3 hours. Prerequisite(s): PHY 215B Comprehensive study of the nucleon-nucleon interaction including the deuteron, nucleon-nucleon scattering, polarization, determination of real parameters of Smatrix, and related topics. Effective: 1997 Winter Quarter.

PHY 224B—Nuclear Physics (3)
Lecture—3 hours. Prerequisite(s): PHY 224A Study of nuclear models, including shell model, collective model, unified model. Energy level spectra, static momenta, and electromagnetic transition rates. Effective: 1997 Winter Quarter.

PHY 224C—Nuclear Physics (3)
Lecture—3 hours. Prerequisite(s): PHY 224B Study of nuclear scattering and reactions including the optical model and direct interactions. Beta decay and an introduction to weak interactions. Effective: 1997 Winter Quarter.

PHY 229A—Advanced Nuclear Theory (3)
Lecture—3 hours. Prerequisite(s): PHY 224C Advanced topics in nuclear theory; theory of quantum-mechanical scattering processes. Exact formal theory and models for two-body scattering. Effective: 1997 Winter Quarter.

PHY 229B—Advanced Nuclear Theory (3)
Lecture—3 hours. Prerequisite(s): PHY 229A Advanced topics in nuclear theory; theory of quantum-mechanical scattering processes. Exact formal theory and models for three-body scattering. Effective: 1997 Winter Quarter.

PHY 230A—Quantum Theory of Fields (3)
Lecture—3 hours. Prerequisite(s): PHY 215C Relativistic quantum mechanics of particles; techniques and applications of second quantization; Feynman diagrams; renormalization. Effective: 1997 Winter Quarter.

PHY 230B—Quantum Theory of Fields (3)
Lecture—3 hours. Prerequisite(s): PHY 230A Continuation of 230A, with selected advanced topics, such as S-matrix theory, dispersion relations, axiomatic formulations. Effective: 1997 Winter Quarter.

PHY 230C—Quantum Theory of Fields (3)
Lecture—3 hours. Prerequisite(s): PHY 230A; PHY 230B; or Consent of Instructor. Renormalization theory and applications, including dimensional regularization, Ward identities, renormalization group equations, coupling constant unification, and precision electroweak calculations. May be repeated for credit with consent of instructor. Effective: 2007 Winter Quarter.

PHY 240A— Condensed Matter Physics A (3)
Lecture—3 hours. Prerequisite(s): PHY 215C; PHY 219A; PHY 140A and PHY 140B or equivalent recommended. Topics in condensed matter physics: Crystal structure; one-electron theory; transport and optical properties of semiconductors; phonons, electron-phonon scattering. Effective: 2007 Fall Quarter.

PHY 240B—Condensed Matter Physics B (3)
Lecture—3 hours. Prerequisite(s): PHY 240A Topics in condensed matter physics: transport and optical properties of metals and quantum structures; experimental measurement the Fermi surface and of phonon spectra. Effective: 2008 Spring Quarter.

PHY 240C—Condensed Matter Physics (3)
Lecture—3 hours. Prerequisite(s): PHY 240A; PHY 240B Review of second quantization. Interacting electron gas, electron-phonon interaction and effects, including instabilities of electronic systems. Topics in the theory of superconductivity and magnetism. Effective: 2005 Spring Quarter.

PHY 241—Advanced Topics in Magnetism (3)
Lecture—3 hours. Prerequisite(s): PHY 240A; PHY 240B; PHY 240C; PHY 240D; or Consent of Instructor. Topics chosen from areas of current research interest. Effective: 1997 Winter Quarter.

PHY 242—Advanced Topics in Superconductivity (3)
Lecture—3 hours. Prerequisite(s): PHY 240A; PHY 240B; PHY 240C; PHY 240D; or Consent of Instructor. Topics chosen from areas of current research interest. Effective: 1997 Winter Quarter.

PHY 243A—Surface Physics of Materials (3)
Lecture—3 hours. Prerequisite(s): PHY 140A; PHY 140B; PHY 115A; PHY 115B; Or the equivalent to any; PHY 215A, PHY 240A, or the equivalents recommended. Experimental and theoretical fundamentals of surface and interface physics and chemistry, including electronic and magnetic structure, thermodynamics, adsorption kinetics, epitaxial growth, and a discussion of various spectroscopic and structural probes based on photons, electrons, ions, and scanning probes. Effective: 1999 Winter Quarter.

PHY 243B—Surface Physics of Materials (3)
Lecture—3 hours. Prerequisite(s): PHY 140A; PHY 140B; PHY 115A; PHY 115B; Or the equivalent to any; PHY 215A, PHY 240A, or the equivalents recommended. Experimental and theoretical fundamentals of surface and interface physics and chemistry, including electronic and magnetic structure, thermodynamics, adsorption kinetics, epitaxial growth, and a discussion of various spectroscopic and structural probes based on photons, electrons, ions, and scanning probes. Effective: 1999 Winter Quarter.

PHY 243C—Surface Physics of Materials (3)
Lecture—3 hours. Prerequisite(s): PHY 140A; PHY 140B; PHY 115A; PHY 115B; Or the equivalent to any; PHY 215A, PHY 240A, or equivalents recommended. Experimental and theoretical fundamentals of surface and interface physics and chemistry, including electronic and magnetic structure, thermodynamics, adsorption kinetics, epitaxial growth, and a discussion of various spectroscopic and structural probes based on photons, electrons, ions, and scanning probes. Effective: 2000 Spring Quarter.

PHY 245A—High-Energy Physics (3)
Lecture—3 hours. Prerequisite(s): PHY 230A Phenomenology and systematics of strong, electromagnetic, and weak interactions of hadrons and leptons; determination of quantum numbers; quarks and quarkonia; deep inelastic scattering; the quark parton model; experiments at hadron colliders and electron-positron colliders. Effective: 1997 Winter Quarter.

PHY 245B—High-Energy Physics (3)
Lecture—3 hours. Prerequisite(s): PHY 245A Electroweak interactions; phenomenology of the Standard Model of SU(2)LxU(1); weak interaction experiments; properties of and experiments with W and Z vector bosons; Glashow-Weinberg-Salam model and the Higgs boson; introduction to supersymmetry and other speculations. Effective: 1997 Winter Quarter.

PHY 245C—Collider Physics (3)
Lecture—3 hours. Prerequisite(s): PHY 245A; PHY 252B (can be concurrent); or Consent of Instructor. PHY 252B taken previously or concurrently. Collider physics. Topics include quark and gluon distribution functions and the computation of cross sections; Large Hadron Collider and International Linear Collider phenomenology; collider and detector characteristics; extracting models from data; software tools for analyzing experimental data. May be repeated for credit with consent of instructor. Effective: 2008 Spring Quarter.

PHY 246—Supersymmetry: Theory and Phenomenology (3)
Lecture—3 hours. Prerequisite(s): PHY 230A, PHY 230B, PHY 245A, PHY 245B recommended, or consent of instructor. Construction of supersymmetric models of particle physics; superfields; supersymmetry breaking the minimal supersymmetric standard model; supergravity. Collider phenomenology of supersymmetry. Dark matter phenomenology. Effective: 1998 Spring Quarter.

PHY 246A—Supersymmetry: Theory and Phenomenology (3)
Lecture—3 hours. Prerequisite(s): PHY 230A; PHY 230B; PHY 245A, PHY 245B recommended or consent of instructor. Construction of supersymmetric models of particle physics; superfields; supersymmetry breaking the minimal supersymmetric standard model; supergravity. Collider phenomenology of supersymmetry. Dark matter phenomenology. Not offered every year. Effective: 2008 Spring Quarter.

PHY 246B—Advanced Supersymmetry (3)
Lecture—3 hours. Prerequisite(s): PHY 246A Advanced topics in supersymmetry. Topics include holomorphy, the Affleck-Dine-Seiberg superpotential, Seiberg duality for SUSY QCD, dynamical SUSY breaking, Seiberg-Witten theory, superconformal field theories, supergravity, anomaly and gaugino mediation, and the AdS/CFT correspondence. Effective: 2007 Fall Quarter.

PHY 250—Special Topics in Physics (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Topic varies. May be repeated for credit. Effective: 1997 Fall Quarter.

PHY 252A—Techniques of Experimental Physics (3)
Lecture—3 hours. Introduction to techniques and methods of designing and executing experiments. Problems and examples from condensed matter research will be utilized. Effective: 1997 Winter Quarter.

PHY 252B—Techniques of Experimental Physics (3)
Lecture—3 hours. Introduction to techniques and methods of designing and executing experiments. Problems and examples from nuclear and particle research will be utilized. Effective: 1997 Winter Quarter.

PHY 252C—Statistics and Data Analysis for Particle Physics (3)
Lecture—3 hours. Introduction to statistical data analysis methods in particle physics. Theoretical lectures combined with practical computer laboratory work. Effective: 2007 Spring Quarter.

PHY 253—Signals and Noise in Physics (3)
Lecture—3 hours. Techniques for extracting signals from noise, systematic error. Effective: 2007 Winter Quarter.

PHY 256A—Physics of Information (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Advanced undergraduate or introductory graduate differential equations, applied linear algebra, and probability theory; e.g., Mathematics 119A/B or 207A, 167 or 226A, and 135A/B or 235A, respectively; or in Physics 104A/C or 204A/B. Class size limited to 30 students. Nonlinear dynamics, deterministic chaos, bifurcations, pattern formation, symbolic dynamics, measurement theory, stochastic processes, elementary information theory, information in complex systems, computational laboratory. Effective: 2017 Spring Quarter.

PHY 256B—Physics of Computation (4)
Extensive Problem Solving; Lecture—3 hours. Prerequisite(s): PHY 256A; Consent of Instructor. Advanced undergraduate or introductory graduate differential equations, applied linear algebra, and probability theory; e.g., Mathematics 119A/B or 207A, 167 or 226A, and 135A/B or 235A, respectively; or in Physics 104A/C or 204A/B. Class size limited to 30 students. Structural complexity, computational mechanics, information measures, causal inference, applications to complex materials, quantum dynamics, and nonequilibrium thermodynamics, computational laboratory. Effective: 2017 Spring Quarter.

PHY 260—Introduction to General Relativity (3)
Lecture—3 hours. Prerequisite(s): PHY 200A; PHY 200B An introduction to general relativity. Differential geometry and curved spacetime; the Einstein field equations; gravitational fields of stars and black holes; weak fields and gravitational radiation; experimental tests; Big Bang cosmology. Effective: 1999 Spring Quarter.

PHY 262—Early Universe Cosmology (3)
Lecture—3 hours. Prerequisite(s): Second year standing in Physics Graduate Program or consent of instructor. Introduction to early universe cosmology: the Big Bang, inflation, primordial nucleosynthesis, dark matter, dark energy, and other topics of current interest Effective: 2005 Spring Quarter.

PHY 263—Cosmic Structure Formation (3)
Lecture—3 hours. Prerequisite(s): PHY 260 Growth of structure from small density inhomogeneities in the early universe to the diverse structures observable today. Use of observable properties (cosmic microwave background, gravitational lensing, peculiar velocities, number density, etc.) to constrain models of structure formation and fundamental physics. Effective: 2005 Spring Quarter.

PHY 265—High Energy Astrophysics and Radiative Processes (3)
Lecture—3 hours. Prerequisite(s): Graduate standing in Physics or consent of instructor. Survey course covering galactic and extragalactic X-ray and gamma-ray astronomy, radiative processes, and techniques of high-energy astrophysics. Effective: 2004 Fall Quarter.

PHY 266—Data Analysis for Astrophysics (3)
Lecture—3 hours. Prerequisite(s): Graduate standing in Physics or consent of instructor. Survey course covering measurement and signal analysis techniques for astrophysics and cosmology throughout the electromagnetic spectrum. Effective: 2005 Winter Quarter.

PHY 267—Observational Extragalactic Astronomy & Cosmology (3)
Lecture—3 hours. Prerequisite(s): Graduate standing in Physics or consent of instructor. Survey course covering current areas of research on extragalactic objects, their physical properties, origin, evolution, and distribution in space. Effective: 2005 Spring Quarter.

PHY 270—Current Topics in Physics Research (3)
Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing in Physics or consent of instructor. Reading and discussion to help physics graduate students develop and maintain familiarity with the current and past literature in their immediate field of research and related areas. May be repeated for credit. (S/U grading only.) Effective: 2013 Fall Quarter.

PHY 285—Careers in Physics (1)
Seminar—1.5 hours. Prerequisite(s): Graduate standing in Physics. Designed to give Physics graduate students an in-depth appreciation of career opportunities with a graduate degree in physics. Professional physicists, mainly from outside academia, will give seminars describing both research and career insights. May be repeated for credit. (S/U grading only.) Effective: 2005 Winter Quarter.

PHY 290—Seminar in Physics (1)
Seminar. Prerequisite(s): Graduate standing in Physics or consent of instructor. Presentation and discussion of topics of current research interest in physics. Topics will vary weekly and will cover a broad spectrum of the active fields of physics research at a level accessible to all physics graduate students. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

PHY 291—Seminar in Nuclear Physics (1)
Seminar—1 hour. Prerequisite(s): Graduate standing in Physics or consent of instructor. Presentation and discussion of topics of current research interest in nuclear physics. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

PHY 292A—Seminar in Elementary Particle Physics (1)
Seminar—1 hour. Prerequisite(s): Graduate standing in Physics or consent of instructor. Presentation and discussion of topics of current research interest in elementary particle physics. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 2008 Fall Quarter.

PHY 292B—High Energy Frontier Initiative And Cosmology Theory Seminar (1)
Seminar—1 hour. Prerequisite(s): Physics graduate students. May be repeated up to 5 time(s). (S/U grading only.) Effective: 2007 Fall Quarter.

PHY 293—Seminar in Condensed Matter Physics (1)
Seminar—1 hour. Prerequisite(s): Graduate standing in Physics or consent of instructor. Presentation and discussion of topics of current research interest in condensed matter physics. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

PHY 294—Seminar in Cosmology (1)
Seminar—1 hour. Prerequisite(s): Graduate standing in Physics or consent of instructor. Presentation and discussion of topics of current research interest in Cosmology. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1999 Winter Quarter.

PHY 295—Introduction to Departmental Research (1)
Seminar—1 hour. Seminar to introduce first- and second-year physics graduate students to the fields of specialty and research of the Physics staff. (S/U grading only.) Effective: 1997 Winter Quarter.

PHY 297—Research on the Teaching and Learning of Physics (3)
Seminar—3 hours. Prerequisite(s): Graduate standing in Physics or consent of instructor. Discussion and analysis of recent research in how students construct
understanding of physics and other science concepts and the implications of this research for instruction. Effective: 1997 Winter Quarter.

PHY 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

PHY 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

PHY 371—Teaching in an Active-Engagement Physics Discussion/Lab Setting (1)
Lecture/Discussion—1 hour. Prerequisite(s): PHY 009D; Or equivalent. Open to graduate students only. Analysis of recent research on science/physics teaching and learning and its implications for teaching labs, discussions, and discussion/labs with an emphasis on differences between conventional and active-engagement instructional settings. The appropriate role of the instructor in specific instructional settings. May be repeated up to 2 time(s). Effective: 2008 Summer Session 1.

PHY 390—Methods of Teaching Physics (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing in Physics. Practical experience in methods and problems related to teaching physics laboratories at the university level, including discussion of teaching techniques, analysis of quizzes and laboratory reports and related topics. Required of all Physics Teaching Assistants. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

PHY 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

PLB Plant Biology

Courses in PLB:

PLB 010—Plant Biology (3)
Lecture—3 hours. The social and natural science of plants. Cultural history and socioeconomic importance of plants. Biology of plants reproduction, including flowers, seeds and fruits. Historical, cultural, religious and medicinal uses of plants. Plants in the visual arts, music and literature. GE credit: SE, SL. Effective: 2016 Winter Quarter.

PLB 090X—Plant Science Seminar (1-4)
Variable. Prerequisite(s): Consent of Instructor. Examination of a special topic in a small group setting. Not open for
credit to students who have completed course Plant Science 90X. Not open for credit to students who have completed PLS 090X. Effective: 1997 Winter Quarter.

PLB 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Technical and/or professional experience on or off campus. Supervised by a member of the Plant Biology faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

PLB 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Primarily for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

PLB 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

PLB 102—California Floristics (5)
Fieldwork; Laboratory—5 hours; Lecture—2 hours. Prerequisite(s): PLS 002 or BIS 002C; Or equivalent course in Plant Science. Survey of the California flora, emphasizing recognition of important plant families and genera and use of taxonomic keys to identify species. Phylogenetic relationships among families. Principles of systematics and taxonomy. Two Saturday field trips. (Plant Sciences 102.) GE credit: SE, VL. Effective: 2017 Fall Quarter.

PLB 105—Developmental Plant Anatomy (5)
Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): BIS 002C; Or other similar preparation in plant biology. Restricted to 50 students; split equally into two lab groups. Structural anatomy of vascular plants. Training in basic tissue sectioning, staining, and use of the compound microscope. GE credit: SE. Effective: 2011 Fall Quarter.

PLB 108—Systematics and Evolution of Angiosperms (5)
Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): (BIS 001A, BIS 001B, BIS 001C) or (BIS 002A, BIS 002B, BIS 002C) Diversity and classification of angiosperms (flowering plants) on a world scale, and current understanding of the origin of angiosperms and evolutionary relationships and trends within them based on morphological and molecular evidence. (Evolution and Ecology 108) Effective: 2008 Spring Quarter.

PLB 111—Plant Physiology (3)
Lecture—3 hours. Prerequisite(s): (BIS 002A, BIS 002B, BIS 002C); (CHE 008B (can be concurrent) or CHE 118B (can be concurrent)); PHY 007C (can be concurrent); PLB 105 recommended. Plant cell as a functional unit. The processes of absorption, movement, and utilization of water and minerals. Water loss, translocation, photosynthesis, respiration. Effective: 2016 Fall Quarter.

PLB 111D—Problems in Plant Physiology (1)
Discussion—1 hour. Prerequisite(s): PLB 111 (can be concurrent); PLB 111 required concurrently. Discussion of problems and applications relating to principles presented in course 111. Students will be assigned problems each week showing novel applications of principles described in course 111 and will prepare answers to be delivered orally during the class period. (P/NP grading only.) Effective: 1997 Winter Quarter.

PLB 112—Plant Growth and Development (3)
Lecture—3 hours. Prerequisite(s): (BIS 002A, BIS 002B, BIS 002C); (CHE 008B or CHE 118B); BIS 101 Introduction to the mechanisms and control systems that govern plant growth and development and the responses of plants to the environment. Strong emphasis on vegetative development of flowering plants. GE credit: QL, SE, SL. Effective: 2016 Fall Quarter.

PLB 112D—Problems in Plant Growth and Development (1)
Discussion—1 hour. Prerequisite(s): PLB 112 (can be concurrent); PLB 112 required concurrently. Discussion of problems and applications relating to principles presented in course 112. Students will be assigned problems each week showing novel applications of the principles described in course 112 and will prepare answers to be delivered orally during class period. (P/NP grading only.) Effective: 1997 Winter Quarter.

PLB 113—Molecular and Cellular Biology of Plants (3)
Lecture—3 hours. Prerequisite(s): (BIS 002A, BIS 002B, BIS 002C); BIS 101 Molecular and cellular aspects of the growth and development of plants and their response to biological and environmental stresses. Primary focus on processes unique to plants. Experimental approaches will be emphasized. GE credit: QL, SL, VL. Effective: 2016 Fall Quarter.

PLB 113D—Problems in Molecular and Cellular Biology of Plants (1)
Discussion—1 hour. Prerequisite(s): PLB 113 (can be concurrent); PLB 113 required concurrently. Discussion of topics and applications related to principles presented in course 113. Assigned topics each week show novel applications of the principles described in course 113; discussion of topics during class period. (P/NP grading only.) Effective: 1997 Winter Quarter.

PLB 116—Plant Morphology and Evolution (5)
Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): Introductory Plant Biology (e.g., BIS 002C, PLS 002). Introduction to the form, development and evolution of vascular plants. Emphasis given to the form and development of reproductive structures in ferns and seed-producing plants as a basis for determining evolutionary relationships. Not open for credit to students who have completed PLS 116. (Plant Sciences 116.) GE credit: SE, VL. Effective: 2015 Winter Quarter.

PLB 117—Plant Ecology (4)
Fieldwork—3 hours; Lecture—3 hours. Prerequisite(s): (BIS 001A, BIS 001B, BIS 001C) or (BIS 002A, BIS 002B, BIS 002C); PLB 111 recommended. The study of the interactions between plants, plant populations or vegetation types and their physical and biological environment. Special emphasis on California. Four full-day field trips and brief write-up of class project required. (Evolution and Ecology 117.) Effective: 2008 Fall Quarter.

PLB 119—Population Biology of Invasive Plants and Weeds (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): (BIS 001A, BIS 001B, BIS 001C) or (BIS 002A, BIS 002B, BIS 002C); Introductory statistics recommended. Origin and evolution of invasive plant species and weeds, reproduction and dispersal, seed ecology, modeling of population dynamics, interactions between invasive species, native species, and crops, biological control. Laboratories emphasize design of competition experiments and identification of weedy species. (Evolution and Ecology 119.) GE credit: SE. Effective: 2011 Spring Quarter.

PLB 123—Plant-Virus-Vector Interaction (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 101; PLB 105, PLP 120, and ENT 100 recommended. Analysis of interactions necessary for viruses to infect plants.Interactions among insect vectors and host plants involved in the plant-virus life cycle. Evolutionary aspects of the molecular components in viral infection and modern approaches to the interdiction of viral movement. (Entomology 123 and Plant Pathology 123.) GE credit: SE, SL, WE. Effective: 2014 Winter Quarter.

PLB 126—Plant Biochemistry (3)
Lecture—3 hours. Prerequisite(s): BIS 103 or BIS 105 The biochemistry of important plant processes and metabolic pathways. Discussion of methods used to understand plant processes, including use of transgenic plants. (Molecular and Cellular Biology 126) GE credit: SE, SL. Effective: 2008 Spring Quarter.

PLB 143—Evolution of Crop Plants (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PLS 002 or BIS 001C or BIS 002C Origins of crops and agriculture, including main methodological approaches, centers of crop biodiversity, dispersal of crops, genetic and physiological differences between crops and their wild progenitors, agriculture practiced by other organisms, and role and ownership of crop biodiversity. GE credit: SE, SL, SS, WE. Effective: 2009 Spring Quarter.

PLB 148—Introductory Mycology (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): BIS 001A; BIS 001B; BIS 001C Limited enrollment. Systematics, ecology, evolution, and morphology of fungi. Importance of fungi to humans. (Plant Pathology 148.) GE credit: SE. Effective: 2001 Fall Quarter.

PLB 189—Experiments in Plant Biology: Design and Execution (3)
Discussion/Laboratory—6 hours. Prerequisite(s): (BIS 001A, BIS 001B, BIS 001C) or (BIS 002A, BIS 002B, BIS 002C); and Consent of Instructor. Or the equivalent courses in Plant Sciences. Provides an opportunity for undergraduate students to formulate experimental approaches to current questions in plant biology and to carry out their proposed experiments. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2008 Fall Quarter.

PLB 190C—Research Conference in Plant Biology (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing in Plant Biology or related discipline. Introduction to research methods in plant biology. Design of field or laboratory research projects, survey of appropriate literature, and discussion of research by faculty and students. May be repeated for credit. (P/NP grading only.) Effective: 2007 Fall Quarter.

PLB 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Technical and/or professional experience on or off campus. Supervised by a member of the Plant Biology Department faculty. May be repeated for credit. (P/NP grading only.) Effective: 2008 Fall Quarter.

PLB 194H—Special Study for Honors Students (1-5)
Variable. Prerequisite(s): Consent of Instructor. Open only to majors of senior standing on honors list. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior
thesis. (P/NP grading only.) Effective: 1997 Winter Quarter.

PLB 197T—Tutoring in Plant Biology (1-5)
Discussion—2-6 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Assisting the instructor by tutoring students in one of the Department's regular courses. May be repeated for credit. (P/NP grading only.) Effective: 2008 Fall Quarter.

PLB 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

PLB 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

PLB 396—Teaching Assistant Training Practicum (1-4)
Variable—3-20 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Practical experience in acting as teaching assistant in Plant Biology courses. Learning activity: hands on experience in preparing for and conducting discussions, guiding student laboratory work, and the formulation of questions and topics for examinations. May be repeated for credit. (S/U grading only.) Effective: 2013 Fall Quarter.

PLP Plant Pathology

Courses in PLP:

PLP 040—Edible Mushroom Cultivation (2)
Discussion/Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): BIS 010 or MIC 020 recommended. Principles and practices of growing edible mushrooms, including culture maintenance, basic mushroom substrate preparation, composting, spawn generation techniques, inoculation methods, harvesting, and pests and pest management. Effective: 1998 Winter Quarter.

PLP 120—Introduction to Plant Pathology (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): BIS 001C; MIC 102 recommended. The nature, cause, and control of plant diseases. Effective: 1997 Winter Quarter.

PLP 123—Plant-Virus-Vector Interaction (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 101; PLB 105, PLP 120, and ENT 100 recommended. Analysis of interactions necessary for viruses to infect plants.Interactions among insect vectors and host plants involved in the plant-virus life cycle. Evolutionary aspects of the molecular components in viral infection and modern approaches to the interdiction of viral movement. (Entomology 123 and Plant Biology 123.) GE credit: SE, SL, WE. Effective: 2014 Winter Quarter.

PLP 130—Fungal Biotechnology and Biochemistry (3)
Lecture—3 hours. Prerequisite(s): PLB 119; BIS 103 How fundamental physiological and biochemical activities of fungi impact the destructive and beneficial roles of these organisms in nature. Utilization and manipulation of fungi for biotechnological and industrial applications. Effective: 1997 Winter Quarter.

PLP 135—Field Identification of Mushrooms (1)
Fieldwork. Prerequisite(s): Introductory course in Biological Sciences; course in mycology recommended. Collection and identification of mushrooms and other fleshy fungi based on macro and microscopic features. (P/NP grading only.) Effective: 1999 Winter Quarter.

PLP 140—Agricultural Biotechnology and Public Policy (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): High school level biology, including genetics; BIS 010 is recommended. Examination of the development and deployment of agricultural biotechnologies, particularly transgenic crop plants, microorganisms and animals, with consideration of conventional agriculture, public perceptions of technologies, food safety, environmental impact, public policies and regulations. GE credit: SL. Effective: 2005 Spring Quarter.

PLP 148—Introductory Mycology (4)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): BIS 001A; BIS 001B; BIS 001C Limited enrollment. Systematics, ecology, evolution, and morphology of fungi. Importance of fungi to humans. (Plant Biology 148.) GE credit: SE. Effective: 2001 Fall Quarter.

PLP 150—Fungal Ecology (3)
Lecture—3 hours. Prerequisite(s): BIS 001C; Or equivalent. The ecological roles of fungi as saprobes, mutualists and parasites in native and managed ecosystems. Physiological and reproductive strategies associated with adaptations to diverse habitats. Effective: 1999 Winter Quarter.

PLP 185—Advanced Mushroom Taxonomy (2)
Discussion/Laboratory—3 hours; Fieldwork—1 hour. Prerequisite(s): (PLP 135 or PLP 148); BIS 101; Or the equivalent to BIS 101. Class size limited to 12 students. Microscopic and molecular methods used in the identification of mushroom species; molecular characterization including PCR-amplification of ribosomal nuclear DNA, digestion of the product with restriction enzymes, and DNA sequencing; a one-day field trip is required. Effective: 2002 Fall Quarter.

PLP 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): PLP 120; and Consent of Instructor. Work experience off and on campus, supervised by a member of the faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

PLP 198—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

PLP 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

PLP 201A—Impacts, Mechanisms and Control of Plant Disease (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PLP 120; Graduate student status in the Plant Pathology Graduate Program or consent of instructor. A case-studies approach to analysis of plant diseases caused by bacteria, fungi, oomycetes, and viruses, including impacts, etiology, pathogen taxonomy and epidemiology, biochemical and genetic aspects of pathogen-host interactions, virulence and resistance, and approaches to disease control. Effective: 2009 Winter Quarter.

PLP 201B—Impacts, Mechanisms and Control of Plant Disease (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): PLP 120; PLP 201A; Graduate student status in the Plant Pathology Graduate Program or consent of instructor. A case-studies approach to analysis of plant diseases, including emerging diseases, caused by bacteria, fungi, nematodes, and oomycetes: impacts, etiology, pathogen taxonomy, epidemiology, biochemical and genetic aspects of pathogen-host interactions, virulence, resistance, disease control and statistical analysis. Effective: 2009 Spring Quarter.

PLP 205A—Diseases of Vegetable and Field Crops (3)
Fieldwork—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): PLP 120 Clinical study of diseases of vegetable and field crops with emphasis on etiology, epidemiology, diagnosis, and control. Field trips required. Effective: 2006 Spring Quarter.

PLP 205B—Diseases of Vegetable and Field Crops - Summer Field Trip (1)
Fieldwork—3 hours. Prerequisite(s): PLP 120; PLP 205A Continuation of Course 205A- four-day field trip investigating diseases of vegetable and field crops. (S/U grading only.) Effective: 2004 Summer Session 1.

PLP 206A—Diseases of Fruit, Nut, and Vine Crop (3)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): PLP 120; PLB 119; and Consent of Instructor. Course 205 may be taken concurrently. Clinical study of fruit, nut, and vine crops diseases with emphasis on etiology, epidemiology, diagnosis, and control. Effective: 1997 Winter Quarter.

PLP 206B—Diseases of Fruit, Nut, and Vine Crop (1)
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): PLP 120; PLB 119; and Consent of Instructor. Course 205 may be taken concurrently. Clinical study of fruit, nut, and vine crops diseases with emphasis on etiology, epidemiology, diagnosis, and control. Effective: 1997 Winter Quarter.

PLP 210—Biochemistry and Molecular Biology of Plant-Microbe Interaction (4)
Lecture/Discussion—4 hours. Prerequisite(s): BIS 101; BIS 102; BIS 103; BIS 104; Or the equivalent. Discussion of plantmicrobe interactions, focused on the underlying cellular, biochemical, and molecular events that determine the diseased state. Effective: 1997 Winter Quarter.

PLP 217—Molecular Genetics of Fungi (3)
Lecture—3 hours. Prerequisite(s): BIS 101; BIS 103; MCB 161; PLB 119; PLP 130; PLP 215X; Graduate standing in a Biological Science; MIC 215 recommended. Advanced treatment of molecular biology and genetics of filamentous fungi and yeasts, including gene structure, organization and regulation;
plant pathogenesis; secretion; control of reproduction; reproduction; molecular evolution; transformation; and gene manipulation. (Biological Chemistry 217) Effective: 1997 Winter Quarter.

PLP 224—Advanced Mycology (4) ***Review all entries***
Laboratory—6 hours; Lecture—2 hours. Prerequisite(s): PLP 148 or PLB 148; or Consent of Instructor. Systematics, evolution, and ecology of the fungi. Topics include modern techniques and theories on classification of fungi, species concepts, sexual compatibility and vegetative compatibility. Laboratories will emphasize various approaches to fungal identification. Effective: 2002 Spring Quarter.

PLP 224—Advanced Mycology (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): PLP 148 or PLB 148; PLP 120; or Consent of Instructor. Physiology, cell biology and biochemistry of fungi. Topics include mycotoxins, epidemiology and nature of emerging and re-emerging fungal diseases, fungicides, and fungicide resistance. Effective: 2018 Fall Quarter.

PLP 228—Plant Bacteriology (5) ***Review all entries***
Laboratory—9 hours; Lecture—2 hours. Prerequisite(s): PLP 120; BIS 102; BIS 103; MIC 002 or the equivalent. Study of bacteria which have a saprophytic, symbiotic, or parasitic association with higher and lower plants. Clinical and molecular methods for identification and classification of these bacteria. Effective: 1997 Winter Quarter.

PLP 228—Plant Bacteriology (3) ***Review all entries***
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): PLP 120; or equivalent or consent of instructor. Study of plant pathogenic microorganisms including taxonomy, biology, molecular mechanisms of disease, and plant disease management. Topics include quorum sensing, rhizosphere biology, genomics, virulence factors, and host plant resistance genes. Effective: 2019 Winter Quarter.

PLP 230—Plant Virology (3)
Lecture—3 hours. Prerequisite(s): Upper division or graduate course in Molecular Biology or graduate student in Plant Pathology. Viruses as causal agents of plant disease and as tools for manipulating plants; structures of virus particles; mechanisms of transmission, replication, and spread in the plant; cytology and molecular biology in susceptible and resistant reactions to virus infection; virus disease control. Only two units of credit to students who complete MIC 262; not open for credit to students who have completed PLP 226. Effective: 2003 Spring Quarter.

PLP 290—Seminar (1)
Seminar—1 hour. Review and evaluation of current research in plant pathology. (S/U grading only.) Effective: 1997 Winter Quarter.

PLP 290C—Advanced Research Conference (1)
Seminar—1 hour. Prerequisite(s): PLP 120; or Consent of Instructor. Presentation, evaluation, and critical discussions of research activities in the area of advanced plant pathology; primarily designed for graduate students. (S/U grading only.) Effective: 1997 Winter Quarter.

PLP 291—Seminar in Molecular Plant Pathology (1)
Seminar—1 hour. Prerequisite(s): PLP 120; or Consent of Instructor. Review and evaluation of current literature and research in biochemistry and molecular biology of plant microbe interactions. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

PLP 295—Seminar in Mycology (1)
Seminar—1 hour. Review and evaluation of current literature and research in mycology. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

PLP 298—Special Group Study (1-5)
Variable. Effective: 1997 Winter Quarter.

PLP 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

PLS Plant Sciences

Courses in PLS:

PLS 001—Agriculture, Nature and Society (3)
Discussion/Laboratory—1 hour; Lecture—2 hours. Multiple perspectives and connections between natural sciences,
social sciences, and agriculture. Emphasizes agriculture's central position between nature and society and its key role in our search for a productive, lasting and hospitable environment. Several full-period field trips provide hands-on learning. Not open for credit to students who have completed AMR 001. (Former course AMR 001.). GE credit: SE. Effective: 2007 Fall Quarter.

PLS 002—Botany and Physiology of Cultivated Plants (4)
Discussion/Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): High school course in biology and chemistry recommended. A holistic introduction to the underlying botanical and physiological principles of cultivated plants and their response to the environment. Includes concepts behind plant selection, cultivation, and utilization. Laboratories include discussion and interactive demonstrations. Not open for credit to students who have complete AMR 002. (Former course AMR 002.). GE credit: SE, SL. Effective: 2007 Winter Quarter.

PLS 005—Plants for Garden, Orchard and Landscape (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): For non-majors. Hands-on experience with plants cultivated for food, environmental enhancement and personal satisfaction. Topics include establishing a vegetable garden, pruning and propagation activities, growing flowers and ornamental plants, and the role of plants in human health and well-being. Not open for credit to students who have completed Plant Biology 1 or Plant Sciences 2. (Former course Plant Biology 1.). (P/NP grading only.) GE credit: SE. Effective: 2008 Fall Quarter.

PLS 006—Flower Power--Art and Science of Flowers and Their Uses (2)
Lecture/Discussion—2 hours. Prerequisite(s): High school biology. Introduction to the art and science of using and growing flowers to harness the power that is represented by their aesthetic beauty. Handling, production, arranging, breeding and marketing of flowers. Emphasis on potted plants and cut-flowers. (P/NP grading only.) Effective: 2010 Spring Quarter.

PLS 007—Just Coffee: The Biology, Ecology and Socioeconomic Impacts of the World's Favorite Drink (4)
Discussion—1 hour; Lecture—3 hours. Coffee used as a case study to examine biological, ecological and social factors influencing sustainability of farming systems and how food production systems impact human well-being. GE credit: SE, SS, WE. Effective: 2017 Fall Quarter.

PLS 012—Plants and Society (4)
Extensive Writing—3 hours; Lecture—3 hours. Prerequisite(s): High school biology. Dependence of human societies on plant and plant products. Plants as resources for food, fiber, health, enjoyment and environmental services. Sustainable uses of plants for food production, raw materials, bioenergy, and environmental conservation. Global population growth and future food supplies. Not open for credit to students who have complete PLB 012. (Former course PLB 012.). (Science and Society 012.) GE credit: SE, SS, WE. Effective: 2007 Fall Quarter.

PLS 014—Introduction to Current Topics in Plant Biology (4)
Discussion—3 hours. Introduction to scientific methods and current understanding of genetics, metabolism, and cellular structure in plants, with special emphasis on topics related to societal issues, such as herbal medicines and genetically modified organisms. Designed for students not specializing in biology. Not open for credit to students who have completed PLB 011. GE credit: SE, SL. Effective: 2007 Fall Quarter.

PLS 015—Introduction to Sustainable Agriculture (4)
Laboratory—3 hours; Lecture—3 hours. Multidisciplinary introduction to agricultural sustainability with a natural sciences emphasis. Sustainability concepts and perspectives. Agricultural evolution, history, resources and functions. Diverse agricultural systems and practices and their relative sustainability. Laboratories provide direct experience with selected agricultural practices and systems. GE credit: SE. Effective: 2009 Spring Quarter.

PLS 021—Application of Computers in Technology (3)
Discussion/Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): High school algebra. Not open for students who have completed Agricultural Management and Rangeland Resources 21. (Former course Agricultural Management and Rangeland Resources 21.) Concepts of computing and applications using personal computers, spreadsheets, database management, word processing and communications. GE credit: SE, VL. Effective: 2009 Winter Quarter.

PLS 049—Organic Crop Production Practices (3)
Discussion—1 hour; Laboratory—3 hours; Lecture—1 hour. Principles and practices of organic production of annual crops. Including organic crops, soil, and pest management, cover cropping, composting, seeding, transplanting, irrigation, harvesting and marketing. Not open for credit to students who have completed AMR 049. (Former course AMR 049.). (P/NP grading only.) GE credit: SE. Effective: 2007 Fall Quarter.

PLS 092—Internship (1-12)
Internship—3-36 hours. Work experience on or off campus in subject areas pertaining to plant and environmental sciences. Internship supervised by a faculty member. May be repeated for credit. (P/NP grading only.) Effective: 2007 Winter Quarter.

PLS 098—Directed Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Primarily for lower division students. May be repeated for credit. (P/NP grading only.) Effective: 2007 Winter Quarter.

PLS 099—Special Study for Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Primarily for lower division students. (P/NP grading only.) Effective: 2007 Winter Quarter.

PLS 100A—Metabolic Processes of Cultivated Plants (3)
Lecture—3 hours. Prerequisite(s): PLS 002 or BIS 002C; or Consent of Instructor. Principles of energy capture and photosynthesis, water use, and nutrient cycling. Conversion of these resources into products (carbohydrates, proteins, lipids, and other chemicals) by plants. Emphasis on the relationships between environmental resources, plant metabolism and plant growth. GE credit: SE. Effective: 2017 Spring Quarter.

PLS 100AL—Metabolic Processes of Cultivated Plants Laboratory (2)
Discussion/Laboratory—3 hours. Prerequisite(s): PLS 100A (can be concurrent); Or the equivalent. Techniques and instruments used to study plant metabolic processes, including water relations, respiration, photosynthesis, enzyme kinetics, microscopy, immunochemistry, and nitrogen fixation. Quantitative methods, problem solving, and practical applications are emphasized. GE credit: SE. Effective: 2007 Fall Quarter.

PLS 100B—Growth and Yield of Cultivated Plants (3)
Lecture—3 hours. Prerequisite(s): PLS 100A; Or the equivalent of PLS 100A. Principles of the cellular mechanisms and hormonal regulation underlying plant growth, development, and reproduction. Emphasis on how these processes contribute to the harvestable yield of cultivated plants and can be managed to increase crop productivity and quality. GE credit: SE. Effective: 2017 Spring Quarter.

PLS 100BL—Growth and Yield of Cultivated Plants Laboratory (2)
Discussion/Laboratory—3 hours. Prerequisite(s): PLS 100B (can be concurrent); Or equivalent. Laboratory exercises in plant growth and development and their regulation, including photomorphogenesis, plant growth regulators, plant anatomy, seed germination, fruit ripening and senescence. Includes field trips to illustrate relationships to cropping and marketing systems. GE credit: SE. Effective: 2007 Fall Quarter.

PLS 100C—Environmental Interactions of Cultivated Plants (3)
Lecture—3 hours. Prerequisite(s): PLS 100A; Or the equivalent of PLS 100A. Principles of plant interactions with their physical and biological environments and their acquisition of the resources needed for growth and reproduction. Emphasis on how management practices and environmental conditions affect crop productivity. GE credit: SE. Effective: 2017 Spring Quarter.

PLS 100CL—Environmental Interactions of Cultivated Plants Laboratory (2)
Discussion/Laboratory—3 hours. Prerequisite(s): PLS 100C (can be concurrent) Techniques and instruments used to study plant interactions with their physical and biological environments, including light responses, transpiration, microclimatology, nutrient availability and utilization, biomass accumulation. Quantitative methods and modeling are emphasized. GE credit: SE. Effective: 2007 Fall Quarter.

PLS 101—Agriculture and the Environment (3)
Lecture—3 hours. Prerequisite(s): PLS 002; or Consent of Instructor. Focus on the interaction between agriculture and the environment to address the principles required to analyze conflict and develop solutions to complex problems facing society. Not open for credit to students who have completed AMR 101. (Former course AMR 101.). GE credit: SE, SL. Effective: 2007 Fall Quarter.

PLS 102—California Floristics (5)
Fieldwork; Laboratory—5 hours; Lecture—2 hours. Prerequisite(s): PLS 002 or BIS 002C; Or equivalent course in Plant Science. Survey of the California flora, emphasizing recognition of important plant families and genera and use of taxonomic keys to identify species. Phylogenetic relationships among families. Principles of systematics and taxonomy. Two Saturday field trips. (Plant Biology 102.) GE credit: SE, VL. Effective: 2017 Fall Quarter.

PLS 105—Concepts in Pest Management (3)
Discussion/Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): CHE 008B; PLS 002 or BIS 002B or BIS 002C Introduction to the ecological principles of integrated pest management, biology of different classes of pests and the types of losses they cause, population assessment, evaluation of advantages and disadvantages of different techniques used for pest management, IPM programs. Not open for credit to students who have completed AMR 105. (Former course AMR 105.). GE credit: SE. Effective: 2017 Winter Quarter.

PLS 110—Crop Management Systems for Vegetable Production (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): PLS 002 or (BIS 002A, BIS 002B, BIS 002C) Horticultural principles applied to production and management systems for vegetable crops. Laboratory and discussion illustrate efficient field management and resource use practices. Not open for credit to students who have completed PLS 110C. (Former course PLS 110C.). GE credit: SE. Effective: 2017 Winter Quarter.

PLS 112—Forage Crop Production (3)
Lecture—3 hours. Prerequisite(s): PLS 002 or BIS 001C or BIS 002C; or Consent of Instructor. Forages as a world resource in food production. Ecological principles governing the adaptation, establishment, growth and management of perennial and annual forages, including pastures, rangelands and hay; aspects of forage quality which affect feeding value to livestock. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 112. (Former course Agricultural Management and Rangeland Resources 112.). GE credit: SE. Effective: 2008 Spring Quarter.

PLS 113—Biological Applications in Fruit Tree Management (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): PLS 002 or BIS 001C or BIS 002C; Or equivalent. Physiology, growth, development and environmental requirements of fruit trees and the cultural practices used to maintain them. Emphasis on the application of biological principles in the culture of commercially important temperate zone fruit tree species. Not open for credit to students that have completed PLB 173. (Former course PLB 173.). GE credit: SE. Effective: 2007 Fall Quarter.

PLS 114—Biological Applications in Fruit Production (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): PLS 002 or BIS 001C or BIS 002C; PLS 113 recommended. Reproductive biology of tree crop species. Biological principles of fruit production, tree nutrition and orchard management for optimizing cropping. Laboratories emphasize hands-on work with orchard tree systems that are done specifically to produce the crop. Not open for credit to students who have completed PLB 174. (Former course PLB 174.). GE credit: SE. Effective: 2007 Fall Quarter.

PLS 116—Plant Morphology and Evolution (5)
Laboratory—4 hours; Lecture—3 hours. Prerequisite(s): Introductory Plant Biology (e.g., BIS 002C, PLS 002). Introduction to the form, development, and evolution of vascular plants. Emphasis given to the form and development of reproductive structures in ferns and seed-producing plants as a basis for determining evolutionary relationships. Not open for credit to students who have completed PLB 116. (Plant Biology 116.) GE credit: SE, VL. Effective: 2015 Winter Quarter.

PLS 120—Applied Statistics in Agricultural Sciences (4)
Discussion/Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Upper division standing. Application of statistical methods to design and analysis of research trials for plant, animal, behavioral, nutritional, and consumer sciences. Basic concepts and statistical methods are presented in lectures, laboratories emphasize data processing techniques, problem solving, and interpretation in specialized fields. Not open for credit for students who have completed AMR 120. (Former course AMR 120.). GE credit: QL. Effective: 2008 Spring Quarter.

PLS 130—Rangelands: Ecology, Conservation and Restoration (3)
Lecture—3 hours. Prerequisite(s): PLS 002 or BIS 002B or BIS 002C; or Consent of Instructor. Upper division standing Introduction to the ecological principles and processes important for an understanding of the dynamics of range ecosystems. Emphasis on ecological and evolutionary concepts underlying management strategies for conserving biological diversity and environmental quality in rangelands. Not open for credit to students who have completed AMR 130. (Former course AMR 130.). GE credit: SE. Effective: 2017 Winter Quarter.

PLS 131—Identification and Ecology of Grasses (2)
Discussion—5 hours; Laboratory—20 hours; Lecture—7.5 hours. Prerequisite(s): PLS 130 or PLS 102 or PLS 147 recommended. Taxonomy and identification of western grasses. Development of skills in using plant identification keys. Ecology and evolution of grasses in grazing ecosystems. Given the week following spring quarter. Not open for credit to students who have completed AMR 131. (Former course AMR 131.). GE credit: SE, VL. Effective: 2017 Spring Quarter.

PLS 135—Ecology and Community Structure of Grassland and Savannah Herbivores (3)
Lecture—3 hours. Prerequisite(s): (BIS 001A or BIS 001B); (PLS 002 or BIS 001C); General ecology course (ESP 100) recommended. Feeding ecology of grassland herbivores and its importance in evolution of herbivore communities and social systems. Optimal foraging, interspecific interactions, and primary productivity are considered as factors structuring natural and managed grassland and savannah systems. Not open for credit to students who have completed AMR 135. (Former course AMR 135.). Effective: 2007 Winter Quarter.

PLS 141—Ethnobotany (4)
Discussion/Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): PLS 002 or BIS 001C or BIS 002C Relationships and interactions between plants and people, including human perceptions, management, and uses of plants, influences of plants on human cultures, and effects of human activity on plant ecology and evolution. Concepts, questions, methods, and ethical considerations in ethnobotanical research. Not open for credit to students who have completed PLB 141. (Former course PLB 141.). GE credit: OL, SE, SS, WE. Effective: 2008 Winter Quarter.

PLS 144—Trees and Forests (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PLS 002 or BIS 001C or BIS 002C Biological structure and function of trees as organisms; understanding of forests as communities and as ecosystems; use of forests by humans; tree phenology, photosynthesis, respiration, soil processes, life histories, dormancy, forest biodiversity, and agroforestry. Not open for credit to students who have completed PLB 144 or ENH 144 or ERS 144. (Former course PLB 144, ENH 144, ERS 144.). (Environmental Science and Management 144.) GE credit: SE, VL. Effective: 2011 Fall Quarter.

PLS 147—California Plant Communities (3)
Lecture/Discussion—3 hours. Prerequisite(s): PLS 002 or BIS 002C Ecology, distribution, and species of California's plant communities. Environmental forces that determine these communities, the threats they face, and their conservation and restoration opportunities. Not open for credit to students who have completed PLB 147. (Former course PLB 147.). GE credit: SE, VL. Effective: 2012 Spring Quarter.

PLS 147L—California Plant Communities Field Study (1)
Discussion/Laboratory—3 hours. Prerequisite(s): (PLS 002 or BIS 002C); PLS 147 (can be concurrent); Concurrent or previous enrollment in PLS 147. Visits to many of northern California's plant communities, from the north coast to the Central Valley to the Sierras. Discussion of community ecology and hands-on identification of species. Two Saturday and two three-day field trips required. Not open for credit to students who have completed PLB 147. (Former course PLB 147.). GE credit: SE, VL. Effective: 2012 Spring Quarter.

PLS 150—Sustainability and Agroecosystem Management (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): SSC 010; CHE 002A; (PLS 002 or BIS 001C or BIS 002C) Interdisciplinary analysis of agricultural production and food systems with primary emphasis on biophysical processes. General concepts governing the functioning of temperate and tropical agroecosystems in relation to resource availability, ecological sustainability, and socio-economic viability. Comparative ecological analyses of agroecosystems. Not open for credit to students who have completed AMR 150. (Former course AMR 150.). GE credit: OL, SE, SL. Effective: 2008 Spring Quarter.

PLS 152—Plant Genetics (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): BIS 001A or BIS 002A; or Consent of Instructor. Basic principles of transmission genetics, cytogenetics, population and quantitative genetics, and molecular genetics. Practical aspects of genetic crosses and analysis of segregating populations. Not open to students who have completed PLB 152. (Former course PLB 152.). GE credit: SE. Effective: 2007 Fall Quarter.

PLS 153—Plant, Cell, Tissue and Organ Culture (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): PLS 002 or BIS 001C or BIS 002C Basic and applied aspects of plant tissue culture including media preparation, micropropagation, organogenesis, embryogenesis, anther culture, protoplast culture and transformation. Not open for credit to students who have completed PLB 153. (Former course PLB 153.). GE credit: SE. Effective: 2007 Fall Quarter.

PLS 154—Introduction to Plant Breeding (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): PLS 152 or BIS 101; or Consent of Instructor. Principles, methods and applications of plant breeding and genetics to the improvement of crop plants. Illustration of how plant breeding is a dynamic, multidisciplinary, constantly-evolving science. Laboratory emphasizes hands-on experience in the basics of breeding through experiments. Not open for credit to students who have completed PLB 154. (Former course PLB 154.). GE credit: SE. Effective: 2007 Fall Quarter.

PLS 157—Physiology of Environmental Stresses in Plants (4)
Discussion—2 hours; Lecture—2 hours. Prerequisite(s): PLS 100C or PLB 111 or PLB 112 or ENH 102 or VEN 110 Stress concepts and principles; molecular, physiological, developmental and morphological characteristics enabling plants to avoid or tolerate environmental stresses; stress acclimation and adaptation processes; responses of wild and cultivated species to drought, flooding, nutrient deficiencies, salinity, toxic ions, extreme temperatures, etc. Not open for credit to students who have completed PLB 157. (Former course PLB 157.). GE credit: SE. Effective: 2007 Fall Quarter.

PLS 158—Mineral Nutrition of Plants (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): PLS 100A or PLB 111 or ENH 102 or VEN 110 Evolution and scope of plant nutrition; essential elements; mechanisms of absorption and membrane transporters; translocation and allocation processes; mineral metabolism; deficiencies and toxicities; genetic variation in plant nutrition; applications to management and understanding ecological effects of nutrient availability or deficiency. Not open for credit to students who have completed PLB 158. (Former course PLB 158.). GE credit: SE. Effective: 2007 Fall Quarter.

PLS 160—Agroforestry: Global and Local Perspectives (3)
Lecture/Discussion—3 hours. Prerequisite(s): (PLS 002 or BIS 001C or BIS 002C); (PLS 142 or PLS 150 or BIS 002B); Or general ecology course in lieu of PLS 142 or PLS 150 or BIS 002B. Traditional and evolving use of trees in agricultural ecosystems; their multiple roles in environmental stabilization and production of food, fuel, and fiber; and socioeconomic barriers to the adoption and implementation of agroforestry practices. Not open for credit to students who have previously taken AMR 160. (Former course AMR 160.). (International Agricultural Development 160.) GE credit: SE. Effective: 2011 Spring Quarter.

PLS 162—Urban Ecology (3)
Lecture/Discussion—3 hours. Prerequisite(s): Course in general or plant ecology such as PLB 117, ESP 100, EVE 101, EVE 120 or PLS 163. Application of fundamental concepts and approaches in landscape and ecosystem ecology to urban ecosystems. Ecological and social drivers and responses. Landscape heterogeneity, nutrient dynamics, invasive species, altered hydrology and climate, and pollution. Discussion of primary literature. GE credit: SE, SL. Effective: 2017 Winter Quarter.

PLS 163—Ecosystem and Landscape Ecology (4)
Lecture/Discussion—4 hours. Prerequisite(s): Course in general, plant, or soil ecology such as EVE 117, PLB 117, ESP 100, EVE 101, or SSC 112. Integration of concepts to understand and manage ecosystems in a complex and changing world. Emphasis on interactions among biotic, abiotic and human factors and changes over space/time. Local to global controls over water, carbon and nutrients across ecosystems/landscapes. Not open for credit to students who have completed ECL 201. Effective: 2010 Winter Quarter.

PLS 164—Practicum in Ecological Restoration (1)
Fieldwork—3 hours. Prerequisite(s): ENH 160 recommended. Hands-on field course that exposes students to various aspects of ecological restoration throughout the seasonal restoration cycle with real-world practitioners. Emphasis on grassland/rangeland, riparian, and oak woodland communities. May be repeated up to 3 time(s). (P/NP grading only.) Effective: 2014 Spring Quarter.

PLS 170A—Fruit and Nut Cropping Systems (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): PLS 002 or BIS 002C; or Consent of Instructor. Overview of production and handling systems of major pomological crops, analysis of current cultural and harvesting problems and concerns associated with commercial fruit growing. Not open for credit to students who have completed AMR 170A. (Former course AMR 170A.). GE credit: SE. Effective: 2017 Spring Quarter.

PLS 170B—Fruit and Nut Cropping Systems (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): PLS 002 or BIS 002C; or Consent of Instructor. Overview of production and handling systems of major pomological crops, including analysis of current cultural and harvesting problems and concerns associated with commercial fruit growing. Not open for credit to students who have completed AMR 170B. (Former course AMR 170B.). GE credit: SE. Effective: 2017 Spring Quarter.

PLS 171—Principles and Practices of Plant Propagation (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): PLS 002 or BIS 001C or BIS 002C Principles and practices of propagating plants covering anatomical, physiological, and practical aspects. Not open for credit to students who have completed PLB 171. (Former course PLB 171.). GE credit: SE. Effective: 2007 Fall Quarter.

PLS 172—Postharvest Physiology and Technology (4)
Discussion/Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): General plant science background (e.g., PLS 002, PLS 012); PLS 196 recommended. Overview of physiological processes related to maturation and senescence of plant products and their responses to postharvest stresses. Targeted approaches and technologies to maintain product quality and limit postharvest disorders. Not open for credit to students who have completed PLB 172. (Former course PLB 172.). GE credit: SE. Effective: 2008 Fall Quarter.

PLS 173—Molecular and Cellular Aspects of Postharvest Biology (3)
Lecture/Discussion—3 hours. Prerequisite(s): PLS 002 or BIS 001C or BIS 002C; Or equivalent. Basic concepts and current knowledge of issues relevant to postharvest biology. Mechanisms of fruit ripening, senescence, programmed cell death. Metabolism and functions of phytohormones, carbohydrates, lipids, pigments, flavor compounds, and phytonutrients at molecular and cellular levels. GE credit: SE. Effective: 2017 Spring Quarter.

PLS 174—Microbiology and Safety of Fresh Fruits and Vegetables (3)
Lecture—3 hours. Prerequisite(s): PLS 002 or BIS 001C or BIS 002C; Or equivalent. Overview of microorganisms on fresh produce, pre- and postharvest factors influencing risk of microbial contamination, attachment of microorganisms to produce, multiplication during postharvest handling and storage, and methods of detection. Mock outbreak trial and presentation of science-based forensic discovery. GE credit: SE. Effective: 2008 Fall Quarter.

PLS 176—Introduction to Weed Science (4)
Discussion/Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): PLS 002 or BIS 001C or BIS 002C Weed biology and ecology, methods of weed management, biological control, herbicides and herbicide resistance. Weed control in managed and natural ecosystems; invasive species. Laws and regulations. Application of herbicides. Sight and software-assisted identification of common weeds. Not open for credit to students who have completed PLB 176. (Former course PLB 176.). GE credit: SE, VL. Effective: 2011 Fall Quarter.

PLS 178—Biology and Management of Aquatic Plants (3)
Lecture—3 hours. Prerequisite(s): (PLS 002 or BIS 001C or BIS 002C); (CHE 008B or CHE 118B); PLS 100C, PLB 111, ENH 102, or HYD 122 recommended. Brief survey of common and invasive fresh water plants and macroalgae, their reproductive modes, physiology, growth (photosynthesis, nutrient utilization), development (hormonal interactions), ecology, modes and impacts of invasion, and management. Two Saturday field trips required. Not open for credit to students who have completed former course PLB 178. (Former course PLB 178.). GE credit: SE. Effective: 2007 Fall Quarter.

PLS 188—Undergraduate Research Proposal (3)
Lecture/Discussion—3 hours. Prerequisite(s): Upper division standing. Preparation and review of a scientific proposal. Problem definition, identification of objectives, literature survey, hypothesis generation, design of experiments, data analysis planning, proposal outline and preparation. (Biotechnology 188) GE credit: OL, SE, WE. Effective: 2008 Summer Quarter.

PLS 189L—Laboratory Research in Plant Sciences (2-5)
Discussion—1 hour; Laboratory—3-12 hours. Prerequisite(s): PLS 188; and Consent of Instructor. Formulating experimental approaches to current questions in plant science; performance of proposed experiments. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2008 Spring Quarter.

PLS 190—Seminar on Alternatives in Agriculture (2)
Discussion—1 hour; Seminar—1 hour. Prerequisite(s): Upper division standing or consent of instructor. Seminar on topics related to alternative theories, practices and systems of agriculture and the relationship of agriculture to the environment and society. Scientific, technological, social, political and economic perspectives. May be repeated up to 2 time(s) for a total of three times. (P/NP grading only.) GE credit: SE. Effective: 2017 Winter Quarter.

PLS 190C—Research Group Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Advanced standing. Weekly conference on research problems, progress and techniques in the plant sciences. May be repeated for credit. May be repeated for credit. (P/NP grading only.) Effective: 2007 Fall Quarter.

PLS 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Work experience on or off campus in subject areas pertaining to plant and environmental sciences. Internship supervised by a faculty member. May be repeated for credit. (P/NP grading only.) Effective: 2007 Winter Quarter.

PLS 193—Garden and Farm-Based Experiential Education Methods (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): Upper division standing or consent of instructor. Methods of teaching children and youth about fruit and vegetable production and consumption. Lesson and activity planning for garden and farm field trips. Basic biology, ecology, plant science, and crop management practices. Mentorship in experiential learning. Preparation of garden site. (P/NP grading only.) GE credit: OL, SE. Effective: 2015 Winter Quarter.

PLS 194H—Senior Honors Thesis (1-2)
Independent Study—3-6 hours. Prerequisite(s): Senior standing; overall GPA of 3.250 or higher and consent of master advisor. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis. (P/NP grading only.) GE credit: SE, WE. Effective: 2016 Fall Quarter.

PLS 196—Postharvest Technology of Horticultural Crops (3)
Fieldwork—45 hours; Lecture/Discussion—45 hours. Prerequisite(s): Upper division or graduate student standing. Intensive study of postharvest considerations and current procedures and challenges in postharvest handling for fruits, nuts, vegetables, and ornamentals in California. Scheduled first two weeks immediately following last day of spring quarter. Not open for credit to students who have completed PLB 196. (Former course PLB 196.). (P/NP grading only.) GE credit: SE. Effective: 2007 Fall Quarter.

PLS 197T—Tutoring in Plant Sciences (1-5)
Tutorial—1-5 hours. Prerequisite(s): Consent of Instructor. Upper division standing, completion of course being tutored or the equivalent. Leading small voluntary discussion or lab groups affiliated with one of the department's regular courses. May be repeated up to 8 unit(s). (P/NP grading only.) Effective: 2007 Winter Quarter.

PLS 198—Directed Group Study (1-5)
Variable—3-15 hours. May be repeated for credit. (P/NP grading only.) Effective: 2007 Winter Quarter.

PLS 199—Special Study for Advanced Undergraduates (1-5)
Variable—3-15 hours. May be repeated for credit. (P/NP grading only.) Effective: 2007 Winter Quarter.

PLS 205—Experimental Design and Analysis (5)
Discussion/Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): PLS 120; Or equivalent. Introduction to the research process and statistical methods to plan, conduct and interpret experiments. Not open for credit to students who have completed AGR 205. (Former course AGR 205.). Effective: 2010 Winter Quarter.

PLS 206—Applied Multivariate Modeling in Agricultural and Environmental Sciences (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PLS 120; (STA 106 or STA 108 or PLS 205) Multivariate linear and nonlinear models. Model selection and parameter estimation. Analysis of manipulative and observational agroecological experiments. Discriminant, principal component, and path analyses. Logistic and biased regression. Bootstrapping. Exercises based on actual research by UCD students. Not open for credit to students who have complete AGR 206. (Former course AGR 206.). Effective: 2017 Winter Quarter.

PLS 212—Postharvest Biology and Biotechnology of Fruits and Nuts (3)
Lecture—3 hours. Prerequisite(s): PLS 172 Review of postharvest biology of fruits and nuts and biotechnological approaches to address postharvest challenges. Morphology, biology and postharvest handling of fruits and nuts are presented along with current research, including biotechnology, and discussion of future research needs and approaches. Not open for credit to students who have completed POM 212. Effective: 2008 Spring Quarter.

PLS 213—Postharvest Physiology of Vegetables (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): PLS 172 or PLS 100B or PLB 112 Comparative physiology of harvest vegetables; emphasis on maturation, senescence, compositional changes, physiological disorders and effects of environmental factors. Concepts and research procedures. Not open for credit to students who have completed VCR 212. (Former course VCR 212.). Effective: 2010 Spring Quarter.

PLS 220—Genomics and Biotechnology of Plant Improvement (3)
Lecture—3 hours. Prerequisite(s): BIS 101; Or the equivalent. Integration of modern biotechnology and classical plant breeding including the impact of structural, comparative and functional genomics on gene discovery, characterization and exploitation. Also covers molecular markers, plant transformation, hybrid production, disease resistance, and novel output traits. Not open for credit to students who have completed VCR 220. (Former course VCR 220.). (Genetics 220.) Effective: 2007 Winter Quarter.

PLS 221—Genomics and Breeding of Vegetable Crops (3)
Lecture—3 hours. Prerequisite(s): BIS 101; Or equivalent. Preview of genome structure, mapping, gene tagging and development of other genetic resources applied to improvement of major vegetables. For graduate students contemplating a career in modern vegetable breeding and biotechnology. Not open for credit to students who have completed VCR 221. (Former course VCR 221.). Effective: 2007 Winter Quarter.

PLS 222—Advanced Plant Breeding (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): PLS 154; PLS 205; GGG 201D or ANG 107 recommended. Philosophy, methods, and problems in developing improved plant species. Topics include: inbreeding, heterosis, progeny testing, breeding methodology, index selection, germplasm conservation, and breeding for stress resistance. Laboratories include tours of breeding facilities and calculation and interpretation of quantitative data. Effective: 2014 Winter Quarter.

PLS 230—Forest Biology (4)
Lecture—3 hours; Seminar—1 hour. Prerequisite(s): Graduate standing or advanced undergraduate with consent of instructor. Cross-disciplinary review of forest biology, including physiology, genetics, pathology, ecology, and silviculture. Effective: 2014 Spring Quarter.

PLS 290—Seminar (1-2)
Seminar—1-2 hours. Topics of current interest related to Plant Sciences. (S/U grading only.) Effective: 2007 Winter Quarter.

PLS 290C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. May be repeated for credit. (S/U grading only.) Effective: 2007 Winter Quarter.

PLS 297T—Tutoring in Plant Sciences (1-5)
Tutorial—1-5 hours. Prerequisite(s): Consent of Instructor. Graduate standing; completion of course to be tutored or the equivalent. Designed for graduate students who desire teaching experience but are not teaching assistants. May be repeated up to 5 unit(s) Same course may not be tutored more than one time. (S/U grading only.) Effective: 2007 Winter Quarter.

PLS 298—Group Study (1-5)
Variable. Effective: 2007 Winter Quarter.

PLS 299—Research (1-12)
Variable—3-36 hours. May be repeated for credit. (S/U grading only.) Effective: 2007 Winter Quarter.

PLS 396—Teaching Assistant Training Practicum (1-4)
Variable—3-12 hours. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit. (S/U grading only.) Effective: 2007 Winter Quarter.

PMD Med - Pathology

Courses in PMD:

PMD 192—Internship in Human Pathology (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in pathology and related fields. (P/NP grading only.) Effective: 1997 Winter Quarter.

PMD 199—Special Study in Pathology for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Advanced undergraduates. (P/NP grading only.) Effective: 1997 Winter Quarter.

PMD 290C—Research Group Conferences (1)
Seminar—1 hour. Prerequisite(s): Graduate level standing. Focused around the mechanisms of function of the central nervous system under normal and pathogenic conditions. Seminars lead by various speakers from UC Davis and other Institutions, both domestic and international. May be repeated for credit. (S/U grading only.) Effective: 2017 Fall Quarter.

PMD 296—Neurodevelopment Group Study (1-6)
Variable—1-6 hours. Explore mechanisms that impact perinatal development of the cerebral cortex, and other cortical structures, under normal and pathological conditions. (S/U grading only.) Effective: 2017 Summer Quarter.

PMD 298—Advanced Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Group Study provides the opportunity for a faculty member to work with students in a focused manner. (S/U grading only.) Effective: 2017 Summer Quarter.

PMD 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

PMD 405—Brain Cutting Conference (1-4)
Seminar—1-4 hours. Prerequisite(s): Third- and fourth year medical students or consent of instructor. Current specimens are sectioned, discussed, and clinical correlations proposed. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PMD 407—Advanced Neuropathology (3-18)
Lecture/Discussion—40 hours. Prerequisite(s): Consent of Instructor. Third or fourth year medical student. Restricted to Medical students only. Presents an integrated introduction to mechanisms of the central and peripheral nervous system injury. Gain an understanding of pathological mechanisms underlying disease, the anatomic and molecular manifestations of pathologic processes of the CNS and PNS. (H/P/F grading only.) Effective: 2015 Fall Quarter.

PMD 410A—General and Endocrine Pathology (2.5)
Discussion/Laboratory—4.5 hours; Lecture—4 hours. Restricted to medical students only. Pathologic mechanisms of human disease. Concepts of general pathologic processes, i.e., cell death, inflammation and neoplasia. Endocrine pathology in the context of clinical human disease. Emphasis on integration of clinical practice with gross and histologic images emphasizing team-based learning. (P/F grading only.) Effective: 2015 Winter Quarter.

PMD 410B—Systemic Pathology (1)
Discussion/Laboratory—0.5 hours; Lecture—1 hour. Prerequisite(s): Approval by SOM Committee on Student progress. Restricted to Medical students only. Anatomic and clinical pathology of organ system human disease with an emphasis on integration with clinical medicine. Topics include hematopathology and neuropathology. (P/F grading only.) Effective: 2010 Spring Quarter.

PMD 410C—Systemic Pathology (2)
Discussion—2 hours; Lecture—1 hour. Prerequisite(s): Approval by SOM Committee on Student progress. Restricted to Medical students only. Anatomic and clinical pathology of organ system human disease with an emphasis on integration with clinical medicine. Topics include pulmonary pathology, cardiovascular pathology, hematopatology, oncologic pathology, and nephropathology. (P/F grading only.) Effective: 2010 Spring Quarter.

PMD 410D—Systemic Pathology (2.5)
Discussion—2 hours; Lecture—1 hour. Prerequisite(s): Approval by SOM Committee on Student progress. Restricted to Medical students only. Anatomic and clinical pathology of organ system human disease with emphasis on integration with clinical medicine. Course content parallels concurrent clinical courses with integration of lectures and discussions. Topics include gastrointestinal and gynecologic pathology, hepatopathology, oncologic pathology and musculoskeletal pathology. (P/F grading only.) Effective: 2010 Spring Quarter.

PMD 435—Clinical Patient Care in Pathology (3-9)
Clinical Activity—24 hours; Independent Study—7 hours; Lecture/Discussion—4 hours. Prerequisite(s): and Consent of Instructor. Completed one of the following 3rd year clerkships: Family Medicine, Internal Medicine, Surgery, OBGYN or Pediatrics. Four-week course is designed to give the third-year medical student an exposure to the diverse roles that pathologists have in clinical patient care. May be repeated for credit. (H/P/F grading only.) Effective: 2015 Summer Quarter.

PMD 440—Surgery-Pathology-Radiology (SPR) Research Laboratory (2)
Discussion/Laboratory—2 hours; Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Provide future clinicians and scientists with basic clinical and bioengineering laboratory skills to prepare for careers in translational research (P/F grading only.) Effective: 2014 Summer Quarter.

PMD 464—Anatomic Pathology (3-6)
Clinical Activity—40 hours; Variable. Prerequisite(s): Consent of Instructor. Fourth-year Medical Students. Restricted to Medical Students only. Anatomic pathology with an emphasis on autopsy and surgical pathology with application to clinical practice. Specimen grossing, frozen sections, microscopic sign-out and conferences. Exposure to cytopathology, hematopathology, and clinical pathology is available. (H/P/F grading only.) Effective: 2010 Winter Quarter.

PMD 465—Applied Clinical Laboratory Medicine (3-6)
Variable—40 hours. Prerequisite(s): Consent of Instructor. Emphasis upon laboratory techniques, procedures, and interpretation of laboratory results. Students will be expected to participate fully and in all laboratory operations including bench techniques, laboratory management, and quality control. May be repeated for credit. (H/P/F grading only.) Effective: 2012 Winter Quarter.

PMD 470—Sub-Specialty in Didactic Pathology (3-16)
Lecture/Lab—25 hours. Prerequisite(s): Consent of Instructor. Externship provides in-depth exposure to one of a variety of sub-specialties in Pathology. May be repeated for credit. (H/P/F grading only.) Effective: 2011 Spring Quarter.

PMD 474—Anatomic Pathology Acting Internship (3-9)
Clinical Activity—40-80 hours. Prerequisite(s): Fourth-year medical student or consent of instructor. Restricted to medical students only. Anatomic Pathology AI will permit students to gain skills needed for first year Pathology Residency. Students will perform autopsies and take full responsibility for a variety of surgical pathology cases. A mix of outpatient and inpatient cases is expected. May be repeated for credit. (H/P/F grading only.) Effective: 2011 Summer Quarter.

PMD 475—Anatomic Pathology Acting Internship (3-9)
Clinical Activity—40-80 hours. Prerequisite(s): PMD 410A; PMD 410B; PMD 410C; PMD 410D; and Consent of Instructor. Or equivalent. Successful completion of third-year clinical rotations. Restricted to Medical Students only. Year four level course is designed to provide a concentrated experience in Surgical Pathology and Cytolopathology. Rotate on the surgical and cytopathology sub-specialty teams and assume responsibility for patient cases. May be repeated for credit. (H/P/F grading only.) Effective: 2015 Summer Quarter.

PMD 493—Interdisciplinary Study of Gastrointestinal Cancer (6)
Clinical Activity—12 hours; Discussion/Laboratory—20 hours; Laboratory—3 hours; Lecture—5 hours. Prerequisite(s): Consent of Instructor. In-depth study of gastrointestinal, hepatic and pancreatic cancer. Emphasis on an integration of basic science and clinical medicine. Participating departments include pathology, surgical oncology, medical oncology, gastroenterology, radiology and radiotherapy. (Surgery 493D.) (H/P/F grading only.) Effective: 2012 Summer Quarter.

PMD 497T—Tutoring in Pathology (1-5)
Tutorial—3-15 hours. Prerequisite(s): Advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum of the School of Medicine. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PMD 498—Advanced Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Medical student. Group study in variety of advanced topics in general, special, experimental, or comparative pathology. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PMD 499—Research (1-18)
Variable. Prerequisite(s): Medical student with consent of instructor. Limited enrollment. Research in experimental, molecular, comparative, and applied pathology. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

PMI VM - Pathology, Microbiology & Immunology

Courses in PMI:

PMI 099—Special Study for Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2003 Fall Quarter.

PMI 126—Fundamentals of Immunology (3)
Lecture—3 hours. Prerequisite(s): BIS 102; or Consent of Instructor. Or equivalent. Overview of immunology including components of the immune system, initiation and regulation of the immune response, infection and immunity, hypersensitivity and immune dysfunction. Clinical immunologic techniques, immunodeficiency, and vaccinology. Effective: 2004 Fall Quarter.

PMI 126L—Immunology Laboratory (2)
Laboratory—6 hours. Prerequisite(s): PMI 126 (can be concurrent); Or equivalent. Laboratory procedures in clinical immunology. Cells of the innate and adaptive systems. Quantitative and qualitative characterization of the immune response. Effective: 2014 Winter Quarter.

PMI 127—Medical Bacteria and Fungi (5) ***Review all entries***
Laboratory—6 hours; Lecture—3 hours. Prerequisite(s): Any Microbiology course with lab; Immunology strongly recommended. Introduction to the bacterial and mycotic pathogens of man and animals, with emphasis on pathogenic mechanisms and ecologic aspects of infectious disease. Effective: 2015 Spring Quarter.

PMI 127—Medical Bacteria and Fungi (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): PMI 127L (can be concurrent); Any Microbiology course with lab; Immunology strongly recommended; PMI 127L to be taken concurrently. Pass One restricted to Microbiology majors. Introduction to the bacterial and mycotic pathogens of man and animals, with emphasis on pathogenic mechanisms and ecologic aspects of infectious disease. Effective: 2018 Fall Quarter.

PMI 127L—Medical Bacteria and Fungi Lab (2)
Laboratory—6 hours. Prerequisite(s): PMI 127 (can be concurrent); Any Microbiology course with lab; Immunology strongly recommended. Pass One restricted to Microbiology majors. Introduction to the bacterial and mycotic pathogens of man and animals, with emphasis on pathogenic mechanisms and ecologic aspects of infectious disease. Effective: 2018 Fall Quarter.

PMI 128—Biology of Animal Viruses (3)
Lecture—3 hours. Prerequisite(s): BIS 102 Fundamental physical and chemical properties of animal viruses; methods of propagation, purification and assay. Mechanisms of viral replication and pathogenesis of viral infections in man and animals. Immunity to virus diseases and oncogenic properties of animal viruses. Two units of credit given if completed MIC 162. Effective: 2004 Fall Quarter.

PMI 129Y—One Health: Human, Animal & Environment Interfaces (3)
Lecture/Discussion—3 hours; Web Electronic Discussion. Class size limited to upper division undergraduate students in good standing with the school and who fulfill the course prerequisites below; enrollment limited to 100 students/term. Introduction to fundamentals, challenges, and opportunities in One Health using local and global health case studies. Animal, human, and environmental health problems, along with tools and transdisciplinary approaches, will be introduced to foster innovative thinking that addresses complex issues. GE credit: OL, SE, SL, SS. Effective: 2013 Spring Quarter.

PMI 198—Directed Group Study (1-5)
Independent Study—3-5 hours. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2004 Fall Quarter.

PMI 199—Special Study for Advanced Undergraduates (1-5)
Variable—3-15 hours. May be repeated for credit. (P/NP grading only.) Effective: 2003 Fall Quarter.

PMI 200—Research Foundations (1)
Seminar—1 hour. Introduction to key components of graduate school success including mentor/mentee relationship issues, avoiding plagiarism, hypothesis development and experimental design, demystifying the grant writing process, understanding the NIH administrative structure, preparing for a non-academic career, and strategies to maintain a work-life balance. (S/U grading only.) Effective: 2018 Fall Quarter.

PMI 201—Integrative Pathobiology Core I (5)
Discussion—2 hours; Lecture—3 hours. Overview of molecular biology techniques, tissue structure and function, cell membrane pathology and cellular mechanisms of disease including cellular responses and adaptations to stress, cell cycle, cell death, cell biomechanics, vascular disturbances, and mechanisms of neoplasia and tumorigenesis. Effective: 2014 Winter Quarter.

PMI 202—Integrative Pathobiology Core II (4)
Discussion—2 hours; Lecture—2 hours. The second required core course in the graduate group with topics in inflammation, host-pathogen interaction, regenerative medicine, integrative pathology and population and ecosystem health. Effective: 2014 Spring Quarter.

PMI 203—Experimental Design and Data Analysis in Pathobiology (2)
Lecture—1 hour; Lecture/Lab—2 hours. Follows two required core courses in, courses 201 and 202, for Ph.D. and M.S. students. Goal is to bridge gap between statistics and real-world pathobiology to increase students' skills and independence in experiment design and data analysis. Effective: 2013 Fall Quarter.

PMI 206—Mentored Scientific Writing (1)
Discussion—1.5 hours. Prerequisite(s): Consent of Instructor. Enrollment limited to 12 students. Drafting a scientific manuscript for publication based on research results. Students engage in collaborative peer review and learn effective writing, including how to convey a persuasive message and write clearly and succinctly. May be repeated up to 1 time(s). (S/U grading only.) Effective: 2017 Winter Quarter.

PMI 214—Vector-borne Infectious Diseases: Changing Patterns (2)
Lecture/Discussion—2 hours. Prerequisite(s): Open to graduate students, MPVM and MPH students, DVM and medical students with second- or third-year standing. Open to upper division undergraduate students with consent of instructor(s) Vector-borne infectious diseases especially as they relate to changing patterns associated with climatic changes, trade and population movement. (ENT 214) Effective: 2010 Fall Quarter.

PMI 221—Topics in Virus Research (1)
Discussion—1 hour. Prerequisite(s): Graduate student standing (Ph.D. or M.S.). Restricted to 10 students. Discussion-based seminar covering graduate student virology research. Informal presentations and discussion of technical problems in research design and experimentation are encouraged. Current stage of the research project is not important. May be repeated up to 4 time(s). (S/U grading only.) Effective: 2010 Fall Quarter.

PMI 270—Advanced Immunology (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): Introductory course in Immunology. Restricted to graduate student status in the Comparative Pathology Graduate Group; all other students require consent of instructor. Current concepts of immunology with an emphasis on interactions between the host, the environment and the pathogen. These interactions will include those that are protective and successful for the host as well as those that are deleterious. Effective: 2008 Summer Session 1.

PMI 290—Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate level standing. Topics in pathology, microbiology or immunology. May be repeated for credit. (S/U grading only.) Effective: 2005 Winter Quarter.

PMI 291A—Seminar in Immunology (1)
Seminar—1 hour. Prerequisite(s): PMI 126; Or the equivalent course. Students choose topic for each quarter. Individual or pairs of students choose a paper for all to read and present a seminar based on the subject of the paper. All students participate in discussion. May be repeated for credit. (S/U grading only.) Effective: 1997 Fall Quarter.

PMI 293A—Seminar in Infectious Diseases (1)
Seminar—1 hour. Prerequisite(s): Current enrollment in health science professional school or graduate standing in biological sciences. Discussion of current topics and cases of infectious diseases. May be repeated up to 1 time(s) topic differs. (S/U grading only.) Effective: 2004 Fall Quarter.

PMI 298—Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Group study. May be repeated for credit. (S/U grading only.) Effective: 2005 Winter Quarter.

PMI 299—Research (1-12)
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit. (S/U grading only.) Effective: 2004 Winter Quarter.

PMR Med - Physcial Medicine & Rehabilitation

Courses in PMR:

PMR 100—Research Approaches to Disability and Rehabilitation (2)
Lecture/Discussion—2 hours. Discussion and evaluation of research approaches to medical rehabilitation, community integration, and quality of life of disabled persons, with a focus on the progressive disabilities associated with neuromuscular diseases. Intent is to encourage interest in professions that serve the disabled community and increase awareness of rehabilitation goals. Effective: 2002 Winter Quarter.

PMR 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Advanced standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

PMR 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Advanced standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

PMR 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

PMR 405—Healthy Living: Leading by Example (1.5)
Clinical Activity—1 hour; Discussion—2 hours; Laboratory—4 hours; Lecture—4 hours. Prerequisite(s): Consent of Instructor. Course is to improve the physical and mental health of participating students while supplementing their medical education with specific concepts. May be repeated for credit. (P/F grading only.) Effective: 2014 Fall Quarter.

PMR 405A—Healthy Living: Leading by Example (1)
Clinical Activity—1 hour; Discussion—2 hours; Laboratory—4 hours; Lecture—4 hours. Prerequisite(s): Consent of Instructor. Improve the physical and mental health of participating students while supplementing their medical education with specific concepts. May be repeated for credit. (P/F grading only.) Effective: 2014 Fall Quarter.

PMR 405B—Healthy Living: Leading by Example (0.5)
Clinical Activity—1 hour; Discussion—2 hours; Laboratory—4 hours; Lecture—4 hours. Prerequisite(s): Consent of Instructor. Improve the physical and mental health of participating students while supplementing their medical education with specific concepts. May be repeated for credit. (P/F grading only.) Effective: 2014 Fall Quarter.

PMR 421—Introduction to Sports Medicine (1)
Clinical Activity—4 hours; Fieldwork; Lecture—1 hour. Introduction to basic concepts of Sports Medicine in Physical Medicine and Rehabilitation. Students attend afternoon clinic with Sports Medicine attending; attend lectures focusing on Sports Medicine topics. Students also eligible to cover sporting events with attending physicians where available. (P/F grading only.) Effective: 2007 Summer Quarter.

PMR 440—Rehabilitation Medicine Clerkship (3)
Clinical Activity—36 hours; Lecture/Discussion—4 hours. Prerequisite(s): IMD 430; SUR 430; and Consent of Instructor. Rehabilitation and comprehensive care of physically disabled and physical medicine management of neurologic, neuromuscular and musculoskeletal disorders. Emphasis on evaluation and conservative treatment of spinal disorders, sports injuries and neuromuscular disease. Emphasis on inpatient rehabilitation, pediatrics, spine or sports possible. (H/P/F grading only.) Effective: 2008 Spring Quarter.

PMR 461—Rehabilitation Medicine (6)
Clinical Activity—36 hours; Lecture/Discussion—4 hours. Prerequisite(s): IMD 430; SUR 430; and Consent of Instructor. 4-week rotation designed as broad overview of PM&R practice for students interested in residency training in the specialty. Emphasis on evaluation and conservative treatment of spinal disorders, sports injuries, neuromuscular disease, neurological and non-operative orthopedic problems requiring rehabilitative management. (H/P/F grading only.) Effective: 2008 Winter Quarter.

PMR 462—Rehabilitation Medicine Clinical Elective (5-18)
Clinical Activity. Prerequisite(s): IMD 430; SUR 430; and Consent of Instructor. Completion of third year in Medical School. Emphasis on evaluation of patients with neurological or orthopaedic problems requiring rehabilitative techniques for their management. Introduction to management of such patients. Physical Medicine and Rehabilitation at off-campus facility must be approved by Chairperson. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PMR 470—Away Acting Internship in Physical Medicine & Rehabilitation (3-6)
Clinical Activity. Prerequisite(s): Consent of Instructor. AI Externship option for PM&R rotations at other institutions. May be repeated for credit. (H/P/F grading only.) Effective: 2018 Spring Quarter.

PMR 493—Applied Musculoskeletal Anatomy: Sports & Spine SSM (6)
Clinical Activity—4 hours; Laboratory—16 hours; Lecture—5 hours; Lecture/Lab—10 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. This four week module will review the anatomy and biomechanics of the musculoskeletal system as well as its associated pathology. The students will be instructed on appropriate musculoskeletal exam techniques and logical approach to the patient in the clinical setting. (H/P/F grading only.) Effective: 2008 Winter Quarter.

PMR 498—Advanced Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Study and experience for medical students in any of a number of areas in physical medicine and rehabilitation. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PMR 499—Research for Medical Students (1-12)
Variable. Prerequisite(s): Consent of Instructor. Research on any of a variety of topics in physical medicine and rehabilitation. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

POL Political Science

Courses in POL:

POL 001—American National Government (4)
Discussion—1 hour; Lecture—3 hours. Survey of American national government, including the constitutional system, political culture, parties, elections, the presidency, Congress, and the courts. GE credit: ACGH, SS, WE. Effective: 1997 Winter Quarter.

POL 002—Introduction to Comparative Politics (4)
Discussion—1 hour; Lecture—3 hours. Introduction to basic concepts in political analysis and application of them in comparative studies of selected countries. Coverage is given to cultural and other informal dimensions of politics as well as to more formal political and governmental structures. GE credit: SS, WC, WE. Effective: 1997 Winter Quarter.

POL 003—International Relations (4)
Discussion—1 hour; Lecture—3 hours. International conflict and cooperation, including the Cold War, nuclear weapons, and new techniques for understanding international politics. GE credit: SS, WC, WE. Effective: 2011 Fall Quarter.

POL 004—Basic Concepts in Political Theory (4)
Discussion—1 hour; Lecture—3 hours. Analysis of such concepts as the individual, community, liberty, equality, justice, and natural law as developed in the works of the major political philosophers. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

POL 005—Contemporary Problems of the American Political System (4)
Discussion—1 hour; Lecture—3 hours. In-depth treatment of selected problems and issues of American politics, governmental institutions, and policies. GE credit: ACGH, SS, WE. Effective: 1997 Winter Quarter.

POL 007—Contemporary Issues in Law and Politics (4)
Seminar—4 hours. Limited enrollment; open to students having no more than 40.1 units. Seminar focusing on the political dimensions of American law and institutions. Examines the role of courts in resolving contemporary issues of law and politics including abortion, capital punishment, and civil rights. GE credit: ACGH, SS, WE. Effective: 1997 Winter Quarter.

POL 011A—America Decides: Who Will Win This Year's Election? (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Survey of factors influencing presidential and congressional elections. Analysis of candidate nominations, campaign strategy, campaign finance, media coverage, and voter decision-making. GE credit: ACGH, SS, WE. Effective: 2016 Fall Quarter.

POL 011B—Citizen Lawmaking: Direct Democracy, Public Policy & Political Representation in America (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Analysis of direct participation by citizens in the lawmaking process. GE credit: ACGH, SS, WE. Effective: 2016 Fall Quarter.

POL 011C—Politics and Film (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Survey of portrayals of politics and policy issues in moving pictures. Analysis of political processes, policy development, social mores, and historical periods as highlighted in Hollywood movies, television, and/or documentary films. GE credit: ACGH, SS, VL, WE. Effective: 2016 Fall Quarter.

POL 011D—Political Persuasion (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Examination of political influence and persuasion. GE credit: SS, WE. Effective: 2016 Fall Quarter.

POL 012A—Politics and Sports (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Core issues in American and world politics through the lens of sports and the athletes who play them. The introduction of American civil rights movement, the Cold War, Middle East Tensions, and democratization. GE credit: SS, WE. Effective: 2016 Fall Quarter.

POL 012B—Climate Change and Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Analysis of political institutions' response and adaptation to climate change. GE credit: SS, WE. Effective: 2016 Fall Quarter.

POL 012Y—Data Visualization in the Social Sciences (4)
Laboratory—1.5 hours; Lecture—2 hours; Web Virtual Lecture—1.5 hours. Introduction to quantitative data across the social sciences (Communications, Political Science, Psychology, Sociology, and other disciplines). Transforming data, describing data, producing graphs, visual reasoning, and interpretations. (Same course as Communications 12Y, Sociology 12Y, Psychology 12Y.) GE credit: QL, VL. Effective: 2016 Spring Quarter.

POL 051—Scientific Study of Politics (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the basic principles of the scientific study of politics. Research design and empirical analysis of data with applications to different methodological approaches and different substantive areas in political science. GE credit: AH, QL, SE, SS, VL, WE. Effective: 2006 Fall Quarter.

POL 090X—Lower Division Seminar (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Limited enrollment. Examines fundamental issues and concepts that shape the study and practice of politics. Students will read, discuss and write about some of the most significant texts in political science in order to develop a foundation for the study of politics. Effective: 1997 Winter Quarter.

POL 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

POL 100—Local Government and Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Politics and government of local communities in the United States, including cities, counties and special districts. Emphasizes sources and varieties of community conflict, legislative and executive patterns, expertise, decision making and the politics of structure. Observation of local governing boards. GE credit: ACGH, SS, WE. Effective: 2016 Spring Quarter.

POL 102—Urban Public Policy (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 001 recommended. Political and economic relationships among central cities, suburbs, and regional, state, and federal governments. Focuses upon policy areas such as poverty, transportation, welfare, and housing, and upon who governs and who benefits from the policies in these areas. GE credit: ACGH, DD, QL, SS, WE. Effective: 2016 Spring Quarter.

POL 104—California State Government and Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 001 recommended. California political system. Political culture, constitution, elections and parties, direct democracy, legislature, governor, executive branch, courts, finances, state-local relations and policy issues. GE credit: ACGH, SS, WE. Effective: 2016 Spring Quarter.

POL 105—The Legislative Process (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Legislative process with emphasis on the United States Congress; legislative organization and procedures, legislative leadership and policy making, legislators and constituents, relations between Congress and other agencies. GE credit: ACGH, SS, WE. Effective: 2016 Spring Quarter.

POL 106—The Presidency (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. American presidencies origins and development; presidential power and influence as manifest in relationships with Congress, courts, parties, and the public in the formulation and administration of foreign and domestic policy; nominations, campaigns, and elections. GE credit: ACGH, SS, WE. Effective: 2016 Spring Quarter.

POL 107—Environmental Politics and Administration (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Environment as a political issue in the United States. Development of administrative mechanisms for handling environmental problems. Changing role of Congress, the presidency, the bureaucracy and the courts in environmental policy formulation and implementation. GE credit: ACGH, QL, SS, WE. Effective: 2016 Spring Quarter.

POL 108—Policy Making in the Public Sector (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 001 recommended. Theoretical rationale for governmental activity, program evaluation, PPBS, positive theories of policy making, the quantitative study of policy determinants, implementation, and proposals for improved decision making. GE credit: ACGH, QL, SS, WE. Effective: 2016 Spring Quarter.

POL 109—Public Policy and the Governmental Process (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Processes of formulating public policy, including individual and collective decision making, political exchange, competition, bargaining, coalition formation and the allocation of public goods, resources and opportunities. GE credit: ACGH, QL, SS, WE. Effective: 2016 Spring Quarter.

POL 110—The Strategy of Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Introduction to game theory. Explanation of the behavior of individuals in strategic interaction. Rational and behavioral approaches. Applications to political science and other fields. GE credit: QL, SS, WE. Effective: 2016 Spring Quarter.

POL 112—Contemporary Democratic Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 004 recommended. Major contemporary attempts to reformulate traditional democratic theory, attempts to replace traditional theory by conceptual models derived from modern social science findings. GE credit: AH, SS, WE. Effective: 2016 Spring Quarter.

POL 113—American Political Thought (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 004 recommended. Origins and nature of American political thought. Principles of American thought as they emerge from the founding period to the present. GE credit: ACGH, AH, SS, WE. Effective: 2016 Spring Quarter.

POL 114—Quantitative Analysis of Political Data (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 051 recommended. Logic and methods of analyzing quantitative political data. Topics covered include central tendency, probability, correlation, and non-parametric statistics. Particular emphasis will be placed on understanding the use of statistics in political science research. GE credit: AH, QL, SE, SS, VL, WE. Effective: 2016 Spring Quarter.

POL 115—Medieval Political Thought (4)
Lecture—3 hours; Term Paper. Prerequisite(s): POL 004 recommended. Examination of the ideas central to medieval political thinking. Emphasis will be upon the thoughts of the major political thinkers of the period, rather than upon political history. GE credit: AH, SS, WE. Effective: 2016 Spring Quarter.

POL 116—Foundations of Political Thought (4)
Lecture/Discussion—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 004 recommended. Analysis and evaluation of the seminal works of a major political philosopher or of a major problem in political philosophy. May be repeated up to 1 time(s) when topic differs. GE credit: AH, SS, WC, WE. Effective: 2016 Spring Quarter.

POL 117—Topics in the History of Political Thought (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 004 recommended. Political thought of a specific historical period. Topics may include: Ancient Athens, the Italian Renaissance, the Enlightenment, or Nineteenth Century Germany. May be repeated up to 1 time(s) when topics differ. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 118A—History of Political Theory: Ancient (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 004 recommended. Critical analyses of classical and medieval political philosophers such as Plato, Aristotle, Cicero and St. Thomas. GE credit: AH, SS, WC, WE. Effective: 2016 Spring Quarter.

POL 118B—History of Political Theory: Early Modern (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 004 recommended. Critical analysis of the works of early modern political philosophers such as Machiavelli, Montaigne, Hobbes, Locke and Hume. GE credit: AH, SS, WC, WE. Effective: 2016 Spring Quarter.

POL 118C—History of Political Theory: Late Modern (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 004 recommended. Critical analyses of the works of late modern political philosophers such as Rousseau, Kant, Hegel, Tocqueville, Mill, Marx and Nietzsche. GE credit: AH, SS, WC, WE. Effective: 2016 Spring Quarter.

POL 119—Contemporary Political Thought (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 004 recommended. Contemporary political thought from the end of the nineteenth century to the present. Emphasis upon an individual philosopher, concept, or philosophical movement; e.g., Nietzsche, Continental political thought, Rawls and critics, theories of distributive justice, feminist theory. GE credit: AH, SS, WC, WE. Effective: 2016 Spring Quarter.

POL 120—Theories of International Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 003 recommended. Major contemporary approaches to the study of international politics, including balance of power, game theory, Marxist-Leninist theory, systems theory, and decision-making analysis. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 121—Scientific Study of War (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 003 recommended. Analysis of political processes involved in the initiation, conduct and termination of modern interstate warfare. GE credit: QL, SS, WE. Effective: 2016 Spring Quarter.

POL 122—International Law (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 003 recommended. Selected topics in international law; territory, sovereign immunity, responsibility, the peaceful settlement or nonsettlement of international disputes. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 123—The Politics of Interdependence (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 003 recommended. In the past several decades, growing economic interdependence has generated new problems in international relations. Course deals with difficulties in managing complex interdependence and its implication on national policies and politics. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 124—The Politics of Global Inequality (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 003 recommended. Analysis of current economic and political international relations resulting from a long standing division of the global system into rich and poor regions. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 126—Ethnic Self-Determination and International Conflict (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 003 recommended. Compares the claims of the state and ethnic peoples in countries undergoing internal conflicts; e.g., South Africa, Northern Ireland. Analyzes the role of the international community in facilitating the peaceful resolution of conflicts. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 129—Special Studies in International Politics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): POL 003 recommended. Intensive examination of one or more special problems in international politics. May be repeated once for credit when different topic is studied. May be repeated up to 1 time(s). GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 130—Recent U.S. Foreign Policy (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 003 recommended. Broad survey of the development of U.S. foreign policy in twentieth century with emphasis on transformation of policy during and after World War II, and the introduction to analytic tools and concepts useful for understanding of current foreign policy issues. GE credit: ACGH, SS, WE. Effective: 2016 Spring Quarter.

POL 131—Analysis of U.S. Foreign Policy (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. POL 003 recommended. Detailed presentation and examination of the formulation of execution of U.S. foreign policy. Survey of numerous factors influencing policy outcomes and how such determinants vary according to policy issue areas. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 132—National Security Policy (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 003 recommended. Development of national security policies since 1945. Analysis of deterrence and assumptions upon which it is based. Effects of nuclear weapons upon conduct of war, alliance systems, and the international system. Prospects of security and stability through arms control. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 134—Africa and U.S. Foreign Policy (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. POL 003 recommended. Overview of American foreign policy toward Africa. Relationship to global adversaries. Legacies of colonialism. Challenge of national self-determination and white racism. Policies on non-alignment, producer cartels, multinational corporations, continental integration and trade and aid relations. Effective: 2016 Spring Quarter.

POL 135—International Politics of the Middle East (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 003 recommended. International politics of the Middle East as a microcosm of world politics. The Middle East as a regional system. Domestic and International Politics in the Middle East. Changing Political Structures in the Middle East. Superpower involvement in the Middle East. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 136—The Arab-Israeli Conflict (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 003 recommended. Causes, course, and implications of Arab-Israeli conflict. Competing Israeli and Arab narratives, politics of force, diplomacy. Domestic politics and A-I conflict, the superpowers and the A-I conflict, A-I conflict and world politics, potential solutions. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 137—International Relations in Western Europe (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 003 recommended. Analysis of European unity, problems of the Atlantic alliance, Atlantic political economy, East-West relations, communism in Western Europe and the relationship between domestic politics and foreign policy. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 139—Special Studies in Foreign Policy (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. POL 003 recommended. Extensive examination of one or more special problems in foreign policy. May be repeated up to 1 time(s) when topic differs. Effective: 2016 Spring Quarter.

POL 140A—Comparative Political Institutions: Electoral Systems (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 002 recommended. Workings of electoral institutions, focusing on systems used to elect presidents and assemblies, pass laws, and generally make decisions. Examples from systems throughout the world, including cases from both the advanced industrial and developing worlds. GE credit: QL, SS, WE. Effective: 2016 Spring Quarter.

POL 140B—Comparative Political Institutions: Parties (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 002 recommended. Factors shaping political parties and their role in democratic representation. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 140C—Comparative Political Institutions: Legislatures (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 002 recommended. Examination of legislatures from a comparative perspective. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 140D—When Institutions Fail (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 002 recommended. Examination of factors contributing to the success and failure of political institutions. GE credit: QL, SS, WE. Effective: 2016 Spring Quarter.

POL 140E—Policy-Making Processes (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 002 recommended. Comparative analysis of policy-making in the U.S. and other countries. GE credit: QL, SS, WE. Effective: 2016 Spring Quarter.

POL 142A—Comparative Development: Political Development in Modernizing Societies (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 002 recommended. Nature and sequence of political development; its economic and social concomitants; role of elites, military, bureaucracy, and party systems; social stratification and group politics; social mobilization and political participation; instability, violence, and the politics of integration. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 142B—Comparative Development: Politics and Inequality (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 002 recommended. Linkages between politics and the distribution of social and economic goods. Impact of civil rights legislation, the politics of welfare states, and the effects of political participation on the distribution of goods. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 142C—Comparative Political Development: Democracy and Democratization (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 002 recommended. Examination of conditions promoting democratization and democratic stability. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 143A—Latin American Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 002 recommended. Issues related to democratic consolidation in Latin America, with a regional focus on South America. Topics include transitions to democracy, the role of the military, political economy, and political behavior. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 143B—Mexican Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 002 recommended. Introduction to the politics of contemporary Mexico. Focus on rise, fall, and aftermath of Mexico's one-party dominant system. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 144A—Politics of Post-Communist Countries: East European Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 002 recommended. Post-war democratization, state-building and economic reform in East European states. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 144B—Politics of Post-Communist Countries: Russia (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 002 recommended. Democratization, state-building and economic reform; creation of new institutions; impacts of Soviet rule. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 146A—Politics of Africa: Issues in Contemporary African Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 002 recommended. African politics since the end of the Cold War. Topics include: Strategic Security Approach, Democratization, Human Rights, HIV/AIDS, African Peacekeeping, Terrorism, Religious and Ethnic Conflict, Debt and Stalled Development. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 146B—Politics of Africa: Development in Africa (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 002 recommended. Political and economic development within Sub-Saharan Africa. States and institutions, democracy, party systems, military coups/rule, bureaucracy/corruption, race/ethnicity, national/regional integrations, trade unions, economic development strategies, class formation, and women's roles and ideology. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 147A—West European Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 002 recommended. Evolution, politics, and contemporary problems of selected political systems of Western Europe. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 147B—West European Politics: British Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 002 recommended. Evolution, politics, and contemporary problems of Britain's political system. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 147C—West European Politics: French Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 002 recommended. Evolution, politics and contemporary problems of France's political system. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 147D—West European Politics: German Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 002 recommended. Evolution, politics and contemporary problems of Germany's political system. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 148A—Government and Politics of East Asia: China (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 002 recommended. Evolution of political institutions and political culture in China with emphasis on the post-1949 period. Primary attention to nationalism, modernization and political efficacy. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 148B—Government and Politics in East Asia: Japan (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 002 recommended. Japanese politics, with an emphasis on the postwar period. Particular emphasis on political parties, elections, political economy, and social problems. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 148C—Government and Politics in East Asia: Southeast Asia (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 002 recommended. Evolution of political institutions and economy of selected nations in Southeast Asia. Emphasis on imperialist legacy, nation building in multi-ethnic communities, and contrasts in economic performance. GE credit: SS, WC, WE. Effective: 2016 Spring Quarter.

POL 150—Judicial Politics and Constitutional Interpretation (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Politics of judicial policy making , issues surrounding constitutional interpretation and decision making, prerequisite for courses on the politics of constitutional law. GE credit: ACGH, DD, SS, WE. Effective: 2016 Spring Quarter.

POL 151—The Constitutional Politics of the First Amendment and the Right to Privacy. (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Constitutional politics surrounding such issues as the right to free expression, associational rights, the right to free exercise of religious beliefs and the right to privacy. GE credit: ACGH, DD, SS, WE. Effective: 2016 Spring Quarter.

POL 152—The Constitutional Politics of the Equality (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Constitutional politics of equality in the American political system; issues surrounding constitutional doctrine and judicial policymaking; special attention on racial and sexual equality. GE credit: ACGH, DD, SS, WE. Effective: 2016 Fall Quarter.

POL 153—The Constitutional Politics of the Justice System (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Constitutional politics of the American criminal justice system. Issues surrounding constitutional doctrine and judicial policymaking on issues such as search and seizure. Arrest, trial, incarceration and other issues of due process. GE credit: ACGH, DD, SS, WE. Effective: 2016 Spring Quarter.

POL 154—Legal Philosophy (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Analysis of the nature and functions of law; law as an instrument of social control and the relationship between law and morality. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 155—Judicial Process and Behavior (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Analysis of the behavior of judges and courts in the political process.
Techniques of judicial decision making. Relationships among courts and other decision-making bodies. GE credit: ACGH, SS, WE. Effective: 2016 Spring Quarter.

POL 160—American Political Parties (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Analysis of the structured operations of the party system in the United States; party functions and organizations, nomination processes, campaigns and elections, party trends and reforms. GE credit: ACGH, DD, QL, SS, WE. Effective: 2016 Fall Quarter.

POL 162—Elections and Voting Behavior (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Analysis of American elections and partisan behavior; political socialization, political participation, partisanship and individual and group determinants of voting. GE credit: ACGH, DD, SS, WE. Effective: 2016 Spring Quarter.

POL 163—Group Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Groups, institutions and individuals, especially in American politics. Historical and analytical treatment of group theories as applied to interest groups (especially labor, business, agriculture, science, military); to racial, ethnic and sectional groups; to parties, public and legislative groups, bureaucracies. GE credit: ACGH, DD, SS, WE. Effective: 2016 Spring Quarter.

POL 164—Public Opinion (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 001 recommended. Nature of public opinion in America as it is supposed to be and as it is. Distribution of opinions among different publics and the significance of that distribution for system stability and institutions. Opinion polling and its problems. GE credit: ACGH, DD, SS, WE. Effective: 2016 Spring Quarter.

POL 165—Mass Media and Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Organization of and decision making within the media; media audiences and the effect of the media on attitudes and behavior; the relationship of the government to the media (censorship, secrecy, freedom of the press, government regulation);the media in election campaigns. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 166—Women in Politics (4)
Discussion—1 hour; Lecture—3 hours; Seminar—1 hour. Prerequisite(s): POL 001 recommended. Role of women in American politics. Historical experiences; contemporary organizations and strategies; areas of legislative concern; the impact of differences in social class, race, and ethnicity upon the involvement of women in politics. GE credit: ACGH, DD, SS, WE. Effective: 2016 Fall Quarter.

POL 168—Chicano Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Political aspects of Chicano life in America; examines the Chicano's political role as it has been historically defined by different groups in society and the Chicano's responses to his/her political environment. GE credit: ACGH, DD, SS, WE. Effective: 2016 Spring Quarter.

POL 170—Political Psychology (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Overview to the growing literature on political psychology. Introduction to how psychological concepts (personality, attitudes, stereotypes, heuristics, affect, identity, group dynamics) help us understand how citizens think about politics. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 171—The Politics of Energy (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Nature and performance of political processes for making energy choices at the international, national and state levels. Interaction of energy policy with other political goals and the ability of governmental institutions to overcome constraints on policy innovation. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 172—American Political Development (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Systematic analysis of contemporary issues in American political development: historical determinants of political change; the timing and character of institutional development; conditions for successful political action. Democratization, cultural change, party formation, state-building, constitutionalism, race relations. GE credit: ACGH, DD, SS, WE. Effective: 2016 Spring Quarter.

POL 174—Government and the Economy (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Political basis of economic policy (taxation, spending and regulation); impact of prices, employment and growth on political demands; elite responses to economic conditions; policy alternatives and the public interest. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 175—Science, Technology, and Policy (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 001 recommended. Analysis of policymaking for science and the use of scientific expertise for making decisions about technology. Topics include funding of basic research, relationship of science to technological development, science and military policy, technological risks, technology assessment and scientists and politics. GE credit: QL, SS, WE. Effective: 2016 Spring Quarter.

POL 176—Racial Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Race, racial attitudes and racial policies in the United States with a specific emphasis on African Americans. GE credit: ACGH, DD, SS, WE. Effective: 2016 Spring Quarter.

POL 179—Special Studies in Comparative Politics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 002 recommended. Intensive examination of one or more special problems appropriate to comparative politics. Coverage is given to formal and informal political institutions, economically developing and developed countries, and non-democratic, democratic, and democratizing countries. May be repeated up to 1 time(s). GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 180—Bureaucracy in Modern Society (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 001 or POL 002 recommended. Role of bureaucracy in a complex society, with emphasis upon changing relationships between government and the economy; consequences of rapid technological and social change for bureaucratic structures and processes; the problems of reconciling expertise and democracy and increasing the responsiveness of public bureaucracy. GE credit: ACGH, SS, WE. Effective: 2016 Spring Quarter.

POL 183—Administrative Behavior (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 001 recommended. Implications for American public administration of evolving concepts about behavior in organizations. GE credit: ACGH, SS, WE. Effective: 2016 Spring Quarter.

POL 187—Administrative Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): POL 004 recommended. Historical and critical analysis of the principal theories of organization and management of public agencies in light of such concepts as decision making, bureaucracy, authority and power, communication and control; examination of role of government bureaucracies in the total society. GE credit: SS, WE. Effective: 2016 Spring Quarter.

POL 190—International Relations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Consent of Instructor. POL 003 recommended. Analysis and evaluation of substantive issues in contemporary international relations. Readings drawn from current academic and non-academic periodicals. GE credit: SS, WE. Effective: 2016 Fall Quarter.

POL 192A—Internship in Public Affairs (5)
Variable. Prerequisite(s): Enrollment dependent on availability of intern positions with highest priority assigned to students with Political Science Public Service major; upper division standing. Supervised internship and study in political, governmental, or related organizations. (P/NP grading only.) GE credit: ACGH, SS, WE. Effective: 1997 Winter Quarter.

POL 192B—Internship in Public Affairs (5)
Variable. Prerequisite(s): POL 192A; Enrollment dependent on availability of intern positions with highest priority assigned to students with Political Science-Public Service major; upper division standing. Supervised internship and study in political, governmental, or related organizations. (P/NP grading only.) GE credit: ACGH, SS, WE. Effective: 1997 Winter Quarter.

POL 193—Research in Practical Politics (2)
Project (Term Project)—6 hours. Prerequisite(s): POL 192A; POL 192B; Open only to Political Science-Public Service majors, for whom it is required. Supervised preparation of an extensive paper relating internship experience to concepts, literature, and theory of political science. GE credit: SS, WE. Effective: 1997 Winter Quarter.

POL 193W—Washington Center Research Seminar (4)
Independent Study—3 hours; Lecture/Discussion—1 hour; Tutorial—0.5 hours. Prerequisite(s): POL 192W (can be concurrent); POL 192W required concurrently. Core academic component of Washington Program. Topics coordinated with internships. Research draws on resources uniquely available in Washington, DC. Supervised preparation of extensive paper. (Same course as UC Davis Washington Center 193.) GE credit: OL, SS, WE. Effective: 2002 Spring Quarter.

POL 194HA—Special Study for Honors Students (4)
Independent Study—2 hours; Seminar—2 hours. Prerequisite(s): Major in Politcal Science with upper division standing and a GPA of 3.500 in the major. Directed reading, research and writing culminating in preparation of a senior honors thesis under the direction of faculty advisor. GE credit: OL, SS, VL, WE. Effective: 2002 Fall Quarter.

POL 194HB—Special Study for Honors Students (4)
Independent Study—2 hours; Seminar—2 hours. Prerequisite(s): Major in Political Science with upper division standing and a GPA of 3.500 in the major. Directed reading, research and writing culminating in preparation of a senior honors thesis under the direction of faculty advisor. GE credit: OL, SS, VL, WE. Effective: 2002 Fall Quarter.

POL 195—Special Studies in American Politics (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Intensive examination of one or more special problems appropriate to
American politics. May be repeated up to 1 time(s) when topic differs. GE credit: ACGH, SS, WE. Effective: 1997 Winter Quarter.

POL 196A—Seminar in American Politics (4)
Seminar—3 hours; Term Paper—1 hour. Prerequisite(s): Upper division Political Science majors or consent of instructor. Intensive reading, discussion, research, writing in American politics. Topics may include Congress, the Presidency, the Supreme Court, federalism, voting behavior, interest groups, ethnic groups or other topics with a more specialized content than normal course offerings. May be repeated up to 1 time(s) when topic differs. GE credit: ACGH, SS, WE. Effective: 2002 Fall Quarter.

POL 196B—Seminar in Comparative Politics (4)
Seminar—3 hours; Term Paper—1 hour. Prerequisite(s): Upper division Political Science majors or consent of instructor. Intensive reading, discussion, research, writing in comparative politics. Topics may include one country or geographical area, political institutions or behavior across countries, political development, or other topics that are more specialized than normal course offerings. May be repeated up to 1 time(s) topic differs. GE credit: SS, WE. Effective: 2002 Fall Quarter.

POL 196C—Seminar in International Relations (4)
Seminar—3 hours; Term Paper—1 hour. Prerequisite(s): Upper division Political Science majors or consent of instructor. Intensive reading, discussion, research, writing in international relations including study of international political institutions (UN, EU, or NATO) or interstate relations (war, trade, immigration) and other topics with more specialized content than normal course offerings. May be repeated up to 1 time(s) topic differs. GE credit: SS, WE. Effective: 2002 Fall Quarter.

POL 196D—Seminar in Political Theory (4)
Seminar—3 hours; Term Paper—1 hour. Prerequisite(s): Upper division Political Science majors or consent of instructor. Intensive reading, discussion, research, writing in political theory. Topics may include study of a single political thinker, a group of related thinkers, development of political concepts, or other topics with more specialized content than normal course offerings. May be repeated up to 1 time(s) topic differs. GE credit: SS, WE. Effective: 2002 Fall Quarter.

POL 196E—Seminar in Research Methods (4)
Seminar—3 hours; Term Paper—1 hour. Prerequisite(s): Upper division Political Science majors or consent of instructor. Intensive reading, discussion, research, and writing in selected topics in Research Methods such as research design, statistics, game theory, etc. May be repeated up to 1 time(s) topic differs. GE credit: QL, SS, VL, WE. Effective: 2002 Fall Quarter.

POL 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Fall Quarter.

POL 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

POL 201—Urban Government and Politics (4)
Seminar—4 hours. Survey and analysis of the literature in the field of local government and politics in the United States. Approaches to the study of political
reform, local autonomy, community power, representation, expertise, service delivery, policymaking and political change. Effective: 1997 Winter Quarter.

POL 202—American State Government and Politics (4)
Seminar—4 hours. Survey and analysis of the literature in the field of state government, politics, and policy. Approaches to the study of the American states as political systems, including their governing institutions and processes and their role in the Federal system. Effective: 1997 Winter Quarter.

POL 203A—American Government: The Presidency (4)
Seminar—3 hours; Term Paper. Restricted to graduate students only. Thorough overview of the current research on political executives, with particular emphasis on the American presidency. Two principal goals: the development of important and innovative student research programs; and adequate preparation for qualifying examinations. Effective: 2011 Spring Quarter.

POL 203B—American Government: Congress (4)
Seminar—3 hours; Term Paper. Restricted to graduate students only. Thorough overview of the current research on Congress, with particular emphasis on political representation. Two principal goals: the development of important and innovative student research programs; and adequate preparation for qualifying examinations. Effective: 2011 Spring Quarter.

POL 203C—American Government: Courts (4)
Seminar—4 hours. Survey and analysis of the literature in the field of American government with a focus on courts. Emphasis on the development and testing of theories of behavior and processes. Effective: 1997 Winter Quarter.

POL 207—Environmental Public Policy (4)
Seminar—4 hours. Analysis of the interface between the world of academic reflection about ecological and environmental problems and the world of political action. Evaluation of alternative approaches to policy analysis and recommendation. Individual research, including field research, will parallel discussion of the literature. Effective: 1997 Winter Quarter.

POL 208—Policy Analysis (4)
Seminar—4 hours. Social science techniques applied to public policy formation and evaluation. Effective: 1997 Winter Quarter.

POL 209—The American Political System (4)
Seminar—3 hours; Term Paper. Restricted to graduate students only. Analysis of selected theoretical and empirical issues posed by contemporary research in American government and politics. Effective: 2011 Spring Quarter.

POL 210—Research Design in Political Science (4)
Discussion/Laboratory—1 hour; Seminar—3 hours. Prerequisite(s): Graduate standing. Introduction to philosophy of science and research design for political science. Topics include: logic of empirical research, overview of research design approaches for political science research. Effective: 2006 Winter Quarter.

POL 211—Research Methods in Political Science (4)
Discussion/Laboratory—1 hour; Seminar—3 hours. Prerequisite(s): Graduate standing. Pass One open to graduate majors; Pass Two open to graduate students. Introductory seminar on the foundations of probability theory and mathematical statistics that are critical to empirical investigations in political science. Effective: 2015 Winter Quarter.

POL 212—Quantitative Analysis in Political Science I (4)
Discussion/Laboratory—1 hour; Seminar—3 hours. Prerequisite(s): POL 211 Pass One open to graduate majors; Pass Two open to graduate students. Seminar provides students with an introduction to the linear regression model. Students who complete the course will have a working knowledge of basic regression techniques and problems. Effective: 2015 Winter Quarter.

POL 213—Quantitative Analysis in Political Science II (4)
Seminar—3 hours; Term Paper. Prerequisite(s): POL 211; POL 212 Pass One open to graduate majors; pass 2 open to graduate students. More advanced topics in the use of statistical methods, with emphasis on political applications. Topics include: properties of least squares estimates, problems in multiple regression, and advanced topics (probit analysis, simultaneous models, time-series analysis, etc.). Effective: 2011 Fall Quarter.

POL 214A—Research in Political Science (4)
Discussion—2 hours; Lecture—1 hour; Term Paper. Prerequisite(s): POL 213 Advanced level graduate students in the Department of Political Science only. Research seminar sequence required of all PhD students. Design, execution, and defense of an original piece of research in political science, culminating in a paper of publishable quality. Effective: 2004 Spring Quarter.

POL 214B—Research in Political Science (4)
Discussion—2 hours; Lecture—1 hour; Term Paper. Prerequisite(s): POL 212; POL 214A Advanced level graduate students in the Department of Political Science only. Research seminar sequence required of all PhD students. Design, execution, and defense of an original piece of research in political science, culminating in a paper of publishable quality. Effective: 2006 Winter Quarter.

POL 215—Introduction to Modeling Political Behavior (4)
Seminar—3 hours; Term Paper. Prerequisite(s): POL 211; POL 212 Pass One open to graduate majors; pass 2 open to graduate students. Introduction to formal and game theoretic analyses of politics. Students will learn basic game theory and modeling skills. We examine the benefits of modeling, and look at examples of formal analysis in a variety of political science sub-fields. Effective: 2011 Fall Quarter.

POL 216—Qualitative Research Methods (4)
Seminar—3 hours; Term Paper—1 hour. Methodology for utilizing theoretically-oriented case studies and controlled comparison of a small number of cases to develop and test theories. Examination of how the case study method compliments experimental, statistical and deductive modes of research. Effective: 2000 Winter Quarter.

POL 217—Social Choice Theory and Spatial Modeling (4)
Seminar—4 hours. Introduction to social choice theory and formal spatial modeling including Arrows Theorem, the paradox of voting, cycling and agenda control. Focus on mastering modeling techniques as well as interpretation of classic works. Effective: 1998 Winter Quarter.

POL 218—Topics in Political Theory (4)
Seminar—3 hours; Term Paper. Topics vary and may be the work of a single theorist, time period, or political concept, such as justice. May be repeated up to 3 time(s) when topic differs. Effective: 2011 Fall Quarter.

POL 219A—Political Theory Sequence (4) ***Review all entries***
Seminar—3 hours; Term Paper. Survey of the great works in ancient and medieval political theory including such writers as Plato, Aristotle, Cicero, St. Augustine, Aquinas, Alfarabi and Marsilius. Discussion of various interpretations of these authors. Effective: 1997 Winter Quarter.

POL 219A—Political Theory Sequence (4) ***Review all entries***
Seminar—3 hours; Term Paper. Survey of the great works in ancient and medieval political theory including such writers as Plato, Aristotle, Cicero, St. Augustine, Aquinas, Alfarabi and Marsilius. Discussions of various interpretations of these authors. May be repeated for credit if topic differs. Effective: 2018 Fall Quarter.

POL 219B—Political Theory Sequence (4) ***Review all entries***
Seminar—3 hours; Term Paper. Survey of the great works in early modern to contemporary political theory including such writers as Machiavelli, Hobbes, Locke, Rousseau, Marx, Mill, Nietzsche, and Rawls. Discussion of various interpretations of these authors. Effective: 1997 Winter Quarter.

POL 219B—Political Theory Sequence (4) ***Review all entries***
Seminar—3 hours; Term Paper. Survey of the great works in early modern to contemporary political theory including such writers as Machiavelli, Hobbes, Locke, Rousseau, Marx, Mill, Nietzsche, and Rawls. Discussion of various interpretations of these authors. May be repeated for credit if topic differs. Effective: 2018 Fall Quarter.

POL 219C—Contemporary Political Theory (4)
Seminar—3 hours; Term Paper—1 hour. Survey of important works in contemporary political theory including such writers as Nietzsche, Heidegger, Arendt, Rawls, Nozick, Sandel. May be repeated for credit topic differs. Effective: 2004 Fall Quarter.

POL 220—Seminar in Political Theory (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Open to graduate students only. Introduction to political theory and current debates over its study. Readings from and textual interpretations of political theory including the Federalist Papers and major works by thinkers such as Plato, Aristotle, Machiavelli, Hobbes, Locke, Rousseau, and Rawls. Other readings addressing issues of textual interpretation. Effective: 2003 Fall Quarter.

POL 223—International Relations (4)
Seminar—3 hours; Term Paper. Effective: 1997 Winter Quarter.

POL 225—The International System (4)
Seminar—3 hours; Term Paper. Analysis of the international system by means of theory formulation and
integration; critique of research designs; use of various techniques of data generation and analysis. Effective: 1997 Winter Quarter.

POL 226—Seminar in International Political Economy (4)
Seminar—3 hours; Term Paper. Restricted to graduate students. Research in international political economy. Structure of the global economy, as well as specific dimensions of international economic relations, including trade, capital flows, global production structures, and migration. Effective: 2011 Spring Quarter.

POL 230—American Foreign Policy (4)
Seminar—3 hours; Term Paper. Effective: 1997 Winter Quarter.

POL 231—U.S. Political Culture and Foreign Relations (4)
Seminar—3 hours; Term Paper. Relates U.S. political culture to formulation of foreign policy. Analyzes American ideological preferences in historical perspective, contemporary public opinion, decision making and implementation. Concludes by examining linkages between foreign policy behavior and
democratic process. Effective: 1997 Winter Quarter.

POL 241—Communist Political Systems (4)
Seminar—4 hours. Prerequisite(s): or Consent of Instructor. Or the equivalent. Systematic analysis of selected topics dealing with the political process of communist political systems. Effective: 1997 Winter Quarter.

POL 242—Seminar in Comparative Politics (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Systematic survey of theories and methods used in the study of comparative politics. Effective: 1997 Winter Quarter.

POL 243—Comparative Institutional Change (4)
Seminar—3 hours; Term Paper. Restricted to graduate students. Comparison of institutional changes in countries of the former Soviet Union and Eastern Europe during the period of transition to democracy. Special attention to institutions of mass representation - electoral and party systems and national legislatures. Effective: 2011 Spring Quarter.

POL 246—Policymaking in Third-World Societies (4)
Seminar—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Included in an analysis of policymaking process in Third-World countries are such topics as political resources, institutional resources, decision making, resource allocations, planning, and budgeting, implementation, and distribution of world resources. Effective: 1997 Winter Quarter.

POL 250—Policy Development and Impact in U.S. Courts (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Thorough overview of the literature regarding courts as policymaking institutions of government, with emphasis on the formation and implementation of judicial policy. Differences and similarities across the judicial, congressional, and executive branch policy processes. Effective: 1997 Winter Quarter.

POL 260—Political Parties (4)
Seminar—3 hours; Term Paper. Survey of selected topics in American and comparative parties. Effective: 1997 Winter Quarter.

POL 261—Political Behavior (4)
Seminar—3 hours; Term Paper. Survey of selected topics in political behavior and public opinion. May be repeated up to 3 time(s) when topic differs. Effective: 2011 Fall Quarter.

POL 274—Political Economy (4)
Seminar—3 hours; Term Paper. Restricted to graduate students. Politics of economic policy as reflected in taxation, spending and regulation; impact of prices, employment, and growth on political demands; government responses to economic conditions; electoral politics and the political business cycle. Effective: 2011 Spring Quarter.

POL 279—Political Networks: Methods and Applications (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Structure of political networks, socio-matrices and affiliation networks; general networks characteristics: density, centralization, polarization, interdependence, dyadic and triadic characteristics: structural and role equivalence; subsets of networks: cliques, blocks and bloc modeling; characteristics of individuals in networks: centrality and prestige. Effective: 2007 Fall Quarter.

POL 280—Bayesian Methods: for Social and Behavioral Sciences (4)
Seminar—3 hours; Term Paper. Prerequisite(s): POL 212; Or equivalent to course. Pass One open to graduate majors only; Pass Two open to graduate students. Methodology seminar introducing Bayesian quantitative methods to issues and problems in political science and other social and behavioral sciences. Effective: 2011 Fall Quarter.

POL 281—Statistical Computing Issues in Political Science (4)
Discussion/Laboratory—1 hour; Seminar—3 hours. Prerequisite(s): POL 213; Or equivalent to course. Restricted to graduate standing. Methodology seminar introducing computing issues in empirical models for political science and other social and behavioral sciences. Effective: 2005 Fall Quarter.

POL 282—Advanced Modeling of Political Behavior (4)
Seminar—3 hours; Term Paper—1 hour. Prerequisite(s): POL 215; Or equivalent to course. Restricted to graduate standing or with instructors permission. Applications of formal theory to political science. Review of relevant contributions in other social sciences. Consideration of advanced techniques in game theory. Rational and behavioral approaches. Effective: 2005 Fall Quarter.

POL 283—Organizational Behavior (4)
Seminar—4 hours. Organizational behavior as it relates to public sector decision making. Effective: 1997 Winter Quarter.

POL 284—Advanced Network Analysis (4)
Seminar—3 hours; Term Paper. Prerequisite(s): POL 211; POL 212; POL 279 Exponential Random Graph Models (ERGMS) of networks, game theoretic models of network formation and network dynamics, diffusion processes, shocks and network collapse, percolation, cross-network spillover processes, social and political applications of advanced network models. Effective: 2013 Fall Quarter.

POL 290A—Research in American Government and Public Policy (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Restricted to graduate students. Special research seminar on problems and issues in the study of American government and public policy. May be repeated up to 6 time(s) if topic differs. Effective: 2011 Spring Quarter.

POL 290B—Research in Political Theory (4)
Lecture—3 hours; Term Paper. Restricted to graduate students only. Special research seminar on problems and issues in the study of political theory. May be repeated up to 6 time(s) if topic varies. Effective: 2010 Spring Quarter.

POL 290C—Research in International Relations (4)
Lecture—3 hours; Term Paper. Restricted to graduate students only. Special research seminar on select problems and issues in the study of international relations. May be repeated up to 6 time(s) if topic varies. Effective: 2010 Spring Quarter.

POL 290D—Research in Judicial Politics (4)
Seminar—4 hours. Prerequisite(s): Graduate standing in Political Science or consent of instructor. Contemporary research on judicial politics, judicial institutions, jurisprudence, and judicial behavior. Effective: 1997 Winter Quarter.

POL 290E—Research in Political Parties, Politics, and Political Behavior (4)
Seminar—4 hours. Special research seminar on selected problems and issues in the study of political parties, politics, and political behavior. Effective: 1997 Winter Quarter.

POL 290F—Research in Comparative Government and Policy (4)
Lecture—3 hours; Term Paper. Restricted to graduate students only. Special research seminar on select problems and issues in the study of comparative government and policy. May be repeated up to 6 time(s) if topic varies. Effective: 2010 Spring Quarter.

POL 290G—Research in Methodology (4)
Lecture—3 hours; Term Paper. Prerequisite(s): POL 212 Special research seminar on selected problems and issues in methods in political science. May be repeated up to 3 time(s) topics vary. Effective: 2005 Fall Quarter.

POL 297—Internships in Political Science (2)
Seminar—2 hours. Prerequisite(s): Open only to persons who have internships or other positions in governmental agencies, political parties, etc. Application and evaluation of theoretical concepts through work experience or systematic observation in public and political agencies. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

POL 298—Group Study (1-5)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

POL 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

POL 299D—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

POL 390—The Teaching of Political Science (1)
Seminar—1 hour. Prerequisite(s): Graduate student standing in Political Science. Methods and problems of teaching political science at the undergraduate
level. (S/U grading only.) Effective: 1997 Winter Quarter.

POL 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

POR Portuguese

Courses in POR:

POR 001—Elementary Portuguese (5) ***Review all entries***
Laboratory—1 hour; Lecture/Discussion—5 hours. Introduction to Portuguese grammar and development of all language skills in a cultural context with special emphasis on communication. Students who have successfully completed Portuguese 2 or 3 in the 10th or higher grade of high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed. GE credit: WC. Effective: 2008 Fall Quarter.

POR 001—Elementary Portuguese (5) ***Review all entries***
Lecture/Discussion—5 hours. Introduction to Portuguese grammar and development of all language skills in a cultural context with special emphasis on communication. Students who have successfully completed POR 002 or POR 003 in the 10th or higher grade of high school may receive unit credit for this course on a P/NP grading basis only; although a passing grade will be charged to the student's P/NP option, no petition is required; all other students will receive a letter grade unless a P/NP petition is filed. GE credit: AH, WC. Effective: 2018 Fall Quarter.

POR 001A—Accelerated Intensive Elementary Portuguese (15)
Lecture/Discussion—15 hours. Intended for students who wish to complete three quarters of Portuguese 1, 2, and 3. Not open to students who have completed courses 1, 2 or 3. GE credit: WC. Effective: 2014 Spring Quarter.

POR 002—Elementary Portuguese (5) ***Review all entries***
Laboratory—1 hour; Lecture/Discussion—5 hours. Prerequisite(s): POR 001 Continuation of course 001 in the areas of grammar and development of all basic language skills in cultural context with special emphasis on communication. GE credit: WC. Effective: 2009 Winter Quarter.

POR 002—Elementary Portuguese (5) ***Review all entries***
Lecture/Discussion—5 hours. Prerequisite(s): POR 001 Continuation of course 001 in the areas of grammar and development of all basic language skills in cultural context with special emphasis on communication. GE credit: AH, WC. Effective: 2018 Fall Quarter.

POR 003—Elementary Portuguese (5) ***Review all entries***
Laboratory—1 hour; Lecture/Discussion—5 hours. Prerequisite(s): POR 002 Continuation of course 002 in the areas of grammar and development of all basic language skills in cultural context with special emphasis on communication. GE credit: WC. Effective: 2009 Spring Quarter.

POR 003—Elementary Portuguese (5) ***Review all entries***
Lecture/Discussion—5 hours. Prerequisite(s): POR 002 Continuation of course 002 in the areas of grammar and development of all basic language skills in cultural context with special emphasis on communication. GE credit: AH, WC. Effective: 2018 Fall Quarter.

POR 008—Elementary Portuguese Conversation (2)
Discussion—3 hours. Prerequisite(s): POR 003 Not open to native speakers or upper division students. Designed to develop oral communication skills. Emphasis on increasing vocabulary, improving listening comprehension, pronunciation, accuracy and grammar control. Practice of everyday situations. GE credit: WC. Effective: 2014 Fall Quarter.

POR 021—Intermediate Portuguese (5) ***Review all entries***
Laboratory—1 hour; Lecture/Discussion—5 hours. Prerequisite(s): POR 003 Review and develop the grammar, vocabulary, and composition acquired in first year Portuguese through exercises and reading of modern texts. GE credit: WC. Effective: 2009 Spring Quarter.

POR 021—Intermediate Portuguese (5) ***Review all entries***
Lecture/Discussion—5 hours. Prerequisite(s): POR 003 Review and develop the grammar, vocabulary, and composition acquired in first year Portuguese through exercises and reading of modern texts. GE credit: AH, WC. Effective: 2018 Fall Quarter.

POR 022—Intermediate Portuguese (5) ***Review all entries***
Laboratory—1 hour; Lecture/Discussion—5 hours. Prerequisite(s): POR 021 Continuation of course 21. Focus on more difficult grammar concepts and further composition practice. Development of all language skills through exercises and reading of modern texts. GE credit: WC. Effective: 2009 Spring Quarter.

POR 022—Intermediate Portuguese (5) ***Review all entries***
Lecture/Discussion—5 hours. Prerequisite(s): POR 021 Continuation of course 21. Focus on more difficult grammar concepts and further composition practice. Development of all language skills through exercises and reading of modern texts. GE credit: AH, WC. Effective: 2018 Fall Quarter.

POR 023—Portuguese Composition I (4) ***Review all entries***
Extensive Writing; Lecture—3 hours. Prerequisite(s): POR 022 Development of writing skills by way of reading, discussion, and analysis of authentic materials, literary texts, and videos. Selective review of grammar. Class activities include composition, journals, letters, individual and group projects. GE credit: WC, WE. Effective: 2009 Spring Quarter.

POR 023—Portuguese Composition I (4) ***Review all entries***
Extensive Writing; Lecture—3 hours. Prerequisite(s): POR 022 Development of writing skills by way of reading, discussion, and analysis of authentic materials, literary texts, and videos. Selective review of grammar. Class activities include composition, journals, letters, individual and group projects. GE credit: AH, WC, WE. Effective: 2018 Fall Quarter.

POR 028—Intermediate Portuguese Conversation (2)
Discussion—3 hours. Prerequisite(s): POR 008 Continuation of course 8. Designed to develop oral communication skills at a more advanced level. Practice in more complex situations. Effective: 2014 Winter Quarter.

POR 031—Intermediate Portuguese for Spanish Speakers (4)
Laboratory—1 hour; Lecture/Discussion—3 hours. Development of linguistic and learning skills required for Spanish-speaking students in upper-division courses in Portuguese. Effective: 2016 Fall Quarter.

POR 031G—Portuguese for Spanish-Speaking Graduate Students (4)
Laboratory—1 hour; Lecture/Discussion—3 hours. Restricted to graduate students only. Intensive review of grammar and composition. Development of all language skills, but with emphasis on reading of modern texts, presentation/discussion, and writing on academic topics. Development on the following writing skills: analytical, argumentative, and creative. Effective: 2014 Winter Quarter.

POR 098—Directed Group Study (1-5)
Variable—2 hours. Prerequisite(s): Consent of instructor and Department Chairperson. Directed group study primarily for lower division students. (P/NP grading only.) Effective: 2014 Spring Quarter.

POR 100—Principles of Luso-Brazilian Literature and Criticism (4)
Lecture—3 hours; Term Paper. Prerequisite(s): POR 022 or POR 023; or Consent of Instructor. Principles of literary criticism applied to the study of fiction, poetry, and essays of major literary writers of the Luso-Brazilian world. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

POR 111—The Structure of Portuguese: Sounds and Words (3)
Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Linguistic description of sound patterns of Portuguese and how those sounds can be used to form larger units, such as morphemes and words. Theoretical and practical comparisons with English and with other Romance languages. GE credit: SS. Effective: 2016 Fall Quarter.

POR 130—Survey of Luso-Brazilian Literature: 1500-1800 (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): POR 100; (POR 022 or POR 023) Overview of Luso-Brazilian literature, covering three major literary periods: Renaissance, Baroque, and Enlightenment. Attention to the concept of imitation and nativism. GE credit: AH, WC. Effective: 2015 Winter Quarter.

POR 132—Portuguese Literature: Medieval and Renaissance (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): POR 100; or Consent of Instructor. Overview of the origins of the Portuguese literature, spanning from the 13th C to the 16th C. Studies of lyrical and epic poetry, drama, and travel narratives. GE credit: AH, WC. Effective: 2016 Fall Quarter.

POR 134—Luis de Camões (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): POR 100; (POR 022 or POR 031) Overview of the greatest Renaissance Portuguese poet, Luis de Camões. Study his famous epic poem, Os Lusiadas, and a series of sonnets written by him. GE credit: AH, WC. Effective: 2014 Spring Quarter.

POR 141—Introduction to Luso-Brazilian Culture (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): POR 023 or POR 022 Introduction to history, geography, and culture of Portugal and Brazil. Art, history of ideas, and everyday cultural manifestations. Introduction to critical reading and textual analysis. Taught in Portuguese. GE credit: AH, WC. Effective: 2016 Fall Quarter.

POR 159—Special Topics in Luso-Brazilian Literature and Culture (4)
Lecture—3 hours; Term Paper. Prerequisite(s): POR 100; or Consent of Instructor. Special topics in the study of Luso-Brazilian literature and culture. May be repeated up to 1 time(s). GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

POR 161—Luso-Brazilian Literature and Culture (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): POR 100; or Consent of Instructor. Colonial Brazilian literature survey. Readings include 16th-18th centuries manuscripts and books of cultural importance in a society dominated by censorship and with no printing presses. Study of the role literary Academies played in the so called "culture of manuscripts." GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

POR 162—Introduction to Brazilian Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): POR 003; (POR 031 or POR 031G) Narrative and poetic texts of the 19th and 20th centuries in Brazil. In-depth and comparative study of Romantic and (Neo)Naturalist movements as a forum for discussion about literary tradition and modernity in Latin America. GE credit: AH, WE. Effective: 2016 Spring Quarter.

POR 163—20th C Masters in Brazilian Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): POR 100; or Consent of Instructor. Overview of modern Brazilian literature from early 20th C to the poetry by João Cabral de Melo Neto and the Concretists (1960s), including European avant-garde movements and literary and cultural manifestos leading to a revolutionary body of literature. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

POR 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of instructor and Department Chairperson. (P/NP grading only.) GE credit: AH, WC, WE. Effective: 2008 Fall Quarter.

POR 199—Special Study for Advanced Undergraduates (1-5)
Variable—2 hours. Independent study with professor for advanced undergraduate students, or honor thesis students. (P/NP grading only.) GE credit: AH. Effective: 2014 Winter Quarter.

PSC Psychology

Courses in PSC:

PSC 001—General Psychology (4)
Lecture—4 hours. Principles and basic concepts of psychology. The empirical study of individual behavior including perception, cognition, development, personality, social interactions and the biological underpinnings of behavior. Not open for credit to students who have taken course 001Y. GE credit: SS. Effective: 2017 Winter Quarter.

PSC 001Y—General Psychology (4)
Discussion—1 hour; Lecture—1 hour; Web Virtual Lecture—2 hours. Introduction to empirical approaches. Focus on perception, cognition, personality and social psychology, and biological aspects of behavior. Not open for credit to students who have taken course 001. GE credit: SS. Effective: 2016 Fall Quarter.

PSC 012Y—Data Visualization in the Social Sciences (4)
Laboratory—1.5 hours; Lecture—2 hours; Web Virtual Lecture—1.5 hours. Introduction to quantitative data across the social sciences (Communications, Political Science, Psychology, Sociology, and other disciplines). Transforming data, describing data, producing graphs, visual reasoning, and interpretations. (Communications 12Y, Sociology 12Y, Political Science 12Y.) GE credit: QL, VL. Effective: 2016 Spring Quarter.

PSC 020—Freshman Psychology Seminar (4)
Seminar—4 hours. Prerequisite(s): Freshman standing. Instructor will acquaint students with his or her program of research, the development of scientific questions from the literature, and the application of research methods to examine these questions. Critical
thinking will be encouraged via expository writing and brief presentations. Effective: 1997 Winter Quarter.

PSC 041—Research Methods in Psychology (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 012Y, STA 013, or STA 100 strongly recommended. Introduction to experimental design, interviews, questionnaires, field and observational methods, reliability, and statistical inference. GE credit: QL. Effective: 2017 Fall Quarter.

PSC 051—Relationship Science: Lust, Love, and Evolution (4)
Lecture—4 hours. Prerequisite(s): PSC 001 or PSC 001Y; or introductory social science course or introductory life science course. Evolutionary perspectives on attraction and close relationships. Integrating social psychological and evolutionary theories with empirical evidence pertaining to human mating. GE credit: SE, SS. Effective: 2018 Spring Quarter.

PSC 090X—Lower Division Seminar (1-2)
Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Limited enrollment. Examination of a special topic in Psychology through shared readings, discussions, written assignments, or special activities such as fieldwork or laboratory work. Effective: 1997 Winter Quarter.

PSC 098—Directed Group Study (1-5)
Variable. Primarily for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

PSC 099—Special Study for Lower Division Students (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

PSC 100—Introduction to Cognitive Psychology (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041 Introduction to human information processing, mental representation and transformation, imagery, attention, memory, language processing, concept formation, problem solving, and computer simulation. Not open for credit to students who have completed former course 136. Effective: 2018 Winter Quarter.

PSC 100Y—Introduction to Cognitive Psychology (4)
Discussion—1 hour; Lecture—1 hour; Web Virtual Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041 Introduction to human information processing, mental representation and transformation, imagery, attention, memory, language processing, concept formation, problem solving, and computer simulation. Not open for credit to students who have completed former course 136 or current course 100. Effective: 2018 Spring Quarter.

PSC 101—Introduction to Biological Psychology (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041 Pass One open to majors. Survey and integration of the relationships between behavior and biological processes, including physiology, genes, development, ecology, and evolution. Two units of credit for those students who have completed Neurobiology, Physiology and Behavior 100. Effective: 2018 Winter Quarter.

PSC 103A—Statistical Analysis of Psychological Data (5)
Laboratory—2 hours; Lecture—4 hours; Term Paper. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; (STA 013 or STA 013Y or STA 102) Pass One open to Psychology Majors. Design and statistical analysis of psychological investigations and the interpretation of quantitative data in psychology. Not open for credit to students who have completed course 103. GE credit: QL. Effective: 2018 Winter Quarter.

PSC 103B—Statistical Analysis of Psychological Data (5)
Laboratory—2 hours; Lecture—4 hours. Prerequisite(s): PSC 103A; (STA 013 or STA 013Y or STA 102) Pass One open to Psychology majors. Probability theory, sampling distributions, statistical inference, and hypothesis testing using standard parametric and correlational approaches. Simple regression analysis, multiple regression analysis, non-parametric statistics, introduction to multivariate statistics, with applications in psychology. Not open for credit to students who have completed course 105. GE credit: QL. Effective: 2018 Winter Quarter.

PSC 104—Applied Psychometrics: An Introduction to Measurement Theory (4)
Lecture—4 hours. Prerequisite(s): PSC 041; PSC 103A; (STA 013 or STA 013Y); Upper division standing in Psychology. Examination of the basic principles and applications of classical and modern test theory. Topics include test construction, reliability theory, validity theory, factor analysis and latent trait theory. GE credit: QL. Effective: 2018 Spring Quarter.

PSC 107—Questionnaire and Survey Research Methods (4)
Discussion/Laboratory—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): PSC 001 or PSC 001Y; and Consent of Instructor. PSC 041 or an equivalent course on social or behavioral research methods or consent of instructor. Limited enrollment. Introduction to survey and questionnaire research methods with emphasis on how to ask questions. Social and psychological factors that influence survey response. Practical aspects of fielding survey and questionnaire research. GE credit: QL. Effective: 2018 Spring Quarter.

PSC 113—Developmental Psychobiology (4)
Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): PSC 101 The biology of behavioral development; survey and integration of the organismic and environmental processes that regulate the development of behavior. Effective: 1997 Fall Quarter.

PSC 120—Agent-Based Modeling (4)
Lecture/Lab—4 hours. Prerequisite(s): PSC 100 and/or PSC 101 recommended Class size limited to 24 students. Introduction to agent-based computer simulation and analysis with emphasis on learning how to model animals, including humans, to achieve insight into social and group behavior. GE credit: QL. Effective: 2018 Spring Quarter.

PSC 121—Physiological Psychology (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; PSC 101 Pass One open to Psychology majors. Relationship of brain structure and function to behavior, motivation, emotion, language, and learning in humans and other animals. An introduction to the methodology of physiological psychology and neuroscience. Not open for credit to students who have completed former course 108. Effective: 2018 Winter Quarter.

PSC 122—Advanced Animal Behavior (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): PSC 101 or NPB 102 Pass One open to Psychology majors. Advanced integrative survey of biological principles of behavioral organization, emphasizing historical roots, current research directions, conceptual issues and controversies. Laboratory exercises on the description and analysis of the behavior of captive and free-living animals Not open for credit to students who have completed former course 150. (Same course as Neurobiology, Physiology, and Behavior 150.) Effective: 2000 Fall Quarter.

PSC 123—Hormones and Behavior (3)
Lecture—3 hours. Prerequisite(s): NPB 101; (PSC 101 or NPB 102) Pass One open to Psychology majors. Endocrine physiology with an emphasis on the principles of behavior. Fundamental relationships between hormones and various behaviors engaged in by the organism during its lifetime. Role of hormones in behavioral homeostasis, social behavior, reproductive behavior, parental behavior, adaptation to stress. Not open for credit to students who have completed former course 152. (Same course as Neurobiology, Physiology, and Behavior 152.) Effective: 2000 Fall Quarter.

PSC 124—Comparative Neuroanatomy (4) ***Review all entries***
Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): PSC 101 or NPB 100 or NPB 101 Overview of the neuroanatomy of the nervous system in a variety of mammalian and non-mammalian vertebrates. Examine changes or modifications to neural structures as a result of morphological or behavioral specializations. (Neurobiology, Physiology, and Behavior 124) GE credit: SL. Effective: 1997 Fall Quarter.

PSC 124—Comparative Neuroanatomy (3) ***Review all entries***
Lecture—3 hours. Prerequisite(s): NPB 100 or NPB 101 or NPB 110B or PSC 121 Overview of the neuroanatomy in mammalian vertebrates, focusing on the cerebral cortex and experimental techniques. Examine changes or modifications to neural structures as a result of morphological or behavioral specializations. (NPB 124.) Effective: 2018 Fall Quarter.

PSC 124L—Comparative Neuroanatomy Laboratory (2)
Laboratory—6 hours. Prerequisite(s): PSC 124 (can be concurrent) Pass One restricted to PSC and NPB majors; must be concurrently enrolled in PSC 124. Comparative neuroanatomy laboratory illustrating modern neuroanatomical techniques in determining neural connections within the mammalian brain. Includes experimentation and presentation of results. (Same course as NPB 124L.) Effective: 2018 Fall Quarter.

PSC 125—Behavioral Epigenetics (4)
Lecture—4 hours. Prerequisite(s): PSC 101 Review of basic principles in genetics and epigenetics with emphasis on behavior. Introduction to the use of modern molecular methods in understanding the complex relationships between genes, environment, and behavior. Effective: 2016 Fall Quarter.

PSC 126—Health Psychology (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; PSC 101 recommended. Pass One open to Psychology majors. Psychological factors influencing health and illness. Topics include stress and coping, personality and health, symptom perception and reporting, heart disease, cancer, compliance, and health maintenance and promotion. Not open for credit to students who have completed former course 160. Effective: 2018 Winter Quarter.

PSC 130—Human Learning and Memory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; (PSC 012Y or STA 013 or STA 100); or Consent of Instructor. Consideration of major theories of human learning and memory with critical examination of relevant experimental data. Effective: 2018 Winter Quarter.

PSC 131—Perception (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; (PSC 100 or PSC 135) Cognitive organizations related to measurable physical energy changes mediated through sensory channels. Perception of objects, space, motion, events. Effective: 2018 Winter Quarter.

PSC 132—Language and Cognition (4)
Lecture—3 hours; Term Paper. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; (PSC 100 or PSC 135); or Consent of Instructor. Introduction to the cognitive processes involved in language comprehension and production. Topics include the biological foundations of language, speech perception, word recognition, syntax, reading ability, and pragmatics. GE credit: WE. Effective: 2018 Winter Quarter.

PSC 133—Neuroeconomics/Reinforcement Learning and Decision Making (4)
Lecture—3 hours; Term Paper. Prerequisite(s): (PSC 100 or PSC 100Y or PSC 135 or ARE 100A or ECN 100A or NPB 162 or NPB 163); (STA 013 or STA 013Y or STA 100 or PSC 103A); or Consent of Instructor. Theoretical and empirical approaches to neuroeconomics (neuroscience of decision making) from psychology, neuroscience, economics, and computer science. Neuroscience of judgment and decision making, behavioral economics, and reinforcement learning. (ECN 107 & CGS 107) GE credit: SL, SS. Effective: 2018 Spring Quarter.

PSC 135—Cognitive Neuroscience: The Biological Foundations of the Mind (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; or Consent of Instructor. PSC 101, PSC 121, or PSC 129 recommended. Neuroscientific foundations of higher mental processes including attention, memory, language, higher-level perceptual and motor processes, and consciousness. Emphasis on the neural mechanisms which form the substrates of human cognition and the relationship of mind to brain. Effective: 2018 Winter Quarter.

PSC 136—Psychology of Music (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; (PSC 100 or PSC 135 or MUS 006C); or Consent of Instructor. Introduction to the mental and neural representations of musical structures and processes involved in perceiving, remembering, and performing music. Music and emotion. GE credit: WE. Effective: 2018 Spring Quarter.

PSC 137—Neurobiology of Learning & Memory (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; PSC 101 Overview of the neural basis of learning and memory focusing on modern behavioral neuroscience research with animals. Topics include consolidation, neural plasticity, cellular competition for memory storage, and the role of neurogenesis in learning. Effective: 2018 Spring Quarter.

PSC 138—Consciousness and Cognition (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; (PSC 100 or PSC 135) Current theoretical and empirical evidence in the study of cognition and consciousness. Theories of consciousness, psychological and neural basis of conscious and unconscious processes such as attention, intentionality, and dreams. (CGS 138) Effective: 2018 Spring Quarter.

PSC 139—Advanced Cognitive Neuroscience (4)
Lecture—3 hours; Term Paper. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; PSC 135; or Consent of Instructor. Advanced integrative survey of cognitive neuroscience, including perception, attention, memory, and navigation. Emphasis on reviewing literature in psychology, neuroscience, and statistics; understanding methods in cognition; and presentation skills. GE credit: SL. Effective: 2018 Spring Quarter.

PSC 140—Developmental Psychology (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041 Pass One open to Psychology majors. An ontogenetic account of human behavior through adolescence with emphasis on motor skills, mental abilities, motivation, and social interaction. Two units of credit allowed to students who have completed Human Development 100A or 100B; not open for credit to students who have completed course 112. (Former course 112.). Effective: 2018 Winter Quarter.

PSC 141—Cognitive Development (4)
Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): PSC 140 or HDE 100A or HDE 100B Pass One open to Psychology & Human Development majors. Theories, methods, evidence, and debates in the field of cognitive development, such as nature/nurture, constraints on learning, and the role of plasticity. Topics include attention, memory, concepts about the physical and social world, and language. (Human Development 101.) GE credit: WE. Effective: 2002 Fall Quarter.

PSC 142—Social and Personality Development (4)
Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): PSC 140 or HDE 100A or HDE 100B Pass One open to Psychology and Human Development majors. Social and personality development of children, infancy through adolescence. Topics include the development of personality, achievement motivation, self-understanding, sex-role identity, and antisocial behavior. Emphasis on the interface between biological and social factors. (Human Development 102.) GE credit: SS, WE. Effective: 2002 Fall Quarter.

PSC 143—Infant Development (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; (PSC 140 or HDE 100A) Psychological development in infancy. Topics include physical and motor development, sensory and nervous system development, and memory and cognitive development. Emphasis will be on evaluating theories, empirical research, and experimental methods for understanding infant development. GE credit: WE. Effective: 2018 Winter Quarter.

PSC 145—Social Psychology (4) ***Review all entries Discontinued***
Lecture—4 hours. Behavior of the individual in the group. Examination of basic psychological processes in social situations, surveying various problems of social interaction: group tensions, norm-development, attitudes, values, public opinion, status. Effective: 2000 Fall Quarter.

PSC 145—Developmental Cognitive Neuroscience (4) ***Review all entries***
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): PSC 135 or ((PSC 140 or HDE 100A or HDE 100B); (PSC 101 or PSC 121 or NPB 161 or HDE 163)); PSC 141 recommended. Neuroscientific theories and methods (EEG, ERP, fNIRS, fMRI) that inform an understanding of behavioral and cognitive development over infancy and childhood. Neurodevelopmental correlates of perception, action, language, and social cognition; value of the neuroscientific perspective; limitations and challenges of neuroscientific research in the developmental context. GE credit: SL. Effective: 2018 Fall Quarter.

PSC 146—The Development of Memory (4)
Lecture—3 hours; Term Paper—1 hour. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; and any Psychology upper division course from Core Group A or D. Pass One open to Psychology majors. Theory and research on memory development with focus on infancy and childhood. Not open for credit to students who have completed former course 133. GE credit: WE. Effective: 2018 Spring Quarter.

PSC 148—Developmental Disorders (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; (PSC 140 or PSC 141 or HDE 100A or HDE 100B) Current scientific knowledge of the influences of biological, cognitive, and environmental factors on the emergence of disorders with onset in childhood. Examples include autism spectrum, ADD/ADHD, dyslexia and dyscalculia. Emphasis placed on understanding these disorders, their causes and their treatments. Effective: 2018 Spring Quarter.

PSC 151—Social Psychology (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041 Pass One open to Psychology majors. Behavior of the individual in the group. Examination of basic psychological processes in social situations, surveying various problems of social interaction: group tensions, norm-development, attitudes, values, public opinion, status. Not open for credit to students who have completed former course 145. GE credit: DD. Effective: 2018 Winter Quarter.

PSC 151—Social Psychology (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): PSC 001 or PSC 001Y, PSC 041 recommended Pass One open to Psychology majors. Behavior of the individual in the group. Examination of basic psychological processes in social situations, surveying various problems of social interaction: group tensions, norm-development, attitudes, values, public opinion, status. Not open for credit to students who have completed former course 145. GE credit: DD. Effective: 2018 Summer Session 1.

PSC 152—Social Cognition (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041 Examines how social factors influence how we attend to, encode, and process information and how these mental processes affect subsequent judgments and behavior. Effective: 2018 Spring Quarter.

PSC 153—Psychology and Law (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041 Pass One open to Psychology majors. Current theoretical and empirical issues in the study of psychology and law. Topics include eyewitness testimony, child abuse, jury decision making, juvenile delinquency and criminology, prediction of violence, insanity defense, and memory for traumatic events. Not open for credit to students who have completed former course 115. Effective: 2018 Spring Quarter.

PSC 154—Psychology of Emotion (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041 Pass One open to Psychology majors. An introduction to current theories and research on emotion and bodily feelings with special reference to self-knowledge. Not open for credit to students who have completed former course 143. Effective: 2018 Winter Quarter.

PSC 154—Psychology of Emotion (4) ***Review all entries***
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041 Pass One open to Psychology majors. Introduction to current theories and research on emotion and bodily feelings with special reference to self-knowledge. Effective: 2018 Summer Session 1.

PSC 157—Stereotyping, Prejudice, and Stigma (4)
Lecture/Discussion—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041 Social psychological underpinnings of stereotyping, prejudice, and stigma from sociocultural, motivational, and cognitive perspectives. Topics include: origins, maintenance, change, effects on person perception and memory, and the automaticity/controllability of stereotyping and prejudice. GE credit: DD. Effective: 2018 Winter Quarter.

PSC 158—Sexual Orientation and Prejudice (4)
Lecture/Discussion—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041 Pass One open to Psychology majors. Current scientific knowledge about sexual orientation and prejudice based on sexual orientation. Emphasis is placed on learning the skills necessary for a critical understanding of science and public policy issues relevant to sexuality. GE credit: ACGH, DD, SS, WE. Effective: 2018 Spring Quarter.

PSC 159—Gender and Human Reproduction (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041 Pass One open to Psychology majors. Psychology of reproduction. Reproductive events over the course of an individual's life, including sexual development, mate choice, relationships, and reproduction. Biological and social psychological explanations at the levels of mechanism and evolutionary function. Not open for credit to students who have completed former course 149. (Formally course 149.). Effective: 2018 Spring Quarter.

PSC 161—Psychology of the Self (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041 Psychological theory and research on the self. Topics include: self-knowledge, self-esteem, self-regulation, self-presentation, cognitive and emotional aspects of the self, and the role of the self in shaping social interaction. Effective: 2018 Spring Quarter.

PSC 162—Introduction to Personality Psychology (4)
Lecture—3 hours; Term Paper. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041 Pass One open to Psychology majors. Scientific study of personality. Methods of personality research. Overview of current research and theory in the field of personality psychology. Not open for credit to students who have completed former course 147. GE credit: SS. Effective: 2018 Winter Quarter.

PSC 165—Introduction to Clinical Psychology (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; PSC 168; (PSC 140 or PSC 151) Major theoretical formulations in the history of clinical psychology, from classical psychoanalysis to contemporary existentialism and behavior modification. A survey, based on lectures, films, and tapes, of what clinical psychologists do, including methods of appraisal, professional roles,and approaches to treatment. Effective: 2018 Spring Quarter.

PSC 168—Abnormal Psychology (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041 Descriptive and functional account of behavioral disorders, with primary consideration given to neurotic and psychotic behavior. GE credit: SS. Effective: 2018 Winter Quarter.

PSC 170—Psychology of Religion (4)
Lecture—4 hours. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041 Major theories, issues, data, and research methodologies of the psychology of religion. Religious experience and expression; religious development in childhood, adolescence, and adulthood; conversion; religious influences on physical and mental health; cross-cultural perspectives. GE credit: WE. Effective: 2018 Winter Quarter.

PSC 175—Genius, Creativity, and Leadership (4)
Lecture—3 hours; Term Paper. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; or Consent of Instructor. Or equivalents. Phenomenon of genius is examined from a diversity of theoretical, methodological, and disciplinary perspectives, with an emphasis on outstanding creativity and leadership in art, music, literature, philosophy, science, war, and politics. GE credit: SS, WE. Effective: 2018 Spring Quarter.

PSC 180A—Research in Cognitive and Perceptual Psychology (4)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): PSC 041; and Consent of Instructor. And four upper division Psychology courses. Empirical research on selected topics in general experimental psychology
(general research design and analysis, perception, cognition, cognitive development, etc.). Specific content will vary from quarter to quarter.
May be repeated once for credit when content differs. May be repeated up to 1 time(s). Effective: 1998 Fall Quarter.

PSC 180B—Research in Psychobiology (4)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): PSC 101; and Consent of Instructor. Three additional upper division courses in Psychology. Empirical research on selected topics in psychobiology (animal learning, animal behavior, physiological and sensory psychology, developmental psychobiology, computer modeling of neural systems). Content varies. May be repeated once for credit when content differs. May be repeated up to 1 time(s). Effective: 1997 Fall Quarter.

PSC 180C—Research in Personality and Social Psychology (4)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): PSC 041; and Consent of Instructor. And four upper division Psychology courses. Empirical research on selected topics in personality and social psychology (personality, social psychology, organizational psychology, etc.). Content will vary from quarter to quarter. May be repeated once for credit when specific content differs. May be repeated up to 1 time(s). Effective: 1997 Winter Quarter.

PSC 180D—Research in Developmental Psychology (4)
Laboratory—4 hours; Lecture—2 hours. Prerequisite(s): PSC 041; Consent of Instructor. Four upper division Psychology courses. Empirical research on selected topics in developmental psychology (research design and analysis, development, cognitive development, social and personality development etc.). May be repeated up to 1 time(s) when content differs. Effective: 2017 Winter Quarter.

PSC 185—History of Psychology (4)
Lecture—3 hours; Term Paper. Prerequisite(s): (PSC 001 or PSC 001Y); PSC 041; Upper division standing or consent of instructor. Pass One open to Psychology majors. Development of psychological thought and research in context of history of philosophy and science. Not open for credit to students who have completed course 120. (Former course 120.). GE credit: SS, WE. Effective: 2018 Winter Quarter.

PSC 190—Seminar in Psychology (4)
Seminar—4 hours. Prerequisite(s): Junior or senior standing; major in Psychology or consent of instructor. Intensive treatment of a special topic or problem of psychological interest. May be repeated for credit in different subject area. May be repeated for credit. Effective: 1997 Winter Quarter.

PSC 190X—Upper Division Seminar (1-2)
Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Limited enrollment. In-depth examination at an upper division level of a special topic in Psychology. Emphasis on student participation in learning. May not be repeated for credit. Effective: 1997 Winter Quarter.

PSC 192—Fieldwork in Psychology (1-6)
Fieldwork—1-6 hours. Prerequisite(s): Consent of Instructor. Upper division standing in Psychology. Limited enrollment. Supervised internship off and on campus, in community and institutional settings. Maximum of six units may be used towards satisfaction of upper division major requirement. May be repeated up to 1 time(s) per internship site. (P/NP grading only.) Effective: 2017 Winter Quarter.

PSC 194HA—Special Study for Honors Students (3)
Independent Study—9 hours. Prerequisite(s): Consent of Instructor. Senior standing in Psychology and qualifications for admission into college honors program; at least one course from PSC 180A, PSC 180B, PSC 180C or PSC 199 strongly recommended. Directed research. Supervised reading, research and writing leading to submission of a Senior Honors thesis under the direction of faculty sponsor. GE credit: WE. Effective: 1997 Winter Quarter.

PSC 194HB—Special Study for Honors Students (3)
Independent Study—9 hours. Prerequisite(s): Consent of Instructor. Senior standing in Psychology and qualifications for admission into college honors program; at least one course from PSC 180A, PSC 180B, PSC 180C or PSC 199 strongly recommended. Directed research. Supervised reading, research and writing leading to submission of a Senior Honors thesis under the direction of faculty sponsor. GE credit: WE. Effective: 1997 Winter Quarter.

PSC 197T—Tutoring in Psychology (1-3)
Tutorial—1-3 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Intended for advanced undergraduate students who will lead discussion sections in Psychology courses. May be repeated for credit for a total of 8 units. May be repeated up to 8 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

PSC 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

PSC 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

PSC 200—Proseminar in Psychology (3)
Independent Study—1 hour; Seminar—2 hours. Prerequisite(s): Graduate standing in Psychology or consent of instructor. Introduces matriculating graduate students to research activities of departmental faculty. (S/U grading only.) Effective: 1997 Winter Quarter.

PSC 201—Research Preceptorship (4)
Discussion—5 hours; Laboratory—4 hours. Prerequisite(s): Consent of Instructor. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

PSC 202—Research Seminar (1)
Seminar—1 hour. Prerequisite(s): Graduate standing in Psychology. Presentation of graduate research to program faculty and graduate students. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

PSC 204A—Statistical Analysis of Psychological Experiments (5)
Laboratory—2 hours; Lecture—4 hours. Prerequisite(s): STA 102; Or equivalent; graduate standing in Psychology or consent of instructor. Probability theory, sampling distributions, statistical inference, and hypothesis testing using standard parametric and correlational approaches. Analysis of variance, factorial and repeated measures, and tests of trends. Not open for credit to students who have completed course 206. Effective: 2014 Spring Quarter.

PSC 204B—Causal Modeling of Correlational Data (5)
Laboratory—2 hours; Lecture—4 hours. Prerequisite(s): PSC 204A; Or the equivalent course and graduate standing in Psychology or consent of instructor. Examination of how to make causal inferences from correlational data in the behavioral sciences. Emphasis is on testing rival causal models using correlations among observed variables. Beginning with multiple regression analysis, discussion advances to path analysis and related techniques. Not open for credit to students who have completed course 207A. Effective: 2015 Spring Quarter.

PSC 204D—Advanced Statistical Inference from Psychological Experiments (5)
Laboratory—2 hours; Lecture—4 hours. Prerequisite(s): PSC 204A; Or the equivalent; graduate standing in Psychology or consent of instructor. Advanced topics in statistical inference, which may include probability theory, sampling distributions, statistical inference and hypothesis testing, nonparametric statistics, Bayesian approaches, and advanced issues in analysis of variance. Not open for credit to students who have completed course 205. Effective: 2014 Spring Quarter.

PSC 205A—Applied Multivariate Analysis of Psychological Data (4)
Lecture—4 hours. Prerequisite(s): PSC 204A; PSC 204B; PSC 204D; or Consent of Instructor. Review of the major methods of multivariate data analysis for psychological data. Students will program statistical routines using a linear algebra-based computing language. Topics will include multivariate analysis of variance. discriminant analysis, canonical analysis factor analysis, and component analysis. Not open for credit to students who have completed course 207B. (Former course 207B.). Effective: 2017 Spring Quarter.

PSC 205B—Factor Analysis (4)
Lecture—3 hours; Term Paper. Prerequisite(s): PSC 204A; PSC 204B; or Consent of Instructor. Or equivalent courses; graduate standing. Theory and methods of factor analysis, including exploratory factor analysis, confirmatory factor analysis, and principal component analysis. Effective: 2015 Winter Quarter.

PSC 205C—Structural Equation Modeling (4)
Lecture—3 hours; Term Paper. Prerequisite(s): PSC 204A; PSC 204B; or Consent of Instructor. Or equivalent courses; graduate standing. Theory and methods of structural equation modeling, including path analysis, confirmatory factor analysis, multiple-group modeling and latent growth curve modeling. Effective: 2008 Fall Quarter.

PSC 205D—Multilevel Models (4)
Lecture—4 hours. Prerequisite(s): PSC 204A; Graduate standing or consent of instructor. Introduction to statistical techniques for the analysis of normal, hierarchically structured data, such as cross-sectional clustered data or repeated-measures data. Topics include hierarchical linear models, latent growth curve models, and how these methods handle unbalanced and/or missing data. Effective: 2004 Fall Quarter.

PSC 205E—Applied Psychometrics and Measurement Theory (4)
Lecture—4 hours. Prerequisite(s): PSC 204A; Graduate standing in Psychology or consent of instructor. Examination of the basic principles and applications of classical and modern test theory. Topics include test construction, reliability theory, validity theory, factor analysis, and latent trait theory. Not open for credit to students who have completed course 204 or 204C. Effective: 2013 Fall Quarter.

PSC 205F—Item Response Theory (4)
Lecture—3 hours; Term Paper. Prerequisite(s): PSC 204A; Or the equivalent; graduate standing in Psychology or consent of instructor. Item response theory allows for the creation of precise measurement instruments in psychological testing. Review Classical Test Theory, and then cover basic IRT models through advanced applications. Effective: 2014 Winter Quarter.

PSC 205G—Applied Longitudinal Data Analysis (4)
Lecture—3 hours; Term Paper. Prerequisite(s): PSC 204A; Graduate standing in Psychology or consent of instructor. Modeling and understanding of intraindividual change and interindividual differences in change. Reviews conventional methods and introduces contemporary techniques for modeling intraindividual change. Effective: 2014 Fall Quarter.

PSC 206A—Theoretical Foundations: Research Methods in Psychology (4)
Lecture/Discussion—3 hours; Term Paper. Restricted to graduate student status. Examines the philosophy and research practices underlying experimental psychology. Topics to be covered include philosophy of science/epistemology, research design, inference and bias in research, theory development, validity, the social context of research, and critical thinking about research. Effective: 2010 Spring Quarter.

PSC 206B—Research Methods in Psychology: Applications in Social-Personality Research (4)
Lecture/Discussion—3 hours; Term Paper. Restricted to graduate student status. Overview of the research designs, assessment methods, and statistical procedure used by social-personality psychologists. Focus on the practical issues that arise when using each method in specific research contexts. Effective: 2009 Fall Quarter.

PSC 207—Survey and Questionnaire Research Methods (4)
Lecture/Discussion—4 hours. Prerequisite(s): Completion of a course on social or behavioral research methods, graduate standing. Survey and questionnaire research methods with emphasis on how to ask questions. Cognitive, motivational, and social processes that influence how respondents answer questions; sampling techniques; internet resources; practical aspects of fielding survey and questionnaire research. Effective: 2003 Fall Quarter.

PSC 208—Physiological Psychology (4)
Seminar—4 hours. Prerequisite(s): Graduate standing in Psychology or consent of instructor. A conceptual analysis of the contributions of neuroanatomy, neurophysiology and neurochemistry to an understanding of animal and human behavior. Effective: 1997 Winter Quarter.

PSC 208A—Fundamentals of Human Electrophysiology (4)
Extensive Problem Solving—1.5 hours; Laboratory—3 hours; Lecture/Discussion—1.5 hours; Project (Term Project)—3 hours. Prerequisite(s): Consent of Instructor. Restricted to 15 students. In-depth introduction and hands-on experience with the event-related potential (ERP) method in the study of attention, executive control, memory, language and social cognitive neuroscience. Effective: 2010 Winter Quarter.

PSC 209A—Introduction to Programming: Matlab (4)
Lecture/Lab—3 hours. Prerequisite(s): Graduate standing or consent of instructor. The Matlab programming environment as a means of organizing, analyzing, and visualizing scientific data. Basic programming concepts such as variables, loops, conditional branching, and efficient programming techniques will be emphasized. Effective: 2006 Fall Quarter.

PSC 210—Fundamentals of Cognitive Neuroimaging (3)
Lecture/Discussion—3 hours. Prerequisite(s): Basic knowledge of inferential statistics and experimental Psychology. Introduction to empirical foundations and methodology of neuroimaging, emphasizing pragmatics of functional magnetic resonance imaging (fMRI) to study cognition. Topics include MR physics, the relationship between neural activity and the BOLD response, experimental design, and analysis of fMRI data. Effective: 2007 Fall Quarter.

PSC 211—Advanced Topics in Neuroimaging (3)
Laboratory—1 hour; Seminar—2 hours. Prerequisite(s): PSC 210; or Consent of Instructor. Restricted to 16 students. Critical presentation and discussion of the most influential advanced issues in neuroimaging, emphasizing fMRI design/analysis and the integration of fMRI with EEG/MEG. May be repeated for credit Course may be repeated when topics differ. (Neuroscience 211 and Neurobiology, Physiology, and Behavior 211.) (S/U grading only.) Effective: 2017 Spring Quarter.

PSC 212A—Developmental Psychology: Cognitive and Perceptual Development (4)
Seminar—4 hours. Prerequisite(s): Graduate standing or consent of instructor; completion of an undergraduate or graduate course on developmental psychology or human development. Theories and empirical findings concerning human cognitive and perceptual development. Development of perception, memory, concepts (e.g., theory of mind, concepts about number), problem solving, and language from infancy to adolescence. Effective: 2003 Fall Quarter.

PSC 212B—Developmental Psychology: Social, Emotional, and Personality Development (4)
Seminar—4 hours. Prerequisite(s): Graduate standing or consent of instructor; completion of an undergraduate or graduate course on developmental psychology or human development. Theories and empirical findings concerning human social, emotional, and personality development. Development of emotions, moral reasoning and behavior, personality, self-concept, and social cognition from infancy to adolescence (may include adulthood). Effective: 2003 Fall Quarter.

PSC 217—Behavioral Genetics (4)
Discussion/Laboratory—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): Graduate standing. Restricted to 20 students. Review basic principles in genetics and select topics in molecular genetics with emphasis on behavior. Use of modern molecular methods to outline complex relationships between genes, environment, and behavior. Not open for credit to students who have completed course 251. Effective: 2008 Spring Quarter.

PSC 218A—Fundamentals of Animal Behavior (5)
Discussion—1 hour; Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Upper division undergraduate introduction to the biology of behavior, such as PSC 101, PSC 122, PSC 123, NPB 102, NPB 150, NPB 152, WFC 141, ENT 104, or ANS 105. Survey of the phenomena and theory of animal behavior from the perspectives of multiple biological disciplines, including evolution, ecology, psychology, genetics, neurobiology, endocrinology, and animal science. (Animal Behavior 218A.) Effective: 2007 Fall Quarter.

PSC 218B—Fundamentals of Animal Behavior (5)
Discussion—1 hour; Lecture/Discussion—4 hours. Prerequisite(s): PSC 209A; or Consent of Instructor. Survey of the phenomena and theory of animal behavior from the perspectives of multiple biological disciplines, including evolution, ecology, psychology, genetics, neurobiology, endocrinology, and animal science. (Animal Behavior 218B.) Effective: 2007 Fall Quarter.

PSC 220—History of Psychology (4)
Lecture—2 hours; Seminar—2 hours. Prerequisite(s): Graduate standing in Psychology or consent of instructor. A lecture-seminar on the history of psychology and on the applicability of early psychological theory and research to contemporary investigations. Effective: 1997 Winter Quarter.

PSC 221—Academic Writing in Psychology (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Class size limited to 10 students. Strategies for developing and honing academic writing skills and writing productivity, with a particular focus on how to write a clear and compelling empirical journal article in psychology. May be repeated up to 4 unit(s) with consent of instructor if student chooses to focus on a substantially different writing project. Effective: 2013 Spring Quarter.

PSC 230—Cognitive Psychology (4)
Seminar—4 hours. Prerequisite(s): Graduate standing in Psychology or consent of instructor. Analysis of the mental processes by which knowledge is acquired, manipulated, stored, retrieved and used. Effective: 1997 Winter Quarter.

PSC 231—Sensation and Perception (4)
Seminar—4 hours. Prerequisite(s): Graduate standing in Psychology or consent of instructor. Analysis of the role of sensory processes and perception in experience and their effects on behavior. Effective: 1997 Winter Quarter.

PSC 241—Attitudes and Social Influence (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Survey of theory and research in the field of attitudes and social influence. Topics include attitude definition and measurement, major theories of attitude formation and change, the relationship between attitudes and behavior, and recent directions and controversies. Effective: 2011 Fall Quarter.

PSC 242—Attraction and Close Relationships (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing in Psychology, Sociology, Human Development, a related social science, or consent of instructor. Social psychological theory and research on attraction and close relationships, with a particular emphasis on romantic relationships. Covers attachment theory, interdependence theory, and evolutionary psychological perspectives. Effective: 2018 Winter Quarter.

PSC 243—Social Cognition (4)
Lecture/Discussion—3 hours; Term Paper. Processes underlying the perception, memory, and judgment of social stimuli, the effects of social and affective factors on cognition, and the interpersonal consequences of those processes. Topics include automaticity/control, motivated cognition, person perception, stereotyping, attitudes, and persuasion. Effective: 2007 Fall Quarter.

PSC 244—Stereotyping, Prejudice, and Stigma (4)
Lecture/Discussion—3 hours; Term Paper. This course examines the social psychological underpinnings of stereotyping, prejudice, and stigma, including sociocultural, motivational, and cognitive factors. Effective: 2007 Fall Quarter.

PSC 245—Social Psychology (4)
Seminar—4 hours. Prerequisite(s): Graduate standing in Psychology or consent of instructor. Theory and research in social psychology. Effective: 1997 Winter Quarter.

PSC 247—Personality (4)
Seminar—4 hours. Prerequisite(s): Graduate standing in Psychology or consent of instructor. Theory and research in human personality. Effective: 1997 Winter Quarter.

PSC 251—Topics in Genetic Correlates of Behavior (4)
Seminar—4 hours. Prerequisite(s): Graduate standing in Psychology or consent of instructor. Theory and experiment in the genetic contributions to animal and human behavior. May be repeated for credit when topic differs. May be repeated for credit. Effective: 1997 Winter Quarter.

PSC 252—Topics in Psychobiology (4)
Seminar—4 hours. Prerequisite(s): Graduate standing in Psychology or consent of instructor. Critical study in a selected area of psychobiology. May be repeated for credit when content differs. May be repeated for credit. Effective: 1997 Winter Quarter.

PSC 261—Cognitive Neuroscience (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Graduate student standing in Psychology or Neuroscience or consent of instructor. Graduate core course for neuroscience. Neurobiological bases of higher mental function including attention, memory, language. One of three in three-quarter sequence. (Neuroscience 223.) Effective: 1997 Winter Quarter.

PSC 263—Topics in Cognitive Psychology (4)
Seminar—4 hours. Prerequisite(s): Graduate standing in Psychology or consent of instructor. Selected topics in language processing, memory, perception, problem solving, and thinking, with an emphasis on the common underlying cognitive processes. May be repeated for credit when content differs. May be repeated for credit. Effective: 1997 Winter Quarter.

PSC 264—Topics in Psycholinguistics (4)
Seminar—4 hours. Prerequisite(s): Graduate standing in Psychology or consent of instructor. Discussion of fundamental issues in the psychology of language. May be repeated for credit when content differs. May be repeated for credit. Effective: 1997 Winter Quarter.

PSC 270—Topics in Personality and Social Psychology (4)
Seminar—4 hours. Prerequisite(s): Graduate student standing or consent of instructor. Critical study of a selected area of personality or social psychology. May be repeated for credit for credit when content differs. Effective: 2005 Fall Quarter.

PSC 272—Topics in Developmental Psychology (4)
Seminar—4 hours. Prerequisite(s): Graduate standing in Psychology or consent of instructor. Selected topics in developmental psychology, including developmental neuroscience, memory development, infancy, cognitive development, social development, child maltreatment, children and law, perceptual development, emotional development, children at risk, and adolescence, with emphasis on developmental processes and developmental theory. May be repeated for credit. Effective: 2005 Fall Quarter.

PSC 289A—Current Research in Psychology (2)
Seminar—2 hours. Prerequisite(s): Graduate standing in Psychology or consent of instructor. Contemporary theory and empirical research in specialized topics in psychology. Topics include developmental attachment, social neuroscience, mental health, emotion, sexual orientation and identity. May be repeated for credit if topic differs. Effective: 2007 Winter Quarter.

PSC 289B—Current Research in Psychology (2)
Discussion—2 hours. Prerequisite(s): PSC 289A; Graduate standing in Psychology or consent of instructor. Intensive examination of contemporary theory and empirical research on a specialized topic in psychology. Sample topics include developmental attachment, social neuroscience, culture and mental health, electrophysiology and cognitive neuroscience, emotion, implicit cognitive processes, sexual orientation and identity, and attention. May be repeated for credit content differs. Effective: 2007 Winter Quarter.

PSC 290—Seminar (4)
Seminar—4 hours. Prerequisite(s): Graduate standing in Psychology or consent of instructor. Seminar devoted to a highly specific research topic in any area of basic psychology. Special topic selected for a quarter will vary depending on interests of instructor and students. Effective: 1997 Winter Quarter.

PSC 298—Group Study (1-5)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

PSC 299—Research (2-9)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

PSC 299D—Dissertation Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

PSC 390—The Teaching of Psychology (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Advanced graduate standing in Psychology or a closely related discipline. Methods and techniques of teaching undergraduate psychology. Integration of learning outcomes with effective evaluation. Practical experience in the application of pedagogical principles. (S/U grading only.) Effective: 2017 Winter Quarter.

PSC 390A—The Teaching of Psychology (6)
Discussion—6 hours; Lecture—6 hours; Practice—6 hours. Prerequisite(s): Consent of Instructor. Advanced graduate standing in Psychology or a closely related discipline. Methods and problems of teaching psychology at the undergraduate and graduate levels; curriculum design and evaluation. Practical experience in the preparation and presentation of material. (S/U grading only.) Effective: 1997 Winter Quarter.

PSC 390B—The Teaching of Psychology (4)
Discussion—6 hours; Lecture—4 hours; Practice—2 hours. Prerequisite(s): Consent of Instructor. Advanced graduate standing in Psychology or a closely related discipline. Methods and problems of teaching psychology at the undergraduate and graduate levels; curriculum design and evaluation. Practical experience in the preparation and presentation of material. (S/U grading only.) Effective: 1997 Winter Quarter.

PSC 391—Teaching of Psychology Practicum (4)
Fieldwork; Seminar—1 hour. Prerequisite(s): PSC 390; or Consent of Instructor. Supervised teaching in undergraduate classrooms. Techniques for delivering content through lectures, discussions, or labs; course administration; communications; assessment of student learning; solving ethical problems; instructional technology. (S/U grading only.) Effective: 2017 Fall Quarter.

PSC 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

PSU Med - Plastic Surgery

Courses in PSU:

PSU 460—Clinical Plastic Surgery Elective (1-18)
Clinical Activity. Prerequisite(s): SUR 430; and Consent of Instructor. Third- or fourth-year medical students. Total involvement in patient care involving surgical preparation, treatment, operative care, and follow-up. Developing and understanding reconstruction and aesthetic plastic surgery. Microvascular surgery included. Student rotation. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PSY Med - Psychiatry

Courses in PSY:

PSY 092—Willow Clinic (1-2)
Clinical Activity—2-6 hours; Seminar—1-2 hours; Variable. Open to lower division undergraduate students. Student run clinic for undergraduate students interested in learning about and meeting the unique health care needs for the homeless population. May be repeated for credit. (P/NP grading only.) Effective: 2009 Fall Quarter.

PSY 192—Willow Clinic (1-2)
Clinical Activity—2-6 hours; Lecture—1-2 hours; Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. UC Davis enrollment; upper division standing. Student run clinic for upper division students interested in learning about and meeting the unique health care needs for the homeless population. May be repeated for credit. (P/NP grading only.) Effective: 2009 Winter Quarter.

PSY 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Advanced standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

PSY 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Advanced standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

PSY 298—Directed Group Study for Graduate Students (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. Effective: 1997 Winter Quarter.

PSY 299—Special Study for Graduate Students (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

PSY 403—Fundamentals of Clinical Psychiatry (3)
Clinical Activity—1 hour; Lecture—3 hours. Prerequisite(s): Approval of SOM Committee on Student Progress. Restricted to medical student only. Psychiatric interviewing, Mental Status Exam and diagnosis. Major child and adult disorders, including substance abuse and dependence. Weekly student interviews of psychiatric patients in small group format. (P/F grading only.) Effective: 2008 Winter Quarter.

PSY 410—Klingenstein Summer Elective (2.5)
Clinical Activity—20 hours. Prerequisite(s): Consent of Instructor. During this "mini-clerkship," fellows will attend clinics, in-patient settings, and clinicians' offices. They will meet weekly to present cases and review current literature, and will complete a summary narrative at the end of their experience. (P/F grading only.) Effective: 2015 Spring Quarter.

PSY 410L—Klingenstein Longitudinal Elective (2)
Clinical Activity—5 hours; Discussion—2 hours; Discussion/Laboratory—10 hours. Prerequisite(s): Consent of Instructor. Year-long mentoring program provides clinical exposure to child and adolescent psychiatric healthcare during a medical student's pre-clinical years. (P/F grading only.) Effective: 2015 Fall Quarter.

PSY 412—Psychiatry Grand Rounds (1)
Lecture—1 hour. Prerequisite(s): Medical students or staff or other qualified mental health professionals with consent of instructor. Weekly conference at UCDMC for presentation of selected clinical cases,
presentation of lecture and research reports. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PSY 413—Outpatient Psychiatry Clerkship (6)
Clinical Activity—36 hours; Conference—2 hours; Lecture—2 hours. Prerequisite(s): PSY 430; And/or consent of coordinator. Experience in clinical management/treatment of adult outpatients with psychiatric and substance abuse disorders; crisis management/intervention, evaluation/development of diagnosis and treatment plan; emphasis on outpatient psychopharmacology/brief psychotherapy; observation of group therapy. Individual supervision by faculty/residents. (H/P/F grading only.) Effective: 2009 Winter Quarter.

PSY 414—Psychosomatic Medicine Clerkship (3-12)
Clinical Activity—32 hours; Discussion—8 hours. Prerequisite(s): Psychiatry Clerkship or consent of instructor; medical students only. A large university hospital service in which the student functions as a member of the team in evaluation, management and psychiatric liaison with other medical specialties. Intensive supervision from senior staff and psychiatric residents. May be repeated up to 2 time(s). (H/P/F grading only.) Effective: 2007 Winter Quarter.

PSY 415—Telemedicine Clinical Elective (3-9)
Clinical Activity—20 hours. Prerequisite(s): Fourth-year medical student with consent of instructor. Fourth-year medical student elective in Telemedicine focusing on psychiatric issues. Align with University, School and Center for Health and Technology mission of rural outreach and public health, particularly in primary care. May be repeated for credit. (H/P/F grading only.) Effective: 2011 Winter Quarter.

PSY 416—Child Psychiatry Clerkship (6)
Clinical Activity—36 hours; Conference—2 hours; Lecture/Discussion—2 hours. Prerequisite(s): PSY 430; And/or consent of coordinator. Didactic and clinical inpatient, outpatient, and consultation-liaison experiences with children, adolescents and families. Clinical observations, diagnostic assessment, and treatment will be undertaken with close supervision. Literature review and case conferences presented on a regular basis. (H/P/F grading only.) Effective: 2009 Winter Quarter.

PSY 417—Jail Psychiatric Clerkship (6)
Clinical Activity—28 hours; Conference—8 hours; Lecture—4 hours. Prerequisite(s): PSY 430; And/or consent of course coordinator. Students gain experience, under close faculty supervision, assessing
acute and chronic mentally ill inmates in both inpatient and clinic settings. (H/P/F grading only.) Effective: 2009 Winter Quarter.

PSY 418—Off-Campus Clinical Experience (3-9)
Clinical Activity—20-40 hours. Prerequisite(s): Consent of Instructor. Fourth-year medical students. Clinical or research elective in off-campus medical school or mental health setting. To be arranged with advance approval of instructor and
individual in charge of off-campus setting. May be repeated for credit. (H/P/F grading only.) Effective: 2012 Winter Quarter.

PSY 419—Combined Family Medicine-Psychiatry Clerkship (3-6)
Clinical Activity—32 hours; Discussion—8 hours. Students rotate through the county Primary Care Clinic under the supervision of dual-boarded Psychiatry and Family Practice Faculty to provide medical care of indigent and uninsured patients as well as primary care for psychiatry patients. May be repeated for credit. (H/P/F grading only.) Effective: 2018 Winter Quarter.

PSY 420—Acting Internship in Psychiatry (3-6)
Clinical Activity—40 hours. Prerequisite(s): PSY 430; And/or consent of course coordinator. Acting intern position with close faculty supervision with emphasis on biological psychiatry, psychopharmacology and psychodynamic aspects appropriate to diagnostic and long-term patient management. (H/P/F grading only.) Effective: 2016 Summer Quarter.

PSY 421—Combined Internal Medicine-Psychiatry Clerkship (3-6)
Clinical Activity—32 hours; Discussion—8 hours. Prerequisite(s): Psychiatry Clerkship or consent of instructor; medical students only. Students rotate through the county Primary Care Clinic under the supervision of dual-boarded Psychiatry and Internal Medicine Faculty to provide medical care of indigent and uninsured patients as well as primary care for psychiatry patients. May be repeated for credit. (H/P/F grading only.) Effective: 2018 Winter Quarter.

PSY 422—Readings in Psychiatry (1-3)
Discussion. Independent reading of a selected topic in psychiatry. Supervision and discussion with a psychiatry faculty member. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PSY 423—Willow Clinic (3-12)
Variable—4-10 hours. Prerequisite(s): Open to medical students in all four years of medical school. Student run clinic for medical students interested in learning about and meeting the unique health care needs for the homeless population. May be repeated for credit. (P/F grading only.) Effective: 2009 Spring Quarter.

PSY 424—Functional Genomics (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): Graduate standing or consent of instructor. The theory, methods and principles of functional neurogenomics with emphasis on the relationship to molecular mechanisms involved in development and disease of the nervous system. (H/P/F grading only.) Effective: 2010 Winter Quarter.

PSY 430—Psychiatry Clinical Clerkship (12)
Clinical Activity—45 hours. Prerequisite(s): Approval by School of Medicine Committee on Student Progress. Assigned to clinical settings, students build upon the skills gained in preclinical years; emphasis on diagnostic, therapeutic and interpersonal skills. Areas of focus - patient management, interviewing skills, mental status exam, differential diagnosis, basic psychopharmacology, crisis assessment, intervention and case (H/P/F grading only.) Effective: 2001 Summer Quarter.

PSY 430FA—SJVP Longitudinal Psychiatry Clerkship (1.5-6)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Family Medicine, Pediatrics and Internal Medicine for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PSY 430FB—SJVP Longitudinal Psychiatry Clerkship (1.5-6)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Family Medicine, Pediatrics and Internal Medicine for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PSY 430FC—SJVP Longitudinal Psychiatry Clerkship (1.5-6)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Family Medicine, Pediatrics and Internal Medicine for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PSY 430FD—SJVP Longitudinal Psychiatry Clerkship (1.5-6)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Progress. Longitudinal Clerkship runs concurrently with Family Medicine, Pediatrics and Internal Medicine for 32 weeks. Time is spent in direct patient care situations under the guidance of faculty. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PSY 430R—Rural PRIME Psychiatry Longitudinal Clerkship (2)
Clinical Activity—45 hours. Psychiatry Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PSY 430RA—Rural PRIME Psychiatry Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Psychiatry Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PSY 430RB—Rural PRIME Psychiatry Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Psychiatry Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PSY 430RC—Rural PRIME Psychiatry Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Psychiatry Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PSY 430RD—Rural PRIME Psychiatry Longitudinal Clerkship (1)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Psychiatry Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

PSY 430TA—TeachMS Longitudinal Psychiatry Clerkship (A) (4)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Promotions. Longitudinal Clerkship runs concurrently with Primary Care and Medicine for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only.) Effective: 2013 Fall Quarter.

PSY 430TB—TeachMS Longitudinal Psychiatry Clerkship (B) (6)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Promotions. Longitudinal Clerkship runs concurrently with Primary Care and Medicine for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only.) Effective: 2013 Fall Quarter.

PSY 430TC—TeachMS Longitudinal Psychiatry Clerkship (C) (2)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Approval by School of Medicine Committee on Student Promotions. Longitudinal Clerkship runs concurrently with Primary Care and Medicine for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only.) Effective: 2013 Fall Quarter.

PSY 439D—Directed Clinical Studies in Psychiatry (1-12)
Clinical Activity—40 hours. Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for modified curriculum or to complete a clinical rotation following a leave of absence. May be repeated for credit. (P/F grading only.) Effective: 2011 Spring Quarter.

PSY 439R—Directed Studies in Psychiatry (1-12)
Clinical Activity—30 hours; Independent Study—10 hours. Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for remediation of all or part of clinical rotation. Clinical studies to accommodate and satisfy remedial work as directed by the Committee on Student Progress and approved by the course IOR. May be repeated for credit. (P/F grading only.) Effective: 2011 Summer Quarter.

PSY 480—Insights in Psychiatry (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. First- or second-year medical student in good academic standing. On individual basis, student provided with an opportunity for gaining
insight into various clinical activities in the practice of psychiatry. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PSY 488—Acting Internship in Inpatient Psychiatry, Away Rotation (6)
Clinical Activity—40 hours. Prerequisite(s): Psychiatry Clerkship and/or consent of course coordinator. Inpatient acting internship at approved non-UCDHS affiliated training program that provides experience and preparation for ambulatory medical care. Students perform as an intern, with a smaller number of patients, greater supervision, and responsibility for the ongoing care of assigned patients. (H/P/F grading only.) Effective: 2009 Summer Quarter.

PSY 489—Acting Internship in Ambulatory Psychiatry, Away Rotation (6)
Clinical Activity—40 hours. Prerequisite(s): Psychiatry Clerkship and/or consent of course coordinator. Outpatient acting internship at an approved non-UCDHS affiliated training program that provides experience and preparation for ambulatory medical care. Students perform as an intern, with smaller number of patients, greater supervision, and responsibility for the ongoing care of assigned patients. (H/P/F grading only.) Effective: 2009 Summer Quarter.

PSY 493—Culture, Medicine and Society (6)
Clinical Activity—16 hours; Discussion—4 hours; Independent Study—8 hours; Seminar—12 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. Students will learn about the epidemiological significance of health disparities and barriers to access to health care. The course will cover (1) Epidemiology/Health Disparities; (2) Society and Medicine; (3) Cinemeducation; (4) Reflection/Integration. (H/P/F grading only.) Effective: 2007 Spring Quarter.

PSY 498—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Approved for graduate degree credit. Medical students desiring to explore particular topics in depth. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PSY 499—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Approved for graduate degree credit. Individual research on selected topics or research projects. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

PTX Pharmacology - Toxicology

Additional courses that satisfy the breadth and depth requirements of the program are taught under departments of faculty in the group.

Courses in PTX:

PTX 201—Principles of Pharmacology and Toxicology I (5)
Lecture—5 hours. Prerequisite(s): BIS 102; NPB 101 First of three courses presenting fundamental principles of pharmacology and toxicology. Introductory overview of basic concepts in pharmacology/toxicology, followed by in-depth blocks on fate processes of chemicals in the body, fate processes in tissue selective responses, selective toxicity employed therapeutically. Effective: 1997 Fall Quarter.

PTX 202—Principles of Pharmacology and Toxicology II (4)
Lecture—4 hours. Prerequisite(s): PTX 201 The second of three courses presenting fundamental principles of pharmacology and toxicology. Principles of pharmacodynamics and mechanisms of drug/toxicant actions. Effective: 1999 Winter Quarter.

PTX 203—Principles of Pharmacology and Toxicology III (4)
Lecture—4 hours. Prerequisite(s): PTX 201; PTX 202 Integrated physiological systems, cardiovascular and nervous systems and how drugs and toxicants act to perturb function. Effective: 1999 Spring Quarter.

PTX 215—Electrophysiology Techniques and Applications (3)
Discussion—1.5 hours; Lecture—1.5 hours. Broad scope of topics in electrophysiology techniques and applications. (Molecular, Cellular and Integrative Physiology 215.) (S/U grading only.) Effective: 2015 Spring Quarter.

PTX 230—Advanced Topics in Pharmacology and Toxicology (1-3)
Discussion—1 hour; Lecture—1 hour; Seminar—1 hour. Prerequisite(s): PTX 201; and Consent of Instructor. In-depth coverage of selected topics for graduate students in Pharmacology-Toxicology and related disciplines. Topics determined by instructor in charge for each quarter. Effective: 1997 Winter Quarter.

PTX 277—Molecular Mechanisms in Cancer and other Diseases (3)
Lecture/Discussion—2 hours; Project (Term Project). Prerequisite(s): MCB 121 or MCB 122; Undergraduate or graduate introductory course in cell biology (such as BIS 104), and general biochemistry (MCB 121 or MCB 122) required; PTX 202 recommended. Restricted to graduate standing or consent of instructor. Exploration of cutting edge investigations on the underlying mechanisms of cancer biology, cancer therapy and other diseases. Current medical research in Cancer and other diseases, as it spans the bench to bedside. Effective: 2015 Winter Quarter.

PTX 290—Seminar (1)
Variable. Current topics in pharmacology and toxicology. (S/U grading only.) Effective: 1997 Winter Quarter.

PTX 290C—Advanced Research Conference (1)
Lecture/Discussion. Provide credit for participation in and attendance at research conferences. May be repeated up to 3 time(s). (S/U grading only.) Effective: 2011 Fall Quarter.

PTX 299—Research (1-12)
Research with a faculty member in the Pharmacology & Toxicology Graduate Group. May be repeated for credit. (S/U grading only.) Effective: 2003 Winter Quarter.

PUL Med - Intl: Pulmonary Medicine

Courses in PUL:

PUL 192—Internship in Pulmonary Medicine (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Upper division standing; approval of project by preceptor prior to internship. Supervised work experience in pulmonary medicine. May be repeated for
credit up to 12 units. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

PUL 299—Pulmonary Disease Research (1-12)
Laboratory. Prerequisite(s): Consent of Instructor. By arrangement only. Pulmonary disease research activity with focus in inhalation toxicity, oxidants or lung biochemistry, and cell and molecular biology. (S/U grading only.) Effective: 1997 Winter Quarter.

PUL 460—Comprehensive Pulmonary Medicine Clerkship (3-6)
Clinical Activity—40 hours. Prerequisite(s): Completion of second year of medical school and/or consent of instructor; completion of Internal Medicine Clerkship. Rotation intended to provide a comprehensive student education in Pulmonary Medicine. Students will participate in hands on clinical education, as well as completing an assigned curricula. Intended for students pursuing Internal Medicine & Primary Care careers. May be repeated for credit. (H/P/F grading only.) Effective: 2013 Summer Quarter.

PUL 461—Critical Care Clinical Clerkship (3-6)
Clinical Activity—40 hours. Prerequisite(s): Completion of second year of medical school and/or consent of instructor; completion of Internal Medicine and Surgical Clerkships. Rotation intended to provide student education in the Critical Care Management of sub-specialty patients. May be repeated for credit. (H/P/F grading only.) Effective: 2013 Summer Quarter.

PUL 462—Pulmonary Consult Clerkship (3-6)
Clinical Activity—35 hours. Prerequisite(s): Completion of second year of medical school and/or consent of instructor; completion of Internal Medicine Clerkship. Similar to course 460. Rotation designed for students interested in learning pulmonary medicine, but who desire more variety in their clerkships, and do not desire the comprehensive experience offered by a four-week pulmonary rotation. May be repeated for credit. (H/P/F grading only.) Effective: 2013 Summer Quarter.

PUL 470—Practicum in Care of the Terminally Ill (3-6)
Clinical Activity—35 hours; Seminar—5 hours; Variable—3-6 hours. Prerequisite(s): Consent of Instructor. Restricted to fourth-year Medical students in good standing. Work with hospice interdisciplinary team. Direct experience in the care of patients with illnesses where no cure is possible. Emphasis on symptom relief, end of life issues, physician assisted suicide. (H/P/F grading only.) Effective: 2010 Spring Quarter.

PUL 475—Encounters in Ethics in the ICU (3-6)
Clinical Activity—12 hours; Independent Study—6 hours; Lecture/Discussion—6 hours. Prerequisite(s): Fourth-year Medical Student. Care for critically ill adults with complex medical disease carries with it unique ethical roles and duties for the physician. May be repeated for credit. (H/P/F grading only.) Effective: 2011 Summer Quarter.

PUL 480—Pulmonary-Critical Care Medicine Insights (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. Student in good academic standing. Attend respiratory outpatient clinics and in-patient pulmonary consultation rounds and medical intensive care rounds. Introduction to diagnosis and treatment of common pulmonary problems. (H/P/F grading only.) Effective: 1997 Winter Quarter.

PUL 499—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Research opportunity in Pulmonary Medicine. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

RAL Med - Intl: Rheumatology-Allergy

Course in RAL:

RAL 099—Directed Research Immunology (1-5)
Laboratory. Prerequisite(s): Consent of Instructor. Independent research will be encouraged in basic immunology, including the role of the cellular immune system in oncogenesis. (P/NP grading only.) Effective: 1997 Winter Quarter.

RAL 192—Internship in Rheumatology-Allergy (1-12)
Internship—3-36 hours. Prerequisite(s): Upper division standing; approval of project by preceptor prior to internship. Supervised work experience in rheumatology-allergy. May be repeated for credit up to 12 units. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

RAL 199—Directed Research in Immunology (1-5)
Laboratory. Prerequisite(s): Consent of Instructor. Independent research will be encouraged in basic immunology, including the role of the cellular immune system in oncogenesis. (P/NP grading only.) Effective: 1997 Winter Quarter.

RAL 209—Current Topics in Immunology: From Presentations to Grants (3)
Lecture—1 hour; Project (Term Project)—1 hour; Term Paper/Discussion—1 hour. Prerequisite(s): IMM 201 Current developments in various aspects of immunology and their interrelationships. Focus on areas of immunology not currently covered in the basic and advanced immunology courses. Oral presentation, written review and grant preparation. Effective: 2008 Winter Quarter.

RAL 298—Topics in Rheumatology and Clinical Immunology (1-5)
Laboratory. Prerequisite(s): Consent of Instructor. Library and/or laboratory work as required. (S/U grading only.) Effective: 1997 Winter Quarter.

RAL 299—Research in Autoimmune Disease (1-12)
Laboratory. Prerequisite(s): Consent of Instructor. Independent research will be encouraged in both animal models of human disease (including congenitally athymic [nude], asplenic, and New Zealand mice) and the cellular immune system of patients with systemic
lupus erythematosus, Sjögrens syndrome, polymyositis and drug hypersensitivity. (S/U grading only.) Effective: 1997 Winter Quarter.

RAL 460—Rheumatology Clinical Clerkship (1-18)
Clinical Activity—2-40 hours. Prerequisite(s): MDS 431 and Consent of Instructor. Participation with members of the subspecialty service in the diagnosis and therapeutic management of patients with rheumatologic diseases. May be repeated for credit. (H/P/F grading only.) Effective: 2009 Spring Quarter.

RAL 461—Allergy Clinical Clerkship (3-18)
Clinical Activity. Prerequisite(s): Consent of Instructor. Completion of second year of medical school. Student will work with practicing allergist in daily work with patients and participate in weekly allergy clinic and teaching conferences. Study of the literature. Will see patients with problems in clinical immunology, immunodeficiency, asthma, allergic rhinitis. (H/P/F grading only.) Effective: 1997 Winter Quarter.

RAL 480—Insights in Rheumatology (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. Student in good academic standing. Participation in rheumatology consultation rounds, rheumatic disease clinics and conferences with supervised readings in rheumatology. (S/U grading only.) Effective: 1997 Winter Quarter.

RAL 499—Research (1-12)
Variable—2-40 hours. Prerequisite(s): Medical student with consent of instructor. Part-time participation in active clinical and basic research projects which can involve both patient care and relevant laboratory procedures.
Students can gain experience in clinical medicine and clinical investigation. May be repeated for credit. (H/P/F grading only.) Effective: 2009 Spring Quarter.

RDI Med - Radiology - Diagnostic

Courses in RDI:

RDI 413—Radiological Diagnosis II (Physics of Diagnostic Radiology) (5)
Laboratory—6 hours; Lecture—49 hours. Prerequisite(s): Consent of Instructor. Physics of diagnostic imaging; x-ray production and interaction; image formation; modulation transfer function; fluoroscopy; cine fluoroscopy; stereoscopy; xeroradiography; computerized and geometrical tomography;
magnetic resonance and ultrasound. Principles of radiation protection in imaging will be covered. (H/P/F grading only.) Effective: 1997 Winter Quarter.

RDI 414—Medical Radiation Biology (3)
Lecture—27 hours. Prerequisite(s): Consent of Instructor. Medical radiation biology; molecular cellular and organ system response to acute and chronic irradiation; radiation carcinogenesis and genetic effects; radiation risk assessment; diagnostic ultrasound and magnetic resonance imaging health effects. Medical/legal considerations of radiation exposure. (H/P/F grading only.) Effective: 1997 Winter Quarter.

RDI 430—Introduction to Clinical Radiology (3-6)
Variable. Prerequisite(s): Consent of Instructor. Introduces students to common radiology tests, including limitations and risks by using ACR Appropriateness Criteria and incorporate patient specific clinical data into ordering and interpreting appropriate imaging tests. (H/P/F grading only.) Effective: 2017 Fall Quarter.

RDI 461—Advanced Clinical Clerkship in Diagnostic Radiology (3-6)
Clinical Activity—35 hours; Conference—4 hours; Discussion/Laboratory—1 hour. Prerequisite(s): Consent of Instructor. Satisfactory completion of second year medical school curriculum and of third-year clerkships in Internal Medicine and General Surgery. Restricted to eight students per rotation; open to visiting medical students from accredited programs. Work with clinical Radiologists in image interpretation fluoroscopy angiography image-guided intervention cardiac stress testing radionuclide therapy. Daily conferences in Radiology Diagnosis and Therapy Health Physics Radiation Safety. Prepare two clinical cases for in-class presentation. Assigned readings. May be repeated for credit. (H/P/F grading only.) Effective: 2014 Spring Quarter.

RDI 462—Diagnostic Imaging of Acquired and Congenital Heart Disease (2)
Lecture/Discussion—5 hours. Prerequisite(s): RDI 461 (can be concurrent); Fourth-year medical student in good academic standing. Main emphasis on radiology of acquired and congenital heart disease, but also on magnetic resonance, nuclear medicine, and echocardiography of heart diseases. (H/P/F grading only.) Effective: 1997 Winter Quarter.

RDI 473—Advanced Clinical Clerkship in Neuroradiology (3-6)
Clinical Activity—35 hours; Conference—4 hours; Independent Study—1 hour; Variable—9-18 hours. Prerequisite(s): Fourth-year medical student with interest in Diagnostic Radiology, Neuroradiology, Neurology, Neurosurgery, Psychiatry, Psychology, or related field; satisfactory completion of RDI 461, or the equivalent, is strongly encouraged. Restricted to one student per 2/4 week rotation. Work with Neuroradiologists in image interpretation of CT, MRI, and fluoroscopy. Opportunity to participate in assessment of Neurointerventional patients, and to observe Neurointerventional procedures. Daily conferences in Neuroimaging, General Radiology, Health Physics, and Radiology Safety. Assigned readings. May be repeated for credit. Credit limited to 3 units for 2 weeks; 6 units for 4 weeks. (H/P/F grading only.) Effective: 2014 Spring Quarter.

RDI 474—Advanced Clinical Clerkship in Pediatric Radiology (3-6)
Clinical Activity—30 hours; Conference—5 hours; Film Viewing—3 hours; Independent Study—2 hours. Prerequisite(s): Fourth-year medical students with interest in Radiology and/or Pediatrics; interested third-year medical students who have successfully completed Pediatrics clinical clerkships may enroll, given availability and consent of the instructor of record; prior completion of PDI 461, or the equivalent, encouraged. Restricted to two students per two-week or four-week rotation. Participation in the radiological care of Pediatric patients; evaluate the patient receiving the radiographic study, including pertinent historical/physical findings. Student expected to write up case files on interesting cases encountered during their rotation. May be repeated for credit. Credit limited to 3 units for 2 weeks; 6 units for 4 weeks. (H/P/F grading only.) Effective: 2014 Spring Quarter.

RDI 475—Advanced Clinical Clerkship in Musculoskeletal Radiology (MSK) (3-6)
Clinical Activity—35 hours; Conference—4 hours; Discussion/Laboratory—1 hour; Variable—9-18 hours. Prerequisite(s): Fourth-year medical student with interest in Musculoskeletal Radiology, Orthopedic Surgery, Sports Medicine, PMNR, or related field; satisfactory completion of RDI 461, or the equivalent, is strongly encouraged. Restricted to one student per 2/4 week rotation. Work with Musculoskeletal Radiologists in interpretation of CT, MRI, radiography, and fluoroscopy. Opportunity to assess patients for, and to observe image-guided procedures. Daily conferences in Musculoskeletal Imaging, General Radiology, Health Physics, and Radiology Safety. Assigned readings. May be repeated for credit. credit limited to 3 units for 2 weeks, 6 units for 4 weeks. (H/P/F grading only.) Effective: 2014 Spring Quarter.

RDI 476—Advanced Clinical Clerkship Vascular/Interventional Radiology (IR) (3-6)
Clinical Activity—35 hours; Conference—4 hours; Discussion/Laboratory—1 hour; Variable—9-18 hours. Prerequisite(s): Fourth-year medical student with interest in Diagnostic Radiology, Vascular/Interventional Radiology, Cardiovascular Imaging, Cardiology, Cardiovascular Surgery, Surgical Oncology, General Surgery, or related field; satisfactory completion of RDI 461, or the equivalent, is strongly encouraged. Restricted to one student per 2/4 week rotation. Medical student will work with Vascular/Interventional Radiologists in the evaluation of patients for interventional procedures. There will be opportunities to Daily conferences in Neuroimaging, General Radiology, Health Physics, and Radiology Safety. Assigned readings. May be repeated for credit. Credit limited to 3 units for 2 weeks, 6 units for 4 weeks. (H/P/F grading only.) Effective: 2014 Spring Quarter.

RDI 477—Advanced Clinical Clerkship in Ultrasound Radiology (3-6)
Clinical Activity—30 hours; Conference—5 hours; Film Viewing—3 hours; Variable—9-18 hours. Prerequisite(s): Fourth-year medical student with interest in Radiology, OB/GYN, or in other medical or surgical subspecialties employing ultrasound in their clinical practice; prior completion of RDI 461, or the equivalent, is encouraged. Restricted to two students per 2/4 week rotation. Participation as an active team member on a busy clinical ultrasound service. May be repeated for credit. (H/P/F grading only.) Effective: 2016 Summer Quarter.

RDI 478—Advanced Clinical Clerkship Abdominal Imaging (3-6)
Clinical Activity—35 hours; Conference—4 hours; Discussion/Laboratory—1 hour; Variable—9-18 hours. Restricted to one student per 2/4 week rotation. Work with clinical Radiologists on abdominal and pelvic CT, MR, ultrasound, digital radiography, gastrointestinal and genitourinary procedures, image-guided intervention. Offered as a 2-week rotation for third-year medical students and a 2/4-week rotation for fourth-year medical students. May be repeated for credit. Credit limited to 3 units for 2 weeks, 6 units for 4 weeks. (H/P/F grading only.) Effective: 2014 Spring Quarter.

RDI 479—Specialty Externship in Radiology (3-16)
Clinical Activity—25 hours; Discussion—10 hours. Externship provides in-depth exposure to one of a variety of sub-specialties in Radiology. May be repeated for credit. (H/P/F grading only.) Effective: 2011 Winter Quarter.

RDI 498—Group Study in Diagnostic Radiology (1-12)
Variable. Prerequisite(s): Consent of Instructor. (H/P/F grading only.) Effective: 1997 Winter Quarter.

RDI 499—Research in Diagnostic Radiology (1-12)
Variable. Prerequisite(s): Consent of Instructor. Approved for graduate degree credit. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

REL Study of Religion

Courses in REL:

REL 200A—Historical Roots of the Study of Religion (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Consideration of the historical and philosophical formation of religion as a concept. Treats the emergence of religion as a category of analysis and understanding from the Reformation through the Enlightenment. Effective: 2013 Fall Quarter.

REL 200B—Foundational Theories of Religion (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Survey of classical 19th and 20th century approaches to the study of religion. Effective: 2013 Fall Quarter.

REL 200C—Contemporary Approaches to the Study of Religion (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Consideration of major themes, issues and methods in the contemporary study of religion. Perspectives from diverse cultural settings employed to consider modern historical, philosophical, and social contexts that inform understandings of religion. Effective: 2013 Fall Quarter.

REL 200D—Field Profile Seminar I and II (1-2)
Project (Term Project). Individually guided research to survey the field of study, under the supervision of a faculty member. Four units total over two or more quarters are required by the end of the second year. May be repeated for credit. Effective: 2013 Fall Quarter.

REL 210A—Special Topics in American Religious Cultures (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Comparative, interpretive study of the treatment of specific topics in American religious cultures. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

REL 210B—Special Topics in Asian Religious Cultures (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Comparative, interpretive study of the treatment of specific topics in Asian religious cultures. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

REL 210C—Special Topics in Mediterranean Religious Cultures (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Comparative, interpretive study of the treatment of specific topics in Mediterranean religious cultures. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

REL 230A—Thematic Topics - Body and Praxis (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Comparative, interpretive study of the treatment of religion through specific topics and themes relating to the body and praxis. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

REL 230B—Thematic Topics - Language, Rhetoric, and Performance (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Comparative, interpretive study of the treatment of religion through specific topics and themes relating to language, rhetoric, and performance. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

REL 230C—Thematic Topics - Modernity, Science, and Secularism (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Comparative, interpretive study of the treatment of religion through specific topics and themes relating to modernity, science, and secularism. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

REL 230D—Thematic Topics - Theory and Method (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Comparative, interpretive study of the treatment of religion through specific topics and themes relating to theory and method. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

REL 230E—Thematic Topics - Values, Ethics, and Human Rights (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Comparative, interpretive study of the treatment of religion through specific topics and themes relating to values, ethics, and human rights. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

REL 230F—Thematic Topics - Visual Culture, Media, and Technology (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Comparative, interpretive study of the treatment of religion through specific topics and themes relating to visual culture, media, and technology. May be repeated for credit when topic differs. Effective: 2013 Fall Quarter.

REL 231B—Theories of Language (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Restricted to graduate students. Focuses on historical theories of language that precede and accompany post-structuralist theory. Intended to introduce graduate students to the context of modern theory formation. May cover structuralism, integrationalism, and grammaticalization. Effective: 2015 Spring Quarter.

REL 231E—History, Theory and Criticism of Human Rights (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Restricted to graduate students. Introduces the advanced study of Human Rights and the theoretical and practical elaboration of the international Human Rights system. Seminar will engage with criticism of Human Rights and develop research and teaching within disciplinary and interdisciplinary frameworks. (Human Rights 200A.) Effective: 2013 Fall Quarter.

REL 298—Group Study (1-5)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Group Study May be repeated for credit. (S/U grading only.) Effective: 2013 Fall Quarter.

REL 299—Research (1-12)
Variable. Prerequisite(s): Graduate standing or consent of instructor. Research May be repeated for credit. (S/U grading only.) Effective: 2012 Fall Quarter.

REL 299D—Dissertation Writing (1-12)
Variable. Prerequisite(s): Consent of Instructor. Advanced to candidacy for the Ph.D. program. Dissertation Writing May be repeated for credit. (S/U grading only.) Effective: 2013 Fall Quarter.

RNU Med - Radiology - Nuclear Medicine

Courses in RNU:

RNU 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

RNU 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

RNU 299—Research: Special Study for Graduate Students (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

RNU 401—Biomedical Radiochemistry (3)
Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Open to graduate and medical students. Approved for graduate degree credit.Course is designed to combine basic nuclear physics, chemistry, and biology into a comprehensive and vigorous lecture-laboratory experience in biomedical nuclear chemistry.Subjects include choice and purification of appropriate gamma and beta radioisotopes,compounding biological pharmacodynamics and radioimmunoassay. (H/P/F grading only.) Effective: 1997 Winter Quarter.

RNU 411—Radiological Physics I (Physics of Nuclear Medicine) (5)
Laboratory—12 hours; Lecture—43 hours. Prerequisite(s): Consent of Instructor. Physics of diagnostic and therapeutic nuclear medicine, nuclear physics, radioactive decay; interaction of ionizing radiation; dosimeters; attenuation; internal and external dosimetry; health physics; radiation detection and imaging, scintillation cameras, computerized planar and tomographic imaging. Offered at UC Davis Medical Center. (H/P/F grading only.) Effective: 1997 Winter Quarter.

RNU 463—Clinical Clerkship in Nuclear Medicine (3-8)
Clinical Activity. Prerequisite(s): Consent of Instructor. Satisfactory completion of second-year medical school; RDI 461 recommended. Limited enrollment. Clerkship correlates radioisotopic methods with clinical, pathophysiological, and other diagnostic aspects of the patients care. Each patient reviewed with student by faculty member. Reading assignments, informal projects, and research techniques available. (H/P/F grading only.) Effective: 1999 Spring Quarter.

RNU 498—Group Study in Nuclear Medicine (1-12)
Variable. Prerequisite(s): Consent of Instructor. Approved for graduate degree credit. (H/P/F grading only.) Effective: 1997 Winter Quarter.

RNU 499—Research in Nuclear Medicine (1-12)
Variable. Prerequisite(s): Consent of Instructor. Research in Nuclear Medicine. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

RON Med - Radiation Oncology

Course in RON:

RON 199—Special Study for Advanced Undergraduates; Research in Radiation Biology (1-5)
Variable—3-15 hours. Radiation Oncology is a unique discipline combining elements of clinical practice linked to complex physics based dosimetry and treatment planning. Included within this clinical environment is a strong basis in biology that underpins the clinical effectiveness of radiation treatment. May be repeated for credit. (P/NP grading only.) Effective: 2010 Fall Quarter.

RON 211—Introduction to Radiation Oncology Physics (3-6)
Variable. Prerequisite(s): Consent of Instructor. Restricted to physics and engineering graduate students and senior undergraduate physics majors. Class size limited to three students. Introduction to radiation oncology physics. Overview of treatment methodologies. Medical physics equipment. Treatment machine dosimetry, including calibration. Machine quality assurance. Patient dosimetry. Treatment planning. Simulation and treatment. Treatment quality assurance, including calculation checks and chart checks. Brachytherapy. (S/U grading only.) Effective: 2008 Fall Quarter.

RON 299—Independent Study and Research (1-12)
Laboratory—3-40 hours. Prerequisite(s): Enrollment with a graduate group for Ph.D. candidacy and consent of group advisor and sponsor. Research under supervision of Radiation Oncology faculty. Work must be appropriate to fulfill the requirements for the Ph.D. degree. (S/U grading only.) Effective: 2012 Fall Quarter.

RON 420—Radiobiology Lecture Course (1)
Lecture—1 hour. Prerequisite(s): BIS 001A; MAT 012; PHY 001A Radiobiology lectures are designed to engage the physician residents, physics residents and medical students in learning Radiobiology principles and concepts during the year the Radiation Physics course is taught. May be repeated up to 2 time(s). (H/P/F grading only.) Effective: 2011 Winter Quarter.

RON 463—Radiation Oncology Clerkship (3-9)
Clinical Activity—30 hours. Prerequisite(s): MDS 430; MDS 431; third-year clinical clerkship; consent of instructor required. Introduction to radiation oncology. Students will participate in workup and treatment planning for radiation oncology patients and will be introduced to the concepts involved in clinical radiation oncology, radiation biology, and radiation physics. May be repeated for credit. (H/P/F grading only.) Effective: 2012 Summer Quarter.

RON 465—Externship in Radiation Oncology (3-16)
Clinical Activity—30 hours. Prerequisite(s): Consent of Instructor. Externship provides in-depth exposure to the field of Radiation Oncology for students who rotation through an affiliated institution. May be repeated for credit. (H/P/F grading only.) Effective: 2015 Spring Quarter.

RON 499—Independent Study and Research in Therapeutic Radiology (1-18)
Variable—3-40 hours. Prerequisite(s): Consent of Instructor. Advanced-level research seminar in clinical and/or translational radiation oncology. Work with the course instructor to generate a testable hypothesis. May be repeated for credit. (H/P/F grading only.) Effective: 2014 Fall Quarter.

RST Religious Studies

Courses in RST:

RST 001—Survey of Religion (4)
Discussion—1 hour; Lecture—3 hours. Basic concepts introduced through readings of the primary religious literature. Discussion of central ideas (creation, history, law, prophecy, suffering, mysticism, asceticism, karma, reincarnation, moksha, etc.); readings from the Bible, Bhagavad Gita, the Koran, selections from Plato and early Buddhist writings. GE credit: ACGH, AH, DD, OL, VL, WE. Effective: 1997 Winter Quarter.

RST 001A—Pilgrimage (4)
Discussion—1 hour; Lecture—3 hours. Introduction to comparative religion, focusing on the theme of pilgrimage in different religious traditions. Not open to students who have taken course 3A. GE credit: AH, WC, WE. Effective: 2013 Spring Quarter.

RST 001B—Death and Afterlife (4)
Discussion—1 hour; Lecture—3 hours. Introduction to comparative religion, focusing on the theme of death and the afterlife in different religious traditions. Not open to students who have taken course 3B. GE credit: AH, OL, VL, WC, WE. Effective: 2013 Spring Quarter.

RST 001C—Sacrifice (4)
Discussion—1 hour; Lecture—3 hours. Introduction to comparative religion, focusing on the theme of sacrifice in different religious traditions. Not open to students who have taken course 3C. GE credit: AH, OL, VL, WC, WE. Effective: 2013 Spring Quarter.

RST 001D—Conversion (4)
Discussion—1 hour; Lecture—3 hours. Introduction to comparative religion, focusing on the theme of conversion in different religious traditions. Not open to students who have taken course 3D. GE credit: AH, WC, WE. Effective: 2013 Spring Quarter.

RST 001E—Fundamentalism (4)
Discussion—1 hour; Lecture—3 hours. Introduction to comparative religion, focusing on the idea of fundamentalism in different religious traditions. No credit given to students that have taken course 3E. GE credit: AH, DD, OL, SS, WE. Effective: 2017 Fall Quarter.

RST 001F—Religion Today (4)
Discussion—1 hour; Lecture—3 hours. Introduction to comparative religion, focusing on different religious traditions in the contemporary world. GE credit: AH, DD, WC, WE. Effective: 2013 Spring Quarter.

RST 001G—Myth, Ritual, and Symbolism (4)
Discussion—1 hour; Lecture—3 hours. Not open to students who have taken and received unit credit for course 2. Myths, rituals and religious symbols found in a variety of religious traditions including examples from ancient and contemporary religious life. Variety of religious phenomena; validity of different approaches to the study of religion. Not open to students who have taken and received unit credit for course 2. GE credit: AH, OL, VL, WC, WE. Effective: 2009 Fall Quarter.

RST 001H—Sex, Marriage, and Divorce in Medieval and Modern Society (4)
Discussion—1 hour; Lecture—3 hours. Methods used in the study of religion, focusing on a particular theme in a number of religious traditions. GE credit: AH, OL, WC, WE. Effective: 2015 Winter Quarter.

RST 001J—Music, Voice, and the Word (4)
Discussion—1 hour; Lecture—3 hours. Exploration of relation between religion and musical traditions in various cultures. Investigation of ways music, vocal performance and sound production reflect and shape modern religious sensibilities. Special attention to gender, ethnicity, race, class, nationalism, secularism and mass media. GE credit: AH, WC. Effective: 2015 Spring Quarter.

RST 005—Comparative Religion (2)
Lecture—2 hours. Comparative Religion based on rotating topics such as Dreams and Revelations, Evil, Prophecy, Salvation, and Crime and Punishment. May be repeated for credit when topic differs. GE credit: AH, WE. Effective: 2018 Winter Quarter.

RST 006—Introduction to Health Sciences and the Humanities (4)
Extensive Writing; Lecture/Discussion—3 hours. Humanities in the health sciences focusing on illness, the practice of medicine, and the role of culture in biomedical research. GE credit: ACGH, AH, DD, SS, WE. Effective: 2018 Spring Quarter.

RST 010—Contemporary Ethical Issues (2)
Lecture—2 hours. Presents challenging, contemporary ethical issues from a multi-cultural perspective. Rotating topics will include Ethical Eating, Capital Punishment, Euthanasia, Poverty, and Animal Rights. May be repeated for credit. GE credit: AH, WE. Effective: 2012 Fall Quarter.

RST 010A—Contemporary Ethical Issues (2)
Discussion—1 hour; Extensive Writing. Prerequisite(s): RST 010 (can be concurrent); RST 010 required concurrently; GE topical breadth and diversity credit only with concurrent enrollment in RST 010. Restricted to students enrolled in course 10. Discussion of the readings assigned for course 10 and completion of a major research paper. May be repeated for credit. GE credit: AH, WE. Effective: 2007 Winter Quarter.

RST 011—Ethical Eating (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Introduction to the complex and varied ethical, religious, and cultural meanings that food has had across the centuries and globe. GE credit: AH, OL, VL, WC, WE. Effective: 2014 Winter Quarter.

RST 012—The Emergence of Judaism, Christianity and Islam (4)
Discussion—1 hour; Lecture—3 hours. History of religion in the ancient Near East and Mediterranean, from the Persian period through the rise of Islam. Emphasis on historical and social contexts of the formation of new traditions, in particular Judaism, Christianity, and Islam. GE credit: AH, OL, WC, WE. Effective: 2012 Winter Quarter.

RST 015Y—Reading War/Fighting War (4)
Extensive Writing; Lecture—2 hours; Web Electronic Discussion—1 hour. Introduction to both classic religious texts about war and a set of actual scenarios drawn from the experience and training of soldiers in recent military conflicts. GE credit: ACGH, AH, DD, OL, VL, WC, WE. Effective: 2013 Spring Quarter.

RST 021—Hebrew Scriptures (4) ***Review all entries***
Lecture—3 hours; Term Paper/Discussion. Selected texts from the Hebrew Scriptures (GenesisII Chronicles) and review of modern scholarship on the texts from a variety of perspectives (historical, literary, sociological, psychological). Course work is based on an English translation and no knowledge of Hebrew is required. GE credit: AH, WC, WE. Effective: 2013 Spring Quarter.

RST 021—The Bible and Its Interpreters (4) ***Review all entries***
Lecture—3 hours; Term Paper/Discussion. Introduction to the Hebrew Bible (Old Testament): key narratives and themes (creation, flood, prophecy, justice, sexuality, etc.); origins in Ancient Israel; diverse ways it has been interpreted in Jewish and Christian communities. GE credit: AH, WC, WE. Effective: 2018 Fall Quarter.

RST 023—Introduction to Judaism (4)
Lecture/Discussion—3 hours; Term Paper. Introduction to the study of religion using examples from the rituals, art and holy texts of Judaism. No prior knowledge of either Judaism or the study of religion is necessary. GE credit: ACGH, AH, DD, WC, WE. Effective: 1997 Winter Quarter.

RST 030—Religions of South Asia (4)
Discussion—1 hour; Lecture—3 hours. Introduction to South Asian religions, including Hinduism, Buddhism, Islam, Jainism and Sikhism. Traces historical developments from Vedic texts and their ascetic reformulation by sages such as Yajnavalkya, Siddhartha Gautama, and Mahavira into our global present. GE credit: AH, VL, WC, WE. Effective: 2014 Winter Quarter.

RST 040—New Testament (4)
Discussion—1 hour; Lecture—3 hours. New Testament literature from critical, historical, and theological
perspectives. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

RST 042—Religion and Science Fiction (4)
Lecture—3 hours; Term Paper. Representations of actual and fictional religious movements in science fiction and fantasy writing and film. Examination of: the characteristics of religion and religiosity in fictional religious movements; the relationship between religion, science, and technology in modern speculative fiction. GE credit: AH, VL, WE. Effective: 2014 Winter Quarter.

RST 045—Christianity (4)
Lecture/Discussion—3 hours; Term Paper/Discussion. Major concepts and practices in the Christian tradition. Survey of the history of Christianity and Christian expansion from antiquity to modern times. Course pays particular attention to Christianity in China, India, Africa, the Middle East, and Latin America. GE credit: AH, VL, WC, WE. Effective: 2012 Fall Quarter.

RST 060—Introduction to Islam (4)
Lecture/Discussion—3 hours; Term Paper/Discussion—1 hour. Introduction to topics central to the Islamic tradition. Muhammad, the Qur'an, Islamic law, theology, philosophy, cosmology, worship, and mysticism. Race and gender in Islam, Islamic revival, and varying experiences of Islam in different historical and cultural settings. GE credit: AH, SS, WC, WE. Effective: 2014 Winter Quarter.

RST 065C—The Qur'an and Its Interpretation (4)
Extensive Writing; Lecture/Discussion—3 hours. The Qur'an, its history, its various functions in the lives of Muslims, and its different interpretations. Quranic themes such as God and humankind, nature and revelation, eschatology and Satan. Islam and other religions; women, gender, and sexuality. GE credit: AH, WC, WE. Effective: 2005 Spring Quarter.

RST 067—Modern Hinduism (4)
Lecture/Discussion—3 hours; Term Paper. Historical survey of modern Hinduism from the early nineteenth century to the present. Topics include Rammohun Roy, Sir William Jones, and Mahatma Gandhi, nationalism, post-colonialism and diasporic religion. GE credit: AH, SS, VL, WC, WE. Effective: 2011 Winter Quarter.

RST 068—Hinduism (4)
Extensive Writing; Lecture—3 hours. Hindu tradition from ancient to modern times. Multiplicity of religious forms within Hinduism with mention of Jainism, Buddhism, and Sikhism and their relation to the mainstream of Hindu religion. GE credit: AH, VL, WC, WE. Effective: 2002 Fall Quarter.

RST 069—Introduction to Hindu Mythology (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Survey of the major narrative traditions within Hinduism, including epic literature and local stories in oral, textual, visual and performative forms. GE credit: AH, VL, WC, WE. Effective: 2014 Winter Quarter.

RST 070—Religion and Language (4)
Lecture/Discussion—3 hours; Term Paper. Basic toolkit for studying religious discourse in a variety of traditions. Concentration on the sacred and profane, the wondrous and ordinary, and the mystical and reasonable. GE credit: AH, WC, WE. Effective: 2014 Winter Quarter.

RST 075—Introduction to Chinese Philosophy (4)
Lecture/Discussion—4 hours. Introduction to Chinese philosophy from classical pre-modern times; emphasis on basic concepts and their impact on social conduct; the Age of Philosophers, the Han synthesis, the medieval Buddhist contribution. Effective: 2004 Summer Session 2.

RST 080—Religion, Gender, Sexuality (4)
Lecture/Discussion—3 hours; Term Paper. Constructions of gender and sexuality within one or more religious
traditions, pre-modern and modern. Emphasis on the interaction between religious, medical, and ethical definitions of the human body and sexual behavior. GE credit: AH, WE. Effective: 2009 Winter Quarter.

RST 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Primarily for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

RST 099—Special Study for Lower Division Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

RST 100—Study of Religion: Issues and Methods (4)
Lecture—3 hours; Term Paper. Principal issues and methods of Religious Studies and associated fields. GE credit: AH, SS, WC, WE. Effective: 1997 Winter Quarter.

RST 102—Christian Origins (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Development of Christianity from the end of the first century through the major controversies of the fifth century. Emphasis on the relationship between the new religious movement and the Roman Empire, and issues of early Christian identity and diversity. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

RST 103—Medieval and Byzantine Christianity (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Christianity in Europe and the Near East from the year 600 to 1450. Focus on the development of Catholic and Orthodox traditions in ritual, art, and thought, with attention to interactions between regional groups, and Christian interaction with Islam. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

RST 104—Christianity 1450-1700 (4)
Lecture/Discussion—3 hours; Term Paper. History of Reformation conflicts over the authority of scripture, the nature of man and the universe, and the basis of morality with the goal of understanding how these conflicts laid the foundation for the modern world. Effective: 2010 Spring Quarter.

RST 105—Christianity and Modernity, 1700-1920 (4)
Lecture—3 hours; Term Paper. Reaction of Christian critics and apologists to the profound cultural and scientific transformations resulting from the Scientific Revolution, the Enlightenment, and the advent of the modern critical study of religion. GE credit: AH, OL, VL, WC, WE. Effective: 2012 Spring Quarter.

RST 106—Christianity in the Contemporary World (4)
Lecture—3 hours; Term Paper. Christianity in the 20th and 21st centuries. Relationship of Christianity to globalization, industrialization, mass media, and the contemporary secular state. Focus on Christianity in America and developing nations, and on the relationship of established Christian institutions to new Christian movements. GE credit: ACGH, AH, WC, WE. Effective: 2012 Spring Quarter.

RST 110—Life, Meaning and Identity (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Upper division standing. Study of religious lives, the quest for meaning and for personal identity; how religions frame the problems of life; how cultural and personal crises affect youthful identity; the nature and structure of dreams, myths, and ideals. GE credit: AH, WE. Effective: 2016 Spring Quarter.

RST 111—Persuasion and Conviction in Religious Tradition (4)
Lecture/Discussion—4 hours; Term Paper. Selected topics in religious argument. Familiarizes students with the discourse structures of religious persuasion and enables them to perform analysis of such texts. Covers argument styles and structures used in ethics, theology, and preaching. GE credit: ACGH, AH, OL, WC, WE. Effective: 2015 Spring Quarter.

RST 115—Mysticism (4)
Lecture—3 hours; Term Paper. Prerequisite(s): One lower division Religious Studies course. Historical and descriptive analysis of selected key figures in mystical traditions and readings of representative mystical texts. Analytic term paper. GE credit: AH, OL, VL, WC, WE. Effective: 2016 Spring Quarter.

RST 120—Religion, Magic and Science (4)
Extensive Writing; Lecture—3 hours. Religion, magic, and science from the middle ages to the present. Contrast between modern scientific methodology and religious and magical thinking. (STS 120) GE credit: AH, OL, VL, WC, WE. Effective: 2005 Fall Quarter.

RST 122—Studies in Biblical Texts (4)
Lecture—3 hours; Term Paper. Prerequisite(s): RST 021 Study of a book from the Prophets or writings from critical, historical, and religious perspectives. May be repeated once for credit in different subject area. May be repeated up to 1 time(s). GE credit: AH, WE. Effective: 1997 Winter Quarter.

RST 123—Sex and Gender in the Bible (4)
Lecture—3 hours; Term Paper. Gender and sexuality in the Bible and its interpretation in Judaism and Christianity. Femininity and masculinity; gender roles; homosexuality; sexual violence. Historical origins in the ancient world; influence on contemporary views. GE credit: AH, WC, WE. Effective: 2017 Fall Quarter.

RST 124—Topics in Judaism (4)
Lecture—3 hours; Term Paper. Prerequisite(s): RST 023; RST 021 Examination of selected aspects of Jewish life, religion, or literature. Potential topics include: Jewish Perspectives on Jesus; The Golem: History and Legend; Sexuality and Gender in Late Antique Judaism and Early Christianity. May be repeated for credit when topic differs. Effective: 2016 Spring Quarter.

RST 125—Dead Sea Scrolls, Apocrypha, and Pseudepigrapha (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): RST 021; or Consent of Instructor. Survey of the Dead Sea Scrolls, apocryphal and pseudepigraphical writings of Judaism and Christianity and their historical, social, and religious importance. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

RST 126—The Formation of the Rabbinic Tradition (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): RST 021; RST 023; (RST 040 or RST 125) Survey of the classical rabbinic Jewish texts such as the Talmud and of the social and historical contexts of their production in Palestine and Babylonia. GE credit: WC. Effective: 2011 Fall Quarter.

RST 130—Topics in Religious Studies (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): RST 001 or RST 002 or RST 003A or RST 003B or RST 003C; or Consent of Instructor. One course. Thematic study of a phenomenon in more than one religious tradition or of the relationship between religion and another cultural phenomenon. Topics may include archeology and the Bible, women and religion, religion and violence. May be repeated for credit when topic differs. GE credit: WC, WE. Effective: 2002 Fall Quarter.

RST 131—Genocide (4) ***Review all entries***
Lecture/Discussion—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Upper division standing. Comparative and critical study of the modern phenomenon of genocide from religious, ethical and historical perspectives. (Human Rights 131.) GE credit: AH, SS, VL, WC, WE. Effective: 2014 Spring Quarter.

RST 131—Genocide (4) ***Review all entries Discontinued***
Lecture/Discussion—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): Upper division standing. Comparative and critical study of the modern phenomenon of genocide from religious, ethical and historical perspectives. (Human Rights 131.) GE credit: AH, SS, VL, WC, WE. Effective: 2018 Fall Quarter.

RST 132—Topics in Mediterranean Ancient Religion (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): RST 021; RST 040; or Consent of Instructor. Thematic study of specific sociological, literary or theological theme across the religious traditions of the ancient Mediterranean/Near East: Greek and Roman religions, Judaism, Christianity, Zoroastrianism, Manichaeism, etc. Topics may include creation, sacrifice, priesthoods, prophecies, holy books, the afterlife. May be repeated up to 2 time(s) when topic differs. GE credit: AH, WC, WE. Effective: 2011 Fall Quarter.

RST 134—Human Rights (4)
Lecture/Discussion—3 hours; Term Paper/Discussion—1 hour. Introduction to the interdisciplinary study of the origins, evolution, denial and protection of Human Rights. No credit for students who have completed course 90. (Human Rights 134.) GE credit: AH, SS, WC, WE. Effective: 2014 Spring Quarter.

RST 135—The Bible and Film (4)
Film Viewing—3 hours; Lecture—2 hours; Term Paper. Prerequisite(s): HUM 010 recommended. Examination of the uses of the Judeo-Christian Scriptures in film. Topics include dramatic depictions of biblical stories, the tension between science and religion, allegorical treatments of biblical themes, and the problems of religious conviction. Effective: 2003 Winter Quarter.

RST 138—Human Rights, Gender, and Sexuality (4) ***Review all entries***
Lecture/Discussion—3 hours; Term Paper. Gender and sexuality in the context of human rights. Topics include women's participation in the public sphere, the right to change gender, the right for family privacy, and the right to marriage. (Human Rights 138.) GE credit: AH, WC, WE. Effective: 2015 Fall Quarter.

RST 138—Human Rights, Gender, and Sexuality (4) ***Review all entries Discontinued***
Lecture/Discussion—3 hours; Term Paper. Gender and sexuality in the context of human rights. Topics include women's participation in the public sphere, the right to change gender, the right for family privacy, and the right to marriage. (Human Rights 138.) GE credit: AH, WC, WE. Effective: 2019 Spring Quarter.

RST 140—Christian Theology (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Historical and systematic introduction to Christian doctrine, with attention to divergent traditions and the problem of orthodoxy and heresy. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

RST 141A—New Testament Literature: Synoptic Gospels (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Life and thought of the early Church as reflected by the Synoptic Tradition; Matthew, Mark, Luke and Acts. Offered every third year to alternate with 141B, 141C. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

RST 141B—New Testament Literature: John (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Life and thought of the early Church as reflected by the Johannine Tradition; the Gospel and letters of John. Offered every third year to alternate with courses 141A and 141C. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

RST 141C—New Testament Literature: Paul (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Life and thought of the early Church as reflected by the Pauline tradition. The letters of Paul. Offered every third year to alternate with 141A, 141B. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

RST 143—New Testament Apocrypha (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Extra-canonical Christian writings and their reception, from antiquity to the present. Emphasis on the importance of New Testament figures both as literary characters and as authors within different Christian traditions. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

RST 144—History of the Bible (4)
Lecture—3 hours; Term Paper. Prerequisite(s): RST 021 or RST 040 History of the formation of the Christian biblical canon, with emphasis on differences between Christian traditions; survey of translations and adaptations of biblical narrative in Christianity, Judaism, and Islam, as well as in contemporary culture. GE credit: AH, WC, WE. Effective: 2014 Winter Quarter.

RST 145—Contemporary American Religion (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): RST 040 and HIS 017B recommended. Examination of several major movements and phenomena in twentieth-century American religion. GE credit: ACGH, AH, DD, WE. Effective: 1997 Winter Quarter.

RST 150—Religious Ethics (4)
Lecture/Discussion—3 hours; Term Paper/Discussion. Prerequisite(s): RST 010 recommended. Study of the religious bases of ethics through examination of ethical problems that arise in different religious cultures around the world and in nations where multiple religious cultures face similar issues. GE credit: AH, WC, WE. Effective: 2014 Winter Quarter.

RST 154—The Hindu Temple (4)
Lecture—3 hours; Term Paper. Comparative history of architecture and symbolism of the Hindu Temple in India, Southeast Asia and the United States. Attention to the temple as expression of religious knowledge, political authority, and cultural heritage through the lens of colonialism and postcolonialism. (Art History 154.) GE credit: AH, SS, VL, WC, WE. Effective: 2015 Fall Quarter.

RST 156—Religion and the Performing Arts in India (4)
Lecture—3 hours; Term Paper. Prerequisite(s): RST 030; RST 068; or Consent of Instructor. Survey of religion and performing arts in India. Emphasis on the influence of colonialism, nationalism, and regionalism on the history of Indian performing arts. GE credit: AH, WC, WE. Effective: 2012 Winter Quarter.

RST 157—Hindu Women and Goddesses (4)
Lecture—3 hours; Term Paper. Hindu goddesses and the religious lives of Hindu women in India and the diaspora. GE credit: AH, VL, WC, WE. Effective: 2010 Fall Quarter.

RST 158—The Ramayana (4)
Lecture—3 hours; Term Paper. Exploration of the Indian epic, Ramayana, through the lens of literature, performance, and visual art. Emphasis on the text's diversity and its contemporary global relevance. Topics include Ramayanas in Southeast Asia, and in various South Asian diaspora communities. (Comparative Literature 156.) GE credit: AH, WC, WE. Effective: 2015 Spring Quarter.

RST 160—Introduction to Islamic Thought (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): RST 060 recommended. The development of Islamic thought from the first centuries of Islam to the eighteenth century. Theology, philosophy, ethics, Sufism, historiography, political theory, fundamentalism, al-Farabi, al-Ghazzali, Ibn Rushd, Tusi, Ibn al-Arabi, Rumi, Molla Sadra, Ibn Khaldun, Ibn Abd al-Wahhab. GE credit: AH, WC, WE. Effective: 2004 Fall Quarter.

RST 161—Modern Islam (4)
Lecture/Discussion—3 hours; Term Paper. Response of Islam to modernity: secularism, reformism, fundamentalism. Islam and imperialism, women, media and immigration. Islamic modernism, political Islam, Islam in Europe and America. GE credit: AH, WC, WE. Effective: 2016 Spring Quarter.

RST 161B—Modern Islam: Authority and Tradition In Process (4)
Lecture/Discussion—3 hours; Term Paper. Survey of Islamic thought, social organization, politics from eighteenth century through present. Focus on changing notations of moral authority and tradition. Concentration on Middle East and South Asia with sustained treatment of North American engagements with the Islamic world. GE credit: AH, OL, SS, WC, WE. Effective: 2014 Spring Quarter.

RST 162—Introduction to Islamic Law (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): RST 060 recommended. The development of Islamic law in the formative centuries of Islam, ca. 600-1000, as well as its adaptation to changing economic, social, and political conditions in subsequent periods. Legal schools, legal theory, the Shari'a, reformist movements, human rights. GE credit: AH, WC, WE. Effective: 2004 Fall Quarter.

RST 163—Social Life of Islam (4)
Lecture—3 hours; Term Paper. Prerequisite(s): RST 060 or HIS 006 recommended. Introduction to culture and social life in Muslim societies. Focus on the plurality of traditions in Muslim faith, reason, and everyday practice. Special attention to Muslim rituals, ethical values, verbal genres, family life, sexuality and veiling, and youth culture. GE credit: AH, OL, SS, WC, WE. Effective: 2015 Spring Quarter.

RST 165—Islam in Asia (4)
Extensive Writing; Lecture/Discussion—3 hours. Islam as a lived religion in the Indian sub-continent, Central Asia, China, and Southeast Asia. Emphasis is on primary sources studied comparatively and historically. Effective: 2004 Winter Quarter.

RST 166—Religion and Media in the Arab World (4)
Lecture—4 hours. Exploration of the role and experience of media technologies in the Arab world. Study of digital and electronic media as well as alternative media practices. Investigation of new trends in political activism and identity formation. (Middle East/South Asian Studies 131C.) GE credit: OL, SS, VL, WC, WE. Effective: 2014 Fall Quarter.

RST 167—Iraq (4)
Seminar—3 hours; Term Paper—1 hour. Origins, causes and ethical challenges of conditions in Iraq; larger historical, cultural and ethical dimensions of mass violence, war, liberation, neocolonialism, terrorism and resistance. Effective: 2007 Spring Quarter.

RST 170—Buddhism (4)
Lecture—3 hours; Term Paper. Buddhism in its pan-Asian manifestations, from its beginning in India to its development in Sri Lanka and Southeast Asia, Central Asia, China and Japan; teachings and practices, socio-political and cultural impact. GE credit: AH, VL, WC. Effective: 2005 Spring Quarter.

RST 172—Ch'an (Zen) Buddhism (4)
Lecture/Discussion—3 hours; Term Paper. Doctrines and methods of the Ch'an Buddhism, both ancient and modern. Review of ritual techniques, including meditation. Effective: 2005 Spring Quarter.

RST 175A—Chinese Intellectual Traditions: Daoist Traditions (4)
Lecture/Discussion—4 hours. Prerequisite(s): A course in Chinese history recommended. English-language survey of key Daoist texts and scholarship. Topics include Daoist concepts of the cosmos, the natural world, scripture, the body, and immortality; Daoist divinities; Daoism and the state. (Chinese 100A.) GE credit: AH, WC. Effective: 2016 Fall Quarter.

RST 189—Senior Colloquium (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Primarily for seniors in Religious Studies. Discussion in depth of a problem in religion which requires the methods of several disciplines and is important in the encounter between religions. Effective: 1997 Winter Quarter.

RST 190—Seminar (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Required of all Religious Studies majors. Allows majors to integrate their disciplined study of the field. Emphasis on current scholarly debate about the methods for analyzing and comparing diverse religious traditions. Effective: 1997 Winter Quarter.

RST 194HA—Special Study for Honors Students (1-5)
Independent Study. Open only to majors of senior standing who qualify for honors program. Guided research, under the direction of a faculty member approved by the Program Director, leading to a senior honors thesis on a religious studies topic. (P/NP grading only.) Effective: 1997 Winter Quarter.

RST 194HB—Special Study for Honors Students (1-5)
Independent Study. Open only to majors of senior standing who qualify for honors program. Guided research, under the direction of a faculty member approved by the Program Director, leading to a senior honors thesis on a religious studies topic. (P/NP grading only.) Effective: 1997 Winter Quarter.

RST 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

RST 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

RST 201—Methods and Issues in Religious Studies (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Focuses on controversies in the study of comparative religion. How is religion best defined? Are there methods unique to the study of religion? What does the study of religion contribute to the study of society in general? May be repeated up to 2 time(s) the content is substantially different. Effective: 2006 Spring Quarter.

RST 205—Religion and Media (4)
Lecture/Discussion—3 hours; Term Paper. Many communities are finding global media technologies useful for religious practice. This course examines how religious revitalization is historically situated. A phenomenological approach will enable students to situate media and religion within the social and material world of practitioners. Effective: 2009 Winter Quarter.

RST 210—Religion and Postcoloniality, or Savages, Civilization, and Spirituality (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. This course examines relations between religion and colonialisms. Using specific historical situations it explores some of our thorniest theoretical problems. Students acquire a solid understanding of postcolonial theory and the historical tools to critically engage religion in the present. Effective: 2007 Fall Quarter.

RST 212—Religion and Violence (4)
Seminar—3 hours; Term Paper. Comparative and critical study of the ideological, cultural, and theological relationship between forms of violence and religion and religious practice. Effective: 2007 Fall Quarter.

RST 215—Topics in the History of Christianity (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing. Selected topics in the history of Christianity. Intended for graduate students seeking to do advanced work in the study of Christianity. May cover issues in Christian thought from antiquity, the middle ages, the early modern or modern period. May be repeated for credit when topic differs. Effective: 2010 Fall Quarter.

RST 299—Directed Research (1-12)
Variable. May be repeated for credit. (S/U grading only.) Effective: 2007 Fall Quarter.

RST 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit. (S/U grading only.) Effective: 2009 Winter Quarter.

RUS Russian

Course Placement. Students who have learned Russian at home must consult the department for placement instructions. Students with two years of Russian in high school normally continue in RUS 002; those with three years, RUS 003; those with four years, RUS 004.

Courses in RUS:

RUS 001—Elementary Russian (5)
Discussion—5 hours; Laboratory—1 hour. Introduction to Russian grammar and development of all language skills in a cultural context with special emphasis on communication. GE credit: AH, WC. Effective: 1997 Winter Quarter.

RUS 001A—Accelerated Intensive Elementary Russian (15)
Lecture/Discussion—15 hours. Special 12 week accelerated, intensive summer session course that combines the work of courses 1, 2, and 3. Introduction to Russian grammar and development of all language skills in a cultural context with emphasis on communication. Not open to students who have completed Russian 1, 2, or 3. Effective: 2008 Summer Special Session.

RUS 002—Elementary Russian (5)
Discussion—5 hours; Laboratory—1 hour. Prerequisite(s): RUS 001 Continuation of grammar and language skills developed in course 1. GE credit: AH, WC. Effective: 1997 Winter Quarter.

RUS 003—Elementary Russian (5)
Discussion—5 hours; Laboratory—1 hour. Prerequisite(s): RUS 002 Continuation of grammar and language skills developed in course 2. GE credit: AH, OL, WC. Effective: 2015 Spring Quarter.

RUS 004—Intermediate Russian (4)
Discussion/Laboratory—4 hours. Prerequisite(s): RUS 003 Grammar review and conversational practice in Russian. GE credit: AH, OL, WC. Effective: 2016 Fall Quarter.

RUS 005—Intermediate Russian (4)
Discussion—4 hours; Laboratory—1 hour. Prerequisite(s): RUS 004 Grammar review. Introduction to literature in its sociopolitical context. Conversational practice. GE credit: AH, OL, WC. Effective: 2015 Spring Quarter.

RUS 006—Intermediate Russian (4)
Discussion—4 hours; Laboratory—1 hour. Prerequisite(s): RUS 005 Grammar review. Intermediate conversation and continued reading of literature. Social and cultural practices in contemporary Russia; introduction to Russian history. GE credit: AH, OL, WC. Effective: 2015 Spring Quarter.

RUS 098—Directed Group Study (1-5)
Discussion—1-5 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

RUS 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

RUS 101A—Advanced Russian (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): RUS 006; or Consent of Instructor. Topics in Russian. Grammar for the advanced student. Reading and discussion of journalistic texts and classic and contemporary literature. Conversation exercises utilizing literary and colloquial variants of current Russian speech. GE credit: AH, WC. Effective: 2011 Fall Quarter.

RUS 101B—Advanced Russian (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): RUS 101A; or Consent of Instructor. Continuation of course 101A. Topics in Russian grammar for the advanced student. Reading and discussion of journalistic texts and classic and contemporary literature. Conversational exercises utilizing literary and colloquial variants of current Russian speech. GE credit: AH, WC. Effective: 2011 Winter Quarter.

RUS 101C—Advanced Russian (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): RUS 101B Continuation of course 101B. Topics in Russian grammar for the advanced student. Reading and discussion of journalistic texts and classic and contemporary literature. Conversational exercises utilizing literary and colloquial variants of current Russian speech. GE credit: AH, WC. Effective: 2011 Spring Quarter.

RUS 102—Russian Composition (4)
Lecture/Discussion—3 hours; Tutorial—1 hour. Prerequisite(s): RUS 006; or Consent of Instructor. Practice in writing Russian. One composition on a different topic each week. Topics include: history, geography, politics, and literature of Russia; comparison of Russian and American lifestyles; current events. Conducted in Russian. GE credit: AH, WC, WE. Effective: 2002 Winter Quarter.

RUS 103—Literary Translation (4)
Discussion—3 hours. Prerequisite(s): RUS 101C Translation of Russian literary texts into stylistically equivalent idiomatic English. Effective: 1997 Winter Quarter.

RUS 105—Advanced Russian Conversation (4)
Discussion—3 hours; Practice—1 hour. Prerequisite(s): RUS 006 Intensive conversational practice and discussion based on current events and contemporary texts. GE credit: AH, OL, WC. Effective: 2015 Winter Quarter.

RUS 120—Topics in Russian Literature and Culture (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Upper division standing or consent of instructor. Knowledge of Russian not required. Investigation of significant themes and issues of Russian literature and culture within their European context. May be repeated up to 1 time(s). GE credit: AH, OL, WC, WE. Effective: 2017 Spring Quarter.

RUS 122—19th-Century Russian Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): RUS 101C when the course offered in Russian; no prerequisite when offered in English. Not open to students who have taken course 121 and 127. Study of Russian literature (prose fiction, drama, poetry) from the period between 1800 and the end of the 19th century. May include authors like Pushkin, Lermontov, Gogol, Turgenev, Dostoevsky, Tolstoy, Chekhov. Offered alternately in English or Russian. GE credit: AH, OL, VL, WC, WE. Effective: 2015 Spring Quarter.

RUS 124—Twentieth-Century Russian Literature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): RUS 101C when offered in Russian; no prerequisite when offered in English. Study of Russian literature (prose, drama, poetry) from the period between 1900 and the end of the 20th century. Authors like Y. Olesha, M. Bulgakov, D. Kharms, and L. Petrushevskaia. Taught in Russian. Not open for credit to students who have taken courses 123 or 128. GE credit: AH, OL, VL, WC, WE. Effective: 2015 Fall Quarter.

RUS 126—The Russian Theater (4)
Lecture—3 hours; Term Paper. Prerequisite(s): RUS 101C; or Consent of Instructor. The main works of Russian dramatists from Fonvizin to the present, including Gogol, Turgenev, Tolstoy, Ostrovsky, Chekhov, Blok, Mayakovsky, Kharms. Conducted in Russian. GE credit: AH, WC, WE. Effective: 2008 Fall Quarter.

RUS 129—Russian Film (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): Completion of Subject A requirements. History of Russian film; film and social revolution, the cult of Stalin, dissident visions; film and the collapse of the Soviet empire; gender and the nation in Russian film. Course taught in English; films are in Russian with English subtitles. (Film Studies 129.) GE credit: AH, VL, WC, WE. Effective: 2009 Fall Quarter.

RUS 130—Contemporary Russian Culture (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Trends in Russian culture and the relationship between artists and the government. Topics: recent changes in the cultural scene, postmodernist trends in literature, visual art, film, and theater. GE credit: AH, OL, VL, WC, WE. Effective: 2016 Spring Quarter.

RUS 133—Post-Soviet Literature (4)
Lecture/Discussion—3 hours; Term Paper. Major authors and trends in Russian literature in post-1991 period. Discussion of impact of economic, social, and cultural turmoil of post-Soviet period on literary marketplace. Analysis of development of literary postmodernism in Russia. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

RUS 139—Pushkin (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): RUS 101C; or Consent of Instructor. Three major periods of Pushkin's poetical works: his early Lyceum verse; his poetry of the early 1820s; and the mature period. Further study of Pushkin's prose fiction, drama, and journalism. GE credit: AH, OL, WC, WE. Effective: 2015 Fall Quarter.

RUS 140—Dostoevsky (in English) (4)
Lecture—3 hours. Reading and analysis of Dostoevskys principal works such as Crime and Punishment, The Idiot, The Brothers Karamazov, and The Diary. Study of social and political views as reflected in Dostoevskys works. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

RUS 141—Tolstoy (in English) (4)
Lecture—3 hours; Term Paper. Study of Leo Tolstoy's literary evolution and moral quest. Readings include his Confession, a major novel such as War and Peace or Anna Karenina, and representative shorter fiction. GE credit: AH, OL, WE. Effective: 2015 Fall Quarter.

RUS 142—Women in Russian Culture (4)
Lecture/Discussion—3 hours; Term Paper. Study of the representation of women in contemporary Russian fiction and film. Exploration of issues such as family dynamics/motherhood, sexuality, work, and women's relationship to the state. Offered in English. GE credit: AH, OL, VL, WC, WE. Effective: 2017 Winter Quarter.

RUS 143—Chekhov (in English) (4)
Extensive Writing; Lecture/Discussion—3 hours. Examination of Chekhov's short stories and major plays, such as The Seagull, Uncle Vanya, The Three Sisters, The Cherry Orchard, and Ivanov, in the broader cultural context of European and Russian fin de siecle. GE credit: AH, OL, WC, WE. Effective: 2016 Fall Quarter.

RUS 150—Russian Culture (4)
Discussion—3 hours; Term Paper. Study of Russian culture in nineteenth and twentieth centuries. Brief introduction of the beginnings up to nineteenth century. Russian art, music, philosophy, church, traditions, and daily life. Knowledge of Russian not required. GE credit: AH, OL, VL, WC, WE. Effective: 2016 Spring Quarter.

RUS 192—Research Essay (2)
Variable. Prerequisite(s): A Russian literature course (may be taken concurrently). A research essay, based on primary and secondary sources, dealing in depth with a topic arising from or related to the prerequisite literature course. May be repeated for credit. May be repeated for credit. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

RUS 194H—Special Study for Honors Students (4)
Independent Study—4 hours. Prerequisite(s): Open only to majors of senior standing who qualify for honors program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in Russian studies. Effective: 1997 Winter Quarter.

RUS 195H—Honors Thesis (4)
Independent Study—4 hours. Prerequisite(s): RUS 194H Writing an honors thesis, under the direction of a faculty member, on a topic in Russian studies. Effective: 1997 Winter Quarter.

RUS 197T—Tutoring in Russian (1-4)
Laboratory—1-2 hours; Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Tutoring in undergraduate courses, including leadership in small voluntary discussion groups affiliated with departmental courses. May be repeated up to 6 unit(s). (P/NP grading only.) Effective: 2014 Winter Quarter.

RUS 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

RUS 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

RUS 299—Individual Study (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. Restricted to graduate students. May be repeated for credit. (S/U grading only.) Effective: 2014 Spring Quarter.

RUS 396—Teaching Assistant Training Practicum (1-4)
Variable—3-20 hours. Prerequisite(s): Graduate standing. May be repeated for credit. (S/U grading only.) Effective: 2014 Winter Quarter.

SAF Sustainable Ag & Food Systems

Courses in SAF:

SAF 090—SA & FS Seminar (1-2)
Seminar—1-3 hours. Introductory or survey topics within Sustainable Agriculture and Food Systems. May be repeated for credit When topic differs. (P/NP grading only.) Effective: 2018 Spring Quarter.

SAF 090X—SA & FS Portfolio (1-4)
Workshop—3-12 hours. Prerequisite(s): Consent of Instructor. Restricted to Sustainable Agriculture and Food Systems majors with lower-division standing or consent of instructor. SA&FS Portfolios are designed to complement interdisciplinary, academic coursework by supporting student development of each of the SA&FS Student Learning Outcomes: Systems Thinking, Experimentation & Inquiry, Understanding Values, Interpersonal Communication, Strategic Management, Civic Engagement and Personal Development. May be repeated for credit. (P/NP grading only.) Effective: 2015 Spring Quarter.

SAF 092—Internship (1-12)
Internship—3-36 hours; Variable—1 hour. Prerequisite(s): Consent of Instructor. Restricted to Sustainable Agriculture and Food Systems majors or with consent of instructor. Lower-division internship for students enrolled in the Sustainable Agriculture and Food Systems program of study. Enrollment for non-majors by consent of instructor. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2013 Fall Quarter.

SAF 098—Directed Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Restricted to Sustainable Agriculture and Food Systems major or with consent of instructor. Group study on focused topics in Sustainable Agriculture and Food Systems. Varies according to instructor. Course plan is adapted to student need and interest in conjunction with the expertise of the instructor. May be repeated for credit. (P/NP grading only.) Effective: 2013 Fall Quarter.

SAF 099—Special Study for Undergraduates (1-5)
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. Under faculty supervision, students pursue a special or individualized course of study related to Sustainable Agriculture and Food Systems. May be repeated for credit. (P/NP grading only.) Effective: 2013 Fall Quarter.

SAF 192—Internship (1-12)
Internship—3-36 hours; Variable—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing. Restricted to Sustainable Agriculture and Food Systems majors or non-majors by consent of instructor. Upper-division internship for students enrolled in the Sustainable Agriculture and Food Systems program of study. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2013 Fall Quarter.

SAF 197T—Tutoring in Sustainable Agriculture and Food Systems (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Undergraduates assist the instructor by tutoring students in regularly scheduled courses that fulfill SA&FS major requirements. May be repeated for credit. (P/NP grading only.) Effective: 2013 Fall Quarter.

SAF 197TC—SA&FS Tutoring in the Community (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Undergraduates assist the instructor by tutoring in the community in settings related to Sustainable Agriculture and Food Systems. May be repeated for credit. (P/NP grading only.) Effective: 2013 Fall Quarter.

SAF 198—Directed Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Restricted to Sustainable Agriculture and Food Systems major or with consent of instructor. Group study on focused topics in Sustainable Agriculture and Food Systems. Varies according to instructor. Course plan is adapted to student need and interest in conjunction with the expertise of the instructor. May be repeated for credit. (P/NP grading only.) Effective: 2013 Fall Quarter.

SAF 199—Special Study for Advanced Undergraduates (1-5)
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Under faculty supervision, advanced students pursue a special or individualized course of study related to Sustainable Agriculture and Food Systems. May be repeated for credit. (P/NP grading only.) Effective: 2013 Fall Quarter.

SAS Science and Society

Courses in SAS:

SAS 001—Critical Inquiry into Contemporary Issues (4)
Discussion—1 hour; Lecture/Discussion—3 hours. Open to first year and new transfer students only. Contemporary issues, including global population trends, economic and environmental changes, cultural diversity and biodiversity, nutrition and food safety, fiber and textiles, changing consumer cultures. Inquiry processes emphasize ethics, multiple disciplines, and multiple perspectives. GE credit: SE, SS, WE. Effective: 2003 Fall Quarter.

SAS 002—Feeding the Planet: Influences on the Global Food Supply (3)
Lecture/Discussion—3 hours. Scientific principles and dynamic interactions involved in food production, food processing, nutrition, shelf life and marketing from differing viewpoints. Physical, biological and social science issues influencing the availability and safety of the food supply worldwide. GE credit: SE, SL, SS. Effective: 1997 Winter Quarter.

SAS 003—Science, Technology and Society (4)
Lecture—4 hours. Impact of developments in science and technology on the individual in society and how economics, politics, culture and values affect technological development. Not open for credit to students who have completed former course Applied Behavioral Sciences 18. GE credit: SE, SS. Effective: 1997 Winter Quarter.

SAS 004—Water in Popular Culture (3)
Discussion—1 hour; Film Viewing—2 hours; Lecture—1 hour. Importance of water in many aspects of society as revealed through a survey of its depictions in film. GE credit: SE, SL, SS. Effective: 2008 Fall Quarter.

SAS 005—Pathways to Discovery: Science and Society (3)
Lecture/Discussion—3 hours. Highlights a current issue and/or controversy found in contemporary society and looks at how this problem impacts and is affected by the physical, social and biological sciences. Course varies with topic offered. May be repeated up to 2 time(s). GE credit: SE, SS. Effective: 1997 Winter Quarter.

SAS 007—Terrorism and War (4)
Discussion—1 hour; Lecture—3 hours; Term Paper. Exploration of terrorism and war from science and social sciences perspectives. Terrorist cells and groups; biological, chemical, nuclear, and environmental terrorism; intelligence gathering and espionage; military strategy; genocide; epochal wars; clash of civilizations; nation building; and future global scenarios. GE credit: SE, SS, WE. Effective: 2004 Winter Quarter.

SAS 007V—Terrorism and War (4)
Auto Tutorial—5 hours; Extensive Writing; Web Electronic Discussion—1 hour; Web Virtual Lecture—3 hours. Terrorism and war from science and social sciences perspectives: terrorism (terrorist cells, WMD's, religious extremism), warfare (military strategy, genocide), and statecraft (diplomacy, clash of civilizations, epochal wars). Students my not take both SAS 007V and SAS 007 for credit. GE credit: SS, WC, WE. Effective: 2017 Spring Quarter.

SAS 008—Water Quality at Risk (3)
Discussion—1 hour; Lecture—2 hours. Not open to students who have successfully completed ERS 008. (Formerly Environmental and Resource Sciences 8.) Natural and human threats to water quality. Balance of science and policy in all aspects of attaining, maintaining, and managing water quality, water contamination. Decoding popular media coverage of water quality and water contamination. (Environmental Science and Management 008.) GE credit: SE, SL, SS, WE. Effective: 2011 Fall Quarter.

SAS 009—Crisis in the Environment (3)
Lecture—3 hours. Explores contemporary environmental issues by examining the causes, effects and solutions to a wide range of environmental problems facing the global ecosystem. Integrated discussion of political, societal and economic impact linkages with environmental problems. GE credit: SE, SS, WE. Effective: 2006 Fall Quarter.

SAS 010—Water, Power, Society (3)
Discussion—1 hour; Lecture—2 hours. Water resources issues. How water has been used to gain and wield socio-political power. Water resources development in California related to current and future sustainability of water quantity and quality. Roles of science and policy in solving water problems. (Hydrologic Science 10.) GE credit: SE, SL, SS. Effective: 2005 Spring Quarter.

SAS 011—California Geography (3)
Discussion—1 hour; Lecture—2 hours; Term Paper. Introduction to cultural/societal patterns of California and their relationship to natural resources, biomes,geomorphology, and physiography. Focus on diversity of California's environments and their impacts on and alterations by human activities. Environmental issues in the State. GE credit: SE, SS, WE. Effective: 2006 Fall Quarter.

SAS 012—Plants and Society (4)
Extensive Writing—3 hours; Lecture—3 hours. Prerequisite(s): High school biology. Dependence of human societies on plant and plant products. Plants as resources for food, fiber, health, enjoyment and environmental services. Sustainable uses of plants for food production, raw materials, bioenergy, and environmental conservation. Global population growth and future food supplies. Not open for credit to students who have completed Plant Biology 12.
(Former course Plant Biology 12.). (Plant Science 012.) GE credit: SE, SS, WE. Effective: 2007 Fall Quarter.

SAS 013—Disease and Society (3)
Lecture—3 hours. Limited enrollment. Introduction to the concept of disease, the societal and personal impacts of past, present and future diseases, and the science behind disease discoveries, causes, evolution, diagnosis, treatment, and prevention. GE credit: SE, SL, SS. Effective: 2012 Fall Quarter.

SAS 014—Forests and Society (3)
Discussion—1 hour; Lecture—2 hours. Class size limited to 120 students. Sociology, natural history and current issues of the world's forests. Application of scientific principles in outdoor laboratories and on-campus field trips. GE credit: ACGH, OL, SE, SL, SS, WE. Effective: 2016 Fall Quarter.

SAS 018—GIS and Society (3)
Laboratory—3 hours; Lecture—2 hours; Term Paper/Discussion—0.3 hours. Geographic Information Systems (GIS) as a spatial technology and a tool for change in society. Evaluate physical, biological and social impact of GIS in the context of case studies such as land, water and community planning. GE credit: QL, SE, SL, SS, VL. Effective: 2007 Spring Quarter.

SAS 020—Genetics and Society (4)
Discussion—1 hour; Lecture—3 hours. Basic concepts of genetics, modern methods of biotechnology, the process of scientific discovery and the public perception of the process; present and future impact of genetics on society. Not open for credit to students who have completed course 140. GE credit: OL, SE, SL, SS, WE. Effective: 2005 Winter Quarter.

SAS 025—Global Climate Change: Convergence of Biological, Geophysical, & Social Sciences (3)
Discussion—1 hour; Lecture—2 hours. Causes of global climate change and the biological, geophysical, and social consequences of such change. Methods used by different scientists for predicting future events. Complexity of global affairs. Decision making under uncertainty. GE credit: OL, QL, SE, SL, SS, VL, WC, WE. Effective: 2006 Winter Quarter.

SAS 025V—Global Climate Change: Convergence of Biological, Geophysical, & Social Sciences (3)
Auto Tutorial—5 hours; Extensive Writing—2 hours; Web Electronic Discussion—2 hours; Web Virtual Lecture. Causes of global climate change and the biological, geophysical, and social consequences of such change. Methods used by different scientists for predicting future events. Complexity of global affairs. Decision making under uncertainty. Students cannot take both course 025 and 025V for credit. GE credit: DD, OL, QL, SE, SL, SS, VL, WC, WE. Effective: 2013 Winter Quarter.

SAS 030—Mushrooms, Molds, and Society (3)
Lecture/Discussion—3 hours. Fungi as organisms with which humans interact daily, societal issues arising from these interactions. Fungi in medicine, religion, agriculture, and industry, as well as cultural perceptions of fungi. GE credit: SE, SS. Effective: 1998 Spring Quarter.

SAS 035—Germs: The Good, the Bad, and the Ugly (3)
Discussion—1 hour; Lecture—2 hours. Class size restricted to 60 students. Impact of microorganisms on Earth, Humans and Society. Historical, scientific, and contemporary issues dealing with microbes on natural and built environments. GE credit: SE, SS, WE. Effective: 2017 Spring Quarter.

SAS 040—Photography: Bridging Art and Science (3)
Lecture—2 hours; Studio—3 hours. Photography is used to explore the common ground between art and science. Photographic processes, creativity and aesthetics, chaos and order, principles of space, time and light. Photographic interpretation and documentation of the natural world. Camera required. GE credit: AH, SE, SL, VL, WE. Effective: 2008 Spring Quarter.

SAS 041—Understanding Performance: Appreciation of Modern Theatre, Dance, Film and Performance Art for the Humanities and Sciences (4)
Discussion/Laboratory—1 hour; Lecture/Discussion—3 hours. Relevance of theatre and performance to modern culture, science and society. Approaches to theatre/dance/media/performance art, integrated into Mondavi Centre for the Arts and Theatre and Dance Department programs. (Dramatic Art 5.) GE credit: AH, DD, OL, VL, WC, WE. Effective: 2015 Winter Quarter.

SAS 042—Earth, Water, Science, Song (3)
Lecture—2 hours; Studio—3 hours. Fusion of water and soil science with performing arts. Creative communication of scientific concepts and facts through exercises in song writing and poetry. Design, discuss and conduct public performances related to the functioning of the natural world. GE credit: AH, OL, SE. Effective: 2009 Summer Session 2.

SAS 043—Energy, Materials, and Design Over Time (4)
Discussion—1 hour; Lecture—3 hours. Global history of design across time, viewed through the lens of the effects of the creation and discovery of new energy sources, processes, and materials on design. (DES 040A) GE credit: AH, WC. Effective: 2018 Spring Quarter.

SAS 070A—Genetic Engineering in Medicine, Agriculture, and Law (5)
Lecture—5 hours. Not open to students who have completed BIS 002A and BIS 002B and BIS 002C. Historical and scientific study of the impact of genetic engineering in medicine, agriculture, and law, including examination of social, ethical, and legal issues raised. Offered in a distance-learning format. GE credit: SE, SL, SS. Effective: 2018 Winter Quarter.

SAS 090A—Issues in Environmental and Resource Sciences (2)
Seminar—2 hours. Prerequisite(s): Limited to lower division students. Discussion of historical and current issues in environmental and resource sciences. Lectures, reading and field trips will provide background for selected topics. Effective: 1997 Winter Quarter.

SAS 090B—Observing and Writing in Biology (2)
Laboratory—1 hour; Seminar—1 hour; Term Paper. Students will observe the interactions between microscopic organisms, conduct simple laboratory experiments, describe and analyze observations and discuss scientific observations and writing. Effective: 1997 Winter Quarter.

SAS 090E—Biotechnology-a New Era, a New Struggle (2)
Seminar—2 hours. Animal biotechnology and its applications. Discussion topics include potential societal impacts of various technologies, factors shaping public opinion, and ethical and moral questions arising from new biotechnology applications. Effective: 2001 Fall Quarter.

SAS 090F—Food Distribution in a Hungry World (2)
Seminar—2 hours. Class size limited to 15 students. The biological, technological, environmental, and socioeconomic factors related to food distribution systems at local, regional, national, and international levels. The potential for increasing world food supply by reducing losses between harvest and consumption. Effective: 2001 Fall Quarter.

SAS 090G—Science, Society and the Environment (2)
Seminar—2 hours. Contemporary environmental issues, scientific approaches to addressing these issues, and accompanying societal and ethical considerations. Effective: 2001 Fall Quarter.

SAS 090X—Lower Division Seminar (1-4)
Seminar—1-4 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Limited enrollment. Examination of a special topic in Science and Society through shared readings, discussions, written assignments, or special activities such as fieldwork, laboratory work, etc. May be repeated for credit. Effective: 1997 Winter Quarter.

SAS 092—Internship in Science and Society (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Supervised internship on and off campus, in the community, or in institutional settings. (P/NP grading only.) Effective: 1997 Winter Quarter.

SAS 097T—Tutoring in Science and Society (2-3)
Discussion/Laboratory—6-9 hours. Prerequisite(s): Consent of Instructor. Lower division standing; completion of course being tutored. Tutoring in undergraduate Science and Society courses. Assisting with leading discussion groups under supervision of instructor(s) and teaching assistants. Acting as liaison between the students and course instructor(s) to foster effective communication and interaction. May not be repeated. (P/NP grading only.) Effective: 1998 Fall Quarter.

SAS 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

SAS 099—Special Study for Undergraduates (1-5)
Discussion—3-15 hours. Prerequisite(s): Consent of Instructor. Lower division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

SAS 109—Environmental Change, Disease and Public Health (4)
Lecture/Discussion—3 hours; Project (Term Project). Analysis of environmental changes from pre-history to the present and their influence on disease distribution, virulence and public health. Focus on critical study of many human-driven environmental changes and the accelerated transformation/spread of pathogens under globalization. Not open for credit to students who have taken course HIS 109B. (History 109) GE credit: SE, SL, SS, WC. Effective: 2016 Fall Quarter.

SAS 110—Applications of Evolution in Medicine, Human Behavior, and Agriculture (4)
Discussion—1 hour; Lecture—2 hours; Term Paper. Prerequisite(s): BIS 002A; BIS 002B; BIS 002C Class size limited to 60 students. Applications of evolutionary biology in medicine, human behavior, and agriculture. Examination of the imprint of evolution on the human life cycle from conception to death. GE credit: SE, SL, WE. Effective: 2013 Fall Quarter.

SAS 120—Science and Contemporary Societal Issues (3)
Lecture/Discussion—3 hours. Prerequisite(s): Upper division standing. Study of a contemporary societal issue/problem emphasizing critical thinking with information drawn from several disciplines. Multiple instructors illustrate the necessity of an interdisciplinary and cooperative approach in solving important issues. Topic will vary. May be repeated up to 1 time(s). GE credit: SE, SS. Effective: 1997 Winter Quarter.

SAS 121—Global Poverty: Critical Thinking and Taking Action (4)
Discussion—1 hour; Lecture—3 hours. Social science and engineering analysis of causes and effects of world poverty and of policies to reduce it via economic growth, foreign aid, and community-level interventions, e.g., in potable water, sanitation, lighting, small scale energy, irrigation, health and microfinance. GE credit: SS, WC. Effective: 2013 Fall Quarter.

SAS 130—Contemporary Leadership (4)
Lecture—3 hours; Seminar—1 hour. Prerequisite(s): Consent of Instructor. Class size limited to 40 students. Leadership, including issues, skills, and practices as they relate to individuals, organizations, diverse social settings and communities. Written and verbal communications, personality styles for collaborative work, and ethics. GE credit: OL. Effective: 2006 Fall Quarter.

SAS 190X—Science & Society Seminar (1-4)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing. Class size limited to 20 students. In-depth examination at an upper division level of a special topic in Science and Society. Emphasis upon student participation in learning. May be repeated for credit. (P/NP grading only.) Effective: 2005 Fall Quarter.

SAS 192—Internship in Science and Society (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Supervised internship on or off campus, in the community, or in institutional settings. (P/NP grading only.) Effective: 1997 Winter Quarter.

SAS 197T—Tutoring in Science and Society (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division standing; completion of course being tutored or the equivalent. Tutoring of students in Science and Society courses. Assistance with discussion groups and laboratory sections under supervision of instructor. May be repeated for credit if tutoring another Science and Society course. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

SAS 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

SAS 199—Special Study in Science and Society (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 1997 Winter Quarter.

SAS 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. May be repeated for credit when topic differs. May be repeated for credit. (S/U grading only.) Effective: 1998 Fall Quarter.

SAS 299—Graduate Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate student. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1998 Fall Quarter.

SAS 390—Teaching Methods in Science and Society (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate level. Practical experience in methods and problems related to teaching Science and Society courses. Discussion of critical pedagogies specific to teaching of science-societal issues, preparing for and conducting discussion sessions, analyses of texts and supporting material, formulation of assignments, exams. May be repeated for credit. (S/U grading only.) Effective: 1998 Fall Quarter.

SOC Sociology

Courses in SOC:

SOC 001—Introduction to Sociology (5)
Discussion—1 hour; Lecture—4 hours. Principles and basic concepts of sociology. The study of groups, culture, collective behavior, classes and caste, community and ecology, role, status, and personality. GE credit: ACGH, DD, SS. Effective: 1997 Winter Quarter.

SOC 002—Self and Society (4)
Discussion—1 hour; Lecture—3 hours. Exploration of how self and identity are formed and transformed by socialization and social interaction in relation to roles, groups, institutions, power, and social change. Consideration of how people make decisions, fall in love, and come to blows. GE credit: ACGH, DD, SS. Effective: 2015 Winter Quarter.

SOC 003—Social Problems (4)
Discussion—1 hour; Lecture—3 hours. General sociological consideration of contemporary social problems in relation to sociocultural change and programs for improvement. GE credit: ACGH, DD, SS. Effective: 1997 Winter Quarter.

SOC 004—Immigration and Opportunity (4)
Discussion—1 hour; Lecture—3 hours; Term Paper. Social and demographic analysis of immigration: motives and experiences of immigrants; immigration and social mobility; immigration, assimilation, and social change; multicultural societies. Detailed study of immigration into the U.S., with comparative studies of Europe, Australia, and other host countries. GE credit: ACGH, DD, SS, WC. Effective: 1997 Winter Quarter.

SOC 005—Global Social Change: An Introduction to Macrosociology (4)
Discussion—1 hour; Lecture—3 hours. Introduction to change and diversity in world history, including the United States. Examines population and family, technological change and economic development, power and status, culture and identity. GE credit: ACGH, SS, WC. Effective: 1997 Winter Quarter.

SOC 006—Health and Illness (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the sociology of health and illness, including social determinants of health, social inequalities in health/health disparities, social construction of health, the organization of health care, and the politics of health care reform. GE credit: DD, SS. Effective: 2016 Fall Quarter.

SOC 011—Sociology of Labor and Employment (4)
Discussion—1 hour; Lecture—3 hours. Labor and employment issues in the contemporary United States with some use of historical and comparative materials. Topics will include strategies pursued by employers and employees, labor market discrimination and the role of social policies in shaping labor markets. GE credit: SS. Effective: 2006 Summer Session 1.

SOC 012Y—Data Visualization in the Social Sciences (4)
Laboratory—1.5 hours; Lecture—2 hours; Web Virtual Lecture—1.5 hours. Introduction to quantitative data across the social sciences (Communications, Political Science, Psychology, Sociology, and other disciplines). Transforming data, describing data, producing graphs, visual reasoning, and interpretations. (Communication 12Y, Psychology 12Y, Political Science 12Y.) GE credit: QL, VL. Effective: 2016 Spring Quarter.

SOC 025—Sociology of Popular Culture (4)
Discussion—1 hour; Lecture—3 hours. Social mechanisms that shape modern popular culture. High, folk, and mass culture: historical emergence of popular culture. Mass media, commercialization, ideology and cultural styles. Theories and methods for analyzing cultural expressions in pop music, street art, film, television, and advertising. GE credit: SS, VL. Effective: 1997 Winter Quarter.

SOC 030A—Intercultural Relations in Multicultural Societies (3)
Discussion—1.5 hours; Lecture—1.5 hours. Macro-structural analysis of contemporary multicultural societies; immigration and assimilation in comparative perspective; social construction of racial and ethnic group identities; ethnicity and gender; group conflict and cooperation; controversies surrounding multiculturalism. First course in a two-course Multicultural Immersion Program. GE credit: ACGH, DD, SS. Effective: 2005 Fall Quarter.

SOC 030B—Intercultural Relations in Multicultural Societies (3)
Discussion—1.5 hours; Lecture—1.5 hours. Prerequisite(s): SOC 030A; or Consent of Instructor. Social-psychological analysis of personal experiences living in a multicultural society; conforming to or rejecting group identity or stereotypes; managing and reducing conflict; cross-cultural communication; promises and problems of diversity at UCD. Second course in a two-course Multicultural Immersion Program. GE credit: ACGH, DD, SS. Effective: 2005 Winter Quarter.

SOC 046A—Introduction to Social Research (4)
Discussion—1 hour; Lecture—3 hours; Project (Term Project); Term Paper. Examination of the methodological problems of social research. Selection and definition of problems of investigation, data-gathering techniques, and sampling. GE credit: SS. Effective: 1997 Winter Quarter.

SOC 046B—Introduction to Social Research (5)
Discussion—1 hour; Lecture—4 hours. Data-analysis techniques, measurement, scaling, multivariate analysis, and quantitative measures of association. GE credit: QL, SS. Effective: 2012 Fall Quarter.

SOC 090X—Lower Division Seminar (1-2)
Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Limited enrollment. Examination of a special topic in sociology through shared readings, discussions, written assignments, or special activities such as fieldwork, laboratory work, etc. May not be repeated for credit. GE credit: SS. Effective: 1997 Winter Quarter.

SOC 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Primarily intended for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

SOC 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

SOC 100—Origins of Modern Sociological Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Origins of modern sociological thought. Special emphasis on three major theorists from the classical tradition of nineteenth century European social thought: Karl Marx, Max Weber, and Emile Durkheim. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 102—Society and Culture of California (4)
Discussion—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. California's distinctive society and culture; sociological analyses of topical issues concerning diversity, environment, cities. GE credit: ACGH, DD, SS. Effective: 2016 Fall Quarter.

SOC 103—Evaluation Research Methods (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SOC 001 or SOC 002 or SOC 003 recommended; SOC 046A and SOC 046B recommended. Surveys applications of research methods to the evaluation of social programs, primarily emphasizing methodological issues, e.g., research design and data collection; uses of evaluation research are also discussed and placed in theoretical context. Participation in an evaluation project. GE credit: SL, SS. Effective: 2016 Fall Quarter.

SOC 104—The Political Economy of International Migration (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, SOC 003, or SOC 004 recommended. Analysis of worldwide migration patterns, and social scientific theories of international and transnational migration. Focus in economical, political, and social impact of immigration and potential for international and regional cooperation. (International Relations 104.) GE credit: SS, WC. Effective: 2016 Fall Quarter.

SOC 106—Intermediate Social Statistics (5)
Discussion—1 hour; Lecture—4 hours. Prerequisite(s): SOC 046B; or Consent of Instructor. Intermediate level course in statistical analysis of social data, emphasizing the logic and use of statistical measures, procedures, and mathematical models especially relevant to sociological analysis. GE credit: QL, SL, SS. Effective: 2016 Fall Quarter.

SOC 118—Political Sociology (4)
Lecture—3 hours; Project (Term Project); Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Relation of social cleavages and social cohesion to the functioning of political institutions; the social bases of local and national power structures; social sources of political movement, analysis of concepts of alienation, revolution, ideology, ruling class, and elite. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 120—Deviance (4)
Lecture—3 hours; Term Paper/Discussion. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Social structural sources, institutional practices and microprocesses associated with illegality, evil, disease, immorality, disability, racial and class differences, citizenship, and the body. Special emphasis on expert knowledge and the production and management of social difference. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 122—Sociology of Adolescence (4)
Lecture—3 hours; Project (Term Project); Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Chronological age and social status; analysis of social processes bearing upon the socialization of children and adolescents. The emergence of youth cultures. Generational succession as a cultural problem. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 123—American Society (4)
Discussion—1 hour; Lecture—3 hours; Project (Term Project); Term Paper. The demographic and social structure of American society and population, with emphasis on ethnic and class groups as bases for political and economic interest. Attention to selected current social controversies. GE credit: ACGH, DD, SS. Effective: 1997 Winter Quarter.

SOC 124—Education and Inequality in the U.S. (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Functions of schooling in contemporary U.S. society. Racial, ethnic, social class, and gender inequalities in student outcomes. Consideration of classic and current controversies in the sociology of education and education policy. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 125—Sociology of Culture (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Sociological approaches to study of historical and contemporary culture and mass media, and their structuring in relation to social actors, institutions, stratification, power, the production of culture, audiences, and the significance of culture in processes of change. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 126—Social Interaction (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Everyday interaction in natural settings; ethnographic approaches to the understanding of social meanings, situations, personal identity and human relationships. Particular attention to the work of Erving Goffman and to principles of field observation and qualitative analysis. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 128—Interracial Interpersonal Dynamics (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Analysis of the influences of cultural differences and racial stratification on interpersonal interaction in instrumental settings (e.g., work, education, political action) and intimate settings (e.g., friendship, love, marriage, family). Minority/majority relationships. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 129—Sociology of Black Experience in America (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Survey of historical and contemporary theoretical sociological perspectives on the Black experience in United States. Emphasis on comparisons of Black sociological perspectives and mainstream perspectives of specific sociologists. GE credit: ACGH, DD, SS. Effective: 2016 Fall Quarter.

SOC 130—Race Relations (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Functions of the social definitions of race and racial groups. Analysis of racial conflict, oppression, and other forms of ethnic stratification. Models of ethnic interaction and social change. Emphasis on racial relationships within the U.S. GE credit: ACGH, DD, SS. Effective: 2016 Fall Quarter.

SOC 131—The Family (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Contemporary family life in historical and cross-cultural perspective. How different family forms arose, their significance today and prospects for further family change. Attention to power relations within and beyond the family and to the social implications of family transformation. GE credit: ACGH, DD, SS. Effective: 2016 Fall Quarter.

SOC 132—The Sociology of Gender (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Analysis of biological, psychological, cultural and structural conditions underlying the status and roles of men and women in contemporary society, drawing on a historical and comparative perspective. GE credit: ACGH, DD, SS. Effective: 2016 Fall Quarter.

SOC 133—Sexual Stratification and Politics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. SOC 001, SOC 002, or SOC 003 recommended. Analysis of origins, dynamics, and social implications of sexual stratification. Examination of classical and contemporary theorists such as Engels, Freud, J.S. Mill, de Beauvoir, Juliet Mitchell, D. Dinnerstein. Attention to selected issues in social movements for and against sexual equality. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 134—Sociology of Racial Ethnic Families (4)
Discussion—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Asian American, Black, Chicano, and Native American family life in comparative historical perspective. Family structure and gender roles are considered in relation to socio-historical dynamics. GE credit: ACGH, DD, SS. Effective: 2016 Fall Quarter.

SOC 135—Social Relationships (4)
Discussion—1 hour; Lecture—3 hours; Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Social and cultural factors influencing friendships and intimate relationships. Topics include relationship development, relationship maintenance, and relationship loss. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 137—African American Society and Culture 1790 to 1990 (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Political and social transformations of African American communities between 1790 and 1990, as seen through film, literature, and music. Topics include: Black consciousness, Afro-Slave culture, The Harlem Renaissance, and contemporary Hip Hop. GE credit: ACGH, DD, SS. Effective: 2016 Fall Quarter.

SOC 138—Economic Sociology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Overview of the rapidly growing field of economic sociology. Focus on variations in the ways that markets are organized. The relationship between individual and collective rationality will also be emphasized. GE credit: ACGH, SS, WC. Effective: 2016 Fall Quarter.

SOC 139—Corporations and Society (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Study of the history and power of the modern corporation; corporate organization; politics, the state, and the corporation; labor unions and the labor process; competition, regulation and international markets; the multinational and conglomerate corporation; and mass markets and consumerism. GE credit: ACGH, SS. Effective: 2016 Fall Quarter.

SOC 140—Social Stratification (4)
Lecture—3 hours; Project (Term Project); Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Systems of social ranking, theories of stratification; power, prestige, culture, and styles of life of various social classes; social mobility and its consequences for social structure. GE credit: ACGH, DD, SS. Effective: 2016 Fall Quarter.

SOC 141—Industrialization and Social Change (4)
Lecture—3 hours; Project (Term Project); Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Selected technological and social factors. Preconditions of economic development and industrialization. Social, political, and cultural issues at various levels of economic development. Major historical differences and major current trends. Emphasis either on highly industrialized countries or on less developed countries. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 143A—Urban Society (4)
Discussion—1 hour; Lecture—3 hours; Project (Term Project); Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Theories of city origins. Analysis of the historic process of urbanization and of varying city types. Comparison of American and European experience of metropolitanization,counterurbanization,and neighborhood change. Consideration of competing theories of urban growth and change and competing visions of the urban future. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 143B—Sociology of City Life (4)
Discussion—1 hour; Lecture—3 hours; Project (Term Project); Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Critical dissection of the loss of community issue. Analysis of the organization of primary ties in the city, of the culture of urban public life and of the learning of city skills. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 144—Agriculture and Society (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Development of agriculture as a major enterprise in modern society with the concomitant reduction in the labor force and family farms. Analysis of issues including mechanization, migrant labor, corporate farming, and public resource policy. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 145A—Sociology of Third World Development (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SOC 001; Upper division standing. Introduction to theories and contemporary issues in the sociology of
development. Topics such as urbanization, rural/agrarian change, class, status groups, international division of labor, sectoral shifts, international capital, informal economy, gender, and political processes
are analyzed within a comparative-historical framework. GE credit: SS, WC. Effective: 1997 Winter Quarter.

SOC 145B—Gender and Rural Development in the Third World (4)
Seminar—4 hours. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Political-economic analysis of women and work during the process of socioeconomic change in the world with particular attention to the family/household context. GE credit: SS, WC. Effective: 2016 Fall Quarter.

SOC 146—Sociology of Religion (4)
Discussion—1 hour; Lecture—3 hours; Project (Term Project); Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Relationship between social structures and religions. The social setting of the major world religions. Religious innovators and institutionalization (churches, sects, cults). Secularization in the modern world and the rise of secular ideologies. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 147—Sociological Perspectives on East Asia (4)
Discussion—1 hour; Lecture—3 hours; Project (Term Project); Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Sociological theories and concepts applied toward understanding East Asian society. Emphasis on the political structure, stratification, and economy in China and Japan. Analysis of historical and contemporary similarities and differences. GE credit: SS, WC. Effective: 2016 Fall Quarter.

SOC 148—Collective Behavior (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Study of behavior of human crowds and masses in extraordinary circumstances, including crowd panics, mass scares, collective protests, riots, revolutionary situations, ecstatic and revivalist gatherings, crazes, fads, and fashions. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 149—Religion and American Society (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Historical, contemporary survey of religious traditions and organizations and their relation to U.S. social and cultural patterns. Civil religion, religious pluralism, minority and deviant communities, religious migration, U.S. religion as a social institution, and religion, politics, and social stratification. GE credit: ACGH, DD, SS. Effective: 2016 Fall Quarter.

SOC 150—Criminology (4)
Lecture—3 hours; Project (Term Project); Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Sociological analysis of criminal behavior in relation to social structure and the criminalization process. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 151—The Criminal Justice System (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Sociological analysis of the different components of the criminal justice system including the emergence and interpretation of criminal laws, the contemporary roles and functions of the police, criminal courts and correctional institutions. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 152—Juvenile Delinquency (4)
Lecture—3 hours; Project (Term Project); Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Study of juvenile delinquency in relation to the family, peer groups, community, and institutional structures. Consideration of processing of the delinquent by formal agencies of control. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 153—The Sociology of Childhood (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Contemporary childhood in historical, cross-cultural, and global perspectives. Examine changes in understanding of the nature of childhood and "best interests of the child" by class, race, gender, geographic region, and historical period. GE credit: ACGH, DD, SS, WC. Effective: 2016 Fall Quarter.

SOC 154—Health and Illness (4)
Lecture—3 hours; Project (Term Project); Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Theoretical tools for understanding the social determinants of health and health care, including such topics as health policy, social sources of illness, social construction of illness, medicalization, social disparities in health, and the illness experience. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 155—Sociology of Law (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Law considered as social control; relation of legal institutions to society as affecting judicial decision making and administration of justice. Lawyers as an occupational group. Legal reform. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 156—Social Movements (4)
Discussion—1 hour; Lecture—3 hours; Project (Term Project); Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Analysis of several aspects of social movements: mobilization, forms of organization, ideology, recruitment, leadership, strategies and tactics, development, effects. Frequent use of sound and film materials. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 157—Social Conflict (4)
Discussion—1 hour; Lecture—3 hours; Project (Term Project); Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Analysis of the causes, dynamics, and regulation of social conflict within and between various kinds of social groupings with particular reference to nonviolent methods of waging and regulating conflict. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 158—Women's Social Movements in Latin America (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Contemporary women's social movements in Latin America, focusing on Honduras, El Salvador, Brazil, and Nicaragua. Examination of exploitation and oppression in Latin America. GE credit: DD, SS, WC. Effective: 2016 Fall Quarter.

SOC 159—Work, Employment, and Careers in the 21st Century (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Historical and contemporary overview of employment, work, and occupations in American society. Study of authority and power relations, labor markets, control systems, stratification, and corporate structures, and how these factors shape work in diverse or organizational and employment setting. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 160—Sociology of the Environment (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Production, consumption, and urban expansion. Basic social logics surrounding current problems of resource scarcity (environmental extractions) and excess wastes (environmental additions). Ways that society can change and re-organize itself to become more environmentally conscious and hence ecologically sustainable. GE credit: ACGH, DD, SS, WC. Effective: 2016 Fall Quarter.

SOC 161—The Civil Justice System (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Empirical studies of the different aspects of the civil justice system in the United States and Global Society including the litigation, juries, civil rights, and international laws relating to trade, the environment, and human rights. Effective: 2016 Fall Quarter.

SOC 162—Society, Culture, and Health (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SOC 001, SOC 002, SOC 003, or SOC 006 recommended. Analysis of how socio-cultural factors shape illness experience. Evaluation of how certain conditions come to be understood as health conditions; illness identities and biographies; doctor-patient interactions; biomedical cultures; and how race, ethnicity, and gender shape health practices. GE credit: DD, SS. Effective: 2016 Fall Quarter.

SOC 163—Population Health: Social Determinants and Disparities in Health (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SOC 001, SOC 002, SOC 003, or SOC 006 recommended. Survey of the social determinants and disparities in health: measurement of population health; health transitions and global disparities; domestic disparities in health by class, race/ethnicity, nativity, gender, and sexual orientation; social determinants including social support, social stress, neighborhoods, and policy. GE credit: DD, SS. Effective: 2016 Fall Quarter.

SOC 164—Health Policy and Politics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SOC 001, SOC 002, SOC 003, or SOC 006 recommended. Introduction to health policy and politics, including health care access and delivery, and policies related to health inequalities, the social determinants of illness and health behaviors. GE credit: DD, SS. Effective: 2016 Fall Quarter.

SOC 170—Population (4)
Discussion—1 hour; Lecture—3 hours; Project (Term Project); Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Introduction to the study of human population, including theories and statistical measures; social causes and consequences of population trends; changes in population structure; geographical distribution, migration, sociopsychological factors affecting fertility. GE credit: QL, SS. Effective: 2016 Fall Quarter.

SOC 171—Sociology of Violence and Inequality (4)
Lecture/Discussion—4 hours. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. How systems of social inequality organize the practice of violence. Definitions of violence and issues affecting the social capacity for violence. Analysis and comparison of different forms of violence associated with race, class, gender relations and social organization. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 172—Ideology of Class, Race and Gender (4)
Lecture—4 hours. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Examination of popular belief systems that accompany relations between social classes, whites and blacks, and men and women in the United States. How do dominant groups attempt to justify each relationship, and is there ideological conflict or consensus between groups. GE credit: ACGH, DD, SS. Effective: 2016 Fall Quarter.

SOC 173—Sociology Through Literature (4)
Discussion—1 hour; Lecture—3 hours; Project (Term Project); Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Introduction to analysis of literature as sociological data. Reading of numerous works on American and other societies by authors such as Steinbeck, Lewis, Dreiser, Schulberg, Orwell, etc. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 174—American Jewish Identities and Communities (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Sociology of Jewish life, analyzing challenges to Jewish identity and community in the diaspora. Diversity within the Jewish community, Americanization, women, new immigrants, post-Holocaust Jewish identity, and LGBT Jews. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 175—Mass Communication (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Examines the relationship between the media and social structures. History of mediastate relations. Media as reflector and shaper of values. Emphasis on current European and Marxist and pluralist theories rather than on content analysis. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 176—Sociology of Knowledge, Science, and Scientific Knowledge (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Social, cultural, and historical dimensions of knowledge, especially scientific knowledge. Problems, methods, and theory in sociology of scientific knowledge. Laboratory and historical case studies. Scientific and technical knowledge in institutional and organizational contexts. (Science and Technology Studies 176.) GE credit: SS. Effective: 2016 Fall Quarter.

SOC 178—Punishment and Corrections (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SOC 001, 002, or 003 recommended. Origins, characteristics, and consequences of various sanctions and punishment regimes including fines, banishment, incarceration, deportation, and execution. GE credit: SS. Effective: 2017 Spring Quarter.

SOC 180A—Complex Organizations (4)
Discussion—1 hour; Lecture—3 hours; Project (Term Project); Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Develops a sociological approach to organizations theory. Designed to
introduce sociological concepts, address the alternative psychological and economic models, and involve students in the practice of organizational analysis. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 180B—Complex Organizations (4)
Discussion—1 hour; Lecture—3 hours; Project (Term Project); Term Paper. Prerequisite(s): Consent of Instructor. SOC 001, SOC 002, or SOC 003 recommended. Builds on concepts and skills developed in course 180A. Deals with the issues of organizational decision making, design, and survival. Emphasis on relations between organizations and the effects of those relations in both the public and private sectors. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 181—Social Change Organization (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Analysis of organizations with social change and improvement goals and programs, emphasizing voluntary associations and grassroots citizen groups. Topics treated include formation, decision making and leadership, strategies and tactics, factionalism and coalitions, effectiveness. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 182—Utopian Communal Groups and Movements (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Formations, structures, and social life of historical and contemporary countercultural, utopian, dystopian, intentional, and religious communal settlements and movements, including comparison with other small settlement forms such as monasteries, villages, neighborhoods, encampments, and communities. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 183—Comparative Organizations (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): SOC 001, SOC 002 or SOC 003 recommended; SOC 180A recommended. Examination of the economic, cultural, and political organization of major industrial and developing nations. Discussion of patterns and practices, alternative theoretical models of explanation, and case studies of organizations. Societies may include Japan, Germany, Egypt, China, and the U.S. GE credit: ACGH, SS, WC. Effective: 2016 Fall Quarter.

SOC 185—Social Policy (4)
Lecture—3 hours; Project (Term Project); Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Examination of social policies that affect the well-being of individuals, families and groups, including such policies as old-age pensions, health insurance, and aid to the poor. Students may not take both course 185 and 185Y for credit. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 185Y—Social Policy (Hybrid Version) (4)
Lecture—1.5 hours; Term Paper/Discussion—1 hour; Web Virtual Lecture—1.5 hours. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Examination of social policies that affect the well-being of individuals, families and groups, including such policies as old-age pensions, health insurance, and aid to the poor. Students may not take both courses 185 and 185Y for credit. GE credit: SS, WE. Effective: 2016 Fall Quarter.

SOC 188—Markets, Culture and Inequality in China (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Economic and political systems and patterns of social interaction and inequality in China. State and corporate structures and practices, market and consumer behaviors, social mobility and stratification, protest and resistance. GE credit: SS, WC. Effective: 2016 Fall Quarter.

SOC 189—Social Science Writing (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Improved analytic writing and methods for reporting social science research to a wider public. Sociological analysis of the conditions of good and bad writing. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 190X—Seminar in Sociological Analysis (4)
Seminar—3 hours; Term Paper. Prerequisite(s): SOC 100; Upper division standing; SOC 100 (former SOC 165A). Limited enrollment. In-depth examination at an upper division level of a special topic in Sociology. Emphasis on student participation in learning. May not be repeated for credit. GE credit: SS. Effective: 1997 Winter Quarter.

SOC 191—Workshop in Contemporary Sociological Theory (4)
Lecture—2 hours; Term Paper; Workshop—1 hour. Prerequisite(s): SOC 100; SOC 100 (former SOC 165A); senior standing. Workshop in contemporary sociological theory that allows students to explore the uses of theory in empirical inquiry on problems of interest to students. Contemporary theory considered in relation to classical and modern influences, concept formation, theory construction, and explanation. Not open for credit to students who have received credit for course 165B. GE credit: SS. Effective: 1997 Winter Quarter.

SOC 192—Internship and Research Practicum (2-6)
Internship—6-18 hours. Prerequisite(s): Consent of Instructor. Must have 84 units complete; faculty approval of proposed internship. Supervised internship and study in an agency, organization, or institution; application of sociological concepts to the work experience. May be repeated for credit with consent of instructor. Maximum of four units may be counted toward the major. (P/NP grading only.) Effective: 2018 Winter Quarter.

SOC 193—Workshop in Field Research (2)
Lecture/Discussion—2 hours. Prerequisite(s): SOC 046A; (SOC 192 (can be concurrent) or SOC 199 (can be concurrent)); SOC 192 or SOC 199 required concurrently for 2.0-4.0 units, senior standing. Overview of the process of collecting, recording, analyzing, and reporting qualitative social data. Emphasis on application of principles; each participant completes an original research project. Not open for credit to students who have completed course 194HA. GE credit: SS, WE. Effective: 2001 Fall Quarter.

SOC 194H—Special Study for Honors Students (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Open to Sociology majors of senior standing who qualify for the Honors program. Independent study of a sociological problem involving the writing of an Honors thesis. May be repeated up to 8 unit(s). (P/NP grading only.) GE credit: WE. Effective: 2014 Fall Quarter.

SOC 194HA—Special Study for Honors Students (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Senior standing and admission to the Honors Program. Directed reading, research and writing culminating in the preparation of a Senior Honors Thesis under direction of faculty advisor. GE credit: SS. Effective: 1997 Fall Quarter.

SOC 194HB—Special Study for Honors Students (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Senior standing and admissions to the Honors Program. Directed reading, research and writing culminating in the preparation of a Senior Honors Thesis under direction of faculty advisor. GE credit: SS. Effective: 1997 Spring Quarter.

SOC 195—Special Topics in Sociological Analysis (4)
Seminar—3 hours; Term Paper. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. In-depth examination of topics in sociology. Emphasis on student research and writing. May be repeated for credit when topic differs. May be repeated for credit. GE credit: SS. Effective: 2016 Fall Quarter.

SOC 197T—Tutoring in Sociology (1-4)
Tutorial—3-12 hours. Prerequisite(s): Upper division standing; completion of appropriate course with distinction. Activities vary depending on the nature of the course assignment. May include (but not limited to) tutoring on course material, advising on projects and papers, and leading discussion groups. (P/NP grading only.) Effective: 1997 Winter Quarter.

SOC 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

SOC 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Must have 84 units complete and faculty approval. Special study. (P/NP grading only.) Effective: 2018 Winter Quarter.

SOC 201—Social Research (4)
Lecture/Discussion—3 hours; Term Paper—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Comparative survey of sociological inquiry, taught as a practicum. Philosophy of social science; values and research; research agendas and research problem formulations; research process; explanations; interpretation; study design; concept formation, measure, sampling, data acquisition, inference; rhetoric and presentation of findings. Effective: 2007 Fall Quarter.

SOC 206—Quantitative Analysis in Sociology (4)
Lecture—4 hours. Prerequisite(s): SOC 106 Survey of the statistical models and methods that serve as a foundation for quantitative research in sociology, with an emphasis on multivariate regression analysis, as well as measurement theory and time series analysis. (S/U grading only.) Effective: 1997 Winter Quarter.

SOC 207A—Methods of Quantitative Research (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SOC 106; Or the equivalent. Principles of study design, examination of measurement, survey research methods and multivariate analysis. Course will stress actual practice of techniques. Students will carry out quantitative data analysis using packaged computer programs. May be repeated up to 8 unit(s) with instructor approval. Effective: 2015 Fall Quarter.

SOC 208—Topics in Advanced Quanitative Methods in Social Science (4)
Seminar—3 hours; Term Paper. Prerequisite(s): SOC 206; Or the equivalent and graduate standing; major graduate students. Analysis of the logic and application of an advanced statistical model; the particular model chosen may vary. Emphasis on the model's assumptions, its strengths and weaknesses, its application for social science inquiry, and the relationship between methods and social theory. May be repeated up to 12 unit(s). Effective: 2007 Spring Quarter.

SOC 215—Economy, Polity, and Society (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Open to graduate students in sociology and related disciplines. Course introduces students to topics and selected issues in the related fields of economic and political sociology and political economy. Effective: 1997 Winter Quarter.

SOC 220—Deviance, Law, and Social Control (4)
Project (Term Project); Seminar—3 hours. Prerequisite(s): SOC 120; or Consent of Instructor. Report and discussions of literature on selected forms of deviance in relation to law and formal social control. Agency contacts and exploratory research projects. Effective: 1997 Winter Quarter.

SOC 224—Sociology of Education (4)
Seminar—3 hours; Term Paper. Prerequisite(s): SOC 206 or equivalent recommended. Restricted to graduate students or consent of instructor. Overview of sociological theories accounting for the form, role, and evolution of educational systems. Emphasis on empirical research on education and social stratification and application to educational policy. Effective: 2018 Winter Quarter.

SOC 225—Cultural Sociology (4)
Seminar—3 hours; Term Paper. Explores the varied ways in which culture is understood in the social sciences and the research questions that follow from contrasting viewpoints. The approach is historically informed and focused on changing cultural forms in relation to industrialization and post-modernism. Effective: 1997 Winter Quarter.

SOC 226—Sociological Social Psychology (4)
Seminar—3 hours; Term Paper—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Advanced study of the varying approaches, methods, issues and topical concerns of sociological social psychology. Analysis of central and representative historical and contemporary works. Effective: 1997 Winter Quarter.

SOC 227—Sociology of Reproduction (4)
Discussion—1 hour; Lecture—3 hours. Recent social science scholarship in such areas as teenage pregnancy,
family planning, abortion, adoption, AIDS, and new reproductive technologies; focus on the current situation in the United States. Effective: 1997 Winter Quarter.

SOC 230—Ethnic (Race) Relations (4)
Lecture—3 hours; Term Paper. Advanced study of the determinants of ethnic groupings and their interrelationships. Major theme will be the patterns of ethnic stratification and causes of ethnic conflict. Specific focus upon dominance and resistance to dominance. Influence of social science research. Effective: 1997 Winter Quarter.

SOC 233—Gender, Culture, and Local/Global Transformation (4)
Seminar—3 hours; Term Paper. Focus on critical approach to women and development; analyze local transformations with global connections within specific cultural contexts. Course covers theory, methodological issues, and relationship between theory and practice. Effective: 1998 Fall Quarter.

SOC 234—Gender, Family, and Society (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. The major theoretical traditions and concerns in family sociology and sociology of gender. Analysis of selected classical and contemporary works representative of functionalist, Marxist, psychoanalytic, feminist and critical theoretical approaches to these subjects (e.g.,Engels,Parsons,Freud,Horkheimer,Goode,Lasch,Mitchell). Emphasis on macro and historical questions. Effective: 1997 Winter Quarter.

SOC 242A—Methodologies of Sociohistorical Inquires (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of instructor not required for graduate students in the Social Sciences Division or the Humanities, Arts, and Cultural Studies Division; required for undergraduates and students from other divisions or colleges. Introduction to comparative and case methodological approaches to sociohistorical inquiry, theoretical and practical issues, and substantive research agendas ranging from study of large-scale social transformations to close microhistories, including research agendas being developed by students in the course. Effective: 2015 Fall Quarter.

SOC 243—Urban Society (4)
Seminar—3 hours; Term Paper. Broad overview of the issues and concerns of the field of urban sociology. Special emphasis on the human experience of urban living in contemporary, cross-cultural or historical settings. Effective: 1997 Winter Quarter.

SOC 245—Developing Societies (4)
Project (Term Project); Seminar—3 hours; Term Paper. Prerequisite(s): Graduate student status or familiarity with problems of developing societies. Analysis of social and economic problems of developing societies from the standpoint of theory and research on modernization and underdevelopment. Nature of third world dependency and interdependence in the global political economy. Effective: 1997 Winter Quarter.

SOC 248—Social Movements (4)
Seminar—3 hours; Term Paper. Analysis of current issues in and contributions to the study of collective behavior and social movements; particular focus upon the strategies and tactics of social movements. Effective: 1997 Winter Quarter.

SOC 254—Sociology of Health and Illness (4)
Seminar—3 hours; Term Paper. Open to graduate or professional students. Sociological perspectives and methods on the study of health and illness. Students select topics for supervised research. Research paper required. Effective: 2018 Winter Quarter.

SOC 255—Sociology of Law (4)
Seminar—4 hours. Prerequisite(s): Consent of Instructor. Analysis of the nature of the legal process and its impact on social behavior. Will consider (1) nature and functions of law, (2) the organization and administration of law, and (3) the capacity of law to affect social behavior. Effective: 1997 Winter Quarter.

SOC 265A—Classical Sociological Theory (4)
Discussion—1 hour; Lecture—3 hours. Introduces graduate students to the work of the main classical thinkers in the tradition of social theory, such as Marx, Durkheim, Weber, Simmel, Freud, G.H. Mead, and Parsons, locating them within the historical,cultural,and philosophical milieu in which their ideas originated. Effective: 1997 Winter Quarter.

SOC 265B—Theory in Contemporary Sociology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SOC 265A Explores the uses of theories in contemporary sociology by tracing their connections with classical sociological writings and their relations to broader theoretical concerns of contemporary social thought, with particular emphasis on relevance to the current historical, cultural and social milieu. Effective: 1997 Winter Quarter.

SOC 270—Social Demography (4)
Seminar—4 hours. Prerequisite(s): SOC 170; or Consent of Instructor. How social institutions affect and are affected by the level and variation of mortality, migration, and fertility. Special emphases on the determinants of fertility-related attitudes and behavior, on less-developed countries, and on contemporary empirical studies. Effective: 1997 Winter Quarter.

SOC 280—Organizations and Institutions (4)
Seminar—4 hours. Theory of formal organizations and bureaucracy. Methods of research in organizational and institutional studies. Historical and comparative
analysis of political, religious, educational, military, and economic structure. Effective: 1997 Winter Quarter.

SOC 288—Integrative Research Practicum (4)
Extensive Writing; Seminar—6 hours; Term Paper. Prerequisite(s): SOC 207A; SOC 242A; SOC 292A; Consent of Instructor. Continuing training in field, quantitative, and/or comparative-historical methods. Emphasis on students' research projects and applications of principles related to research design, concept and theory construction causality and interpretation, and data and measurement. Completion of research paper is required. Effective: 2015 Fall Quarter.

SOC 290—Seminar (4)
Seminar—3 hours; Term Paper. (S/U grading only.) Effective: 1997 Winter Quarter.

SOC 292A—Field Research (4)
Fieldwork; Seminar—3 hours. Prerequisite(s): Graduate standing in Sociology or consent of instructor. Introduction to the logic, methods, and practices of field research, with particular emphasis on the ethnographic tradition of participant observation. Interviewing and other qualitative techniques will also be covered. Students will develop original research projects based on their own fieldwork. Effective: 2015 Fall Quarter.

SOC 293—Proseminar in Sociology (2)
Seminar—2 hours. Prerequisite(s): First-year Sociology graduate students only. Introduction to graduate training in sociology. A seminar designed to introduce students entering graduate work in the department to its ongoing research activities. (S/U grading only.) Effective: 1997 Winter Quarter.

SOC 295—Special Topics Seminar (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Research topics in Sociology. Specific topic will vary according to faculty interest and student demand. May be repeated for credit when topic differs. May be repeated for credit. Effective: 1999 Fall Quarter.

SOC 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

SOC 299—Individual Study (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

SOC 390A—The Teaching of Sociology (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): Graduate standing; required for first-time teaching assistants. Practical instruction in teaching methods for qualitative and quantitative courses. Pedagogical issues involved in critical sociological analysis. (S/U grading only.) Effective: 1997 Winter Quarter.

SOC 390B—The Teaching of Sociology (2)
Discussion—1 hour; Lecture—1 hour. Prerequisite(s): Graduate standing. Practical instruction in devising course syllabi, lectures and assignments for Associate-Instructors and others interested in college teaching. Discussion of pedagogical methods of teaching qualitative and quantitative courses. (S/U grading only.) Effective: 1997 Winter Quarter.

SOC 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

SOC 466—Research Paper Workshop (2)
Discussion—0.5 hours; Workshop—1.5 hours. Prerequisite(s): Master of Arts standing. A workshop to assist advanced graduate students in the preparation of an original research paper. Students present their research papers and discuss issues in theory, research design, data, empirical inference, and verbal and written presentation of a professional research paper. (S/U grading only.) Effective: 1997 Winter Quarter.

SPA Spanish

Courses in SPA:

SPA 001—Elementary Spanish (5)
Lecture/Discussion—5 hours. Introduction to Spanish grammar and development of all language skills in a cultural context with special emphasis on communication. Not open for credit for students who have completed equivalent course 001S. Students who have successfully completed Spanish 2 or 3 in the 10th or higher grade of high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed. GE credit: AH, WC. Effective: 2016 Winter Quarter.

SPA 001A—Accelerated Intensive Elementary Spanish (15)
Lecture/Discussion—15 hours. Introduction to Spanish grammar and development of all language skills in a cultural context with emphasis on communication. Special 12-week accelerated, intensive summer session course combining the work of courses 1, 2 and 3. Not open to students who have completed equivalent courses 1, 1S, 2, 2S, 2V, 2Y, 3, 3S, 3V or 3Y. GE credit: AH, WC. Effective: 2016 Summer Special Session.

SPA 001S—Elementary Spanish (5)
Lecture/Discussion—5 hours. Introduction to Spanish grammar and development of all language skills in a cultural context with special emphasis on communication. Offered in a Spanish speaking country under the supervision of a UC Davis faculty/lecturer. Not open for credit to students who have taken equivalent course 1. GE credit: AH, WC. Effective: 2016 Spring Quarter.

SPA 002—Elementary Spanish (5)
Lecture/Discussion—5 hours. Prerequisite(s): SPA 001 or SPA 001S; Or the equivalent. Continuation of courses 1 and 1S in the areas of grammar and basic language skills. Not open for credit for students who have completed equivalent course 2S, 2V or 2Y. GE credit: AH, WC. Effective: 2016 Winter Quarter.

SPA 002S—Elementary Spanish (5)
Lecture/Discussion—5 hours. Prerequisite(s): SPA 001 or SPA 001S Continuation of Spanish 001 and 001S in the areas of grammar and basic language skills. Offered in a Spanish speaking country under the supervision of UC Davis faculty/lecturer. Not open for credit to students who have taken course 002, 002V or 002Y. GE credit: AH, WC. Effective: 2016 Spring Quarter.

SPA 002V—Elementary Spanish (5)
Web Electronic Discussion—2 hours; Web Virtual Lecture—3 hours. Prerequisite(s): SPA 001 or SPA 001S; Or the equivalent. Continuation of course 1, 1S, or previous high school experience in the areas of grammar and basic language skills. Online format combining synchronous chatting with technologically based materials. Not open for credit to students who have taken equivalent course 2, 2S, 2Y, or higher. GE credit: AH, WC. Effective: 2017 Spring Quarter.

SPA 002Y—Elementary Spanish (5)
Lecture/Discussion—3 hours; Web Electronic Discussion—2 hours. Prerequisite(s): SPA 001 or SPA 001S Continuation of course 1 or 1S in the areas of grammar and basic language skills. Hybrid format combining classroom instruction with technologically based materials. Not open for credit to students who have taken equivalent course 2, 2S, or 2V. GE credit: AH, WC. Effective: 2016 Winter Quarter.

SPA 003—Elementary Spanish (5)
Lecture/Discussion—5 hours. Prerequisite(s): SPA 002 or SPA 002S or SPA 002V or SPA 002Y Completion of grammar sequence and continuing practice of all language skills using cultural texts. Not open for credit for students who have completed equivalent course 003S, 003V or 003Y. GE credit: AH, WC. Effective: 2016 Spring Quarter.

SPA 003S—Elementary Spanish (5)
Lecture/Discussion—5 hours. Prerequisite(s): SPA 002 or SPA 002S or SPA 002V or SPA 002Y Completion of grammar sequence and continuing practice of all language skills using cultural texts. Offered in a Spanish speaking country under the supervision of UC Davis faculty. Not open for credit for students who have completed equivalent course 003, 003V or 003Y. GE credit: AH, WC. Effective: 2016 Spring Quarter.

SPA 003V—Elementary Spanish (5)
Web Electronic Discussion—2 hours; Web Virtual Lecture—3 hours. Prerequisite(s): SPA 002 or SPA 002S or SPA 002V or SPA 002Y Continuation of course 2, 2S, 2V or 2Y. Online format combining synchronous chatting with technologically based materials. Not open to students who have taken equivalent course 3, 3S, 3Y, or higher. GE credit: AH, WC. Effective: 2016 Winter Quarter.

SPA 003Y—Elementary Spanish (5)
Lecture/Discussion—3 hours; Web Electronic Discussion—2 hours. Prerequisite(s): SPA 002 or SPA 002S or SPA 002V or SPA 002Y Completion of grammar sequence and continuing practice of all language skills using cultural texts. Hybrid format combining classroom instruction with technologically based materials. Not open to students who have taken equivalent course 3, 3S, or 3V. GE credit: AH, WC. Effective: 2016 Winter Quarter.

SPA 008—Elementary Spanish Conversation (2)
Discussion—3 hours. Prerequisite(s): (SPA 003 or SPA 003V or SPA 003Y); SPA 021 (concurrently) recommended. Not open to native speakers or upper division students. Designed to develop oral communication skills. Emphasis on increasing vocabulary, improving listening comprehension, pronunciation, accuracy and grammar control. Practice of everyday situations. GE credit: OL, WC. Effective: 2018 Spring Quarter.

SPA 021—Intermediate Spanish (5)
Lecture/Discussion—5 hours. Prerequisite(s): SPA 003 or SPA 003S or SPA 003V or SPA 003Y Review and development of grammar, vocabulary and composition acquired in the first year through exercises and reading of modern texts. Not open for credit for students who have completed equivalent course 021S, 021V or 021Y. GE credit: AH, WC. Effective: 2016 Spring Quarter.

SPA 021S—Intermediate Spanish (5)
Lecture/Discussion—5 hours. Prerequisite(s): SPA 003 or SPA 003S or SPA 003V or SPA 003Y Review and development of the grammar, vocabulary and composition acquired in the first year through exercises and reading of modern texts. Not open for credit for students who have completed equivalent course 021, 021V or 021Y. GE credit: AH, WC. Effective: 2016 Spring Quarter.

SPA 021V—Intermediate Spanish I (5)
Web Electronic Discussion—2 hours; Web Virtual Lecture—3 hours. Prerequisite(s): SPA 003 or SPA 003Y or SPA 003V; Or the equivalent from previous high school language experience. Continuation of course 3, 3V, 3Y, 3S, or previous high school experience in the areas of grammar and intermediate language skills. Online format combining synchronous chatting with technologically based materials. Not open for credit to students who have taken equivalent course 21, 21Y or 21S. GE credit: AH, OL, WC, WE. Effective: 2016 Spring Quarter.

SPA 021Y—Intermediate Spanish (5)
Lecture/Discussion—3 hours; Web Electronic Discussion—2 hours. Prerequisite(s): SPA 003 or SPA 003S or SPA 003V or SPA 003Y Continuation of courses 3, 3S, 3V and 3Y in the areas of grammar and basic language skills. Hybrid format combining classroom instruction with technologically based materials where learning takes place both face-to-face and online. Not open for credit to students who have taken equivalent course 21, 21S or 21V. GE credit: AH, WC. Effective: 2016 Spring Quarter.

SPA 022—Intermediate Spanish (5)
Lecture/Discussion—5 hours. Prerequisite(s): SPA 021 or SPA 021S or SPA 021V or SPA 021Y Development of all language skills through exercises and reading of modern texts. Development on more difficult grammar concepts and further practice on composition. Not open for credit for students who have completed equivalent course 022S, 022V or 022Y. GE credit: AH, WC. Effective: 2016 Spring Quarter.

SPA 022S—Intermediate Spanish (5)
Lecture/Discussion—5 hours. Prerequisite(s): SPA 021 or SPA 021S or SPA 021V or SPA 021Y Development of all language skills through exercises and reading of modern texts. Development of more difficult grammar concepts and further practice on composition. Not open for credit for students who have completed equivalent course 022, 022V or 022Y. GE credit: AH, WC. Effective: 2016 Spring Quarter.

SPA 022V—Intermediate Spanish II (5)
Web Electronic Discussion—2 hours; Web Virtual Lecture—3 hours. Prerequisite(s): SPA 021 or SPA 021S or SPA 021V or SPA 021Y; Or equivalent from previous high school language experience. Continuation of course 21, 21V, 21Y, 22S, or previous high school experience in the areas of grammar and intermediate language skills. Online format combining synchronous chatting with technologically based materials. Not open for credit to students who have taken course 22, 22Y, or 22S. GE credit: AH, OL, SS, WC, WE. Effective: 2016 Spring Quarter.

SPA 022Y—Intermediate Spanish (5)
Lecture/Discussion—3 hours; Web Electronic Discussion—2 hours. Prerequisite(s): SPA 021 or SPA 021S or SPA 021V or SPA 021Y Continuation of course 21, 21S, or 21V in the areas of grammar and basic language skills. Online format combining synchronous chatting with technologically based materials. Not open to students who have taken equivalent course 22, 22S or 22V. GE credit: AH, WC. Effective: 2016 Winter Quarter.

SPA 023—Spanish Composition I (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): SPA 022 or SPA 022S or SPA 022V or SPA 022Y Development of writing skills by way of reading, discussion, and analysis of authentic materials, literary texts, and videos. Selective review of grammar. Composition, journals, individual and group projects. Not open for students who have completed equivalent course 023S. GE credit: AH, WC, WE. Effective: 2016 Winter Quarter.

SPA 023S—Spanish Composition I (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): SPA 022 or SPA 022S or SPA 022V or SPA 022Y Development of writing skills by way of reading, discussion, and analysis of authentic materials, literary texts, and videos. Selective review of grammar. Composition, journals, individual and group projects. Course is taught in a Spanish speaking country. Not open for credit to students who have completed equivalent course 23. GE credit: AH, WC, WE. Effective: 2016 Winter Quarter.

SPA 024—Spanish Composition II (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): SPA 023 or SPA 023S Development of advanced level writing skills, with emphasis on how to write argumentative prose, essays, and research papers. Introduction to the analysis of literary genres. Compositions, journals, individual and group projects. Not open for credit for students who have completed equivalent course 024S. GE credit: AH, WC, WE. Effective: 2016 Winter Quarter.

SPA 024S—Spanish Composition II (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): SPA 023 or SPA 023S Development of advanced level writing skills, with emphasis on how to write argumentative prose, essays, and research papers. Introduction to the analysis of literary genres. Compositions, journals, individual and group projects. Not open for credit to students who have completed equivalent course 24. GE credit: AH, WC, WE. Effective: 2016 Winter Quarter.

SPA 028—Intermediate Spanish Conversation (2)
Discussion—3 hours. Prerequisite(s): SPA 008 or SPA 022 or SPA 022V or SPA 022Y Continuation of course 8. Designed to develop oral communication skills at a more advanced level. Practice in more complex situations. (Former course 9) GE credit: OL, WC. Effective: 2018 Spring Quarter.

SPA 031—Intermediate Spanish for Native Speakers I (5)
Extensive Writing; Lecture/Discussion—3 hours; Tutorial—1 hour. Prerequisite(s): SPA 003 or SPA 003V or SPA 003Y; Or equivalent course or consent of instructor. First course of a three-quarter series designed to provide bilingual students whose native language is Spanish with the linguistic and learning skills required for successfully completing upper division courses in Spanish. Intensive review of grammar and composition. GE credit: AH, OL, WC, WE. Effective: 2018 Winter Quarter.

SPA 032—Intermediate Spanish for Native Speakers II (5)
Extensive Writing; Lecture/Discussion—3 hours; Tutorial—1 hour. Prerequisite(s): SPA 031; Consent of Instructor. Continuation of Spanish 31, intensive review of grammar and composition. Development of all language skills through reading of modern texts, presentation/discussion of major ideas, vocabulary expansion, and writing essays on topics discussed. Designed for students whose native language is Spanish. GE credit: AH, OL, WC, WE. Effective: 2016 Winter Quarter.

SPA 033—Intermediate Spanish for Native Speakers III (5)
Extensive Writing; Lecture/Discussion—3 hours; Tutorial—1 hour. Prerequisite(s): SPA 032; Consent of Instructor. Development of writing skills, with emphasis on experimenting with various writing styles: analytical, argumentative, and creative. Analytical review of literary genres. Written essays will be assigned. Students will develop a research paper. Designed for students whose native language is Spanish. GE credit: AH, OL, WC, WE. Effective: 2016 Winter Quarter.

SPA 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of instructor and department chairperson. Primarily for lower division students. (P/NP grading only.) Effective: 1997 Winter Quarter.

SPA 098F—Student Facilitated Course (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Student facilitated course intended primarily for lower division students. (P/NP grading only.) Effective: 2017 Winter Quarter.

SPA 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

SPA 100—Principles of Hispanic Literature and Criticism (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SPA 024 or SPA 024S or SPA 033 Principles of literary criticism applied to the study of fiction, drama, poetry, and essay of major literary writers of the Hispanic world. Not open for credit to students who have taken course 100S. GE credit: AH, OL, WC, WE. Effective: 2004 Spring Quarter.

SPA 100S—Principles of Hispanic Literature and Criticism (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SPA 024 or SPA 033 Principles of literary criticism applied to the study of fiction, drama, poetry and essay of major literary writers of the Hispanic world. Offered in a Spanish speaking country under the supervision of a UC Davis faculty/lecturer. Not open to students who have taken equivalent course 100. GE credit: AH, OL, WC, WE. Effective: 2002 Spring Quarter.

SPA 110—Advanced Spanish Composition (4)
Lecture—3 hours. Prerequisite(s): SPA 024 or SPA 033 Practice in expository writing with emphasis on clarity and idiomatic
expression. Practical application and review of selected grammar topics. (Part of former courses 110A and 110B.) GE credit: WE. Effective: 1997 Winter Quarter.

SPA 111N—The Structure of Spanish: Sounds and Words (3)
Lecture—3 hours. Prerequisite(s): (SPA 024 or SPA 033); or Consent of Instructor. LIN 001 recommended. Linguistic description of the sound patterns of Spanish and how those sounds can be used to form larger units, such as morphemes and words. Theoretical and practical comparisons with English and with other Romance languages. (Former course 132.) GE credit: SS. Effective: 2016 Fall Quarter.

SPA 112N—The Structure of Spanish: Words and Phrases (3)
Lecture—3 hours. Prerequisite(s): SPA 111N; or Consent of Instructor. A study of Spanish word and phrase structure, with special emphasis on the constituent structure of noun and verb phrases. Theoretical and practical comparisons with English and with other Romance languages. (Former course 131.) GE credit: SS. Effective: 2016 Fall Quarter.

SPA 113—Spanish Pronunciation (4)
Lecture—3 hours; Term Paper. Prerequisite(s): (SPA 024 or SPA 033); LIN 001 recommended. Sound structure of modern Spanish; theoretical analysis of selected problems in pronunciation. Strongly recommended for prospective teachers of Spanish. GE credit: SS. Effective: 2016 Fall Quarter.

SPA 114N—Contrastive Analysis of English and Spanish (4)
Extensive Writing; Lecture—3 hours. Prerequisite(s): SPA 024 or SPA 033; or Consent of Instructor. SPA 111N and SPA 112N recommended. Contrastive analysis of English and Spanish, error analysis, introduction to structuralist and transformational linguistics. Individual and group conferences. (Former course 137.) GE credit: SS. Effective: 2016 Fall Quarter.

SPA 115—History of the Spanish Language (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SPA 024 or SPA 033; or Consent of Instructor. LIN 001 recommended. Spanish language from its roots in spoken Latin to modernity. Emphasis on the close relationship between historical events and language change, and the role that literature plays in language standardization. Not open to students who have completed equivalent course 115S. GE credit: AH, SS. Effective: 2016 Fall Quarter.

SPA 115S—History of the Spanish Language (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SPA 024 or SPA 033; or Consent of Instructor. LIN 001 recommended. Spanish language from its roots in spoken Latin to modernity. Emphasis on the close relationship between historical events and language change, and the role that literature plays in language standardization. Offered in a Spanish speaking country under the supervision of a UC Davis faculty/lecturer. Not open to students who have completed equivalent course 115. GE credit: AH, SS. Effective: 2016 Fall Quarter.

SPA 116—Applied Spanish Linguistics (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SPA 024 or SPA 033; or Consent of Instructor. LIN 001 recommended. Exploration of the major theoretical and practical issues concerning learning Spanish as a second language. For students interested in teaching Spanish as a career. Not open to students who have taken equivalent course 116S. GE credit: SS. Effective: 2016 Fall Quarter.

SPA 116S—Applied Spanish Linguistics (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SPA 024 or SPA 033; or Consent of Instructor. LIN 001 recommended. Exploration of the major theoretical and practical issues concerning learning Spanish as a second language. For students interested in teaching Spanish as a career. Offered in a Spanish speaking country, in Spanish, under the supervision of UC Davis faculty. Not open to students who have taken course 116. GE credit: SS. Effective: 2016 Fall Quarter.

SPA 117—Teaching Spanish as a Native Tongue in the U.S.: Praxis and Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SPA 024 or SPA 033; or Consent of Instructor. LIN 001 recommended. Designed for students interested in teaching Spanish to native speakers. Focus on cultural diversity of the Spanish speaking population in the United States; applied language teaching methodologies in the context of teaching Spanish to native speakers at different levels. GE credit: OL. Effective: 2016 Fall Quarter.

SPA 118—Topics in Spanish Linguistics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 111N; or Consent of Instructor. Study of specialized topics in Spanish linguistics, for example: language and use; text and context; language and society; bilingualism; Spanish dialectology; syntax and semantics. May be repeated once for credit when topic differs. May be repeated up to 1 time(s). GE credit: SS. Effective: 2016 Fall Quarter.

SPA 123—Creative Writing in Spanish (4)
Discussion—4 hours. Prerequisite(s): SPA 024 or SPA 033; or Consent of Instructor. Intensive writing of poetry or fiction in Spanish or in a bilingual (Spanish/English) format. Students will write both in prescribed forms and in experimental forms of their own choosing. GE credit: WE. Effective: 1997 Winter Quarter.

SPA 130—Survey of Spanish Literature to 1700 (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Survey of Spanish literature (narrative, poetry and drama) to 1700, Emphasis on the multicultural birth of the Spanish culture, the formation and growth of the Spanish language and letters through its written records and the literature of the early period. GE credit: AH, WC. Effective: 2008 Summer Session 1.

SPA 131N—Survey of Spanish Literature: 1700 to Present (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Survey of modern Spanish literature, providing an overview of main literary movements (romanticism, realism, naturalism, modernism, avantgarde). Emphasis on the philosophical and historical background and on the European context for modern Spanish literature. (Part of former courses 104A and 104B.) GE credit: AH, WC. Effective: 2008 Summer Session 1.

SPA 132—Golden Age Drama and Performance (4)
Lecture—1.5 hours; Performance Instruction—1.5 hours. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Limited enrollment. Golden Age drama: text and performance. Study of Spanish Baroque drama as performance art. Close reading of plays and related aspects of seventeenth-century theater: theatrical spaces, staging, performance, actors, public, language, costumes. Final project is performance of a play. May be repeated up to 2 time(s). GE credit: AH, OL, VL, WC. Effective: 2007 Winter Quarter.

SPA 133N—Golden Age Literature of Spain (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Introduction to the study of the principal authors and literary movements of 16th- and 17th-century Spain and Spanish American colonial literature. May be repeated up to 3 time(s) with consent of instructor. GE credit: AH, OL, WC, WE. Effective: 2008 Summer Session 1.

SPA 134A—Don Quijote I (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Critical interpretation of Don Quijote Part One by Cervantes. Focused study of key elements within the socio-cultural context of Golden Age Spain. Don Quijote as prototype for the modern novel. GE credit: AH, WC, WE. Effective: 2007 Fall Quarter.

SPA 134B—Don Quijote II (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 134A Critical interpretation of Don Quijote Part Two by Cervantes. Focused study of key elements within the socio-cultural context of Golden Age Spain. Don Quijote as prototype for the modern novel. GE credit: AH, WC, WE. Effective: 2006 Winter Quarter.

SPA 135N—Spanish Romanticism (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Romanticism as a philosophical concept, and as a literary movement in Spain, with emphasis on its distinctive, specific "romantic" qualities and its literary expression in five leading authors of the early nineteenth century. (Former course 114.) GE credit: AH, WC. Effective: 2008 Summer Session 1.

SPA 136N—The Spanish Novel of the 19th Century (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Literary realism in Spain, focusing on Leopoldo Alas (Clarín), Emilia Pardo Bazán and Benito Pérez Galdós unique characteristics of Spanish realism and its historical roots in Cervantes and the picaresque. GE credit: AH, WC, WE. Effective: 2008 Summer Session 1.

SPA 137N—Twentieth-Century Spanish Fiction (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Study of the main literary trends and authors of the modern Spanish novel and short story. Selected works by Unamuno, Valle-Inclán, Sender,
Cela, Matute, Ayala and others. GE credit: AH, WC, WE. Effective: 2008 Summer Session 1.

SPA 138N—Modern and Contemporary Spanish Poetry (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Study of the main literary trends and authors of modern and contemporary Spanish poetry. Selected works by Machado, Juan Ramón Jiménez, García Lorca, Guillén, Aleixandre, Hernández Hierro and others. Offered in alternate years. (Former course 120C.) GE credit: AH, OL, WC. Effective: 2008 Summer Session 1.

SPA 139—Modern Spanish Theater (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Study of the main dramatic trends and playwrights of modern Spanish theater. Selected works by Valle Inclán, García-Lorca, Mihura, Buero-Vallejo, Arrabal and others. Offered in alternate years. GE credit: AH, WC. Effective: 2008 Summer Session 1.

SPA 140N—Modern Spanish Essay (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Ortega, Unamuno and the modern Spanish essay. Their concept of Spain and their relations with other movements and thinkers. GE credit: AH, WC, WE. Effective: 2008 Summer Session 1.

SPA 141—Introduction to Spanish Culture (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SPA 024 or SPA 024S or SPA 033 Introduction to history, geography and culture of Spain. Art, history of ideas, and everyday cultural manifestations. Introduction to critical reading and textual analysis. Not open for students who have completed equivalent course 141S. GE credit: AH, VL, WC. Effective: 2007 Fall Quarter.

SPA 141S—Introduction to Spanish Culture (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SPA 024 or SPA 024S or SPA 033 Introduction to history, geography and culture of Spain. Art, history of ideas, and everyday cultural manifestations. Introduction to critical reading and textual analysis. Offered in a Spanish speaking country under the supervision of UC Davis faculty. Not open to students who have taken equivalent course 141. GE credit: AH, VL, WC. Effective: 2007 Spring Quarter.

SPA 142—Special Topics in Spanish Cultural and Literary Studies (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Special topics in the study of Spanish literature and culture. May be repeated up to 2 time(s). GE credit: AH, OL, WC, WE. Effective: 2008 Summer Session 1.

SPA 143—Spanish Art (4)
Discussion—1 hour; Lecture—3 hours; Term Paper. Spanish art and the different historical, sociological and political manifestations that frame it. History of art, including Paleolithic, Roman, Visigothic, Romanesque, Goth, Renaissance, Baroque, Neoclassic
and Contemporary art. GE credit: AH, VL, WC. Effective: 2000 Summer Quarter.

SPA 144—Topics in Spanish Cultural Studies (4)
Lecture—3 hours; Project (Term Project)—1 hour. Prerequisite(s): SPA 024 or SPA 024S or SPA 033 Study of specific historical tendencies in Spanish culture(s) from the Romans to the present. Sources studied may include literature, film, art, journalism, and performance. Approaches to material may address issues of aesthetics, politics, identity, and globalization. May be repeated up to 1 time(s). GE credit: AH, WC. Effective: 2005 Fall Quarter.

SPA 147—Anglos, Latinos and the Spanish Black Legend: The Origins and Educational Implications of Anti-Hispanic Prejudice (4)
Fieldwork; Lecture/Discussion—3 hours; Term Paper. Examination of Anti-Hispanic prejudice in the United States focusing on the "Black Legend," a 16th Century anti-Spanish myth underpinning the doctrine of "Manifest Destiny." Exploration of the Legend's presence in contemporary American society through interviews and analysis of school textbooks. (Education 147.) GE credit: ACGH, AH, DD, WE. Effective: 2016 Fall Quarter.

SPA 148—Cinema in the Spanish-Speaking World in Translation (4)
Film Viewing—3 hours; Lecture—3 hours. Prerequisite(s): SPA 024 or SPA 024S or SPA 033 Analysis of the culture of the Spanish-speaking world through film in translation. Emphasis on the cultural information illustrated by the films; no prior knowledge of cinematography required. Films with subtitles. Not open for students who have completed equivalent course 148S. GE credit: AH, VL, WC. Effective: 2004 Fall Quarter.

SPA 148S—Cinema in the Spanish-Speaking World in Translation (4)
Film Viewing—3 hours; Lecture—3 hours. Prerequisite(s): SPA 024 or SPA 033 Analysis of the culture of the Spanish-speaking world through film in translation. Emphasis on the cultural information illustrated by the films; no prior knowledge of cinematography required. Films with subtitles. Offered in a Spanish speaking country, in Spanish, under the supervision of UC Davis faculty. Not open to students who have taken equivalent course 148. GE credit: AH, VL, WC. Effective: 2002 Spring Quarter.

SPA 149—Latin-American Literature in Translation (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ENL 003; Or the equivalent of ENL 003. Reading, lectures and discussions in English of works by Borges, Cortázar, Fuentes, García Márquez, Paz and others. May not be counted toward the major in Spanish. GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

SPA 150N—Survey of Latin American Literature to 1900 (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Latin American literature from preconquest texts and the chronicles of the Conquest to romanticism and modernism. Reading selections include fiction, poetry, drama and essays. GE credit: AH, WC. Effective: 2008 Summer Session 1.

SPA 151—Survey of Latin American Literature 1900 to Present (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Latin American literature from 1900 to the present. Reading selections include fiction, poetry, drama, essays, testimonio, etc. GE credit: AH, WC. Effective: 2008 Fall Quarter.

SPA 153—Latin American Short Story (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Evolution of the Latin American short story from the 19th century to the present. Emphasis on the contemporary period. GE credit: AH, WC. Effective: 2008 Summer Session 1.

SPA 154—Latin American Novel (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Evolution of the Latin American novel from the 19th century to the present. Emphasis on significant contemporary works. GE credit: AH, WC. Effective: 2008 Summer Session 1.

SPA 155—Mexican Novel (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Evolution of the Mexican novel from the 19th century to the present. Emphasis on the narrative of the Revolution and significant contemporary works. GE credit: AH, WC. Effective: 2008 Summer Session 1.

SPA 156—Latin American Literature of the Turn of the 20th Century (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Modernism as an authentic expression of Latin American literature and its influence on 20th-century poetry and prose. In depth analysis of the works of Darío and other major writers of the era. Offered in alternate years. GE credit: AH, WC. Effective: 2008 Summer Session 1.

SPA 157—Great Works of Latin American Literature/Culture (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Study of major works of Latin American literature/culture and their cultural and literary milieus. May include novels, poetry, film, etc. Works may be analyzed in terms of style, influence, cultural significance, political importance, and/or commercial success. GE credit: AH, WC. Effective: 2008 Fall Quarter.

SPA 158—Latin American Poetry: From Vanguardism to Surrealism and Beyond (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S Study of vanguardism, surrealism, and more recent movements of Latin American poetry. An in-depth analysis of the works of such major poets as Neruda, Vallejo, and Paz. GE credit: AH, WC. Effective: 2008 Summer Session 1.

SPA 159—Special Topics in Latin American Literature and Culture (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S; One course. Special topics in the study of Latin American literature and culture. May be repeated up to 1 time(s) when topic or subject differs; students may take any SPA 159 course two times total in combination. GE credit: AH, WC. Effective: 2015 Winter Quarter.

SPA 159S—Special Topics in Latin American Literature and Culture (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S; One course. Special topics in the study of Latin American literature and culture. Offered in a Spanish speaking country under the supervision of UC Davis faculty. May be repeated up to 1 time(s) when topic or subject differs; students may take any SPA 159 course two times total in combination. GE credit: AH, WC. Effective: 2015 Winter Quarter.

SPA 159Y—Special Topics in Latin American Literature and Culture (4)
Lecture/Discussion—1 hour; Web Virtual Lecture—3 hours. Prerequisite(s): SPA 100 or SPA 100S or SPA 141 or SPA 141S or SPA 170 or SPA 170S; One course. Special topics in the study of Latin American literature and culture. Hybrid format combining classroom instruction with technologically based materials. May be repeated up to 1 time(s) when topic or subject differs; students may take any Spanish 159 course two times total in combination. GE credit: AH, WC. Effective: 2016 Spring Quarter.

SPA 160—Latin American Women Writers in Translation (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Upper division standing or consent of instructor. Latin American women writers from the 19th and 20th centuries. Recent theoretical approaches to literature by women in Latin America. Discussions in English of works by Matto de Turner, Avellaneda, Storni, Ocampo, Agustini, Mistral, Castellanos, and others. GE credit: AH, WC. Effective: 2005 Spring Quarter.

SPA 170—Introduction to Latin American Culture (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 024 or SPA 024S or SPA 033 Introduction to history, geography and culture of Latin America. Multiple genres of cultural production and representation, with a focus on cultural diversity and regional difference. Introduction to critical reading and textual analysis. Not open for students who have completed equivalent course SPA 170S. GE credit: AH, VL, WC, WE. Effective: 2008 Summer Session 1.

SPA 170S—Introduction to Latin American Culture (4)
Lecture—3 hours; Project (Term Project). Prerequisite(s): SPA 024 or SPA 024S or SPA 033 Introduction to history, geography and culture of Latin America. Multiple genres of cultural production and representation, with a focus on cultural diversity and regional difference. Introduction to critical reading and textual analysis. Offered in a Spanish-speaking country. Not open for students who have completed equivalent course 170. GE credit: AH, VL, WC, WE. Effective: 2008 Summer Session 1.

SPA 171—Music from Latin America (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Examination of music from Latin America. Characteristic music (i.e. tango, bossa nova, salsa, musica motena, musica andina) as well as its implications in other musical genres. Taught in English or Spanish depending on instructor. May be repeated up to 1 time(s) when the topic differs. Not open to students who taken Spanish 171S or Music 127S. (Music 127) GE credit: AH, VL, WC, WE. Effective: 2018 Winter Quarter.

SPA 171S—Music from Latin America (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Examination of music from Latin America. Characteristic music (i.e. tango, bossa nova, salsa, musica motena, musica andina) as well as its implications in other musical genres. Taught in English or Spanish depending on instructor. May be repeated up to 1 time(s) when content differs. Not open to students who have taken SPA 171 or MUS 127. (Music 127S.) GE credit: AH, VL, WC, WE. Effective: 2018 Winter Quarter.

SPA 172—Mexican Culture (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SPA 024 or SPA 024S or SPA 033 Study of Mexican culture through a diversity of cultural expression, including elite, popular and mass media culture. Focus on national icons and archetypes, multiculturalism, transnationalism. May be repeated up to 1 time(s). GE credit: AH, VL, WC. Effective: 2008 Fall Quarter.

SPA 173—Cinema and Latin American Culture (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): SPA 024 or SPA 024S or SPA 033 Understanding Latin American cultures through cinema. History and critical analysis of Latin American film. Focus on a national cinematic tradition. Comparative experiences in different parts of Latin America and/or a particular era. Conducted entirely in Spanish. May be repeated up to 1 time(s) when topic differs. GE credit: AH, VL, WC. Effective: 2005 Spring Quarter.

SPA 174—Chicano Culture (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SPA 024 or SPA 033 An interdisciplinary survey of Chicano culture. Topics include literature, art, folklore, oral tradition, music, politics, as well as
everyday cultural manifestations. Conducted in Spanish. (Former course 124.) GE credit: ACGH, AH, DD. Effective: 1997 Winter Quarter.

SPA 175—Topics in Latin American Cultural Studies (4)
Lecture—3 hours; Project (Term Project)—1 hour. Prerequisite(s): SPA 024 or SPA 024S or SPA 033 Specific historical tendencies and issues in Latin American culture(s) from precolombian times to present. Studies of literature, film, art, journalism and performance. Focus on issues of aesthetics, politics, identity, and globalization. May be repeated up to 1 time(s) content differs. GE credit: AH, VL, WC, WE. Effective: 2008 Fall Quarter.

SPA 176—Literature in Spanish Written in the United States (4)
Lecture—3 hours; Term Paper. Prerequisite(s): SPA 024 or SPA 033 Survey of the literary and cultural contributions of the main Spanish-speaking populations present in the U.S.: Chicanos, Puerto Ricans, Cuban-Americans, Central Americans, and other Latinos. GE credit: ACGH, AH, DD. Effective: 1997 Winter Quarter.

SPA 177—California and Latin America (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SPA 024 or SPA 024S or SPA 033 Interdisciplinary survey on the relationship between California and Latin America (1500s-present). Latin American representations of California and Californian representations of Latin America, as well as borderlands texts, with a special focus on Mexican-American perspectives. Conducted in Spanish. GE credit: ACGH, DD. Effective: 2008 Fall Quarter.

SPA 178A—Spanish for the Professions (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SPA 024 or SPA 024S or SPA 033 For students with an advanced level of Spanish interested in the use of Spanish in the health care, legal and law enforcement and marketing and business professions. Field trips documenting the use of Spanish in the public context. GE credit: AH, DD, OL, SS, WE. Effective: 2014 Fall Quarter.

SPA 179—Science and Politics of the Human Body in the Spanish-Speaking World (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Interaction between the interpretations of scientific ideas, philosophical issues, and politics concerning the human body in the Spanish-speaking world through different historical periods. Not open to students who have taken equivalent course 179Y. GE credit: AH, SE, SS. Effective: 2015 Fall Quarter.

SPA 179Y—Science and Politics of the Human Body in the Spanish-Speaking World (4)
Discussion—2 hours; Web Virtual Lecture—2 hours. Interaction between the interpretations of scientific ideas, philosophical issues, and politics concerning the human body in the Spanish-speaking world through different historical periods. Not open for credit to students who have taken equivalent course 179. GE credit: AH, SE, SS. Effective: 2015 Fall Quarter.

SPA 180—Senior Seminar in Spanish Linguistics (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Senior standing; a major in Spanish or consent of instructor. Limited enrollment. Group study of a special topic drawn from Spanish linguistics. Independent research project. May be repeated up to 1 time(s). GE credit: AH, OL, SS, WE. Effective: 2007 Fall Quarter.

SPA 181—Senior Seminar in Spanish Literature/Culture (4)
Seminar—3 hours; Term Paper—1 hour. Prerequisite(s): Senior standing; a major in Spanish or consent of instructor. Limited enrollment. Group study of a special topic drawn from Spanish literary or cultural studies. Independent research project. May be repeated up to 1 time(s) if content differs. GE credit: AH, OL, WE. Effective: 2006 Fall Quarter.

SPA 182—Senior Seminar in Latin American Literature/Culture (4)
Seminar—3 hours; Term Paper—1 hour. Prerequisite(s): Senior standing; a major in Spanish or consent of instructor. Limited enrollment. Group study of a special topic drawn from Latin American literary or cultural studies. Independent research project. May be repeated up to 1 time(s) if content differs. GE credit: AH, OL, WC, WE. Effective: 2006 Fall Quarter.

SPA 192I—Internship in Spanish (1-12)
Independent Study—3-36 hours. Prerequisite(s): SPA 023; and Consent of Instructor. Junior standing; major in Spanish, Chicano Studies, or a related field. Internships in fields where Spanish language skills can be used and perfected (teaching, counseling, translating-interpreting). May be repeated up to 8 unit(s) Units will not count toward the Spanish major. (P/NP grading only.) Effective: 1997 Winter Quarter.

SPA 194H—Special Study for Honors Students (1-5)
Independent Study—3-15 hours. Prerequisite(s): Consent of Instructor. Senior standing and qualificaiton for the Spanish honors program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in Spanish literature, civilization, or language studies. May be repeated up to 8 unit(s). (P/NP grading only.) GE credit: AH, WC, WE. Effective: 2000 Winter Quarter.

SPA 197T—Tutoring in Spanish (1-4)
Tutorial—1-4 hours. Prerequisite(s): Upper division standing and permission of the chair. Tutoring in undergraduate courses including leadership in small voluntary discussion groups affiliated with departmental courses. May be repeated for credit for a total of 6 units. May be repeated up to 6 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

SPA 197TC—Tutoring in the Community (2-4)
Tutorial—2-4 hours. Prerequisite(s): Upper division standing and permission of the chair. Tutoring in public schools under the guidance of a regular teacher and supervision by a departmental faculty member. May be repeated for credit for a total of 6 units. May be repeated up to 6 unit(s). (P/NP grading only.) Effective: 1997 Winter Quarter.

SPA 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of instructor and department chairperson. (P/NP grading only.) GE credit: AH, WC, WE. Effective: 1997 Winter Quarter.

SPA 198F—Student Faciliated Course (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Student facilitated course intended primarily for upper division students. (P/NP grading only.) Effective: 2017 Winter Quarter.

SPA 199—Special Study for Advanced Undergraduates (1-5)
Variable. Special study of a topic or an author to be determined in consultation with an individual faculty member. May be repeated up to 6 unit(s). (P/NP grading only.) GE credit: AH, WC, WE. Effective: 2000 Winter Quarter.

SPA 199FA—Student Facilitated Course Development (1-2)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Open to upper division Spanish majors only. Under the supervision of a faculty member, an undergraduate student plans and develops the course they will offer under 98F/198F. (P/NP grading only.) Effective: 2017 Spring Quarter.

SPA 199FB—Student Facilitated Teaching (1-4)
Variable—1-4 hours. Prerequisite(s): SPA 199FA; Consent of Instructor. Must have completed course 199FA, and be teaching a course 98F or 198F; open to upper division Spanish majors only. Student-facilitated course under the supervision of a faculty member, an undergraduate student teaches a course under 98F/198F. (P/NP grading only.) Effective: 2017 Fall Quarter.

SPA 201—Literary Theory I (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Basic theories and practical approaches to modern and contemporary Hispanic literature. Emphasis on formalism, poststructuralism, socio-cultural discourses, and ideologies. Effective: 1997 Winter Quarter.

SPA 202—Literary Theory II (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Major contemporary critical theories including recent, innovative approaches to Hispanic literature and culture. Readings from Semiotics and Deconstructionism to Psychological and Socio-ideological approaches.
Emphasis on Postmodern and Neo-colonial discourse. Effective: 1997 Winter Quarter.

SPA 203—Research Methodologies (1)
Seminar—2 hours. Introduction to the range of scholarly research methodologies currently being realized in Spanish linguistics, literary and cultural studies: archival research, textual analysis, discourse analysis, statistics for linguistics, etc.; introduction to scholarly writing (MLA style) and scholarly publishing. (S/U grading only.) Effective: 2013 Fall Quarter.

SPA 205—Spanish Phonology (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Some knowledge of phonetics is required and consent of instructor; LIN 109 and LIN 139 highly recommended. Analyzes the sound patterns of Spanish from both linear and non-linear perspectives. Students will develop a clear understanding of what phonology is and the nature of Spanish phonology, as defined by modern linguistic analysis. Effective: 1997 Winter Quarter.

SPA 206—Spanish Syntax (4)
Seminar—3 hours; Term Paper. Prerequisite(s): LIN 165; LIN 140. An examination of Spanish word order within the framework of general linguistic theory. The student will investigate how to write a grammar
of Spanish with particular attention to the structure of noun and verb clauses. Effective: 1997 Winter Quarter.

SPA 207—History of the Spanish Language (4)
Seminar—3 hours; Term Paper. Prerequisite(s): LAT 001 (Former course 220A.) Effective: 1997 Winter Quarter.

SPA 208—Old Spanish Texts (4)
Seminar—3 hours; Term Paper. Prerequisite(s): SPA 207 An in-depth linguistic examination of Old Spanish texts from the 12th to the 15th centuries, with particular attention to the significance of orthographic changes. Effective: 1997 Winter Quarter.

SPA 211—Hispanic Dialectology (4)
Seminar—3 hours; Term Paper. Prerequisite(s): SPA 220; or Consent of Instructor. Descriptive and historical study of the distinctive features of Peninsular and American Spanish dialects. (Former course 221.) Effective: 1997 Winter Quarter.

SPA 212—Applied Linguistics (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing and SPA 215 and SPA 216 recommended. Focuses on the relevant linguistic aspects of teaching Spanish. Designed for graduate students who have an interest in second-language learning
and teaching. Effective: 1997 Winter Quarter.

SPA 215—Special Topics in Hispanic Linguistics (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. SPA 205 and SPA 206 recommended. Specialized topics in Hispanic linguistics (e.g., pragmatics, sociolinguistics, topics in syntax, semantics, or diachronic studies). May be repeated for credit when topic differs. May be repeated for credit. Effective: 1997 Winter Quarter.

SPA 220—Catalan Language and Culture (4)
Laboratory—1 hour; Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Good command of Spanish, Portuguese, French or Italian and graduate level of studies in any of these languages. Open to advanced undergraduate students, with notions of Catalan, can be admitted with consent of instructor; designed for graduate students. Foundation for the acquisition of Catalan oral, reading and elementary writing level skills for students of Spanish (Iberianists or Hispanists), with the capacity to interpret educated written language. Emphasis on weekly review of grammar and all language skills. Effective: 2014 Winter Quarter.

SPA 222—Critical Approaches to Spanish Literature I: Prose & Essay (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Critical approaches to Spanish narrative and essay. May be repeated up to 2 time(s) topic differs. Effective: 2002 Fall Quarter.

SPA 223—Critical Approaches to Spanish Literature II: Poetry & Drama (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Critical approaches to Spanish poetry and drama. May be repeated up to 2 time(s) when topic differs. Effective: 2002 Fall Quarter.

SPA 224—Studies of a Major Writer, Period, or Genre in Spanish Literature (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Artistic development of a major Spanish writer and his/her intellectual and literary milieu or study of a special topic, period, or genre. May be repeated for credit with consent of instructor. May be repeated for credit. Effective: 1997 Winter Quarter.

SPA 230—Topics in Latin American Cultural Studies (4)
Seminar—3 hours; Term Paper. Discussion of select contemporary theoretical debates in Latin American Cultural Studies. Application of critical questions to the analysis of cultural texts. May be repeated up to 2 time(s) when content differs. Effective: 2007 Fall Quarter.

SPA 231—Interamerican Studies (4)
Seminar—3 hours; Term Paper. Survey of methodologies of investigation for crosscultural or comparative projects in the geographical context of the Americas. Focus on particular problems of language, discipline, national definitions, and global hierarchies of knowledge that complicate such projects. Readings of interamerican cultural texts. Effective: 2007 Fall Quarter.

SPA 252—Medieval Spanish Literature: Prose (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. An exploration of the major genres of Medieval Spanish prose from its origins to 1450. Effective: 1997 Winter Quarter.

SPA 253—Medieval Spanish Literature: Epic (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Medieval Spanish epic narratives. Major theoretical perspectives on the genesis, diffusion, and character of the Medieval epic. Relationship of epic to ballad literature. Effective: 1997 Winter Quarter.

SPA 254—Medieval Hispanic Lyric (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Analysis of the most representative lyric poetry in the various Peninsular languages and in provencal, troubadour poetry, kharjas, villancicos, cantigas de amigo, and courtly lyric. Effective: 1997 Winter Quarter.

SPA 255—Spanish Literature of the Early Renaissance (4)
Seminar—3 hours; Term Paper. Spanish Literature, 1450-1550, with emphasis on La Celestina. (Former
course 229.) Effective: 1997 Winter Quarter.

SPA 256—Spanish Literature of the Renaissance and Golden Age: Poetry (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Extensive critical study of the main currents of Renaissance and Baroque Spanish poetry through its language structures, styles (Culteranismo-Conceptismo), rhetorical devices, myths, and themes (love, death, time). Effective: 1997 Winter Quarter.

SPA 257—Spanish Literature of the Renaissance and Golden Age: Drama (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. An exploration of major 16th and17th century literary and cultural developments through the study of selected dramas. Effective: 1997 Winter Quarter.

SPA 258—Spanish Literature of the Renaissance and Golden Age: Prose (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. The origins and development of the Spanish novel during the Renaissance
and the Spanish Golden Age. Effective: 1997 Winter Quarter.

SPA 259—Cervantes and the Novel (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. The narrative works of Miguel de Cervantes with special emphasis on Don Quijote. Effective: 1997 Winter Quarter.

SPA 260—Modern Spanish Literature (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Topics of Spanish literature, from 1700-1920. Effective: 1997 Winter Quarter.

SPA 261—Contemporary Spanish Literature: Poetry (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Critical analysis of modern Spanish poetry from a wide spectrum of poetic currents. Effective: 1997 Winter Quarter.

SPA 262—Contemporary Spanish Literature: Narrative (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Study of the 20th-century novel and short story with emphasis on the avant-garde, existentialism, social realism, and postmodern trends. May be repeated up to 2 time(s) when topic differs and with consent of instructor. Effective: 2003 Spring Quarter.

SPA 263—Contemporary Spanish Literature: Drama (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. The Spanish theatrical production of the last 70 years. Effective: 1997 Winter Quarter.

SPA 264—Contemporary Spanish Literature: Essay (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Major thinkers from Ganivet to Unamuno and Ortega y Gassett. Emphasis will be placed on the relationships between Spanish thought and European philosophical currents. Effective: 1997 Winter Quarter.

SPA 265—Women Writers of Spain (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Introduction to the development of a feminine consciousness in the Spanish contemporary literary scene. Selected texts represent particularly innovative typologies of feminine discourse in the realm of the historical, psychoanalytical, and metafictional, erotic, and allegorical fiction. Effective: 1997 Winter Quarter.

SPA 272—Critical Approaches to Latin American Literature: Narrative (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Development of Latin American literary periods and currents in narrative (novel, short story, and essay), from early colonial times to the present. May be repeated up to 2 time(s) material changes. Effective: 2008 Summer Session 1.

SPA 273—Critical Approaches to Latin American Literature: Poetry and Drama (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Development of Latin American literary periods and currents in poetry and drama, from early Colonial times to the present. May be repeated up to 2 time(s) when topic differs. Effective: 2008 Summer Session 1.

SPA 274—Studies of a Major Writer, Period, or Genre in Latin American Literature (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Artistic development of a major Latin American writer and his/her intellectual and literary milieu or study of a special topic, period, or genre. May be repeated for credit with consent of instructor. May be repeated for credit. Effective: 2008 Summer Session 1.

SPA 275—Colonial Literature (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Graduate standing. An examination of pre-Hispanic and Colonial narrative, poetry and theatre. Emphasis on historical, anthropological, and ethnographic approaches to Colonial discourse. Effective: 1997 Winter Quarter.

SPA 276—Twentieth-Century Latin American Drama (4)
Seminar—4 hours. Prerequisite(s): Graduate standing or consent of instructor. Major Latin American dramatists from Florencio Sánchez to the present. (Former course 240.). Effective: 2008 Summer Session 1.

SPA 277—Latin American Novel, 1900-1950 (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Study of main trends and key authors in Latin America in the first half of the 20th century. (Former course 241A.). Effective: 2008 Summer Session 1.

SPA 278—New Trends in Latin American Fiction (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Recent developments in Latin American narrative. Emphasis on innovative language and structure. (Former course 241B.). Effective: 2008 Summer Session 1.

SPA 279—Mexican Narrative (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Study of the evolution of Mexican narrative. Emphasis on the narrative
of the Revolution and significant contemporary works. Effective: 1997 Winter Quarter.

SPA 280—Latin American Short Story (4)
Seminar—3 hours; Term Paper. Works by major writers with emphasis on 20th-century authors such as
Quiroga, Borges, García Márquez, Cortázar, and Rulfo. (Former course 243). Effective: 2008 Summer Session 1.

SPA 281—Latin American Women Writers (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Study of feminist critical theories, gender construction, and self-representation within the history of socio-cultural changes in Latin America. Effective: 2008 Summer Session 1.

SPA 282—Darío and Modernism (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Study of poetry and prose of Spanish-American Modernism (1880-1916). Offered in alternate years. (Former course 245.) Effective: 1997 Winter Quarter.

SPA 283—New Directions in Latin American Poetry (4)
Seminar—3 hours; Term Paper. New trends in Latin American poetry. Effective: 2008 Summer Session 1.

SPA 284—The Latin American Essay (4)
Seminar—3 hours; Term Paper. Major Latin American essayists from Sarmiento to contemporary essayists. Effective: 2008 Summer Session 1.

SPA 285—Multicultural Approaches to Cuban Literature and Culture (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Study of main trends in Cuban literature. Emphasis on historical, geographic, social and cultural context (including music and film). Course taught in English with some readings in Spanish. Effective: 1999 Spring Quarter.

SPA 291—Foreign Language Learning in the Classroom (4)
Project (Term Project); Seminar—3 hours. Overview of approaches to university-level foreign language instruction and the theoretical notions underlying current trends in classroom practices across commonly taught foreign languages. (German (GER) course 291; French (FRE) course 291) Effective: 2006 Fall Quarter.

SPA 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

SPA 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

SPA 300—The Teaching of Spanish (3)
Lecture—3 hours. Prerequisite(s): Senior or graduate standing; a major or minor in Spanish. Effective: 1997 Fall Quarter.

SPA 390—The Teaching of Spanish in College (4)
Discussion—2 hours; Lecture—2 hours. Prerequisite(s): Graduate standing. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required of graduate teaching assistants. Effective: 1997 Winter Quarter.

SPA 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

SPH Med - Public Health Sciences

Courses in SPH:

SPH 092—Internship in Community Health (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Students apply theory and concepts learned in the classroom through field work in a community health agency. (P/NP grading only.) Effective: 2008 Summer Session 2.

SPH 101—Introduction to Public Health (3)
Lecture—3 hours. Prerequisite(s): Undergraduate standing. Provide basic concepts and controversies in public health, basic science of public health, social and behavioral factors in health and disease, environmental and occupational health issues, the relationship of public health to the medical care system and health care reform. GE credit: SE, SS. Effective: 2016 Winter Quarter.

SPH 102—Introduction to Human Epidemiology (4)
Discussion—2 hours; Lecture—2 hours. Practice of epidemiology as it relates to human populations. Content is fundamental to the Public Health minor and a required core course. GE credit: SE. Effective: 2017 Spring Quarter.

SPH 104—Globalization and Health: Evidence and Policies (3)
Lecture—3 hours. Provides an overview of the evidence on the multiple effects of globalization policies on health. GE credit: SS, WC. Effective: 2017 Winter Quarter.

SPH 113—Health Disparities in the U.S. (3)
Lecture—3 hours. Introduction to the principles and practice of health disparities research. GE credit: DD, SS. Effective: 2018 Spring Quarter.

SPH 132—Health Issues Confronting Asian Americans and Pacific Islanders (4)
Lecture/Discussion—4 hours. Health issues confronting Asian Americans and Pacific Islanders. (Asian American Studies 132.) GE credit: SS. Effective: 2009 Winter Quarter.

SPH 160—General Health Education and Prevention (5)
Discussion—1 hour; Lecture—4 hours. Open to students in the internship program for the Health Education Program only; class size limited to 50 students. Topics include addiction, substance abuse/prevention, nutrition, stress management, physical fitness, body image, reproductive anatomy & physiology, contraceptive options, safer sex, sexual health, healthy relationships, and other general wellness/health promotion topics. Practice in peer counseling and outreach presentations. (P/NP grading only.) Effective: 2008 Summer Session 2.

SPH 161—Campus Alcohol/Other Drug Abuse Prevention Program Peer Educator Training (4)
Lecture/Discussion—3 hours; Practice—1 hour. Prerequisite(s): SPH 160 (can be concurrent); and Consent of Instructor. Preparation for internship in campus and community substance abuse prevention and educational intervention. Addiction and other physiological responses to alcohol and other drugs. Harm-reduction strategies for individuals and target populations. Practice in peer counseling skills and outreach presentations to groups. (P/NP grading only.) Effective: 2008 Summer Session 2.

SPH 162—Health Advocates Peer Educator Training (4)
Lecture/Discussion—3 hours; Practice—1 hour. Prerequisite(s): SPH 160 (can be concurrent); and Consent of Instructor. Preparation for internship in campus and community health promotion and risk reduction. Nutrition, stress management, physical fitness, body image and disordered eating, skin cancer prevention, and other general wellness/health promotion topics. (P/NP grading only.) Effective: 2008 Summer Session 2.

SPH 190—Topics in Public Health (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Seminar on key issues and current topics in public health. May be repeated for credit. (P/NP grading only.) Effective: 2016 Fall Quarter.

SPH 190C—Research Conference in Community and International Health (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Weekly conference on research problems, progress, and techniques in Community and International Health. Critical discussion of recent journal articles. May be repeated for credit. (P/NP grading only.) Effective: 2008 Summer Session 2.

SPH 192—Internship in Community Health Practice (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Upper division and graduate students. The student, through fieldwork in a community health agency, learns to apply theory and concepts learned in the classroom. (P/NP grading only.) Effective: 2008 Summer Session 2.

SPH 198—Study in Community and International Health (1-5)
Variable. Prerequisite(s): Consent of Instructor. Undergraduate standing. Study and experience for undergraduate students in any number of areas in community and international health. (P/NP grading only.) Effective: 2008 Summer Session 2.

SPH 199—Research in Community and International Health (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Undergraduate standing. Student will work with faculty member in areas of research interest, including but not limited to injury control, international health, health policy, occupational and environmental health, health promotion and wellness, women's health, and health demographics. (P/NP grading only.) Effective: 2008 Summer Session 2.

SPH 201—Introduction to Public Health (3)
Discussion/Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Provides an overview of public health. Covers the history of public health in the U.S.; defines its major functions and constituencies; and, introduces fundamental principles of epidemiology, biostatistics, behavioral sciences, environmental health, infectious diseases, and reducing health disparities. May be repeated up to 1 time(s). Effective: 2011 Summer Session 2.

SPH 202—Public Health Issues in California's Central Valley (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Public health issues in California’s Central Valley, including the influences of migration, racial and ethnic diversity, the agricultural industry, environmental exposures, and rurality. Effective: 2018 Spring Quarter.

SPH 203—Learning and Teaching in Public Health Contexts (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Aimed at current and future public health professionals interested in learning more about the educational potential for interactions with community members and other health professionals—all stakeholders in improving the health of communities. Effective: 2012 Spring Quarter.

SPH 204—Globalization and Health: Evidence and Policies (3)
Lecture—3 hours. Open to graduate student standing. Provides an overview of the evidence on the multiple effects of globalization policies on health. Effective: 2015 Fall Quarter.

SPH 205AY—Epidemiology for Health Professionals (4)
Lecture—2 hours; Web Virtual Lecture—2 hours. Prerequisite(s): Consent of Instructor. Basic epidemiologic concepts and approaches to epidemiologic research, with examples from human medicine, including outbreak investigation, infectious disease epidemiology, properties of tests. Effective: 2017 Fall Quarter.

SPH 207—Advanced Epidemiologic Methodology (4)
Lecture/Discussion—4 hours. Prerequisite(s): EPI 206 In-depth integration of advanced epidemiological concepts. Theory, methods, and applications for observational studies including random and systematic error, confounding, counterfactuals, causal inference, effect modification, internal and external validity, estimability, and interpretation of effect measures, and advanced study designs. (Epidemiology 207.) Effective: 2016 Winter Quarter.

SPH 208—Principles & Applications of Cancer Prevention & Control (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Principles and applications of cancer prevention and control from a public health perspective. (S/U grading only.) Effective: 2018 Spring Quarter.

SPH 209—History of Epidemiology in Public Health (2)
Discussion—1.5 hours; Lecture—0.5 hours. Introduction to the history of epidemiology in solving major public health problems. Original historical articles will be read/discussed. Topics may include: infectious disease, accidents/adverse events, nutritional deficiencies, community vaccination trials, occupational exposures, cancer, birth defects, cardiovascular disease, and smoking. (Epidemiology 209.) Effective: 2014 Fall Quarter.

SPH 210—Public Health Informatics (2)
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Collection, verification, and utilization of data related to populations; infrastructure, functions, and tools used to generate public health knowledge supporting public health practices and policy development/dissemination. (S/U grading only.) Effective: 2008 Summer Session 2.

SPH 212—Migration and Health (3)
Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing. Principles of migration and health. Topics will include demographics, public health invention programs, health care delivery, occupational health, and effects of international migration on the health in communities of origin, transit and destination. Guest presentations by outside experts. Effective: 2012 Spring Quarter.

SPH 213—Health Disparities in the U.S. (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Introduction to the principles and practice of health disparities research. Effective: 2018 Spring Quarter.

SPH 222—Social & Behavioral Aspects of Public Health (3)
Lecture/Discussion—3 hours. Prerequisite(s): STA 102; STA 106; and Consent of Instructor. Graduate standing. Theories and strategies of health behavior change at the individual, group, community, and environmental levels. Examples include: transtheoretical model, social networks, and social marketing. Theories are applied to solve common public health problems (cancer, obesity, smoking, and HIV/AIDS). Effective: 2009 Winter Quarter.

SPH 223—Obesity Prevention in Community Settings (3)
Lecture/Discussion—3 hours. Prerequisite(s): Consent of Instructor. Look at causes of the obesity epidemic in the U.S.; identify and critically assess the research literature on various prevention strategies; understand, and apply evidence-based public health strategies to combat obesity; and translate the science to a general audience. Effective: 2014 Fall Quarter.

SPH 232—Health Communication (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Health communication theories and research traditions. Topics include consumer health information seeking; physician-patient interaction; information, social marketing, "edutainment," and media advocacy campaigns; social networks and coping; media influences on health; and new communication technologies in health promotion and healthcare delivery. (Communication 232.) Effective: 2011 Fall Quarter.

SPH 233—Persuasive Technologies for Health (4)
Lecture/Discussion—3 hours; Term Paper. Theorizing, designing and evaluating ethical technology-based health communication interventions. Uses of social media, mobile communication apps, wearable devices, computer-generated tailored messages, educational games, and computational approaches in health promotion and healthcare delivery. (CMN 233) Effective: 2017 Fall Quarter.

SPH 235—Health Communication Campaigns (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Consent of Instructor. Restricted to graduate students. Principles of health communication campaign planning, implementation and evaluation. Strategies for changing health behaviors, shaping policy, and improving healthcare organizations' relations with stakeholders. (CMN 235.
) Effective: 2017 Fall Quarter.

SPH 244—Introduction to Medical Statistics (4)
Lecture—4 hours. Introduction to statistical methods and software in clinical, laboratory and population medicine. Graphical and tabular presentation of data, probability, binomial, Poisson, normal, t-, F-, and Chi-square distributions, elementary nonparametric methods, simple linear regression and correlation, life tables. Only one unit of credit for students who have completed Statistics 100 or Preventive Veterinary Medicine 402. (Clinical Research 244.) Effective: 2017 Winter Quarter.

SPH 245—Biostatistics for Biomedical Science (4)
Lecture—4 hours. Prerequisite(s): CLH 244 or SPH 244; and Consent of Instructor. Or an equivalent course. Analysis of data and design of experiments for laboratory data. (Clinical Research 245.) Effective: 2015 Spring Quarter.

SPH 246—Biostatistics for Clinical Research (4)
Lecture—4 hours. Prerequisite(s): SPH 245 or CLH 245 Emphasizes critical biostatistics for clinical research and targets biomedical audience. Students will develop understanding for basic planning and analysis of clinical studies and learn to develop collaborations with biostatisticians. May be repeated for credit. (Clinical Research 246.) Effective: 2015 Winter Quarter.

SPH 247—Statistical Analysis for Laboratory Data (4)
Lecture—4 hours. Prerequisite(s): CLH 245 or SPH 245 Statistical methods for experimental design and analysis of laboratory data including gene expression arrays, RNA-Seq, and mass spec. (Clinical Research 247.) Effective: 2015 Spring Quarter.

SPH 252—Social Epidemiology (2)
Lecture/Discussion—2 hours. Prerequisite(s): EPI 205A; and Consent of Instructor. Social determinants of health; psychosocial and physiological pathways; health and social inequality; gender and racial/ethnic disparities in health; social support, social cohesion and health; social gradient in behavioral risk factors; social ecological approaches to health intervention; interventions addressing social determinants. (Epidemiology 252.) Effective: 2009 Spring Quarter.

SPH 255—Human Reproductive Epidemiology (3)
Lecture—3 hours. Prerequisite(s): MPM 405; MPM 406; PHY 220; PGG 222; or equivalents or Consent of Instructor. Human reproductive effects and risk of reproductive disorders, examined from macro- and micro-environmental exposures in community and occupational settings, epidemiologic study designs and analyses. Effective: 2009 Spring Quarter.

SPH 262—Principles of Environmental Health Science (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Principles, approaches and issues related to environmental health. Recognizing, assessing, understanding and controlling the impact of people on their environment and the impact of the environment on the public. Effective: 2008 Summer Session 2.

SPH 264—Public Health Econometrics (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Principles of demand and supply; elasticity; benefits and costs; least squares regression; stepwise regression; economic and statistical significance; fixed and random effects; longitudinal data; non-linear relations; continuous and binary variables; instrumental variables; attrition bias; tobit regression; Two-part cost model. (S/U grading only.) Effective: 2008 Spring Quarter.

SPH 266—Applied Analytic Epidemiology (3)
Laboratory—2 hours; Lecture—2 hours. Prerequisite(s): MPM 404; or Consent of Instructor. Principles and applications in analysis of epidemiologic data. Methods of analyzing stratified and matched data, logistic regression for cohort and case-control studies, Poisson regression, survival-time methods. (Population Health and Reproduction 266) Effective: 2009 Spring Quarter.

SPH 273—Health Services Administration (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. Limited enrollment. Structure and function of public and private medical care. Topics include categories and trends in national medical spending, predictors of patient use, causes of death, managed care, HMOs, Medicare, Medicaid, costs of technology, and medical care in other countries. Effective: 2008 Summer Session 2.

SPH 274—Economic Evaluation in Health Care (3)
Lecture/Lab—3 hours. Prerequisite(s): At least one semester of graduate level Statistics or consent of instructor. Cost-effectiveness/cost-benefit analysis (CE/CBA) methods among various economic evaluation methods. CE/CBA is increasingly used to evaluate alternative choices in public health and clinical practice and to enlighten and inform health policy determinations. Effective: 2012 Fall Quarter.

SPH 276—Critical Assessment in Health Policy and Economics (2)
Lecture/Discussion—2 hours. Course aims to develop critical reading skills of the health policy and health economics literature, mainly following the microeconomic paradigm and analytical techniques. Some basic concepts of micro economic theory will be explained in the class. Effective: 2014 Fall Quarter.

SPH 277—Net Benefit Regression (3)
Lecture/Discussion—3 hours. Prerequisite(s): STA 100 or SPH 244 or MPM 202; or Consent of Instructor. Graduate student standing. Open to graduate students only. Uses regression methods for cost-effectiveness analysis. Focus on methods that create and explain economic information in person-level data. Effective: 2017 Fall Quarter.

SPH 280—Introduction to SAS Programming (3)
Discussion/Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): Introductory statistics course (e.g., MPM 402, STA 102). Introduction to SAS, an integrated software system for data retrieval and management, data manipulation and programming. (Epidemiology (Graduate Group) 280.) Effective: 2016 Fall Quarter.

SPH 290—Topics in Public Health (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Open to students in Master of Public Health program. Key issues and current topics in public health. Course begins in August SSII. Students must enroll in August, then Fall and Winter. The course is a series but grades and units are given at end of each quarter. May be repeated up to 10 time(s). (S/U grading only.) Effective: 2017 Winter Quarter.

SPH 291—Public Health Sciences Doctoral Seminar (1-7)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Seminar to explore research on translational science and rural health; includes presentations of student research in progress. May be repeated up to 6 time(s) when topic differs; with consent of instructor, etc. (S/U grading only.) Effective: 2017 Fall Quarter.

SPH 292A—Public Health Translational Science Rotation (1-7)
Variable—1-7 hours. Prerequisite(s): Ph.D. student in Public Health Sciences or consent of instructor. Public Health Translational Science Rotation for Ph.D. students in Public Health Sciences. May be repeated up to 8 unit(s) with consent of instructor. (S/U grading only.) Effective: 2017 Fall Quarter.

SPH 292B—Public Health Translational Science Rotation (1-7)
Variable—1-3 hours. Prerequisite(s): Consent of Instructor. Open to Ph.D. students in Public Health Sciences. Public Health Translational Science Rotation for Ph.D. students in Public Health Sciences. May be repeated up to 8 unit(s) with consent of instructor. (S/U grading only.) Effective: 2018 Winter Quarter.

SPH 295—International Health (2)
Lecture/Discussion—2 hours. Prerequisite(s): Graduate standing or consent of instructor. Forum for learning health issues and health care systems in other countries. Topics include health care for refugees, the impact of political strife on health, the health care professional in international settings. (S/U grading only.) Effective: 2010 Winter Quarter.

SPH 297—Public Health Practicum (1-16)
Variable—3-32 hours. Prerequisite(s): Consent of Instructor. Open to Master of Public Health students. Practical fieldwork experience in public health. Placement site will vary based on the interest and experience of each student. May be repeated up to 4 time(s). (S/U grading only.) Effective: 2008 Summer Session 2.

SPH 298—Study in Community and International Health (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Graduate student in good academic standing. Study and experience for graduate students in any number of areas in community and international health. (S/U grading only.) Effective: 2008 Summer Session 2.

SPH 299—Research in Community and International Health (1-12)
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Student will work with faculty member in areas of research interest, including but not limited to injury control, international health, health policy, occupational and environmental health, health promotion and wellness, women's health, and health demographics. (S/U grading only.) Effective: 2008 Summer Session 2.

SPH 402—Introductory Medical Spanish (2)
Lecture—2 hours. Prerequisite(s): Medical student or consent of instructor. The vocabulary needed to conduct a basic history and physical examination in Spanish. (H/P/F grading only.) Effective: 2008 Summer Session 2.

SPH 461—Clerkship in Community Health Group Practice (3-9)
Clinical Activity. Prerequisite(s): Third-or fourth-year medical student. Overview of local community health in group practice situations. Students participate in treatment at several clinic sites in Yolo County. Topics include primary care, environmental health, maternal and child health, jail health, and preventive health care for the aged. (S/U grading only.) Effective: 2008 Summer Session 2.

SPH 465—Community Health Preceptorship (3-18)
Clinical Activity—5-40 hours. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing. Participate at state or county health department or other public health organization in on-going investigations into current public health problems, e.g., birth defects, cancer control, diabetes, hypertension, injury control, infectious diseases, aging, Alzheimer's disease, and smoking and tobacco use control. (H/P/F grading only.) Effective: 2010 Spring Quarter.

SPH 466—Occupational and Environmental Medicine Elective (6-12)
Clinical Activity; Laboratory; Variable—6-12 hours. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing. Participate in activities of Occupational and Environmental Health Unit. Major activity is involvement in an epidemiologic research project of the University. Participate in Occupational and Environmental Medicine Clinic at UC Davis Medical Center and other sites, as arranged. (H/P/F grading only.) Effective: 2010 Summer Quarter.

SPH 470—Clinical Selective in Occupational and Environmental Medicine (3-6)
Clinical Activity—9-18 hours. Prerequisite(s): Consent of Instructor. Fourth-year medical student in good academic standing. Outpatient clinical experience in Occupational and Environmental Medicine at UCDMC and other sites, as arranged. Gain experience in evaluating occ/env medical conditions, use of medical literature resources, the worker's compensation system, and toxicological principles. Students may take up to four weeks for six units. (H/P/F grading only.) Effective: 2010 Spring Quarter.

SPH 480—Insights in Occupational and Environmental Medicine (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. First- or second-year medical student in good academic standing. Observe and participate in research and clinical activities in occupational and environmental medicine which include conferences, occupational and environmental medicine clinical activities and field visits. Develop and present small individual research projects. (P/F grading only.) Effective: 2010 Summer Quarter.

SPH 495—International Health (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. Medical student in good academic standing. Forum for learning health issues and health care systems in other countries. Topics include health care for refugees, the impact of political strife on health, the health care professional in international settings. (H/P/F grading only.) Effective: 2009 Spring Quarter.

SPH 496—Current Issues in Public Health (1)
Lecture/Discussion—1 hour. Topical issues in public health. Speakers from the local public health community address issues such as disease control programs, access to care. May be repeated up to 3 time(s). (P/F grading only.) Effective: 2008 Summer Session 2.

SPH 498—Study in Public Health Sciences (1-6)
Variable—3-18 hours. Prerequisite(s): Consent of Instructor. Medical student in good academic standing. Study and experience for medical students in areas in community and international health. May be repeated for credit. (H/P/F grading only.) Effective: 2009 Spring Quarter.

SPH 499—Research in Public Health Sciences (1-9)
Variable. Prerequisite(s): Medical students with consent of instructor. Work with faculty member in areas of research interest, including but not limited to public health, injury control, international health, health policy, occupational and environmental health, health promotion and wellness, women's health, and health demographics. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

SSC Soil Science

Questions pertaining to the following courses should be directed to the instructor, to the Resource Sciences Teaching Center in 1150 Plant and Environmental Sciences Building 530-752-1603.

Courses in SSC:

SSC 010—Soils in Our Environment (3)
Independent Study; Lecture—3 hours. Class size limited to 90 students. Soils in our global ecosystem; soils as natural bodies formed by interactive environmental processes; soil response to use and management; sustainable use of soil resources; role of soils in agricultural and environmental issues; role of soils in our daily lives. GE credit: QL, SE, SL. Effective: 2006 Fall Quarter.

SSC 092—Soil Science Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Work experience off and on campus in soil science. Internship supervised
by a member of the faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

SSC 100—Principles of Soil Science (5)
Laboratory—3 hours; Lecture—3 hours; Term Paper. Prerequisite(s): College-level courses in each of chemistry, physics, biology, and geology recommended. Soil as part of natural and managed ecosystems and landscapes. Solid, liquid, and gas phases and their interactions in the soil. Water, gas and heat movement in soil. Soil biology. Plant nutrient acquisition and use.Soil development, management and use. GE credit: QL, SE, SL, VL. Effective: 2018 Winter Quarter.

SSC 102—Environmental Soil Chemistry (3)
Lecture—3 hours. Prerequisite(s): General chemistry; SSC 100 or equivalent recommended. Soil chemistry processes related to the fate and transport of contaminants in soil. Soil minerals, natural organic matter, surface charge, soil solution chemistry, redox reactions in soil, and sorption of inorganic and organic contaminants. GE credit: QL, SE, SL. Effective: 2018 Winter Quarter.

SSC 105—Field Studies of Soils in California Ecosystems (5)
Prerequisite(s): SSC 100 and SSC 120 or equivalent recommended. Class size limited to a minimum of 10 and a maximum of 24 students. Field-based studies of soils in California ecosystems, away from campus, throughout California. Emphasis on description and classification of soils; relationships among soils, vegetation, geology, and climate; physical, chemical, and biological processes in soils on the landscape; and the role of soils in land use. May be repeated up to 1 time(s). GE credit: QL, SE, SL, VL, WE. Effective: 2005 Summer Special Session.

SSC 107—Soil Physics (5)
Discussion—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): SSC 100; ERS 100; MAT 016A; Or the equivalent of MAT 016A. Physical properties of soil. Principles of water, gas, heat, and solute movement in soil with selected examples related to soil and water management. Influence of soil properties on transfer processes. GE credit: SE. Effective: 1999 Fall Quarter.

SSC 109—Sustainable Nutrient Management (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): SSC 100; Or the equivalent. Availability of nutrients in organic and conventional agricultural, vineyard, orchard and plantation forest soils; management of fertilizers, cover crops, compost, sewage sludge and manures for crop production and to prevent loss to the environment is emphasized. GE credit: OL, QL, SE, SL, VL, WE. Effective: 2008 Spring Quarter.

SSC 111—Soil Microbiology (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): BIS 002C recommended. Major groups of microorganisms in soil, their interrelationships, and their responses to environmental variables. Role of microorganisms in cycling of nutrients. Plant-microbe relationships. Transformations of organic and inorganic pollutants. GE credit: QL, SE, SL, WE. Effective: 2018 Winter Quarter.

SSC 112—Soil Ecology (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): SSC 100 or equivalent recommended. Overview of living constituents of soils, their interactions, importance to, and impact on biogeochemical cycles, decomposition, and soil properties. Practical applications of soil biological diversity are emphasized. GE credit: SE. Effective: 2018 Winter Quarter.

SSC 118—Soils in Land Use and the Environment (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. SSC 100 or equivalent recommended. Soils are considered as elements in land use planning and environmental quality. Topics include: soil survey reports, remote sensing, land capability classification, soil erosion/conservation, waste disposal on soils and soil reclamation. One one-day field trip. GE credit: SE, SL. Effective: 2018 Winter Quarter.

SSC 120—Soil Genesis, Morphology, and Classification (5)
Laboratory—3 hours; Lecture—4 hours. Prerequisite(s): SSC 100; GEL 050 recommended. Recognition and description of soils; chemical, biological and physical processes of soil formation. Factors of soil formation. Interactions of soils with diverse ecosystems. Introduction to soil classification. Practice using soil taxonomy. Practical experience describing soil properties in the field. GE credit: QL, SE, SL, VL. Effective: 1997 Winter Quarter.

SSC 192—Soil Science Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Work experience off and on campus in soil science. Internship supervised by a member of the faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

SSC 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

SSC 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

SSC 202—Topics in Advanced Soil Chemistry (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Consent of Instructor. General chemistry; SSC 100 or equivalent recommended. Restricted to 18 students. Reviews of current research in soil chemistry. Topics include double layer theory; clay mineral and oxide surface chemistry; adsorption on soil surfaces; speciation and modeling of solution ions; solubility and mineral stability diagrams. May be repeated up to 1 time(s) if topic differs. Effective: 2018 Winter Quarter.

SSC 205—Field Studies of Soils in California Ecosystems (5)
Discussion—15 hours; Fieldwork—50 hours; Lecture—5 hours. Prerequisite(s): SSC 100 and SSC 120 or equivalent recommended. Class size limited to 24 students. Field-based soil studies in California ecosystems. Description and classification of soils; relationships among soils, vegetation, geology, and climate; physical, chemical, and biological processes; their role in land use. Similar to course 105; requires additional work for graduate credit. May be repeated up to 1 time(s) if geographic locale changes. Effective: 2006 Spring Quarter.

SSC 208—Soil-Plant Interrelationships (3)
Lecture—3 hours. Prerequisite(s): (SSC 100); PLB 111; or Consent of Instructor. Plant needs, occurrence and reactions of water and mineral nutrients in soils; root systems and their growth in soils; mass flow and diffusion mechanisms in nutrient acquisition; models relating nutrient uptake to soil and plant characteristics;nutrient assimilation and crop quality. Effective: 1997 Winter Quarter.

SSC 211—Advanced Soil Microbiology (3)
Lecture—3 hours. Prerequisite(s): CHE 008A; CHE 008B; SSC 111; BIS 102, BIS 103 or an equivalent course recommended. Microbial metabolism of organic chemicals in soil, both natural and
xenobiotic. Decomposition of organic matter. Kinetics of microbial processes in soil. Effective: 1997 Winter Quarter.

SSC 219—Ecosystem Biogeochemistry (4)
Discussion/Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): Introductory courses in ecology/biology and soils recommended; undergraduates accepted with consent of instructor. Multidisciplinary analysis of energy and nutrient transfers within terrestrial ecosystems. Examination of processes and inter- and intra-system interactions between the atmosphere, biosphere, lithosphere and hydrosphere. Laboratory section uses biogeochemical simulation models to examine case studies. (Ecology 219) Effective: 1997 Winter Quarter.

SSC 220—Pedology (3)
Lecture—3 hours. Prerequisite(s): Consent of Instructor. SSC 120 recommended. Topics selected from studies of soil-forming processes, soil-geomorphic
relations, mineral weathering, new developments in soil classification, and development of pedologic theory. Topics vary from year to year. May be repeated once for credit. May be repeated up to 1 time(s). Effective: 1997 Winter Quarter.

SSC 222—Global Carbon Cycle (3)
Lecture—3 hours. Prerequisite(s): CHE 008A; CHE 008B; MAT 016A; MAT 016B; SSC 100; Or the equivalent of SSC 100. Global carbon cycle from Phanerozoic epoch to modern times. Examination of long and short-term carbon cycles. Transfer of carbon among ocean, land and life with emphasis on humic substance formation, methods of characterization, reactions with organics and soil carbon stabilization. Effective: 2008 Summer Session 1.

SSC 290—Special Topics in Soil Science (1-4)
Seminar—1-4 hours; Variable. Prerequisite(s): Graduate standing. Seminars and critical review of problems, issues, and research in soil science. May be repeated for credit. (S/U grading only.) Effective: 2010 Fall Quarter.

SSC 298—Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Group Study May be repeated for credit when topic differs. (S/U grading only.) Effective: 2014 Spring Quarter.

SSC 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

SSC 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

STA Statistics

Courses in STA:

STA 010—Statistical Thinking (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): Two years of high school algebra. Statistics and probability in daily life. Examines principles of collecting, presenting and interpreting data in order to critically assess results reported in the media; emphasis is on understanding polls, unemployment rates, health studies; understanding probability, risk and odds. GE credit: QL, SE. Effective: 2000 Spring Quarter.

STA 012—Introduction to Discrete Probability (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): Two years of high school algebra. Random experiments; countable sample spaces; elementary probability axioms; counting formulas; conditional probability; independence; Bayes theorem; expectation; gambling problems; binomial, hypergeometric, Poisson, geometric, negative binomial and multinomial models; limiting distributions; Markov chains. Applications in the social, biological, and engineering sciences. GE credit: QL, SE. Effective: 1999 Fall Quarter.

STA 013—Elementary Statistics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Two years of high school algebra or Mathematics D. Descriptive statistics; basic probability concepts; binomial, normal, Student's t, and chi-square distributions. Hypothesis testing and confidence intervals for one and two means and proportions. Regression. Not open for credit for students who have completed course 13V, or higher. GE credit: QL, SE. Effective: 2016 Fall Quarter.

STA 013Y—Elementary Statistics (4)
Lecture—1.5 hours; Web Virtual Lecture—5 hours. Prerequisite(s): Two years of high school algebra or Mathematics D. Descriptive statistics; basic probability concepts; binomial, normal, Student's t, and chi-square distributions. Hypothesis testing and confidence intervals for one and two means and proportions. Regression. Not open for credit for students who have completed course 13, or higher. GE credit: QL, SE. Effective: 2016 Fall Quarter.

STA 032—Gateway to Statistical Data Science (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016B or MAT 021B or MAT 017B Probability concepts; programming in R; exploratory data analysis; sampling distribution; estimation and inference; linear regression; simulations; resampling methods. Alternative to Statistics 13 for students with a background in calculus and programming. Only two units of credit allowed to students who have taken course 13; not open for credit to students who have taken course 100. GE credit: QL, SE. Effective: 2018 Winter Quarter.

STA 090X—Seminar (1-2)
Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. High school algebra. Examination of a special topic in a small group setting. Effective: 1997 Winter Quarter.

STA 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

STA 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2000 Spring Quarter.

STA 100—Applied Statistics for Biological Sciences (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016B or MAT 017B or MAT 021B Descriptive statistics, probability, sampling distributions, estimation, hypothesis testing, contingency tables, ANOVA, regression; implementation of statistical methods using computer package. Only two units credit allowed to students who have taken course courses 13, 32 or 103; not open for credit to students who have taken course 102. GE credit: QL, SE. Effective: 2017 Spring Quarter.

STA 101—Advanced Applied Statistics for the Biological Sciences (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 100 Basic experimental designs, two-factor ANOVA without interactions, repeated measures ANOVA, ANCOVA, random effects vs. fixed effects, multiple regression, basic model building, resampling methods, multiple comparisons, multivariate methods, generalized linear models, Monte Carlo simulations. GE credit: QL, SE. Effective: 2014 Fall Quarter.

STA 103—Applied Statistics for Business and Economics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (STA 013 or STA 013Y or STA 032 or STA 100); (MAT 016B or MAT 017B or MAT 021B) Descriptive statistics; probability; random variables; expectation; binomial, normal, Poisson, other univariate distributions; joint distributions; sampling distributions, central limit theorem; properties of estimators; linear combinations of random variables; testing and estimation; Minitab computing package. Two units credit given to students who have completed course 100. GE credit: QL, SE. Effective: 2018 Winter Quarter.

STA 104—Applied Statistical Methods: Nonparametric Statistics (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 013 or STA 013Y or STA 032 or STA 100 Sign and Wilcoxon tests, Walsh averages. Two-sample procedures. Inferences concerning scale. Kruskal-Wallis test. Measures of association. Chi square and Kolmogorov-Smirnov tests. GE credit: QL, SE. Effective: 2018 Winter Quarter.

STA 106—Applied Statistical Methods: Analysis of Variance (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 013 or STA 013Y or STA 032 or STA 100 Basics of experimental design. One-way and two-way fixed effects analysis of variance models. Randomized complete and incomplete block design. Multiple comparisons procedures. One-way random effects model. GE credit: SE. Effective: 2018 Winter Quarter.

STA 108—Applied Statistical Methods: Regression Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 013 or STA 013Y or STA 032 or STA 100 Simple linear regression, variable selection techniques, stepwise regression, analysis of covariance, influence measures, computing packages. GE credit: QL, SE, SL. Effective: 2018 Winter Quarter.

STA 130A—Mathematical Statistics: Brief Course (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 016C or MAT 017C or MAT 021C Basic probability, densities and distributions, mean, variance, covariance, Chebyshev's inequality, some special distributions, sampling distributions, central limit theorem and law of large numbers, point estimation, some methods of estimation, interval estimation, confidence intervals for certain quantities, computing sample sizes. Only 2 units of credit allowed to students who have taken course 131A. GE credit: QL, SE. Effective: 2018 Winter Quarter.

STA 130B—Mathematical Statistics: Brief Course (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 130A or STA 131A or MAT 135A Transformed random variables, large sample properties of estimates. Basic ideas of hypotheses testing, likelihood ratio tests, goodness-of-
fit tests. General linear model, least squares estimates, Gauss-Markov theorem. Analysis of variance, F-test. Regression and correlation, multiple regression. Selected topics. GE credit: QL, SE. Effective: 2016 Fall Quarter.

STA 131A—Introduction to Probability Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021B; MAT 021C; MAT 022A or MAT 067 Fundamental concepts of probability theory, discrete and continuous random variables, standard distributions, moments and moment-generating functions, laws of large numbers and the central limit theorem. Not open for credit to students who have completed Mathematics 135A. GE credit: QL, SE. Effective: 2018 Winter Quarter.

STA 131B—Introduction to Mathematical Statistics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 131A or MAT 135A; or Consent of Instructor. Sampling, methods of estimation, bias-variance decomposition, sampling distributions, Fisher information, confidence intervals, and some elements of hypothesis testing. GE credit: SE. Effective: 2017 Winter Quarter.

STA 131C—Introduction to Mathematical Statistics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 131B; or Consent of Instructor. Testing theory, tools and applications from probability theory, Linear model theory, ANOVA, goodness-of-fit. GE credit: SE. Effective: 2016 Fall Quarter.

STA 135—Multivariate Data Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (STA 130B or STA 131B); (MAT 022A or MAT 067) Multivariate normal distribution; Mahalanobis distance; sampling distributions of the mean vector and covariance matrix; Hotellings T2; simultaneous inference; one-way MANOVA; discriminant analysis; principal components; canonical correlation; factor analysis. Intensive use of computer analyses and real data sets. GE credit: QL, SE. Effective: 2016 Fall Quarter.

STA 137—Applied Time Series Analysis (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 108 Time series relationships; univariate time series models: trend, seasonality, correlated errors; regression with correlated errors; autoregressive models; autoregressive moving average models; spectral analysis: cyclical behavior and periodicity, measures of periodicity, periodogram; linear filtering; prediction of time series; transfer function models. GE credit: QL, SE. Effective: 2016 Fall Quarter.

STA 138—Analysis of Categorical Data (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (STA 130B or STA 131B) or (STA 106, STA 108) Varieties of categorical data, cross-classifications, contingency tables, tests for independence. Multidimensional tables and log-linear models, maximum likelihood estimation; tests of goodness-of-fit. Logit
models, linear logistic models. Analysis of incomplete tables. Packaged computer programs, analysis of real data. GE credit: QL, SE. Effective: 1997 Winter Quarter.

STA 141A—Fundamentals of Statistical Data Science (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (STA 108 or STA 106); (STA 032 or STA 100 or STA 013 or STA 013Y) Introduction to computing for data analysis and visualization, and simulation, using a high-level language (e.g., R). Computational reasoning, computationally intensive statistical methods, reading tabular and non-standard data. Not open for credit to students who have taken course 141 or course 242. Effective: 2018 Spring Quarter.

STA 141B—Data & Web Technologies for Data Analysis (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 141A Essentials of using relational databases and SQL. Processing data in blocks. Scraping Web pages and using Web services/APIs. Basics of text mining. Interactive data visualization with Web technologies. Computational data workflow and best practices. Statistical methods. Effective: 2018 Winter Quarter.

STA 141C—Big Data & High Performance Statistical Computing (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 141B or (STA 141A, ECS 010) High-performance computing in high-level data analysis languages; different computational approaches and paradigms for efficient analysis of big data; interfaces to compiled languages; R and Python programming languages; high-level parallel computing; MapReduce; parallel algorithms and reasoning. Effective: 2018 Winter Quarter.

STA 144—Sampling Theory of Surveys (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): (STA 130B or STA 131B) or (STA 106, STA 108) Simple random, stratified random, cluster, and systematic sampling plans; mean, proportion, total, ratio, and regression estimators for these plans; sample survey design, absolute and relative error, sample size selection, strata construction; sampling and nonsampling sources of error. GE credit: QL, SE. Effective: 2016 Fall Quarter.

STA 145—Bayesian Statistical Inference (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 130B or STA 131B Subjective probability, Bayes Theorem, conjugate priors, non-informative priors, estimation, testing, prediction, empirical Bayes methods, properties of Bayesian procedures, comparisons with classical procedures, approximation techniques, Gibbs sampling, hierarchical Bayesian analysis, applications, computer implemented data analysis. GE credit: QL, SE. Effective: 2016 Fall Quarter.

STA 160—Practice in Statistical Data Science (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 106; STA 108; (STA 130B or STA 131B); (STA 141 or STA 141A) Principles and practice of interdisciplinary, collaborative data analysis; complete case study review and team data analysis project. Effective: 2016 Spring Quarter.

STA 190X—Seminar (1-2)
Seminar—1-2 hours. Prerequisite(s): STA 013 or STA 013Y or STA 032 or STA 100 or STA 103 In-depth examination of a special topic in a small group setting. Effective: 2018 Spring Quarter.

STA 192—Internship in Statistics (1-12)
Internship—3-36 hours; Term Paper. Prerequisite(s): Consent of Instructor. Upper division standing. Work experience in statistics. (P/NP grading only.) Effective: 1997 Winter Quarter.

STA 194HA—Special Studies for Honors Students (4)
Independent Study—12 hours. Prerequisite(s): Senior qualifying for honors. Directed reading, research and writing, culminating in the completion of a senior honors thesis or project under direction of a faculty advisor. GE credit: SE. Effective: 1997 Winter Quarter.

STA 194HB—Special Studies for Honors Students (4)
Independent Study—12 hours. Prerequisite(s): Senior qualifying for honors. Directed reading, research and writing, culminating in the completion of a senior honors thesis or project under direction of a faculty advisor. GE credit: SE. Effective: 1997 Winter Quarter.

STA 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

STA 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

STA 200A—Introduction to Probability Theory (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): MAT 021A; MAT 021B; MAT 021C; MAT 022A; Consent of Instructor. Fundamental concepts of probability theory, discrete and continuous random variables, standard distributions, moments and moment-generating functions, laws of large numbers and the central limit theorem. Effective: 2018 Winter Quarter.

STA 200B—Introduction to Mathematical Statistics I (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 200A; or Consent of Instructor. Sampling, methods of estimation, bias-variance decomposition, sampling distributions, Fisher information, confidence intervals, and some elements of hypothesis testing. Effective: 2018 Winter Quarter.

STA 200C—Introduction to Mathematical Statistics II (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 200B; or Consent of Instructor. Testing theory, tools and applications from probability theory, Linear model theory, ANOVA, goodness-of-fit. No credit to students who have taken course 131C. Effective: 2018 Spring Quarter.

STA 201—SAS Programming for Statistical Analysis (3)
Discussion/Laboratory—1 hour; Lecture—2 hours. Prerequisite(s): Introductory, upper division statistics course; some knowledge of vectors and matrices; STA 106 or STA 108 or the equivalent suggested. Introductory SAS language, data management, statistical applications, methods. Includes basics, graphics, summary statistics, data sets, variables and functions, linear models, repetitive code, simple macros, GLIM and GAM, formatting output, correspondence analysis, bootstrap. Prepare SAS base programmer certification exam. Effective: 2013 Fall Quarter.

STA 205—Statistical Methods for Research with SAS (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): An introductory upper division statistics course and some knowledge of vectors and matrices; STA 100, or STA 102, or STA 103 suggested or the equivalent. Focus on linear statistical models widely used in scientific research. Emphasis on concepts, methods and data analysis using SAS. Topics include simple and multiple linear regression, polynomial regression, diagnostics, model selection, variable transformation, factorial designs and ANCOVA. Effective: 2008 Fall Quarter.

STA 206—Statistical Methods for Research - I (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): Introductory statistics course; some knowledge of vectors and matrices. Focus on linear statistical models. Emphasis on concepts, method and data analysis; formal mathematics kept to minimum. Topics include simple and multiple linear regression, polynomial regression, diagnostics, model selection, factorial designs and analysis of covariance. Use of professional level software. Effective: 2013 Fall Quarter.

STA 207—Statistical Methods for Research II (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 206; Knowledge of vectors and matrices. Linear and nonlinear statistical models emphasis on concepts, methods/data analysis using professional level software; formal mathematics kept to minimum. Topics include linear mixed models, repeated measures, generalized linear models, model selection, analysis of missing data, and multiple testing procedures. Effective: 2013 Fall Quarter.

STA 208—Statistical Methods in Machine Learning (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 206; STA 207; STA 135; Or their equivalents. Focus on linear and nonlinear statistical models. Emphasis on concepts, methods, and data analysis; formal mathematics kept to minimum. Topics include resampling methods, regularization techniques in regression and modern classification, cluster analysis and dimension reduction techniques. Use professional level software. Effective: 2013 Fall Quarter.

STA 209—Optimization for Big Data Analytics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 200A; STA 208 Optimization algorithms for solving problems in statistics, machine learning, data analytics. Review computational tools for implementing optimization algorithms (gradient descent, stochastic gradient descent, coordinate descent, Newton’s method.) Effective: 2018 Spring Quarter.

STA 222—Biostatistics: Survival Analysis (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 131C Incomplete data; life tables; nonparametric methods; parametric methods; accelerated failure time models; proportional hazards models; partial likelihood; advanced topics. (Biostatistics 222.) Effective: 2002 Fall Quarter.

STA 223—Biostatistics: Generalized Linear Models (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 131C Likelihood and linear regression; generalized linear model; Binomial regression; case-control studies; dose-response and bioassay; Poisson regression; Gamma regression; quasi-likelihood models; estimating equations; multivariate GLMs. (Biostatistics 223.) Effective: 2002 Fall Quarter.

STA 224—Analysis of Longitudinal Data (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): ((STA 222, STA 223) or (BST 222, BST 223)); STA 232B; or Consent of Instructor. Standard and advanced methodology, theory, algorithms, and applications relevant for analysis of repeated measurements and longitudinal data in biostatistical and statistical settings. (Biostatistics 224.) Effective: 2005 Spring Quarter.

STA 225—Clinical Trials (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 223 or BST 223; or Consent of Instructor. Basic statistical principles of clinical designs, including bias, randomization, blocking, and masking. Practical applications of widely-used designs, including dose-finding, comparative and cluster randomization designs. Advanced statistical procedures for analysis of data collected in clinical trials. (Biostatistics 225.) Effective: 2005 Spring Quarter.

STA 226—Statistical Methods for Bioinformatics (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 131C; or Consent of Instructor. Data analysis experience recommended. Standard and advanced statistical methodology, theory, algorithms, and applications relevant to the analysis of -omics data. (Biostatistics 226.) Effective: 2007 Fall Quarter.

STA 231A—Mathematical Statistics I (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 131A; STA 131B; STA 131C; MAT 025; MAT 125A; Or equivalent of MAT 025 and MAT 125A. First part of three-quarter sequence on mathematical statistics. Emphasizes foundations. Topics include basic concepts in asymptotic theory, decision theory, and an overview of methods of point estimation. Effective: 2008 Summer Session 1.

STA 231B—Mathematical Statistics II (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 231A Second part of a three-quarter sequence on mathematical statistics. Emphasizes: hyposthesis testing (including multiple testing) as well as theory for linear models. Effective: 2008 Summer Session 1.

STA 231C—Mathematical Statistics III (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 231A; STA 231B Third part of three-quarter sequence on mathematical statistics. Emphasizes large sample theory and their applications. Topics include statistical functionals, smoothing methods and optimization techniques relevant for statistics. Effective: 2008 Summer Session 1.

STA 232A—Applied Statistics I (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 106; STA 108; STA 131A; STA 131B; STA 131C; MAT 167 Estimation and testing for the general linear model, regression, analysis of designed experiments, and missing data techniques. Effective: 2011 Fall Quarter.

STA 232B—Applied Statistics II (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 106; STA 108; STA 131A; STA 131B; STA 131C; STA 232A; MAT 167 Alternative approaches to regression, model selection, nonparametric methods amenable to linear model framework and their applications. Effective: 2011 Fall Quarter.

STA 232C—Applied Statistics III (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 106; STA 108; STA 131C; STA 232B; MAT 167 Multivariate analysis: multivariate distributions, multivariate linear models, data analytic methods including principal component, factor, discriminant, canonical correlation and cluster analysis. Effective: 2011 Fall Quarter.

STA 233—Design Experiments (3)
Lecture—3 hours. Prerequisite(s): STA 131C Topics from balanced and partially balanced incomplete block designs, fractional factorials, and response surfaces. Effective: 1997 Winter Quarter.

STA 235A—Probability Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): (MAT 125B, MAT 135A) or STA 131A; or Consent of Instructor. Measure-theoretic foundations, abstract integration, independence, laws of large numbers, characteristic functions, central limit theorems. Weak convergence in metric spaces, Brownian motion, invariance principle. Conditional expectation. Topics selected from: martingales, Markov chains, ergodic theory. (Mathematics 235A.) Effective: 2007 Spring Quarter.

STA 235B—Probability Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): STA 235A or MAT 235A; or Consent of Instructor. Measure-theoretic foundations, abstract integration, independence, laws of large numbers, characteristic functions, central limit theorems. Weak convergence in metric spaces, Brownian motion, invariance principle. Conditional expectation. Topics selected from: martingales, Markov chains, ergodic theory. (Mathematics 235B.) Effective: 2008 Spring Quarter.

STA 235C—Probability Theory (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): STA 235B or MAT 235B; or Consent of Instructor. Measure-theoretic foundations, abstract integration, independence, laws of large numbers, characteristic functions, central limit theorems. Weak convergence in metric spaces, Brownian motion, invariance principle. Conditional expectation. Topics selected from: martingales, Markov chains, ergodic theory. (Mathematics 235C.) Effective: 2008 Spring Quarter.

STA 237A—Time Series Analysis (4)
Lecture—3 hours; Term Paper. Prerequisite(s): STA 131B; Or the equivalent of STA 131B. Advanced topics in time series analysis and applications. Models for experimental data, measures of dependence, large-sample theory, statistical estimation and inference. Univariate and multivariate spectral analysis, regression, ARIMA models, state-space models, Kalman filtering. Effective: 1999 Fall Quarter.

STA 237B—Time Series Analysis (4)
Lecture—3 hours; Term Paper. Prerequisite(s): STA 131B; STA 237A; Or the equivalent of STA 131B. Advanced topics in time series analysis and applications. Models for experimental data, measures of dependence, large-sample theory, statistical estimation and inference. Univariate and multivariate spectral analysis, regression, ARIMA models, state-space models, Kalman filtering. Effective: 1999 Fall Quarter.

STA 238—Theory of Multivariate Analysis (4)
Lecture—3 hours; Term Paper. Prerequisite(s): STA 131B; STA 135 Multivariate normal and Wishart distributions, Hotellings T-Squared, simultaneous inference, likelihood ratio and union intersection tests, Bayesian methods, discriminant analysis, principal component and factor analysis, multivariate clustering, multivariate regression and analysis of variance, application to data. Effective: 1999 Fall Quarter.

STA 240A—Nonparametric Inference (4)
Lecture—3 hours; Term Paper. Prerequisite(s): STA 231C; STA 235A, STA 235B, STA 235C recommended. Comprehensive treatment of nonparametric statistical inference, including the most basic materials from classical nonparametrics, robustness, nonparametric estimation of a distribution function from
incomplete data, curve estimation, and theory of resampling methodology. Effective: 2000 Winter Quarter.

STA 240B—Nonparametric Inference (4)
Lecture—3 hours; Term Paper. Prerequisite(s): STA 231C; STA 235A, STA 235B, STA 235C recommended. Comprehensive treatment of nonparametric statistical inference, including the most basic materials from classical nonparametrics, robustness, nonparametric estimation of a distribution function from
incomplete data, curve estimation, and theory of re-sampling methodology. Effective: 2000 Winter Quarter.

STA 241—Asymptotic Theory of Statistics (4)
Lecture—3 hours; Term Paper. Prerequisite(s): STA 231C; STA 235A, STA 235B, STA 235C desirable. Topics in asymptotic theory of statistics chosen from weak convergence, contiguity, empirical processes, Edgeworth expansion, and semiparametric inference. Effective: 2000 Spring Quarter.

STA 242—Introduction to Statistical Programming (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 130A; STA 130B; or equivalent of STA 130A and STA 130B. Essentials of statistical computing using a general-purpose statistical language. Topics include algorithms; design; debugging and efficiency; object-oriented concepts; model specification and fitting; statistical visualization; data and text processing; databases; computer systems and platforms; comparison of scientific programming languages. Effective: 2009 Winter Quarter.

STA 243—Computational Statistics (4)
Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): (STA 130A, STA 130B); (MAT 067 or MAT 167); Or equivalent of STA 130A and 130B, or equivalent of MAT 167 or MAT 067. Numerical analysis; random number generation; computer experiments and resampling techniques (bootstrap, cross validation); numerical optimization; matrix decompositions and linear algebra computations; algorithms (markov chain monte carlo, expectation-maximization); algorithm design and efficiency; parallel and distributed computing. Effective: 2009 Winter Quarter.

STA 250—Topics in Applied and Computational Statistics (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): STA 131A; STA 232A recommended, not required. Resampling, nonparametric and semiparametric methods, incomplete data analysis, diagnostics, multivariate and time series analysis, applied Bayesian methods, sequential analysis and quality control, categorical data analysis, spatial and image analysis, computational biology, functional data analysis, models for correlated data, learning theory. May be repeated for credit with consent of graduate advisor. Effective: 2006 Spring Quarter.

STA 251—Topics in Statistical Methods and Models (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STA 231B; Or the equivalent of STA 231B. Topics may include Bayesian analysis, nonparametric and semiparametric regression, sequential analysis, bootstrap, statistical methods in high dimensions, reliability, spatial processes, inference for stochastic process, stochastic methods in finance, empirical processes, change-point problems, asymptotics for parametric, nonparametric and semiparametric models, nonlinear time series, robustness. May be repeated for credit if topics differ; only with consent of the graduate advisor. Effective: 2002 Fall Quarter.

STA 252—Advanced Topics in Biostatistics (4)
Discussion/Laboratory—1 hour; Lecture—3 hours. Prerequisite(s): (STA 222 or BST 222); (STA 223 or BST 223) Biostatistical methods and models selected from the following: genetics, bioinformatics and genomics; longitudinal or functional data; clinical trials and experimental design; analysis of environmental data; dose-response, nutrition and toxicology; survival analysis; observational studies and epidemiology; computer-intensive or Bayesian methods in biostatistics. May be repeated for credit with consent of advisor when topic differs. (Biostatistics 252.) Effective: 2002 Fall Quarter.

STA 260—Statistical Practice and Data Analysis (3)
Lecture/Discussion—3 hours. Prerequisite(s): STA 207 or STA 232B; Working knowledge of advanced statistical software and the equivalent of STA 207 or STA 232B. Open to students enrolled in the graduate program in Statistics or Biostatistics, as the class also serves to provide professional service to clients and collaborators who work with the students. Principles and practice of interdisciplinary collaboration in statistics, statistical consulting, ethical aspects, and basics of data analysis and study design. Emphasis on practical consulting and collaboration of statisticians with clients and scientists under instructor supervision. May be repeated up to 1 time(s). Effective: 2014 Fall Quarter.

STA 280—Orientation to Statistical Research (2)
Seminar—2 hours. Prerequisite(s): Consent of Instructor. Guided orientation to original statistical research papers, and oral presentations in class of such papers by students under the supervision of a faculty member. May be repeated once for credit. May be repeated up to 1 time(s). (S/U grading only.) Effective: 1999 Spring Quarter.

STA 290—Seminar in Statistics (1-6)
Variable. Prerequisite(s): Consent of Instructor. Seminar on advanced topics in probability and statistics. (S/U grading only.) Effective: 1997 Winter Quarter.

STA 292—Graduate Group in Statistics Seminar (1-2)
Seminar—1-2 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Advanced study in various fields of statistics with emphasis in applied topics, presented by members of the Graduate Group in Statistics and other guest speakers. (S/U grading only.) Effective: 1997 Fall Quarter.

STA 298—Directed Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Graduate standing. Special topics in Statistics appropriate for study at the graduate level. May be repeated for credit. Effective: 2004 Spring Quarter.

STA 299—Individual Study (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

STA 299D—Dissertation Research (1-12)
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. Advancement to candidacy for Ph.D. Research in Statistics under the supervision of major professor. May be repeated for credit. (S/U grading only.) Effective: 2004 Spring Quarter.

STA 390—Methods of Teaching Statistics (2)
Laboratory—1 hour; Lecture/Discussion—1 hour. Prerequisite(s): Graduate standing. Practical experience in methods/problems of teaching statistics at university undergraduate level. Lecturing techniques, analysis of tests and supporting material, preparation and grading of examinations, and use of statistical software. Emphasis on practical training. May be repeated for credit. (S/U grading only.) Effective: 2004 Spring Quarter.

STA 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

STA 401—Methods in Statistical Consulting (3)
Discussion—1 hour; Lecture—3 hours. Students must be enrolled in the graduate program in Statistics or Biostatistics. Introduction to consulting, in-class consulting as a group, statistical consulting with clients, and in-class discussion of consulting problems. Clients are drawn from a pool of University clients. May be repeated for credit with consent of graduate advisor. (S/U grading only.) Effective: 2006 Spring Quarter.

STH Social Theory & Comparative History

Courses in STH:

STH 250—Research in Social Theory and Comparative History (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Admission to Social Theory and Comparative History Designated Emphasis. Theoretically informed research in comparative history. Students read exemplary works and learn to frame their own research projects. Presentations include Center for History, Society, and Culture faculty and visitors discussing current research. Effective: 1997 Winter Quarter.

STH 290—Advanced Topics in Social Theory and Comparative History (4)
Seminar—3 hours; Term Paper. Prerequisite(s): HIS 204 or SOC 242A; and Consent of Instructor. Interdisciplinary study of particular substantive problems in social theory and comparative history. Topics vary. Effective: 1997 Winter Quarter.

STH 295—Advanced Group Research in Social Theory and Comparative History (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Participation in research workshops sponsored by the Center for Comparative Research for History, Society, and Culture. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

STH 296—Theory and Society Journal Editorial Workshop (1-4)
Independent Study—3 hours; Workshop—1 hour. Reading and offering workshop critiques of papers submitted for publication. Reading and discussion of other relevant work in history and the social science. May be repeated up to 36 unit(s) with consent of instructor. (S/U grading only.) Effective: 2000 Fall Quarter.

STS Science and Technology Studies

Courses in STS:

STS 001—Introduction to Science, Technology and Medicine Studies (4)
Discussion—1 hour; Lecture—3 hours. History, philosophy, sociology, politics, and cultural studies of science, technology, and medicine. Emphasis on a broad range of perspectives. GE credit: SS, WE. Effective: 1998 Fall Quarter.

STS 002—Introduction to the History of Science and Technology (4)
Discussion—1 hour; Lecture—3 hours. Introduction to topics and methods of the history of science and technology. Emphasis on understanding the role of science and technology in the modern world through a long-term historical perspective. (History 002.) GE credit: AH, SL, SS, WC, WE. Effective: 2017 Fall Quarter.

STS 011—Science on Trial: Law, Science, and Technology in the United States (4)
Lecture/Discussion—3 hours; Term Paper. Relationships among law, technology, and science. Scientific evidence and testimony, biology education, patenting, and sterilization. GE credit: ACGH, SS. Effective: 2018 Spring Quarter.

STS 020—Methods in Science, Technology and Medicine Studies (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): STS 001 recommended. Methodological issues concerning the historical, philosophical, sociological, ethical, and political analysis of science, technology, and medicine. Detailed case studies to illustrate different methods of analysis. GE credit: SS, WE. Effective: 1998 Fall Quarter.

STS 032—Drugs, Science and Culture (4)
Discussion—1 hour; Lecture—3 hours. Drugs, politics, science, society in a cultural perspective: emphasis on roles of science, government and the media in shifting attitudes toward alcohol, marijuana, Prozac and other pharmaceuticals; drug laws, war on drugs and global trade in sugar, opium, cocaine. (Anthropology 32.) GE credit: SS, VL, WE. Effective: 2008 Fall Quarter.

STS 040A—Media History 1, Gutenberg to Oppenheimer (4)
Discussion—1 hour; Extensive Writing; Film Viewing—2 hours; Lecture—3 hours. History of Media to 1945, with particular focus on mechanically reproduced mass media technologies including the printing press, the newspaper, photography, cinema, radio and early computing technology. Analysis of inter-related cultural and political topics. (Cinema and Technocultural Studies 40A.) GE credit: AH, OL, SS, VL, WE. Effective: 2014 Fall Quarter.

STS 040B—Media History 2 1945-Present (4)
Discussion—1 hour; Extensive Writing; Film Viewing—2 hours; Lecture—3 hours. Prerequisite(s): STS 040A History of media from 1945 to present, with particular focus on the development of the computer, digital network and internet technologies in the context of other media infrastructures like radio, television and satellite networks. Analysis of inter-related cultural/political topics. (Cinema & Technocultural Studies 040B.) GE credit: AH, OL, SS, VL, WE. Effective: 2015 Winter Quarter.

STS 050—Ancient Science (4)
Discussion—1 hour; Lecture—3 hours. Study of science in ancient Greece and Rome; consideration of its social context; concentration on the basic concepts of physics the world of medicine and biology the history of mathematics and the practices of astronomy astrology and meteorology. (Classics 50.) GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

STS 051—Ancient Medicine (4)
Discussion—1 hour; Lecture—3 hours. Medicine in ancient Greece and Rome; physiological conceptions of the body within scientific and social frameworks; exploration of sanitation technology and health in antiquity; medical treatment of the female body; medicine and the economy. (Classics 051.) GE credit: AH, WC, WE. Effective: 2016 Winter Quarter.

STS 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Work experience off and on campus in all subject areas offered in the program in Science & Technology Studies under the supervision of a member of the faculty. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2006 Fall Quarter.

STS 098—Directed Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) GE credit: SS. Effective: 2006 Fall Quarter.

STS 099—Special Study for Undergraduates (1-5)
Variable—3-15 hours. (P/NP grading only.) Effective: 2006 Fall Quarter.

STS 101—Introduction to Data Studies (4)
Lecture/Discussion—4 hours. Introduction to basic data science concepts, defining problems, clarifying questions, identifying stakeholders, caring for and cleaning data, interviewing techniques, structuring presentations, use of Excel for data problems. GE credit: SS. Effective: 2017 Spring Quarter.

STS 108—Intellectual Property in Science (4)
Lecture/Discussion—4 hours. Prerequisite(s): STS 001; Or other Social Science or Humanities writing course. Historical and conceptual framework for contemporary debates about intellectual property and science. Topics include US patent system and copyright law, interaction between patents and industrial policy, credit in academic and industrial science, role of IP in global knowledge politics. GE credit: ACGH, SS, WE. Effective: 2011 Spring Quarter.

STS 109—Visualization in Science: A Critical Introduction (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STS 001 or STS 020 or ANT 002 recommended. Anthropological approaches to scientific visualization techniques, informatics, simulations. Examination of different visualization techniques toward understanding the work involved in producing them, critical assessment of their power and limits, especially when visualizations are used socially to make claims. (Anthropology 109.) GE credit: SS, VL, WE. Effective: 2016 Fall Quarter.

STS 110—Computing, Data, & Law in the United States (4)
Lecture/Discussion—3 hours; Term Paper. Introduction to the problems in American law and policy borne out of the creation and use of information technologies. Topics include intellectual property, corporate law, privacy, and emerging problems surrounding big data. GE credit: ACGH, SS, WE. Effective: 2018 Winter Quarter.

STS 112—Visualizing Society with Data (4)
Lecture/Lab—3 hours; Term Paper. Analysis and visualization of historical and contemporary data about populations and societies using R. Critical exploration of visual communication of information about people over time and critical assessment of role of data collection and analysis in societies . GE credit: DD, QL, SS. Effective: 2018 Winter Quarter.

STS 113—Business and Technology in the United States: From Electricity to E-Commerce (4)
Lecture/Discussion—3 hours; Term Paper. Historical introduction to the joint development of business and technology in the United States from the late nineteenth century to the present day. GE credit: ACGH, SS, WE. Effective: 2018 Spring Quarter.

STS 120—Religion, Magic and Science (4)
Extensive Writing; Lecture—3 hours. Religion, magic, and science from the middle ages to the present. Contrast between modern scientific methodology and religious and magical thinking. (RST 120) GE credit: AH, OL, VL, WC. Effective: 2005 Fall Quarter.

STS 121—Special Topics in Medical Anthropology (4)
Lecture/Discussion—4 hours. Prerequisite(s): ANT 002 recommended. Introduction to critical medical anthropology. Topics include anthropological analysis of bio-medicine, psychiatry, systems of knowledge and healing, the body, emotions, and clinical encounters in a cross-cultural perspective. (Anthropology 121.) GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

STS 122—Health and Medical Technologies (4)
Lecture/Discussion—3 hours; Term Paper. Critical/historical examination of medical technologies: imaging, pharmaceuticals, genetics, implants/devices. Exploration of mutually constitutive relationship between health, medical technologies, social difference (race/gender/class/sexuality). GE credit: DD, SS. Effective: 2018 Winter Quarter.

STS 129—Health and Medicine in a Global Context (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): ANT 002 recommended. Recent works in medical anthropology and the science studies of medicine dealing with social and cultural aspects of global health issues such as AIDS, pandemics, clinical trials, cultural differences in illnesses, diabetes, organ trafficking, medical technologies, illness narratives, and others. (Anthropology 129.) GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

STS 130A—From Natural History to the History of Nature (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): HIS 135A recommended. Evolution and demise of natural history as a discipline from Aristotle
to Linnaeus. Considers ancient views of nature and its Renaissance rediscovery; the emergence of biology, botany, geology, and zoology; the history of taxonomy and classification. GE credit: AH, SE, WE. Effective: 1997 Winter Quarter.

STS 130B—History of Modern Biology (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): STS 130A recommended. Development of modern biology from pre-Darwinian roots to the present. Considers emergence of modern biological specialities and consolidation of biological theory around evolutionary ideas. History of allied fields
such as genetics, paleontology, embryology, ecology, systematics and molecular biology. GE credit: AH, SE, WE. Effective: 1997 Winter Quarter.

STS 131—Darwin (4)
Lecture—3 hours; Term Paper. Prerequisite(s): Upper division standing or consent of instructor. Students will explore the life and times of Charles Darwin and will trace the development of evolutionary thinking before and after the Origin of Species to appreciate its place in Victorian society and in the corpus of Darwins thought. GE credit: AH, SE, WE. Effective: 1997 Winter Quarter.

STS 150—Gender and Science (4)
Lecture/Discussion—3 hours; Term Paper. An interdisciplinary approach to the relations between gender and science. Topics include the biological and cultural construction of sexual difference, the role of women as practitioners of science, and feminist approaches to science. GE credit: ACGH, DD, SS, WE. Effective: 1997 Winter Quarter.

STS 151—Media Theory (5)
Discussion—1 hour; Extensive Writing; Film Viewing—3 hours; Lecture—2 hours. Critical and theoretical approaches to the emergence of new technologies since the invention of photography. Examine various approaches to media (formalist, semiotic, structuralist, Frankfurt School, cybernetics, visual and gamer theory). (Cinema and Technocultural Studies 150.) GE credit: AH, OL, SS, VL, WE. Effective: 2014 Fall Quarter.

STS 152—Sounding Data: Critical Approaches to Sonification (4)
Lecture/Discussion—3 hours; Term Paper/Discussion. Critical and creative approaches to auditory data and display in art, science, and technology. Practical introduction to sonification techniques through sound studies and sensory ethnography. Heuristic listening and collaborative sound design. GE credit: SS, WE. Effective: 2017 Spring Quarter.

STS 160—Ghosts of the Machine: How Technology Rewires our Senses (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Historical, aesthetic and critical approaches to how information technologies produced ghost effects or a sense of terror in response to new media like the photograph, gramophone, film, typewriter, computer, Turing Machine. Focus on technological media transforms sense perception. (Technocultural Studies 160.) GE credit: ACGH, AH, SS, VL, WE. Effective: 2013 Fall Quarter.

STS 161—Time: Mechanism and Measurement (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): STS 001 Cultural concepts of time; units and instruments of time measurement; historical differences in the social organization of time; and time measurement in twentieth-century science. GE credit: SS, WE. Effective: 2005 Fall Quarter.

STS 162—Surveillance Technologies and Social Media (4)
Film Viewing—3 hours; Lecture—3 hours; Term Paper. Prerequisite(s): STS 020 or TCS 001 Study of the ubiquitous presence of CCTV, face recognition software, global tracking systems, biosensors, and data mining practices that have made surveillance part of our daily life. Exploration of the boundary between security and control, information and spying. (Cinema & Technocultural Studies 162.) GE credit: ACGH, AH, OL, SS, VL, WE. Effective: 2015 Winter Quarter.

STS 163—History of Communication Technologies (4)
Lecture/Discussion—3 hours; Term Paper. History of communication technologies from the late Middle Ages to the 20th century. Questions of technology, knowledge, power and culture. Particular attention to questions about information and truth. GE credit: SS, WE. Effective: 2005 Fall Quarter.

STS 164—Writing Science (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): STS 001 or ENL 003; Or equivalent. Texts and writing practices in the production of scientific knowledge. Surveys the literary structure of scientific arguments; history of scientific genres; rhetoric and semiotics in scientific culture; graphical systems in the experimental laboratory; narratives of science, including science fiction. (English 164.) GE credit: AH, SL, WE. Effective: 2011 Fall Quarter.

STS 165—Built Environments (4)
Extensive Writing; Lecture—3 hours. Built environments, which are designed to support forms of life. Their role as carriers of cultural memory and in turning knowledge of nature into social assets. Historical constellations of knowledge, social order, and power. GE credit: SS. Effective: 2005 Spring Quarter.

STS 172—Video Games and Culture (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): STS 001 or TCS 001 or ENL 003; Or equivalent of any. Critical approaches to the study of video games, focusing on formal, historical, and cultural modes of analysis. History of software and hardware in North American and global contexts. Relations of games to society, politics, economics, literature, media, and the arts. (Cinema and Technocultural Studies 172 and English 172.) GE credit: ACGH, AH, SS, VL. Effective: 2014 Fall Quarter.

STS 173—Science Fiction (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): STS 001 or ENL 003; Or equivalent. The literary modes and methods of science fiction. Representative texts, authors, and themes of the genre - e.g., time travel, alternative universes, and utopias. Relations of science fiction to science, philosophy, and culture. (English 173.) GE credit: AH, WE. Effective: 2008 Winter Quarter.

STS 175—Laboratory Studies Lab (4)
Discussion/Laboratory—4 hours. Prerequisite(s): Upper division standing or consent of instructor. Hands-on training in Science and Technology Studies fieldwork, interviewing, archival research and data analysis. Review of laboratory studies literature, informed consent procedures, ethics, and care of the data. Individual and group projects possible. GE credit: SS, WE. Effective: 2011 Fall Quarter.

STS 176—Sociology of Knowledge, Science, and Scientific Knowledge (4)
Lecture—3 hours; Term Paper/Discussion—1 hour. Prerequisite(s): SOC 001, SOC 002, or SOC 003 recommended. Social, cultural, and historical dimensions of knowledge, especially scientific knowledge. Problems, methods, and theory in sociology of scientific knowledge. Laboratory and historical case studies. Scientific and technical knowledge in institutional and organizational contexts. (Sociology 176.) GE credit: SS. Effective: 2016 Fall Quarter.

STS 180—Topics in History and Philosophy of Science (4) ***Review all entries***
Seminar—3 hours; Term Paper. Prerequisite(s): Course in History and Philosophy of Science or other course-work relevant to topic. In depth treatment of selected topis in the history and philosophy of science. Possible topics include history of modern physics, history of molecular biology, science and society, science and power, scientific explanation, technology and culture, theory testing. May be repeated for credit consent of instructor. GE credit: SS. Effective: 2004 Fall Quarter.

STS 180—Topics in Science and Technology Studies (4) ***Review all entries***
Seminar—3 hours; Term Paper. Prerequisite(s): Course in Science and Technology Studies or other course-work relevant to topic. In-depth treatment of selected topics in anthropology, history, philosophy, and sociology of science and related fields. Possible topics include science and society, science and power, scientific explanation, technology and culture, theory testing. May be repeated for credit when content varies. GE credit: SS. Effective: 2018 Fall Quarter.

STS 190—Seminar in Science, Technology and Medicine Studies (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): Open to junior and senior Science and Technology Studies majors only. Intensive reading, discussion, research and writing by small groups in
selected topics of science, technology, and medicine studies scholarship. Emphasis on individual research projects. Effective: 1998 Fall Quarter.

STS 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Work experience off and on campus in all subject areas offered in the program in Science & Technology Studies under the supervision of a member of the faculty. May be repeated up to 3 time(s) for up to 12 units of credit. (P/NP grading only.) Effective: 2006 Fall Quarter.

STS 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

STS 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

STS 200—Theories and Methods in Science & Technology Studies (4)
Seminar—3 hours; Term Paper. Theories and methods of Science & Technology Studies as a field of critical and empirical scholarship, and examination of various contexts in which STS has emerged worldwide. May be repeated up to 1 time(s) with consent of instructor. Effective: 2014 Fall Quarter.

STS 210—Digital Technologies: History and Theory (4)
Discussion—3 hours; Term Paper. Introduction to the history and theory of digital technologies. Human-machine interaction, cybernetics, software studies, and global networking. Effective: 2018 Spring Quarter.

STS 250—History and Philosophy of Science (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Interdisciplinary seminar in the history and philosophy of science. Focuses on issues such as historiography, methodology, and the conceptual foundations of science. May be repeated for credit with consent of instructor. May be repeated for credit. Effective: 1997 Winter Quarter.

STS 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

STS 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

STS 396—Teaching Assitant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

SUR Med - Surgery

Course in SUR:

SUR 099—Cardiovascular Tissue Engineering Research (1-5)
Laboratory—3-15 hours. Multidisciplinary research in cardiovascular tissue engineering and regeneration for acquired and congenital cardiovascular disease. Effective: 2011 Summer Session 1.

SUR 192—Internship in General Surgery (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in general surgery and related fields. (P/NP grading only.) Effective: 1997 Winter Quarter.

SUR 199—Special Study in General Surgery for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Advanced undergraduate student with consent of instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

SUR 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 1997 Winter Quarter.

SUR 430—Surgery Clerkship (12)
Clinical Activity—45 hours. Prerequisite(s): Approval by School of Medicine Committee on Student Progress. Eight week general surgery clerkship includes GI, Burn, Oncology, Plastics, Vascular Cardiothoracic, consult, transplant and trauma. Clerkship assignments are at UCDMC. Daily core material presentations and reading assignments. Student involvement includes work-up and care of surgical patients. (H/P/F grading only.) Effective: 2001 Summer Quarter.

SUR 430F—SJVP Surgery Clerkship at UCSF (6-12)
Clinical Activity—45 hours. Prerequisite(s): Approval by School of Medicine Committee on Student Progress. General surgery clerkship includes GI, Burn, Oncology, Plastics, Vascular Cardiothoracic, consult, transplant and trauma. Clerkship assignments are at UCSF Fresno. Student involvement includes work-up and care of surgical patients. (H/P/F grading only.) Effective: 2017 Winter Quarter.

SUR 430R—Rural PRIME Surgery Longitudinal Clerkship (2)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Surgery Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

SUR 430RA—Rural PRIME Surgery Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Surgery Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

SUR 430RB—Rural PRIME Surgery Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Surgery Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

SUR 430RC—Rural PRIME Surgery Longitudinal Clerkship (3)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Surgery Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

SUR 430RD—Rural PRIME Surgery Longitudinal Clerkship (1)
Clinical Activity—45 hours. Prerequisite(s): Consent of Instructor. Surgery Longitudinal Integrated Clerkship for the Rural PRIME Program. (H/P/F grading only.) Effective: 2017 Spring Quarter.

SUR 439D—Directed Clinical Studies in Surgery (1-12)
Clinical Activity—40 hours. Prerequisite(s): Consent of Instructor. Partial completion of a Clinical Rotation. Individual directed studies in extended preparation for modified curriculum or to complete a clinical rotation following a leave of absence. May be repeated for credit. (P/F grading only.) Effective: 2011 Spring Quarter.

SUR 439R—Directed Studies in Surgery (1-12)
Clinical Activity—30 hours; Independent Study—10 hours. Prerequisite(s): Consent of Instructor. Individual directed studies in extended preparation for remediation of all or part of clinical rotation. Clinical studies to accommodate and satisfy remedial work as directed by the Committee on Student Progress and approved by the course IOR. May be repeated for credit. (P/F grading only.) Effective: 2011 Summer Quarter.

SUR 450—Surgical Skills Boot Camp (3-6)
Independent Study—30 hours; Workshop—10 hours. Prerequisite(s): Consent of Instructor. Goal of the surgical skills boot camp didactic is to enable students to demonstrate competence in basic surgical skills and theory, using analytical thinking and hands-on simulation. May be repeated for credit. (H/P/F grading only.) Effective: 2015 Spring Quarter.

SUR 461—Surgery Burn Unit Clerkship (6-18)
Clinical Activity. Prerequisite(s): SUR 430; and Consent of Instructor. Fourth-year medical student or third-year medical student. Rotation through Surgery Specialty Clinics:Vascular, GI, GU, Thoracic, Plastic, Radiotherapy. Student works up one new and two return visit patients. Presents consult to on-site faculty. Weekly review with preceptor and course director. Reading assignments to add perspective for in-depth discussions. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SUR 462—Surgery Trauma Service Clerkship (6-9)
Clinical Activity. Prerequisite(s): SUR 430; and Consent of Instructor. Fourth-year medical student, or third-year medical student. Student works as an extern on one of the two general surgery Trauma teams, participating in resuscitation and management of critically injured patients. Team hours consist of 24 hours on, and 24 hours off. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SUR 463—Surgery Intensive Care Unit (6-9)
Clinical Activity. Prerequisite(s): SUR 430; and Consent of Instructor. Fourth-year medical student, or third-year medical student. Student participates in direct supervision of critically ill surgical patients in a twelve-bed surgery ICU. Each student is closely supervised. Provides in-depth experience with management of critically ill patients. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SUR 466—Clinical Plastic Surgery Elective (3-9)
Clinical Activity—50 hours. Prerequisite(s): SUR 430; and Consent of Instructor. Third- or fourth-year medical students. Total involvement in patient care involving surgical preparation, treatment, operative care, and follow-up. Developing and understanding reconstruction and aesthetic plastic surgery. Microvascular surgery included. Student rotation. (H/P/F grading only.) Effective: 2014 Fall Quarter.

SUR 467—Surgical Oncology (3-9)
Clinical Activity. Prerequisite(s): SUR 430; and Consent of Instructor. Fourth-year medical student, or third-year medical student. Students actively participate in management of patients requiring surgery for cancer, endocrine disease and selected general surgical problems. Cases include malignant melanoma, sarcomas, gastrointestinal cancer, head and neck pathology, and metastatic malignancies. Attending rounds daily. Four teaching conferences weekly. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SUR 468—Cardiothoracic Surgery Clerkship (6-9)
Clinical Activity. Prerequisite(s): SUR 430; and Consent of Instructor. Fourth-year medical student, or third-year medical student. Student works as an extern on the Cardiothoracic Surgical Service, participating in perioperative management and operations on the heart, lungs, mediastinum, and other thoracic structures. Regularly scheduled teaching conferences are conducted. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SUR 471—Gastrointestinal Surgery (3-9)
Clinical Activity. Prerequisite(s): SUR 430; IMD 430; PED 430; and Consent of Instructor. Fourth-year medical student or third-year medical student. Student participates on the GI Surgery Service, working under the immediate supervision of the faculty and surgical housestaff, involving the full spectrum of gastrointestinal diseases performed by the medical student. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SUR 472—Vascular Surgery (3-9)
Clinical Activity. Prerequisite(s): SUR 430; IMD 430; PED 430; and Consent of Instructor. Fourth-year medical student or third-year medical student. Student participates on the vascular surgery service and in the management and operations of arterial and venous system, exclusive of diseases that require cardiopulmonary bypass for treatment. Includes patient care responsibilities with appropriate supervision. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SUR 474—Colorectal Surgery (3-6)
Clinical Activity. Prerequisite(s): Consent of Instructor. Fourth-year medical student. Students actively participate in clinic and the operating room on colon and rectal patients. This includes medical and surgical management. Assignments involve work up and care of the surgical patients. May be repeated for credit. (H/P/F grading only.) Effective: 2018 Spring Quarter.

SUR 475—Pediatric Surgery (6-9)
Clinical Activity—4-6 hours. Prerequisite(s): SUR 430; and Consent of Instructor. Fourth-year medical student or third-year medical student. Care of patients with neonatal congenital surgical problems. Fluid and electrolyte management in infants. General experience with acquired surgical diseases in children. (H/P/F grading only.) Effective: 1998 Fall Quarter.

SUR 476—Surgical Consult Service (6-9)
Clinical Activity. Prerequisite(s): SUR 430; and Consent of Instructor. Fourth-year medical student or third-year medical student. Students function as acting interns working in parallel with the interns on the service. They consult on all non-trauma patients in the emergency room and on the wards and also participate in the operating room. (H/P/F grading only.) Effective: 1998 Fall Quarter.

SUR 477—Clinically Oriented Anatomy (3)
Clinical Activity—40 hours. Prerequisite(s): Completion of three years of medical school. Restricted to fourth-year medical student only. Anatomy of selected regions of the body using cadaver dissection, prosections and interactive CD ROMs. Anatomical relationships relevant to common surgical procedures. Surgical and interventional radiology procedures. (P/NP grading only.) Effective: 2002 Winter Quarter.

SUR 478—Surgical Preceptorship: Off Campus (3-18)
Clinical Activity—60 hours. Prerequisite(s): Consent of Instructor. Fourth-year medical student. Student participates in the preoperative, operative and postoperative care of surgical patients under the supervision of attending staff. (H/P/F grading only.) Effective: 2014 Fall Quarter.

SUR 480—Insights in Surgery (1-3)
Clinical Activity—3-9 hours. Prerequisite(s): Consent of Instructor. Medical student in good academic standing. Individualized activities, including ward rounds, subspecialty clinics and conferences, grand rounds, and observation of a variety of surgical procedures. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SUR 481—Interactive Clinical Case Presentation (ICCP) (3)
Clinical Activity—1 hour. Prerequisite(s): Fourth-year medical students; however, course is open for third and fourth year student observers. Course taught as one session (4 hours) per month for three quarters (July to March); students who enroll can earn up to three credits and the minimum requirements will be to attend at least six sessions; students can do all nine sessions and work toward an honor; for the written part students will have to pick two of the nine case presentations and write a detailed paper with a literature review on "The Current management" of that disease-this can in fact be a manuscript submitted for publication with a faculty member as an advisor; maximum of 10-15 students in good standing. Case presentation of common clinical scenarios (i.e. chestpain/MI; fever/pneumonia; abdo pain/chlecy stites, etc.) from various discipline held in an auditorium with real patients exposure. Interactive session to review history, physical findings and case management. Students will be asked to perform H&P. (H/P/F grading only.) Effective: 2007 Summer Quarter.

SUR 493B—Critically Ill Surgical Patients SSM (6)
Clinical Activity—4 hours; Laboratory—16 hours; Lecture—5 hours; Lecture/Lab—10 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. Special Study Module, a four week course on the topic: Application of Basic Cardiopulmonary Physiology to Problems Encountered in Critically Ill Surgical Patients. (H/P/F grading only.) Effective: 2007 Spring Quarter.

SUR 493C—Physiological Principles in SICU SSM (6)
Clinical Activity—4 hours; Laboratory—16 hours; Lecture—5 hours; Lecture/Lab—10 hours. Prerequisite(s): Consent of Instructor. Restricted to UC Davis School of Medicine students only. Special Studies Module, A four week course on the topic: Care of the Critically Ill Surgical Patient: Use of Physiological Principles to Guide Treatment of Patients with Common Surgical Problems. (Human Physiology 493C.) (H/P/F grading only.) Effective: 2007 Spring Quarter.

SUR 493D—Interdisciplinary Study of Gastrointestinal Cancer (6)
Clinical Activity—12 hours; Discussion/Laboratory—20 hours; Laboratory—3 hours; Lecture—5 hours. Prerequisite(s): Consent of Instructor. In-depth study of gastrointestinal, hepatic and pancreatic cancer. Emphasis on an integration of basic science and clinical medicine. Participating departments include pathology, surgical oncology, medical oncology, gastroenterology, radiology and radiotherapy. (Pathology 493.) (H/P/F grading only.) Effective: 2012 Summer Quarter.

SUR 494H—Fourth-Year Surgical Honors Program (18)
Variable. Prerequisite(s): SUR 430; and Consent of Instructor. Completion of third year of medical school with superior performance on SUR 430. To provide intensive and comprehensive training in surgery to students interested in a postgraduate surgical career, that would enable them to succeed during the internship and residency training. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SUR 495—Intense Introduction to Cardiac Surgery (3)
Clinical Activity—16 hours; Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Restricted to medical student between first and second year. Close contact with vascular surgeon for two-week period. Includes Sunday mornings. 100% mandatory attendance. Physiology of going on and off cardiopulmonary bypass. Atherosclerotic cardiovascular disease, structural and valvular heart disease and electrical and rhythmic heart disease. May be repeated up to 1 time(s). (P/F grading only.) Effective: 2009 Spring Quarter.

SUR 498—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Medical student. Directed reading and discussion and/or laboratory investigation on selected topics. (H/P/F grading only.) Effective: 1997 Winter Quarter.

SUR 499—Laboratory Research (1-12)
Laboratory—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of second year of medical school. Laboratory research on surgically related problems. Participation in projects to include the following: burn, nutrition, oncology, transplant and others. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Fall Quarter.

TCS Technocultural Studies

Courses in TCS:

TCS 001—Introduction to Technocultural Studies (4)
Extensive Writing; Lecture—3 hours. Contemporary developments in the fine and performing arts, media arts, digital arts, and literature as they relate to technological and scientific practices. GE credit: AH, VL, WE. Effective: 2012 Fall Quarter.

TCS 005—Media Archaeology (4)
Lecture/Discussion—3 hours; Term Paper. Evolution of media technologies and practices beginning in the 19th Century as they relate to contemporary digital arts practices. Special focus on the reconstruction of the social and artistic possibilities of lost and obsolete media technologies. GE credit: AH, SE, VL, WE. Effective: 2012 Fall Quarter.

TCS 007A—Technocultural Workshop; Digital Imaging (1)
Seminar—1 hour. Workshops in technocultural digital skills; Digital Imaging. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 007B—Technocultural Workshop; Digital Video (1)
Seminar—1 hour. Workshops in technocultural digital skills; Digital Video. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 007C—Technocultural Workshop; Digital Sound (1)
Seminar—1 hour. Workshops in technocultural digital skills; Digital Sound. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 007D—Technocultural Workshop; Web Design (1)
Seminar—1 hour. Workshops in technocultural digital skills; Web Design. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 007E—Technocultural Workshop; Topics in Digital Production (1)
Seminar—1 hour. Workshops in technocultural digital skills; Topics in Digital Production. May be repeated for credit. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 100—Experimental Digital Cinema I (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): CTS 020 or ART 012 or TCS 007B; TCS 170B; or equivalent with consent of instructor. Class size limited to 20 students. Experimental approaches to the making of film and video in the age of digital technologies. Builds upon foundation provided by course 20. Instruction in technical, conceptual, creative, and critical skills for taking a project from idea to fruition. GE credit: AH, OL, VL. Effective: 2017 Spring Quarter.

TCS 101—Experimental Digital Cinema II (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): TCS 100 Continuation of course 100 with further exploration of digital cinema
creation. Additional topics include new modes of distribution, streaming,
installation and exhibition. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 103—Interactivity and Animation (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Fundamentals of creating interactive screen-based work. Theories of interactivity, linear versus non-linear structures and audience involvement and participation. Use of digital production tools to produce class projects. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 104—Documentary Production (4)
Lecture/Discussion—3 hours; Project (Term Project). Prerequisite(s): TCS 007B; TCS 155; Or equivalent proficiency to TCS 007B. Traditional and new forms of documentary, with focus on technocultural issues. Skills and strategies for producing work in various media. Progression through all stages of production, from conception through post-production to critique. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 110—Object-Oriented Programming for Artists (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): TCS 001 Introduction to object-oriented programming for artists. Focus on understanding the metaphors and potential of object-oriented programming for sound, video, performance, and interactive installations. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 111—Community Media Production (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Use of video and new media tools to address social issues among neighborhood and community groups. Students will use basic video, sound, and lighting techniques as they work with local groups in a group video project. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 112—New Radio Features and Documentary (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. New feature and documentary production for radio and other audiophonic media, including audio streaming websites and installation. Emphasis on new and experimental approaches to audio production for broadcast on community radio and in international arts programming. Effective: 2012 Fall Quarter.

TCS 113—Community Networks (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Impact and implications of computer-based networks in community, civic, and social life. Subjects may include community-access computer sites, neighborhood wireless networks, the digital divide, open-source software, and citizen action. Effective: 2012 Fall Quarter.

TCS 115—Electronics for Artists (4)
Laboratory—3 hours; Lecture—3 hours. Creative application of electronic technology relevant to media and fine arts involving both electronic principles and hands-on application. Effective: 2012 Fall Quarter.

TCS 120—History of Sound in the Arts (4)
Lecture—3 hours; Term Paper. Prerequisite(s): TCS 001 A survey of the use of sound, voice, noise, and modes of listening in the modernist, avante-garde, and experimental arts, from the late 19th Century to the present. Focus on audiophonic and audiovisual technologies. Effective: 2012 Fall Quarter.

TCS 121—Introduction to Electronic Sound (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Introduction to the use of electronic sound within the arts. Techniques and aesthetics of experimental contemporary practices. Creation of original sound works. Effective: 2018 Winter Quarter.

TCS 122—Intermediate Sonic Arts (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): TCS 121; TCS 170C Techniques of recording, editing, mixing, and synthesis to combine voice, field recordings, and electronic signals. Incorporating live, recorded, and found sounds to create multidimensional stories. Presentation of live performances, audio recordings, and sound installations. Effective: 2012 Fall Quarter.

TCS 123—Sight and Soundtrack (4)
Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): TCS 007C; TCS 170C The use of sound to articulate, lend mood or subconciously underscore visual, environmental or performative situations, combining music, voice, sound effects and other noises to create sound designs that enhance, alter or support action and movement. Effective: 2012 Fall Quarter.

TCS 125—Advanced Sound: Performance and Improvisation (4)
Practice—3 hours; Workshop—3 hours. Prerequisite(s): TCS 121; TCS 122; or Consent of Instructor. Culmination of TCS sound courses. Class will focus on performance and improvisation, culminating in a final public performance. Students will be expected to do extensive reading and rehearsal outside of class time. Effective: 2012 Fall Quarter.

TCS 130—Fundamentals of 3D Computer Graphics (4)
Laboratory—3 hours; Lecture—3 hours. A foundation course that teaches students the theory of three dimensional computer graphics, including modeling, rendering and animation. Development of practical skills through the use of professional software to create computer graphics Effective: 2012 Fall Quarter.

TCS 131—Character Animation (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): TCS 130; or Consent of Instructor. The art of character animation in three dimensional computer animation. Movement theory, principles of animation, animation timing. Development of technical and practical skills. Effective: 2012 Fall Quarter.

TCS 150—Introduction to Theories of the Technoculture (4)
Extensive Writing; Lecture/Discussion—3 hours. Major cultural theories of technology with emphasis on media, communications, and the arts. Changing relationships between technologies, humans, and culture. Focus on the evolution of modern technologies and their reception within popular and applied contexts. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 151—Topics in Virtuality (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): TCS 001 Social, political, economic, and aesthetic factors in virtual reality. Artificial environments, telepresence, and simulated experience. Focus on contemporary artists' work and writing. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 152—New Trends in Technocultural Arts (4)
Lecture/Discussion—3 hours; Term Paper. Current work at the intersection of the arts, culture, science, and technology including biological and medical sciences, computer science and communications, and artificial intelligence and digital media. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 153—Concepts of Innovative Soundtracks (4)
Lecture/Discussion—3 hours; Term Paper. Innovative and unconventional soundtracks in cinema, media arts, and fine arts. Introduction to basic analytical skills for understanding sound-image relationships. Effective: 2012 Fall Quarter.

TCS 154—Outsider Machines (4)
Lecture/Discussion—3 hours; Term Paper. Invention, adaptation and use of technologies outside the mainstream, commonsense, and the possible. Topics include machines as metaphor and embodied thought, eccentric customizing and and fictional technologies. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 155—Introduction to Documentary Studies (4)
Lecture/Discussion—3 hours; Term Paper. Recent evolution of the documentary. The personal essay film; found-footage/appropriation work; non-linear, multi-media forms; spoken word; storytelling; oral history recordings; and other examples of documentary expression. GE credit: ACGH, AH, DD, VL. Effective: 2012 Fall Quarter.

TCS 158—Technology and the Modern American Body (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): TCS 001; (AMS 001A or AMS 005) The history and analysis of the relationships between human bodies and technologies in modern society. Dominant and eccentric examples of how human bodies and technologies influence one another and reveal underlying cultural assumptions. (American Studies 158.) GE credit: ACGH, AH, WE. Effective: 2012 Fall Quarter.

TCS 159—Media Subcultures (4)
Lecture/Discussion—3 hours; Term Paper. Relationships between subcultural groups and media technologies. Media as the cohesive and persuasive force of subcultural activities. List-servs, websites, free radio, fan 'zines, and hip-hop culture. GE credit: ACGH, VL. Effective: 2012 Fall Quarter.

TCS 160—Ghosts of the Machine: How Technology Rewires our Senses (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Historical, aesthetic and critical approaches to how information technologies produced ghost effects or a sense of terror in response to new media like the photograph, gramophone, film, typewriter, computer, Turing Machine. Focus on technological media transforms sense perception. (Science and Technology Studies 160.) GE credit: ACGH, AH, SS, VL, WE. Effective: 2013 Fall Quarter.

TCS 170A—Advanced Technocultural Workshop (1)
Seminar—1 hour. Prerequisite(s): TCS 007A; Or equivalent. Workshop in advanced technocultural digital skills: Digital Imaging. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 170B—Advanced Technocultural Workshop (1)
Seminar—1 hour. Prerequisite(s): TCS 007B; Or equivalent. Workshop in advanced technocultural digital skills: Digital Video. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 170C—Advanced Technocultural Workshop (1)
Seminar—1 hour. Prerequisite(s): TCS 007C Workshop in advanced technocultural digital skills: Digital Sound. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 170D—Advanced Technocultural Workshop (1)
Seminar—1 hour. Prerequisite(s): TCS 007D Workshop in advanced technocultural digital skills: Web Design. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 170E—Advanced Technocultural Workshop (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Workshop in advanced technocultural digital skills: Topics in Digital Production. GE credit: VL. Effective: 2012 Fall Quarter.

TCS 175—Small Scale Film Production (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Consent of Instructor. Lecture and intensive workshop teaching small-scale film production. Appointments as a(n) director, director of photography, actor, writer, lighting designer, sound designer and other critical positions are used to produce and submit a short film to a film festival. May be repeated up to 2 time(s). (Dramatic Art 175.) Effective: 2012 Fall Quarter.

TCS 190—Research Methods in Technocultural Studies (4)
Lecture/Discussion—3 hours; Project (Term Project). Introduction to basic research methods for Technocultural Studies: electronic and archived images, sounds and data, satellite downlinking, radiowave scanning, and oral histories. GE credit: VL, WE. Effective: 2012 Fall Quarter.

TCS 191—Writing Across Media (4)
Extensive Writing; Lecture/Discussion—3 hours. Introduction to experimental approaches to writing for different media and artistic practices. How written texts relate to the images, sounds, and performances in digital and media production. GE credit: WE. Effective: 2012 Fall Quarter.

TCS 192—Internship (1-4) ***Review all entries***
Internship—3-12 hours. Supervised internship on or off campus in area relevant to Technocultural Studies. May be repeated up to 2 time(s). (P/NP grading only.) Effective: 2012 Fall Quarter.

TCS 192—Internship (1-4) ***Review all entries Discontinued***
Internship—3-12 hours. Supervised internship on or off campus in area relevant to Technocultural Studies. May be repeated up to 2 time(s). (P/NP grading only.) Effective: 2018 Fall Quarter.

TCS 197T—Tutoring in Technocultural Studies (1-5)
Tutorial—3-15 hours. Prerequisite(s): Consent of Instructor. Undergraduates assist the instructor by tutoring students in one of the department's regularly scheduled courses. May be repeated up to 8 unit(s). (P/NP grading only.) Effective: 2012 Fall Quarter.

TCS 198—Directed Group Study (1-5) ***Review all entries***
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2012 Fall Quarter.

TCS 198—Directed Group Study (1-5) ***Review all entries Discontinued***
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2018 Fall Quarter.

TCS 199—Special study for advanced undergraduates (1-5) ***Review all entries***
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Guided study with faculty member in independent scholarly activity. May be repeated up to 8 unit(s). (P/NP grading only.) Effective: 2012 Fall Quarter.

TCS 199—Special study for advanced undergraduates (1-5) ***Review all entries Discontinued***
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Guided study with faculty member in independent scholarly activity. May be repeated up to 8 unit(s). (P/NP grading only.) Effective: 2018 Fall Quarter.

TRK Turkish

Courses in TRK: Coming Soon...

TTP Transportation Technology and Policy

Courses in TTP:

TTP 200—Transportation Survey Methods (4)
Lecture—4 hours. Prerequisite(s): STA 013 or STA 013Y; ECI 251 recommended. Description of types of surveys commonly used in transportation demand modeling, including travel and activity diaries, attitudinal, panel, computer, and stated-response surveys. Discussion of sampling, experimental design, and survey design issues. Analysis methods, including factor, discriminant and cluster analysis. Not open for credit to students who have taken Civil and Environmental Engineering 255. (Geography 281.) Effective: 2018 Spring Quarter.

TTP 210—Fundamentals of Transportation Technology (4)
Discussion—2 hours; Lecture—2 hours. Prerequisite(s): MAT 021A; MAT 021B; MAT 022A; and Consent of Instructor. Graduate or junior/senior undergraduate as a technical elective. Limited enrollment. Fundamentals of Transportation Technology is a course designed to prepare students in the basics of thermodynamics, fluid mechanics and heat transfer as they relate to transportation. Not open for credit to students who have completed course 289. (Former course 289.). Effective: 2007 Spring Quarter.

TTP 220—Transportation Planning and Policy (4)
Lecture/Discussion—4 hours. Limited enrollment. Transportation planning process at the regional level, including the role of federal policy in shaping regional transportation planning, tools and techniques used in regional transportation planning, issues facing regional transportation planning agencies, pros and cons of potential solutions and strategies. Students having taken this course previously as course 289 cannot repeat it for credit; having taken other course 289 offerings does not preclude taking this course for credit. (Geography 236.) Effective: 2013 Winter Quarter.

TTP 281—ITS Transportation Seminar Series (1)
Seminar—1.5 hours. Transportation seminars by guest speakers, on varied topics. May be repeated for credit. (S/U grading only.) Effective: 2006 Spring Quarter.

TTP 282—Transportation Orientation Seminar (1)
Seminar—1 hour. Ten weeks of seminars, introducing various topics in transportation research and education, focusing on topics of particular interest at UC Davis. May be repeated for credit. (S/U grading only.) Effective: 2006 Spring Quarter.

TTP 283—Professionalism, Leadership, and Ethics (1)
Seminar—2 hours. Speakers from industry, government, academia, and NGOs will lead discussions about succeeding and performing in the professional world. They will address leadership, ethics, and other workplace issues. May be repeated for credit. (S/U grading only.) Effective: 2006 Spring Quarter.

TTP 289A—Selected Topics in Transportation Technology and Policy (1-5)
Laboratory; Lecture. Prerequisite(s): Consent of Instructor. Directed group study of special topics with instruction carried out through lecture or laboratory, or a combination of both. May be repeated for credit. May be repeated for credit. Effective: 1997 Fall Quarter.

TTP 289B—Selected Topics in Transportation Technology and Policy (1-5)
Laboratory; Lecture. Prerequisite(s): Consent of Instructor. Directed group study of special topics with instruction carried out lecture or laboratory, or a combination of both. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1999 Fall Quarter.

TTP 290C—Graduate Research Group Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Research problems, progress, and techniques in transportation. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Fall Quarter.

TTP 292—Internship in TTP (1-5)
Internship. Prerequisite(s): Consent of Instructor. Second year standing; approval of project prior to period of internship. Supervised work experience in transportation studies. May be repeated for credit when topic differs. (S/U grading only.) Effective: 2000 Spring Quarter.

TTP 298—Group Study (1-5)
Discussion—1-5 hours. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Fall Quarter.

TTP 299—Research (1-12)
Discussion—1-12 hours. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Fall Quarter.

TTP 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

TXC Textiles & Clothing

Questions pertaining to the following courses should be directed to the instructor or to the Division of Textiles and Clothing. See also courses in Fiber and Polymer Science.

Courses in TXC:

TXC 006—Introduction to Textiles (4)
Laboratory—3 hours; Lecture—3 hours. Introduction to the structure and properties of textiles. Consumer
use and fabric characteristics are emphasized. GE credit: SE, SL, VL. Effective: 1997 Winter Quarter.

TXC 007—Style and Cultural Studies (4)
Discussion/Laboratory—1 hour; Lecture/Discussion—3 hours. The multiple and overlapping influences of gender, sexuality, ethnicity, and class on constructions of identity and community are explored through the study of style in popular culture and everyday life. Continuity and change in clothing and appearance styles are interpreted. GE credit: AH, SS, VL, WC, WE. Effective: 2010 Fall Quarter.

TXC 008—The Textiles and Apparel Industries (4)
Lecture—4 hours. Textile and apparel industries including fashion theory, production, distribution, and consumption of textile goods. GE credit: SS. Effective: 1997 Winter Quarter.

TXC 092—Internship in Textiles and Clothing (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Work experience off campus in a textiles or clothing-related area. Supervision by a member of the Textiles and Clothing faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

TXC 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

TXC 099—Special Study for Lower Division Students (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

TXC 107—Social and Psychological Aspects of Clothing (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): SOC 002 Social and cognitive factors influencing management and perception of personal appearance in everyday life. Concepts and methods appropriate to the study of meaning of clothes in social and cultural contexts. GE credit: SS, VL, WE. Effective: 1997 Winter Quarter.

TXC 162—Textile Fabrics (3)
Lecture—3 hours. Prerequisite(s): TXC 006 Properties of fabrics as related to serviceability, comfort, and appearance. GE credit: SE, VL. Effective: 1997 Winter Quarter.

TXC 162L—Textile Fabrics Laboratory (1)
Laboratory—3 hours. Prerequisite(s): TXC 162 (can be concurrent) Laboratory methods and procedures employed in studying properties of textile fabrics as related to serviceability, comfort, and appearance. GE credit: QL, SE, VL, WE. Effective: 1997 Winter Quarter.

TXC 163—Textile Coloration and Finishing (3)
Lecture—3 hours. Prerequisite(s): TXC 006; (FPS 110 or CHE 008B) Basic principles of textile dyeing, printing, and finishing; color theory; structure, properties, and application of dyes and finishes; factors affecting application and fastness; maintenance of dyed and finished textiles. GE credit: SE, VL. Effective: 1997 Winter Quarter.

TXC 163L—Textile Coloration and Finishing Laboratory (1)
Laboratory—3 hours. Prerequisite(s): TXC 163 (can be concurrent) Demonstrates various aspects of dyeing, printing, and finishing of textile substrates including the effect of fiber and finish type, and
physical and chemical variables on dyeing and finishing processes and on the properties of the resultant textile. GE credit: QL, SE, SL, WE. Effective: 1997 Winter Quarter.

TXC 164—Principles of Apparel Production (3)
Lecture—3 hours. Prerequisite(s): TXC 006 or TXC 008 Overview of characteristics, technology, processes, and research in apparel manufacturing industries including study of government statistics, material utilization and fabrication, mechanization, management, and production engineering. GE credit: OL, SS, VL. Effective: 1997 Winter Quarter.

TXC 165—Textile Processes (3)
Lecture/Discussion—3 hours. Prerequisite(s): TXC 006 Physical processes involved in the production of textiles from the individual fiber to the finished fabric. Includes spinning, texturing, yarn formation, weaving preparation, weaving and knitting, tufting and
fabric finishing. GE credit: SE. Effective: 1997 Winter Quarter.

TXC 171—Clothing Materials Science (4)
Discussion/Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): TXC 006; TXC 008; And senior standing. The properties, characterization, and performance evaluation of clothing materials and structures for specific functional applications. Principles and methods related to wetting and transport properties, fabric hand and aesthetic properties, clothing comfort, and material and assembly technology. GE credit: SE, VL. Effective: 1997 Winter Quarter.

TXC 173—Principles of Fashion Marketing (3)
Lecture—3 hours. Prerequisite(s): TXC 008; (ECN 001A or ECN 001AV); (ARE 113 or ARE 136) Study of basic elements of fashion marketing including philosophy and objectives, organization, merchandising, pricing, promotion and personnel. GE credit: SS, VL. Effective: 2018 Spring Quarter.

TXC 174—Introduction to World Trade in Textiles and Clothing (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): TXC 008 Structure of the global fiber/textile/apparel complex and its distribution patterns with an overview of political, economic and technological factors that are changing these industries and their markets. GE credit: SS, WC. Effective: 2005 Winter Quarter.

TXC 180A—Introduction to Research in Textiles (2)
Laboratory—6 hours. Prerequisite(s): Consent of Instructor. Senior standing with textile-related major. Senior thesis on independent problems. Research begun in course 180A will be continued and completed in course 180B. GE credit: SS, WE. Effective: 1997 Winter Quarter.

TXC 180B—Introduction to Research in Textiles (2)
Laboratory—6 hours. Prerequisite(s): Consent of Instructor. Senior standing with textile-related major. Senior thesis on independent problems. Research begun in course 180A will be continued and completed in course 180B. GE credit: SS, WE. Effective: 1997 Winter Quarter.

TXC 192—Internship in Textiles and Clothing (1-12)
Laboratory—3-36 hours. Prerequisite(s): Consent of Instructor. Work-learn experience off campus in a textiles or clothing-related area. Supervision by a member of the Textiles and Clothing faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

TXC 197T—Tutoring in Textiles and Clothing (1-5)
Discussion/Laboratory—3-15 hours. Prerequisite(s): Consent of Instructor. Upper division textiles-related major. Tutoring of students in Textiles and Clothing courses. Assistance with discussion groups and laboratory sections under supervision of instructor. May be repeated for credit if tutoring another textiles course. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

TXC 198—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

TXC 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

TXC 230—Behavorial Science Concepts in Textiles (3)
Lecture—3 hours. Prerequisite(s): TXC 107; Upper division or graduate course in statistics (e.g., AMR 120) and one in a behavioral science (e.g., PSC 145). Examination of theories and research concerning relationships between clothing and human behavior with emphasis on research techniques, including methods of measuring clothing variables. Effective: 1997 Winter Quarter.

TXC 290—Seminar (1)
Seminar—1 hour. Critical review of selected topics of current interest in textiles. (S/U grading only.) Effective: 1997 Winter Quarter.

TXC 290C—Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Individual faculty members meet with their graduate students. Critical presentations of original research are made by graduate students. Research activities are planned. Discussions are led by major professors for their research groups. (S/U grading only.) Effective: 1997 Winter Quarter.

TXC 293—Recent Advances in Textiles (3)
Lecture—3 hours. Prerequisite(s): Two upper division courses in Textiles and Clothing or consent of instructor. Critical reading and evaluation on selected topics of current interest in textiles. Multidisciplinary aspects of the topics selected will be stressed. May be repeated for credit. May be repeated for credit. Effective: 1997 Winter Quarter.

TXC 298—Group Study (1-5)
Variable. Effective: 1997 Winter Quarter.

TXC 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

TXC 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

URO Med - Urology

Courses in URO:

URO 199—Special Study for Advanced Undergraduates (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

URO 400—Office Urology (1)
Clinical Activity—4 hours. Prerequisite(s): Fourth-year medical students with consent of instructor. Introduction to ambulatory care of urologic patients including basic therapeutic and diagnostic procedures from case material referred to
private clinic. Management of urinary tract infection will be emphasized. (H/P/F grading only.) Effective: 1997 Winter Quarter.

URO 460—Urology Clinical Clerkship (5-18)
Clinical Activity—8-40 hours. Prerequisite(s): Consent of Instructor. Third-year medical student; physical diagnosis or the equivalent. Limited enrollment. Clinical experience in diagnosis and treatment of urologic disease. Student will work closely with house staff, participate in conferences and surgery, and perform initial patient evaluation on new patients. May be repeated for credit. (H/P/F grading only.) Effective: 2010 Winter Quarter.

URO 461—Externship in Urology (3-18)
Clinical Activity—60 hours. Prerequisite(s): Consent of Instructor. Fourth-year medical students. Under supervision, student acting as intern will assume full inpatient responsibility including admission history, physical examination, management of hospitalization, and participate in surgical procedures, outpatient clinic and learning diagnostic and therapeutic procedures. May be repeated for credit. (H/P/F grading only.) Effective: 2014 Fall Quarter.

URO 499—Research in Urology (1-12)
Variable. Prerequisite(s): Medical or veterinary medical students with consent of instructor. Research in oncology, male infertility, urodynamics, neurogenic bladder. Unique opportunity to apply recent technologies (nuclear medicine resonance, flow cytometry, recombinant DNA) in investigation, diagnosis and treatment of GU cancer, infectious disease, male infertility and development of genitourinary bioprosthetics. May be repeated for credit. (H/P/F grading only.) Effective: 2017 Winter Quarter.

UWP University Writing Program

Courses in UWP:

UWP 001—Expository Writing (4)
Lecture/Discussion—4 hours. Prerequisite(s): Completion of Entry-Level Writing Requirement. Composition, the essay, paragraph structure, diction, and related topics. Frequent writing assignments. Not open for credit to students who have taken courses 1 or 1Y or 1V. GE credit: AH, WE. Effective: 2010 Fall Quarter.

UWP 001V—Expository Writing (4)
Web Electronic Discussion—2 hours; Web Virtual Lecture—2 hours. Prerequisite(s): Completion of Entry-Level Writing Requirement. Composition, the essay, paragraph structure, diction, and related topics. Frequent writing assignments. Not open to students who have taken course 1 or 1Y. GE credit: AH, WE. Effective: 2013 Spring Quarter.

UWP 001Y—Expository Writing (4)
Lecture/Discussion—2 hours; Web Electronic Discussion—2 hours. Prerequisite(s): Completion of Entry-Level Writing Requirement. Composition, the essay, paragraph structure, diction, and related topics. Frequent writing assignments. Not open to students who have taken course 1 or 1V. GE credit: AH, WE. Effective: 2013 Fall Quarter.

UWP 010—Introduction to Professional Writing Studies (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 or UWP 001V or UWP 001Y; Or the equivalent. Introduction to writing as an object of study and to theories and research in the field. Survey of how writing is created, disseminated, and used in private, public, and academic contexts. GE credit: AH, WE. Effective: 2018 Spring Quarter.

UWP 011—Popular Science and Technology Writing (4)
Discussion—1 hour; Lecture/Discussion—3 hours. Positioning of science and technology in society as reflected and constructed in popular texts. Topics include genre theory, demarcation, rhetorical figures, forms of qualitative and quantitative reasoning, and the epistemic role of popularization in science. GE credit: AH, WE. Effective: 2014 Winter Quarter.

UWP 012—Writing and Visual Rhetoric (4)
Discussion—1 hour; Lecture/Discussion—3 hours. Introduction to writing needs, conventions, and genres in design contexts. Emphasis on applying critical reading, analysis, and writing skills to designed products, such as graphics, visual communications, and clothes, and designed spaces, such as exhibitions and interior architecture. GE credit: AH, VL, WE. Effective: 2014 Fall Quarter.

UWP 013—Video Game Rhetorics (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better Examination of video games as rhetorical texts whose meaning is produced through complex interplay of procedures, narratives, rules, and context. Writing about video games using critical perspectives and analytic methods. GE credit: AH, VL, WE. Effective: 2018 Spring Quarter.

UWP 018—Style in the Essay (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better Style, language, and structure in the essay. Analyzing style, developing a voice in writing, revising sentences, developing effective paragraphs and arguments, and writing with force and clarity. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 018—Style in the Essay (4) ***Review all entries Discontinued***
Lecture/Discussion—4 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better Style, language, and structure in the essay. Analyzing style, developing a voice in writing, revising sentences, developing effective paragraphs and arguments, and writing with force and clarity. GE credit: AH, WE. Effective: 2018 Fall Quarter.

UWP 019—Writing Research Papers (4) ***Review all entries***
Lecture/Discussion—4 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better Critical reading, analysis, documentation, and writing research-based assignments. Formulation of research topics and development of effective arguments. Reading and writing assignments may focus on a single theme. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 019—Writing Research Papers (4) ***Review all entries Discontinued***
Lecture/Discussion—4 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better Critical reading, analysis, documentation, and writing research-based assignments. Formulation of research topics and development of effective arguments. Reading and writing assignments may focus on a single theme. GE credit: AH, WE. Effective: 2018 Fall Quarter.

UWP 020—Oral English for International Students (3)
Lecture/Discussion—3 hours. Open to non-native speakers of English with priority enrollment to international teaching assistants with qualifying placement exam scores. Intensive work in oral English for international students, to increase fluency, accuracy, and use of appropriate discourse strategies in academic settings (e.g., seminar, discussion, laboratory). Training in segmental features of English sounds, intonation, stress, non-verbal cues, and register. May be repeated for credit. (P/NP grading only.) Effective: 2018 Fall Quarter.

UWP 021—Introduction to Academic Reading and Writing for Multilingual Students (4)
Lecture/Discussion—4 hours. Pass One placed in the course via the English Language Placement Examination (ELPE) offered by the UWP; students receiving scores below 70 are placed in course 21, the first course in the sequence. Reading and writing paragraphs and short multi-paragraph texts for academic purposes. Suitable for students whose primary home language was not English. Effective: 2016 Fall Quarter.

UWP 022—Intermediate Academic Reading and Writing for Multilingual Students (4)
Lecture/Discussion—4 hours. Prerequisite(s): UWP 021 Pass One passed course 21 with C- or better OR a score of 70-79 on the English Language Placement Examination (ELPE) offered by the UWP. Reading and writing short multi-paragraph texts for academic purposes. Suitable for students whose primary home language was not English. Effective: 2016 Fall Quarter.

UWP 023—Advanced Academic Reading and Writing for Multilingual Students (4)
Lecture/Discussion—4 hours. Prerequisite(s): UWP 022 Pass One passed course 22 with a C- or better OR a score of 80-89 on the English Language Placement Examination (ELPE) offered by the UWP. Reading and writing source/research-based texts for academic purposes. Suitable for students whose primary home language was not English. Effective: 2016 Fall Quarter.

UWP 025—Academic Writing for ESL Students (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Writing skills necessary for upper division courses, including skills crucial to writing lab and project reports, summaries, critiques, abstracts, and responses to exam questions. Includes practice with the syntax, grammar, and vocabulary characteristics of academic writing. Not open for credit to students who have taken LIN 027. Effective: 2018 Spring Quarter.

UWP 026—Reading in Scientific and Technical Subjects for ESL Students (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Instruction and practice in reading scientific and technical texts. Techniques for comprehending and analyzing grammatical and organizational patterns. Notetaking skills, summarizing, vocabulary enrichment. Not open for credit to students who have taken LIN 028. (P/NP grading only.) Effective: 2018 Spring Quarter.

UWP 027—Persuasive Writing for Multilingual Students (4)
Lecture/Discussion—4 hours. Prerequisite(s): UWP 001; Or equivalent. Not open to students with C- (P) or better in courses 101, 102, and 104; class size limited to 18 students. Instruction in analyzing style of persuasive texts, using appropriate vocabulary, and applying English grammatical structures for argumentative purposes. Suitable for multilingual students desiring additional instruction in the linguistic and rhetorical features of persuasive English writing for academic purposes. GE credit: WE. Effective: 2016 Spring Quarter.

UWP 028—Persuasive Writing for Multilingual Students (4)
Lecture/Discussion—4 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better Instruction in analyzing style of persuasive texts, using appropriate vocabulary, and applying English grammatical structures in argumentation. Suitable for multilingual students desiring additional instruction in persuasive English writing. GE credit: AH, WE. Effective: 2017 Fall Quarter.

UWP 029—Research Writing for Multilingual Students (4)
Lecture/Discussion—4 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better Reading and writing effectively in various research genres across the disciplines. Suitable for multilingual students desiring additional instruction in the linguistic and rhetorical features of research writing in English for academic purposes. GE credit: AH, WE. Effective: 2017 Fall Quarter.

UWP 048—Style in the Essay (4)
Lecture/Discussion—4 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; or equivalent. Restricted to completion of UWP 001, or equivalent, with C- (P) or better. Principles of style, language, and structure in the essay. Analysis and development of voice and genre, including sentence revision for force and clarity, and development of effective paragraphs and essays. Not open for credit to students who have taken UWP 018. GE credit: AH, WE. Effective: 2018 Spring Quarter.

UWP 049—Writing Research Papers (4)
Lecture/Discussion—4 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; or equivalent. Restricted to completion of UWP 1, or equivalent, with C- (P) or better. Principles of research writing. Analysis and development of research topics and effective arguments, including critical reading, analysis, integration, and documentation of source material. Not open for credit to students who have taken UWP 019. GE credit: AH, WE. Effective: 2018 Fall Quarter.

UWP 092—Internship in Writing (1-12)
Internship—3-36 hours. Prerequisite(s): UWP 001 or UWP 001V or UWP 001Y or ENL 003 Internships in fields where students can practice their skills. May be repeated up to 12 unit(s). (P/NP grading only.) Effective: 2018 Winter Quarter.

UWP 098—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): UWP 001 or UWP 001V or UWP 001Y or ENL 003; Or equivalent course; consent of instructor. May be repeated up to 2 time(s). (P/NP grading only.) GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 099—Special Study for Undergraduates (1-5)
Variable—1-5 hours. Prerequisite(s): UWP 001 or UWP 001V or UWP 001Y or ENL 003; Or equivalent course; consent of instructor. May be repeated up to 2 time(s). (P/NP grading only.) GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 100—Genre Theory and Professional Writing (4)
Extensive Writing/Discussion—1 hour; Lecture—3 hours. Prerequisite(s): (UWP 001 or UWP 001V or UWP 001Y); UWP 010; Or the equivalent of UWP 001. Introduction to discipline of professional writing. Examination of writing as a social practice, using genre theory as a conceptual framework. Analysis of how genres function rhetorically in specific contexts and how social systems both shape and are shaped by genres. GE credit: AH, WE. Effective: 2018 Spring Quarter.

UWP 101—Advanced Composition (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or ENL 003 C- or better or NAS 005 C- or better; and upper division standing. Instruction in advanced principles of expository writing. Writing tasks within and beyond the University. Different writing modes, including narrative, analysis, explanation, argument, critique. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102A—Writing in the Disciplines: Special Topics (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to majors or to students concurrently enrolled in an upper division course in a specific academic discipline or interdisciplinary field. Advanced instruction in writing in that discipline and practice in effective styles of communication. May be repeated up to 1 time(s) if taken in conjunction with a different subject-matter course. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102B—Writing in the Disciplines: Biology (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to majors in a biological science or to students concurrently enrolled in an upper division biological science course. Advanced instruction in writing in biology. Not open for credit to students who have completed English 102B. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102C—Writing in the Disciplines: History (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to majors in history or to students concurrently enrolled in an upper division course accepted for the history major. Advanced instruction in writing in history. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102D—Writing in the Disciplines: International Relations (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to majors in international relations or to students concurrently enrolled in an upper division course accepted for the major. Advanced instruction in writing in international relations. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102E—Writing in the Disciplines: Engineering (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to upper division students in the College of Engineering and to students enrolled in an upper division engineering or computer science course for the major. Advanced instruction in writing in engineering. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102F—Writing in the Disciplines: Food Science and Technology (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to majors in food science and technology and to students concurrently enrolled in an upper division course in food science and technology. Advanced instruction in writing in food science and technology. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102G—Writing in the Disciplines: Environmental Writing (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to students with upper division coursework with an environmental focus. Advanced instruction in writing and practice in effective styles of communication in the fields of environmental study, policy, or advocacy. Not open for credit to students who have completed course 102A in the same academic field. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102H—Writing in the Disciplines: Human Development and Psychology (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to majors and minors or to students concurrently enrolled in an upper division course in Human Development or Psychology. Advanced instruction in writing and practice in effective styles of communication in Human Development and Psychology. Not open for credit to students who have completed course 102A in the same academic field. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102I—Writing in the Disciplines: Ethnic Studies (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to majors and minors in ethnic studies, or students with upper division coursework focusing on race and ethnicity. Advanced instruction in cross-disciplinary writing about race and ethnicity and practice in effective styles of communication. Not open for credit to students who have completed course 102A in the same academic field. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102J—Writing in the Disciplines: Fine Arts (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to majors and minors or to students concurrently enrolled in an upper division course in Art History, Art Studio, Design, Music, or Theater and Dance. Advanced instruction in writing about the arts and practice in effective styles of communication. Not open for credit to students who have completed course 102A in the same academic field. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102K—Writing in the Disciplines: Sociology (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to majors and minors in Sociology or to students concurrently enrolled in an upper division Sociology course. Advanced instruction in writing and practice in effective styles of communication in Sociology and related academic and professional fields. Not open for credit to students who have completed course 102A in the same academic field. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102L—Writing in the Disciplines: Film Studies (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to majors and minors or to students concurrently enrolled in an upper division course in Film Studies, Technocultural Studies, English, American Studies, or any other upper division course that includes the analysis and understanding of film as a medium. Advanced instruction in writing about film and practice in effective styles of communication. Not open for credit to students who have completed course 102A in the same academic field. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 102M—Writing in the Disciplines: Community and Regional Development (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to upper division Community and Regional Development majors and minors or upper division students concurrently enrolled in an upper division Community and Regional Development course. Advanced instruction in writing in the Community and Regional Development discipline and practice in effective styles of communication. GE credit: ACGH, AH, WE. Effective: 2018 Winter Quarter.

UWP 102N—Writing in the Disciplines: Anthropology (4) ***Review all entries***
Lecture—3 hours; Term Paper. Prerequisite(s): UWP 001 C- or better; ENL 003 C- or better; COM 001 C- or better; COM 002 C- or better; COM 003 C- or better; COM 004 C- or better; NAS 005 C- or better; 4 or 5 on AP English Lit and Comp exam; or 6 or better on IB HL English Exam. Restricted to upper division standing; Anthropology Major or Minor. Advanced instruction in writing and practice in effective styles of communication in Anthropology and related academic and professional fields. GE credit: AH, WE. Effective: 2017 Winter Quarter.

UWP 102N—Writing in the Disciplines: Anthropology (4) ***Review all entries***
Lecture—3 hours; Term Paper. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; 4 or 5 on AP English Lit and Comp exam; or 6 or better on IB HL English Exam. Restricted to upper division standing; Anthropology Major or Minor. Advanced instruction in writing and practice in effective styles of communication in Anthropology and related academic and professional fields. GE credit: AH, WE. Effective: 2018 Summer Session 1.

UWP 104A—Writing in the Professions: Business Writing (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Effective communication in and for organizations, including businesses (corporations), government agencies, and non-profit organizations. Suitable for students entering careers that require substantial communications, such as management, public relations, and grant writing. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 104B—Writing in the Professions: Law (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Advanced principles of critical thinking, argumentation, and style, with special emphasis on their application in the legal profession. Suitable for students planning careers in law, business, administration, or management. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 104C—Writing in the Professions: Journalism (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Non-fiction for magazines and newspapers, with attention to style and language. Emphasis on research, interviewing, market analysis, and query letters. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 104D—Writing in the Professions: Elementary and Secondary Education (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Advanced expository writing in the contemporary American classroom. Strongly recommended for teaching credential candidates. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 104E—Writing in the Professions: Science (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing or enrollment in a graduate science curriculum. Writing abstracts, research proposals, scientific papers, other forms of scientific communication. Presenting data graphically. Primarily for students engaged in or planning careers in basic or applied research. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 104F—Writing in the Professions: Health (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Not open to students who have taken course 104FY. Advanced expository writing common in the health professions, emphasizing effective communication between the writer and different audiences. Topics relate to health, disability, and disease. Suitable for students planning careers in professions such as medicine, dentistry, physical therapy, optometry. Not open for credit to students who have taken course 104FY. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 104FY—Writing in the Professions: Health (4)
Extensive Writing; Lecture/Discussion—1.5 hours; Web Electronic Discussion—1.5 hours. Prerequisite(s): UWP 001 C- or better; UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Not open to students who have taken course 104F. Advanced expository writing common in the health professions, emphasizing effective communication between the writer and different audiences. Topics relate to health, disability, and disease. Suitable for students planning careers in professions such as medicine, dentistry, physical therapy, optometry. Not open for credit to students who have taken course 104F. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 104I—Writing in the Professions: Internships (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Open to students concurrently enrolled in an internship and to Contemporary Leadership minors. Advanced instruction in writing in the workplace, including public and private sectors, government agencies, profit and non-profit organizations. Collaborative work and practice in effective styles of communication. Not open for credit to students who have completed course 102A. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 104J—Writing in the Professions: Writing for Social Justice (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Advanced instruction in writing for Social Justice, using an interdisciplinary approach combining feminist, critical race, ethnic, cultural, and transnational studies; practice in techniques of research and styles of communication for diverse audiences. Suitable for activists in community organizing, non-profits, politics. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 104T—Writing in the Professions: Technical Writing (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 001 C- or better or UWP 001V C- or better or UWP 001Y C- or better or ENL 003 C- or better or COM 001 C- or better or COM 002 C- or better or COM 003 C- or better or COM 004 C- or better or NAS 005 C- or better; and upper division standing. Communicating effectively about technology and other technical subjects to varied audiences for varied purposes. Suitable for students entering professions that require communicating technical information to subject matter experts, managers, technicians, and non-specialists. Not open for credit to students who have taken course 104A prior to fall 2012. GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 106—English Grammar (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): UWP 001 or UWP 001V or UWP 001Y or ENL 003 or LIN 001 or LIN 001Y; or Consent of Instructor. Survey of present-day English grammar as informed by contemporary linguistic theories. The major syntactic structures of English; their variation across dialects, styles, and registers; their development; and their usefulness in describing the conventions of English. (English 106 and Linguistics 106.) GE credit: AH. Effective: 2018 Winter Quarter.

UWP 110—Specialized Genres in Professional Writing (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Satisfaction of the upper division writing requirement. Restricted to upper-division students who have satisfied the upper-division writing requirement. Counts toward the writing minor. Instruction in the elements and practices of professional writing in specialized genres. May be repeated up to 2 time(s) when topic differs. GE credit: AH, WE. Effective: 2015 Winter Quarter.

UWP 111A—Specialized Topics in Journalism (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Satisfaction of the upper division writing requirement. Restricted to upper-division students with a strong interest in journalism. Counts toward the writing minor. Instruction in the elements and practices of advanced journalism. May be repeated up to 1 time(s) specialized journalism topic for each course differs. GE credit: AH, WE. Effective: 2009 Fall Quarter.

UWP 111B—Specialized Topics in Journalism: Investigative Journalism (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Satisfaction of the upper division writing requirement. Restricted to upper-division students with a strong interest in journalism; counts toward the writing minor. Instruction in the elements and practices of in-depth investigative journalism. GE credit: AH, WE. Effective: 2009 Fall Quarter.

UWP 111C—Specialized Topics in Journalism: Science Journalism (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Satisfaction of the upper division writing requirement. Restricted to upper-division students with a strong interest in journalism. Counts toward the writing minor. Instruction in the elements and practices of science journalism. GE credit: AH, WE. Effective: 2009 Fall Quarter.

UWP 112A—Introduction to Professional Editing (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Satisfaction of the upper-division writing requirement. Restricted to upper-division students who have satisfied the upper-division writing requirement; counts toward the writing minor, Group C: Theory, History, and Design. Introduction to general editing practices and principles, with an emphasis on professional editing in organizational contexts, including academia and the workplace. Extensive practice in copy, comprehensive, and collaborative editing. GE credit: AH, VL, WE. Effective: 2010 Fall Quarter.

UWP 120—Rhetorical Approaches to Scientific and Technological Issues (4)
Extensive Writing; Lecture/Discussion—3 hours. Restricted to upper division standing. Application of rhetorical theories to scientific issues. Topics include: Rhetorical dimensions of scientific knowledge-making; scientific voice; rhetorical figures in science; incommensurability and demarcation; epistemology, definition, and classification; science wars; models of scientific literacy and accommodation, and implications for risk communication. GE credit: AH, SE, SL, WE. Effective: 2015 Winter Quarter.

UWP 121—History of Scientific Writing (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Upper division standing. History of scientific writing from the 17th century to the present; origins and evolution of scientific genres; role of scientific writing in producing scientific knowledge; discursive differences between disciplines; emergence of English as a global language of science. GE credit: AH, SE, SL, WE. Effective: 2013 Fall Quarter.

UWP 190—Capstone Portfolio Seminar (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): UWP 100 Open to majors who have completed 135 units. Capstone course for majors. Synthesis and application of rhetorical concepts learned in the major. Development of professional digital and print portfolio for graduate school and career applications. Effective: 2016 Spring Quarter.

UWP 192—Internship in Writing (1-12)
Internship—3-36 hours. Prerequisite(s): UWP 001 or UWP 001V or UWP 001Y or ENL 003; or equivalent course; consent of instructor. Internships in fields where students can practice their skills. May be repeated up to 12 unit(s). (P/NP grading only.) GE credit: AH. Effective: 2018 Winter Quarter.

UWP 197T—Tutoring in Writing (1-5)
Tutorial—1-5 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Tutoring one-on-one or leading small voluntary discussion groups affiliated with a writing course. May be repeated up to 10 unit(s). (P/NP grading only.) GE credit: AH. Effective: 2005 Fall Quarter.

UWP 197TC—Community Tutoring in Writing (1-4)
Tutorial—1-4 hours. Prerequisite(s): Consent of Instructor. Upper division standing. Field experience, with individuals or in K-12 classroom instruction, focusing on reading- and writing-to-learn strategies in any subject area. May be repeated up to 10 unit(s). (P/NP grading only.) GE credit: AH. Effective: 2005 Fall Quarter.

UWP 198—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): UWP 001 or UWP 001V or UWP 001Y or ENL 003; or equivalent course; consent of instructor. May be repeated up to 10 unit(s). (P/NP grading only.) GE credit: AH, WE. Effective: 2018 Winter Quarter.

UWP 199—Special Study for Advanced Undergraduates (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: AH, WE. Effective: 2005 Fall Quarter.

UWP 220—Rhetorical Approaches to Genre Study (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Using genre theory and methods of analysis to understand and prepare to do research on different types of writing in varying academic and professional contexts. Emphasis on problems in organizational, professional, and/or interdisciplinary communication. Effective: 2015 Fall Quarter.

UWP 250—Writing Assessment (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Examines key testing and measurement concepts; the history of writing assessment; and relationships among writing tests and methods of teaching writing; the impacts of Information and Communication Technology (ICT), and how educational policies both drive and respond to writing assessments. Effective: 2011 Fall Quarter.

UWP 253—Writing Program Administration (4)
Extensive Writing; Lecture/Discussion—3 hours. Theories, models, and procedures of writing programs, primarily in higher education. Developmental, first-year, and advanced writing programs, writing centers, writing-across-the-curriculum programs, writing minors and majors, and graduate programs in rhetoric and composition. Effective: 2014 Fall Quarter.

UWP 255—Theory and Research in Response to Student Writing (4)
Discussion—3 hours; Extensive Writing; Extensive Writing/Discussion; Project (Term Project). Restricted to graduate standing. Intensive focus on the critical topic of response or feedback to student writers. Coverage of philosophy, theory, and empirical research on teacher written feedback, teacher-student writing conferences, peer response, and error correction. Effective: 2013 Fall Quarter.

UWP 270—Literacy and Technology (4)
Extensive Writing; Lecture/Discussion—3 hours. Prerequisite(s): Graduate standing or consent of instructor. Examines how the physical qualities of texts offer different affordances during production and reception; grounds these discussions in the development of literacy practices and writing technologies from ancient to contemporary; creates frameworks for research into literacy, teaching, and textual technologies. Effective: 2011 Fall Quarter.

UWP 271—Second Language Writing (4)
Extensive Writing; Project (Term Project); Seminar—3 hours. Prerequisite(s): Graduate standing. Restricted to graduate standing. Traces the history of second language writing theory and research on second language writers in a variety of academic and professional contexts. Emphasis on writer characteristics, texts, and contexts. Effective: 2013 Fall Quarter.

UWP 280—Journal Editing Workshop: Writing on the Edge (2)
Seminar—2 hours. Reading and critiquing manuscript submissions. Discussing relevant work in the field of writing studies. Applying principles of professional editing. Developmental editing, copy-editing, and typesetting of accepted manuscripts. Soliciting articles and communicating with contributors. Students encouraged to enroll both quarters. May be repeated for credit. (S/U grading only.) Effective: 2013 Fall Quarter.

UWP 298—Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 2005 Fall Quarter.

UWP 299—Individual Study (1-12)
Workshop—1-12 hours. Prerequisite(s): Consent of Instructor. Graduate standing. (S/U grading only.) Effective: 2005 Fall Quarter.

UWP 390—Theory and Practice of Teaching University-Level Composition (4)
Extensive Writing; Seminar—3 hours. Open to graduate students teaching course 1 in the fall quarter following this course. Examination of current theories and practices in teaching of writing. Practical application to undergraduate writing courses. Emphasis on designing assignments and class sequences, and responding to student writing. Examination of impact of cultural, technological and theoretical changes on composition pedagogy. Effective: 2013 Fall Quarter.

UWP 392—Teaching Expository Writing (2)
Discussion—2 hours. Prerequisite(s): UWP 390; Graduate standing, appointment as Teaching Assistant in the Composition Program; or the equivalent of UWP 390. Discussion of problems related to teaching expository writing at the university level, with special emphasis on teaching reading and writing skills and responding to student papers. (S/U grading only.) Effective: 2005 Fall Quarter.

UWP 395—Teaching Multilingual Writers (4)
Seminar—3 hours. Prerequisite(s): Graduate standing or advanced undergraduate standing. Recommended: UWP 390, LIN 1, ENL/LIN/UWP 106. Preparing teachers of university-level second language writers, whether in composition courses or courses in other disciplines with a substantial writing component. Suitable for graduate students and advanced undergraduates. Effective: 2017 Fall Quarter.

UWP 396—Teaching Assistant Training Practicum (1-4)
Variable—1-4 hours. Prerequisite(s): Consent of Instructor. Graduate standing. May be repeated for credit for credit. (S/U grading only.) Effective: 2005 Fall Quarter.

VEN Viticulture & Enology

Courses in VEN:

VEN 002—Introduction to Viticulture (2)
Lecture—2 hours. Fundamental principles of biology and culture of the grapevine including taxonomy, morphology, physiology, distribution, domestication, utilization, propagation, production systems, harvesting, and storage and processing of grapes. Successful completion of the course should prepare students for upper division courses in viticulture. GE credit: SE. Effective: 1997 Winter Quarter.

VEN 003—Introduction to Winemaking (3)
Lecture—3 hours. Overview of the history of wine, viticulture, fermentation, winery operations, the physiology of wine consumption, wines produced in California and other major wine-producing regions and the sensory evaluation of wine. GE credit: SE, SS. Effective: 1997 Winter Quarter.

VEN 090X—Lower Division Seminar (2)
Extensive Writing; Seminar—1 hour; Term Paper. Prerequisite(s): Consent of Instructor. Lower division standing. Introduction to current issues surrounding wine and health as they relate to diet, nutrition, and toxicology. Effective: 1998 Winter Quarter.

VEN 099—Special Study for Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

VEN 101A—Viticultural Practices (3)
Discussion/Laboratory—3.5 hours; Lecture—1.5 hours. Prerequisite(s): VEN 002 Identification, cultivation, and use of the major wine, table, raisin, and rootstock cultivars. Includes practices specific to the fall such as fruit contracts, maturity sampling, harvesting, cover crops, and soil-pests. One field trip required. GE credit: SE. Effective: 2004 Fall Quarter.

VEN 101B—Viticultural Practices (3)
Discussion/Laboratory—3.5 hours; Lecture—1.5 hours. Prerequisite(s): VEN 002 Theory, principles, and practices of pruning and grapevine propagation. Plant materials and the certification process, weed control and weed identification, wood diseases, and frost protection. One field trip required. GE credit: SE. Effective: 2004 Winter Quarter.

VEN 101C—Viticultural Practices (3)
Discussion/Laboratory—3.5 hours; Lecture—1.5 hours. Prerequisite(s): VEN 002 Field oriented experience in the principles and practices of grapevine production, including vineyard establishment, vine training, trellising, canopy management practices, irrigation and water management, and methods of crop adjustment for improvement of fruit quality. One field trip required. GE credit: SE. Effective: 2004 Spring Quarter.

VEN 110—Grapevine Growth and Physiology (3)
Lecture—3 hours. Prerequisite(s): VEN 002 Botanical aspects including morphology and domestication will precede lectures covering flower development and energy budget concepts. Impact of physiological variables such as photosynthesis translocation, mineral nutrition, and water relations on fruit ripening and composition will be covered. GE credit: SE. Effective: 1997 Winter Quarter.

VEN 111—World Viticulture (3)
Lecture—3 hours. Prerequisite(s): Upper division standing. Study of the diversity of viticulture, both geographical and historical. History of grape growing and its spread throughout the world will be covered, along with discussions of current viticultural practices in different parts of the world, including California. GE credit: OL, SE, WE. Effective: 1997 Winter Quarter.

VEN 111L—Critical Evaluation of Wines of the World (1)
Discussion/Laboratory—3 hours. Prerequisite(s): VEN 111 (can be concurrent); VEN 125 C or better; VEN 111 required concurrently. Critical analysis of wines produced in different parts of the world with emphasis on the relationship between sensory properties of the wines and factors associated with their place of origin. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

VEN 115—Raisin and Table Grape Production (2)
Lecture—2 hours. Prerequisite(s): VEN 002 Overview of the raisin and table grape industries in California and other production areas of the world. Cultural practices associated with raisin and table grape production will also be discussed. GE credit: SE. Effective: 1997 Winter Quarter.

VEN 118—Grapevine Pests, Diseases and Disorders (3)
Lecture—3 hours. Prerequisite(s): VEN 002 Various pests and diseases of vineyards throughout California. Pest/disease identification and control methods (to include sampling techniques) also will be discussed. Integrated management approach to pest control methods will be emphasized. GE credit: SE. Effective: 1997 Winter Quarter.

VEN 123—Analysis of Musts and Wines (2) ***Review all entries***
Lecture—2 hours. Prerequisite(s): CHE 002C; CHE 008B; PLS 021 Fundamental principles of analytical chemistry as they relate to specific methods used in winemaking. GE credit: SE. Effective: 2018 Winter Quarter.

VEN 123—Analysis of Musts and Wines (2) ***Review all entries***
Lecture—2 hours. Prerequisite(s): CHE 002C; PLS 021; (CHE 008B or CHE 118B or CHE 128B) Fundamental principles of analytical chemistry as they relate to specific methods used in winemaking. GE credit: SE. Effective: 2018 Fall Quarter.

VEN 123L—Analysis of Musts & Wines Laboratory (2) ***Review all entries***
Independent Study—3 hours; Laboratory—3 hours. Prerequisite(s): VEN 123 (can be concurrent); CHE 002C; CHE 008B; PLS 021; Or equivalent of CHE 008B. Restricted to upper division and graduate students in Viticulture & Enology; others by approval of instructor. Fundamental principles of analytical chemistry as they relate to specific methods used in winemaking. Laboratory exercises demonstrating various chemical, physical and biochemical methods. Data will be analyzed and results interpreted in weekly lab reports; includes student-designed independent project and written report. GE credit: QL, SE, VL, WE. Effective: 2018 Winter Quarter.

VEN 123L—Analysis of Musts & Wines Laboratory (2) ***Review all entries***
Independent Study—3 hours; Laboratory—3 hours. Prerequisite(s): VEN 123 (can be concurrent); CHE 002C; PLS 021; (CHE 008B or CHE 118B or CHE 128B); Restricted to upper division and graduate students in Viticulture & Enology; others by approval of instructor. Fundamental principles of analytical chemistry as they relate to specific methods used in winemaking. Laboratory exercises demonstrating various chemical, physical and biochemical methods. Data will be analyzed and results interpreted in weekly lab reports; includes student-designed independent project and written report. GE credit: QL, SE, VL, WE. Effective: 2018 Fall Quarter.

VEN 124—Wine Production (2) ***Review all entries***
Lecture—2 hours. Prerequisite(s): VEN 003; VEN 123 (can be concurrent); BIS 102 Principles and practices of making standard types of wines, with special reference to grape varieties used and methods of vinification. GE credit: SE, WE. Effective: 2000 Fall Quarter.

VEN 124—Wine Production (2) ***Review all entries***
Lecture—2 hours. Prerequisite(s): VEN 003; VEN 123 (can be concurrent); (BIS 102 or BIS 105) Principles and practices of making standard types of wines, with special reference to grape varieties used and methods of vinification. GE credit: SE, WE. Effective: 2018 Fall Quarter.

VEN 124L—Wine Production Laboratory (3)
Independent Study—3 hours; Laboratory—3 hours; Term Paper—3 hours. Prerequisite(s): VEN 124 (can be concurrent) Restricted to undergraduates in fermentation science, viticulture & enology, biotechnology, microbiology, food science and applied plant biology majors; to graduate students in food science, agricultural and environmental chemistry and horticulture. Current technologies used in production of California table wines; analysis and monitoring of impact of fermentation variables on microbial performance and product quality; student-designed independent research project. GE credit: OL, SE, WE. Effective: 2000 Fall Quarter.

VEN 125—Wine Types and Sensory Evaluation (2)
Lecture—2 hours. Prerequisite(s): (PLS 120 or STA 106) Open to upper division and graduate students in Viticulture & Enology; others by approval of instructor. Principles of sensory evaluation and application to wines. Factors influencing wine flavor, data from sensory analysis of model solutions. GE credit: QL, SE. Effective: 2018 Spring Quarter.

VEN 125L—Sensory Evaluation of Wine Laboratory (2)
Laboratory—3 hours; Term Paper—3 hours. Prerequisite(s): VEN 125 (can be concurrent) Restricted to upper division major students in fermentation science or viticulture & enology; graduate students in the food science program. Sensory evaluation of wines and model systems using discrimination tests, ranking, descriptive analysis and time-intensity analysis. Data will be analyzed by appropriate statistical tests and the results interpreted in extensive weekly lab reports. GE credit: QL, SE, VL, WE. Effective: 2001 Winter Quarter.

VEN 126—Wine Stability (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): VEN 124 Restricted to viticulture & enology; fermentation science, applied plant biology majors; graduate students in food science, microbiology, horticulture and horticulture and agronomy groups. Principles of equilibria and rates of physical and chemical reactions in wines; treatment of unstable components in wines by adsorption, ion exchange, refrigeration, filtration, and membrane processes; and protein, polysaccharide, tartrate, oxidative and color stabilities. GE credit: SE. Effective: 2001 Winter Quarter.

VEN 126L—Wine Stability Laboratory (2) ***Review all entries***
Independent Study—3 hours; Laboratory—3 hours. Prerequisite(s): VEN 126 (can be concurrent); and Consent of Instructor. Restricted to upper division Fermentation Science, Viticulture & Enology majors, graduate students in the Food Science, Agricultural and Environmental Chemistry, Microbiology, or by consent of instructor. Practical application of principles of equilibria and rates of physical and chemical reactions to wine stability. GE credit: SE, WE. Effective: 2001 Winter Quarter.

VEN 126L—Wine Stability Laboratory (2) ***Review all entries***
Independent Study—3 hours; Laboratory—3 hours. Prerequisite(s): VEN 126 (can be concurrent); VEN 123L; and Consent of Instructor. Restricted to upper division Fermentation Science, Viticulture & Enology majors, graduate students in the Food Science, Agricultural and Environmental Chemistry, Microbiology, or by consent of instructor. Practical application of principles of equilibria and rates of physical and chemical reactions to wine stability. GE credit: SE, WE. Effective: 2019 Winter Quarter.

VEN 127L—Post-Fermentation Wine Processing Lab (3)
Laboratory—3 hours. Prerequisite(s): VEN 123; VEN 123L; VEN 126; VEN 126L; VEN 135 (can be concurrent); or Consent of Instructor. Restricted to upper division or graduate standing. Sensory and chemical impact of processing on wines; bench-scale analytical results to make and implement processing decisions; principles and theories of equipment operation and scale-up. Effective: 2018 Spring Quarter.

VEN 128—Wine Microbiology (2)
Lecture—2 hours. Prerequisite(s): (VEN 123, VEN 124); (MIC 102, FST 104, FST 104L); MIC 103L; VEN 125, VEN 126 recommended Nature, development, physiology, biochemistry and control of yeasts and bacteria involved in the making, aging and spoilage of wine. GE credit: SE. Effective: 2018 Winter Quarter.

VEN 128L—Wine Microbiology Laboratory (2)
Laboratory—6 hours. Prerequisite(s): VEN 123; VEN 124; VEN 128 (can be concurrent); FST 104; FST 104L; MIC 103L Restricted to upper division major students in fermentation science or viticulture & enology; graduate students in the food science program. Nature, development, physiology, biochemistry and control of yeasts and bacteria involved in the making, aging and spoilage of wine. GE credit: SE, VL, WE. Effective: 2018 Winter Quarter.

VEN 135—Wine Technology and Winery Systems (4)
Discussion/Laboratory—2 hours; Lecture—3 hours. Prerequisite(s): PLS 021; MAT 016A; MAT 016B; ((PHY 001A, PHY 001B) or PHY 007A) Process technologies and process systems that are used in modern commercial wineries. Lectures, demonstrations, problem solving sessions, and possible field trips. Includes grape preparation and fermentation equipment; post-fermentation processing equipment; winery utilities, cleaning systems, and waste treatment. GE credit: SE. Effective: 2018 Spring Quarter.

VEN 140—Distilled Beverage Technology (3)
Lecture—3 hours. Prerequisite(s): CHE 008B; FST 110A Distillation principles and practices; production technology of brandy,
whiskey, rum, vodka, gin, and other distilled beverages; characteristics of raw materials, fermentation, distillation, and aging. GE credit: QL, SE. Effective: 1997 Winter Quarter.

VEN 181—Readings in Enology (1)
Discussion—1 hour. Prerequisite(s): VEN 003 Critical evaluation of selected monographs in enology. Discussion leadership rotates among the students. May be repeated up to 3 time(s). (P/NP grading only.) GE credit: SE. Effective: 2002 Spring Quarter.

VEN 190X—Winemaking Seminar (1)
Discussion—1 hour; Seminar—1 hour. Prerequisite(s): VEN 003 Open to Viticulture & Enology majors and graduate students. Outside speakers on a specific winemaking topic chosen for the quarter. Discussion with the speaker hosted by the faculty member(s) in charge. May be repeated up to 3 time(s). (P/NP grading only.) GE credit: SE. Effective: 2002 Spring Quarter.

VEN 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Work experience related to Fermentation Science (Enology) or Plant Science (Viticulture) majors. Internships must be approved and supervised by a member of the department or major faculty, but are arranged by the student. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

VEN 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 1997 Winter Quarter.

VEN 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) GE credit: SE. Effective: 1997 Winter Quarter.

VEN 200—Introduction to Scientific Methods (2)
Lecture/Discussion—1 hour; Term Paper—1 hour. Prerequisite(s): Graduate standing or consent of instructor. Processes involved in conducting scientific research. Topics covered will include conducting literature review, formulating hypotheses, and analyzing and reporting results. Students will complete an annotated bibliography and complete a written and oral research proposal. Effective: 2000 Spring Quarter.

VEN 210—Grape Development and Composition (3)
Discussion—1 hour; Lecture—2 hours. Prerequisite(s): (BIS 102, BIS 103) or BIS 105 Anatomy, physiology and biochemistry of grape berry development, with emphasis on the development of grape composition relevant to winemaking. Effective: 2018 Winter Quarter.

VEN 215—Sensometrics (3)
Lecture—3 hours. Prerequisite(s): FST 117; ((VEN 125, VEN 125L) or (FST 107A or FST 107B)); Or equivalent to course FTS 117. Experimental design and statistical analysis, including multivariate analysis, for both sensory and instrumental data in enology and food-related studies. Effective: 2004 Fall Quarter.

VEN 216—Sustainable Vineyard Development (5)
Fieldwork—3 hours; Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): (VEN 101A, VEN 101B, VEN 101C); (VEN 115 or VEN 118); or Consent of Instructor. Application of plant, meteorological, soil, water, GIS, and economic sciences to sustainable vineyard development. Preparation of a comprehensive study to determine the viticultural and economic feasibility of a given site for raisin, table, or wine grape production. Effective: 2017 Fall Quarter.

VEN 217—Field and GIS Evaluation of Soils (3)
Fieldwork—3 hours; Lecture/Lab—4 hours. Prerequisite(s): PLS 120; (PLS 205 or PLS 206); (SSC 100 or SSC 105 or SSC 107); VEN 101C; Consent of Instructor. ABT 180 is recommended. Principles and practices used to evaluate agricultural soils in the field, including soil pits, soil cores, electrical conductivity meters, ground penetrating radar, geomorphology and surface terrain analysis. Use of geographic information sciences, soil databases, digital elevation models and geostatistics. Effective: 2011 Fall Quarter.

VEN 219—Natural Products of Wine (3)
Lecture—3 hours. Prerequisite(s): VEN 123; VEN 124; and Consent of Instructor. Or natural products background. Structure, occurrence, and changes due to wine production to the natural products found in wine. Chemicals with a sensory impact will be emphasized, including flavonoids and other phenolics, terpenes and norisoprenoids, pyrazines, oak volatiles and other wine constituents. Effective: 1997 Winter Quarter.

VEN 223—Instrumental Analysis of Must and Wine (4)
Discussion—1 hour; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): VEN 123 or FST 103; BIS 102 and BIS 103 or BIS 105, CHE 107B or CHE 115 recommended. Open to upper division students in Viticulture & Enology, Food Science and Technology; students in Food Science, Ag & Environmental Chemistry and Viticulture & Enology graduate groups. Theory and practice of instrumental analysis of wines and musts. mphasis on the principles of analytical techniques (e.g., CE, GC, HPLC, Mass Spectrometry) and factors determining correct choice of instrumental method. Effective: 2011 Fall Quarter.

VEN 224—Advances in the Science of Winemaking (3)
Lecture—3 hours. Prerequisite(s): VEN 125; VEN 126; or Consent of Instructor. Graduate standing. Selected topics in the science and technology of winemaking. Topics will be drawn from current research of participating enology and viticulture faculty. Critical analysis of the technical content of published material will be emphasized. Effective: 2001 Spring Quarter.

VEN 225—Advanced Sensory Analysis of Wines (3)
Laboratory—4 hours; Lecture/Discussion—2 hours. Prerequisite(s): ((VEN 124, VEN 125) or FST 107); AMR 120; Or the equivalent. Sensory descriptive analysis experiments will be designed and conducted using standard sensory science methods.Data will be analyzed by analyses of variance, principal component analyses and generalized Procrustes analysis to evaluate the judges performance and interpret the significance of the results. Effective: 1997 Winter Quarter.

VEN 235—Winery Design (4)
Discussion—1 hour; Independent Study; Lecture—2 hours. Prerequisite(s): VEN 124; VEN 135; or Consent of Instructor. Design of wineries. Includes process calculations, equipment selection, process layout and building choice and siting. Project scheduling, capital costs, and ten-year cash flow analysis for the winery. One field trip required. Effective: 2005 Winter Quarter.

VEN 270—Critical Evaluation of Scientific Literature (2)
Discussion—2 hours. Prerequisite(s): Consent of Instructor. Contemporary research topics in biological sciences. Discussion of recent research articles in a special topic area chosen by instructor. Intended to develop skills in critical evaluation of scientific publications. May be repeated for credit. (S/U grading only.) Effective: 2000 Winter Quarter.

VEN 290—Seminar (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

VEN 290C—Advanced Research Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Planning and results of research programs, proposals, and experiments. Discussion and critical evaluation of original research being conducted by the group. Discussion led by individual research instructors for research group. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

VEN 291—Advanced Viticulture (2)
Lecture/Discussion—2 hours. Prerequisite(s): VEN 110; VEN 116; VEN 124; VEN 125; VEN 210 recommended. Critical evaluation of scientific and popular literature on selected topics of current interest that relate viticulture to fruit or wine sensory attributes or quality. May be repeated up to 1 time(s). Effective: 2000 Winter Quarter.

VEN 292—Advanced Internship (1-15)
Internship—3-45 hours; Variable. Prerequisite(s): VEN 123; VEN 123L; VEN 124; VEN 124L; VEN 125; VEN 125L; VEN 126; VEN 126L; VEN 128; VEN 128L; and Consent of Instructor. Restricted to Viticulture & Enology Graduate Group graduate students. Work experience related to Fermentation Science (Enology) or Plant Science (Viticulture) majors. Internships must be approved and supervised by a graduate group faculty member or students major professor, but are arranged by the student. May be repeated up to 15 unit(s). (S/U grading only.) Effective: 2010 Winter Quarter.

VEN 297T—Tutoring in Viticulture and Enology (1-5)
Variable. Prerequisite(s): Consent of Instructor. Graduate standing. Designed for graduate students who desire teaching experience, but are not teaching assistants. Student contact primarily in laboratory or
discussion sections, and under direction of a faculty member. (S/U grading only.) Effective: 1997 Winter Quarter.

VEN 298—Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

VEN 299—Research (1-12)
Variable. Prerequisite(s): Consent of Instructor. (S/U grading only.) Effective: 1997 Winter Quarter.

VEN 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 1997 Winter Quarter.

VET VM - School of Veterinary Medicine

Courses in VET:

VET 299—Research (1-15)
Variable—1-15 hours. Prerequisite(s): First-, second- and third-year standing in the School of Veterinary Medicine. Research May be repeated up to 6 time(s). (S/U grading only.) Effective: 2012 Fall Semester.

VET 400—Professional and Clinical Skills -- Y1 (2-18)
Variable—2-18 hours. Prerequisite(s): First-year standing in the School of Veterinary Medicine. Outline expectations and skill set required to participate successfully in the DVM curriculum as well as providing learning opportunity in communication, team-building, leadership, conflict management, stress management, critical thinking, professional behaviors, history taking, physical examination skills and medical record keeping. (S/U grading only.) Effective: 2012 Fall Semester.

VET 401—Basic Foundations (2-18)
Variable—2-18 hours. Prerequisite(s): First-year standing in the School of Veterinary Medicine. Essential basic information regarding histology, general pathology, biochemistry, pharmacology and population health that is foundational to all blocks. (S/U grading only.) Effective: 2011 Fall Semester.

VET 402—Heme/Lymph/Coag (2-18)
Variable—2-18 hours. Prerequisite(s): First-year standing in the School of Veterinary Medicine. The lexicon, morphology, production, structure and function of peripheral blood cells, their bone marrow precursors and the lymphoid system, the process and regulation of hemostasis, and the laboratory evaluation of all of these in health and disease. Effective: 2011 Fall Semester.

VET 403—Musculoskeletal (2-18)
Variable—2-18 hours. Prerequisite(s): First-year standing in the School of Veterinary Medicine. Anatomy, histology, and physiology necessary for understanding form and function of the bones, joints, muscles, and tendons in producing locomotion; and the pathologic processes that produce typical responses to injury of musculoskeletal structures in domestic animals. Effective: 2014 Fall Semester.

VET 404—Neuroscience/Senses/Behavior (2-18)
Variable—2-18 hours. Prerequisite(s): First-year standing in the School of Veterinary Medicine. Establish a basis for clinical neurology, ophthalmology, and behavior by providing an integrated study of normal neurobiology, neuroanatomy, neurophysiology, neuropathology, neurpharmacology, neurotoxicology, ophthalmology and behavior. Effective: 2012 Spring Semester.

VET 405—Gastrointestinal/Metabolism (2-18)
Variable—2-18 hours. Prerequisite(s): First-year standing in the School of Veterinary Medicine. Examine interrelatedness and functions of the organs associated with the gastrointestinal tract. Applied problems in pharmacology, physical examination, diagnostic testing, and imaging are used to reinforce a basic understanding of organ anatomy, physiology, pathophysiology, and nutrition/metabolism. Effective: 2012 Spring Semester.

VET 406—Pharmacology/Nutrition/Toxicology (2-18)
Variable—2-18 hours. Prerequisite(s): Consent of Instructor. First-year standing in the School of Veterinary Medicine. Basic principles of nutrition and toxicology as well as pathophysiologic changes, diagnostic procedures and treatments of nutritional diseases and intoxications of domestic animals and wildlife. Incorporate case examples and directed self-learning to reinforce important concepts. Effective: 2015 Fall Semester.

VET 407—VMTH Rotation -- Y1 (1.5)
Clinical Activity—15 hours. Prerequisite(s): First-year standing in the School of Veterinary Medicine. Integrate basic and preclinical material working with senior student in a clinical environment. (S/U grading only.) Effective: 2012 Fall Semester.

VET 408—Cardiology/Respiratory (2-18)
Variable—2-18 hours. Prerequisite(s): Second-year standing in the School of Veterinary Medicine. Normal cardiovascular and respiratory system biology and the integrated response of those systems to injury or disease. Effective: 2012 Fall Semester.

VET 409—Renal/Urinary (2-18)
Variable—2-18 hours. Prerequisite(s): Second-year standing in the School of Veterinary Medicine. Examine and explore the normal morphology (gross and microscopic), physiology, pathology and imaging of the upper and lower urinary tract in multiple species. Effective: 2012 Fall Semester.

VET 410—Endocrinology/Reproduction (2-18)
Variable—2-18 hours. Prerequisite(s): Second-year standing in the School of Veterinary Medicine. Anatomy and histology of endocrine glands and reproductive systems in males and females. Understand the physiology and pathology at the molecular, cellular and organismal level. Effective: 2013 Fall Semester.

VET 411—Skin (2-18)
Variable—2-18 hours. Prerequisite(s): Second-year standing in the School of Veterinary Medicine. Structure and function of the skin and specialized keratinized structures in veterinary species. Review mechanisms by which skin responds to perturbations and discuss wound healing and skin pathology. Effective: 2012 Fall Semester.

VET 412—Oncology (2-18)
Variable—2-18 hours. Prerequisite(s): Second-year standing in the School of Veterinary Medicine. Basic mechanisms, etiology, causes and the approach to diagnosis and treatment of cancer with emphasis on veterinary patients. Effective: 2012 Fall Semester.

VET 413—Immunology/Infectious Disease (2-18)
Variable—2-18 hours. Prerequisite(s): Second-year standing in the School of Veterinary Medicine. Integrate immunology, microbiology, virology, parasitology of common infectious, zoonotic and foreign animal diseases. Effective: 2012 Fall Semester.

VET 414—Population Health (2-18)
Variable—2-18 hours. Prerequisite(s): Second-year standing in the School of Veterinary Medicine. Principles of evidence-based medicine, study design and inference, and disease transmission in populations. Topics include biostatistics, outbreak investigation and response, diagnostic tests, vaccine strategies, food safety, foreign animal diseases, and impact of environmental health on animals and humans. Effective: 2012 Fall Semester.

VET 415—Clinical Foundations (2-18)
Variable—2-18 hours. Prerequisite(s): Second-year standing in the School of Veterinary Medicine. Essential concepts that are shared across year three blocks to include foundational material in anesthesia, surgery and emergency medicine with cases that include interpretation of clinical pathology and imaging. Effective: 2012 Fall Semester.

VET 416—VMTH Rotation - Y2 (1.5)
Clinical Activity—15 hours. Prerequisite(s): Second-year standing in the School of Veterinary Medicine. Integrate basic and preclinical material working with a senior student in a clinical environment. (S/U grading only.) Effective: 2012 Fall Semester.

VET 417—Professional and Clinical Skills -- Y2 (2-18)
Variable—2-18 hours. Prerequisite(s): Second-year standing in the School of Veterinary Medicine. Continue to build on foundations from freshman year in communication, history-taking, client interactions, team-building, conflict and stress management and professional behaviors. (S/U grading only.) Effective: 2012 Fall Semester.

VET 430—Core Stream (2-18)
Variable—2-18 hours. Prerequisite(s): Third-year standing in the School of Veterinary Medicine. Longitudinal stream to include law, ethics, regulatory medicine, business, communication and disaster medicine. (S/U grading only.) Effective: 2014 Fall Semester.

VET 431—Anesthesia and Surgical Stream (2-18)
Variable—2-18 hours. Prerequisite(s): Third-year standing in the School of Veterinary Medicine. Introduction to surgical anatomy, operative and anesthetic skills. (S/U grading only.) Effective: 2013 Fall Semester.

VET 432A—Comparative Stream I (2-18)
Variable—2-18 hours. Prerequisite(s): Third-year standing in the School of Veterinary Medicine. Approach commonly encountered diseases and medical problems across multiple species. Development of problem-solving skills related to the medical problems of all species from the level of individual animals to groups/herds/populations. (S/U grading only.) Effective: 2013 Fall Semester.

VET 432B—Comparative Stream II (2-18)
Variable—2-18 hours. Prerequisite(s): Third-year standing in the School of Veterinary Medicine. Approach commonly encountered diseases and medical problems across multiple species. Development of problem-solving skills related to the medical problems of all species from the level of individual animals to groups/herds/populations. (S/U grading only.) Effective: 2013 Fall Semester.

VET 432C—Comparative Stream III (2-18)
Variable—2-18 hours. Prerequisite(s): Third-year standing in the School of Veterinary Medicine. Approach commonly encountered diseases and medical problems across multiple species. Development of problem-solving skills related to the medical problems of all species from the level of individual animals to groups/herds/populations. (S/U grading only.) Effective: 2014 Spring Semester.

VET 433A—Small Animal Stream I (2-18)
Variable—2-18 hours. Prerequisite(s): Third-year standing in the School of Veterinary Medicine. Clinical manifestations, diagnostic methods, and the medical and surgical approaches to the infectious, musculoskeletal, neurologic and ophthalmologic diseases of small animals. Effective: 2013 Fall Semester.

VET 433B—Small Animal Stream II (2-18)
Variable—2-18 hours. Prerequisite(s): Third-year standing in the School of Veterinary Medicine. Clinical manifestations, diagnostic methods, and the medical and surgical approaches to the dermatologic, dental, and gastrointestinal diseases of small animals as well as preventative medicine and nutrition. Effective: 2013 Fall Semester.

VET 433C—Small Animal Stream III (2-18)
Variable—2-18 hours. Prerequisite(s): Third-year standing in the School of Veterinary Medicine. Clinical manifestations, diagnostic methods, and the medical and surgical approaches to the cardiorespiratory, endocrine, and urinary medicine as well as diagnosis and therapy of oncologic diseases in small animals. Introduction to companion, avian, and exotic pet medicine and surgery. Effective: 2014 Spring Semester.

VET 434A—Large Animal Stream I (2-18)
Variable—2-18 hours. Prerequisite(s): Third- and/or fourth-year standing in the School of Veterinary Medicine. Fundamentals of entry level large animal medicine and surgery to promote development of problem-solving skills for diagnosis, treatment and control of various disease conditions. Effective: 2013 Fall Semester.

VET 434B—Large Animal Stream II (2-18)
Variable—2-18 hours. Prerequisite(s): Third- and/or fourth-year standing in the School of Veterinary Medicine. Continuation of fundamentals of entry level large animal medicine and surgery to promote development of problem-solving skills for diagnosis, treatment and control of various disease conditions. Effective: 2013 Fall Semester.

VET 435A—Large Animal Stream--Equine Emphasis (2-18)
Variable—2-18 hours. Prerequisite(s): Third- and/or fourth-year standing in the School of Veterinary Medicine. Fundamental and advanced levels of equine medicine, surgery, lameness and reproduction. Focus on management of individual equids. Effective: 2014 Spring Semester.

VET 435B—Large Animal Stream--Livestock Emphasis (2-18)
Variable—2-18 hours. Prerequisite(s): Third- and/or fourth-year standing in the School of Veterinary Medicine. Fundamental and advanced levels of livestock medicine and surgery of individual animals and population health. Focus on all livestock species including cattle, sheep, goats, pigs and poultry. Effective: 2014 Spring Semester.

VET 435C—Large Animal Stream--Zoological Medicine Emphasis (2-18)
Variable—2-18 hours. Prerequisite(s): Third- and/or fourth-year standing in the School of Veterinary Medicine. Taxon- and topic-based approach to learning zoological medicine. Anatomy, physiology, nutrition, management, anesthesia, medicine, surgery and pathology on non-domestic free-ranging and captive species. Effective: 2014 Spring Semester.

VET 436—Companion Small Mammals (2-18)
Variable—2-18 hours. Prerequisite(s): Third-year standing in the School of Veterinary Medicine. Fundamental understanding of the etiology, clinical presentation, diagnostic evaluation, treatment, prevention, and control of medical diseases of companion small exotic mammals. Effective: 2014 Spring Semester.

VET 437—Reptile and Avian Health (2-18)
Variable—2-18 hours. Prerequisite(s): Third-year standing in the School of Veterinary Medicine. Organized by organ systems to present reptile and avian health issues. Overview of applied anatomy, physiology and clinical pathology of common species will be provided through laboratory opportunities and discussion of common diseases and treatments. Effective: 2014 Spring Semester.

VET 438—Poultry (2-18)
Variable—2-18 hours. Prerequisite(s): Third-year standing in the School of Veterinary Medicine. Introduction to practical poultry medicine. Gross pathology, biosecurity and basic diagnostic tests. Visits to hatcheries, broiler, layer and turkey farms. Effective: 2014 Spring Semester.

VET 439—Laboratory Animal (2-18)
Variable—2-18 hours. Prerequisite(s): Consent of Instructor. Third-year standing in the School of Veterinary Medicine. Basics of laboratory animal medicine including diseases, medicine, and surgery and comparative biology of the most common species and introduction to regulations. Combination of lecture, wet labs, and projects. Effective: 2017 Spring Semester.

VET 440—Business and Communication (1.5)
Discussion—1.5 hours. Prerequisite(s): Third- and fourth year standing in the School of Veterinary Medicine. Develop professional communication and business skills that are directly applicable in veterinary clinical practice by actively participating in a wide variety of interactive learning opportunities. (S/U grading only.) Effective: 2014 Spring Semester.

VET 441—Clinical Pathology (1.5)
Discussion—1.5 hours. Prerequisite(s): Third- and fourth year standing in the School of Veterinary Medicine. Application of problem-solving and microscopy skills to laboratory data and laboratory specimens. Sections to include hematology, immunology, body fluids, exfoliative cytology, urinalysis, microbiology and clinical chemistry data and interpretation. (S/U grading only.) Effective: 2014 Spring Semester.

VMB VM - Molecular Biosciences

Courses in VMB:

VMB 092—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Work experience off and on campus in all subject areas offered in the Department of Molecular Biosciences. Internships supervised by a member of the faculty. May be repeated for credit. (P/NP grading only.) Effective: 2003 Fall Quarter.

VMB 101V—Principles of Pharmacology and Toxicology (3)
Auto Tutorial—2 hours; Project (Term Project)—1.5 hours; Web Electronic Discussion—1.5 hours; Web Virtual Lecture—0.25 hours. Prerequisite(s): Consent of Instructor. Upper division standing in a science major; chemistry through organic chemistry, general biology, or consent of instructor; good standing with the university; computing capability (use MS Word®, Excel®, PowerPoint, menu driven software programs, Course LMS); own a computer or have ready access to a computer with broadband internet access; Neurobiology, Physiology, and Behavior 101 and Biological Sciences 104 recommended. The course is designed for advanced undergraduate students with interests in pursuing graduate degrees in pharmacology, toxicology, physiological sciences, and for students with an interest in pursuing DVM, MD, Pharmacy, Dentistry and Nursing professional degrees. Students who pursue careers in environmental sciences, public health management, and epidemiology may also benefit from the subject matter presented in this course. Online course will provide training in core concepts of pharmacological and toxicological sciences and prepare students to develop higher-order problem solving and critical thinking skills. GE credit: OL, SE, SL. Effective: 2016 Fall Quarter.

VMB 101Y—Principles of Pharmacology and Toxicology (3)
Auto Tutorial—5 hours; Discussion/Laboratory—1.5 hours; Web Electronic Discussion—0.5 hours; Web Virtual Lecture—1 hour. Prerequisite(s): Upper division standing in a science major; Chemistry through organic chemistry and general biology, or consent from instructor; good standing with university; computing capability using MS Word, Excel, and PowerPoint, menu driven software programs, SmartSite; computer, or ready access to a computer, with broadband Internet access. Restricted to upper division undergraduate students in good standing with school and fulfill course prerequisites. Hybrid course provides training in core concepts of pharmacological and toxicological sciences. Develop higher-order problem solving and critical thinking skills. GE credit: OL, SE, SL. Effective: 2013 Fall Quarter.

VMB 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Work experience off and on campus in all subject areas offered by the Department of Molecular Biosciences. Internships supervised by a member of the faculty. May be repeated for credit. (P/NP grading only.) Effective: 2003 Fall Quarter.

VMB 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

VMB 234—Current Topics in Neurotoxicology (3)
Lecture—3 hours. Prerequisite(s): Core courses in one of the following graduate programs: Pharmacology and Toxicology, Agricultural and Environmental Chemistry, Biochemistry and Molecular Biology, Cell and Developmental Biology, Immunology, Molecular Cellular and Integrative Physiology or Neuroscience. Restricted to upper level undergraduate students must obtain permission from the course coordinator. General principles of neurotoxicology, the cell and molecular mechanisms and health impacts of specific neurotoxicants and the contribution of neurotoxic compounds to complex neurodevelopmental disorders and neurodegenerative diseases. (Environmental Toxicology 234 and Molecular, Cellular, and Integrative Physiology 234.) Effective: 2010 Fall Quarter.

VMB 253—Metabolism of Toxicants and Drugs (2)
Lecture—2 hours. Prerequisite(s): PTX 201; PTX 202; PTX 203; General biochemistry or consent of instructor. Significance/chemical pathways of toxicants and drug metabolism, enzymology and molecular aspects of P450 and flavin monooxygenases,
hydrolases and phase 2 transferases and experimental approaches for metabolism studies. Effective: 1997 Winter Quarter.

VMB 254—Toxicology of the Respiratory System (3)
Discussion; Lecture—3 hours. Prerequisite(s): PTX 201; PTX 202; PTX 203; or Consent of Instructor. Survey of structure and function of the respiratory system, the pathophysiology of major lung diseases, the interactions of toxicants with the lung and response of this organ to injury. Effective: 2006 Winter Quarter.

VMB 255—Pharmacokinetics and Biopharmaceuticals (2)
Discussion—4 hours; Lecture—16 hours. In-depth study of pharmacokinetics, including the fundamentals of pharmacokinetics, how to design a pharmacokinetic study and how to use both compartmental and non-compartmental analysis to interpret the data. Effective: 2011 Spring Quarter.

VMB 290—Seminar (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing. Topics in nutrition, pharmacology/toxicology, and biochemistry. May be repeated for credit. (S/U grading only.) Effective: 2003 Fall Quarter.

VMB 297T—Tutoring in Graduate Molecular Biosciences (1-5)
Practice—1-5 hours. Prerequisite(s): Consent of Instructor. Graduate or professional student standing. Assist in preparation and teaching of courses in Nutrition, Pharmacology and Toxicology, or other courses offered by the department under direct supervision of the instructor. Designed for graduate or professional students who desire teaching experience in graduate courses. May be repeated up to 5 unit(s). (S/U grading only.) Effective: 2003 Winter Quarter.

VMB 298—Group Study (1-5)
Variable—3-15 hours. May be repeated for credit. (S/U grading only.) Effective: 2005 Winter Quarter.

VMB 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

VMB 397T—Tutoring in Molecular Biosciences (1-5)
Discussion—1-5 hours. Prerequisite(s): Consent of Instructor. Graduate or professional student standing. Experience in professional curriculum for graduate or professional students, not teaching assistants, under direct supervision of instructor. May be repeated up to 5 unit(s). (S/U grading only.) Effective: 2003 Fall Quarter.

VME VM - Medicine and Epidemiology

Courses in VME:

VME 057V—Global Population, Health, and Environment (4)
Web Electronic Discussion—2 hours; Web Virtual Lecture—2 hours. Students critically examine multi-scale processes involving human, animal, and ecosystem health. Online team and independent work engage local and global topics around population pressures on environments and environmental pressures on populations. Effective: 2017 Spring Quarter.

VME 158—Infectious Disease in Ecology and Conservation (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B; BIS 002C; or equivalent. EVE 100 is recommended. Introduction to the dynamics and control of infectious disease in wildlife, including zoonotic diseases and those threatening endangered species. Basic epidemiological models and application to field data. Scientists' role in developing disease control policies. Effective: 2017 Winter Quarter.

VME 198—Directed Group Study (1-5)
Variable—3-15 hours. May be repeated for credit. (P/NP grading only.) Effective: 2007 Fall Quarter.

VME 199—Special Studies for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

VME 217—Evaluation and Use of Diagnostic Tests (2)
Discussion—3 hours; Laboratory—6 hours; Lecture—14 hours. Prerequisite(s): MPM 205 or EPI 205; Consent of Instructor. Class size limited to 30 students. Clinical and epidemiologic properties and application of diagnostic tests for disease, with emphasis on selecting tests; validating, evaluating, and interpreting new tests individually and in aggregate; determining cutoff values; and developing testing strategies. Effective: 2017 Winter Quarter.

VME 225—Viral Pathogenesis Seminar/Journal Club (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Graduate student status in the Comparative Pathology, Microbiology or Immunology graduate groups. Participatory seminar addressing the mechanisms of retroviral pathogenesis in a journal club format. Focus on the review of current scientific journal papers concerning viral pathogenesis, immunology and virology with a special focus on retroviruses. May be repeated up to 12 time(s). (S/U grading only.) Effective: 2017 Winter Quarter.

VME 258—Infectious Disease in Ecology and Conservation (1)
Discussion—2 hours. Prerequisite(s): VME 158 must be taken concurrently. Presentation, analysis and discussion of primary literature on the dynamics and control of infectious disease in wildlife, including zoonotic diseases and those threatening endangered species. Multidisciplinary approach combines perspectives of ecology and veterinary medicine. Effective: 2008 Winter Quarter.

VME 298—Group Study (1-5)
Variable. Prerequisite(s): Student in School of Veterinary Medicine or consent of instructor. Group study in selected areas of the clinical sciences. (S/U grading only.) Effective: 1997 Winter Quarter.

VME 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

VSR VM - Surgical & Radiological Sci

Courses in VSR:

VSR 099—Special Study for Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2005 Fall Quarter.

VSR 199—Special Study for Advanced Undergraduates (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. May be repeated for credit. (P/NP grading only.) Effective: 2005 Fall Quarter.

VSR 298—Group Study (1-5)
Variable—3-15 hours. Prerequisite(s): Consent of Instructor. Group study. May be repeated for credit. (S/U grading only.) Effective: 2005 Fall Quarter.

VSR 299—Research (1-12)
Variable—3-36 hours. Prerequisite(s): Consent of Instructor. May be repeated for credit. (S/U grading only.) Effective: 2005 Fall Quarter.

WAS UC Davis Washington Center

Optional elective courses listed at http://www.ucdc.edu/academic/courses.

Courses in WAS:

WAS 187—Gun Violence (4)
Lecture/Discussion—4 hours. Restricted to students attending UC Washington Center program. Gun violence, viewed from the perspectives of criminology and public health. Topics include personal and societal contributing factors and critical assessment of potential solutions. Effective: 2002 Spring Quarter.

WAS 192—Internship in the UC Davis Washington Program (8)
Internship—32 hours. Prerequisite(s): WAS 193 (can be concurrent); Junior or senior standing, admission in the UC Davis Washington Program. WAS 193 required concurrently. Internship in Washington, DC with associated, supervised research project. (P/NP grading only.) Effective: 2014 Fall Quarter.

WAS 193—Washington Center Research Seminar (4)
Independent Study—3 hours; Lecture/Discussion—1 hour; Tutorial—0.5 hours. Prerequisite(s): WAS 192 (can be concurrent) Core academic component of Washington Program. Topics coordinated with internships. Research draws on resources uniquely available in Washington, DC. Supervised preparation of extensive paper. (Political Science 193W.) GE credit: OL, SS, WE. Effective: 2002 Spring Quarter.

WFC Wildlife, Fish & Conservation Biology

Courses in WFC:

WFC 010—Wildlife Ecology and Conservation (4)
Discussion—1 hour; Lecture—3 hours. Introduction to the ecology and conservation of vertebrates. Complexity
and severity of world problems in conserving biological diversity. GE credit: SE, SL, WE. Effective: 1997 Winter Quarter.

WFC 011—Introduction to Conservation Biology (3)
Lecture—3 hours. Introduction to conservation biology and background to the biological issues and controversies surrounding loss of species and habitats for students with no background in biological sciences. GE credit: SE, SL. Effective: 2003 Spring Quarter.

WFC 050—Natural History of California's Wild Vertebrates (3)
Discussion—1 hour; Lecture—2 hours. Examination of the natural history of California's wild vertebrates (fish, amphibians, reptiles, birds, and mammals), including their biogeography, systematics, ecology and conservation status. GE credit: SE, SL, WE. Effective: 2009 Winter Quarter.

WFC 051—Introduction to Conservation Biology (3)
Lecture—3 hours. Introduction to conservation biology including both biological and social issues related to the loss of species and habitats. Intended for students with no background in biological sciences. GE credit: SE, SL. Effective: 2017 Spring Quarter.

WFC 092—Internship (1-6)
Internship—3-18 hours. Prerequisite(s): Consent of Instructor. Lower division standing. Work experience off and on campus in all subject areas offered in the
department. Internships supervised by a member of the faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

WFC 099—Special Study for Undergraduates (1-5)
Variable—1-5 hours. Prerequisite(s): Consent of Instructor. Special study for undergraduates. (P/NP grading only.) Effective: 2010 Winter Quarter.

WFC 100—Field Methods in Wildlife, Fish, & Conservation Biology (4)
Fieldwork—3 hours; Laboratory—3 hours; Lecture—2 hours. Prerequisite(s): EVE 101 (can be concurrent) or ESP 100 (can be concurrent); (BIS 002A, BIS 002B, BIS 002C); and Consent of Instructor. Or equivalent course of EVE 101 or ESP 100 (can be taken concurrently). Introduction to field methods for monitoring and studying wild vertebrates and their habitats, with an emphasis on ecology and conservation. Required weekend field trips. GE credit: SE. Effective: 2017 Spring Quarter.

WFC 101—Field Research in Wildlife Ecology (2)
Lecture/Discussion—2 hours. Prerequisite(s): Consent of Instructor. One upper division course in each of ecology, statistics, and either ornithology, mammalogy, or herpetology. Field research in ecology of wild vertebrates in terrestrial environments; formulation of testable hypotheses, study design, introduction to research methodology, oral and written presentation of results. Limited enrollment. GE credit: SE, VL, WE. Effective: 2017 Winter Quarter.

WFC 101L—Field Research in Wildlife Ecology: Laboratory (4)
Fieldwork—15 hours; Lecture/Discussion—2 hours. Prerequisite(s): WFC 101 (can be concurrent); and Consent of Instructor. Limited enrollment. Field research in ecology of wild vertebrates in terrestrial environments; testing ecological hypotheses through field research, application of research methodology, supervised independent research projects. Held between Labor Day and fall quarter. Effective: 2017 Winter Quarter.

WFC 102—Field Studies in Fish Biology (1)
Lecture/Discussion—1 hour. Prerequisite(s): Consent of Instructor. Upper division course in each of ecology, aquatic biology, fish biology, and statistics. Emphasis on theory of quantitative fish capture methods and design of individual research projects on ecology, behavior, physiology or population biology of fishes. Effective: 1997 Winter Quarter.

WFC 102L—Field Studies in Fish Biology: Laboratory (6)
Discussion/Laboratory—3 hours; Fieldwork—15 hours; Laboratory—12 hours. Prerequisite(s): WFC 102 (can be concurrent); and Consent of Instructor. Field investigations of fish biology are emphasized including quantitative capture methods and individual research projects on ecology, behavior, physiology or population biology of fishes at the field site in relation to their habitats. GE credit: SE, WE. Effective: 2017 Winter Quarter.

WFC 110—Biology and Conservation of Wild Mammals (3)
Lecture—3 hours. Prerequisite(s): (BIS 002A, BIS 002B, BIS 002C); (EVE 101 (can be concurrent) or ESP 100 (can be concurrent)); Or equivalent course to ESP 100 or EVE 101. Origins, evolution, diversification, and geographical and ecological distributions of mammals. Morphological, physiological, reproductive, and behavioral adaptations of mammals to their environment. Effective: 2017 Winter Quarter.

WFC 110L—Laboratory in Biology and Conservation of Wild Mammals (3)
Laboratory—6 hours. Prerequisite(s): WFC 110 (can be concurrent); and Consent of Instructor. Limited enrollment. Laboratory exercises in the morphology, systematics, species identification, anatomy, and adaptations of wild mammals to different habitats. Effective: 2017 Winter Quarter.

WFC 111—Biology and Conservation of Wild Birds (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B; BIS 002C; Upper division ecology course recommended. Phylogeny, distribution, migration, reproduction, population dynamics, behavior and physiological ecology of wild birds. Emphasis on adaptations to environments, species interactions, management, and conservation. GE credit: SE. Effective: 2017 Winter Quarter.

WFC 111L—Laboratory in Biology and Conservation of Wild Birds (3)
Fieldwork—3 hours; Laboratory—6 hours. Prerequisite(s): WFC 111 (can be concurrent); and Consent of Instructor. Limited enrollment. Laboratory exercises in bird species identification, anatomy, molts, age and sex, specialized adaptations, behavior, research, with emphasis on conservation of wild birds. Several weekend field trips, after class bird walks, and independent bird study are required. Limited enrollment. Effective: 2017 Winter Quarter.

WFC 120—Biology and Conservation of Fishes (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B; BIS 002C; Upper division ecology course recommended. Evolution, ecology, and conservation of marine and freshwater fishes. Effective: 2017 Winter Quarter.

WFC 120L—Laboratory in Biology and Conservation of Fishes (2)
Laboratory—3 hours. Prerequisite(s): WFC 120 (can be concurrent); and Consent of Instructor. Limited enrollment. Morphology, taxonomy, conservation, and identification of marine and freshwater fishes with emphasis on California species. Effective: 2017 Winter Quarter.

WFC 121—Physiology of Fishes (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): Upper division courses in nutrition and physiology or consent of instructor. Comparative physiology, growth, reproduction, behavior, and energy relations of fishes. GE credit: SE, WE. Effective: 1997 Winter Quarter.

WFC 122—Population Dynamics and Estimation (4)
Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): (MAT 016A, MAT 016B); (STA 013 or STA 013Y); (BIS 002A, BIS 002B, BIS 002C); Or the equivalent of STA 013; an upper division course in ecology. Description of bird, mammal and fish population dynamics, modeling philosophy, techniques for estimation of animal abundance (e.g., mark-recapture, change-inratio, etc.), mathematical models of populations (e.g., Leslie matrix, logistic, dynamic pool, stockrecruitment); case histories. Effective: 2018 Spring Quarter.

WFC 130—Physiological Ecology of Wildlife (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): EVE 101 or ESP 100; (BIS 002A, BIS 002B, BIS 002C); Or equivalent course to ESP 100. Principles of physiological ecology, emphasizing vertebrates. Ecological, evolutionary, and behavioral perspectives on physiological mechanisms used by animals to adapt to their environment, including consideration of climate-change and other threats to biodiversity. Tropical, temperate, and polar ecosystems are highlighted. GE credit: SE. Effective: 2017 Winter Quarter.

WFC 134—Herpetology (3)
Lecture—2 hours; Term Paper. Prerequisite(s): BIS 002A; BIS 002B; BIS 002C; Upper division ecology course recommended. Evolution and ecology of the world’s diverse reptiles and amphibians. Emphasis on adaptations to environments, species interactions, management, and conservation. Effective: 2017 Winter Quarter.

WFC 134L—Herpetology Laboratory (3)
Laboratory—6 hours. Prerequisite(s): WFC 134 (can be concurrent); and Consent of Instructor. Diagnostic characteristics and functional attributes of amphibians and reptiles, emphasizing ecological, bio-geographic and phylogenetic patterns. Field experience with common species of reptiles and amphibians in the Davis area. Effective: 2017 Winter Quarter.

WFC 136—Ecology of Waterfowl and Game Birds (4)
Fieldwork—1 hour; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): WFC 111; or Consent of Instructor. WFC 111L strongly recommended. Detailed examination of distribution, behavior, population dynamics, and management of waterfowl and upland game birds. Effective: 2017 Winter Quarter.

WFC 141—Behavioral Ecology (4)
Film Viewing—1 hour; Lecture—3 hours. Prerequisite(s): EVE 101 or ESP 100 (can be concurrent); (BIS 002A, BIS 002B, BIS 002C); Or equivalent course. Basic theories underlying the functional and evolutionary significance of behavior, and the role of ecological constraints. Supporting empirical evidence taken mainly from studies of wild vertebrates. GE credit: SE. Effective: 2017 Winter Quarter.

WFC 144—Marine Conservation Science (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Course in introductory ecology. Class size limited to 30 students. Key differences between marine and terrestrial ecosystems, major stressors of marine ecosystems (e.g., fisheries, pollution, bioinvasions, climate change and habitat destruction) and their consequences. Laws and agencies responsible for addressing problems, and the policies used. Effective: 2015 Fall Quarter.

WFC 150—Urban Wildlife Ecology (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B; BIS 002C; Or the equivalent. Introduction to the behavior, ecology, and evolution of wild animals in urban environments. Effects of urbanization on disease, fitness, and dynamics of animal populations. Conservation and conflict management efforts in urban settings. Effective: 2014 Spring Quarter.

WFC 151—Wildlife Ecology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): BIS 002B; Or equivalent. Ecology of wild vertebrates, including habitat selection, spatial organization, demography, population dynamics, competition, predation, herbivory, energetics, and community dynamics, set in the context of human-caused degradation of environments in North America. Effective: 2015 Fall Quarter.

WFC 152—Ecology of Human-Wildlife Conflicts (3)
Lecture—3 hours. Prerequisite(s): BIS 002B; Or equivalent. Ecological approaches to managing wild vertebrates that come into conflict with agriculture, public health, or the conservation of biodiversity. Effective: 2017 Winter Quarter.

WFC 153—Wildlife Ecotoxicology (4)
Discussion—1 hour; Lecture—3 hours. Prerequisite(s): Introductory courses in organic chemistry, ecology, and physiology, or consent of instructor; ETX 101 recommended. Various forms of environmental pollution in relation to fish and wildlife, the effects and mechanisms of pollutants, effects on individuals and systems, laboratory and field ecotoxicology, examples/case histories, philosophical/management considerations. GE credit: SE, WE. Effective: 1997 Winter Quarter.

WFC 154—Conservation Biology (4)
Lecture—3 hours; Term Paper. Prerequisite(s): EVE 101 or ESP 100 (can be concurrent); (BIS 002A, BIS 002B, BIS 002C); Or the equivalent. Introduction to conservation biology and background to the biological issues and controversies surrounding loss of species and habitats. GE credit: SE, WE. Effective: 2017 Winter Quarter.

WFC 155—Habitat Conservation and Restoration (3)
Lecture—3 hours. Prerequisite(s): EVE 101 or ESP 100; Or the equivalent of ESP 100 or EVE 101; WFC 154 and ENH 160 recommended. Analysis of the characteristics of wildlife and fish habitats, the conservation of habitats, and restoration. GE credit: SE, VL, WE. Effective: 2009 Winter Quarter.

WFC 155L—Habitat Conservation and Restoration Laboratory (2)
Fieldwork—3 hours; Laboratory—3 hours. Prerequisite(s): (EVE 101 or ESP 100); WFC 155 (can be concurrent); Or the equivalent of ESP 100 or EVE 101. Analysis of the characteristics of wildlife and fish habitats, application of restoration methods, and evaluation of conservation and restoration projects in the field. Students will also participate during the term in a restoration project. Effective: 2009 Winter Quarter.

WFC 156—Plant Geography (4)
Laboratory—3 hours; Lecture—3 hours; Term Paper. Prerequisite(s): ESP 100 or EVE 101; PLB 102 or PLB 108 strongly recommended. Survey of the geographical distribution of vegetation types and habitats, with consideration of the environmental and historical factors that determine these patterns. Conservation and management approaches. Analytical field and lab techniques introduced. GE credit: SE, VL, WE. Effective: 1997 Fall Quarter.

WFC 157—Coastal Ecosystems (4)
Fieldwork—3 hours; Laboratory—3 hours; Lecture—3 hours. Prerequisite(s): EVE 101; And course work in organismal biology, physical geography, and geology recommended. Overview of coastal ecosystems, physical and biological elements and processes, and coastal zone dynamics, including sandy, rocky and muddy shorelines, estuaries, dunes and coastal watersheds. Discussion of the role of historical factors and conservation, restoration, and management approaches. GE credit: SE, VL. Effective: 1997 Fall Quarter.

WFC 158—Infectious disease in ecology and conservation (3)
Lecture—3 hours. Prerequisite(s): EVE 101 or ESP 100 or VET 409; Or the equivalent. Introduction to the dynamics and control of infectious disease in wildlife, including zoonotic diseases and those threatening endangered species. Basic epidemiological models and their applications. Role of scientists in developing disease control policies. Effective: 2004 Spring Quarter.

WFC 160—Animal Coloration (3)
Lecture—3 hours. Prerequisite(s): BIS 002A; BIS 002B; BIS 002C Evolutionary and ecological significance of coloration in mammals, birds, reptiles, amphibians, fish, cephalopods, crustaceans, spiders, insects, humans as well as color in fashion, plants and the military. Topics include history, protective coloration, warning coloration, mimicry, sexual dichromatism and color change. Effective: 2017 Winter Quarter.

WFC 190—Departmental Research Seminar (1)
Seminar—1 hour. Prerequisite(s): Upper division standing in the Biological Sciences. Reports and discussions of recent advances related to wildlife and fisheries biology. May be repeated up to 3 time(s). (P/NP grading only.) Effective: 2001 Fall Quarter.

WFC 191—Museum Science (2)
Laboratory—3 hours; Lecture—1 hour. Prerequisite(s): Consent of Instructor. Upper division standing. Principles and methods required to preserve and present biological specimens for research, teaching collections, and museums. (P/NP grading only.) Effective: 1997 Winter Quarter.

WFC 192—Internship (1-12)
Internship—3-36 hours. Prerequisite(s): Consent of Instructor. Completion of 84 units. Work experience off and on campus in all subject areas offered in the department. Internships supervised by a member of the faculty. (P/NP grading only.) Effective: 1997 Winter Quarter.

WFC 195—Field and Laboratory Research (3)
Discussion—1 hour; Laboratory—6 hours. Prerequisite(s): (WFC 110L or WFC 111L or WFC 120L); (WFC 121 or WFC 130); EVE 101; and Consent of Instructor. Or the equivalent of EVE 101 Critique and practice of research methods applied to field and/or laboratory environments of wild vertebrates. Students work independently or in small groups to design experimental protocol, analyze data, and report their findings. May be repeated twice for credit. May be repeated up to 2 time(s). GE credit: SE. Effective: 1997 Winter Quarter.

WFC 197T—Tutoring in Wildlife and Fisheries (1-5)
Variable. Prerequisite(s): Consent of Instructor. Major in Wildlife, Fish, and Conservation Biology. Experience in teaching under guidance of faculty member. (P/NP grading only.) Effective: 1997 Winter Quarter.

WFC 198—Directed Group Study (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

WFC 199—Special Study for Advanced Undergraduates (1-5)
Variable. (P/NP grading only.) Effective: 1997 Winter Quarter.

WFC 223—Conservation Biology and Animal Behavior (3)
Discussion—1.5 hours; Lecture—1.5 hours. Prerequisite(s): ECL 208 or ANB 221; and Consent of Instructor. Influences of concepts of animal behavior (functional, evolutionary, developmental, mechanistic, and methodological issues) on conservation biology theory and practice. Effective: 2003 Spring Quarter.

WFC 230—Advanced Physiological Ecology of Wildlife (4)
Discussion—1 hour; Lecture—3 hours. Advanced principles of physiological ecology. Ecological, evolutionary and behavioral perspectives on physiological mechanisms used by animals to adapt to their environment in the context of climate change and other threats to biodiversity. Primary literature will form the basis of discussion. Effective: 2015 Winter Quarter.

WFC 262—Advanced Population Dynamics (3)
Lecture—3 hours. Prerequisite(s): Graduate standing; advanced course in ecology (e.g., Evolution and Ecology 101), population dynamics (e.g., course 122), and one year of calculus; familiarity with matrix algebra and partial differential equations recommended. Logical basis for population models, evaluation of simple ecological models, current population models with age, size, and stage structure, theoretical basis for management and exemplary case histories. Emphasis on development and use of realistic population models in ecological research. (Ecology 262.) Effective: 2016 Spring Quarter.

WFC 290—Seminar (1-3)
Seminar—1-3 hours. Prerequisite(s): Consent of Instructor. Seminar devoted to a highly specific research topic in any area of wildlife or fisheries biology. Special topic selected for a quarter will vary depending on interests of instructor and students. (S/U grading only.) Effective: 1997 Winter Quarter.

WFC 290C—Research Group Conference (1)
Discussion—1 hour. Prerequisite(s): Consent of Instructor. Weekly conference on research problems, progress and techniques in wildlife and fishery sciences. May be repeated for credit. May be repeated for credit. (S/U grading only.) Effective: 1997 Winter Quarter.

WFC 291—Seminar in Aquatic Ecology (2)
Seminar—2 hours. Prerequisite(s): Graduate standing in Biology. Presentation and analysis of assigned topics in aquatic ecology emphasizing fish, fisheries and aquatic conservation. (S/U grading only.) Effective: 1997 Winter Quarter.

WFC 292—Physiology of Fishes Seminar (1)
Seminar—1 hour. Prerequisite(s): Consent of Instructor. Graduate standing and at least two courses in physiology. Seminar devoted to current topics concerning the physiological functioning of fishes. May be repeated twice for credit. May be repeated up to 2 time(s). (S/U grading only.) Effective: 1997 Winter Quarter.

WFC 294—Seminar in Behavioral Ecology of Predators and Prey (3)
Seminar—2 hours. Prerequisite(s): Graduate standing. Presentation and analysis of research papers on social and foraging behavior of predatory animals, antipredator strategies of prey species, co-evolution of predators and prey, and ecology of predator prey interactions. May be repeated up to 2 time(s). (Animal Behavior 294.) Effective: 2003 Winter Quarter.

WFC 295—Seminar in Wildlife Ecotoxicology (3)
Seminar—2 hours; Term Paper. Prerequisite(s): Graduate standing in Biology. Presentation and analysis of assigned and searched research papers on transport, exposure, and effects of environmental contaminants on wildlife-associated ecosystem components, especially at individual/population levels. Specific subjects vary each offering. (S/U grading only.) Effective: 1997 Winter Quarter.

WFC 297T—Supervised Teaching in Wildlife and Fisheries Biology (1-3)
Tutorial—3-9 hours. Prerequisite(s): Consent of Instructor. Meet qualifications for teaching assistant; graduate standing. Tutoring and teaching students in undergraduate courses in Wildlife, Fish, and Conservation Biology. Weekly conferences with instructor;
evaluations of teaching; preparing for and conducting demonstrations, laboratories, and discussions; preparing and grading examinations. May be repeated up to 6 unit(s) when a different course is tutored. (S/U grading only.) Effective: 1997 Winter Quarter.

WFC 298—Group Study (1-5)
Variable. Effective: 1997 Winter Quarter.

WFC 299—Research (1-12)
Variable. (S/U grading only.) Effective: 1997 Winter Quarter.

WMS Women's Studies

Courses in WMS:

WMS 020—Cultural Representations of Gender (4)
Lecture/Discussion—4 hours. Interdisciplinary investigation of how specific cultures represent gender difference. Examine a variety of cultural forms and phenomena including film, television, literature, music, popular movements, and institutions. GE credit: ACGH, AH, DD, SS, VL, WC, WE. Effective: 2016 Spring Quarter.

WMS 025—Gender and Global Cinema (4)
Film Viewing—3 hours; Lecture—3 hours. The role gender plays in film history/culture in various geographical contexts and in aspects of contemporary globalization. Films from nations such as China, Colombia, Cuba, Ethiopia, India, Iran, Korea, New Zealand, and the U.S. GE credit: AH, VL, WC, WE. Effective: 2016 Fall Quarter.

WMS 050—Introduction to Critical Gender Studies (4)
Discussion—1 hour; Lecture—3 hours. Introduction to interdisciplinary, critical gender studies. Addresses the emergence of women's, gender and feminist studies internationally, its links to women's movements, and its influence within the various arts, humanities and social science disciplines. GE credit: ACGH, AH, DD, SS, VL, WE. Effective: 2016 Fall Quarter.

WMS 060—Feminist Critiques of Western Thought (4)
Lecture/Discussion—4 hours. Critical introduction to major traditions of social thinking in the West from a feminist perspective. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Spring Quarter.

WMS 070—Theory and History of Sexualities (4)
Lecture/Discussion—4 hours. Key issues in the social construction, organization, and reproduction of sexualities such as the intersection of sexual identity with gender, race, ethnicity, and class, and the relation between movements for sexual liberation and the regulation of the body. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

WMS 080—Special Topics in Women's Studies (4) ***Review all entries***
Lecture/Discussion—4 hours. Limited enrollment. In-depth examination of a women's studies topic related to the research interest of the instructor. May be repeated for credit when topic differs. May be repeated for credit. Effective: 2016 Fall Quarter.

WMS 080—Special Topics in Critical Gender Studies (4) ***Review all entries***
Lecture/Discussion—4 hours. In-depth examination of a women and gender studies topic related to the research interest of the instructor. May be repeated up to 1 time(s) when topic differs. GE credit: SS, WE. Effective: 2018 Fall Quarter.

WMS 090X—Lower Division Seminar (2)
Seminar—2 hours. Examination of a special topic in Womens Studies through shared readings, discussions, and written assignments. Effective: 2016 Fall Quarter.

WMS 091—Research Seminar in the Transnational Production and Consumption of Fashion (1-2)
Seminar—1-2 hours. Preparation for a research conference. May be repeated for credit when topic differs. Effective: 2016 Fall Quarter.

WMS 098—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2016 Fall Quarter.

WMS 099—Special Study for Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. (P/NP grading only.) Effective: 2016 Fall Quarter.

WMS 102—Gender and Post Colonialism (4)
Lecture/Discussion—4 hours; Term Paper. Explores changing configurations of race, gender, sexuality, class and implications for governmentality in one or more colonial or postcolonial regimes in one or more societies. GE credit: AH, DD, SS, WC, WE. Effective: 2018 Winter Quarter.

WMS 103—Introduction to Feminist Theory (4)
Lecture/Discussion—4 hours. Prerequisite(s): WMS 050 recommended or consent of instructor. Introduction to the emergence of feminist theory and to key concepts in feminist theorizing. Examination of past and current debates over sexuality, race, identity politics, and the social construction of womens experience. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

WMS 104—Feminist Research (4)
Lecture/Discussion—4 hours. Prerequisite(s): Required for Women's Studies major. Introduction to feminist applications and transformations of traditional disciplinary research practices; initial training in methodologies for feminist interdisciplinary work. GE credit: AH, DD, OL, SS, WE. Effective: 2018 Winter Quarter.

WMS 130—Globalization and Politics of Family Change (4)
Lecture/Discussion—4 hours. Political/cultural changes, conflicts, and economic disparities that have led to greater mobility and dispersal of families. Transnationalism on gender relations, sexualities, and the meaning of family. GE credit: AH, OL, SS, WC, WE. Effective: 2018 Spring Quarter.

WMS 136—Critical Food Studies (4)
Lecture/Discussion—4 hours. Production and consumption of food at the intersections of gender, race, ethnicity, nation, and body. Individual and familial experiences as part of larger economic and political structures in the U.S. and globally. GE credit: ACGH, AH, DD, OL, SS, WE. Effective: 2018 Spring Quarter.

WMS 137—Contemporary Debates in Western Feminist Theory (4)
Lecture/Discussion—4 hours. Prerequisite(s): WMS 060; or Consent of Instructor. Interpretations of poststructuralist, postmodern, and postcolonial thought from a critical feminist perspective; includes methods of applying theory to concrete social/cultural problems of gender, race, sexuality, class. GE credit: ACGH, AH, DD, SS, WE. Effective: 2018 Spring Quarter.

WMS 138—Critical Fashion Studies (4)
Lecture/Discussion—4 hours. Feminist cultural studies of style-fashion-dress through transnational circuits, personal subjectivities. Fashion as means of gender oppression and liberation. Histories and discourses of masculinities and femininities. Clothing works on global assembly line. Use of dress in construction/regulation of identities. GE credit: AH, DD, SS, VL, WC, WE. Effective: 2016 Fall Quarter.

WMS 139—Feminist Cultural Studies (4)
Lecture/Discussion—4 hours. Histories, theories, and practices of feminist traditions within Cultural Studies. (American Studies 139) GE credit: ACGH, AH, DD, SS, VL, WE. Effective: 2016 Fall Quarter.

WMS 140—Gender and Law (4)
Lecture/Discussion—4 hours. Exploration of womens legal rights in historical and contemporary context, discussing a variety of legal issues and applicable feminist theories. Topics include constitutional equal protection, discrimination in employment and education, sexual orientation discrimination, and the regulation of abortion. GE credit: ACGH, DD, SS. Effective: 2016 Fall Quarter.

WMS 145—Women's Movements in Transnational Perspective (4)
Lecture/Discussion—3 hours; Term Paper. Prerequisite(s): WMS 050 recommended. Class size limited to 90 students. Transnational perspectives on twentieth and twenty-first century women's movements in Western, colonial and post-colonial contexts, examining movement's forms and political orientations and relationships between women's movements and other forces for change. GE credit: AH, OL, SS, WC, WE. Effective: 2016 Fall Quarter.

WMS 146—Gender, War and Peace (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Applies a critical gender perspective to militarism as manifest in contexts of military rule, war, conflict, peacebuilding and security post-conflict. Addresses the changing configurations of gender and sexuality in military institutions and militarized economies and cultures from an interdisciplinary perspective. GE credit: ACGH, AH, DD, SS, WC, WE. Effective: 2018 Winter Quarter.

WMS 148—Science, Gender, and Social Justice (4)
Lecture/Discussion—4 hours; Term Paper. Class size limited to 60 students. Critical reading and reflection on the history of Western science, scientific institutions and the changing role of science in relation to inequalities of class, race, gender and sexuality, and global struggles for equality and justice. GE credit: AH, DD, SS, WC, WE. Effective: 2016 Spring Quarter.

WMS 158—Masculinities (4)
Lecture/Discussion—3 hours; Term Paper. Cultural, economic, and political forces which shape historical and contemporary masculinities. Impact of race, class, ability, nation and sexuality on experiences and cultural representations of masculinity. GE credit: ACGH, AH, DD, SS, WE. Effective: 2018 Spring Quarter.

WMS 160—Women, 'Race' and Sexuality in Postcolonial Cinema (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Class size limited to 90 students. Feminist analysis of race, sexuality and class in the representation of women in commercial and/or independent films. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

WMS 162—Feminist Film Theory and Criticism (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Historical overview of and contemporary issues in feminist film theory, including representation, spectatorship, and cultural production. Film stars, women filmmakers, and the intersections of gender, race, sexuality, and class in films and their audiences. GE credit: ACGH, AH, DD, VL, WC, WE. Effective: 2016 Spring Quarter.

WMS 164—Topics in Gender and Cinematic Representation (4)
Film Viewing—3 hours; Lecture/Discussion—3 hours. Examination of a specific topic within the broad rubric of gender and cinema. Possible topics include Latinas in Hollywood; gender, nation, cinema; and gender and film genre. Topics vary. May be repeated up to 2 time(s) when topic differs. GE credit: AH, VL, WC, WE. Effective: 2016 Spring Quarter.

WMS 165—Feminist Media Production (6) ***Review all entries***
Fieldwork—6 hours; Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): CTS 020; or equivalent. One course in Women and Gender Studies or consent of instructor. Media production as a mode of cultural criticism, furthering feminist/ social justice activist goals. Fundamentals of camera, editing and distribution via a social engagement model. Study and hands-on response to key historic and contemporary feminist and social justice media discourses. (CDM 105) GE credit: ACGH, AH, DD, SS, VL. Effective: 2017 Winter Quarter.

WMS 165—Feminist Media Production (6) ***Review all entries***
Fieldwork—6 hours; Laboratory—3 hours; Lecture/Discussion—3 hours. Prerequisite(s): (CTS 020 or CDM 020); or two WMS courses Media production as a mode of cultural criticism, furthering feminist/ social justice activist goals. Fundamentals of camera, editing and distribution via a social engagement model. Study and hands-on response to key historic and contemporary feminist and social justice media discourses. (CDM 105) GE credit: ACGH, AH, DD, SS, VL. Effective: 2018 Fall Quarter.

WMS 170—Queer Studies (4)
Lecture/Discussion—4 hours. Prerequisite(s): WMS 070 recommended or consent of instructor. Study of queer sexualities, identities, theories, practices. Alternative sexualities as historical, social, and cultural constructions in intersections with race, gender, class, nationality. Interdisciplinary exploration of sexual liberation and the regulation of sexuality through history, theory and expressive cultural forms. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

WMS 174—Body Politics (4)
Lecture/Discussion—4 hours. The body as a site where status inequalities are formed and resisted. Self-making through bodywork, history of gendered and racial meanings of the body, and analysis of normalizing discourses and practices. GE credit: AH, DD, SS, WC, WE. Effective: 2018 Winter Quarter.

WMS 175—Gender and Experience of Race (4)
Lecture/Discussion—4 hours. Exploration of the co-construction of "race" and gender in comparative national historical contexts and contemporary lived experience. Study of intersections of race and gender in identities and how institutions, labor migration, social movements and consumption shape racialized gendered identities. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

WMS 176—Autobiography, Narrative, Memoir (4)
Discussion—1 hour; Lecture—2 hours; Term Paper. Prerequisite(s): Consent of Instructor. Class size limited to 30 students. Life narrative writings by women. Transgressive voices exploring issues of race, class, and sexuality, women's silence and marginalization. Theories of autobiography, autoethnography and memoir included. May be repeated for credit if subject matter differs. GE credit: AH, DD, SS, WE. Effective: 2018 Summer Session 1.

WMS 178A—Women Writers and the Transnational Imaginary; The Arab World (4)
Lecture/Discussion—4 hours. Prerequisite(s): Consent of Instructor. Writings by women from diverse regions and cultures, understood in their cultural, socio-economic, and historical contexts, with each course offering a focus on women's writing in specific geographic/national locations and their diasporas: The Arab World. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

WMS 178B—Women Writers and the Transnational Imaginary; Asia (4)
Lecture/Discussion—4 hours. Writings by women from diverse regions and cultures, understood in their cultural, socio-economic, and historical contexts, with each course offering a focus on women's writing in specific geographic/national locations and their diasporas: Asia. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

WMS 178C—Women Writers and the Transnational Imaginary; The Caribbean (4)
Lecture/Discussion—4 hours. Writings by women from diverse regions and cultures, understood in their cultural, socio-economic, and historical contexts, with each course offering a focus on women's writing in specific geographic/national locations and their diasporas: The Caribbean. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

WMS 178D—Women Writers and the Transnational Imaginary; Africa (4)
Lecture/Discussion—4 hours. Writings by women from diverse regions and cultures, understood in their cultural, socio-economic, and historical contexts, with each course offering a focus on women's writing in specific geographic/national locations and their diasporas: Africa. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

WMS 178E—Women Writers and the Transnational Imaginary; Diasporic Women Writers in Europe (4)
Lecture/Discussion—4 hours. Writings by women from diverse regions and cultures, understood in their cultural, socio-economic, and historical contexts, with each course offering a focus on women's writing in specific geographic/national locations and their diasporas: Diasporic Women Writers in Europe. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

WMS 178F—Transnationalism and Writing by Women of Color (4)
Lecture/Discussion—4 hours. Writings by women of color in a transnational framework, understood in their cultural, socio-economic, and historical contexts. The interrelation among gender, writing, nationalism, and transnationalism with focus on women's writing in specific geographic/national locations and their diasporas: Topics on Women Writers of Color. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

WMS 179—Gender and Literature (4)
Lecture/Discussion—4 hours. Prerequisite(s): One course in Women's Studies or consent of instructor. Role of literature, especially novels, in constructing, challenging, and transforming normative genders in society. Transhistorical and transnational focus on gender in its intersections with race, class, sexuality, and politics. GE credit: AH, WC, WE. Effective: 2016 Fall Quarter.

WMS 180—Women of Color Writing in the United States (4)
Lecture/Discussion—4 hours. Literature, especially novels, written by contemporary women of color in the United States, understood in their socio-economic, cultural and historical contexts. GE credit: ACGH, AH, DD, WE. Effective: 2016 Fall Quarter.

WMS 182—Globalization, Gender and Culture (4)
Lecture/Discussion—4 hours. Critical gender analysis of globalization as a process of interconnected cultural, social and economic transformations inflected by gender, nation, class and race/ethnicity. Critical self-reflection and social observation skills. GE credit: AH, OL, SS, WC, WE. Effective: 2016 Spring Quarter.

WMS 184—Gender in the Arab World (4)
Lecture/Discussion—4 hours. Examination of the history, culture, and social/political/economic dynamics of gender relations and gendering in the Arab world. GE credit: SS, WC, WE. Effective: 2016 Fall Quarter.

WMS 185—Women and Islamic Discourses (4)
Lecture/Discussion—4 hours. Prerequisite(s): WMS 050; Or comparable course. Introduction to debate/discourses about women and Islam. Transformations in debate/discourses in colonial and postcolonial periods in the Middle East & South Asia. Comparative study of debate/discourses on family, work, law, sexuality, religion, comportment, human rights, feminist and religious movements. (Middle East/South Asia Studies 150.) GE credit: AH, SS, WC. Effective: 2016 Fall Quarter.

WMS 187—Gender and Public Policy (4)
Lecture/Discussion—3 hours; Term Paper. Role of gender in the creation of social policies, especially with respect to issues brought into the policy arena by contemporary feminism. GE credit: ACGH, DD, SS, WE. Effective: 2018 Winter Quarter.

WMS 189—Special Topics in Critical Gender Studies (4)
Lecture/Discussion—4 hours. In-depth examination of a women's studies topic related to the research interests of the instructor. May be repeated up to 1 time(s) when topic differs. GE credit: AH, SS, WE. Effective: 2016 Fall Quarter.

WMS 190—Senior Seminar (4)
Seminar—4 hours. Capstone course for senior Womens Studies majors, which focuses on current issues on feminism as they impact theory, public policy, and practice. GE credit: ACGH, AH, DD, SS. Effective: 2016 Fall Quarter.

WMS 191—Capstone Seminar (4)
Seminar—4 hours. Revision, completion, and presentation of senior research or creative project. Creating a multimedia website for publishing research and creative projects. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

WMS 192—Internship in Women's Studies (1-12)
Internship—3-36 hours; Term Paper. Prerequisite(s): Completion of a minimum of 84 units and consent of instructor; enrollment dependent on availability of intern positions with priority to Women's Studies majors. Supervised internship and study in positions/institutional settings dealing with gender-related problems or issues, as for example, a women's center, affirmative action office, advertising agency, or social welfare agency. Final written report on internship experience. (P/NP grading only.) Effective: 2016 Fall Quarter.

WMS 193—Feminist Leadership Seminar (2)
Seminar—2 hours. Use feminist methods to critically reflect on the ethical, methodological and strategic aspects of an organization, project, campaign, movement or other social change initiative. May be repeated for credit. (P/NP grading only.) GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Fall Quarter.

WMS 194HA—Senior Honors Project in Women's Studies (4-6)
Independent Study—12 hours. Prerequisite(s): Senior standing, Women's Studies major, and advisor's approval. In consultation with an advisor, students complete a substantial research paper or significant creative project on a Womens Studies topic. GE credit: AH, SS, WE. Effective: 2016 Fall Quarter.

WMS 194HB—Senior Honors Project in Women's Studies (4-6)
Independent Study—12 hours. Prerequisite(s): Senior standing, Women's Studies major, and advisor's approval. In consultation with an advisor, students complete a substantial research paper or significant creative project on a Women's Studies topic. GE credit: AH, SS, WE. Effective: 2016 Fall Quarter.

WMS 195—Thematic Seminar in Critical Gender and Women's Studies (4)
Seminar—4 hours. Group study of a topic, issue or area in feminist theory and research involving intensive reading and writing. May be repeated for credit. GE credit: ACGH, AH, DD, SS, WE. Effective: 2016 Spring Quarter.

WMS 197T—Tutoring in Women's Studies (1-4)
Tutorial—3-12 hours. Prerequisite(s): Upper division standing and consent of director. Leading small, voluntary discussion groups affiliated with a Womens
Studies course. May be repeated for credit for a total of 8 units. May be repeated up to 8 unit(s). (P/NP grading only.) Effective: 2016 Fall Quarter.

WMS 198—Directed Group Study (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 2016 Fall Quarter.

WMS 199—Special Study for Advanced Undergraduates (1-5)
Variable. Prerequisite(s): Consent of Instructor. Upper division standing. (P/NP grading only.) Effective: 2016 Fall Quarter.

WMS 200A—Current Issues in Feminist Theory (4)
Seminar—4 hours. Current issues in feminist theory; techniques employed to build feminist theory in various fields. Effective: 2016 Fall Quarter.

WMS 200B—Problems in Feminist Research (4)
Seminar—4 hours. Prerequisite(s): WMS 200A B+ or better Application of feminist theoretical perspectives to the interdisciplinary investigation of a problem or question chosen by the instructor(s). May be repeated for credit when subject area differs. May be repeated for credit. Effective: 2016 Fall Quarter.

WMS 201—Special Topics in Feminist Theory and Research (4)
Lecture/Discussion—4 hours. Limited enrollment. Explores in depth a topic in feminist theory and research related to the research interests of the instructor. May be repeated for credit when topic differs. Limited enrollment. May be repeated for credit. Effective: 2016 Fall Quarter.

WMS 250—Cultural Study of Masculinities (4)
Seminar—3 hours; Term Paper. Prerequisite(s): Graduate standing or consent of instructor. Interdisciplinary approaches to understanding the social and cultural construction of masculinities; attention to the effects of biology, gender, race, class, sexual and national identities; criticism of oral, printed, visual, and mass mediated texts, and of social relations and structures. (American Studies 250) Effective: 2016 Fall Quarter.

WMS 299—Special Study for Graduate Students (1-12)
Variable. (P/NP grading only.) Effective: 2016 Fall Quarter.

WMS 299D—Dissertation Research and Writing (4)
Extensive Writing/Discussion—3 hours. Prerequisite(s): WMS 200A; WMS 200B; Fulfillment of course requirements for the DE in Feminist Theory and Research, advancement to candidacy. (S/U grading only.) Effective: 2016 Fall Quarter.

WMS 396—Teaching Assistant Training Practicum (1-4)
Variable. Prerequisite(s): Graduate standing. May be repeated for credit. (P/NP grading only.) Effective: 2016 Fall Quarter.

About Courses

Use this guide to understand course descriptions and requirements. **Courses listed in this catalog are subject to change without notice.**

Course Descriptions

Course changes during the catalog year appear with a warning reading *Review all entries* and/or *Discontinued* after the units. The change may be anything from a unit change to being discontinued; pay attention to the effective term; this is the *first* term the change is effective or the term the course is discontinued.

Below is a sample of how a course is listed in this catalog:

PRB 190—Proseminar in Problems (1) *Review all entries*

Seminar—1 hour. Prerequisite(s): PRB 111; senior standing. Pass One restricted to seniors. Discussion of serious problems, their issues, and resolutions. Involves a different emphasis each quarter. May be repeated 2 times(s) for credit with consent of instructor. GE credit: AH, DD, WC. Effective: 2001 Winter Quarter.

- **Top line** is course subject code; course number—title; units; *warning*, if applicable.
- **Paragraph following** is course instructional format (learning activity); prerequisite(s) for the courses; enrollment restrictions; course description; grading, if other than letter grading; repeat rules, if any; GE attributes, if any. Term the course is effective

General Education (GE Credit)

- **Topical Breadth.** AH=Arts and Humanities | SE=Science and Engineering | SS=Social Sciences
- **Literacies.** ACGH=American Cultures | DD=Domestic Diversity | OL=Oral Skills | QL=Quantitative | SL=Scientific | VL=Visual | WC=World Cultures | WE=Writing Experience

Prerequisites

Prerequisites for undergraduate courses are checked by Schedule Builder. It is the student's responsibility to meet these requirements and the instructor's responsibility to enforce them. Students who have completed equivalent work may be admitted to the course at the instructor's discretion. For complete information, see Student Information on Prerequisites.

Undergraduate Courses

001-099, Lower Division Courses. Courses open to all students for lower division credit who have met the necessary prerequisites as indicated in the General Catalog course description; designed primarily for freshmen and sophomores.

100-199, Upper Division Courses. Courses open to all students who have met the necessary prerequisites as indicated in the General Catalog course description. Preparation generally includes completion of one lower division course in the given subject or completion of two years of college work.

090X/190X. Seminar courses for in-depth examination of a special topic within the subject area.

092/192. Internship courses enable individual students to obtain practical experience to complement their educational goals or to explore potential career interests and opportunities. Students must have completed 84 units before enrolling in course 192.

097T&C /197T&C. Tutoring and Tutoring in the Community courses for students who want to tutor in a subject in which they are proficient—generally in their major field—while enrolled as an undergraduate.

098/198. Directed Group Study courses are set up on a one-time basis for a group of students in a subject for which no regular courses have been established.

099. Special Study for Undergraduates courses arranged for an individual student who shares, with an instructor, an academic interest that cannot be accommodated within the formal course structure; credit is limited to a total of 5 units per term.

194H. Special Study for Honors Students courses are for individual students with honor status, as determined by the department offering the course and who have completed 84 units; credit is limited to a total of 5 units per term.

199. Special Study for Advanced Undergraduates courses are the upper division counterparts of course 99 and involve supervised independent study and research requiring adequate background in the subject proposed for study as well as prior completion of 84 units; credit is limited to a total of 5 units per term.

Variable-Unit. Subject to approval by the department chair, an instructor may arrange to give a special study course to interested students; numbers 090X, 092, 097T, 097TC, 098, 099, 190X, 192, 194H, 197T, 197TC, 198, 199.

Autotutorial. Courses where students instruct themselves at their own pace. Courses can be identified by the letters AT at the end of their course numbers; e.g., 013AT, 141AT.

Online & Hybrid. Courses where instruction is delivered on the Internet. Courses that are delivered completely online can be identified by the letter V at the end of their course numbers, e.g., 010V, 162V. As a combination on online and classroom can be identified by the letter Y at the end of their course numbers, e.g., 010Y, 162Y.

Research Conference. Courses where advanced undergraduate students may participate in critical discussions of staff research activities. These one-unit courses are numbered 190C and are graded on a Passed/Not Passed basis.

Graduate Courses

200-299. Courses open to graduate students and to undergraduates who have completed 18 units of upper division work basic to the subject matter of the course. However, admission is subject to the approval of the instructor in charge of the course. Grading in 290C courses and most variable-unit 299 or 299D courses is Satisfactory/Unsatisfactory (S/U). Check the course description for grading information.

300-399, Professional Courses for Teachers & Nurse Practitioners. Professional courses for teachers and nurse practitioners are teacher-training courses in the School of Education and in other departments and are especially intended for teachers or prospective teachers. Courses designed to provide instruction to teaching assistants are included. Courses for certification of family nurse practitioners and physician assistants are also included. Courses are open only to students enrolled in those programs.

400-499, Other Professional Courses. Professional training courses. Graduate students should consult their faculty advisor or contact Graduate Studies before registering in 400 series courses to determine if graduate credit may be awarded for the course in question.

Multi-Quarter Courses

A series of course numbers followed by two or three letters (for example, Physics 110A-110B-110C) is continued through three successive quarters; e.g., fall through spring. The first quarter course listed this way is a prerequisite to the second and the second is prerequisite to the third. On the other hand, where A and B portions of a course are listed separately (for example, Economics 160A and 160B), the A course is not a prerequisite to B, unless it is specifically mentioned in the list of prerequisites.

Expanded Course Descriptions

Because of space limitations, you may find that the descriptions in the General Catalog do not include all the information you would like about a course. The faculty has responded to this need by writing the "Expanded Course Descriptions," giving more detailed explanations about each course offering. These descriptions are available each quarter to assist students in selecting their courses. They contain such information as texts used, preparation required of students, basis for grading, course format, special assignments (papers, field trips, etc.) and a topical outline of the material to be covered. Copies of the "Expanded Course Descriptions" are available for on-campus use at the College dean's offices or the Biology Academic Success Center, advisors' offices, advising centers, and departmental offices.

General Catalog Downloads

Download the entire 2018-2019 General Catalog PDF*; this may take several minutes.

* This download is a snapshot of the catalog as it is today; with any updates to courses. For the Apr 30, 2018 version, see the Archive below.

Archived General Catalog

Archived general catalogs in **Adobe Acrobat PDF**.

2018-2019; as published Apr 30, 2018.

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2006-2008 | 2006-2008 Supplement

2004-2006 | 2004 Addendum | 2005-2006 Supplement

2002-2004 | 2002 Addendum | 2003 Addendum

2000-2002 | 2001 Addendum

1999-2000 | 1998-1999 | 1997-1998

1996-1997 | 1995-1996 | 1994-1995

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